



Peak Null Antenna™ Receiver Rev A

SALES AND TECHNICAL SUPPORT INFORMATION

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VIVAX
METROTECH

1 INTRODUCTION

The Metrotech Model *i5000* is a series of state-of-the-art utility line locators precisely designed with many powerful features to provide you with optimum information about your locate situation.

Included are a system overview, product specifications, quick start procedure for experienced users, and maintenance instructions.

2 GENERAL INFORMATION AND SAFETY

Symbols used in this manual

Important instructions concerning the protection of staff and equipment as well as technical safety within this document are labelled with one of the following symbols:

Symbol	Description
 WARNING	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury or material damage.
	Notes have important information and useful tips on the operation of your equipment. Non-observance may result in incorrect measurement results.

Operating personnel

Metrotech utility line locators are intended for use by utility and contractor professionals. Safety hazards for underground utility access areas include electrical shock, explosive gases, and toxic fumes as well as potential influence on communications and control systems such as traffic control and railroad crossings.

Repair and maintenance

Repairs and service must only be done by Metrotech Corporation or authorised service departments of Metrotech Corporation.

3 SAFETY PRECAUTIONS

This manual contains basic advice for the installation and operation of Metrotech Utility Line Locators and accessories. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advice provided in this manual. Therefore, this manual should be provided and reviewed by all personnel associated with the line locating equipment.

Observed Safety Practices

Familiarize yourself with all required safety practices of the local utility company, or other owner of the plant before entering an access area, or connecting a Metrotech transmitter.

Ensure that the line is de-energized and out of service, before connecting the transmitter directly to any conductor. NEVER make a direct connection to a live power cable.

Follow the appropriate safety procedures to avoid the risk of injury if using a clamp on energized electrical or control lines.

Pay special attention when using a locator in high traffic areas.

Intended application

Safe operation is only realized when using the equipment for its intended purpose. Using the equipment for other purposes may lead to human danger and equipment damage.

The limits described under the technical data section may not be exceeded.

Malfunctioning Behavior

The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. Metrotech Corporation must be contacted for technical support and/or service. The instrument may only be operated when the malfunction is resolved.

Five safety rules

The five safety rules must always be followed when working with High Voltage (HV):

De-energize

Protect against re-energizing

Confirm absence of voltage

Ground and short-circuit

Cover up or bar-off neighboring energized parts



Fire fighting in electrical installations:

Recommended extinguishing agent: carbon dioxide (CO₂)

Carbon dioxide is electrically non conductive and does not leave residue. It is safe to use in energized facilities as long as the minimum distances are observed.

It is essential to observe the safety instruction on the extinguishing agent.



Dangers when operating with HV:

Special safety attention is needed when operating HV facilities, especially non-stationary equipment. The regulations VDE 0104 about setting up and operation of electric test equipment, i.e. the corresponding EN 50191 as well as country-specific regulations and standards must be observed.

Safety installations may not be by-passed nor deactivated.

Operation requires a minimum two people whereas the second person must be able to activate the emergency switch in case of danger.

To avoid hazardous electric charges of metallic parts in the vicinity, all metallic parts must be grounded.

To avoid drawing dangerous arcs, switching should only be done in a de-energized condition.

The equipment and all accessories must be connected according to applicable standards VDE, EN or DIN as well as country-specific regulations.

1 Quick Start Guide for the Experience User

1) Turn the Receiver ON

Push the Power ON button to switch on the *i5000* receiver. The Metrotech welcome screen is displayed for a few seconds. This screen also displays the model number and the software revision number.

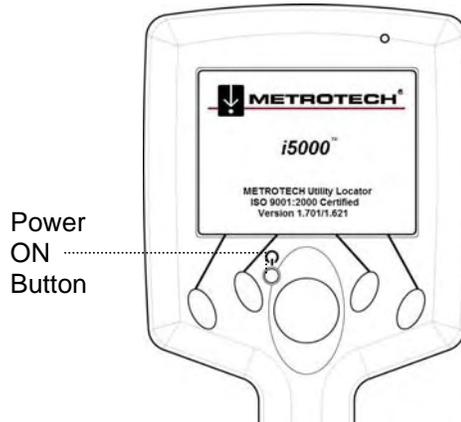


Figure 1-1 *i5000* Welcome Screen

The receiver display then reverts to the main locating screen. The receiver is ready to perform locates.

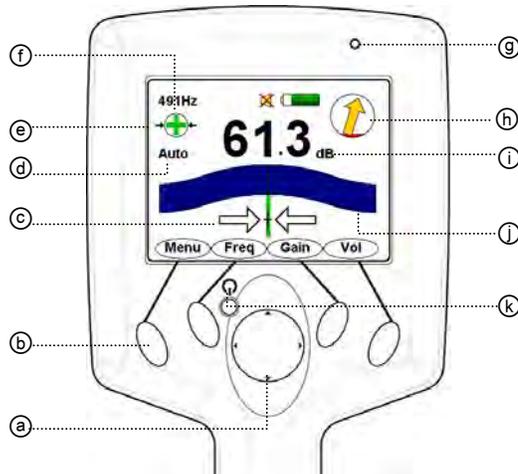


Figure 1-2 Line Locate Operational Interface

Display Legend	
a.	4-Way Navigation Button
b.	Soft Keys
c.	Distance Sensitive Left/Right Guidance™ Needle
d.	Auto or Manual Gain
e.	Signal Select™
f.	Active Frequency
g.	Bluetooth® ON
h.	Guidance Compass™
i.	Numerical Field Signal Strength
j.	Graphical Field Signal Strength
k.	Power ON Button

2) Select the Frequency

Press the **Freq** soft key to select the desired locating frequency. If the receiver detects a transmitter signal, the numerical field strength and the left/right guidance needle respond to movements of the receiver.

3) Determine the Center Line Position

Use the field strength readings and the left/right guidance needle to determine the centerline position of the target line being located.

4) Observe the Guidance Compass

The guidance compass indicator provides additional information about the locate:

- The direction of the signal is indicated by the orientation of the orange arrow inside the guidance compass indicator. A FORWARD pointing arrow indicates that the receiver detects a signal flowing away from the transmitter. A DOWNWARD pointing arrow means that the signal is a return signal flowing back towards the transmitter.
- Changes in the direction of the line relative to the orientation of the receiver are indicated by the signal direction arrow moving away from the North or South position.
- The presence of bleedover signals is indicated by the RED color filling the inside of the guidance compass indicator.

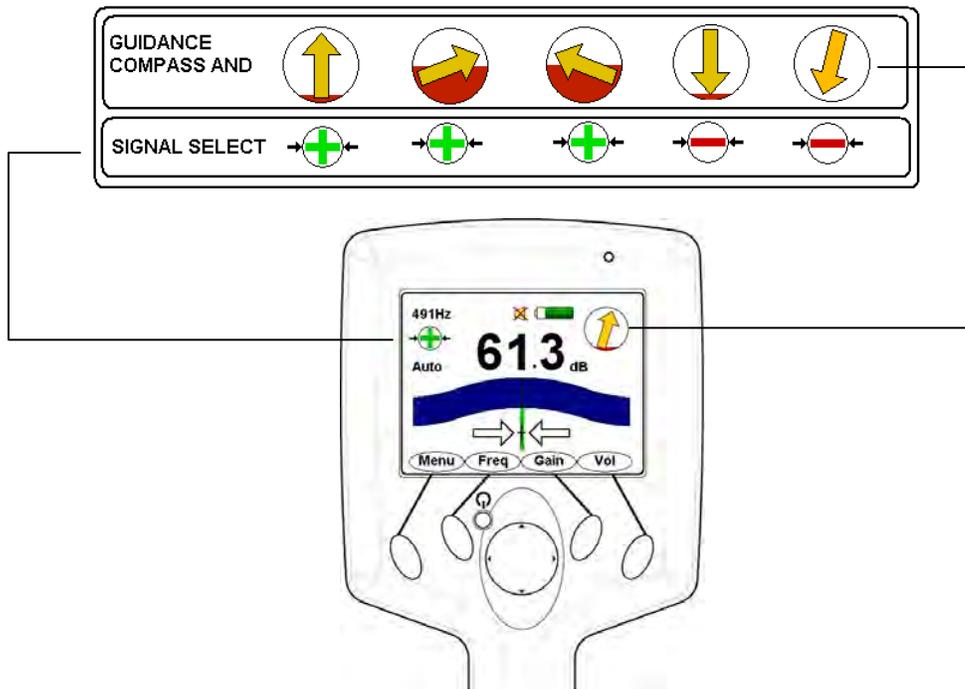


Figure 1-3 Operational Interface

5) Perform Depth and Current Measurements

Press the lower section of the navigation button to compute a depth and current measurement. Depth and current estimates are displayed. Thereafter, the receiver returns to the locating mode.

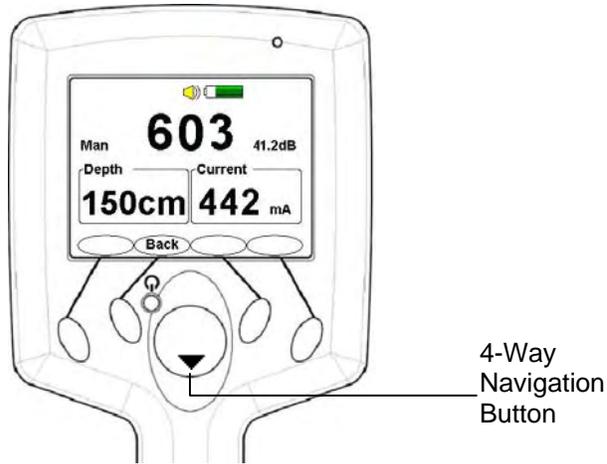


Figure 1-4 Depth & Current Measurement Screen

2 Display Elements

The color graphical display shows intuitive icons used to aid in accurate locating by the user.

Display Icon		Description
Battery Level		Displayed as a continuous level from a full 100% charge to 0%.
Signal Select™		Displayed when activated in direct (conductive) connection or Signal Select Clamp mode. This icon alerts the user if the receiver detects Signal Select modulation.
Guidance Compass™		A single graphical icon that implements three tools aiding locating accuracy – signal select, distortion alert, and line guidance.
Distortion Alert™		The Distortion Alert, displayed as a red-filling or emptying circle, denotes when a non-ideal magnetic field is detected.
Frequency	982Hz	The active frequency, or the passive band name (power or RF), is always displayed on the top left of the display.
Locate Mode	Sonde	In Sonde locate mode, the active mode is displayed on the top left of the display. Otherwise, line locate mode is active.
Signal Gain Mode	Auto Man	Indicates Auto or Manual signal strength mode. In auto mode, signal strength is measured in decibels (dB). The auto gain mode can be readjusted pressing the 4-way navigation button up. Manual gain is displayed in a linear scale from 000 to 999. The manual gain can be increased or decreased by pressing the 4-way navigation button right or left, respectively. Manual gain is displayed in a linear scale from 000 to 999.
Speaker Volume		Indicates the speaker volume setting - from off to high.

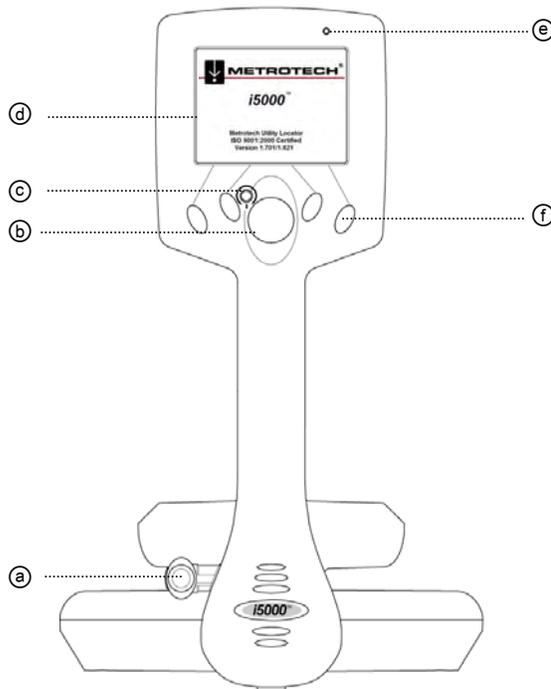
Display Icon		Description
Bluetooth		Indicates an active Bluetooth connection.
RS232		Appears when a host serial cable is connected to i5000 receiver.
GPS		Indicates the receiver can receive signals from 3 or more satellites (optional).

1 i5000 Receiver System Overview

The i5000 Utility Locating System brings the power and flexibility of digital signal processing (DSP) to Metrotech’s long line of sensitive and easy to use utility line locators. Two main interfaces are available to operate all the key features of the receiver.

1.1 Top View

The i5000 receiver includes a colorful graphical display, a 4-way navigation button, and four soft keys for operation and setup modes. A separate Power ON button, located near the navigation button, provides easy access to activate power. See figure below.



Top View Legend	
a.	GPS antenna (optional)
b.	4-way Navigation Button
c.	Power ON Button
d.	Operational Interface
e.	Bluetooth [®] Transmission ON Indicator
f.	Soft Keys

Figure 1-1 i5000 Top View

1.1.1 Operational Interface

The i5000 receiver operational screen is a ¼ VGA bright color graphical display. Two screens are displayed to the user – locate mode and measurement.

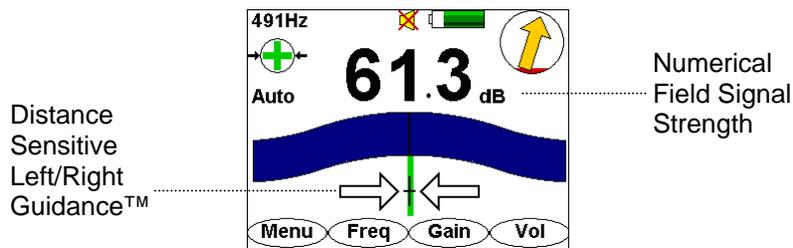


Figure 1-2 Locate Mode Interface

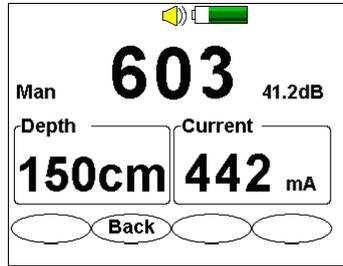


Figure 1-3 Measurement Interface

1.1.1.1 Display Elements

The color graphical display shows intuitive icons used to aid in accurate locating by the user.

Display Icon		Description
Battery Level		Displayed as a continuous level from a full 100% charge to 0%.
Signal Select™		Displayed when activated in direct (conductive) connection or Signal Select Clamp mode. This icon alerts the user if the receiver detects Signal Select modulation.
Guidance Compass™		A single graphical icon that implements three tools aiding locating accuracy – signal select, distortion alert, and line guidance.
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Signal Gain Mode	Auto Man	Indicates Auto or Manual signal strength mode. In auto mode, signal strength is measured in decibels (dB). The auto gain mode can be readjusted pressing the 4-way navigation button up. Manual gain is displayed in a linear scale from 000 to 999. The manual gain can be increased or decreased by pressing the 4-way navigation button right or left, respectively.
Speaker Volume		Indicates the speaker volume setting - from off to high.
Bluetooth		Indicates an active Bluetooth connection.
RS232		Appears when a host serial cable is connected to <i>i5000</i> receiver.

GPS		Indicates the receiver can receive signals from 3 or more satellites (optional).
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1.2 Side Views

The *i5000* is equipped with a smart accessory connector and battery pack, accessible from the receiver's right side panel.

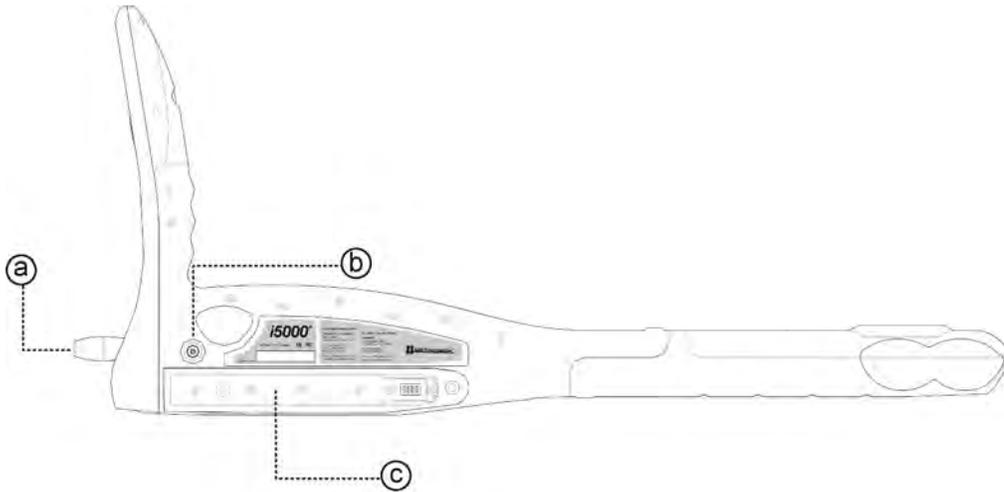


Figure 1-4 i5000 Side View

Side View Legend	
a.	GPS antenna (optional)
b.	Smart Connector
c.	Battery Pack Receptacle

1.2.1 Battery Pack

The *i5000* receiver is powered by a high-capacity Li-ion rechargeable or alkaline battery pack. See figure below.

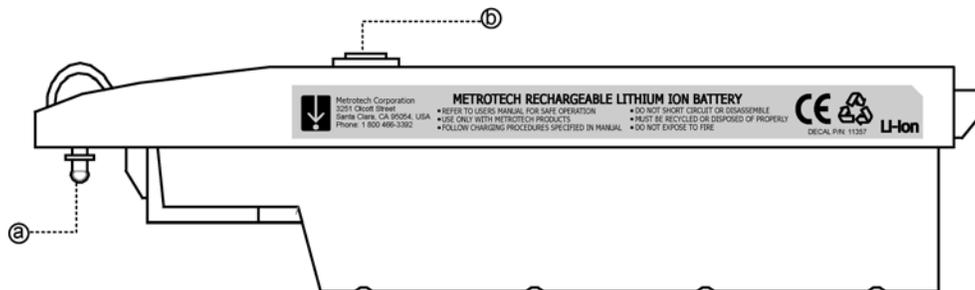


Figure 1-5 Li-ion Battery Pack

Battery Pack Legend	
a.	Battery Lock
b.	Recharging Receptacle

1.2.1.1 Recharging the Battery

The battery pack can be recharged while seated inside the receiver body. To recharge the battery pack:

1. Make sure recharging of the receiver battery occurs at room temperature. Charging the battery at low and high ambient temperature will affect how many charge cycles the battery can withstand and might cause other battery damage.



Excess heat can damage batteries, causing a rupture or ignition. Do not place batteries near fire, heat, or in direct sunshine.

2. Attach the *i5000* mains power supply to the charging jack of the Li-ion battery pack.
3. Plug the power supply into the electrical outlet.
4. The recharging time for a fully discharged battery pack is approximately 8 hrs.

The battery pack can also be recharged via the 12VDC vehicle adapter.



Batteries contain hazardous material that may be harmful to the environment. Dispose used batteries sensibly. Follow local recycling guidelines for disposal of similar material.

1 *i5000* Receiver Technical Specifications

Active Frequencies (Hz)	491, 982, 8.44k, 9.82k, 35k, 82k, 83k (North America) 491, 512, 577, 640, 982, 8k, 8.44k, 9.82k, 35k, 65.5k, 82k, 83k
Passive Frequencies (Hz)	50, 60, 100, 120, RF (14k-21k) Extended and special frequency sets available
Depth Display Accuracy	0-10ft: +/- (5%+2") under ideal field conditions 10-20ft: +/- 10% under ideal field conditions
Depth Range	Maximum 20ft (600 cm)
Gain Adjustment	Automatic & manual with pushbutton centering
Controls	On/off, four-way navigation key and soft keys
Display Indicators	Frequency, GPS, audio volume, battery condition, Guidance Compass™, Distortion Alert™, Signal Select™, signal strength, Distance Sensitive Left/Right Guidance™, menu softkey, frequency softkey, gain softkey, shortcut softkey
Line ID	Signal Select, Guidance Compass, Distortion Alert
Display	¼ VGA Bright Color
Antenna	Peak Null or Distance Sensitive Left/Right Guidance
Communications	Bluetooth®
Data Acquisition	GPS, internal data logging memory
Operating Temperature	-4°F to +122°F (-20°C to +50°C)
Battery Type	Li-ion rechargeable 9 AA Alkaline
Battery Life	30 hours continuous
Battery Check	Continuous display
Dimensions	8 ¼" W x 13 ¼" H x 29" L (21.0cm x 33.7 cm x 74.3cm)
Weight	4.9 lb (2.2 kg)
Regulatory Compliance	FCC, CE
Environmental	IP54

2 Options

Data logging
GPS antenna
MyLocator™ data warehousing and analysis service

3 Accessories

3.1 Standard

Li-ion rechargeable battery pack
AC power adapter for rechargeable battery
Operations manual
Hard carrying case

3.2 Optional

Serial interface cable
12VDC vehicle adapter rechargeable battery
Soft carrying cases
Search coil

1 *i5000* Receiver Features

The locate receiver is the locate technician's most important tool. First and foremost, it must lead to accurate conclusions on the targeted conductor's location, most importantly the centerline and depth. There are always subjective elements of a line locate, primarily due to field distortion caused by bleedoff and bleedover to adjacent conductors. Called Signal Select™, this method both allows detection of galvanically connected reverse (bleedoff) currents, as well as bleedover currents caused by capacitive and inductive coupling. This and other key features of the *i5000* receiver are listed below in summary form.

1.1 Signal Strength

Signal strength is a representation of the amount of current flowing in an underground conductor, at a particular depth. That is, if the depth is known, the signal strength can be used to determine the level of current flowing in the conductor. The signal strength value is displayed both numerically and graphically in a blue signal level bar. In automatic gain mode, the numeric value above the blue signal strength bar graph is in dB (decibel), such that every 6 dB increase or decrease represents a doubling or halving of signal level, respectively.

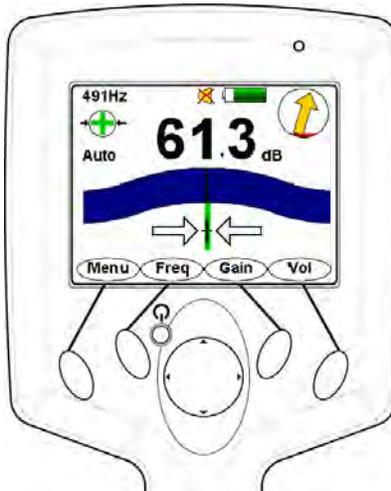


Figure 1-1 Auto Gain Mode Interface

In manual gain mode, the signal strength indication is switched to a higher resolution linear scale ranging from 000 to 999. The dB signal strength indication remains shown on the right hand side of the display.

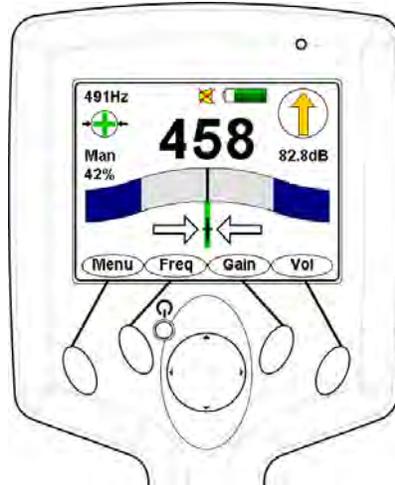


Figure 1-2 Manual Gain Mode Interface

As the peak position is identified and the receiver is used in a swinging motion, the peak position is displayed graphically by the green bar graph then slowly decreases as the signal strength changes.

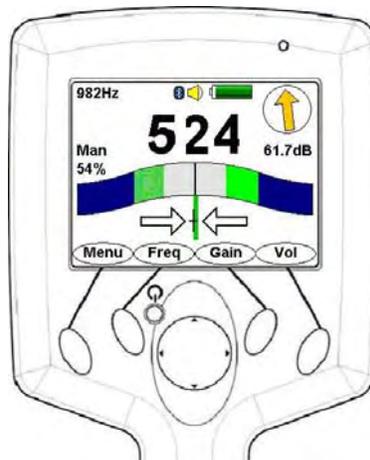


Figure 1-3 Peak Position Graphical Bar Display

1.2 Frequency

The active frequency, or the passive band name (power or RF), is always displayed on the top left of the *i5000* receiver display. When the frequency soft key is used to change frequency, the display is updated as well.

The active frequencies available are below. Please contact Metrotech for extended or special frequency sets.

Region	Frequency (Hz):
North America	Direct: 491, 982, 8.44k, 9.82k, 35.4k, 82k, 83k Passive: 50, 60, 100, 120, RF
International	Direct: 491, 512, 577, 640, 982, 8.192k, 8.44k, 9.82k, 35.4k, 65.5k, 82k, 83k Passive: 50, 60, 100, 120, RF

1.3 Distance Sensitive Left/Right Guidance™ Display

The Left/Right display is tremendously useful in refining the precise location of the target line. The vertical black bar represents the underground utility and when shown on the left of centerline it indicates the target is also to the left.

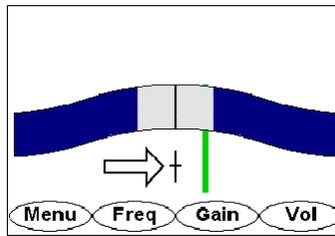


Figure 1-4 Distance Sensitive Left/Right Guidance

Using Metrotech’s Distance Sensitive Left/Right Guidance feature, the deflection distance of the vertical black bar away from the center of the display is proportional to the distance off center from the underground line. Although this is strictly true only when the field is free of distortion, the Left/Right display still plays an important role in sorting out what is going on in the underground utility environment.

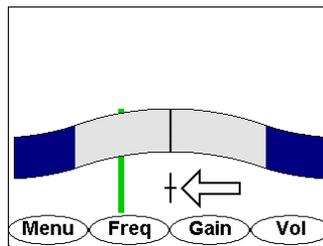


Figure 1-5 Distance Sensitive Left/Right Guidance

Often the receiver is used in a swinging motion over the centerline of the tracked utility. When the action in the Left/Right display is non-symmetric, this can be a warning of the presence of distortion in the field. Care should be taken to determine the effect of other cables in the locate zone that might be creating distortion by carrying bleedover and return currents.

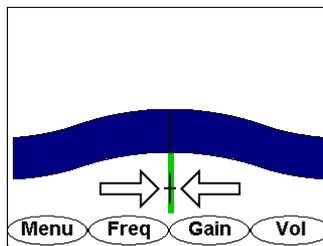


Figure 1-6 Distance Sensitive Left/Right Guidance

1.4 Positive Line ID

Positive Line ID is an essential task of a modern locate receiver. The *i5000* family incorporates three elements that aid the user in positively identifying the target utility from others that might be carrying the signal because of bleedover or bleedoff. Bleedover is defined as a loss of signal due to capacitive or inductive coupling between lines, and increases in significance with higher frequencies. Bleedoff results when two or more lines are galvanically connected through a common bond point, such that the signal in the target line is reduced as it branches out and finds multiple paths to ground. Bleedoff occurs and has equal effect at all frequencies.

Both bleedover and bleedoff can cause signal distortion, since the magnetic field induced from an applied AC current (the directly coupled signal) exists on multiple lines, and can constructively or destructively combine. This, of course, depends on the relative positions and currents of the utilities with respect to the target line. When distortion is present, the normal assumptions about the field behaving as a cylindrical shell around the conductor can be (in various degrees) invalid.

Therefore, centerline, current, and depth estimates made in such distorted fields may also be biased.

In the *i5000* receiver, Distortion Alert™ and Signal Select™ are used to define the degree of distortion present and the direction of the signal in the targeted line, respectively. Both of these methods are enabled by Signal Select modulation. Line Guidance™ composes the third leg of the triad, and facilitates a “look-ahead” of the line direction. Curvature in the target line, or galvanically connected junctions like “Y” and “T” connections create anomalies in the shape of the field that are detected by the Line Guidance function.

All of these elements are combined into a single graphical component, called the Guidance Compass™, in the upper right-hand corner of the receiver display. The yellow arrow shows the detected direction of the line at all times, including the look-ahead guidance feature. The ways that Distortion Alert™ and Signal Select™ and Line Guidance combine is discussed in this section.

1.4.1 Signal Select

The direction of the signal in the targeted line is determined by analyzing the sign of the demodulated Signal Select signal. When the receiver is positioned over a signal that carries an inverted field (i.e., one in which the phase is -180° from the expected, the Guidance Compass points down, as shown below for a line that is bonded to the target line and carries return current.

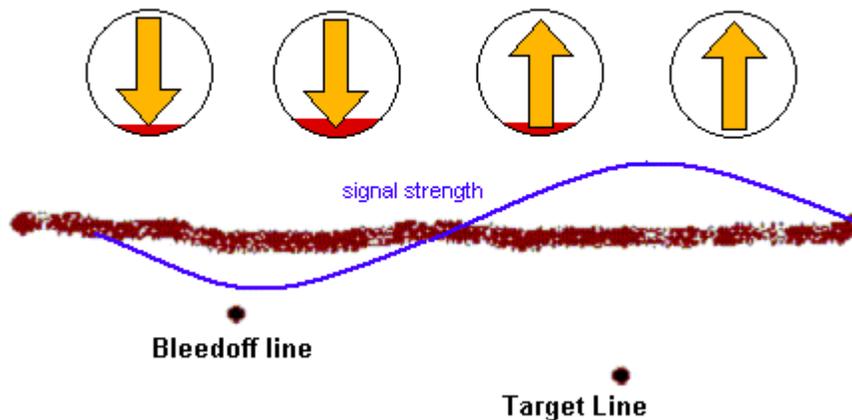


Figure 1-7 Signal Select Sample Scenario

An example of how the Distortion Alert feature acts as a warning about situations that (using traditional methods) appear to be quite ordinary can be seen below. In this case, there is significant bleedover from the target line to a shallower line, with the current running in the same direction forward in both lines. Since the bleedover line is shallower, its effect diminishes as the receiver is positioned farther to the right or left. Thus the red filling is at a lower level in the Guidance Compass in these areas. The measured distortion approaches a peak about in the same place as the signal strength peak, indicating the presence of another conductor.

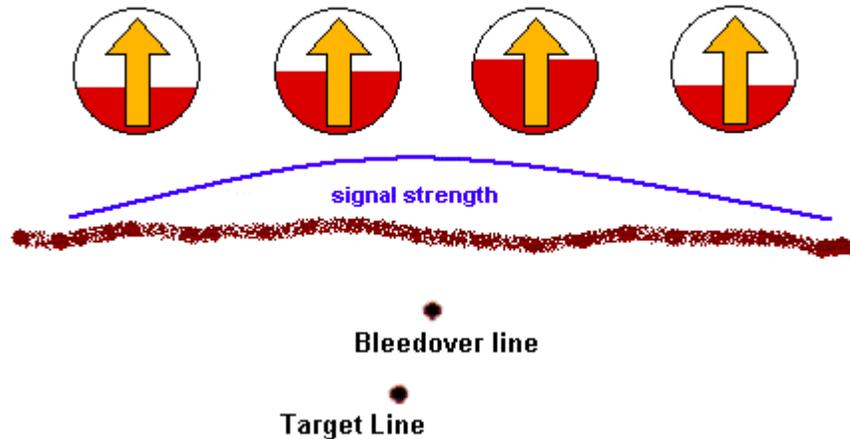


Figure 1-8 Distortion Alert Sample Scenario

In this particular case, the centerline estimate is not significantly biased, though the depth estimate is less accurate.

1.4.2 Distortion Alert



Distortion creates phase anomalies in the signal, which can be detected at the receiver and compared to a phase reference imparted at the transmitter. This reference is set by Signal Select modulation for every active frequency imparted at the transmitter. The transmitter must be in direct (conductive) connection mode, and Signal Select modulation must be switched on for each frequency (this is the default). Even if multiple simultaneous outputs are on, any or all can be selected to carry the modulated output. For each transmitter output that is Signal Select modulated, there is an independent control loop to ensure that the phase reference is zero. The level of distortion in the field is proportional to the level of the red background in the Guidance Compass.

It is not necessarily true that when the Guidance Compass background is predominantly red that a poor locate results. The Distortion Alert feature is just that, an alert that a non-ideal magnetic field is detected. In some cases the conductor that carries the bleedover current may lay directly on top (in the same duct) of the target conductor. In this case, the predominant current that is detectable at the surface is from the bleedover line, but the actual centerline estimate is correct.

1.5 Depth and Current Measurements

When the receiver is located directly over the centerline (the left/right position is at the null), the Depth button ("down" section of 4-way navigation key) can be used to estimate both the depth and current of the target line. The receiver must be at rest, and held in a vertical position with the tip on the ground. At this position, the audio output is silent, indicating that the receiver is at the centerline.



Do not solely rely on centering at the null for accurate depth and current measurements. The centerline should be marked using the peak blue signal level bar and maximum signal strength reading.

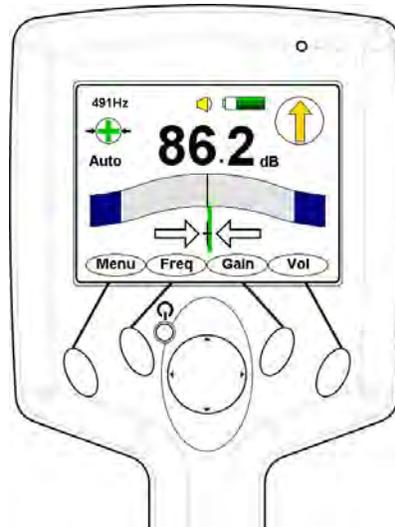


Figure 1-9 Recording Depth Measurement Interface

When the Depth button is pressed, the receiver averages the signal strength for a few seconds and displays the results.



Figure 1-10 Depth Measurement Interface

When the *i5000* receiver data logging option is activated, the operator may press the <Mark> soft key to mark a particular data point as a valid entry into the log file. Depth measurements only taken to help the operator understand the field conditions of the locate site should not be marked using the <Mark> soft key.



Figure 1-11 Data Logging Depth Measurement Interface

1.6 Wireless Connection

The *i5000* is equipped with Bluetooth® wireless transmission. When active (either incoming or outgoing), a blue LED emits from the receiver’s top right corner. This can indicate that a Bluetooth camera phone, a transmitter, or a PC host is currently connected and transferring data to the receiver.

If other locating devices, such as *i5000* transmitters, have been retrofitted with a Metrotech Bluetooth interface module, the *i5000* receiver may interact with these devices. These “paired” devices will interact with the receiver within the 30 ft. range capability.

The transmitter’s software can be updated and maintained with access to Metrotech’s web service, MyLocator, and the Bluetooth wireless interface.

1.7 Battery

Various battery types are available for operation. Depending upon use, an operator can expect typical battery performance in continuous operation as follows.

Battery Type	Battery Life
Li-ion	30 hours
Alkaline (9 AA)	20 hours

	Excess heat can damage batteries, causing a rupture or ignition. Do not place batteries near fire, heat, or in direct sunshine.
	Batteries contain hazardous material that may be harmful to the environment. Dispose used batteries sensibly. Follow local recycling guidelines for disposal of similar material.

1.8 Smart Accessory Detection

The *i5000* is equipped with smart accessory detection. If attached, the receiver automatically acquires calibration information from the accessory and thus, allows the receiver to determine what type of accessory is present.

Metrotech accessories such as speaker or headphone audio output, host serial cable, search coils, etc. are available accessory options.

1.9 Data Acquisition (optional)

With the data logging feature, locate data can be recorded and stored in the receiver's memory until downloaded to Metrotech's MyLocator™ website. Images taken from the site location and transferred to the receiver via Bluetooth can also be stored and filed with the corresponding locate data.

If a GPS antenna is installed on the *i5000* receiver, locate coordinate data – latitude, longitude, and GPS clock time are recorded as well.

1 i5000 Menu System

The receiver’s menu system includes six (6) selectable menus for configuring the *i5000*. Press the <Menu> soft key from the operational interface to access the main menu.

2 Main Menu

To access the main menu, press the <Menu> soft key from the operational interface.

The desired menu is selected using the 4-way navigation button. Press the button up/down/left/right to select the desired menu option. The selected menu is highlighted on the interface as well as labeled at the top of the display.

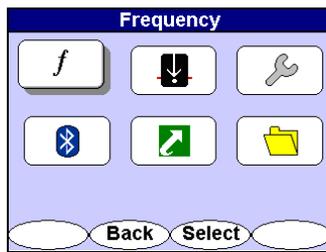


Figure 2-1 Main Menu Selection

2.1 Frequency Menu

The Frequency menu activates or deactivates any of the available receiver frequencies. Depending on the configuration of your *i5000* receiver, the following frequencies may be available. See the table below for the available frequencies.

Region	Base Frequency Set (Hz)
North America	491, 982, 8.44k, 9.82k, 35.4k, 82k, 83k, 50, 60, 100, 120, RF
International	491, 512, 577, 640, 982, 8k, 8.44k, 9.82k, 35.4k, 65.6k, 82k, 83k, 50, 60, 100, 120, RF

To allow easier navigation, the available frequencies are organized into several groups. To access the frequency menu, use the 4-way navigation button to highlight *f*. The chosen menu is also labeled at the top of the menu screen.

Press the <Select> soft key to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

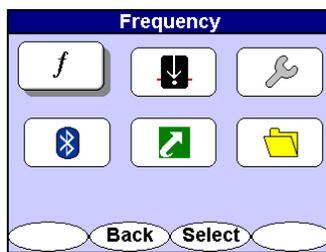


Figure 2-2 Frequency Menu Selection

2.1.1 Low Frequency

Low frequencies are interface frequencies below 1kHz.

Use the 4-way navigation button to move up and down the frequency list. Use the 4-way navigation button to move right to highlight the frequencies. Press the <Select> soft key to activate or deactivate specific or all frequencies.

Deactivating frequencies does not permanently remove these from the *i5000* receiver. Access the frequency menu to reactivate them.

Activated frequencies can be selected from the operational interface by pressing the <Freq> soft key. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

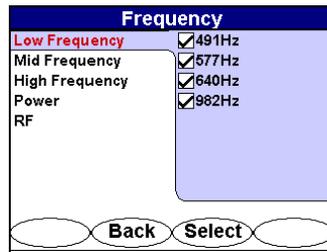


Figure 2-3 Low Frequency Selection Screen in Frequency Menu

2.1.2 Mid Frequency

Mid frequencies are in the range between 1kHz and 10kHz.

Use the 4-way navigation button to move up and down the frequency list. Use the 4-way navigation button to move right to highlight the frequencies. Press the <Select> soft key to activate or deactivate specific or all frequencies.

Deactivating frequencies does not permanently remove these from the *i5000* receiver. Access the frequency menu to reactivate them.

Activated frequencies can be selected from the operational interface by pressing the <Freq> soft key. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

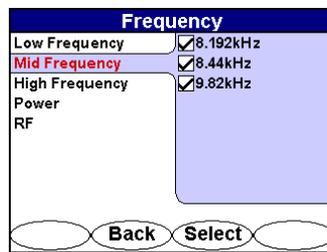


Figure 2-4 Mid Frequency Selection Screen in Frequency Menu

2.1.3 High Frequency

High frequencies are those above 10kHz.

Use the 4-way navigation button to move up and down the frequency list. Use the 4-way navigation button to move right to highlight the frequencies. Press the <Select> soft key to activate or deactivate specific or all frequencies.

Deactivating frequencies does not permanently remove these from the *i5000* receiver. Access the frequency menu to reactivate them.

Activated frequencies can be selected from the operational interface by pressing the <Freq> soft key. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

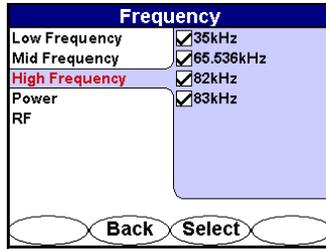


Figure 2-5 High Frequency Selection Screen in Frequency Menu

2.1.4 Power

The Power menu allows switching between 50Hz and 100Hz passive locating modes.

Use the 4-way navigation button to move up and down the frequency list. Use the 4-way navigation button to move right to highlight the frequencies. Press the <Select> soft key to activate or deactivate specific or all frequencies.

Deactivating frequencies does not permanently remove these from the *i5000* receiver. Access the frequency menu to reactivate them.

Activated frequencies can be selected from the operational interface by pressing the <Freq> soft key. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

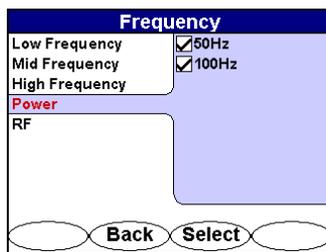


Figure 2-6 Power Frequency Selection Screen in Frequency Menu

2.1.5 RF

The RF menu allows the activation or deactivation of the RF passive locating capability of the *i5000* receiver.

Use the 4-way navigation button to move up and down the frequency list. Use the 4-way navigation button to move right to highlight the frequency. Press the <Select> soft key to activate or deactivate specific or all frequencies.

Deactivating frequencies does not permanently remove these from the *i5000* receiver. Access the frequency menu to reactivate them.

Activated frequencies can be selected from the operational interface by pressing the <Freq> soft key. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

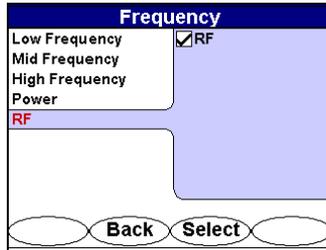


Figure 2-7 RF Selection Screen in Frequency Menu

2.2 Mode Menu

The *i5000* receiver has two locate modes - line locate and sonde locate.

To access the locate mode menu, use the 4-way navigation button to highlight **Mode**. The chosen menu is labeled at the top of the menu screen.

Press the <Select> soft key to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

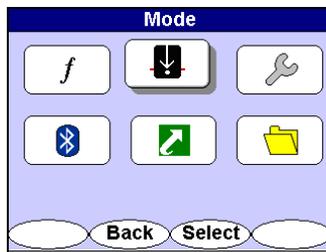


Figure 2-8 Mode Menu Selection

2.2.1 Line Locate

Line Locate mode is used to trace the cable using a rack-mount transmitter signal or a portable transmitter signal.

To access the line locate mode, use the 4-way navigation button to select the desired mode.

Press the <Select> soft key to select the desired mode. Press <Back> to return to the previous interface.

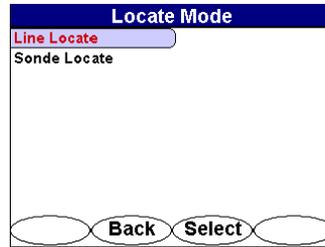


Figure 2-9 Line Locate Selection Screen in Mode Menu

2.2.2 Sonde Locate

In Sonde Locate mode, the receiver automatically adjusts its depth calculation algorithms to reflect the differences between a line radiating a transmitter signal and the signal generated by a sonde transmitter.

To access the sonde locate mode, use the 4-way navigation button to select the desired mode.

Press the <Select> soft key to select the desired mode. Press <Back> to return to the previous interface.

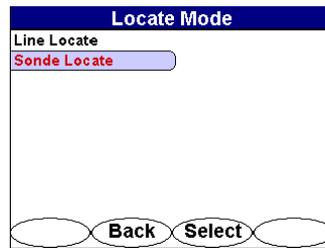


Figure 2-10 Sonde Locate Selection Screen in Mode Menu

2.3 Settings Menu

The Settings menu offers the following menu selections:

- Personalize
- Audio
- Initial Setup
- Display Clock
- Preset State
- About

To access the settings menu, use the 4-way navigation button to highlight **Settings**. The chosen menu is labeled at the top of the menu screen.

Press the <Select> soft key to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

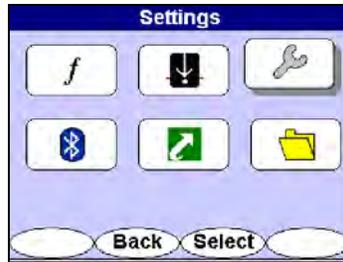


Figure 2-11 Settings Menu Selection

2.3.1 Personalize

The operator can control certain user interface elements of the *i5000* receiver. Available choices are:

- Distortion Number
- Distortion Graph
- Signal Select
- Guidance Compass

Use the 4-way navigation button to move up and down the settings list. Use the 4-way navigation button to move right to highlight the personalized settings. Press the <Select> soft key to activate or deactivate specific or all personalized settings. Press <Back> to return to the previous menu.

Access the settings menu to reactivate them.

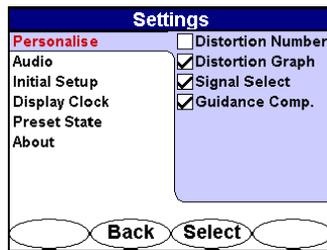


Figure 2-12 Personalize Selection Screen in Settings Menu

2.3.2 Audio

The Audio menu controls the *i5000* receiver audio output characteristics.

Use the 4-way navigation button to move up and down the settings list. Use the 4-way navigation button to move right and highlight the audio options. Press the <Select> soft key to toggle through the different speaker volume settings – from OFF to High.

After selecting the desired speaker volume, use the 4-way navigation button to highlight the **Sound** option. Use the <Select> button to toggle through the available choices - LR, AM and None. The Sound options are:

- LR (Left/Right audio guidance)

- AM (Amplitude modulated audio mode mapped to Peak signal strength)
- None (Deactivates speaker output related to Left/Right audio guidance or Peak signal strength but keeps Key-Sound interface)

Use the 4-way navigation button to highlight the **Key-Sound** option. Highlighting the Key-Sound option switches the key sound ON or OFF. In the ON mode, the speaker emits a short beep any time a key is pressed even when the speaker volume setting is OFF.

Press the <Select> button between ON and OFF. Press <Back> to return to the previous menu.

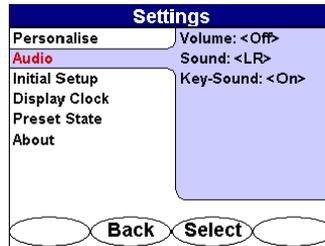


Figure 2-13 Audio Selection in Settings Menu

2.3.3 Initial Setup

The Initial Setup section of the Settings menu controls the following receiver features:

- Backlight
- Units
- Auto-Off
- Last Frequency
- Language

Use the 4-way navigation button to move up and down the settings list. Use the 4-way navigation button to move right and highlight the **Initial Setup** option. Use the 4-way navigation button to move right and highlight the setup options.

The **Backlight** has three selectable options – 60 seconds ON prior to turning OFF, always ON, or always OFF. If the 60s option is selected, any key-push returns the backlight on for 60s should it have been timed out. Press the <Select> soft key to toggle through the different backlight options.

The **Units** menu item controls the depth readout format of the receiver. Two options are available – US and Metric. The US setting displays depth in feet and inches. The Metric setting provides depth readout in cm. Press the <Select> soft key to toggle between the options.

The factory default setting for the **Auto-Off** option is for the receiver to automatically power down after five minutes of inactivity. Changing the setting to ON forces the receiver to stay ON until the Power ON button is pressed. Press the <Select> soft key to toggle through the options

The receiver can be set to automatically select a preferred frequency at power up or to the last frequency used. The factory default setting is Last Frequency Used. Press the <Select> soft key to toggle through the options.

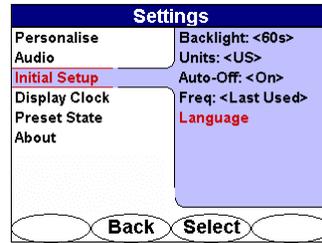


Figure 2-14 Initial Settings Selection in Settings Menu

2.3.3.1 Language

The *i5000* supports various languages – English, Spanish, French, and German. To reset the menu system to the desired language, use the 4-way navigation button to highlight the **Language** option. Press the <Select> soft key to activate the desired language. Press the <Back> soft key to return to the previous interface.

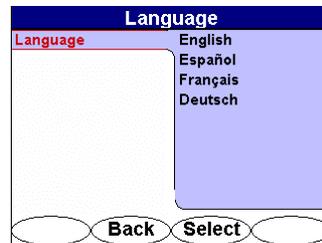


Figure 2-15 Language Selection Menu

2.3.4 Display Clock – Optional GPS Clock Time

The global positioning system (GPS) Clock Time is displayed in Greenwich Mean Time (GMT). To display the GPS clock time, use the 4-way navigation button to move up and down the settings list. Highlight **Display Clock** and press the <Select> soft key.

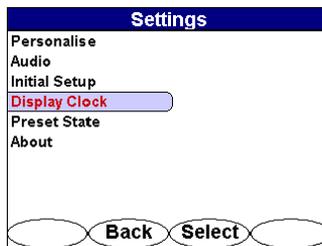


Figure 2-16 Display Clock Selection in Settings Menu

The GPS time is displayed. Press the <Back> soft key to return to the previous screen.

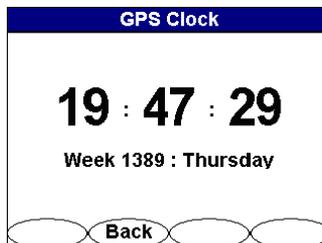


Figure 2-17 GPS Clock Display

2.3.5 Preset State

The Preset State menu option allows the operator to restore the *i5000* receiver user interface configuration to factory default settings for all menu selections in just one simple operation. Selecting the Preset State function does not result in any loss of receiver capability, the choice of available frequencies, or the loss of any data stored in the data logging memory.

Use the 4-way navigation button to move up and down the settings list. Press the <Select> soft key to choose the Preset State. Press the <Back> soft key to return to the previous interface.

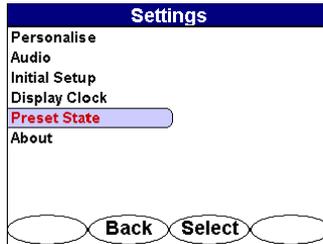


Figure 2-18 Preset State Selection in Settings Menu

After selecting the Preset State function, the following screen appears to prevent accidental resetting to the factory default settings.

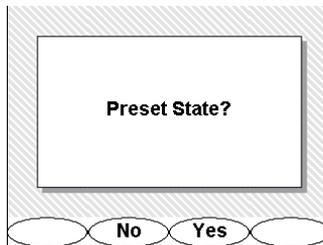


Figure 2-19 Preset State Option in Preset State Menu

Press the <No> or <Yes> soft key to select the desired preset state.

2.3.6 About

The About screen displays important information about the *i5000* receiver's software and hardware configuration.

Use the 4-way navigation button to move up and down the settings list. Press the <Select> soft key to choose the **About** option. Press the <Back> soft key to return to the previous interface.

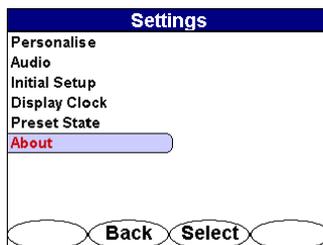


Figure 2-20 About Selection in Settings Menu

The information provided is useful when communicating with Metrotech's technical support organization. Press any soft key to return to the previous interface.

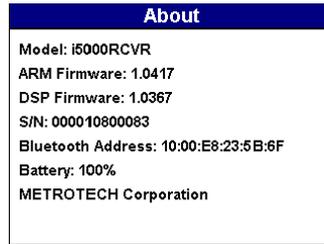


Figure 2-21 About Display Information in Settings Menu

2.4 Bluetooth Menu

The Bluetooth wireless connection allows Bluetooth-enabled devices to communicate with the *i5000* receiver. Data and digital photos can be saved in memory and transferred via Bluetooth wireless communication to laptop computers or PCs. The reverse is also available - locate ticket information and digital photos may be loaded into the *i5000* memory. An example is the downloading of locate tickets into memory and the closing of these tickets with the retransmission of detailed locate information and digital photos.

To access the Bluetooth menu, use the 4-way navigation button to highlight the Bluetooth icon. The chosen menu is also labeled at the top of the menu screen.

Press the <Select> soft key to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

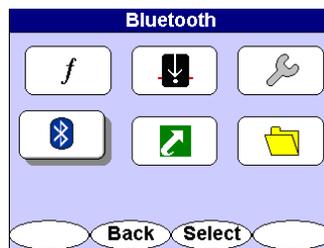


Figure 2-22 Bluetooth Selection in Main Menu

2.4.1 Discoverable Selection

To open a connection with other Bluetooth enabled devices, the receiver must be set to Discoverable. This places the *i5000* receiver open to connections with other Bluetooth devices for 60 seconds. During this period, the *i5000* receiver will identify the Bluetooth device.

Use the 4-way navigation button to move up and down the Bluetooth Settings list. Press the <Select> soft key to choose the **Discoverable** option. Press the <Back> soft key to return to the previous interface.

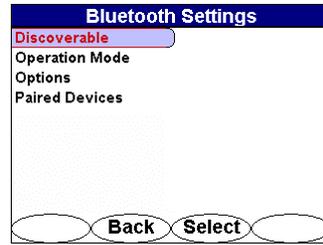


Figure 2-23 Discoverable Option in Bluetooth Menu

2.4.2 Operation Mode

The operation mode sets the data transmission selection – Bluetooth, RS232, or either option. Selecting Auto allows receiver connections via the RS232 cable or via Bluetooth. If the RS232 cable is connected, Bluetooth is not available. Selecting ON allows connection with Bluetooth only. Selecting OFF turns the Bluetooth feature off. The default setting is Auto.

Use the 4-way navigation button to move up and down the Bluetooth Settings list. Use the 4-way navigation button to move right and highlight the options. Press the <Select> soft key to choose the option. Press the <Back> soft key to return to the previous interface.

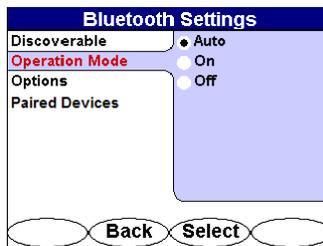


Figure 2-24 Operation Mode in Bluetooth Settings Menu

2.4.3 Options

Selecting Factory Preset resets certain internal Bluetooth settings to factory defaults.

Make sure the *i5000* receiver Bluetooth Setting is in the OFF position before entering any telecommunications central office or other telecommunications data transmission infrastructure.

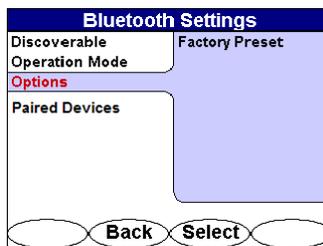


Figure 2-25 Options in Bluetooth Settings Menu

2.4.4 Paired Devices

i5000 transmitters are equipped with Bluetooth transmission capabilities. The paired devices menu allows the user to mate up to six transmitters to a single receiver. If a receiver is within 30 ft. (9 m) of a transmitter and Bluetooth transmission is ON for both instruments, the receiver logs the output power conditions and active frequencies every 30 sec. Logged data is stored in the receiver memory until the receiver is synchronized and uploaded to Metrotech’s MyLocator web

service. The blue LED emits during active transmission.

Use the 4-way navigation button to move up and down the Bluetooth Settings list. Use the 4-way navigation button to move right and highlight the options. Press the <Select> soft key to choose the option. Press the <Back> soft key to return to the previous interface.

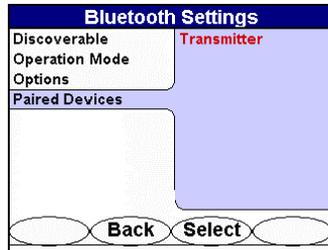


Figure 2-26 Paired Devices in Bluetooth Settings Menu

2.4.4.1 Pairing a Transmitter and Receiver

To pair a transmitter and receiver, make sure both instruments have the Bluetooth feature ON. Press the <Select> soft key to initiate discovery of the transmitter. Press the <Back> soft key to return to the previous interface.

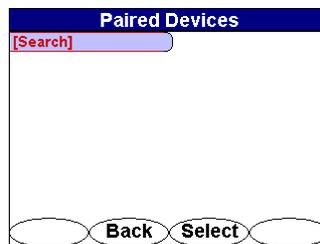


Figure 2-27 Search Feature in Paired Devices Menu

Upon completion of the transmitter discovery, the receiver displays the paired transmitter. The last four digits of each transmitter denotes the unique identity of each paired unit.

To remove a paired transmitter, use the 4-way navigation button to highlight the desired unit. Press the <Clear> soft key to erase a paired transmitter from the list.

To remove all paired devices, use the 4-way navigation button to highlight **Clear all devices**. Press the <Clear> soft key to erase all paired devices.

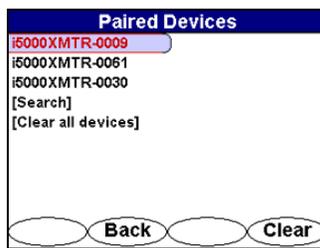


Figure 2-28 Transmitter List in Paired Devices Menu

2.5 Shortcuts Menu

Shortcuts set the right-most soft key to a selection of features including Volume adjustment, Backlight Power, and Ticket Management.

To access the shortcuts menu, use the 4-way navigation button to highlight **Shortcuts**. The chosen menu is labeled at the top of the menu screen.

Press the <Select> soft key to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

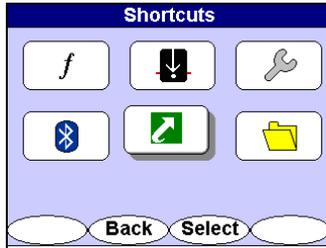


Figure 2-29 Shortcuts Selection in Main Menu

Use the 4-way navigation button to move up and down the Shortcuts list. Press the <Select> soft key to activate or deactivate the options. Press the <Back> soft key to return to the previous interface.

Selecting Adjust Volume places the shortcut to Adjust Volume (VOL).

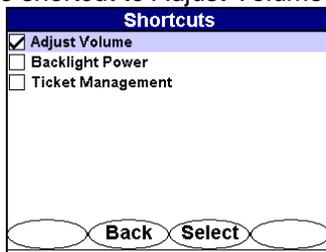


Figure 2-30 Adjust Volume Selection in Shortcuts Menu

Selecting Backlight Power places the shortcut to Backlight Power (BL).

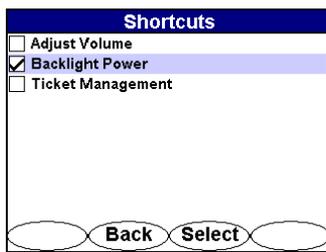


Figure 2-31 Backlight Power Selection in Shortcuts Menu

Selecting Ticket management places the shortcut to Ticket Management (TKT). Ticket Management takes you to the Data Logging Menu where you select Tickets.

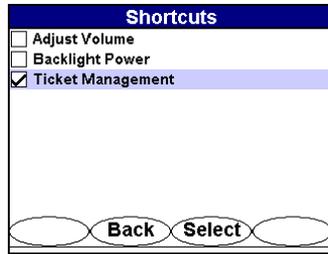


Figure 2-32 Ticket Management Selection in Shortcuts Menu

2.6 Data Logging Menu - Optional

The Data Logging feature provides data ticket management services.

Three selections are available in this menu:

- Tickets
- Data Log
- Record Mode

To access the data logging menu, use the 4-way navigation button to highlight the file folder icon. The chosen menu is also labeled Data Logging at the top of the menu screen. Press the <Select> soft key to open the desired menu screen. Press the <Back> soft key to return to the operational interface.

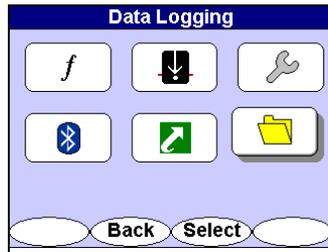


Figure 2-33 Data Logging Selection in Main Menu

2.6.1 Tickets

Two options are available on the tickets menu – creating tickets or viewing tickets.

Use the 4-way navigation button to move up and down the data logging list. Use the 4-way navigation button to move right and highlight the desired option. Press the <Select> soft key to open the menu. Press the <Back> soft key to return to the previous interface.

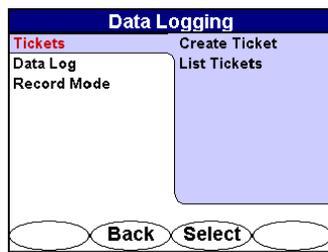


Figure 2-34 Tickets Selection in Data Logging Menu

2.6.1.1 Create Ticket

Create Ticket generates a new ticket on the receiver. A notification that a new ticket is being created appears on the screen for a few moments, then the screen returns to the Data Logging Tickets window.

Press the <Select> soft key to create a new ticket on the receiver.

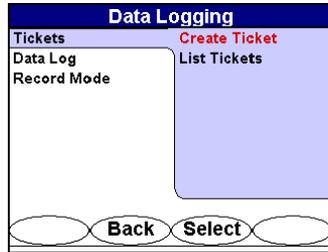


Figure 2-35 Create Ticket Selection in Data Logging Menu

2.6.1.2 List Tickets

All the tickets in memory will be listed along with the menu option - Information / Activate / Close / Enter Response.

To view a list of all tickets created, use the 4-way navigation button to move up and down the ticket list. Use the 4-way navigation button to move right and highlight the desired information. Press the <Select> soft key to open the ticket. Press the <Back> soft key to return to the previous interface.

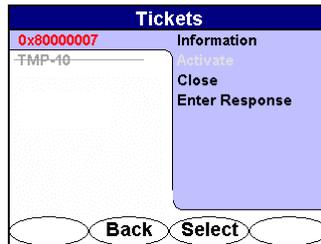


Figure 2-36 List Ticket Selection in Tickets Menu

2.6.1.3 Information

The Ticket Information header indicates the open or closed status. Selecting <Active> opens the ticket to logging additional data. Press the <Back> soft key to return to the previous interface.

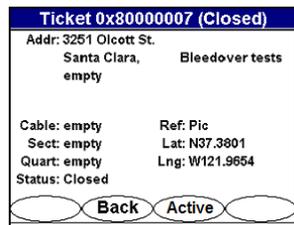


Figure 2-37 Ticket Information in Tickets Menu

2.6.1.4 Activate

Selecting **Activate** opens a ticket to logging data. Press the <Back> soft key to return to the previous interface.

2.6.1.5 Close

Selecting **Close** deactivates a ticket and no data will be logged under that ticket. The ticket name will be stricken through denoting its closure. See Figure 2-35.

2.6.1.6 Enter Response

Selecting **Enter Response** opens the response code list. The list is created by the user and downloaded from the MyLocator web service. A sample response code list is displayed.

Press the <Select> soft key to enter the correct response code or <Cancel> to return to the previous menu screen.

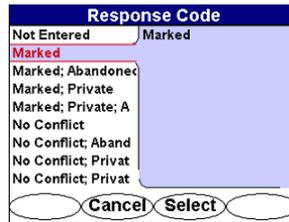


Figure 2-38 Sample Response Code Menu

2.6.2 Data Log

Log Memory displays the total Log Memory, Memory Used, and Number of Log Entries. Use the 4-way navigation button to highlight **Log Memory** and press the <Select> soft key to display the log data statistics.

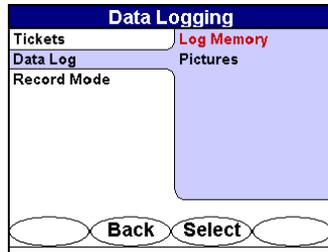


Figure 2-39 Log Memory Selection in Data Log Menu

2.6.2.1 Data Log Memory

The Data Log Memory screen lists the status of the *i5000* receiver memory. Press the <Back> soft key to return to the previous interface.

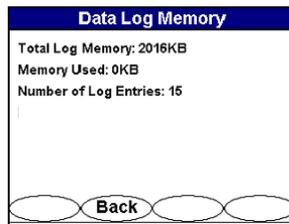


Figure 2-40 Data Log Memory in Data Logging Menu

2.6.2.2 Data Log Pictures

Selecting **Pictures** displays the name and size of all Locate Images in memory. Images are recorded in chronological order. No viewing capability is currently available on the receiver LCD. Images can be uploaded, however, to the MyLocator web service and viewed. Press the <Back> soft key to return to the previous interface.

To log a picture into the receiver memory, a Bluetooth-ready camera must be ON and ready for transmission. The *i5000* receiver must also be set on discoverable prior to transferring the image. The captured image can then be transmitted through the camera's send function. The receiver's blue LED will emit confirming that the Bluetooth connection is active.

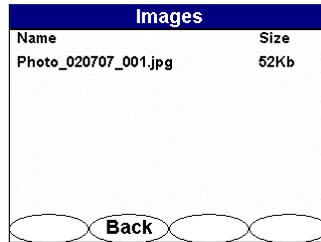


Figure 2-41 Pictures in Data Logging Menu

2.6.3 Record Mode

Record Mode allows the user to select the data logging format. Two choices are available for selection - **on Depth** or **on Depth + Timer**. Check with your supervisor what record mode should be used.

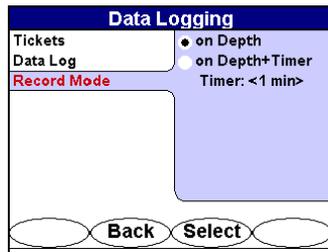


Figure 2-42 Record Mode in Data Logging Menu

1 Service and Maintenance

1.1 Maintenance

The only routine maintenance required for the equipment and accessories is to test and recharge or replace, if necessary, the batteries. A continuous battery test is a standard feature, making it easy to check the condition of the batteries at any time.

The *i5000* receiver is designed for rugged outdoor use, but rough handling should be avoided. Keep the equipment dry, clean, and free of grit. Store the *i5000* (in a dry carrying case) in a cool, dry place. Do not expose to excessive temperatures.

We recommend checking the receiver battery status before each use, preferably before leaving for the job site.

1.2 Service Center Information

If the equipment does not function properly, replace the batteries as described above. If the equipment still malfunctions, contact one of the Metrotech Customer Service departments:

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Application Support:

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Tel : +1-408-454-7159
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Email : applications@vxmt.com

Service & Repairs:

T/Free : +1-800-638-7682
Tel : +1-408-962-9990
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All Other Department:

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Or call the Metrotech headquarters for the nearest authorized Metrotech repair station. Metrotech also manufactures and distributes these instruments: Pipe and Cable Locators, Ferromagnetic Locators, Fiber Optic Cable Locating System, Sheath Fault Locators, Electronics Marker Locators, Acoustic Water Leak Detectors, Water Leak Sound Correlators and Data Loggers. For more details, see our website www.metrotech.com.

2 Warranty

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY, BEYOND THOSE STATED HEREIN.

Metrotech warrants its equipment to be free from defects in workmanship and material under normal and proper use and service for one year from date of purchase by original user. Metrotech assumes no obligation to repair or replace equipment which has been altered or repaired by other than a Metrotech-approved procedure, been subject to misuse, misapplication, improper maintenance, negligence, or accident; has had its serial number or any part thereof altered, defaced or removed; or been used with parts other than those approved by Metrotech. Warranty does not include batteries. Expendable items such as fuses and lamps are excluded. Any detection product proved defective under this warranty will be repaired or replaced free of charge at the Metrotech Corporation factory or approved Metrotech repair station. The equipment should be returned to our factory by prepaid transportation after requesting and receiving return authorization from our Customer Service Department. Metrotech's obligations are limited to repair or replacement of broken or defective parts which have not been abused, misused, altered, or accidentally damaged, or at the option of Metrotech, to refund of the purchase price. Metrotech assumes no liability for removal or installation costs, consequential damages, or contingent expenses of any other nature.

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