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The instrument meets the following standards:

EMC-standard : 89/336/EWG (EEC)

Electromagnetic compatibility

Changing modification rule : 92/31/EWG

As well as:

Low voltage regulation : 73/23/EWG (EEC)

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1 Introduction and Safety

1.1 INTRODUCTION

The Metrotech Model i5000™ MetroMark™ 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.

1.2 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 labeled 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.
 NOTE	Notes have important information and useful tips on the operation of your equipment. Nonobservance may result in incorrect measurement results.

Operating personnel Metrotech utility line and marker 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 authorized service departments of Metrotech Corporation.

1.3 SAFETY PRECAUTIONS

This manual contains basic advice for the installation and operation of Metrotech Utility Line and Marker 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.
Repair and maintenance	Repairs and service must only be done by Metrotech Corporation or authorized service departments of Metrotech Corporation. 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.



WARNING

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.

2 Quick Start Guide

2.1 Quick Start Guide for the Experienced 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 firmware revision number.

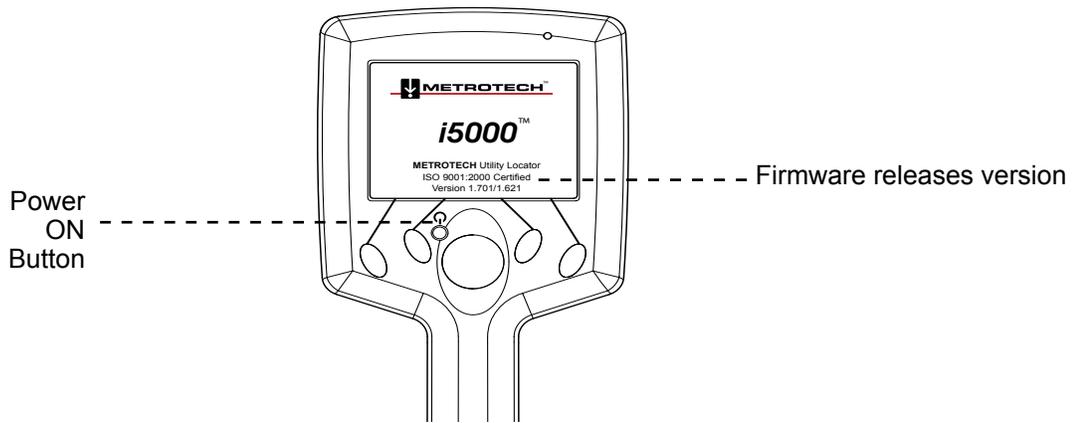


Figure 2-1 i5000 Welcome Screen

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

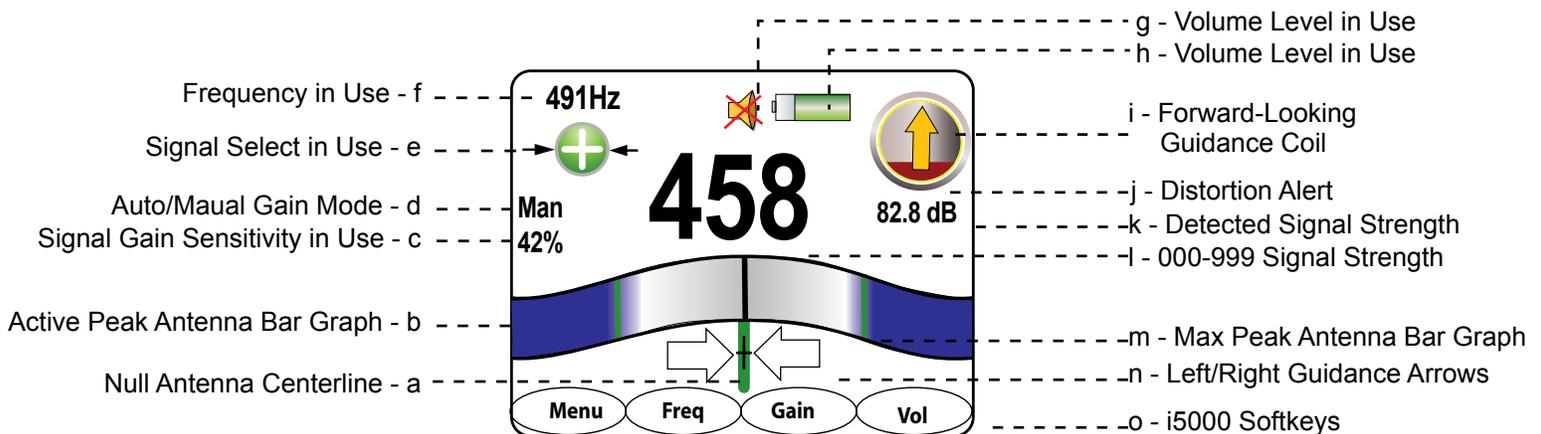


Figure 2-2 Line Locate Operational Interface in Manual Gain Mode

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, peak bar graph, and the null needle respond to movements of the receiver.

3) Determine the Center Line Position

Use the bar graph and signal strength readings to first determine the maximum or peak field strength. Then use the left/right directional arrows to center the line and confirm the position of the target conductor.



In a distorted field, typically in a congested area, it is common for the peak signal and null needle to not agree in the centerline.

NOTE

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.

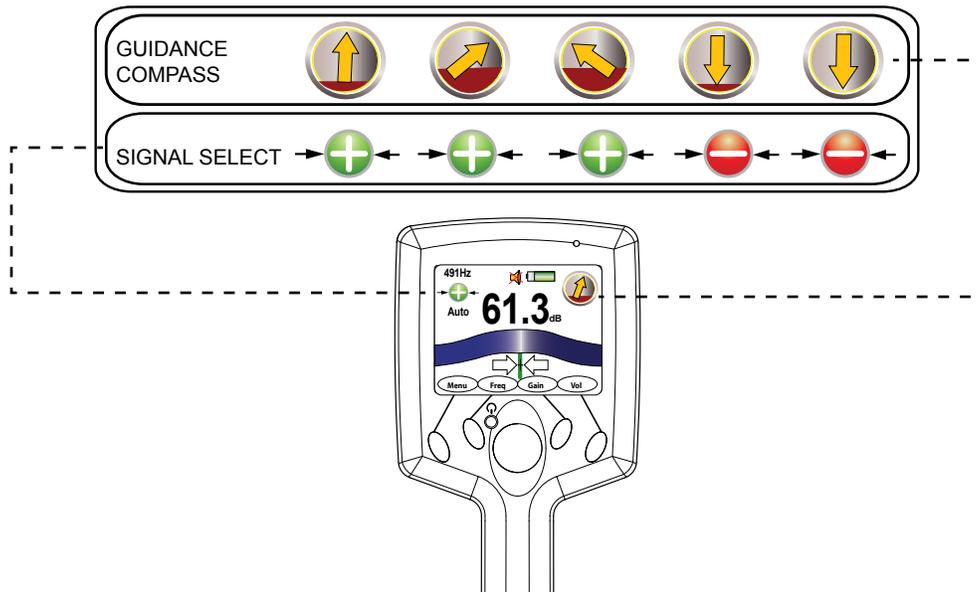


Figure 2-3 Operational Interface

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 2-4 Depth & Current Measurement Screen

2.2 Switching to Marker Locate Mode

- 6) Press the Menu softkey and 4-way navigation button to access the Shortcut Menu list. Select the line locate/marker switch shortcut from the menu list to easily switch from line and marker locate modes from the operational interface.
- 7) Press the Type softkey to choose the desired electronic utility marker to be detected.
- 8) Observe the signal strength to detect and determine the location of a buried marker. The maximum signal strength will indicate the location of the buried marker.
- 9) Press downward on the 4-way navigation to calculate marker depth.

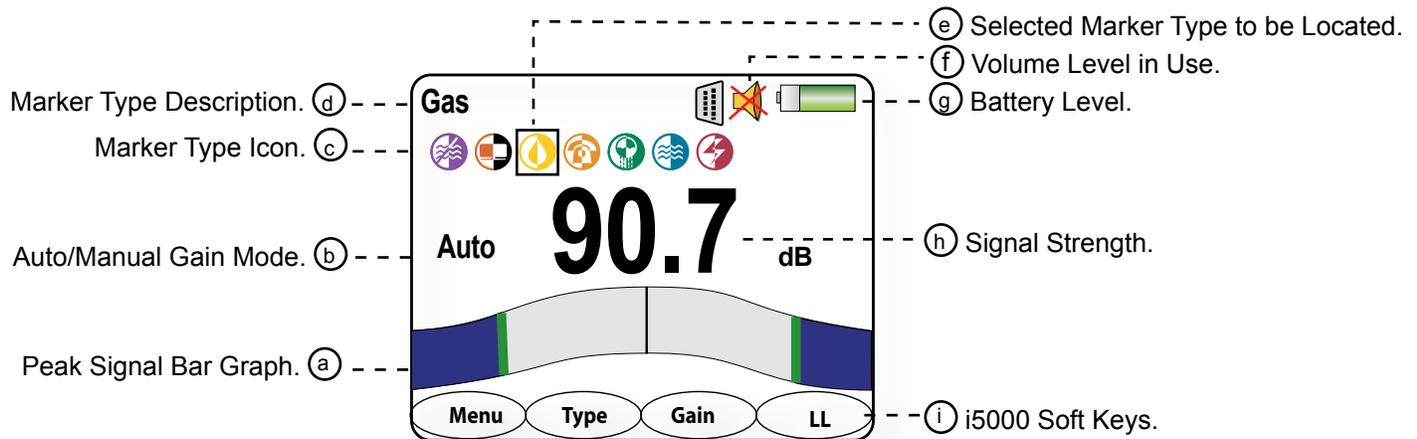
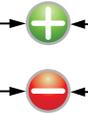


Figure 2-5 Marker Locate Mode

2.3 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	982 Hz The active frequency, or the passive band name (power or RF), is always shown 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.
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).
Electronic Utility Markers (EMS)	 Icons represent the various utility markers by industry available for locating.

3 System overview

3.1 i5000™ MetroMark™ 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.

3.1.1 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.

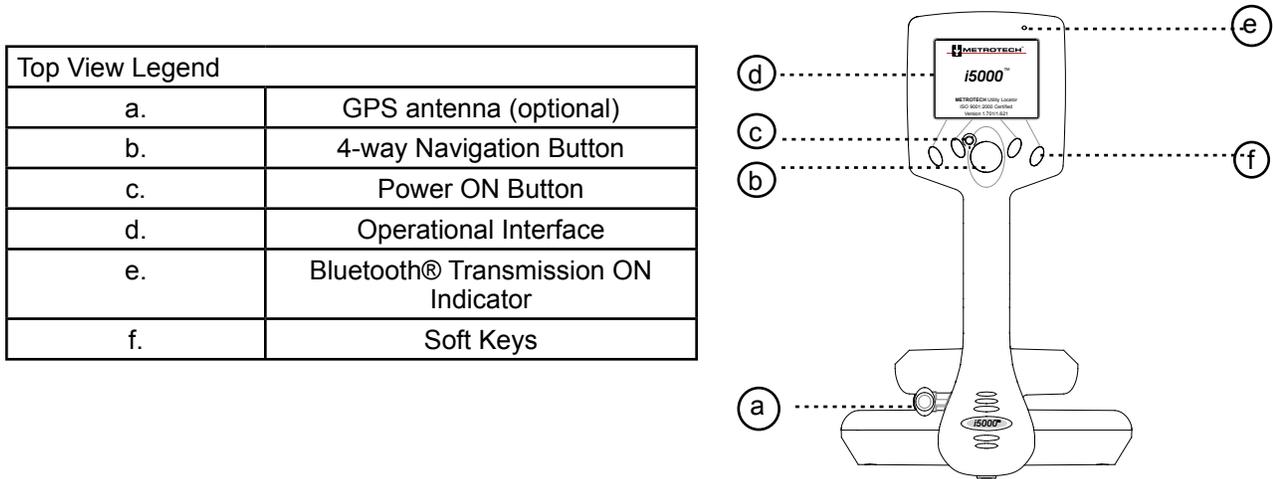


Figure 3-1 i5000 Top View

3.1.1.1 Operational Interface – Line Locate Mode

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

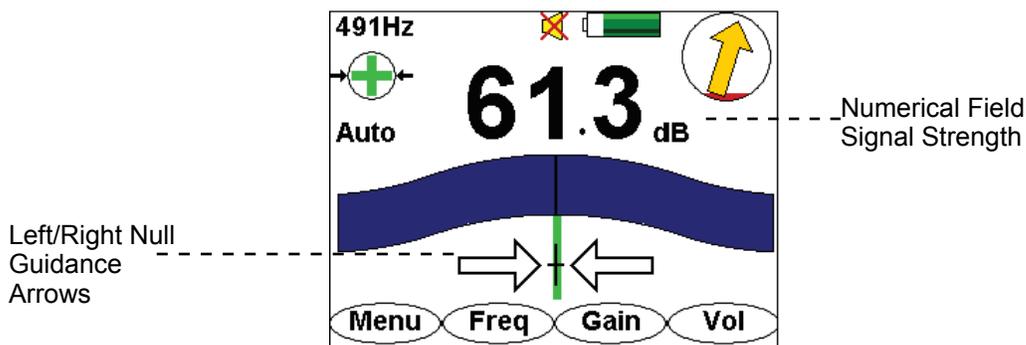


Figure 3-2 Line Locate Mode Interface

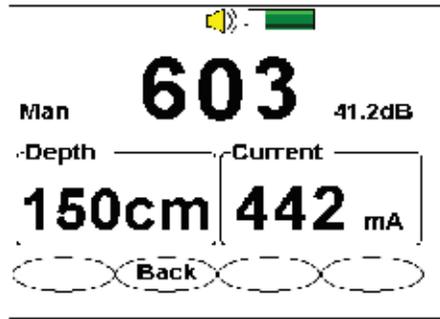


Figure 3-3 Measurement Interface

3.1.1.2 Operational Interface – Marker Locate Mode

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

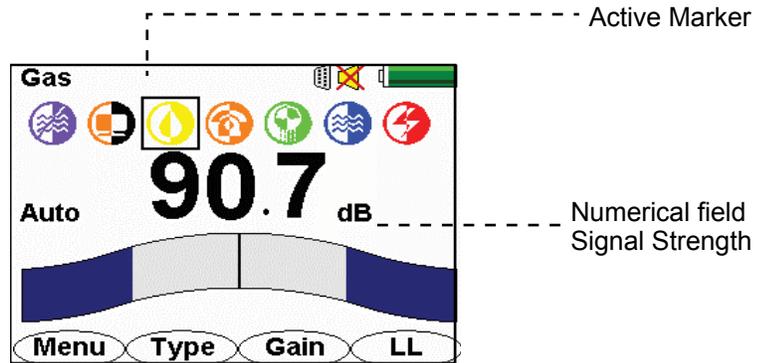


Figure 3-4 Marker Locate Interface

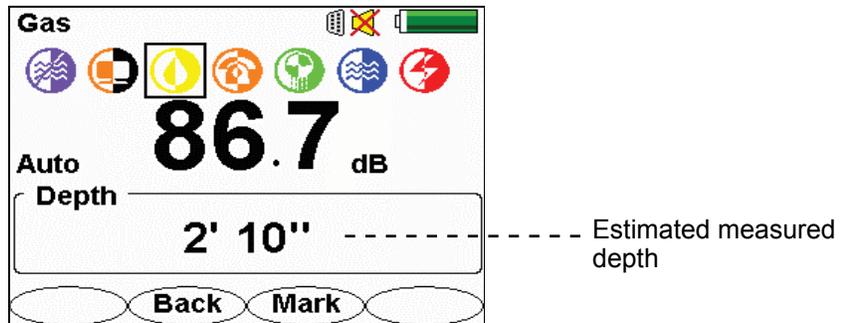


Figure 3-5 Measurement Interface

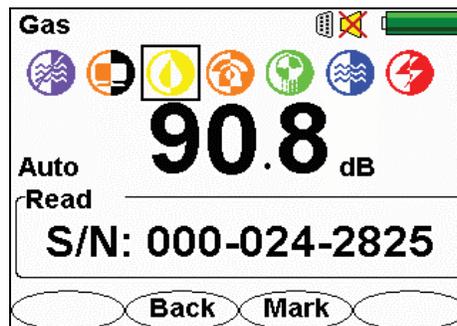
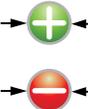


Figure 3-6 Marker Read Interface

3.1.1.3 Display Elements

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

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	982 Hz	The active frequency, or the passive band name (power or RF), is always shown 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.
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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 i5000 receiver.
GPS		Indicates the receiver can receive signals from 3 or more satellites (optional).
Electronic Utility Markers (EMS)		Icons represent the various utility markers by industry available for locating.

3.2 Side Views

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

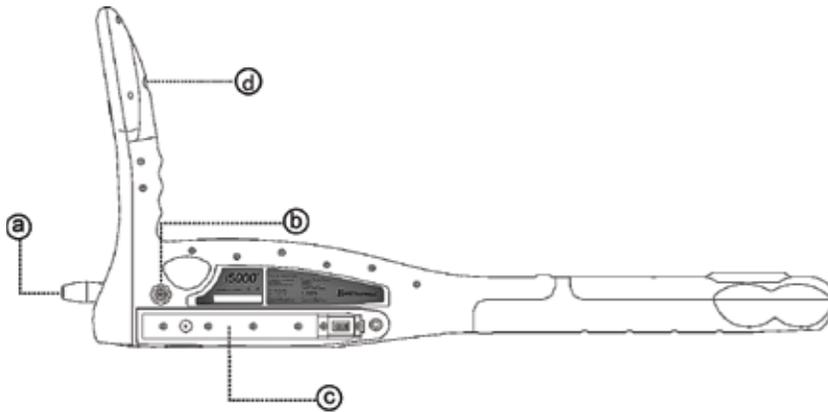


Figure 3-7 i5000 Side View

Side View Legend	
a.	GPS antenna (optional)
b.	Smart Accessory Connector
c.	Battery Pack Receptacle
d.	IP67 RS232 serial connector port

3.3 Battery Pack

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

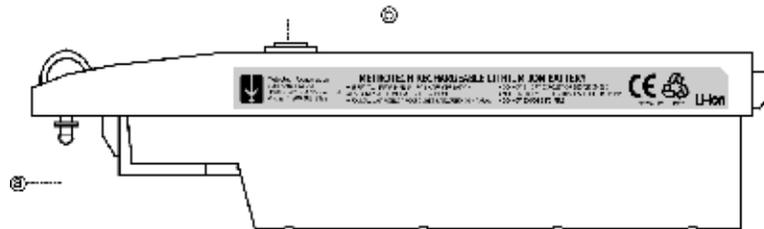


Figure 3-8 Li-ion Battery Pack

Battery Pack Legend	
a.	Battery Lock
b.	Recharging Receptacle

3.3.1 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 sunlight.
	The Li-ion battery will charge in the i5000 receiver with the unit's power OFF. No light indicator confirms the battery is charging. Powering the unit ON will confirm the receiver battery is charging.

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.
--	---

4 Receiver Technical Specifications

4.1 Line Locate Mode:

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 (International) Extended and special frequency sets optional.
Passive Frequencies (Hz)	50, 60, 100, 120, RF (14k-21k)
Depth Display Accuracy	0-10ft (10-3m) +/- 5%+2" under ideal field conditions 10-20ft (3-6m) +/- 10% under ideal field conditions
Depth Range	Maximum 20ft

4.2 Electronic Marker System (EMS) Locate Mode:

Gain Adjustment	Automatic & manual with push button centering		
Detection Range	5ft. (1.5 m)		
Marker Read Capability	10 digit ID number (XXX-XXX-XXXX), 3M™ EMS Marker iD only		
Operating Frequencies	Utility	Industry Code	Frequency (kHz)
	Power	Red	169.8
	Water	Blue	145.7
	Sanitary	Green	121.6
	Telephone	Orange	101.4
	Gas	Yellow	83.0
	Cable Television (CATV)	Orange/Black	77.0
	Non-Potable (NP) Water/ General Purpose	Purple	66.35

4.3 General System:

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, peak signal bar graph, null needle centerline, 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 and Transceiver
Communications	Bluetooth® or RS232 serial cable
Data Acquisition	GPS, 2MB (optional), internal data logging memory
Operating Temperature	4°F to +122°F (-20°C to +50°C)
Battery Type	Li-ion rechargeable or 9 AA Alkaline
Battery Life	Up to 30 hours continuous, depending upon use (Li-ion) Up to 20 hours continuous, depending upon use (Alkaline)
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	5.53 lb (2.5 kg)
Regulatory Compliance	FCC, CE
Environmental	IP54

4.4 Options

4.4.1 Standard Kit

- Li-ion rechargeable battery pack
- AC power adapter for rechargeable battery
- 12 VDC automobile charger kit
- Operations manual
- Hard carrying case

4.4.2 Purchasable Options

- GPS
- MyLocator™ online web service for data logging, warehousing and analysis
- Soft carrying case

4.5 Accessories

A list of available i5000 accessories is below.

Part	Accessory	Description
Search Coil		The Search Coil is a multifunctional mini antenna that connects to the receiver for line tracing or cable identification using Signal Select™. The search coil accessory can be used at 491Hz, 982 Hz, or 9.8kHz.
2" MetroClamp™		2" (50mm) inductive coupler. The inductive coupler can be use at 9.8kHz or 82kHz.
Signal Select™ Clamp		6" (150mm) inductive coupler equipped with Signal Select to aid cable identification.
4" MetroClamp™		4" (100mm) inductive coupler. The inductive coupler can be used at 9.8kHz or 82kHz.

Part	Accessory	Description
8" Clamp		8" (200mm) inductive coupler. The inductive coupler can be used at 9.8kHz or 82kHz.
Soft Carrying Case		Hard or soft nylon case equipped to contain one transmitter, one receiver, and accessories.
Transmitter Battery, Rechargeable		Rechargeable Li-ion battery pack
Transmitter Battery Holder, Alkaline		6 D-cell alkaline battery holder
Receiver Battery, Rechargeable		Rechargeable Li-ion battery pack
Receiver Battery Holder, Alkaline		9 AA-cell alkaline battery holder
A Frame		Standalone A frame for pinpointing sheath faults.
Conductive Attachment Kit		Conductive attachment kit includes conductive leads for direct connection, ground rod, and carrying case.
Ground Rod		Earth ground rod
Sondes		Small, large, and flexi-sondes available in different operating frequencies – 982Hz, 9.8KHz, 35KHz, 82KHz, 83KHz
RS232 communication kit		DB-9 RS232 null modem cable and RS2323 receiver adapter for data transfer and software updating
AC Charger Kit		Charging cable for the transmitter and receiver
12 VDC Automobile Charger		Charging cable for the transmitter and receiver
Doc. No.: R12015		Metrotech Copyright © 2008

5 Features

5.1 i5000 MetroMark™ Receiver Features

The locate receiver is the locate technician's most important tool. The i5000 MetroMark is a multi-functional utility locator, designed to locate metallic or conductive pipes and cables, sondes, and buried utility markers.

5.1.1 Line Locating Mode

First and foremost, the i5000 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. The receiver includes advanced line confirmation technology that reduces the subjective element of a locate.

5.1.1.1 Signal Strength

Determining the centerline and depth of the target should first concentrate on locating the peak signal strength. Signal strength is a representation of the amount of current flowing in an underground conductor, at a particular depth. 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.

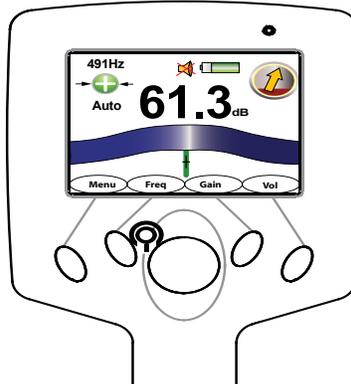


Figure 5 1 Auto Gain Mode Interface

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.

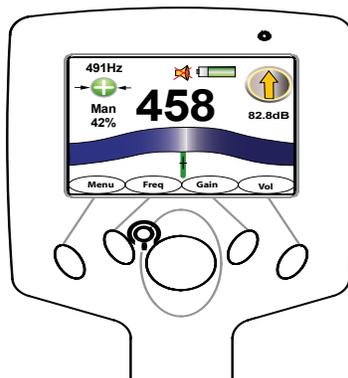


Figure 5 2 Manual Gain Mode Interface

As the peak position is identified and the receiver is used in a swinging motion, the peak position (or strongest detected field strength) is displayed graphically by the green bar graph then slowly decreases as the signal strength changes. This peak hold representation gives the user a graphical indication of the last identified peak signal.

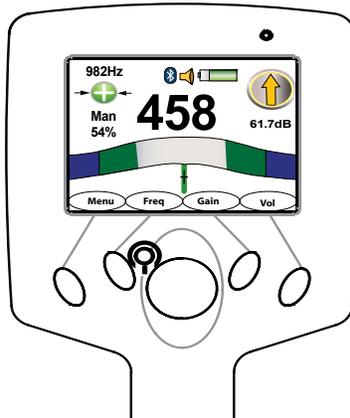


Figure 5-3 Peak Position Graphical Bar Display

5.1.1.2 Left/Right Guidance Display

The Left/Right display is tremendously useful in refining the precise location of the target line. Note: User should always determine the peak signal first. The vertical green bar represents the underground utility using the null antenna. When shown on the left to the centerline it indicates the target is also to the left. The arrow points towards the left, directing the user to step in this direction.

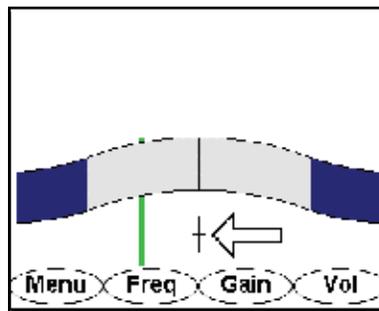


Figure 5-4 Left/Right Guidance

When the vertical bar is shown to the right of centerline, it indicates the target is to the right. The arrow points towards the right, directing the user to step right.

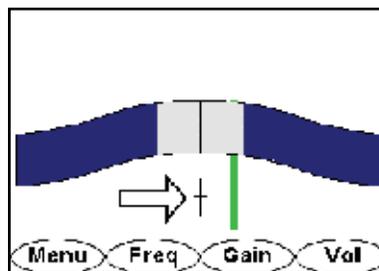


Figure 5-5 Left/Right Guidance

Often the receiver is used in a sweeping 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.

5.1.1.3 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
Electronic Utility Markers	66.35k, 77.0k, 83.0k, 101.4k, 121.6k, 145.7k, 169.8k

5.1.1.4 Positive Line ID



Positive Line ID is an essential task of a modern locate receiver. The i5000 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 an equal effect at all frequencies.

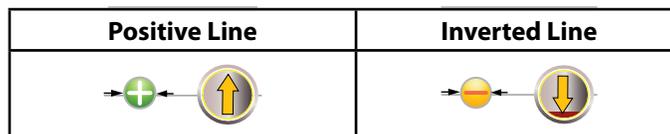
Both bleedover and bleedoff can cause signal distortion, since the magnetic field induced from an applied AC current (the directly coupled signal) exists on multiple lines and can constructively or destructively combine. This, of course, depends on the relative positions and currents of the utilities 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.

5.1.1.5 Signal Select

The Signal Select locate method allows for the detection of galvanically connected reverse (bleedoff) currents, as well as bleedover currents caused by capacitive and inductive coupling.



The direction of the signal in the targeted line is determined by analyzing the sign of the demodulated Signal Select. 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 downward for a line that is bonded to the target line and carries return current, as shown in Figure 5-6.

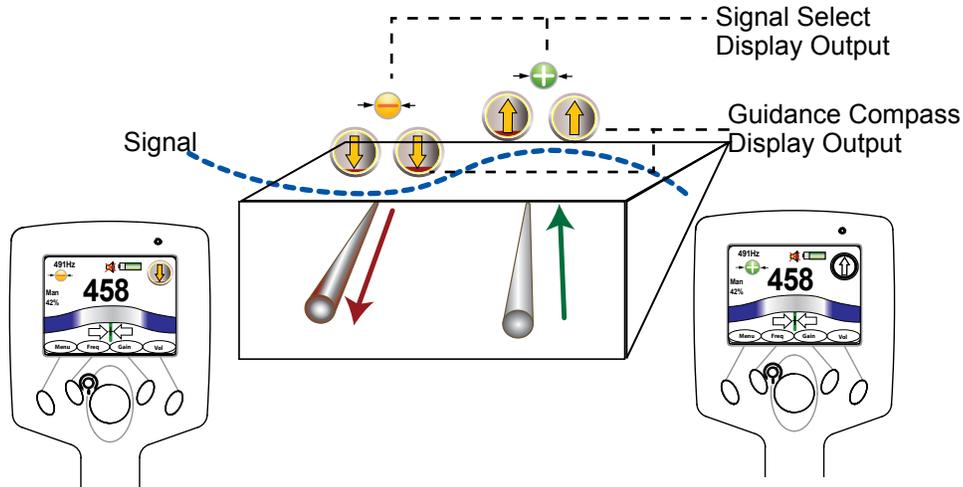


Figure 5-6 Signal Select Sample Scenario

5.1.1.6 Distortion Alert

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.

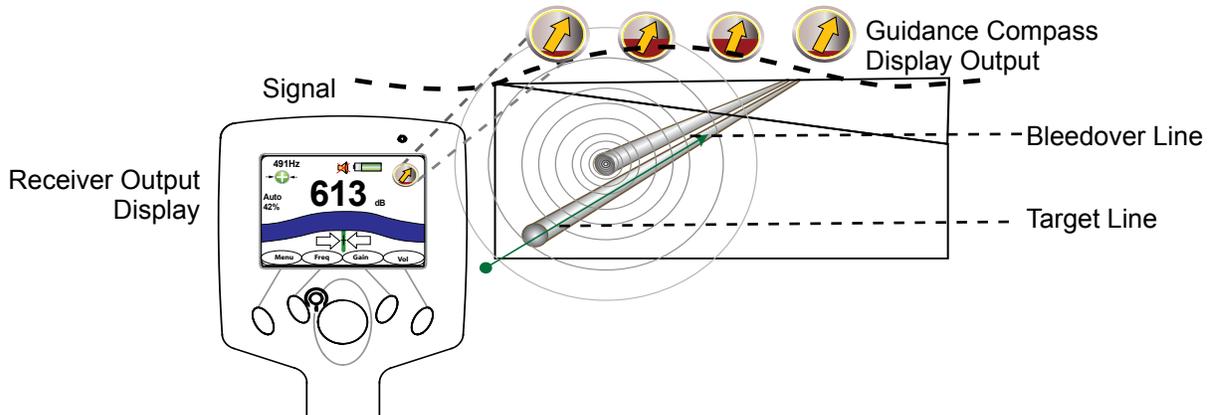


Figure 5-7 Distortion Alert Sample Scenario

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

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. 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.

5.1.1.7 Depth and Current Measurements

When the receiver is located directly over the centerline, the Depth button (“down” section of 4-way navigation key) can be used to estimate 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.

	<p>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.</p>
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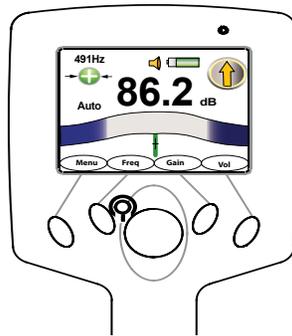


Figure 5-8 Recording Depth Measurement Interface

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



Figure 5-9 Depth Measurement Interface

For data logging purposes, the operator may press the <Mark> softkey to identify a particular data point as a valid entry into the log file. Depth measurements keep taken to help the operator understand the field conditions of the locate site should not be marked using the <Mark> softkey.



Figure 5-10 Data Logging Depth Measurement Interface

For passive power and radio frequency locating, only the peak antenna is used and displayed.

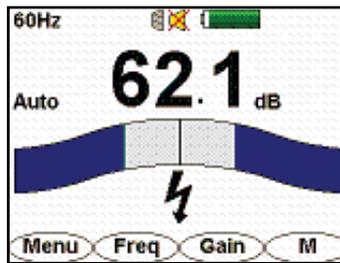


Figure 5-11 Passive Power Operational Interface

5.2 Marker Locating Mode:

The i5000 MetroMark is equipped to locate passive and active buried electronic markers. If these electronic utility markers are known to be buried underground, the i5000 MetroMark can be easily converted with a softkey function to transmit a signal pulse from the receiver down to the ground. This signal pulse for a single utility activates the buried marker that in turn generates a magnetic field response detected by the receiver.

Each marker, depending upon the utility type, emits a specific frequency signal. The frequency emitted by utility type is listed below.

Utility Type	Color Icon	Frequency (Hz)
Non-Potable (NP) Water		66.35K
Cable Television (CATV)		77.0K
Gas		83.0K
Telecommunications		101.4K
Waste Water (Sanitary)		121.6K
Water		145.7K
Power		169.8K

The Marker Locating Mode displays essential information about the marker the user is trying to detect underground with a representative icon and text description of the target utility. For marker locating, the peak signal bar graph and numerical signal sensitivity are displayed to pinpoint the position of the buried marker. Locate the maximum peak signal to determine the marker location and calculate depth.

Four softkeys are available to operate the locating instrument – main **Menu** access, **Type** to switch marker types, **Gain** to allow auto and manual gain switching, and a shortcut softkey. The example shown uses the shortcut softkey to switch from Line Locate (LL) mode from Marker Mode (M) operation.

5.2.1 Changing the Marker Type

Continuously press the <Type> softkey until the desired icon is selected and bound in the box.

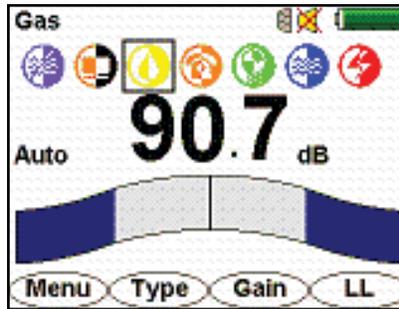


Figure 5-12 Marker Locate Mode Operational Interface

5.2.2 Measuring Depth

Once located, the marker depth can be calculated by pressing downward on the 4-way navigation button. The depth can be recorded as a “Marked” position if desired by pressing the <Mark> softkey.

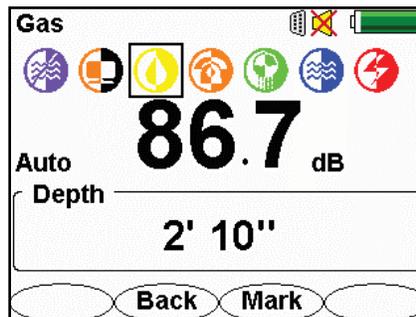


Figure 5-13 Recorded Depth in Marker Locate Mode

5.2.3 RFID Smart Marker Read Mode

In Marker Locate mode, the i5000 MetroMark has the capability of locating and reading the RFID of active markers. This information is the serial number associated with the buried marker.

To activate a marker reading, the <Read> softkey must be selected as a shortcut softkey. Review the Menu System for setup instructions. If detected, the detected marker’s ten digit serial number will be displayed.

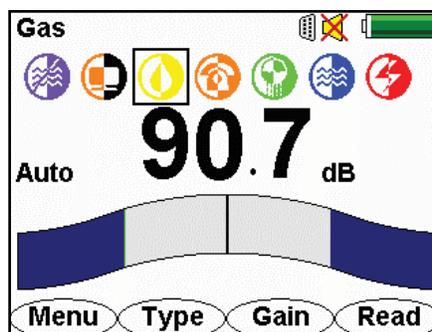


Figure 5-14 Marker Mode with Read shortcut softkey

For data logging purposes, the <Mark> button can be pressed to “Mark” further distinguish that specific marker depth from other locate.

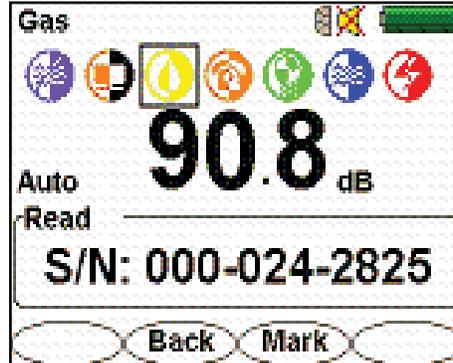


Figure 5-15 Marker Mode reading RFID serial number

5.3 Sonde Locating Mode

The i5000 is equipped to locate active sondes used in non-metallic ducts or pipes that transmit a signal frequency such as 512 Hz, 640 Hz, 982 Hz, 9.8 kHz, or 82 kHz. Like line location, the sonde’s underground depth and position can be measured by pressing the 4-way navigation button downward.

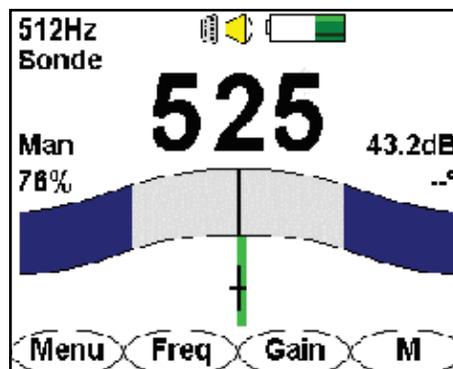


Figure 5-16 Sonde Locate Mode Operational Interface

5.4 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 or other device host is currently connected and transferring data to the receiver.

These “paired” devices will interact with the receiver within the 30 ft. (9m) range capability. See section 6.2.4 for pairing devices to the i5000.

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

5.5 Battery

Various battery types are available for operation. Depending upon use, an operator can expect typical battery performance in continuous operation as follows. Operating the i5000 MetroMark consumes greater battery use compared to line locating.

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

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

5.6 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.

5.7 Data Acquisition (Optional)

Locate data is recorded and stored in the receiver's memory until uploaded 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.

The i5000 receiver has the capability of storing up to 2 MByte of recorded locate data. File size will vary, however, depending upon the user's data logging setup and standard site work order procedure for collecting the data. Minimum file size can be as small as 100 bytes, which could be estimated to cover one month's workload.

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

6 Menu System

6.1 i5000 MetroMark™ Menu System

The receiver's menu system includes six (6) selectable menus for configuring the i5000™. Press the <Menu> softkey from the operational interface to access the main menu.

6.2 Main Menu

To access the main menu, press the <Menu> softkey 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.

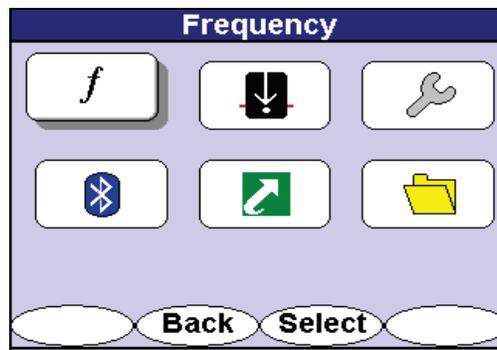


Figure 6-1 Main Menu Selection

6.2.1 Frequency Menu

The Frequency menu activates or deactivates any of the available receiver frequencies. Depending on the configuration of your i5000 MetroMark 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
Electronic Utility Markers	66.35k, 77.0k, 83.0k, 101.4k, 121.6k, 145.7k, 169.8k

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

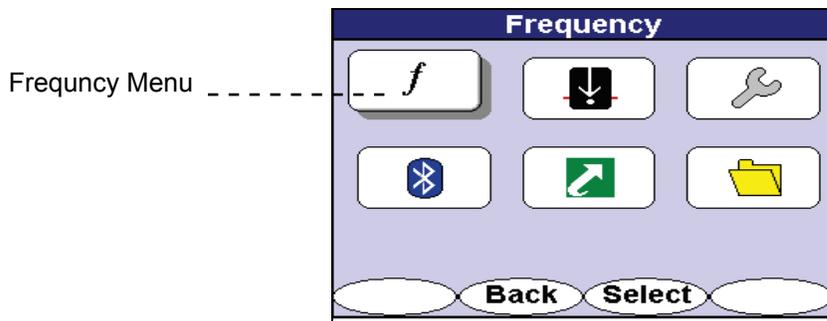


Figure 6-2 Frequency Menu Selection

6.2.1.1 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> softkey 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> softkey. Deactivated frequencies will be unavailable for use. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

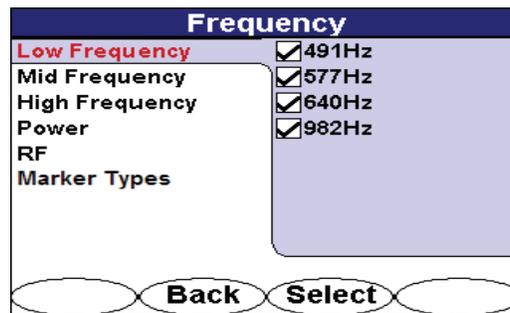


Figure 6-3 Low Frequency Selection Screen in Frequency Menu

6.2.1.2 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> softkey 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> softkey. Deactivated frequencies will be unavailable for use. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

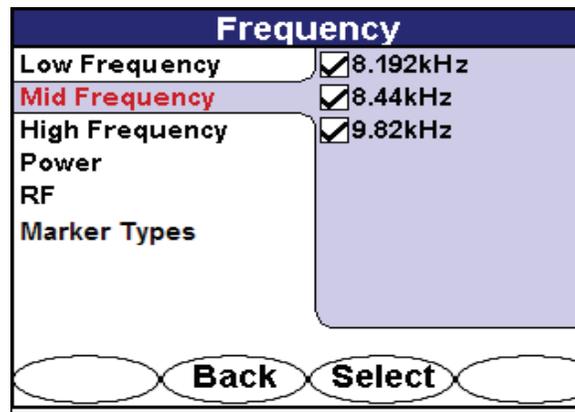


Figure 6-4 Mid Frequency Selection Screen in Frequency Menu

6.2.1.3 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> softkey 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> softkey. Deactivated frequencies will be unavailable for use. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

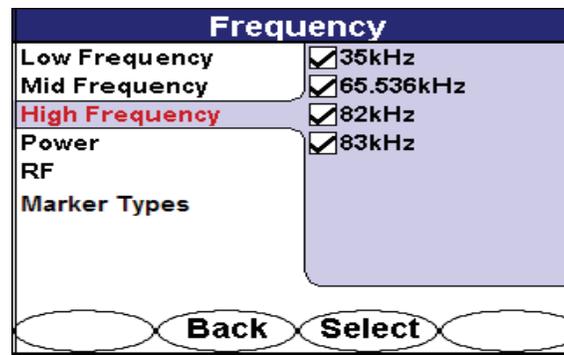


Figure 6-5 High Frequency Selection Screen in Frequency Menu

6.2.1.4 Power

The Power menu allows selection between 50Hz/60Hz passive locating modes and their harmonics.

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> softkey 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> softkey. Deactivated frequencies will be unavailable for use. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

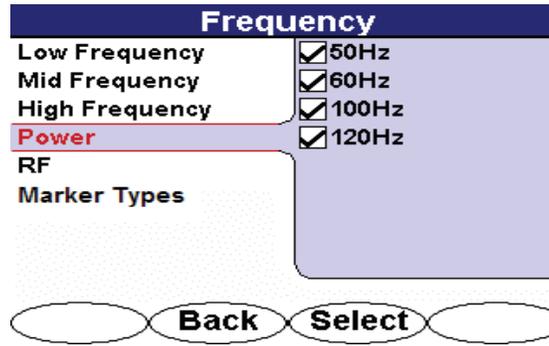


Figure 6-6 Power Frequency Selection Screen in Frequency Menu

6.2.1.5 RF

The RF menu allows the activation or deactivation of the RF passive locating capability, 14 kHz – 21 kHz, of the i5000 MetroMark 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> softkey to activate or deactivate specific or all frequencies.

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

Activated frequencies can be selected from the operational interface by pressing the <Freq> softkey. Deactivated frequencies will be unavailable for use. Selecting fewer frequencies allows faster toggling between frequencies from the operational interface.

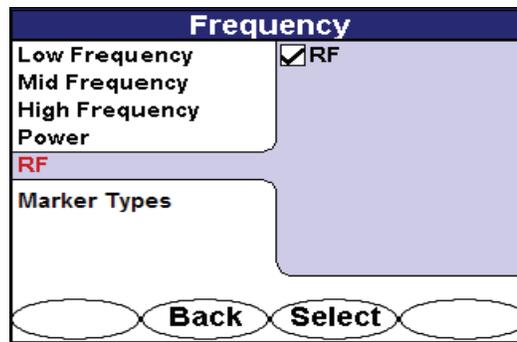


Figure 6-7 RF Selection Screen in Frequency Menu

6.2.1.6 Marker Types

The marker frequency selection menu displays the marker types that can be located with the i5000 MetroMark. The available markers are listed below.

Using the 4-way navigation button, move up and down the menu list to highlight the desired frequency set. Use the 4-way navigation button, to move left and right to highlight the specific marker type or to return to the menu list. Use the <Back> softkey to return to the main operating interface.

Press <Select> to choose the desired marker types to be displayed on the operating interface. The selected or check-marked marker type will then be activated, displayed and ready for locating from the operational interface. Deactivating marker types or un-checking marker types will not be displayed for locating on the operating interface. In this example, the following marker type icons would be displayed on the main operating interface: Non-Potable (NP) Water, Gas, Telephone, Water, and Electric. The following deselected marker types (unchecked items) would be hidden in the operating interface.

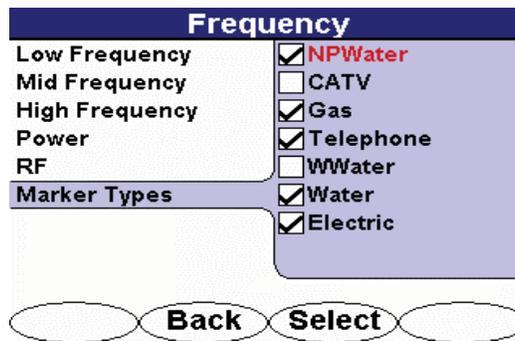


Figure 6-8 Frequency Selection Screen in Marker Mode

6.2.2 Mode Menu

The i5000 MetroMark receiver has three locate modes - line locate, sonde locate, and marker 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> softkey to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

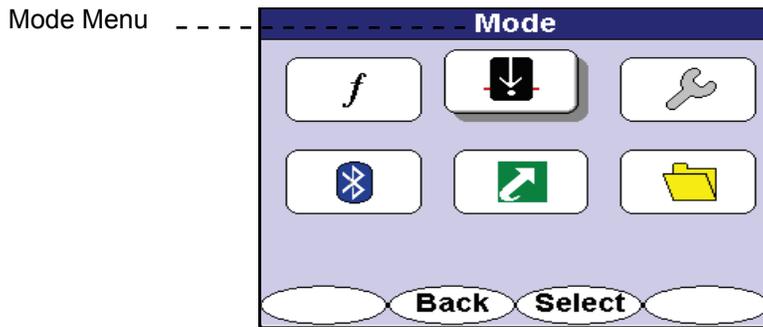


Figure 6-9 Mode Menu Selection

6.2.2.1 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> softkey to select the desired mode. The receiver will automatically return to chosen operational interface.

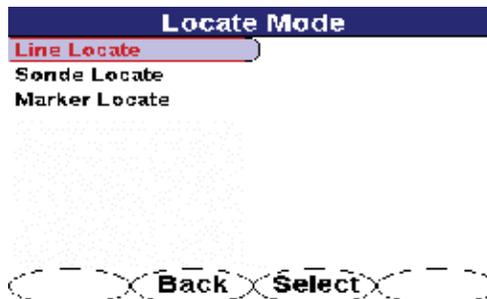


Figure 6-10 Line Locate Selection Screen in Mode Menu

6.2.2.2 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> softkey to select the desired mode. The receiver will automatically return to chosen operational interface.

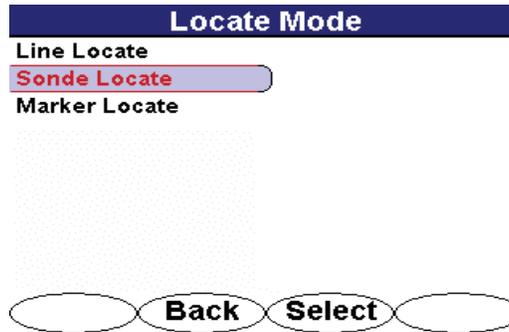


Figure 6-11 Sonde Locate Selection Screen in Mode Menu

6.2.2.3 Marker Locate

In Marker Locate mode, the receiver automatically adjusts to transmit and detect a specific frequency designated for a buried utility marker. A depth calculation can be generated after locating the marker’s peak signal.

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

Press the <Select> softkey to select the desired mode. The receiver will automatically return to chosen operational interface.

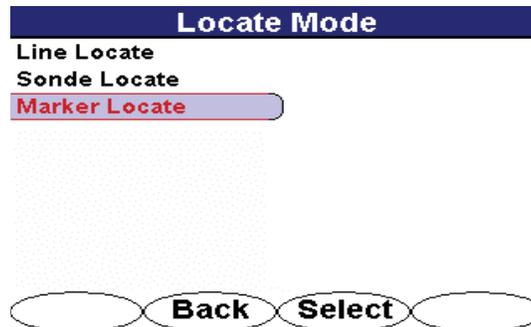


Figure 6-12 Marker Locate Selection Screen in Mode Menu

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

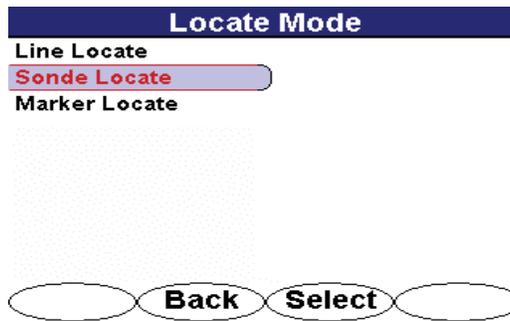


Figure 6-13 Settings Menu Selection

6.2.3.1 Personalize

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

- Distortion Number - Represents the numerical phase of the demodulated Signal Select.
- Distortion Graph - Visual distortion alert as seen in the Guidance Compass.
- Signal Select™ - Allows for Signal Select detection.
- Guidance Compass - Enables Guidance compass visual display.

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> softkey to activate or deactivate specific or all personalized settings. Press <Back> to return to the previous menu.

Access the settings menu to reactivate them.

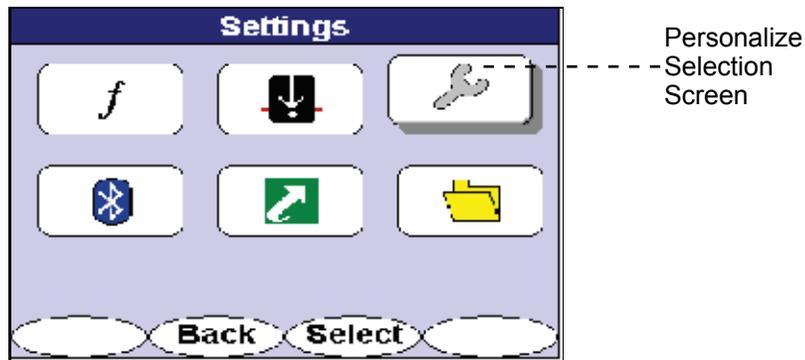


Figure 6-14 Personalize Selection Screen in Settings Menu

6.2.3.2 Audio

The Audio menu controls the i5000 MetroMark 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> softkey 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)

The LR audio produces a solid tone and pulsed tone, directing a user that the target conductor is to the left of the receiver or to the right of the receiver respectively. If a user is directly above the target conductor, no tone will be produced.

The AM tone follows the peak signal response of the sensor. As a user moves the receiver closer to the peak signal or farther away from the peak signal, the tone shall increase or decrease accordingly. If a user is directly above the target conductor, no tone will be produced.

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.

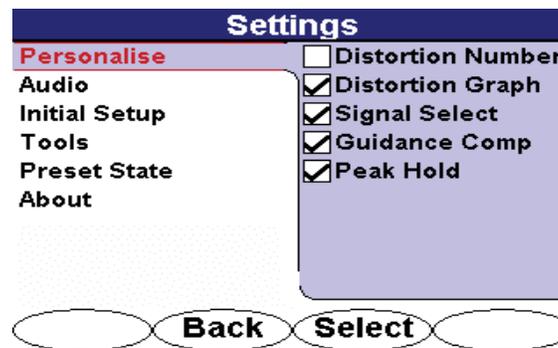


Figure 6-15 Audio Selection in Settings Menu

6.2.3.3 Initial Setup

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

- Backlight
- Units
- Auto-Off
- Frequency
- Language
- Mapping (optional)

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> softkey 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 centimeter. Press the <Select> softkey 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> softkey 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> softkey to toggle through the options.

The receiver's passive power **Line Frequency** default is set at the factory, depending upon the country configuration. Pressing the <Select> softkey to toggle through the options can change the passive power frequency.

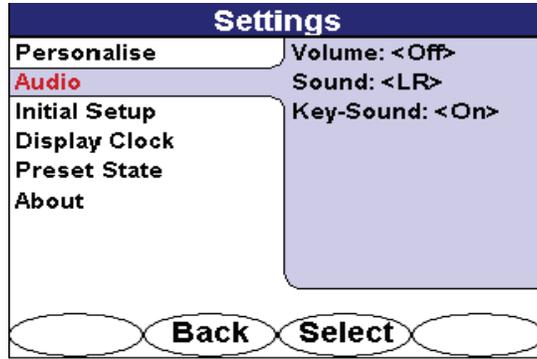


Figure 6-16 Initial Settings Selection in Settings Menu

6.2.3.3.1 Language

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

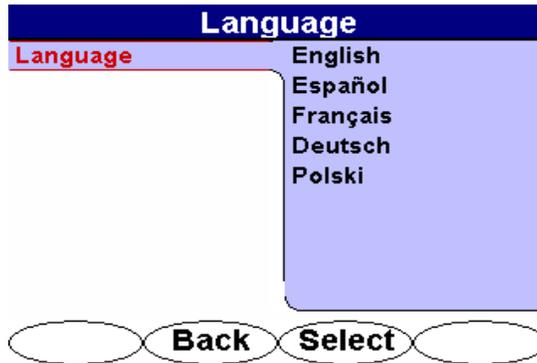


Figure 6-17 Language Selection Menu

6.2.3.3.2 Mapping (Optional)

If the i5000 is enabled to pair with a GPS receiver, the **Mapping** feature is configured to On. Press the <Select> softkey to turn the feature off.

6.2.3.4 Tools

The tools settings menu can be used to set up the local time reference. If GPS is enabled, the default clock time will reflect GPS clock time. The global positioning system (GPS) Clock Time is displayed in Greenwich Mean Time (GMT). Otherwise, the display clock references Metrotech’s network server clock time.

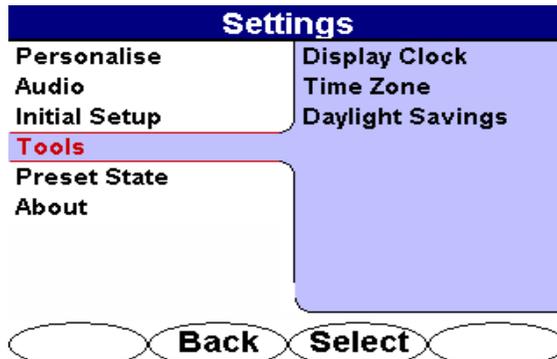


Figure 6-18 Tools Settings Menu

6.2.3.4.1 Display Clock

To display the clock time, use the 4-way navigation button to move up and down the settings list. Highlight Display Clock and press the <Select> softkey.

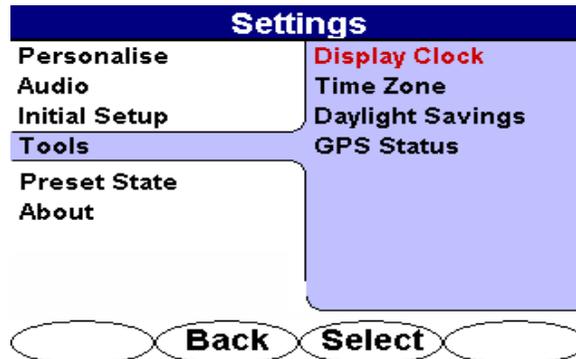


Figure 6-19 Display Clock Selection in Tools Settings Menu

The time is displayed. Press the <Back> softkey to return to the previous screen.

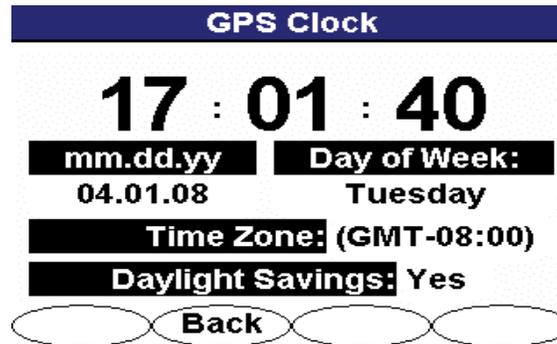


Figure 6-20 GPS Clock Display in Tools Settings Menu

6.2.3.4.2 Time Zone

The time zone can be manually selected according to the desired location. Use the 4-way navigation to move upward or downward to highlight the desired location. Press the <Select> softkey to change the time zone.



Figure 6-21 Time Zone Selection in Tools Settings Menu

6.2.3.4.3 Daylight Savings

The clock time can be manually adjusted for Daylight Savings to display the correct time during this period. The clock time must manually be readjusted to return to standard time.



Figure 6-22 Daylight Savings Screen Setup in Tools Settings Menu

6.2.3.5 GPS Status (Optional)

If GPS is enabled on the i5000, the GPS status screen will report the status of satellites available in the sky to achieve GPS locks.

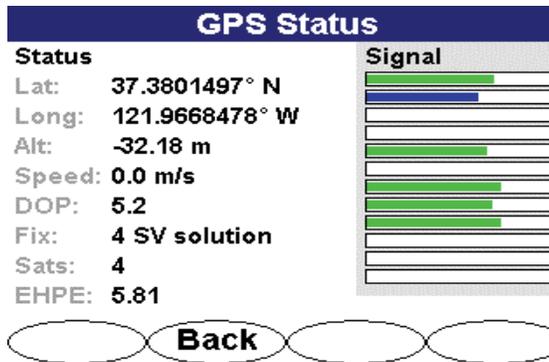


Figure 6-23 GPS Status Screen in Tools Settings Mode

The information provided include the current GPS position in terms of degrees latitude (**Lat**), degrees longitude (**Long**), altitude (**Alt**) in meters, speed, dilution of precision (**DOP**) for geometrical uncertainty or error, calculation method used to lock onto the satellite position (**Fix**), number of satellites locked onto the current position (**Sats**), and expected horizontal position error (**EHPE**).

6.2.3.6 Preset State

The Preset State menu option allows the operator to restore the i5000 MetroMark 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> softkey to choose the Preset State. Press the <Back> softkey to return to the previous interface.

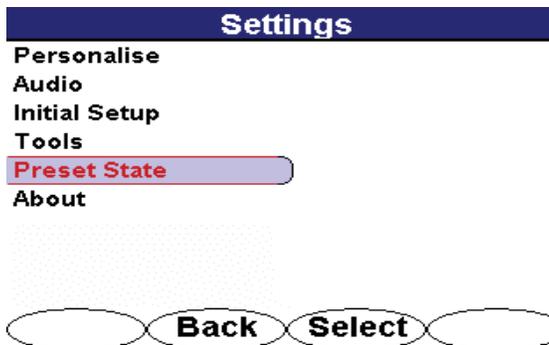


Figure 6-24 Preset State Selection in Settings Menu

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

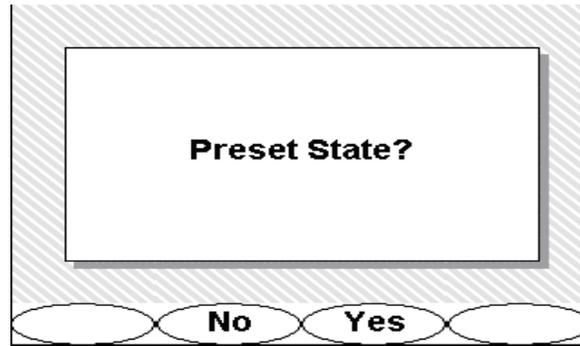


Figure 6-25 Preset State Option in Preset State Menu

Press the <No> or <Yes> softkey to return to the factory default settings.

6.2.3.7 About

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

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

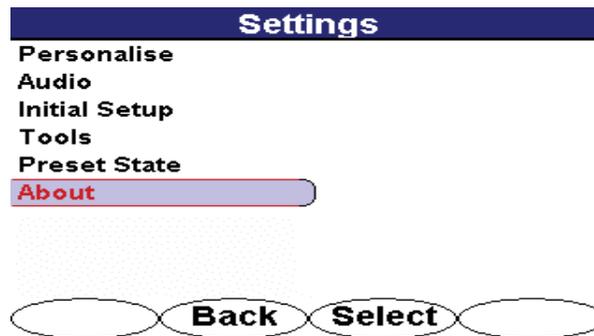


Figure 6-26 About Selection in Settings Menu

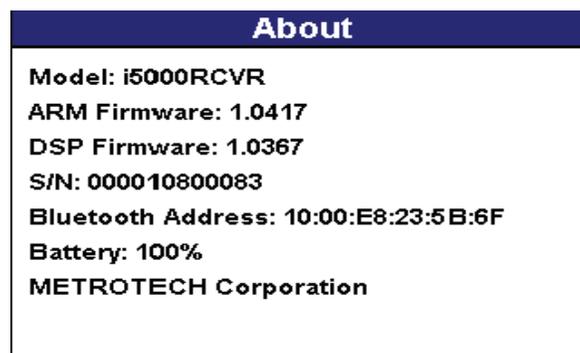


Figure 6-27 About Display Information in Settings Menu

6.2.4 Bluetooth Menu

The Bluetooth connection allows Bluetooth-enabled devices to communicate with the i5000 MetroMark receiver. The i5000 can be either host or client depending upon the transaction. Data, digital photos, and digital voice recordings saved in the memory. The recording can be transferred and launched via Bluetooth communication to laptop computers or PCs. The reverse is also available - locate ticket information and digital photos may be loaded into the i5000 MetroMark 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> softkey to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

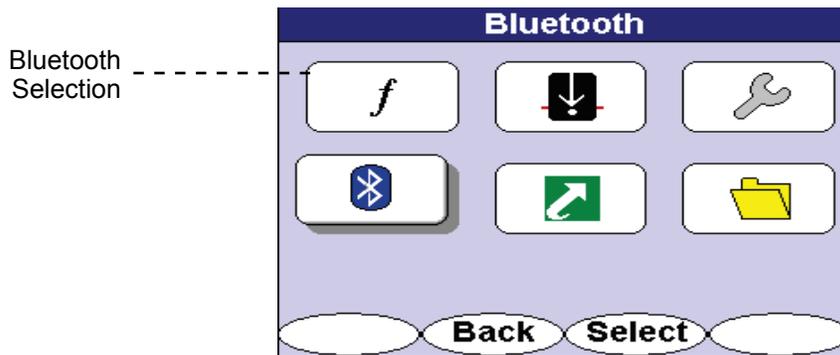


Figure 6-28 Bluetooth Selection in Main Menu

6.2.4.1 Discoverable

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

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

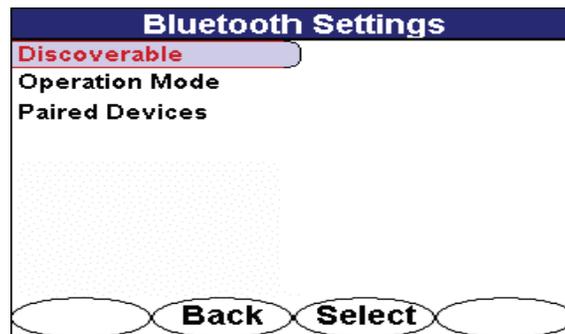


Figure 6-29 Discoverable Option in Bluetooth Menu

6.2.4.2 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> softkey to choose the option. Press the <Back> softkey to return to the previous interface.

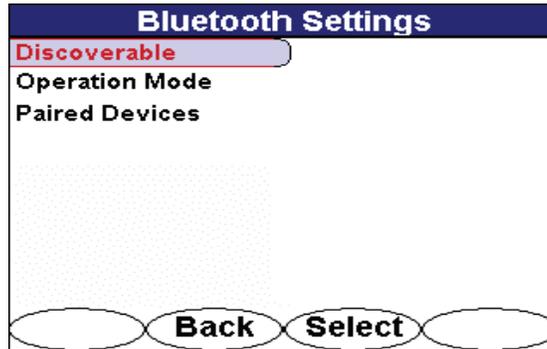


Figure 6-30 Operation Mode in Bluetooth Settings Menu

6.2.4.3 PC or Device Requirements

The i5000 can communicate as a host and/or client with any device operating with Bluetooth protocol v1.0 or higher.

If connecting to a PC, create a virtual port using the PC's Bluetooth procedure. Follow the Bluetooth supplier's instructions to create a virtual serial port for the i5000. The PC must establish a serial port protocol (SPP) through COM2 in order for communication to function properly. Once a virtual port has been set up, repeating this pairing should not be required.

	<p>If a Bluetooth pairing cannot be established, the user may be required to manually establish a SPP through COM2. Typical pairing failure results from the PC using a different port other than COM2 to establish a SPP.</p>
	<p>If your PC or device does not have a Bluetooth module installed internally, a USB-connected Bluetooth device may be used. Follow the supplier's instructions to properly install the Bluetooth driver prior to attempting any i5000 communication.</p>
	<p>If your PC or device requires a passkey to complete a pairing, a default passkey code of "0000" can be used.</p>

Sending voice recordings or images from a Bluetooth-enabled camera, personal digital assistant (PDA), or camera phone typically requires a simpler approach. These devices require that the file formats be pushed to the i5000 memory via Bluetooth, a similar approach to sending email. The data file transfer must be accepted on the receiver to complete the transaction.

6.2.4.4 Pair Devices

i5000 MetroMark 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> softkey to choose the option. Press the <Back>

softkey to return to the previous interface.

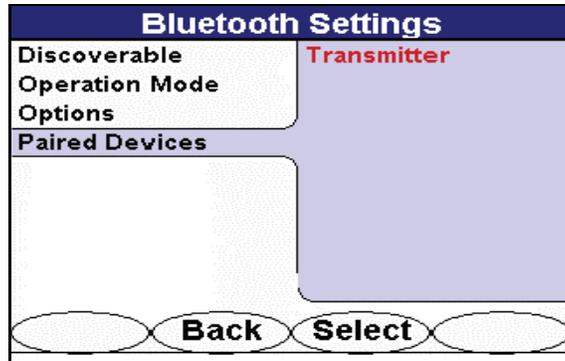


Figure 6-31 Paired Devices in Bluetooth Settings Menu

6.2.4.4.1 Pairing a Transmitter and Receiver Instructions

To pair a transmitter and receiver, make sure both instruments have the Bluetooth feature ON. The transmitter's Bluetooth should be set to discoverable. Press the <Select> softkey to initiate discovery of the transmitter. Press the <Back> softkey to return to the previous interface. Note; If the transmitter and receiver are in close proximity (i.e. within one foot), pairing may become difficult. Separate the two units with greater distance and retry.

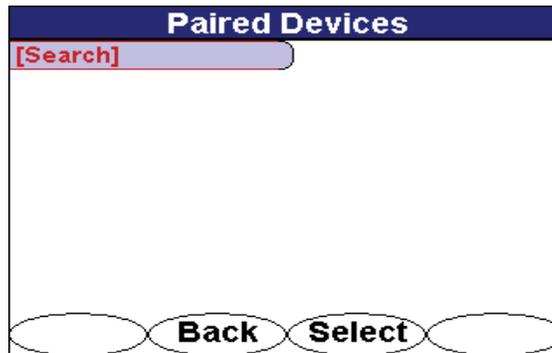


Figure 6-32 Search Feature in Paired Devices Menu

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> softkey 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> softkey to erase all paired devices.

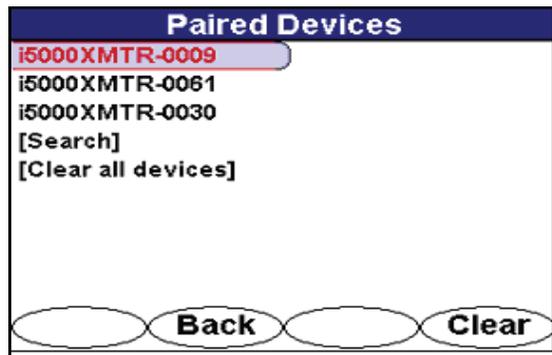


Figure 6-33 Transmitter List in Paired Devices Menu

6.2.4.4.2 Pairing a Mobile GPS Receiver with Global Mapping software and an i5000 (Optional)

The i5000 receiver can be used in conjunction with Metrotech’s Global Mapping software to document and map buried pipes and cables. The i5000 triggers an event to record the GPS coordinates through the software and Bluetooth interface at the marked location.

	<p>The i5000 must be activated with the Global Mapping feature at the factory or through MyLocator to properly pair a receiver and a mobile GPS receiver.</p>
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To pair a mobile GPS receiver and i5000, use the 4-way navigation button to select the Global Mapping feature in the Bluetooth Settings menu.

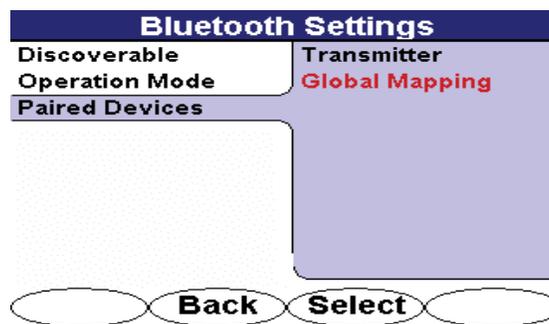


Figure 6-34 Global Mapping Screen in Bluetooth Settings Menu

Following the same instructions above for pairing a transmitter and receiver, press <Select> to search for Bluetooth devices in range. Make sure the GPS receiver Bluetooth is enabled prior to executing the command. Once detected, the GPS receiver name will be listed in the Paired Devices list.

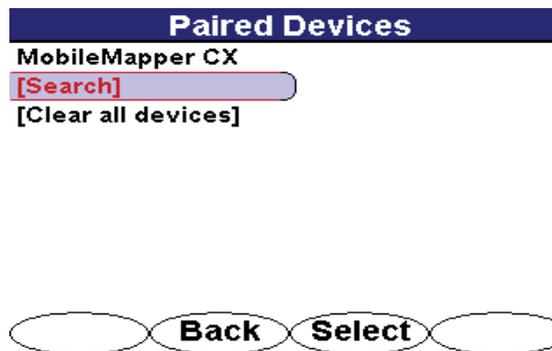


Figure 6-35 Bluetooth Pairing of Mobile GPS Receivers

6.2.5 Shortcuts Menu

Shortcuts set the right-most softkey 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> softkey to open the desired menu screen. Press <Back> to return to the operational interface. Use the 4-way navigation button to select another menu.

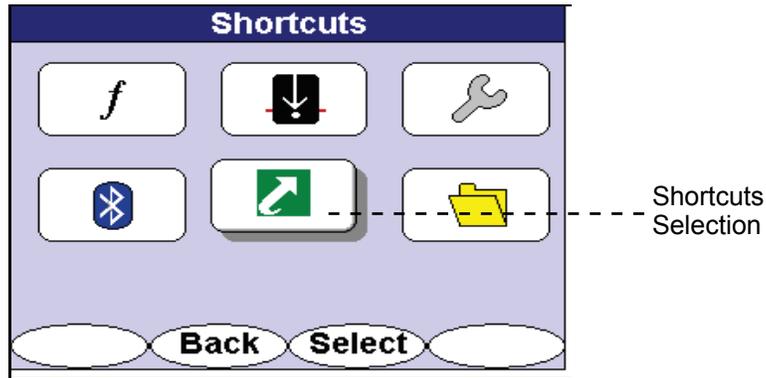


Figure 6-36 Shortcuts Selection in Main Menu

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

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

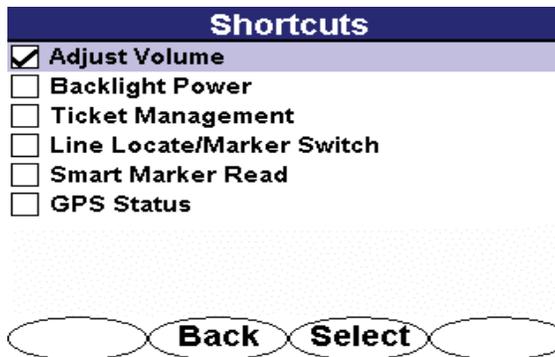


Figure 6-37 Adjust Volume Selection in Shortcuts Menu

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

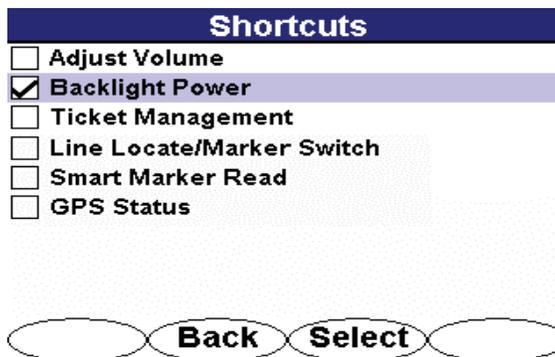


Figure 6-38 Backlight Power Selection in Shortcuts Menu

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

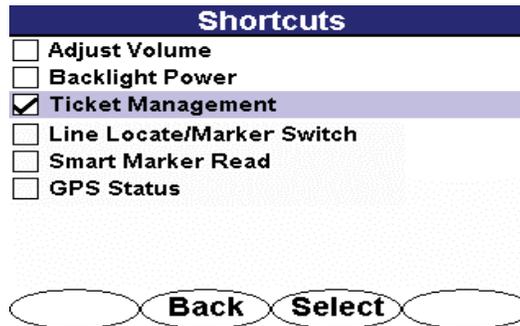


Figure 6-39 Ticket Management Selection in Shortcuts Menu

Selecting the Line Locate (**LL**)/Marker (**M**) Switch softkey shortcut allows the user to easily switch between the line locate mode and marker mode during normal use. Press the <LL> shortcut softkey to switch to line locate mode. Press the <M> shortcut softkey to switch to marker locate mode.

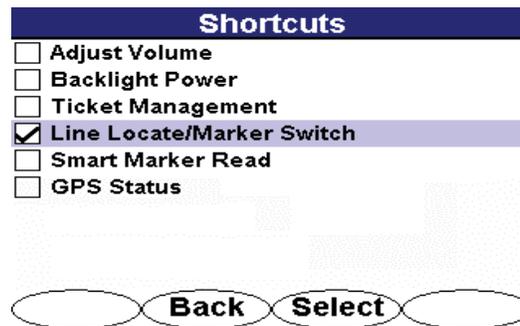


Figure 6-40 Line Locate/Marker Switch Shortcut Menu Screen

The **Smart Marker Read** will only function as described if used on an i5000 MetroMark receiver. Selecting the Smart Marker Read (**Read**) shortcut softkey allows the user to initiate the RFID marker read function from the operational interface. Access to reading active electronic RFID utility markers is available only with this shortcut softkey.

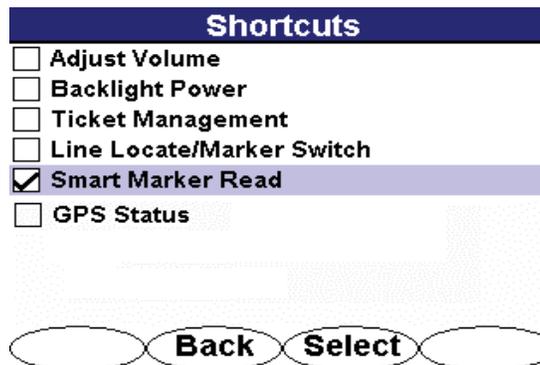


Figure 6-41 Smart Marker Read Screen in Shortcut Menu

The **GPS** Status shortcut softkey allows the user to access the GPS status screen in the Tools menu from the operational interface. Pressing the <GPS> softkey switches the current operating screen to the GPS status screen.

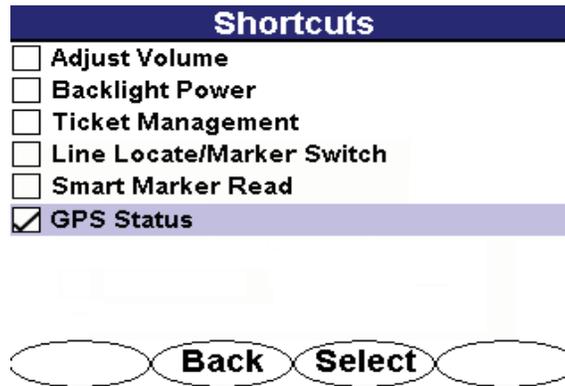


Figure 6-42 GPS Status Screen in Shortcut Menu

6.2.6 Data Logging Menu (Optional)

The Data Logging feature provides the user the capability to review and analyze data online through MyLocator (<https://mylocator.metrotech.com/>), Metrotech’s data warehouse and analysis web service. A MyLocator account can be retrieved after registering the i5000 equipment and agreeing to the service contract terms.

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> softkey to open the desired menu screen. Press the <Back> softkey to return to the operational interface.

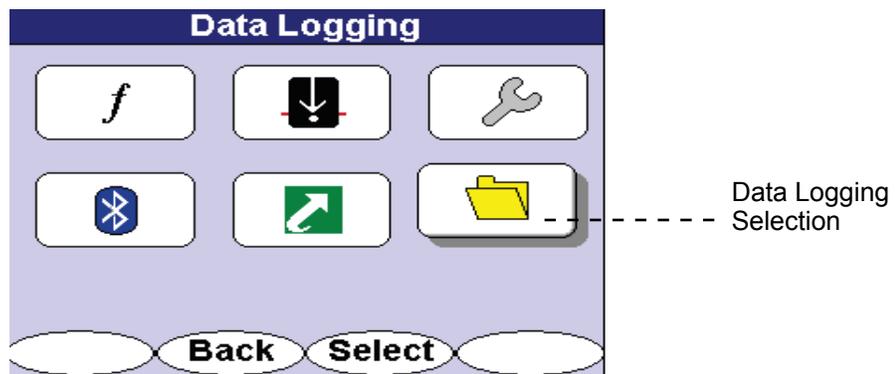


Figure 6-43 Data Logging Selection in Main Menu

6.2.6.1 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> softkey to open the menu. Press the <Back> softkey to return to the previous interface.

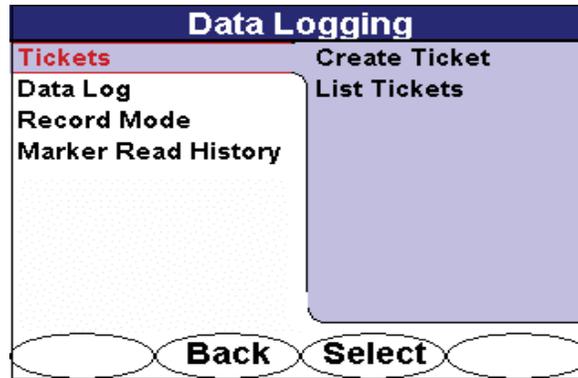


Figure 6-44 Tickets Selection in Data Logging Menu

6.2.6.1.1 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. New tickets created on the receiver will be viewed as SNXXXX_TEMP tickets in MyLocator. These temporary tickets can be renamed once in MyLocator to better distinguish the data information from other locates.

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

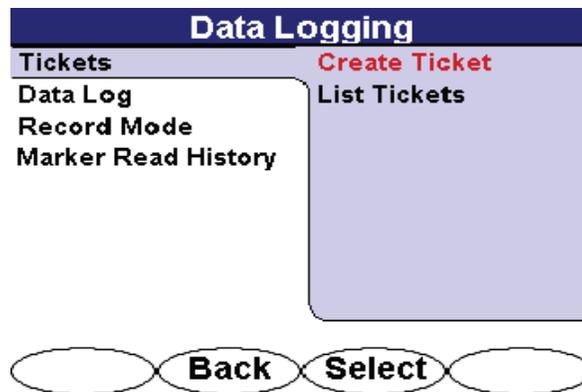


Figure 6-45 Create Ticket Selection in Data Logging Menu

6.2.6.1.2 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> softkey to open the ticket. Press the <Back> softkey to return to the previous interface.

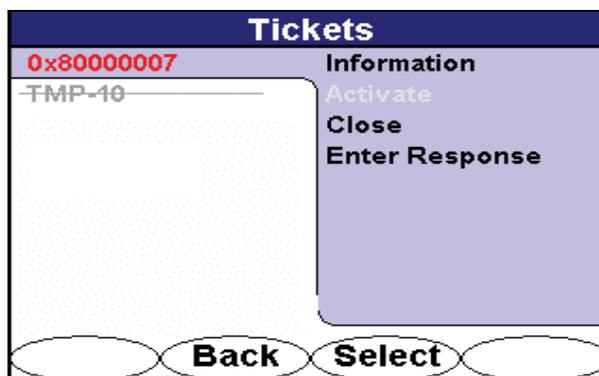


Figure 6-46 List Ticket Selection in Tickets Menu

6.2.6.1.3 Information

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

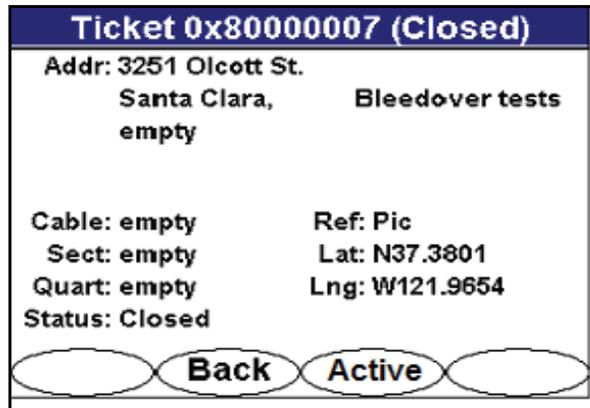


Figure 6-47 Ticket Information in Tickets Menu

6.2.6.1.4 Activate

Selecting Activate opens a ticket to logging data. Press the <Back> softkey to return to the previous interface. All depth and mark measurements taken thereafter will be associated with the open ticket.

6.2.6.1.5 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. Closing a ticket automatically launches the response code selection menu.

6.2.6.1.6 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> softkey to enter the correct response code or <Cancel> to return to the previous menu screen.

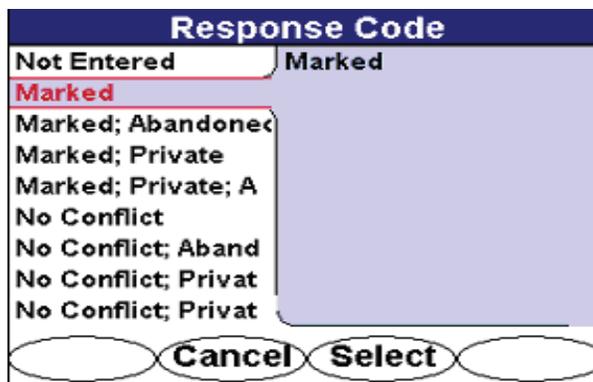


Figure 6-48 Sample Response Code Menu

6.2.6.2 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> softkey to display the log data statistics.

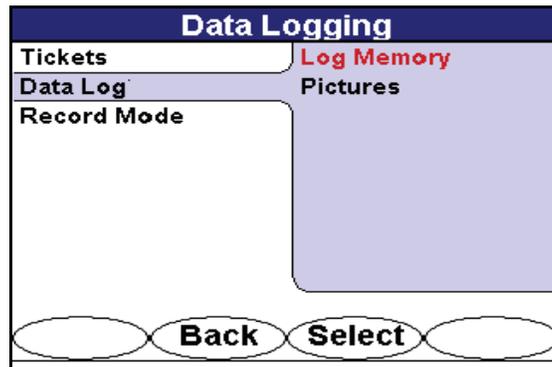


Figure 6-49 Log Memory Selection in Data Log Menu

6.2.6.2.1 Data Log Memory

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

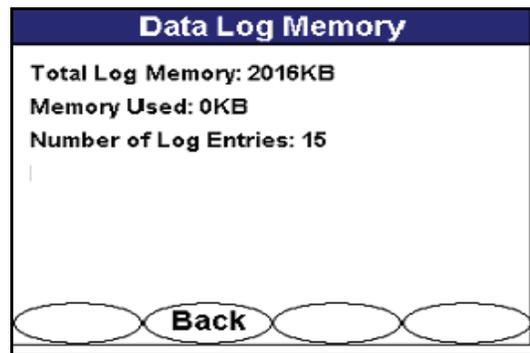


Figure 6-50 Data Log Memory in Data Logging Menu

6.2.6.2.2 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> softkey 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 MetroMark 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.

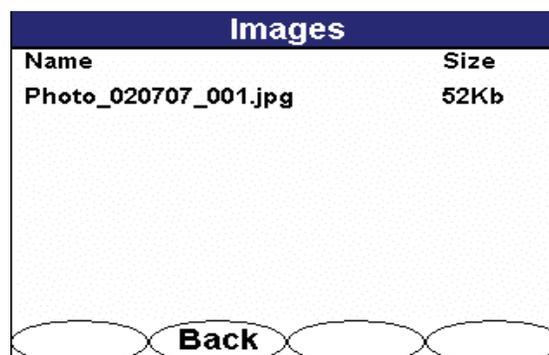


Figure 6-51 Pictures in Data Logging Menu

6.2.6.3 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 6-52 Record Mode in Data Logging Menu

6.2.6.4 Marker Read History

The marker read history provides a data log of RFID recorded serial numbers.

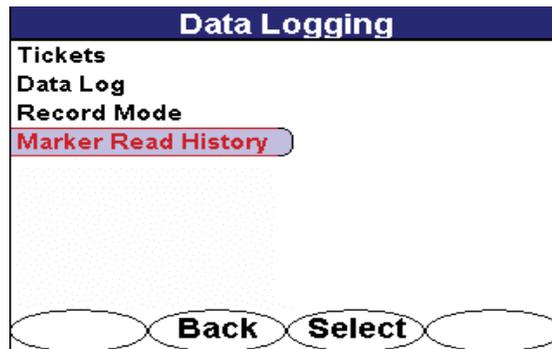


Figure 6-53 Marker Read History in Data Logging Menu

The collected data include the date, marker type, and serial number of each marker that is successfully read. The data log information will be stored in the receiver’s memory until the unit is synchronized with MyLocator.

Marker Read History		
mm.dd.yy	Type	ID#
10.02.83	GAS	000-024-2861
06.20.83	GAS	000-024-2835
06.20.83	GAS	000-024-2817
06.20.83	GAS	000-024-2835
06.20.83	GAS	000-024-2816
Record #: 6 of 6		
Exit		

Figure 6-54 Marker Read History Log in Data Logging

6.2.6.5 Synchronizing Data

Recorded data can be easily uploaded to the MyLocator website via Bluetooth or RS232 data transfer. To upload or synchronize data to MyLocator, the i5000 receiver must be turned ON and connected via Bluetooth or a 9-pin serial (null modem) cable to PC. The PC must also have internet access to <https://mylocator.metrotech.com/>. Review section 2.4.3 for instructions to pair Bluetooth devices.

To link the PC and i5000 receiver with a female-female 9-pin RS232 serial (null modem) cable, a special Metrotech RS232 adapter cable must be used.



If a male 9-pin serial connector port is not available on your PC or laptop, a USB to male 9 pin serial connector adapter may be used.

After logging into MyLocator, select the **Synchronization** menu to transfer the logged data from the receiver to the website. If transferring data through a serial cable, use COM1. If transferring data through Bluetooth, use the virtual COM port assigned for the i5000 receiver.

7

Service and Maintenance

7.1 Maintenance and Storage

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.

7.2 Periodic Measurement Testing Procedure

Metrotech recommends that i5000 owners designate a local “Verification Site” that can serve to validate individual units and serve to indicate problems in the equipment.

The “Verification Site” should be easily accessible and can be as simple as the water pipe that runs along many buildings. Using the transmitter in the direct mode, connect it to the pipe. Once the transmitter is turned on, locate the pipe and walk out to a spot that you can check for centerline and depth. Record the centerline and depth measurements for future measurement verification.

Routine use of this “Verification Site” with each instrument can demonstrate potential problems such as centerline variations, depth reading errors and signal strength fluctuations.

Use of the “Verification Site” does not substitute for routine and periodic calibrations. But if used regularly, it can point out to the operator any variations in readings that the unit typically has at the “Verification Site”.

7.3 Troubleshooting Guide

On occasion, the equipment may not operate as expected. Possible problematic scenarios may be as follows:

1. Null needle seems to be stuck in the centerline cross hairs.
In auto gain mode, readjust the signal gain sensitivity by pressing the 4-way navigation UP, recentering your peak signal and readjusting gain. In manual gain mode, decrease signal gain sensitivity by pressing LEFT on the 4-way navigation button.
2. GPS enabled on the receiver, but no GPS signal.
Navigate to the Menu/Settings/Tools/GPS Status to determine if the GPS is receiving any satellite signals.
3. The Guidance Compass is not displayed on the operational display.
Navigate to Menu/Settings/Personalise to ensure the feature is activated. Select the desired features for display on the operational interface.
4. The unit turns OFF automatically.
Check battery level. Recharge if necessary. If full battery, navigate to Menu/Settings/Tools/Initial Setup and check if Auto-Off feature is ON.
5. The signal frequency setting seems to have disappeared.
Reset factory settings by navigating to Menu/Settings/Preset State. Select Yes to reset the unit to factory settings.

6. The receiver does not respond to any push button command.

Recycle power on the receiver by turning the unit OFF. After 30 seconds, press the Power ON button. If the Power ON button does not respond, remove the battery from the battery compartment and reinsert. Power ON the receiver again.

7.4 Spare Parts List

Metrotech recommends maintaining spare batteries for the i5000 receivers and transmitters, receiver caps to prevent water or dirt ingress, and transmitter conductive leads.

Metrotech authorized and trained technicians should attempt repairing an i5000 instrument. The following parts are available for replacement and repair purposes if necessary.

RECEIVER	PART NUMBER
Right Main Housing	R11125
Left Main Housing	R11134
Make Break Seal	R11049
Display Rear Cover	R11132
Inner Battery Gasket	R11230
Outer Battery Gasket	R11059
Keypad	R10991
10-pin Cable Strip	R162771
20-pin Cable Strip	R162773
GPS Cable	R11319
Bottom Antenna Housing	R11102
PN Top Antenna Housing	R11262
Display PCB Rx	R11025
Main PCB Rx	R10984
PN Antenna PCB	R11222
Make Break Lower PCB	R11150
RS-232 Cable	R11201
Battery Cap	R11738
Accessory Jack Cap	R11739
Front Display	R11704
Lens Gasket	R11031

TRANSMITTER	PART NUMBER
Outer Housing	R11005
Top Lid	R10022
SFL Decal Set	R11384
Main PCB Tx	R10936
Antenna PCB Tx	R11006
Display PCB Tx	R11089
LCD Display	R162820
Tx Lens	R11194
Lens Gasket	R11204

TRANSMITTER	PART NUMBER
Conductive Attachment	R11156
Li-Ion Battery pack	R11636

7.5 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:

Metrotech West Coast Service Center	Metrotech East Coast Service Center	European Service Center
3251 Olcott Street Santa Clara, CA 95054 Tel: 1-800-638-7682 (International: 1-408-734-1400) Fax: 1-408-734-1415 Email: service@metrotech.com Internet: www.metrotech.com	5211 Linbar Drive, Suite 503 Nashville, TN 37211 Tel: 1-800-624-6210 TN: 1-615-366-7323 Fax: 1-615-360-9855 Email: nashville@metrotech.com	SebaKMT Dr.-Herbert-lann-Str. 6 D-96148 Baunach, Germany Tel: +49-9544-680 Fax: +49-9544-2273 Email: service@sebakmt.com

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.

7.6 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.

7.7 Copyright Notice

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