

# LifeLocator<sup>®</sup> III+ System

## User Guide

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Before returning any equipment to GSSI, a Return Material Authorization (RMA) number must be obtained. Please call the GSSI Customer Service Manager who will assign an RMA number. Be sure to have the serial number of the unit available

## Regulatory Information

The use of GSSI antennas is governed by different regulatory agencies around the world. Specific antenna models must be certified for legal operation in your country. Please read and understand the following regulatory passages that pertain to your antenna. A listing of certified antennas by region can be found [www.geophysical.com/regulatoryinformation.htm](http://www.geophysical.com/regulatoryinformation.htm).

## Notice

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

## Survey Wheels

All of GSSI's antennas are designed to operate with survey wheels. Some antennas have built-in survey wheels, including the 62000 Palm Antenna and the Mini-SIR. The series of concrete antennas, including the 5100, 5101 and 52600, have survey wheels built in to their special carts, the 614 and 615. The larger antennas, including the 3101D, 5103, 50400 and 5104 are used in the larger carts, the 623 and 643, which have survey wheels built in to them. Various sizes of survey wheels can also be attached directly to these antennas. This includes the 611, 620 and 622. For highway surveys we use the 630 Distance measuring Instrument (DMI).

## FCC Notice (for U.S. Customers):

This device complies with part 15, class F of the FCC Rules:

Operation is subject to the following 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

**Warning:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Operation of this device is restricted to law enforcement, fire and rescue officials, scientific research institutes, commercial mining companies, construction companies and private parties operating on behalf of these groups. Operation by any other party is a violation of 47 U.S.C. § 301 and could subject the operator to serious legal penalties.

### Coordination Requirements

(a) UWB imaging systems require coordination through the FCC before the equipment may be used. The operator shall comply with any constraints on equipment usage resulting from this coordination.

(b) The users of UWB imaging devices shall supply detailed operational areas to the FCC Office of Engineering and Technology who shall coordinate this information with the Federal Government through the National Telecommunications and Information Administration. The information provided by the UWB operator shall include the name, address and other pertinent contact information of the user, the desired geographical area of operation, and the FCC ID number and other nomenclature of the UWB device. This material shall be submitted to the following address:

Frequency Coordination Branch, OET  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, D.C. 20554  
ATTN: UWB Coordination

(d) Users of authorized, coordinated UWB systems may transfer them to other qualified users and to different locations upon coordination of change of ownership or location to the FCC and coordination with existing authorized operations.

(e) The NTIA/FCC coordination report shall include any needed constraints that apply to day-to-day operations. Such constraints could specify prohibited areas of operations or areas located near authorized radio stations for which additional coordination is required before operation of the UWB equipment. If additional local coordination is required, a local coordination contact will be provided.

**Notice:** Use of this device as a wall imaging system is prohibited by FCC regulations.

**For U.S. Customers**

**Ground Penetrating Radar Coordination Notice And Equipment Registration**

**Note:** This form is only for Domestic United States users. The Federal Communications Commission (FCC) requires that all users of GPR who purchased antennas after July 15<sup>th</sup>, 2002 register their equipment and areas of operation. It is required that you fill out this form and fax or mail to the FCC. Failure to do this is a violation of Federal law.

1.     **Date:**
  
2.     **Company name:**
  
3.     **Address:**
  
4.     **Contact Information [contact name and phone number]:**
  
5.     **Area Of Operation [state(s)]:**

---Continued on next page.

**6. Equipment Identification:**

**Brand Name:** Geophysical Survey Systems, Inc.

**Antenna Model No. (center frequency):** *List all antennas being registered.*

| Model | Frequency | FCC ID (QF7 followed by Model #) |
|-------|-----------|----------------------------------|
|       |           |                                  |
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|       |           |                                  |

**7. Receipt Date Of Equipment:**

**Fax this form to the FCC at:** 202-418-1944

**Or**

**Mail to:**

Frequency Coordination Branch, OET  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, D.C. 20554

ATTN: UWB Coordination

**Do not send this information to GSSI.**

# Canadian Requirements for RSS-220

## Canadian Requirements of RSS-220 for Ground Antennas

This Ground Penetrating Radar Device shall be operated only when in contact with or within 1 m of the ground.

This Ground Penetrating Radar Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

Cet appareil de radar de sol (ou géoradar) ne doit être utilisé qu'en contact avec le sol ou à 1 m maximum au dessus du sol.

Cet appareil de radar de sol ne doit être utilisé que par les forces de l'ordre, les instituts de recherche scientifiques, les sociétés minières, les sociétés de construction, et les organisations de secours d'urgence ou de combat du feu.

## Canadian Requirements of RSS-220 for Hand-held Antennas

This In-wall Radar Imaging Device shall be operated where the device is directed at the wall and in contact with or within 20 cm of the wall surface.

This In-wall Radar Imaging Device shall be operated only by law enforcement agencies, scientific research institutes, commercial mining companies, construction companies, and emergency rescue or firefighting organizations.

Cet appareil de radar de structure (murs, poutres, dalles...) ne doit être utilisé qu'en contact avec la structure ou à 20 cm maximum décollé de cette structure.

Cet appareil de radar de sol ne doit être utilisé que par les forces de l'ordre, les instituts de recherche scientifiques, les sociétés minières, les sociétés de construction, et les organisations de secours d'urgence ou de combat du feu.

## Canadian Requirements of RSS-220 for Search and Rescue Antennas

This Through-wall Radar Imaging Device shall be operated only by law enforcement agencies or emergency rescue or firefighting organizations that are under a local, provincial or federal authority. The equipment is to be operated only in providing services and for necessary training operations.

Cet appareil de radar au travers des murs ne doit être utilisé que par les forces de l'ordre ou les organisations de secours d'urgence ou de combat du feu qui sont sous une autorité locale, provinciale ou fédérale. Cet équipement ne doit être utilisé que dans le cadre de services et pour les opérations d'entraînement nécessaires.



## Declaration of CE Conformance

Geophysical Survey Systems, Inc. hereby confirms that the following named products have been tested and meet the requirements of the European standards as indicated:

**Models:** 3101A, 4105, 4108, 5103, 5103A, 5104, 5104A, 5106, 5106A, 5100B, 5101, 50400, 52600, 62000

**Description:** Ground Penetrating Radar Antennas

**European Standards:** ETSI EN 301 489-32 V1.1.1 (2005-09), ETSI EN 301 489-V1.6.1 (2005-09), ETSI EN 302 066-1 V1.1.1(2005-09), ETSI EN302 066-2 V1.1.1 (2005-09), ECC/DEC/(06)08

**Place and Date of Issue:** Intertek – ETL SEMCO 07.02.07, 03.11.09

**Model:** EMP-400 Profiler

**Description:** Electromagnetic Induction System

**European Standards:** EN61326:1997 + A1:1998 + A2:2001

**Place and Date of Issue:** Intertek – ETL SEMCO 08.29.06

**Models:** FGDC3000/1100, FGMOD5103

**Description:** Ground Penetrating Radar Data Acquisition System

**European Standards:** EN61000-6-2: 2001

**Place and Date of Issue:** Intertek – ETL SEMCO 03.16.04

**Model:** FGMF20/3000

**Description:** Two channel Ground Penetrating Radar data acquisition system

**European Standards:** EN61000-6-2: 2005, EN61000-6-4:2007

**Place and Date of Issue:** Intertek – ETL SEMCO 09.17.08

George Tetreault  
*Name of authorized person*



## System Purpose

The LifeLocator®III+ system has the potential to detect a living human at a range up to 15 feet (5m) (breathing) and up to 30 feet (10 m) (motion) through common structural wall materials and building rubble.

The system is able to search up to a 2100 cubic foot volume in 1 minute and provide locating information on victims for more detailed assessments.

The system can provide an 80% confidence level when determining that the search volume does not include any living human victims.

The large variation in people, their possible medical state and in the materials comprising the debris pile makes testing under all circumstances very difficult, if not impossible.

## Introduction

This manual will help you with the field operation of the LifeLocator III+ System. It is designed to find victims trapped beneath debris by detecting their motion or breathing patterns.

The LifeLocator III+ System consists of a wireless Sensor and PDA-based Control Unit. The Sensor emits 1/100th the power of an ordinary cell phone and is powered by a Li-ion rechargeable battery. While using the System, make sure that the Operator using the Control Unit is greater than 45 feet (15 meters), but less than 100 feet (30 meters) away from the Sensor. Also, make sure that there is no other motion within 45 feet (15 meters) of the Sensor. Keep in mind that this may include other rescue workers, wind blown vegetation and debris.



Sensor: Antenna



Control Unit: PDA



## Specifications

### Sensor:

Size: 18" x 18" x 9" (45 x 45 x 23 cm)

Weight: 24 lbs. (11 kg.)

Battery Life: up to 5 hours

Battery Type: 10.8v, 8800 mAh Li ion

Water resistant

### Control Unit (PDA):

Plots distance to victim when motion or breathing is detected

Water Resistant with Ruggedized Housing

Screen resolution: 480 x 640 pixel (VGA) with LED backlight

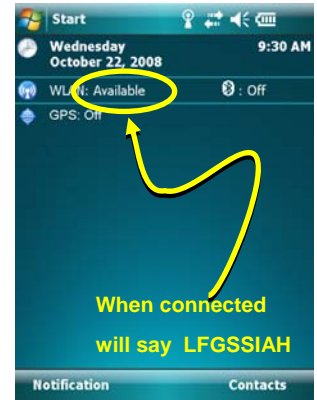
Operating System: Windows Mobile 6.0

Battery Life: up to 8 hours for Li-ion (up to 90 minutes if using AA Alkaline)

Battery Type: 5200 mAh Li-ion (or AA Alkaline can be used in emergencies)

## Section 1: Getting Started

1. Insert a fully charged battery into the battery slot in the back of the Sensor and close the cover.
  - Make sure the Control Unit (PDA) is fully charged.
  - If not already properly set, go to **Start > Settings > System > Clock & Alarms** to set the correct time and date on the Control Unit.
2. Switch the Sensor power button to the ON position and push the Control Unit green power button. On the Sensor, the **blue** power light appears followed, about 45 seconds later, by a flashing **red** light when wireless is ready.
3. On the control Unit (Windows Mobile screen), make sure that LFGSSIAH appears next to WLAN below the date and time.
  - If it says **Off**, tap **WLAN**, then **Wireless LAN** on the next screen. Make sure that Bluetooth is **Off**. When LFGSSIAH appears, press **ok** on the keypad to return to the Windows Mobile screen .

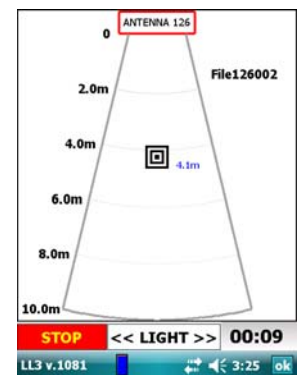


4. To run the LL3 software press the Windows flag logo button on the Control Unit or go to **Start > LL3**. The MAIN menu appears. At the bottom of the screen, notice a small square moving back and forth. Wait for a few seconds for it to turn from red to green, indicating that the Control Unit is ready to communicate with the Sensor.

5. If the ID number (ex., 001) that appears in the CONNECT TO box matches the ID number of the Sensor being used, press the **Enter** button on the Control Unit or tap **RUN**. The target screen appears and the run clock at the bottom right starts incrementing. The filename is indicated in the upper right portion of the Control Unit screen. **Red** circles (breathing) and **black** squares (motion) may be seen and grow larger as detection confidence improves. The approximate distance of the detected motion is indicated on the left margin of the screen.
  - The appearance of both battery status indicators at the bottom of the screen (thin indicator for PDA, wide indicator for Sensor) indicates successful communication between the Control Unit and Sensor.



- Keypad buttons can control nearly all functions.
- Pressing **ok** on the Control Unit quits to a previous screen. From the MAIN menu, it quits to the Windows Mobile screen. Pressing the green power button on the Control Unit turns the PDA off. **Do this only from Windows Mobile, not while in the LifeLocator software.**
- Control Unit backlight may be increased/decreased by use of the PDA's Left and Right arrow buttons.
- To conclude a search press **STOP** on the Control Unit screen or the **ok** button.



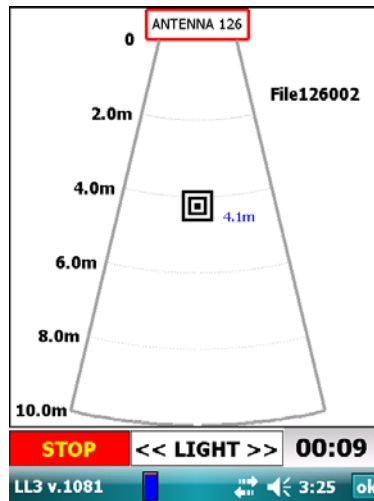
## Additional Details

- If it is necessary to set the Sensor number for the Control Unit to connect to, access the Maintenance screen by tapping **MAINTENANCE** on the Control Unit screen three times (hear three beeps) or use the Up/Down arrows to highlight Maintenance then press **Enter** three times. Tap **Yes** on the screen when the dialog box appears confirming Maintenance Operation. The Sensor ID number can be found on the white label affixed to the Sensor.

  - Use either the Control Unit Up/Down arrows to highlight it or tap **ANTENNA** on the screen. Using the Left/Right arrows, highlight the first digit. Then using the Up/Down arrows, increment (down) or decrement (up) as needed.
  - Using the Left/Right arrows repeat the above procedure for the second and third Sensor ID digit. When finished, press **ok** on the Control Unit or tap **ok** on the PDA screen to return to the MAIN menu.
  - If the CONNECT TO box is not checked on the MAIN menu and RUN is selected, a Select Antenna screen will appear showing all WiFi antennas in the area. Check the appropriate box next to the chosen Sensor, and then press **Select** on the Control Unit screen. A search cycle will begin immediately. Pressing **ok** on the Control Unit will send you back to the MAIN menu.
- The **red**, **green** and **blue** LEDs on the sensor illuminate when communication is established. You will see a screen like the one on the following page. The two power indicators and the incrementing timer/clock also indicates that the system is working and that communication is established.

**Note:** If a dialog box saying Radar Time Out appears, (1) exit out of the LifeLocator program, (2) turn the sensor OFF then ON and (3) rerun LifeLocator.

- The program will look for both breathing and motion. Motion above the alarm threshold produces a **black** square. Breathing above threshold produces **red** concentric circles. Sustained motion or breathing will result in larger squares or circles.
- A flashing ANTENNA box means that you have lost WiFi communication. Try to move closer within 10 seconds to recover.



**Stop:** Tap **STOP** only once. Tapping twice resumes the search. Tap **ok** to MAIN LifeLocator menu or press the **Enter** button.

## Section 2: Target Playback

1. To playback a file (an individual search cycle), select **TARGET PLAYBACK** from the MAIN menu. Select the file you want to play by using the Up/Down arrows on the Control Unit or tapping the chosen file on the Control Unit screen. The most recent searches appear on top. The file will play back to its conclusion in 2X real-time speed.
2. When the chosen search cycle file is finished, press the **ok** button on the Control Unit to return to the SELECT FILE screen. Chose another file to play back or press **ok** once again to return to the MAIN menu.
3. While on the SELECT FILE screen, you may sort by File Number, Sensor (Antenna) Number or Date/Time by tapping any of those column headers.



| FILE    | Ant | Date/Time      | * |
|---------|-----|----------------|---|
| File012 | 004 | 10/21/08 10:32 | P |
| File011 | 004 | 10/21/08 10:28 | P |
| File078 | 008 | 10/20/08 14:46 | P |
| File077 | 008 | 10/20/08 14:46 | P |
| File047 | 070 | 10/20/08 12:00 | P |
| File046 | 070 | 10/20/08 11:59 | P |
| File045 | 070 | 10/20/08 11:46 | P |
| File043 | 070 | 10/17/08 13:17 | P |
| File042 | 070 | 10/17/08 13:15 | P |
| File021 | 001 | 10/17/08 12:48 | P |
| File020 | 001 | 10/17/08 12:34 | P |
| File019 | 001 | 10/17/08 12:27 | P |
| File018 | 001 | 10/17/08 12:10 | P |
| File017 | 001 | 10/17/08 12:09 | P |

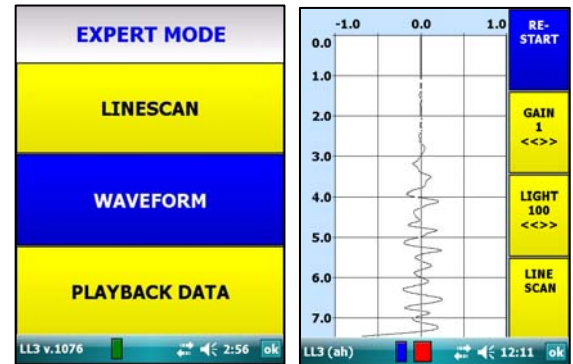
### Section 3: Expert Mode

Access the Expert Mode from the Main menu by using the Up/Down arrows to highlight EXPERT MODE then press the **Enter** button or simply tap **EXPERT MODE** on the Control Unit screen.

**WAVEFORM** is a diagnostic screen. A properly functioning Sensor should show a waveform pattern (see below).

**LINESCAN** enables viewing radar data results in real time that may indicate breathing or motion as an alternative to the basic Run screen (squares and circles). The screen is rotated 90 degrees in order to display data more effectively. The margin on the right displays the approximate distance of any motion signals. The margin on the left permits several user selected options:

- **RESTART:** terminates current search cycle and starts another.
- **COLOR:** a display palette of five colors patterns are available. Typically number 3 and 4 give best results.
- **GAIN:** may be adjusted from 1 to 256 depending on the make up of the material being searched. Best results are normally obtained at settings no higher than 32.
- **LIGHT:** the intensity of the backlight can be increased/decreased.

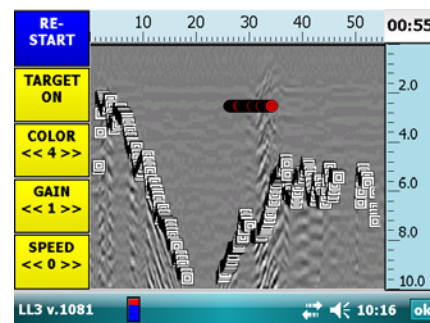
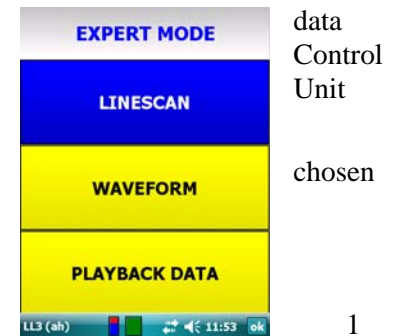


### Expert Mode – Target Playback

While in the Expert Mode, previous search cycles may be played back showing radar data collected at the time. From the Expert Mode screen, use the Up/Down arrows on the Unit to highlight Playback Data or simply tap **PLAYBACK DATA** on the Control screen.

As in normal Playback Mode, the SELECT FILE screen appears. Highlight or tap the search file.

- Similar to the normal Playback Mode, RESTART, COLOR, and GAIN are user selectable choices. An additional choice allows the user to control the speed of playback from (slowest) to 5 (fastest).
- Search files performed in normal mode (circles and squares) but later played back in Expert Mode have the ability to display the circle or square icons overlaid on the radar data if Target Playback (a choice on the left margin) is turned on. Search files performed under Expert Mode cannot show the icons and the Target On button will be grayed out.
- To return to the Expert Mode menu press OK. To return to the MAIN menu, press **ok** once again.



## Appendix A: Battery Use



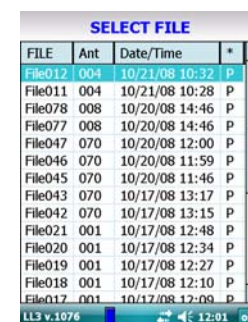
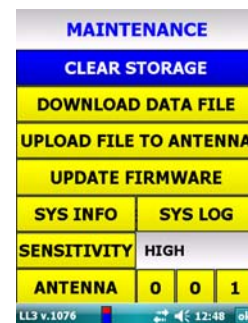
Viewing window

- 1. Checking Sensor Battery Life:** There is a viewing window on the end of the battery near the pull tab. Columns indicate the status of the battery: 5 columns – 100%, 4 columns 80%, 3 columns 60%, 2 columns 40%, 1 column 20% or less. Batteries showing 1 or 2 columns should be fully charged prior to use. Recharge time takes about 2 hours.
- 2. Recharging Sensor Battery:** To recharge a battery, insert it into the charger. Make sure that the ends align correctly into the slot.
- 3. Recharging Control Unit: Recharging the Control Unit Battery:** To recharge the Control Unit (PDA), insert the charging cord into the bottom of the Control Unit. Then plug the charger in. The wall charger is supplied with plug ends for all international sources of power. (Use only the manufacturers supplied charger.) A vehicle charger cord for the Control Unit is also supplied. When using the AA battery unit, be sure to use high quality, high mAh capacity alkaline batteries. To remove the stock Li-ion battery and replace it with the AA battery unit, remove the four screws holding the battery pack with one end of the supplied PDA stylus.

## Appendix B: File Maintenance

- 1. Downloading Files:** Initially all search data files are stored on the Sensor. To transfer them to the Control Unit, you must first download them from the Sensor. To download a file:
  1. Select **MAINTENANCE** from the Main menu by tapping it three times and answering **Yes** to the pop up dialog box.
  2. Select **DOWNLOAD DATA FILE**.
  3. Check the desired files or select **SELECT ALL** then **DOWNLOAD**. This may take a few moments depending on the size and number of files selected.
- 2. Transfer/Export Files to Laptop/Desktop:** To see files on the Control Unit (PDA), exit the LifeLocator program.
  1. Tap **Start > File Explorer**.
  2. Go to the file path **My Device > LL3 > Download**.
  3. You will then need to transfer chosen files via ActiveSync through a USB cable to your computer.

**Note:** This procedure is required for manufacturer analysis of search data.
- 3. Clear Storage:** To delete files from Sensor storage after an exercise or many months of use in training, make sure the Control Unit and Sensor are communicating.
  1. Select **Clear Storage** from within the MAINTENANCE menu.
  2. Select the file(s) you wish to delete or **Select All**.
  3. Select **Delete**. When done the Control Unit will return to the MAINTENANCE menu.



## Appendix C: Troubleshooting

- Check battery status on both units when there is a problem. Low battery power may cause data errors.

**Error:** Radar Time Out or Connection Abandoned error box appears.

**Solution:** Exit out of LifeLocator, reenter and try again. If same error appears, repeat the Startup Procedure including turning the sensor Off then On again.

**Error:** Erratic detection of motion or breathing.

**Solution:** Check around the sensor. Make sure there is no other motion in the vicinity of the sensor. Check sensor and control unit battery power. If problems persist, the environmental noise due to other communications equipment may be overwhelming the sensor. These can be visualized in EXPERT mode.

**Note:** The internal 1GB card can store more than 50 hours of data on the sensor. Since the file system was never intended to go beyond File 99, it will keep overwriting File 99 once it is reached. It is hard to imagine that one would collect all 99 files ½ hour long, but if the 1GB card is full, the system may hang. You would need to Clear Storage and delete all files to recover. Periodically clear storage to avoid memory issues.

**Error:** High radio frequency noise/WiFi environment or nearby waving vegetation causes false positive indicators.

**Solution:** Enter Maintenance Mode (from Main menu press Maintenance three times then press **Yes**). On the Maintenance screen press **Sensitivity** which will change the System setting to Low. Penetration range will not be affected. System setting can be changed back to High by pressing **Sensitivity** again.

## Appendix D: System Use

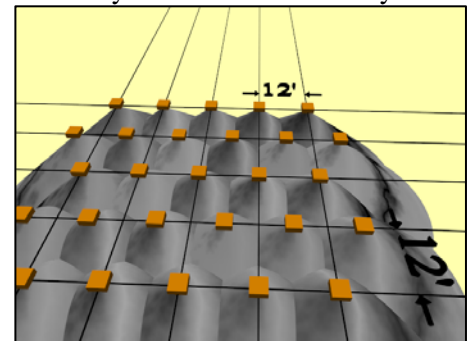
1. The user should place the sensor face down on the rubble and back away about 30 feet or more (up to 50 feet max). The wireless control unit collects data for about three minutes and indicates the presence and distance to the victim. Motion and breathing may be detected as early as twenty seconds. A longer period of time improves the confidence level of detection. After three minutes, the sensor should be moved to the next point in the search grid.
2. A single sensor returns only the approximate *distance to* but not the exact *position of* the victim, since there is a “solid viewing angle” that widens and narrows depending on the medium being penetrated.

For example, the victim might be six feet away from the sensor but not directly beneath it

In moist sand, the victim could be about 50 degrees away from perpendicular, whereas in dry sand or concrete rubble, this angle might be wider.

3. Since it is impossible to know when disasters will strike, it is important that LifeLocator training be conducted routinely so that users are skilled at System operation. It is equally important that the System batteries are fully charged at all times and UVSS recommends a minimum of a monthly inspection of all System batteries to maintain optimum performance.

Although a user might get the victim’s *position* by moving a single sensor around and triangulating the distances, it is likely to be more important to simply to make the positive ID and start digging. A proposed search pattern is shown in the diagram. It uses 12-foot (4m) spacing between search points with staggered lines to minimize the area not searched close to the surface. Once areas are identified (clear, suspect, etc), mark the area with paint, flags, etc.





## Appendix E: Scale, Language and Sensor Options

LifeLocator III+ can be operated in either US-based foot (English) or international metric scale. The Control Unit user interface can display in English, French, Japanese, Hebrew or Chinese. Default is US-based feet (English) and English language.

To change either or both options:

1. From the Windows Desk Top on the Control Unit go to **Start > File Explorer > LL3 > Settings**.
2. Use the Units drop down box to select **ENGLISH** or **METRIC**.
3. Use the Language drop down box to select the appropriate language
4. Tap **Set** to save the configuration, then **ok** to return to the Windows Mobile screen.





UltraVision Security Systems, Inc.  
12 Industrial Way  
Salem, NH 03079-4843  
(603) 893 1109  
[www.geophysical.com](http://www.geophysical.com)