VIVAX METROTECH

vLocPro User Handbook

(English Edition)

Version 2.0

Table of Content

General Safety & Care Information

1.1 Who Can Use This Equipment?

- This equipment must only be used by people suitably trained in the use of pipe and cable locators

1.2 Work-site Safety

- Use your companies, or other applicable safety code and rules when using this equipment.
- Unless having the required authorization, license and appropriate training – do NOT make connections to any pipe, cable or conductor.
- Do NOT use this equipment in explosive areas – such as in the presence of flammable liquids, gases, heavy dust.
- Do NOT directly connect this equipment to cables or pipes that have a potential difference to ground of greater than 35V AC.

1.3 Equipment Safety

- Do NOT open the enclosures (housings) of either the transmitter or receiver.
- Place the ground stake firmly in the ground before connecting the cable from the transmitter.
- Do NOT hold any uninsulated portion of the Connection leads & Clips when the transmitter is switched on.

1.4 Batteries and Environmental Safety

Vivax-Metrotech products use four types of batteries:

- Alkaline batteries
- Ni-MH (Nickel Metal Hydride) – rechargeable
- Lithium Ion batteries – rechargeable
- Lithium metal batteries – (small non rechargeable button cells for "clock" applications)

1.4.1 Alkaline Batteries

- When replacing the alkaline batteries – use only the size and type specified – do NOT mix battery types (rechargeable and alkaline).
- Do NOT mix partially discharged and fully charged cells in the same battery pack – do NOT mix old with new.
- Never attempt to charge alkaline batteries.

1.4.2 Rechargeable Batteries Nickel Metal Hydride and/or Lithium Ion

- When using rechargeable batteries, use only the correct charging device supplied or specified by the manufacturer. The battery pack or the battery charger will contain circuitry to manage the charging process – other chargers (even if they have the same connector, polarity, voltage & current rating will not have the same control circuitry and can cause damage to the product, overheating, and in extreme cases fire or harm to the individual.
- ***DO NOT*** assume that if the plug fits it is the correct charger – a charger with the correct part number MUST be used – just because it is a Vivax-Metrotech charger and the plug fits does NOT mean it is the correct charger.
- Before using for the first time, charge rechargeable batteries for 6 hours. If at any time the rechargeable batteries do NOT last as long as anticipated – discharge fully and then charge for 6 hours.
- Care should be taken when charging batteries – NEVER repeatedly recharge batteries (or turn power off & on) without using the instrument. If used with an inverter in a vehicle – charge the product then unplug the charger and do NOT charge again until the rechargeable batteries have been used for at least ten minutes. Failure to do this could result in the overcharging of the battery which will shorten the life of the battery, and could in some circumstances cause overheating or fire.
- If ever the product becomes hot during the charging process IMMEDIATELY unplug the charger and use the rechargeable batteries for at least 10 minutes before recharging. If this reoccurs the next time the unit is charged – return immediately to Vivax-Metrotech for repair.
- Lithium Ion Batteries – some products use Lithium Ion batteries – the requirements for marking and transportation are still developing. Please contact Vivax-Metrotech before shipping products containing lithium ion batteries or lithium ion battery packs on their own for any "special instructions".
- Do NOT charge batteries for prolonged periods of time without using the locator for at least 10 mins. Charging for prolonged period of time could overcharge the battery, reduce the battery life and in extreme circumstances cause damage to the locator and fire.

1.4.3 Lithium Metal Batteries (non rechargeable)

- Commonly known as "button cells" these are small – non rechargeable batteries used to power internal "clocks" within some units (similar to computers). Generally they have a life of 3 -5 years.
- Under no circumstances should any attempt be made to charge these batteries.
- Dispose of to your company's work practice/environmental standards, the prevailing laws, or recognized best practice. Always dispose of batteries responsibly.

1.4.4 General Rules regarding disposal of batteries

- NEVER disassemble a battery, or battery pack.
- Never dispose of in a fire or water.
- Dispose of batteries in accordance with your Company's work practice/environmental standards, the prevailing laws, or recognized best practice. Always dispose of batteries responsibly.

1.4.5 Transportation of Lithium Ion and Lithium Metal Batteries

- The Lithium ion and Lithium metal batteries used in Vivax-Metrotech products meet the required safety standards and include the designated protection circuitry.
- Recent regulation changes require that when batteries with Lithium Ion and Lithium metal batteries are transported the packaging MUST included specified warning labels. ***Please contact Vivax-Metrotech Customer Service (USA 1-800-446-3392 – international +1-408-734-1400 (USA Pacific Time Zone) for more details.***
- Regulations have also changed regarding the shipping of spare battery packs (battery packs that are not inside a product). There are limitations on the weight of the package, and the packaging must be marked with the appropriate warning labels. ***Please contact Vivax-Metrotech Customer Service (USA 1-800-446-3392 – international +1-408-734-1400 (USA Pacific Time Zone) for more details.***

REMEMBER – BATTERIES CONTAIN DANGEROUS CHEMICALS – THEY CAN BE AFFECTED BY MANY THINGS SUCH AS WATER INGRESS OR HEAT – IN SOME CIRCUMSTANCES THEY CAN EXPLODE. THEY ALSO CAN CAUSE ELECTRIC SHOCKS!

1.5 Care of Equipment

- Use equipment only as directed in this User Handbook.
- Do NOT immerse any part of this equipment in water.
- Store in a dry place.
- Keep equipment in the case provided when not in use.
- If left for prolonged period of time – remove alkaline batteries.
- Keep unit clean and free of dust and dirt.
- Protect against excessive heat.

1.6 Care When Interpreting the Information Provided by the Locator

- Like all locators – this instrument is locating, and providing depth and current readings based on electromagnetic signals that radiate from the buried cable or pipe. In most cases these signals will enable the locator to pinpoint both position depth and current correctly.
- BEWARE – in some cases other factors will distort electromagnetic fields radiating from cable or pipe being located, resulting in incorrect information.
- Always locate responsibly, and use information learned during your training to interpret the information provided by the locator.
- Do NOT provide information regarding depth of cable or pipe to anyone unless authorized to do so by your company.
- REMEMBER that depth measurements are to the center of the electromagnetic field or pipe – In the case of pipes this may be significantly deeper than the top of the pipe.

1.7 American & Canadian Safety Notices

1.7.1 USA

- This transmitter and receiver comply with the general conditions of operation, pursuant to part 15 of the FCC Rules.
  - CFR 47 Part 2 : 2004.
  - CFR 47 Part 15 : 2006.
  - ANSI C63.4 : 2003.
- Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the products.

1.7.2 CANADA

- Equipment is for use by trained operators only, and not for general household or consumer use.
- Usage duration shall be as short as possible; to prevent possible radio interference to authorized services, especially the 100 kHz Loran-C frequency.
- Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference that may cause undesired operation of the device.

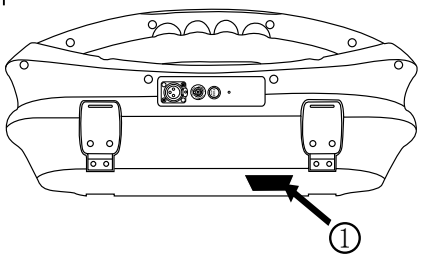
1.7.3 EUROPE

- Vivax-Metrotech confirms that the location system is compliant with relevant provision of European directive 1999/5/EC.
  - ETSI EN 300 330-2 : 2006.
  - ETSI EN 301 489-1 : 2005.
  - ETSI EN 301 489-3 : 2002.

Service & Support

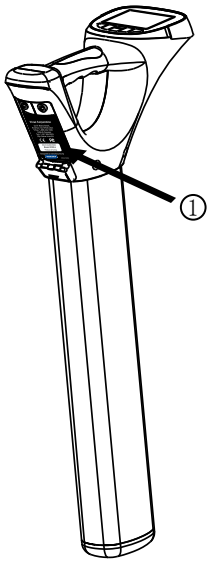
2.1 Serial Number and Software Revision Number

Always quote your receiver and transmitter model # serial number and software revision number when requesting product support. They can be found as follows: (for reference only)



Note:
The transmitter Serial# & Model# can be found at the bottom of the transmitter and also inside the transmitter between the battery tray and the main module of transmitter.

Software Serial#
On both receiver and transmitter the software revision is displayed on the LCD during the start up sequence.



1	Model# & Serial#

2.2 Distributors and Service Centers Closest to You:

United State of America
Vivax-Metrotech Corporation
3251 Olcott Street,
Santa Clara, CA 95054, USA
Website : www.vivax-metrotech.com

Sales & Sales Support:
T/Free : +1-800-446-3392
Tel : +1-408-734-1400
Fax : +1-408-734-1415
Email : sales@metrotech.com

Application Support:
T/Free : +1-800-624-6210
Tel : +1-408-454-7159
Fax : +1-408-743-5597
Email : applications@metrotech.com

Service & Repairs:
T/Free : +1-800-638-7682
Tel : +1-408-962-9990
Fax : +1-408-734-1799
Email : service@metrotech.com

All Other Department:
T/Free : +1-877-330-1647
Tel : +1-408-734-3880
Fax : +1-408-962-9993

Canada
Vivax Canada Inc.
400 Esna Park Drive,
Unit 17, Markham,
Ontario, L3R 3K2, Canada

Tel : +1-289-846-3010
Website : www.vivax-metrotech.com
Email : CanadianSales@vivax.biz

Europe
SebaKMT
Seba Dynatronic
Mess-und Ortungstechnik GmbH
Dr.-Herbert-Iann-Str. 6,
96148 Baunach, Germany

Tel : +49-9544-680
Fax : +49-9544-2273
Website : www.sebakmt.com
Email : service@sebakmt.com

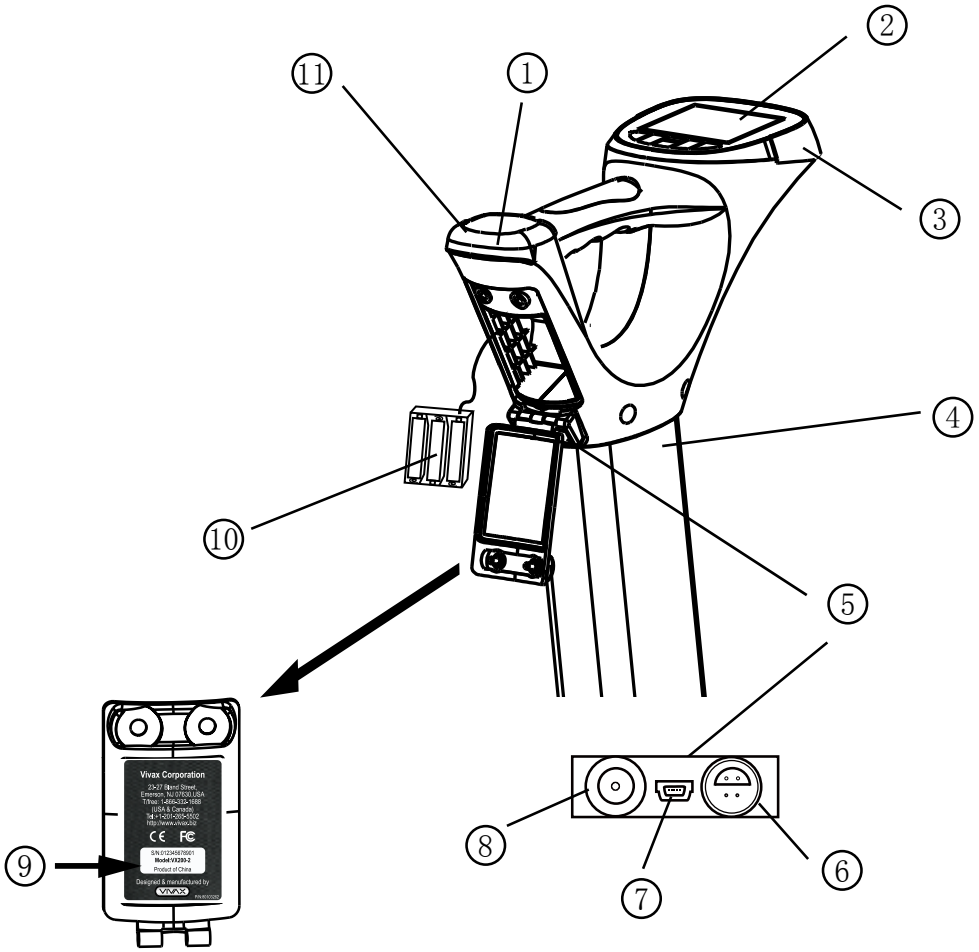
Australasia
SebaKMT AUS
Unit 1, 176 South Creek Road,
Cromer NSW 2009, Australia

Tel : +61-2-9972-9244
Fax : +61-2-9972-9433
Website : www.sebakmtaus.com
Email : sales@sebakmtaus.com
service@sebakmtaus.com

China
Leidi Utility Supply (Shanghai) Ltd.
Rm405 3rd Building No. 641, Tianshan Rd,
Shanghai, China 200336

Tel : +86-21-5187-3880
Fax : +86-21-5168-5880
Website : www.leidi.com
Email : info@leidi.cn

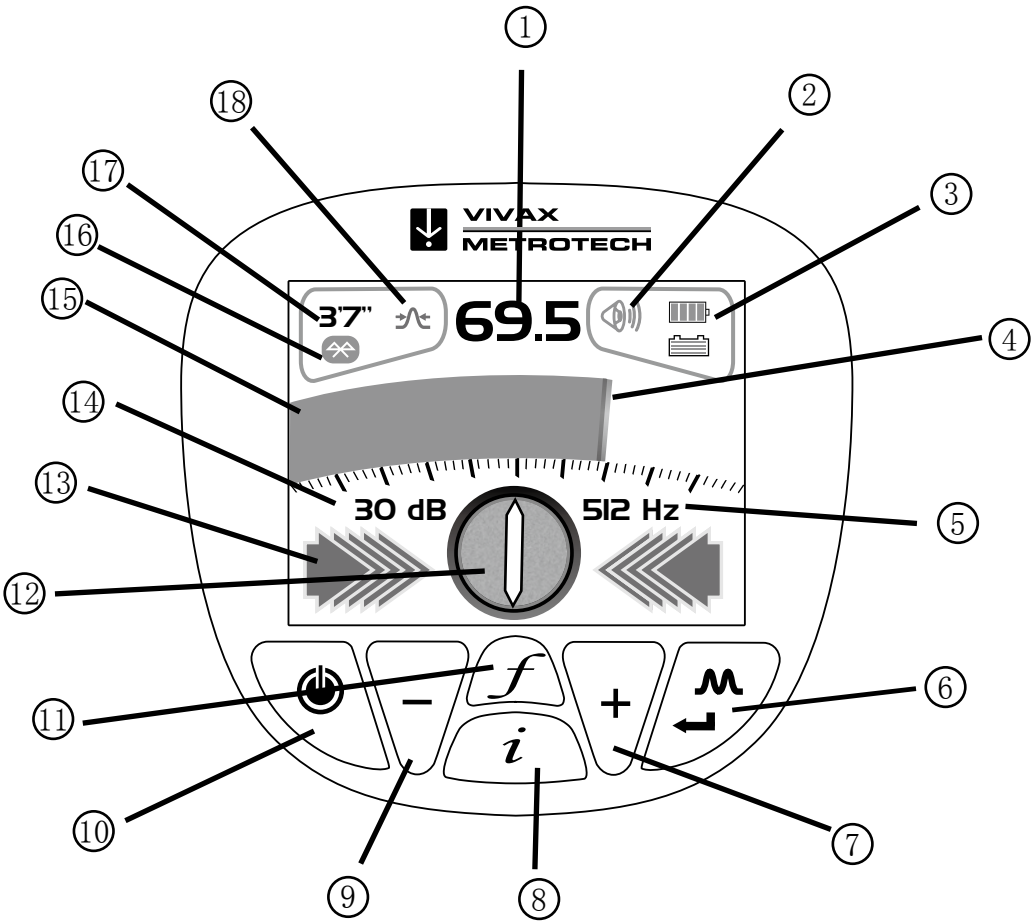
Receiver



1	Rechargeable Batteries (internal)	7	Mini USB Programming
2	Pushbutton & Display	8	Charging Socket
3	Impact Protection	9	Model# & Serial#
4	Carbon Fiber Reinforced Antenna Assembly	10	AA Battery Pack (Removable)
5	Accessory & Charging Sockets	11	Impact Protection
6	Accessories Port		

3.1 vLocPro Receiver Main Display

The vLocPro has several display options – the display shown below is representative of the type of display and icons used

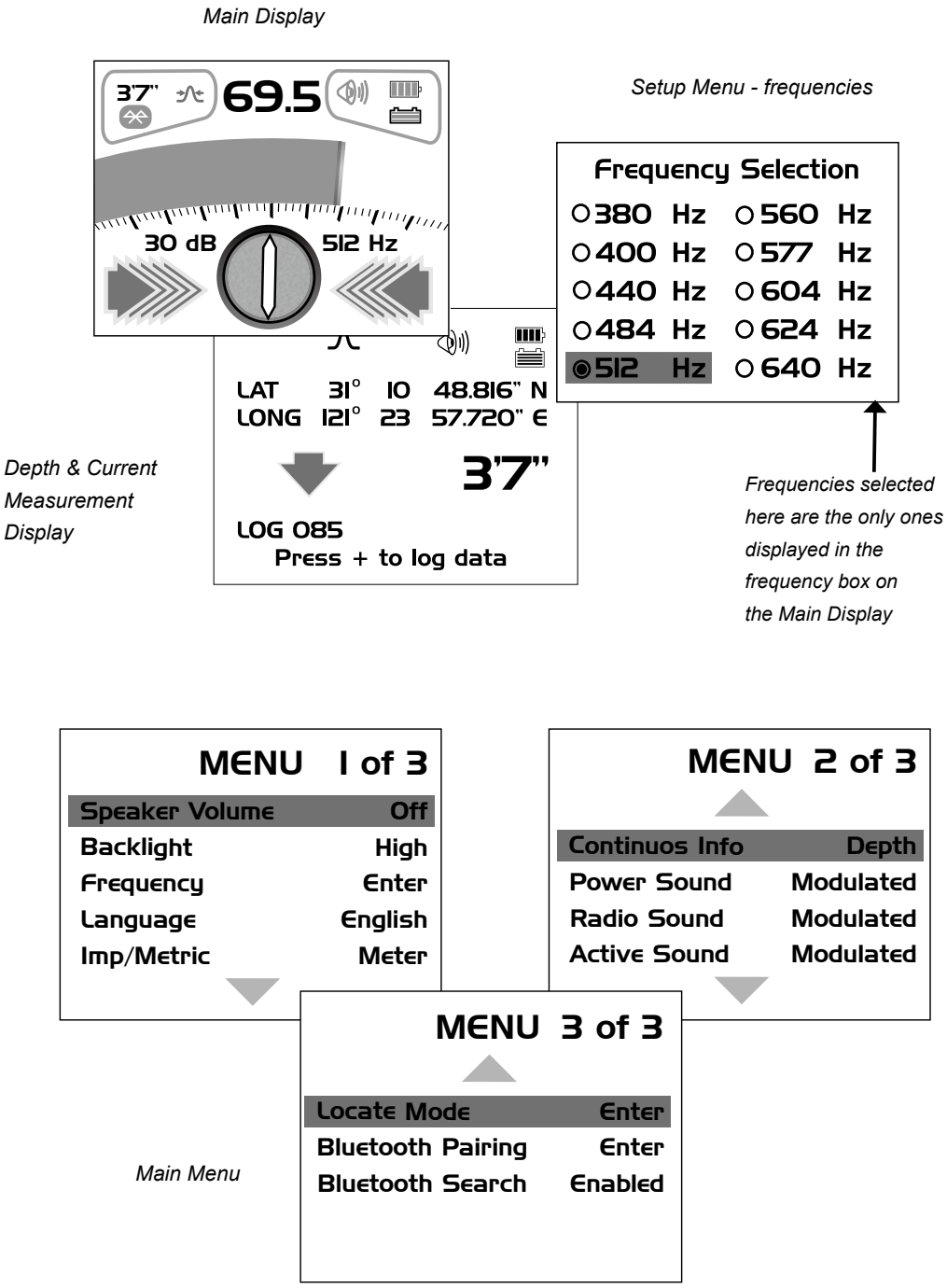


1	Digital Display of Signal Response	10	On/Off Control
2	Loudspeaker Status	11	Frequency Select
3	Alkaline & Rechargeable Battery Status	12	Compass Line Direction Indicator
4	Peak Signal Indication	13	Left vs Right Indication
5	Frequency	14	db Gain Setting
6	Location Mode Select	15	Analogue Display of Signal Response
7	Gain Control (increase gain)	16	Bluetooth Icon
8	Information Depth/Current Measurement	17	Continuous Depth
9	Gain Control (reduce gain)	18	Location Mode (Peak, Null, Sonde, Broad, Peak Arrows)

Note: Bluetooth function is available in vLocPro with Bluetooth module only.

3.2 vLocPro Screen Shots

vLocPro Receiver Menus
(Actual menu may differ)



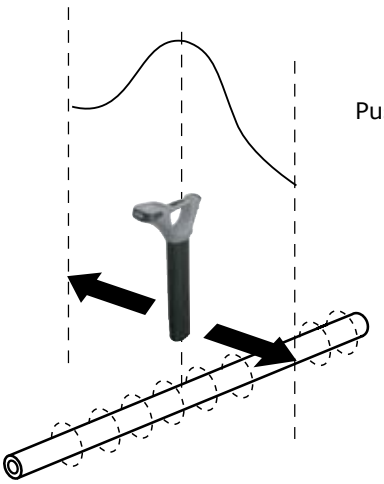
vLocPro Receiver

The vLocPro is a Precision Location System designed to meet the needs of Utility Companies and their contractors. The following describes the features and use of the Receiver:

3.3 Locating Mode (Response)

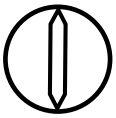
The vLocPro receiver has four antennas, and these can be toggled through different configurations (modes) to provide different responses to the signals radiating from the buried pipes and cables. The modes are:

3.3.1 Peak Response Mode



Pushbutton

Icon

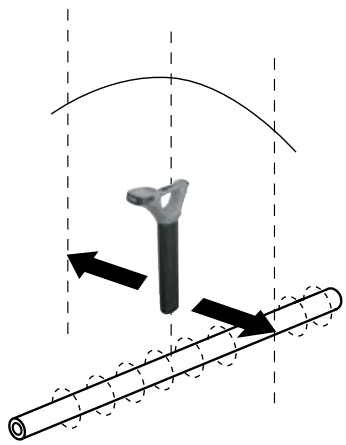


Compass Line Direction Indicator

This uses the two horizontal antennas and provides a "Peak" or maximum signal response over the center of the radiated signal from the buried line. The compass line direction indicator shows the direction of the cable (available in Active modes). The color of the compass changed from clear to blue when the receiver is in line with the buried line.

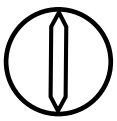
This is the most accurate of the locating modes as both antennas are used to provide a clearly identifiable "Peak". In the "Peak" mode, a "Peak" signal indicator helps to clarify the position of the "Peak". This shows the last "Peak" located for a few seconds, enabling the user to return to that position quickly.

3.3.2 Broad Peak Mode



Pushbutton

Icon

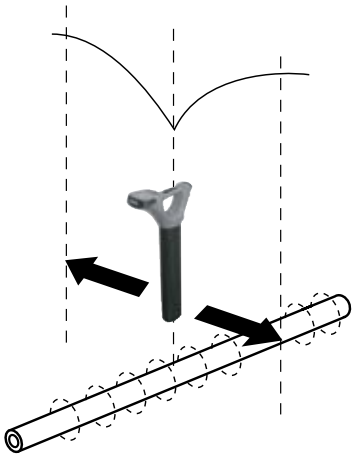


Compass Line Direction Indicator

This uses a single horizontal antenna and provides a "Peak" or maximum signal response over the center of the radiated signal from the buried line. The compass line direction indicator shows the direction of the cable (available in Active modes). The color of the compass changed from clear to blue when the receiver is in line with the buried line.

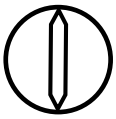
This is less accurate than the twin horizontal antenna "Peak" mode – but is useful if the buried line is particularly deep. For pinpointing the line, the "Peak" mode should be used.

3.3.3 Null Mode



Pushbutton

Icon



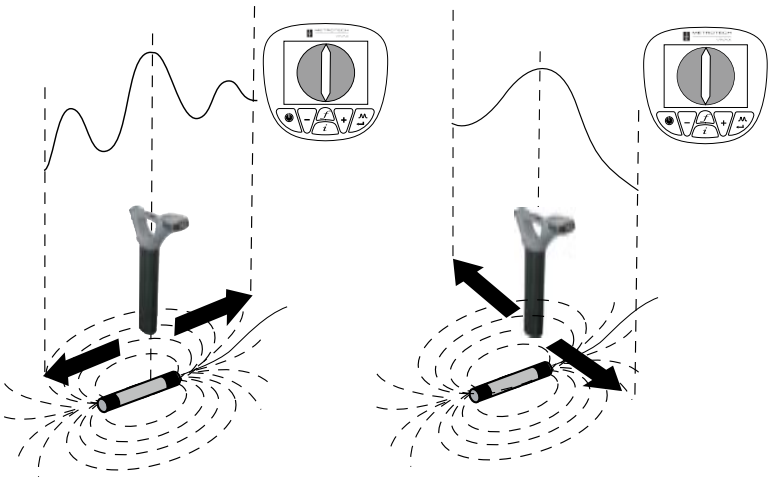
Compass Line Direction Indicator

This uses vertical antennas and provides a minimum or "Null" response over the center of the radiated signal from the buried line. The compass line direction indicator shows the direction of the cable (available in Active modes). The color of the compass changed from clear to blue when the receiver is in line with the buried line.

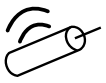
Some users prefer the null response; it works well in uncongested areas, but is more prone to inaccuracies due to distortion of the radiated signal in congested areas.

Left/right indication arrows are also displayed when in "Null" mode. The arrows indicate the direction to move the receiver to locate the position of the buried line.

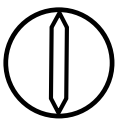
3.3.4 Sonde Mode



Pushbutton



Icon



Compass Line Direction Indicator

Sonde mode uses the antennas in a "Peak" configuration. An ICON on the display indicates if the receiver is in Sonde mode.

A Sonde is a small transmitting coil that is powered by its own internal battery, or by an external transmitter.

Due to its construction, a Sonde gives a different "Peak" pattern – when locating along the direction of the Sonde – instead of the usual single "Peak", the Sonde provides three distinct peaks – a small "Peak" – a large "Peak" – a small "Peak". The Sonde is located under the center of the large "Peak" when located across the direction of the Sonde and it gives the conventional peak response. Note that the Compass Line Indicator points across the line of the Sonde when directly over it and the color of the compass change from clear to blue.

The vLocPro receiver must be used in a different orientation when locating a Sonde – due to the way the signal from the Sonde radiates. With the front of the receiver pointing across suspected direction of the Sonde – pinpoint forward and backward (across the Sonde) and then move along the line of the Sonde until the maximum peak is located (in other words rotate the receiver 90 degrees from the orientation normally used when locating pipes and cables).

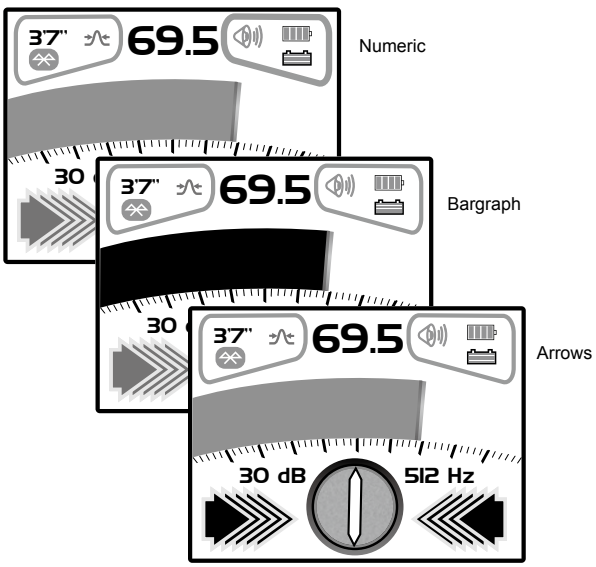
A Sonde is typically used for locating non metallic pipes or ducts, and the camera end of a sewer inspection camera. Low frequency versions (512 Hz/640 Hz) can transmit through some metallic pipes such as cast iron pipes – which are why they are frequently used with sewer inspection cameras.

For using the compass feature to locate Sondes, please refer to 7.1.3.

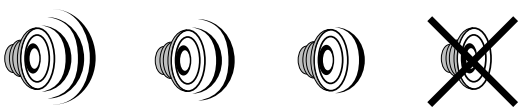
3.4 Display

These responses are shown on the display as

- Moving Bar graph
- Numeric value & db value
- Directional arrows (with 'Null' response)
- A range of different display modes will be available in 2009

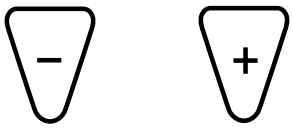


3.5 Audio



The visual display is also accompanied by an audio response. The output level (volume) of this response is set by entering the "Setup menu". Press and hold "i" pushbutton for two seconds to enter setup menu. The setup display defaults to volume. Use the "Mode" pushbutton to toggle through the available options (off – low – med – high). Press the "i" pushbutton again to exit the setup menu. As the loudspeaker uses a significant amount of power, using lower volume can make the battery life of the receiver last longer.

3.6 Sensitivity Control



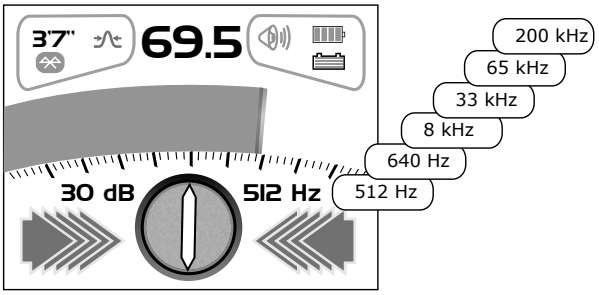
Pushbutton Pushbutton

Up & down pushbuttons are provided to increase or reduce the sensitivity of the receiver. If the bar graph moves towards the minimum or maximum a single touch of the opposite pushbutton returns it to approximately 60% deflection (i.e. if the bar graph goes towards the minimum – press the "+" pushbutton, to the maximum press the "-" pushbutton)

Holding down or repeated pushing of the "+" or "-" pushbuttons increments/decrements the gain.

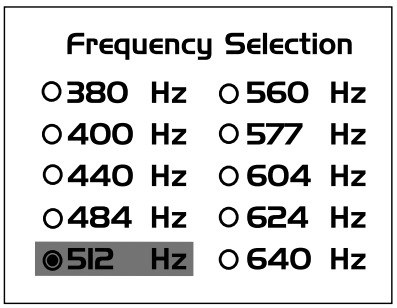
3.7 Frequency Selection

Pushbutton



The vLocPro receiver is capable of locating a large number of frequencies or frequency combinations. A list of these frequencies can be accessed using the setup menu. Most of these frequencies listed – you will never use – the setup menu allows you to select the frequencies you wish to use regularly. The frequency select pushbutton on the main receiver pad is used to toggle through the frequencies defined using the setup menu. The operating frequency will be shown at the lower right side of the display. You can change this selection at any time using the setup menu.

The initial frequencies set at the time the unit is supplied are "Power", "Radio" and the frequencies used by the transmitter purchased. See the transmitter section for suggestions of which frequency is best suited to specific applications.

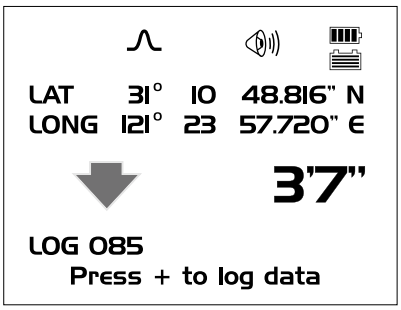


To select the frequencies you wish to use regularly – enter the setup menu by pressing and holding the "i" pushbutton for 2 seconds. Use the "+" and "-" to select the word "Frequency" – then press the "M" mode pushbutton to display the list of available frequencies.

The "+" and "-" pushbuttons are used to navigate the list of frequencies. To add a frequency to the "Frequently used list" press the "M" pushbutton and a dot will appear in the circle alongside the frequency. To deselect a frequency press the "M" pushbutton and the dot will disappear. Once your selection is completed press "i" pushbutton once to return to the setup menu, and again to exit the setup menu.

3.8 Information Pushbutton (Depth & Current)


Pushbutton



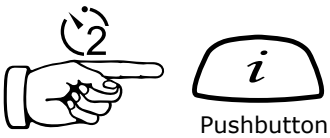
Pressing the (information) pushbutton will display the depth to the center of the radiated signal and a measurement of the current (press the pushbutton briefly – remember if you press and hold – you enter the setup menu. If you do enter the setup menu – press the pushbutton again to return to the locating screen – then try again)

IMPORTANT
When locating a cable or pipe ("Line") – the instrument should be in "Peak" mode and the depth and current measurements should only be taken with the bottom of the receiver standing on the ground and directly in line with the target line.

IMPORTANT
When locating a Sonde – set the mode to Sonde - then the instrument will automatically be in "Peak" configuration. Depth measurements should only be taken with the bottom of the receiver standing on the ground and at ninety degrees to the Sonde.

The accuracy of depth and current readings depends on the quality of the radiated signal being located. If the signal is symmetrical, the depth reading will be accurate to within 5% of the actual depth. If the signal is distorted, depth readings will be less accurate. When taking depth measurement, always hold the receiver at 90° to the ground.

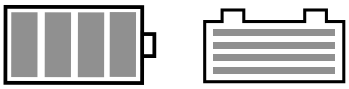
3.9 Setup Menu


Pushbutton

As described previously, a second function performed by the is to access the SETUP menu. Press and hold the Information Pushbutton for two seconds to display the SETUP menu. Use the +, - to navigate through the various options and use the "M" (Mode) pushbutton to select. To exit the setup menu, press the pushbutton.

The setup menu allows the user to configure their personal preference, this menu can be accessed and changed at any time.

3.10 Battery Selection and Condition Indication



Icon A Icon B

The receiver has an internal rechargeable battery – this will provide the power to the unit unless you connect an alkaline battery pack. This allows the user to benefit from using rechargeable batteries, but enables the use of alkaline batteries if for any reason the rechargeable battery lacks charge.

The receiver has two battery packs.

- External alkaline battery pack. Icon A indicates the status of the external battery pack.
- Internal rechargeable batteries. Icon B indicates the status of the internal battery pack.

The unit will operate from the internal batteries until they have no charges left. The unit will then automatically switch over to the external alkaline batteries when this occurs.

vLocML Receiver

4.1 Introduction

The vLocML is a variant of the vLoc locator. It can be identified by the loop antenna attached to the base of the locator tube. The purpose of the loop antenna is to energize passive markers buried above non metallic services or points of interest.

Markers can be supplied in many sizes or shapes but the most commonly used marker is the ball marker. This has a range of over 1.5m. Markers operate over a range of frequencies. Different frequency markers are used to identify different services and are identified by color. The industry standard colors are listed below:

 Telecom (Orange)	Cable paths, buried splices, buried service drops, load coils, conduit stubs, fiber optic facilities, all types of splices, bends, depth changes, manhole covers, road crossings Frequency: 101.4 kHz
 Power (Red)	Cable paths, service drops, conduit stubs, road crossings, all types of splices, buried transformers, service loops, street lighting, bends, man hole covers, distribution loops Frequency: 169.8 kHz
 CATV (Black & Red)	Cable paths, fiber optic facilities, buried service drops, road crossings, buried splices, bends Frequency: 77 kHz
 Non Potable Water (Purple)	Reclaimed water, private campuses, valve boxes, road crossings, path making, buried valves, tees, meter boxes, main stubs, service stubs Frequency: 66.35 kHz
 Water (Blue)	Pipeline paths, service stubs, PVC pipeline, all types of valves, road crossings, tees, clean-outs, casing ends Frequency: 145.7 kHz
 Sewage (Green)	Valves, all types of fittings, clean outs, service stubs, laterals, path marking of non-metallic facility Frequency: 121.6 kHz

 Gas (Yellow)	Pipeline paths, main stubs, service stubs, tees, road crossings, all types of valves, meter boxes, stopping fittings, depth changes, transition fittings, squeeze points, pressure control fittings, electro fusion couplings, all types of fittings and joints Frequency: 83 kHz
 EDF Power (Grey Disk)	Gas and Electric Installations (EDF only) Frequency: 40 kHz
 Seba Energy (Red & Blue)	Cable paths, service drops, conduit stubs, road crossings, all types of splices, buried transformers, service loops, street lighting, bends, man hole covers, distribution loops Frequency: 134 kHz

4.2 Operating the vLocML

The vLocML can be operated in three configurations:

- Standard cable locator
- Dedicated marker locator
- Dual cable locator and marker locator

4.2.1 Switching Between Configuration

There are two ways of switching between configurations:

- Using the user menu
- Using the enter key

To use the user menu, press and hold the "i" pushbutton. Use the "+" pushbutton to scroll down to "Marker Locator". Press the enter key to scroll through the options. Exit the user menu by pressing the "i" pushbutton.

It is possible to hop between configurations using the enter key. To do this press and hold the enter key until the desired configuration is reached.

4.2.2 Standard

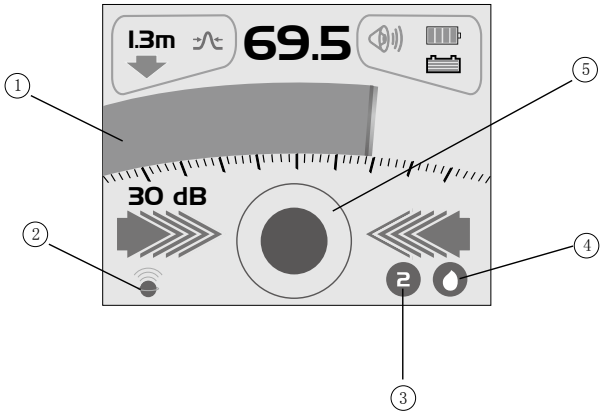
In this configuration the unit operates as a standard vLoc cable and pipe locator. For the operation of this see the standard vLoc user handbook sections.

4.2.3 Dedicated

In this configuration the unit is dedicated to detecting markers. The screen of the vLocML will look similar to the picture below

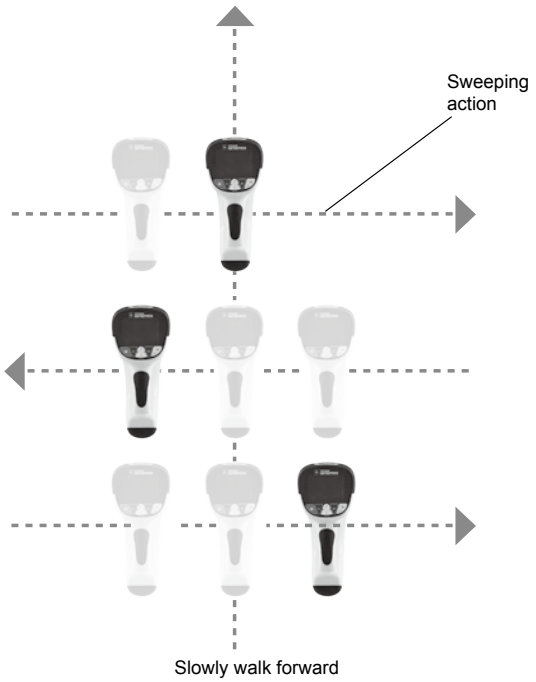
Note that the ball icon is illuminated indicating that the dedicated configuration is selected. If the line icon is illuminated with the ball icon, this indicates that the Dual configuration is activated.

Use the "f" pushbutton to select the marker type that is to be located.



1	Signal strength from Marker used for pinpointing position
2	Marker icon indicating marker detection active
3	Marker type, numeric
4	Marker type, graphic
5	Marker detection ball (Not adjustable)

Sweep the area of where the marker is to be located. Use a slow, deliberate arm sweeping motion slowly moving forward making sure no area is missed.



When the locator is within range of the marker there will be a sound from the speaker and also the icon in the centre of the display (5) will start to fill up.

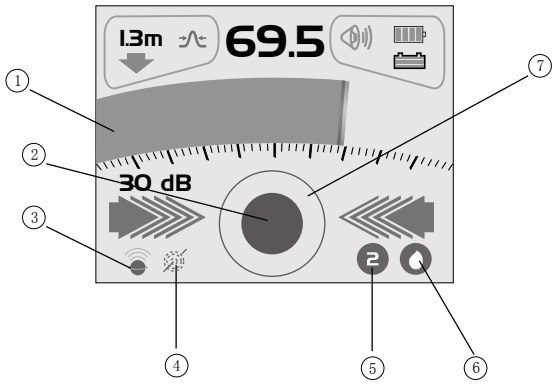
Move the locator forward and back, left and right, until the largest signal is detected. Note the bar graph (1) will also respond. Use the "+" and "-" pushbuttons to keep the signal on scale. The bar graph should be used to pinpoint the position of the marker.

4.2.4 Dual Configuration

In this configuration the unit can be used to trace an energized cable or pipe whilst simultaneously looking for the presence of markers. For example if a cable has markers indicating the position of splices or T joints, the cable can be traces and when a marker is approached the unit will respond indicating the position of the marker.

Enter the Dual configuration as previously described. Select the marker type to be detected by pressing and holding the "i" pushbutton to enter the user menu. Use the "+" and "-" pushbuttons to scroll down to "Marker Type". Press the enter key and scroll down to the desired marker. Use the enter pushbutton to select the marker. Exit the user menu by pressing the "i" pushbutton twice.

The locator screen will look similar to the picture below.



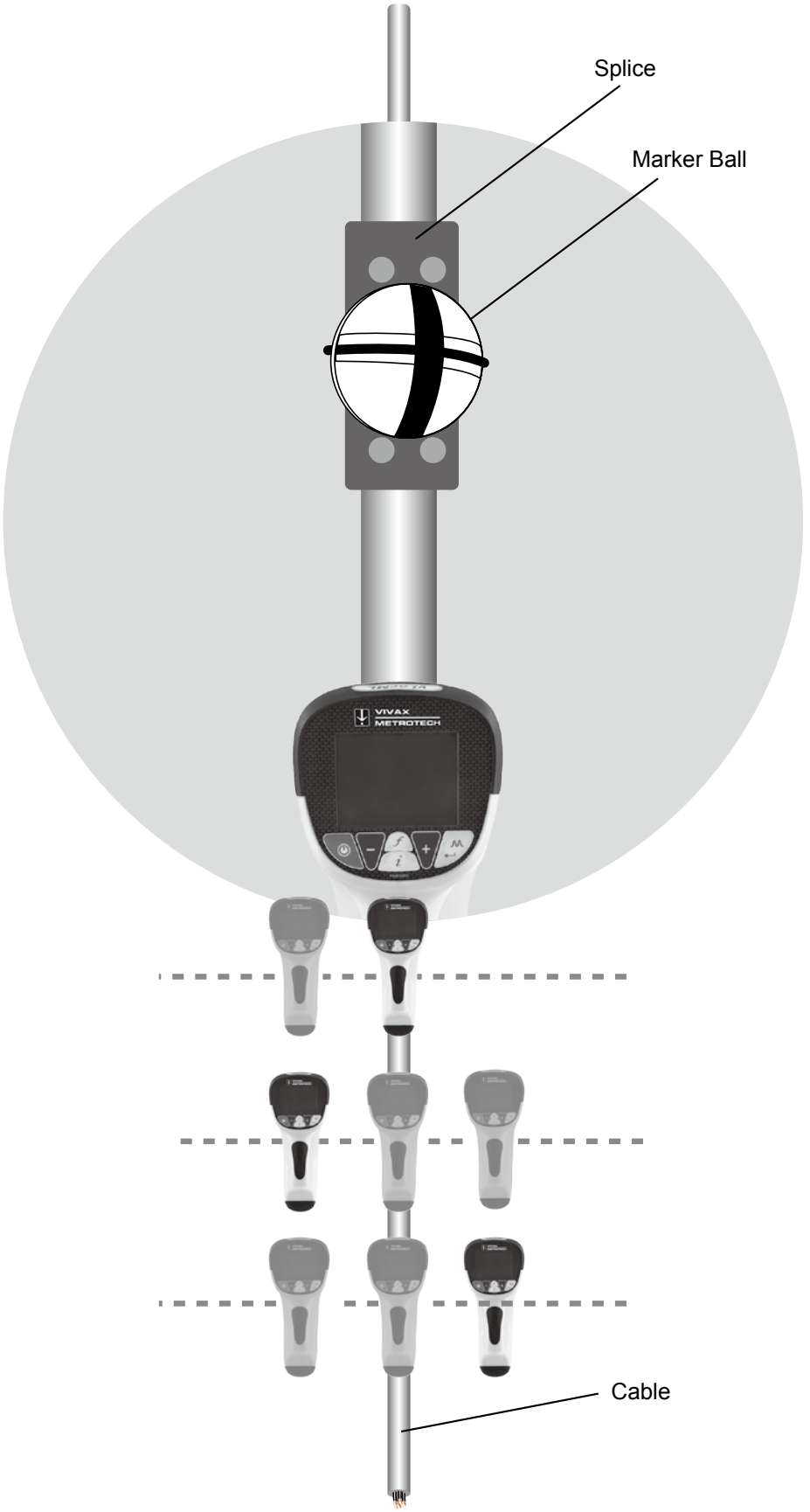
1	Bar graph showing signal strength from energized line
2	Marker detection ball (Not adjustable)
3	Marker icon indicating marker detection active
4	Line icon indicating line locate is active
5	Marker type, numeric
6	Marker type, graphic
7	Line locate frequency

Note that both icons  are now illuminated indicating that Dual Configuration is activated. Energize the cable with 512 Hz, 640 Hz or 8.192 kHz as instructed in the vLoc manual.

Select the antenna configuration by using the enter button. Note that the left/right arrows indicate the cable position and NOT the marker position.

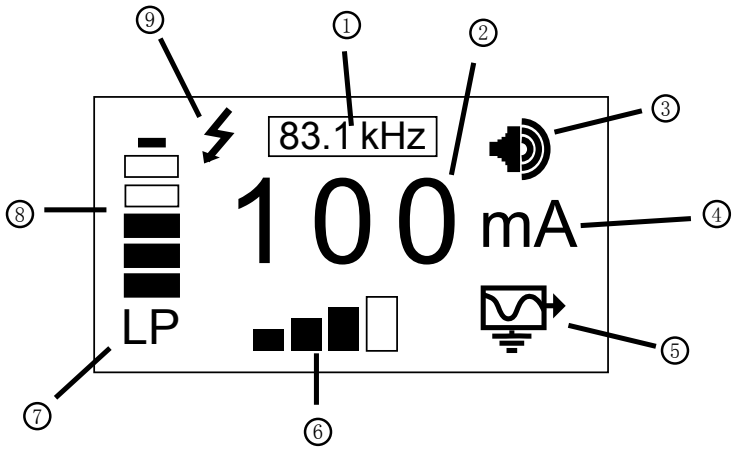
Use the "f" pushbutton to match the transmitter frequency (only 512Hz, 640Hz or 8.19kHz frequencies are available in Dual configuration). Use the locator to identify the position of cable or pipe. Trace the line using the same technique as a standard vLoc locator. The bar graph indicates the signal strength from the cable. Note that in the Dual configuration mode the "+" and "-" pushbuttons alter the sensitivity of the cable locate bar graph. It is not necessary to alter the sensitivity to the marker locate function. The sound is from the line position. In Dual configuration the marker has no sound associated with it.

As a marker is approached the marker locate icon will start to fill up. Move the locator forward and back, left and right to obtain the largest signal. If pinpointing is required select Dedicated configuration and use the bar graph to pinpoint the exact position.


Splice
Marker Ball
VIVAX
METROTECH
Cable

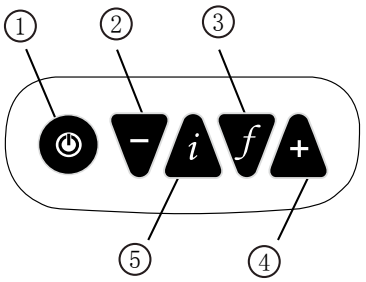
Loc-10Tx Transmitter

Display



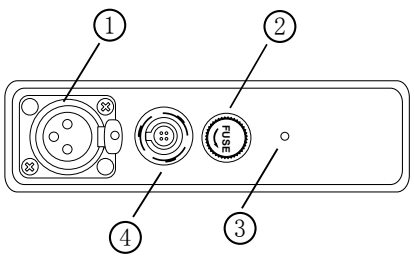
1	Frequency Being Transmitted (200 kHz available in some country)	6	Output Setting (Step) (filled box indicates current level has been reached, empty box indicates requested current level has not been achieved)
2	Digital Read Out (mAmps, volts, ohms)	7	Low Power Indicator (enabled automatically when battery becomes one bar)
3	Loudspeaker Level	8	Battery Status
4	Units (mAmps, volts, ohms)	9	High Voltage Warning (output is enabled for high voltage)
5	Mode Indication		

Pushbutton



1	On/Off Control
2	Output Decrease
3	Frequency Select
4	Output Increase
5	Information (Volume, mAmps, volts, ohms)

Connections



1	Output Connection
2	Output Protection (Fuse)
3	Loudspeaker
4	Battery Charging Socket & DC Input

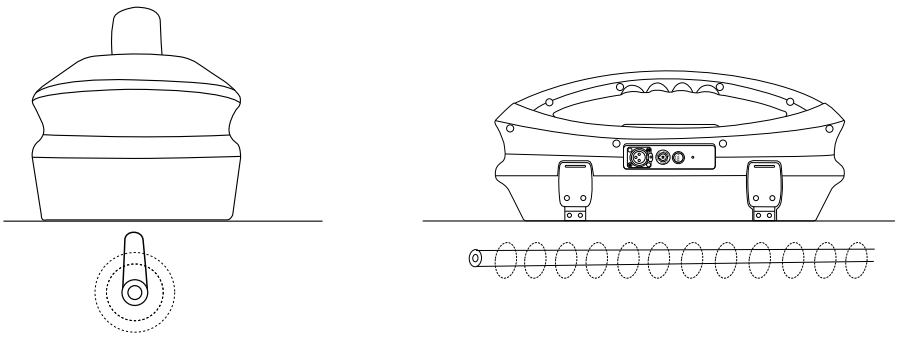
5.1 Transmitter's Overview

The vLocPro transmitter is a rugged portable transmitter powered by alkaline "D" cells or Ni-MH (Nickel Metal Hydride) rechargeable batteries. The following describes the features and uses of the transmitter.

5.2 Transmitting Modes

The transmitter has three transmitting modes, which are selected automatically.

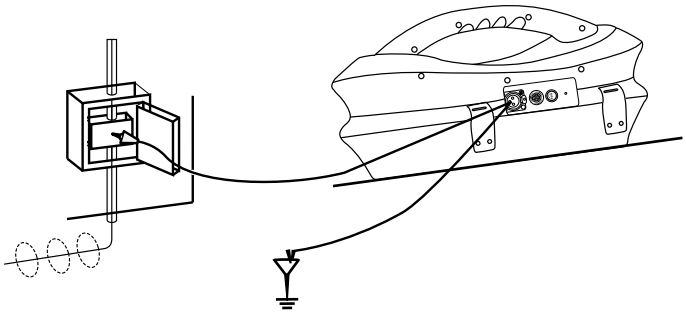
5.2.1 Induction Mode – this uses an internal antenna to induce a locating frequency onto the target pipe or cable (line). "Induction" mode is automatically selected if no connection accessories are plugged into the "output socket". An icon indicating "Induction" mode shows on the display. The icon flashes when the transmitter is transmitting. In order to generate successful induction, the transmitter should be positioned over and with the handle in line with the target line.



"Induction" mode is generally used when no access is available to make a direct connection, or a clamp connection. When using induction it is very likely that the signal being induced onto the target line will also be induced onto other lines in the area, and onto above ground features such as wire fences. This can influence the accuracy of the location, depth and current measurements. "Induction" mode is also the least efficient way of applying the transmitting signal to the target line. The distance located with "Induction" mode is generally much less than that achieved with a direct connection or clamp connection. "Induction" mode generally works better in higher frequencies, 33 kHz, 65 kHz and either 83.1kHz or 200kHz (depending on region). The advantage of induction is that no access is required to "connect" the transmitter, making it a very quick process. The antennas on the transmitter are tuned to induce specific frequencies or range of frequencies. Therefore only a limited number of frequencies can be selected in "Induction" mode.

Note:
For accurate location and depth measurement the locator receiver should be used about 50 feet/20 meters away from the transmitter.

5.2.2 Direct Connection Mode – By plugging in a connection lead to the output socket, "Direct connection" mode is selected. An icon confirming this is shown on the display. The icon flashes when the transmitter is transmitting. The direct connection lead consists of two cables, one (red clip) must be connected to the conductor being located, the other (black clip) to a suitable ground (a ground stake is provided with the transmitter). An auxiliary ground lead is also supplied. If the auxiliary ground lead is used, the ground clip of the connection lead (black clip) is attached to one end of the auxiliary ground lead.

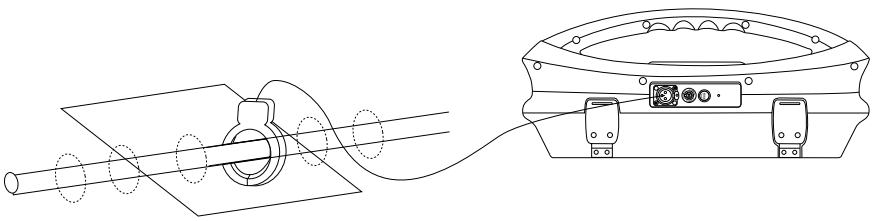


Wherever a direct connection can be safely made without the risk of injury, damage to customer's plant, or the transmitter, it is the best way of applying the transmitter's signal.
The coupling of the transmitted signal to other pipes and cables in the area will be much less than with induction, although where commonly bonded systems are encountered – coupling cannot be avoided.

The positioning of the ground connection can also influence the degree of coupling experienced. Ground connections generally should not be made to other pipes or cables, or above ground metallic structures such as wire fences. In general the lower the frequency is, the further the signal will travel, and the less signal coupling will occur. The most common frequencies used for direct connection are between 512 Hz/640 Hz and 8 kHz.

Regulations in many countries require that power output is limited above certain frequencies. The vLocPro enables frequencies below 45 kHz to be transmitted using as much as 10 watts output, but frequencies over 45 kHz are restricted to 1 watt. Using direct connection and the higher power at the low frequencies helps significantly in achieving greater location distances. Direct connections should not be made to cables carrying greater than 35 volts (or as your safety practices allow). The transmitter is protected (250v fuse) from stray currents that may exist on the target line.

5.2.3 Clamp Mode – plugging the signal clamp supplied by Vivax-Metrotech into the output socket will place the transmitter in "Clamp" mode. An icon confirming this is displayed on the display. The icon flashes when the transmitter is transmitting. When using the clamp no ground connection is needed.



The clamp again is a precise way to apply the locating signal. It is generally used when access to the conductor cannot be achieved to make a direct connection (but there is sufficient access to place the clamp around the cable), or when it is not safe to make a direct connection because the target cable is carrying electricity.

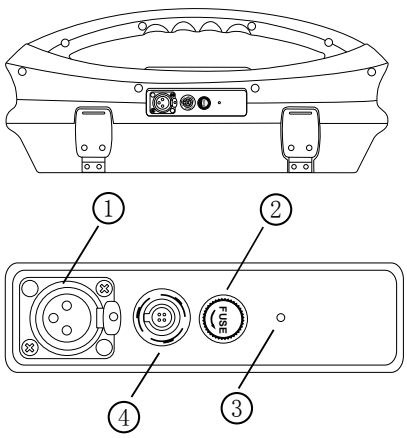
When the locator is within range of the marker there will be a sound from the speaker and also the icon in the centre of the display (5) will start to fill up.

Move the locator forward and back, left and right, until the largest signal is detected. Note the bar graph (1) will also respond. Use the "+" and "-" pushbuttons to keep the signal on scale. The bar graph should be used to pinpoint the position of the marker.

WARNING

When applying the clamp to cables that carry electricity – be sure to follow your company's safety instructions and procedures. Beware that if applied around a high voltage cable – that cable may induce a current in the clamp causing it to snap shut or jump quite dramatically – always apply clamps carefully.

5.2.4 Connection Block



1	Output Connection
2	Output Protection (Fuse)
3	Loudspeaker
4	Battery Charging Socket & DC Input

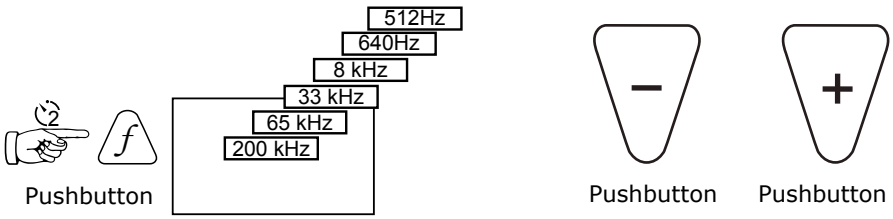
All the connections made to the transmitter are made at the connection block except that a USB socket is mounted inside the battery compartment for programming the transmitter's processor.
The connection block consists of:

- Output (XLR) socket – for the direct connection lead and clamp.
- Charger socket (to allow the retrofitting of a rechargeable battery pack – the charging socket is present even if re-chargeable batteries have not been purchased).
- Transmitter 12V power lead to power (NOT charge) the transmitter from a vehicle.
- Fuse – this protects the transmitter circuitry in the event of the transmitter receiving up to 250v incoming on the output leads.
- A beeper is positioned behind the small hole.

5.2.5 Frequencies & Power Output

The transmitter can be programmed on request to transmit almost any locating frequency in "Direct connection" mode – up to 200 kHz. When purchased the unit is shipped with a standard selection of frequencies, plus any you have specifically requested.
Standard frequencies are:

- 512 Hz (where electrical systems are 60 Hz) direct connection – 10 watts
- 640 Hz (where electrical systems are 50 Hz) direct connection – 10 watts
- 8 kHz direct connection – 10 watts
- 33 kHz direct connection, and clamp – 10 watts
- 65 kHz direct connection – 1 watt
- 83.1kHz direct connection – 1 watt (depending on region)
- 200 kHz direct connection – 1 watt (depending on region)
- Induction frequencies are 8 kHz, 33 kHz and 65 kHz or alternately 33 kHz, 65 kHz and 200 kHz (200 kHz is not permitted in some markets)



As with most manufacturers the clamps and induction antennas are tuned to specific frequencies, and do not work over a wide range of frequencies. Special winding/tuning can be provided on request.

Frequencies are selected by pressing the "Frequency" pushbutton which toggles through the available frequencies for the selection mode. The frequency is automatically selected if you don't toggle past it within 2 seconds. The frequency is shown on the display.

The output current is shown in large characters on the display – to increase or reduce the power output press "+" or "-". The vertical bar graph at the bottom of the display indicates which of the four power output steps is being used.

The current being transmitted will be limited by the impedance of the cable, therefore it is not unusual to increase the output level, but see no increase in the current displayed. This is not a fault with the transmitter.

The transmitter will always revert to first level output when switched on – this is a power saving feature – in most circumstances this output level is sufficient, increasing the power will do nothing but run the batteries down quicker. All other settings remain the same as the last setting used.

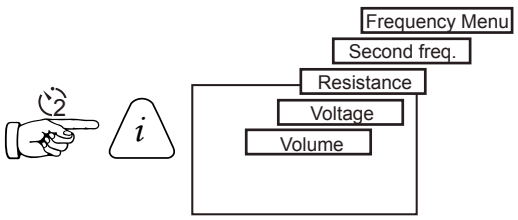
5.2.5.1 Most Used Frequencies (Frequency Selection) Feature.

This feature can be used to allow operator to choose his most used frequencies from a list of possible frequencies. Once these frequencies are selected in the main menu, pressing the "f" pushbutton, user can scroll through them. At any time user can add or remove frequencies from the above list, following the below procedure.

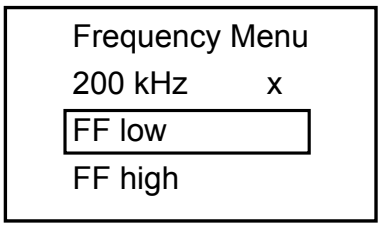
The advantage of this feature is that user can optimize the transmitter and activate at the main menu user's preferred frequencies, instead of having a whole list of frequencies that user has to scroll through.

To enter the "Frequency Menu" proceeds as follows:

1. Press the "i" pushbutton 5 times to get to the "Frequency selection" sub-menu.

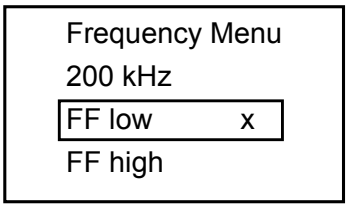


2. Screen will show a list of frequencies available, with the central one in a box



3. Pressing the "+" or "-" pushbuttons, you can scroll up or down through the available frequencies.

4. Once the wanted frequency is inside the box, press "f" pushbutton to select or deselect the frequency. An "x" will appear in the box for a selected frequency.



5. After selecting for the frequencies, press the "i" pushbutton again to exit the "Frequency Menu" and the selected list of frequencies can be select from the main display screen. Save and exit will automatically happen if there is no pushbutton press for about 5 sec while in the "Frequency Menu"

5.2.5.2 "Dual frequency" Mode

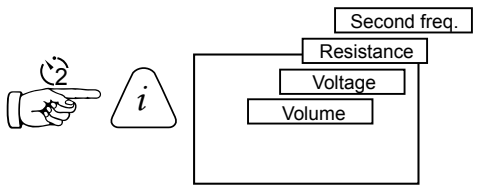
This feature can be used when user wants to energize on user's target two frequencies at the same time. Mainly, it can be used when user is not sure which frequency can be impressed better into the target.

NOTE:

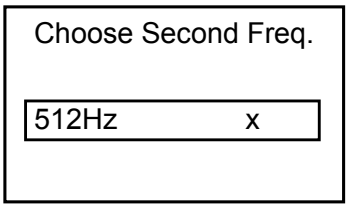
- **When using "dual frequency" mode, total power will be split between the two activated frequencies.**
- **This mode of operation is available only for frequencies below 40 kHz.**
- **The two frequencies have to be available in the main menu.**

To enter the "Choose Second Freq." menu, proceed as follows:

1. Press "f" pushbutton to select the lowest frequency that user want to have in the dual combination.
2. Press "i" pushbutton 4 times to get to the "Choose Second Freq." sub-menu. The above frequency will be shown in a box.



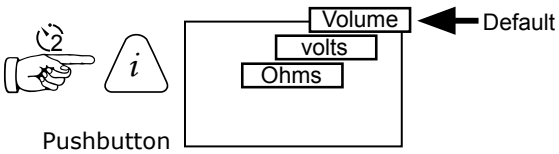
3. By using the "+" and "-" pushbuttons, user can scroll through the available frequencies and bring the wanted one in the box.

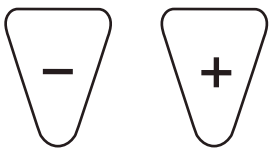


4. Press "f" pushbutton to select the second frequency and exit the submenu to return to the main display.
5. In the main display screen, both frequencies are displayed. The frequency will toggle between the two chosen frequencies.

NOTE:
If user is changing the selected frequency by pressing the "f" pushbutton, this mode will be deactivated. To reactivate it, user has to follow again the above procedures.
If the unit is powered down, this mode will be reset. To activate it again after power up, user has to follow the above procedures.

5.3 Information



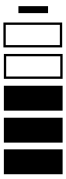


The digits in the center of the display default to output current (in mAmps).

When the "i" (information) pushbutton is pressed, the display will show the volume level of the audio; use the "+" and "-" pushbuttons to increase/reduce the volume or turn the beeper off (off – low – medium – high).

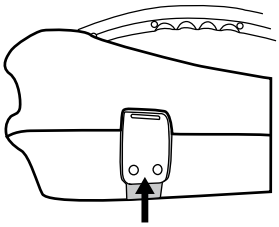
By pressing the "i" (information) pushbutton the display can be toggled to show "voltage" and "resistance". The display indicates mAmps, as the default, and volts or ohms when selected.

5.3.1 Transmitter Battery

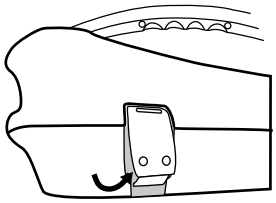


In most markets the transmitter is shipped with alkaline batteries (12 x D cells) unless rechargeable batteries are specified. Batteries are fitted into quick release trays – the alkaline is an open pack, to enable the batteries to be changed. The rechargeable pack is a sealed unit containing Ni-MH (Nickel Metal Hydride) batteries. These packs can only be fitted in a manner to ensure that the alkaline batteries cannot be inadvertently charged.

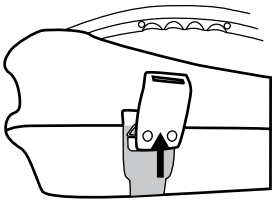
5.3.2 Removing the Battery Tray



Push up button



Pull out bottom of catch

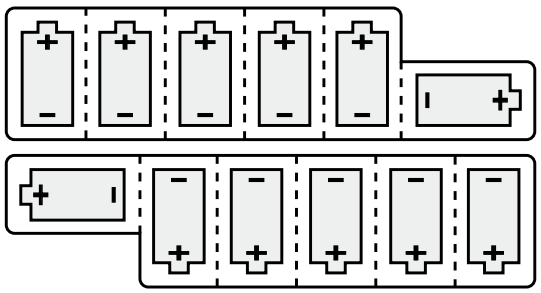


Lift up catch until it clears catch plate

5.3.3 Replacing the Alkaline Battery

- To access batteries – undo stainless steel screws on each battery cover
- To remove batteries – turn tray upside down and give a short sharp tap of the battery tray on your hand
- Replace batteries with new batteries of the same type, be sure not to mix old and new batteries
- Do not use rechargeable batteries in the alkaline battery tray. Ensure that batteries are inserted the correct way (see label and molded "+" and "-" in the bottom of the tray)
- Refit the battery cover – then refit the battery tray

WARNING! Alkaline Batteries – insert alkaline batteries (x12) as shown

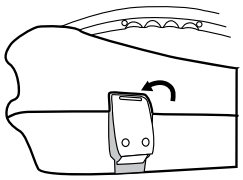


5.3.4 Rechargeable Batteries

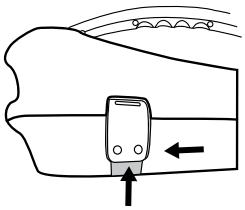
- Do not attempt to replace the rechargeable batteries or remove battery covers – return to Vivax-Metrotech or a Vivax-Metrotech approved service centers for replacement.

WARNING!
Use only Vivax-Metrotech recommended charger

5.3.5 Re-fitting the Battery Tray



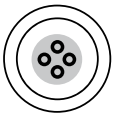
Place top of catch over catch plate



Push up button underneath the catch – where holding that up push in the bottom of the catch. You will hear a positive "click" (Do NOT force catches)

To close battery tray – slid transmitter (TX) onto tray, it will locate itself in the correct position, then close the catches.

WARNING! Power "IN" socket



Two pins are used for power in from charger (to charge rechargeable batteries).
Two pins are used for power from external 12v source.

NOTE:
Rechargeable pack can not be charged from a 12V source.

Contact Vivax-Metrotech or a Vivax-Metrotech approved service center for wiring diagram of plug, if attempting to repair any of the "charging" leads.

5.3.6 Battery Charging and Disposal

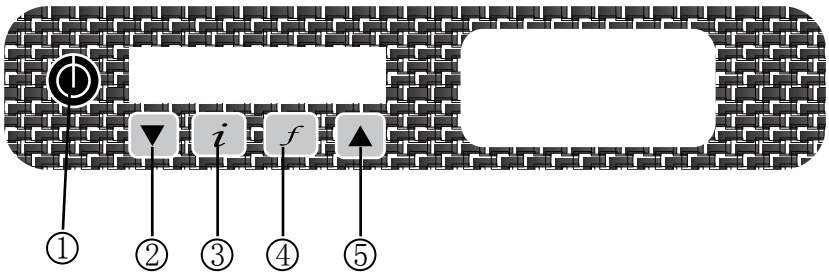
Follow instructions detailed in the General Safety & Care portion of this document.

5.4 Battery Condition Indication

The battery condition (charge) is displayed on the left side of the display, in the case of the rechargeable batteries the condition is indicated on the charger (red/green light).

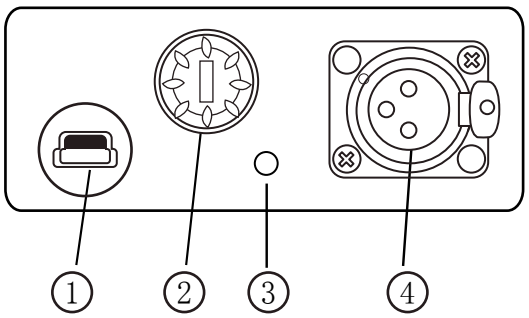
Loc-5Tx Transmitter

6.1 Pushbutton

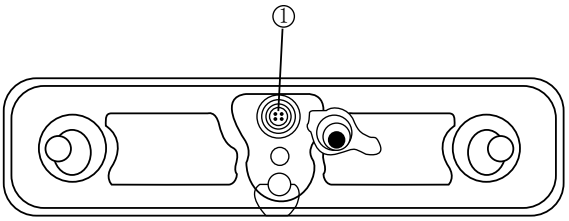


1	On/Off Control
2	Output Decrease
3	Information (Volume, mAmps, Volts, Ohms)
4	Frequency Select
5	Output Increase

6.2 External Connectors



1	Mini USB Port
2	Output Fuse
3	Speaker
4	Output Connection



1	Battery Charging Socket & DC Input

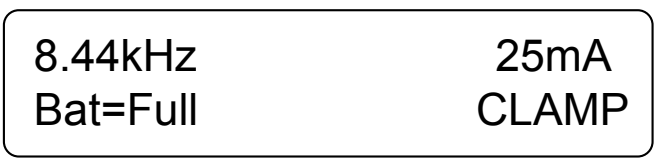
6.3 Display

- Start up screen, software configuration

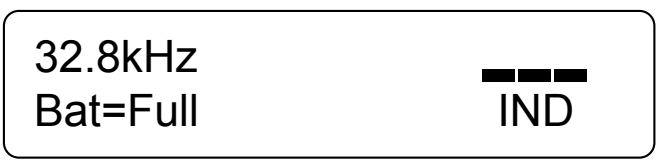
- Main screen

1	Frequency Being Transmitted
2	Battery Status
3	Digital Read Out (mAmps)
4	Mode Indication

- Clamp Mode

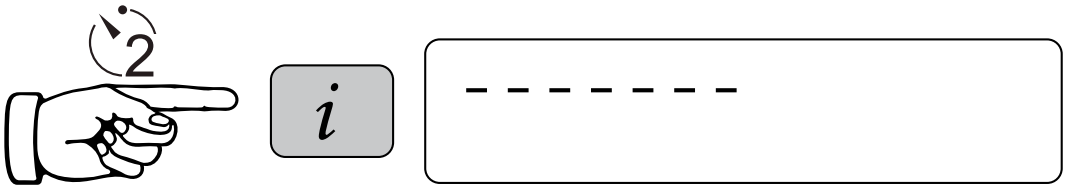


- Induction Mode



- DC Measurement

If a DC measurement want to be done while in the voltage and resistance screen, press and hole the "i" pushbutton. Unit will enter in to the DC measurement sequence and at the end of it will display the DC resistance of the load.

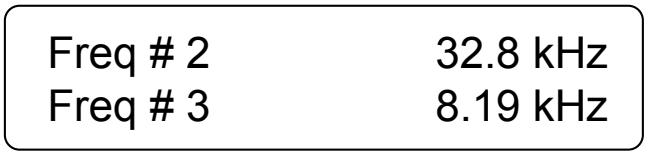


Screen showing DC resistance of the load.

6.4 Multi Frequencies

To transmit simultaneous up to 3 frequencies proceed as follows:

1. Place the transmitter in the first frequency using the "F" key in the main menu
2. Press the "i" key 3 times. The display will show the screen below with "Freq # 2" and "Freq # 3" flashing. This mean they are not set yet.



3. At this point, with the "up" and "down" keys you can select the second frequency to be transmitter. Once in the proper selection, press the "F" button to confirm. The "Freq # 2" row will not flash any more confirming that it has been set. Repeat the above procedure for the third selection or press "i" to exit this menu, if a third frequency is not needed.

4. Main display will show the "MULTI" as a mode of operation as shown below.

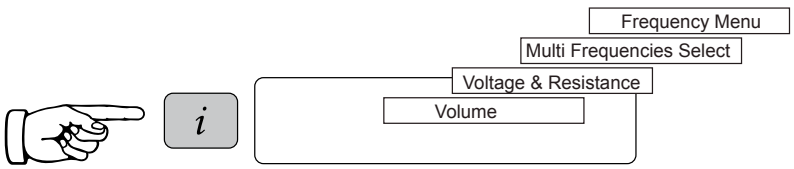
NOTE: The "MULTI" mode is only a one time mode. If unit powered down the MULTI mode has to be reactivated.

6.5 Most Used Frequencies (Frequency Selection) Feature

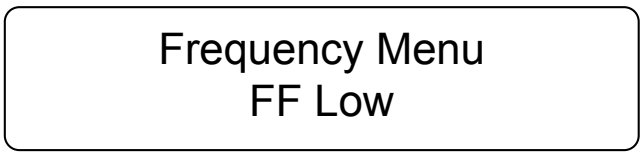
This feature can be used to allow operator to activate the most used frequencies from a list of possible frequencies. Once these frequencies are selected in the main menu, pressing the "f" key, scrolls through them. At any time the user can add or remove frequencies from the above list, following the below procedure.

PROCEDURE:
To enter the "Frequency Menu" proceed as follows:

1. Press the "i" button 3 times to get to the "Frequency selection" sub-menu.

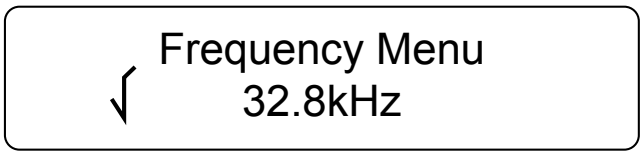


2. Screen will show the available frequencies.



3. Pressing the "+" or "-" buttons, you can scroll up or down through the available frequencies.

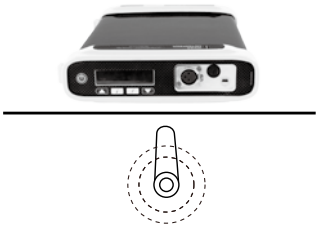
4. Once the wanted frequency is shown on screen, press "f" button to select or deselect the frequency. An "√" will appear in the box for a selected frequency.

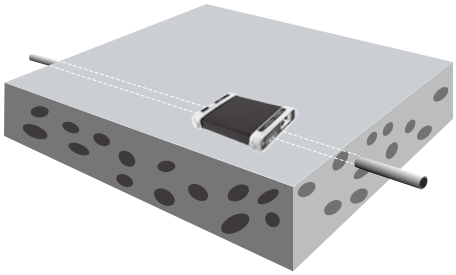


After selecting for the frequencies, press the "i" button again to exit the "Frequency Menu" and the selected list of frequencies can be select from the main display screen. Save and exit will automatically happen if there is no button press for about 5 sec while in the "Frequency Menu".

6.6 Induction Mode

This uses an internal antenna to induce a locating frequency onto the target pipe or cable (Line). "Induction" mode is automatically selected if no connection accessories are plugged into the "output socket". In order to generate successful induction, the transmitter should be positioned over and in line with the target line.





"Induction" mode is generally used when no access is available to make a direct connection, or a clamp connection. When using induction it is very likely that the signal being induced onto the target line will also be induced onto other lines in the area, and onto above ground features such as wire fences. This can influence the accuracy of the location, depth and current measurements. "Induction" mode is also the least efficient way of applying the transmitting signal to the target line. The distance located with "Induction" mode is generally much less than that achieved with a direct connection or clamp connection. "Induction" mode generally works better in higher frequencies, 33 kHz, 65 kHz and either 83.1kHz or 200kHz (depending on region). The advantage of induction is that no access is required to "connect" the transmitter, making it a very quick process. The antennas on the transmitter are tuned to induce specific frequencies or range of frequencies. Therefore only a limited number of frequencies can be selected in "Induction" mode.

Note: For accurate location and depth measurement the locator receiver should not be used within 50 feet/20 meters from the transmitter.

6.7 Direct Connection Mode

Please refer to section 5.2.2.

6.8 Clamp Mode

Please refer to section 5.2.3.

Disclaimer: All product availability or product accessory information is subject to change without notice.

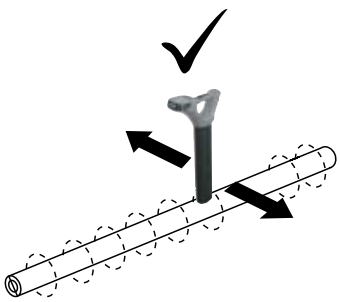
Using the vLocPro

7.1 Using the Receiver

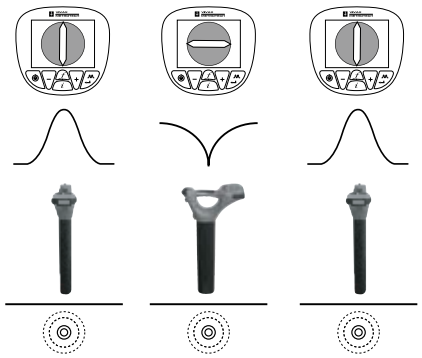
7.1.1 Line Locating – Line locating is when a pipe or cable is being located.

When line locating, the receiver should be held with the display forward, and then swept to the left and right across the suspected direction of the buried line. Note the compass line direction indicator always points in the direction of the line (active in active modes). The compass color change from clear to blue when the receiver is in line with the buried line.

a)



b)



The receiver should be kept parallel to the ground – and should not be flipped up at the end of each pass. See diagram (a).

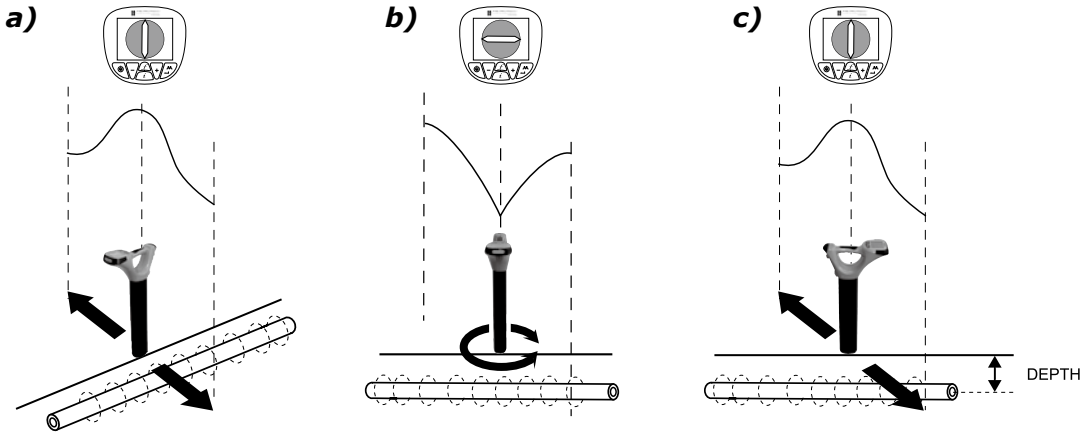
To establish the direction of the cable – use whatever mode you prefer to locate the line; then switch to "Peak" mode to confirm the direction. Pinpoint the line – by carefully establishing the exact "Peak" position. Then (with the base of the receiver on the ground) rotate the receiver through 90 degrees, as you do this the signal being received will reduce substantially (possibly disappear). Then rotate the locator until you find the maximum "Peak". The front of the locator is again facing in the direction of the buried line. See diagram (b).

7.1.2 Depth & Current Measurement

Pinpoint the exact position of the cables as follows:

a) Locate lateral position of the cable
b) Rotate receiver to confirm the direction of the cable (you will see a null response when the receiver is intersecting the direction of the cable at 90 degrees)

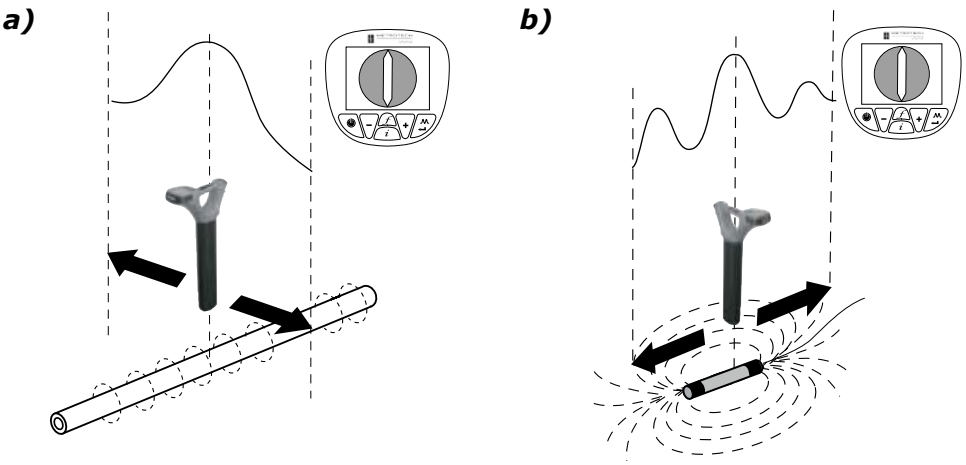
c) Rotate the receiver back until it is exactly in line with the cable



d) Once the position and direction of the cable has been established, stand with the base of the locator on the ground – with the locator in the absolute "Peak" position (over and in line). Then press the "i" information pushbutton briefly, the current and depth will be displayed.

7.1.3 Sonde Location

This is used for locating a Sonde only. The relevant factor is that instead of locating a pipe or a cable where the signal radiated out from the cable (see diagram a) – a Sonde is a transmitting coil and the signal radiates in a different manner (see diagram b).



Due to this construction, the Sonde gives a different "Peak" pattern (see diagram b) – note that there are 3 distinct peaks – a small peak – a large peak – a small peak. The Sonde is located under the center of the "large peak", when locating across the direction of the Sonde it provides the conventional peak response. Note also that the Compass Line Indicator points across the line of the Sonde when the receiver is directly over it and the color of the compass change from clear to blue.

A Sonde is typically used for locating non metallic pipes or ducts, and the camera end of a sewer inspection camera. Low frequency versions (512Hz/640Hz) can transmit through some metallic pipes such as cast iron pipes – which is why they are frequently used with sewer inspection cameras.

The procedure for Depth Measurement is the same as in line location, but must be done in the Sonde mode. Depth measurements taken from a Sonde in any mode other than Sonde mode will be inaccurate.

7.1.3.1 Using the Compass Feature to Locate Sondes

Switch on the vLocCam. Select the frequency to match the Sonde frequency. Use the mode pushbutton to select Sonde.

Stand in the approximate vicinity of the Sonde. Press the "+" pushbutton to increase the gain so that a steady bar graph reading is displayed. If no or very fluctuating bar graph is shown, it means that the Sonde is not in the expected vicinity. If this is the case pull back the Sonde to a known position, which may be the point the Sonde enters the pipe, and start the search here.

Rotate the locator until the compass is pointing at 12 o'clock. Walk in the direction of the compass keeping the compass pointing at 12 o'clock. The locator will lead you in an arc that crosses over the Sonde. Press the gain pushbuttons to keep the bar graph on scale. The maximum bar graph indicates the position of the Sonde.

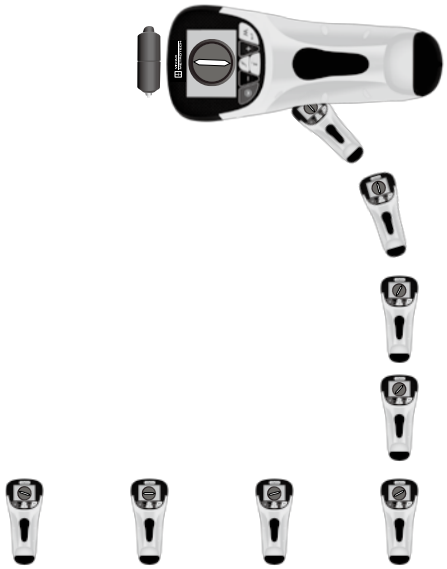
To pinpoint the Sonde, find the peak in both directions.

When over the peak position, the depth is automatically displayed. Press the "i" pushbutton to get a more precise depth reading.

TIP

Using the compass to locate the Sonde requires free space to walk to the side of the Sonde. If there is an obstacle such as a wall or vehicle that restricts walking in an arc, the following method can be used.

1. Position the locator in the approximate vicinity of the Sonde as above.
2. Rotate the locator so that the compass is now pointing at 3 o'clock.
3. Now step to the side keeping the locator pointing in the same direction. The compass will rotate slightly.
4. Keeps the locator pointing in the same direction and walk forward. The compass will slowly rotate. When it reaches 12 o'clock follow the compass keeping it at 12 o'clock.



Pinpoint the Sonde as in the first procedure.

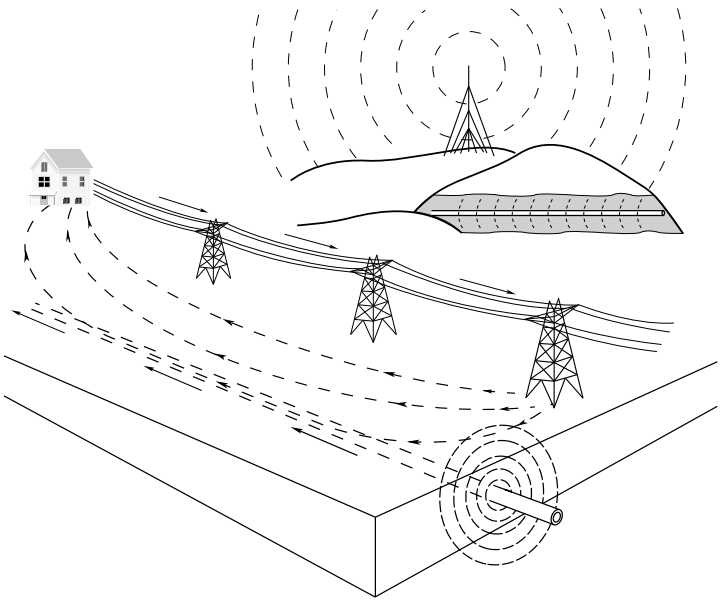
7.2 Passive or Active Location

There are two types of location method available with this system, they are:

7.2 .1 Passive Locating

Passive locating is locating buried utilities using the electromagnetic signals that exist in the environment. We group these under two settings:

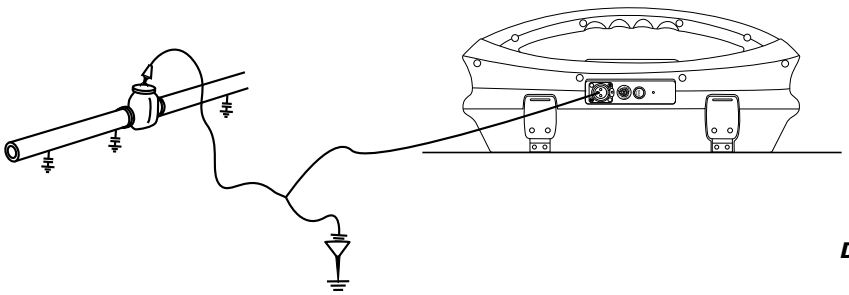
- Power (P) – these are signals that generally originate from electrical power generation systems. These are around 50/60 Hz and their associated harmonic.
- Radio (R) – these are signals that are generally originated by low frequency radio transmissions. These are generally in the range of 16 kHz to 22 kHz.



Passive location is used to search an area to see if buried metallic lines are present (known as locating to AVOID). It does not help to identify what buried pipe or cable is present, only to confirm that there is a pipe or cable there. A typical application would be to check an area before installing a fence post.

7.2.2 Active locating

Active locating is using a transmitter to apply a very precise frequency to a pipe or cable, and then using a receiver turned to find the signal being radiated at that precise frequency. Active location frequencies can be applied by direct connection, clamp or induction.



Direct connection

This receiver provides a wide range of frequencies for active location. Some will be the same as the frequencies provided by the Vivax-Metrotech's transmitter, others will be frequencies used in other manufacturers' transmitter.

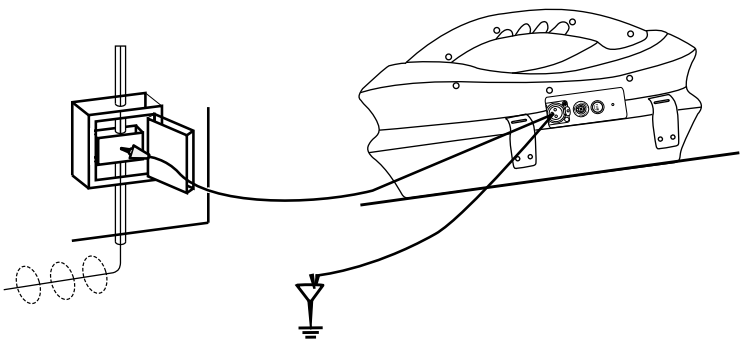
The choice of frequencies when using induction or the clamp is restricted due to the requirement that these modes be tuned for specific frequencies (or range of frequencies). The full range of frequencies is available in "Direct connection" mode.

For frequencies below 45 kHz, authorities such as the FCC allow higher power output to be used; for frequencies of 45 kHz and above, power output for this type of equipment is restricted to 1 watt. Therefore more power is available when lower frequencies are used.

7.3 Applying the Transmitter's Signal

The transmitter's signal cable is applied in any one of the three ways:

7.3.1 Direct Connection - this is used on pipes or cables that are not carrying any electric current. The "Direct connection" mode will be selected automatically when the connection leads are plugged into the transmitter.



Direct Connection

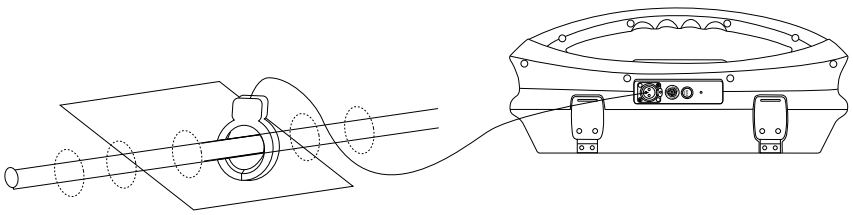
Warning !
NEVER make a direct connection to cables carrying electric/current/ voltage

Do NOT plug the connection leads into the transmitter before connecting to the buried line and fixing the ground stake. Take the ground stake and push firmly into the ground and connect to it the black connection lead. Connect the red connection lead to the target line after removing any surface corrosion. To make the signal travel further along the buried line, ensure to place the ground stake as far away as possible, and at 90 degrees to the line. Where practical avoid having other buried lines between the ground stake and the target line, this will reduce the chances of the transmitter signal coupling to another pipe or cable. Do NOT connect the black lead to any other metallic items that may have an above or below ground structure, or to any other pipes or cables; connecting to such items would cause signals to radiate from these secondary structures, which in turn will increases the likelihood of an incorrect locate.

Plug the connection leads into the transmitter switch on and select the desired frequency.

Warning !
BE CAREFUL not to hit other buried lines when inserting the ground stake into the ground. Check using passive location prior to inserting ground stake. Stop if additional resistance is felt during insertion.

7.3.2 ***Clamp (Coupler)*** This is used when applying the transmitter signal to cables carrying electric current, or cables where access to the metallic conductor is not possible, or undesirable. The "Clamp" mode is selected automatically when the clamp is plugged into the transmitter.



For a clamp to work the current induced by the clamp must flow along the buried line. This means the buried line must have a ground connection at both ends.

Do NOT plug the clamp into the transmitter before applying it to the target line. Open the jaws of the clamp, place around the target line, close the jaws. Be sure that the jaws of the clamp are completely closed. After applying the clamp, plug it into the transmitter, switch on and select the required frequency. Clamps are generally turned to specific frequencies. Your transmitter only allows frequencies that are compatible with the clamp to be selected.

Please note – at the end of the clamp, and in the area close to the clamps hinge the exposed end of the clamp laminations can be seen. Any dirt or corrosion on these ends will reduce the efficiency of the clamp.

Warning !

ALWAYS FOLLOW the appropriate safety requirements mandated by safety legislation, safety practice or your company's safety procedures when applying a clamp (coupler) to a cable.

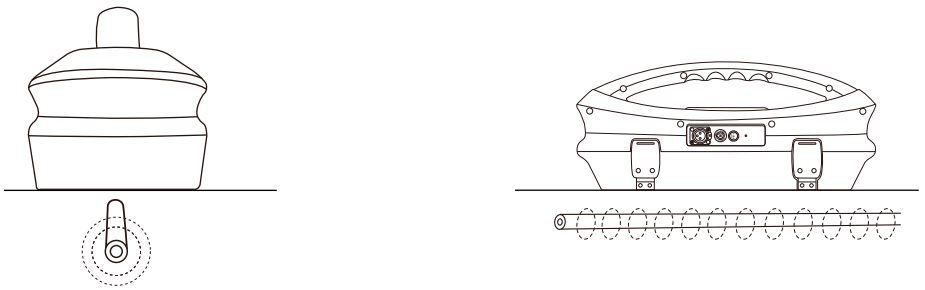
Warning !

BEWARE that when placing a clamp around cables carrying high current, the clamp may vibrate, jump or close violently due to inducted current from the target cable.

7.3.3 Induction – This is used when no connection via direct connection leads, or coupler is possible. If no connection leads or clamp are connected to the transmitter, it will automatically select "Induction" mode.

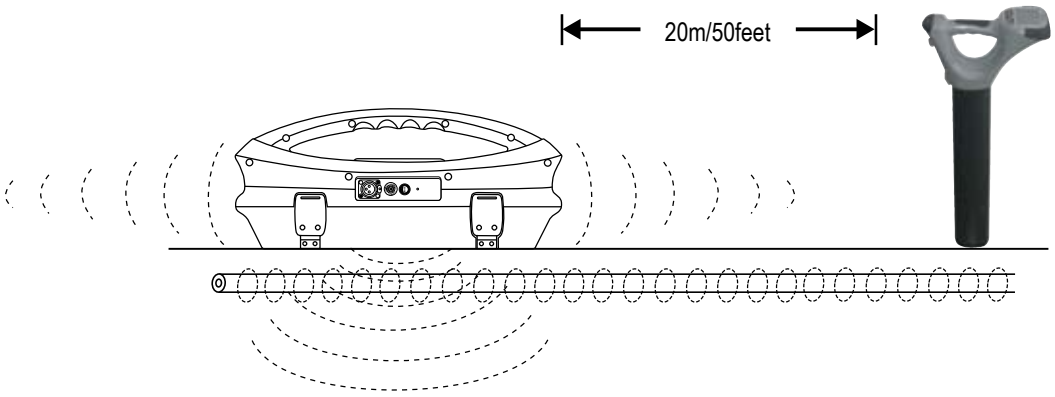
An induction loop is fitted inside the handle of the transmitter. The transmitter must be placed over the target cable with the handle over and in line with the target pipe or cable. The induction loop is tuned to operate at specific frequencies. Only these frequencies can be selected when in "Induction" mode.

Do NOT place the transmitter on a manhole cover, or any other such metallic object, as that object will shield or soak up the signal resulting in little of no signal being induced in the target line.



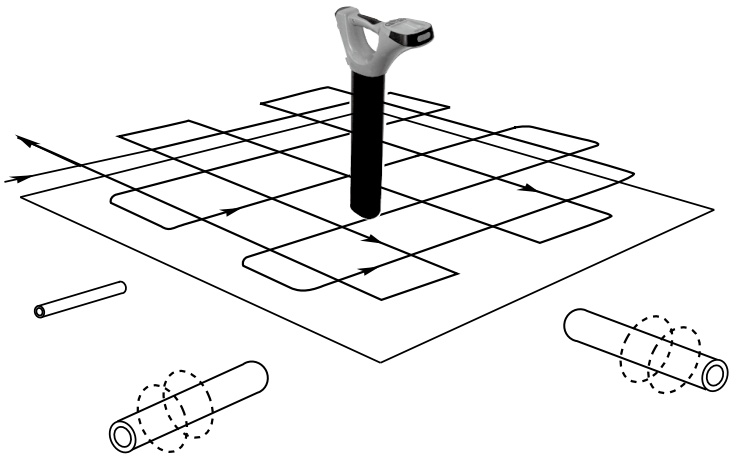
Induction

When using the "Induction" mode to apply a signal to a line, ensure that a minimum distance of 50 feet / 20 meters is maintained. This is because the transmitter will transmit signal through the air which will interfere with signals from the cable, resulting incorrect information.



7.3.4 Searching (sweeping) an Area

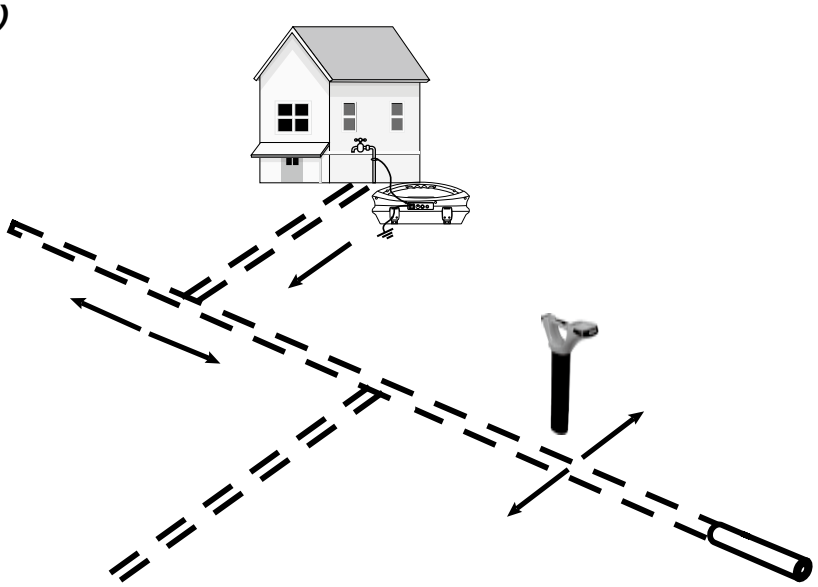
In any given area, it is likely that buried pipes and cables are not parallel to each other, frequently they will cross the area being searched at a variety of different angles and depths. As the response of locator antennas is directional, it is important to search the area in the same or similar pattern as below. This orients the antennas in a way that will locate any signals being radiate from the buried line. Once a response is found, then trace and pinpoint the line and mark. Searching an area in this way is generally (but not exclusively) done in the "Peak" mode using passive locating.



7.3.5 Tracing a Buried Line

Once a buried line is located it is generally necessary, and a good practice, to trace that line for some distance in both directions. Whenever practical it should be traced to a point that provides additional confirmation of what type of service is being located (a telephone pedestal, a manhole cover etc). If tracing a line to which a transmitter signal has been applied, one should trace out from the transmitter connection point. The receiver should be held level to the ground and rotated in a small arc across the anticipated route of the buried line. A clear response should be visible on the display and heard audibly.

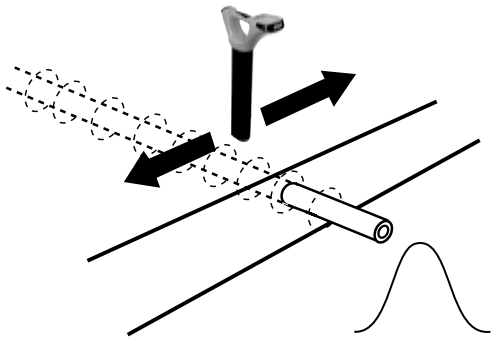
a)



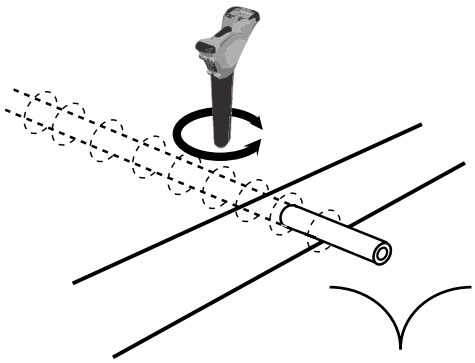
7.3.6 Pinpointing & Confirming the Buried Line

Marking the exact position of the buried line is generally called pinpointing. Pinpoint the line before marking its position. Place the receiver in "Peak" mode, pass the blade of the receiver across path of the cable and identify the peak response on the display and/or audibly.

a)



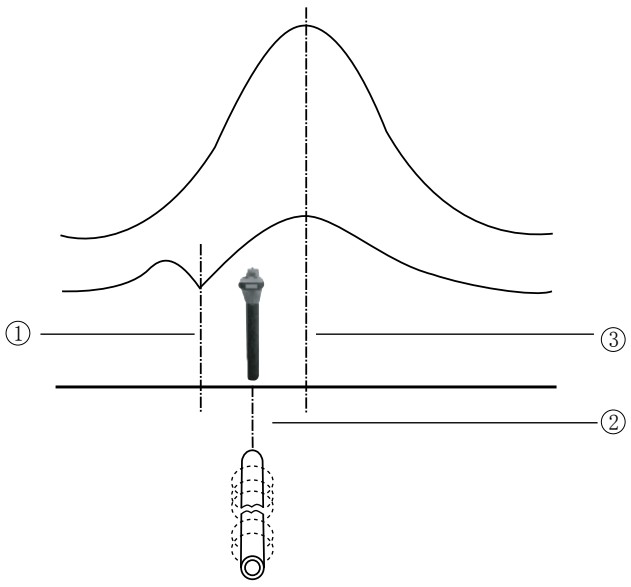
b)



7.3.7 Distorted Fields

When locating always be aware that you are locating the signals radiating from the buried line, and these radiated fields as they are called can be distorted by other lines or electromagnetic buried lines or metallic features like crash barriers or wire mesh fences. The risk of an inaccurate location can be reduced further by the following:

- Check to see if the signal is being distorted by other radiated fields. Locate the cable, first in the "Peak" mode, and then in the null mode. The two locations should indicate that the cable is in the same place. If they do not, the signal field is distorted and the depth measurement may be inaccurate.



1	Null Position
2	True Position
3	Peak Position

- Measure the depth of the buried line by pressing "i" pushbutton briefly to measure depth and current. The depth should be approximately in line with the "as built" plans available. If no plans are available logic would still help to assess the situation (if you are looking for a CCTV distribution cable and the depth indicated is 5ft (1.5m) it is probably not your cable). Current will be displayed at the same time as the depth.

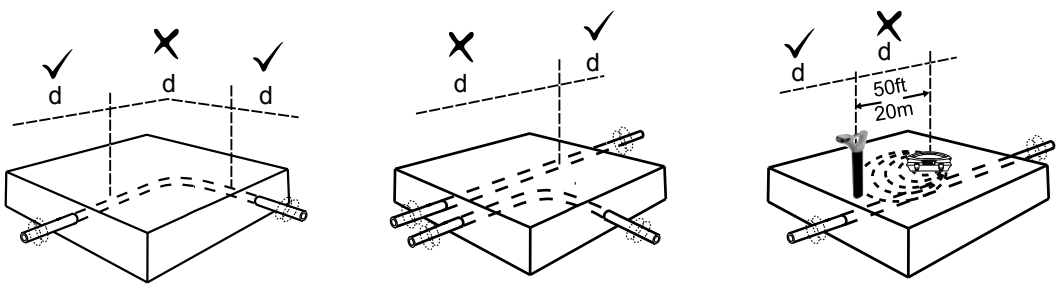
- A depth reading on congested areas of close to bends or tee's maybe inaccurate due to distorted fields.

7.3.8 Measuring Depth and Current

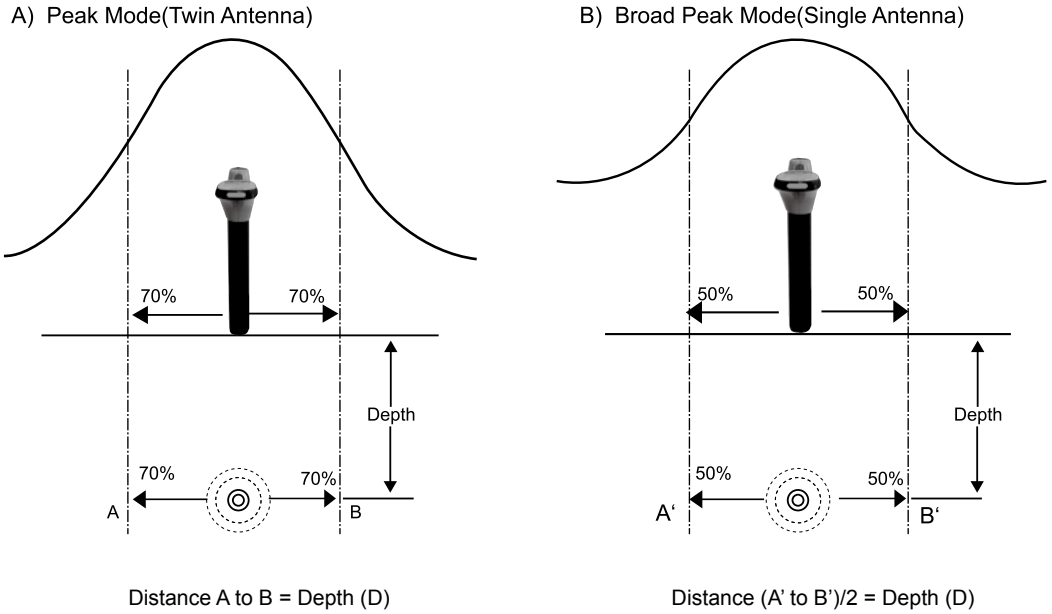
- Pinpoint the cable as described in Pinpointing cable, with the receiver in line with and directly above the buried line – measure the depth (d) by pressing "i" pushbutton briefly. Current will be displayed at the same time as the depth.

- Be careful when locating in congested areas of close to bends or tee's, they may be inaccurate due to distorted fields.

a) ***b)*** ***c)***



- An alternate method of verifying depth (D) is triangulation which can be done in "Peak (Twin antenna)" or "Broad Peak (Single antenna)" modes.



- Measure the current. This is displayed when you briefly press the "i" pushbutton to measure depth. The signal from the transmitter will attenuate with distance. The further you are away from the transmitter the less signal will radiate from the buried line. By locating at several points along the buried line you will identify an approximate rate of signal loss (beware that where a pipe or cable divides the signal will reduce more rapidly). If the signal at the point you are pinpointing is different from the trend would suggest – between that, it may not be the buried line you expect.

Warning !
NEVER mechanically dig over the path of a buried pipe or cable. ALWAYS dig carefully

7.3.9 Signal Direction Precision Identification

(Available for vLocPro-SD model only)

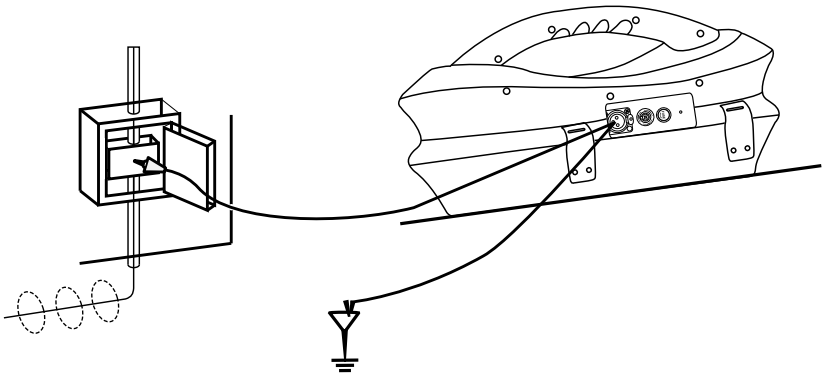
Some models in the vLoc range of locators contain a feature called "SIGNAL DIRECTION". This feature is used to verify if the line being located is the line to which the transmitter has been connected.

When a transmitter is connected to a target line the signal travels along it and finds the easiest way to travel back, usually via the ground and ground stake. However, very often the signal will travel back along adjacent cables or pipes as these can offer an easier route.

As a result there can be multiple signals radiating from cables and pipes in the area making it difficult to identify the target line. These return signals are typically traveling in the opposite direction than the applied signal. The Signal Direction feature identifies which direction the signal is flowing and hence the target line.

To use the signal direction system:

- Connect the transmitter to the target line using a direct connection only.

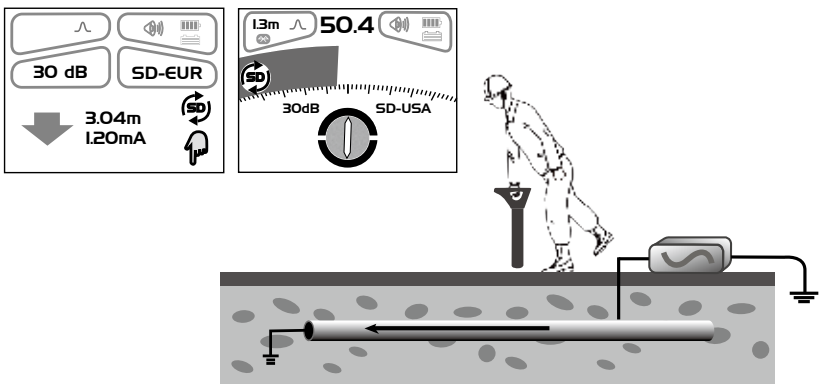


Direct connection

- Turn the transmitter and receiver on and set both to :
  - SD-USA – if in North America or any territory where the power system is 60Hz.
  - SD-EUR – if in Europe or any territory where the power system is 50Hz.

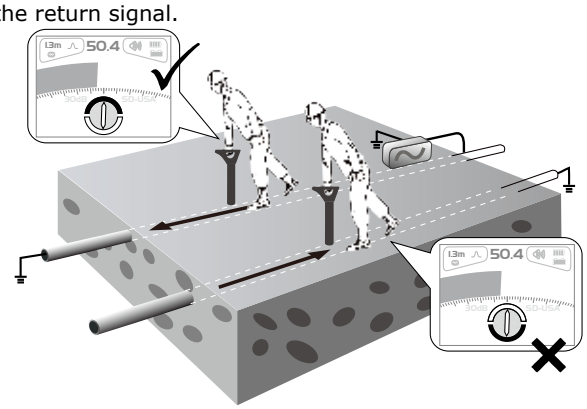
- The receiver may, or may not be flashing the "SD" icon and compass bezel. "
  "A flashing icon and bezel indicates that the unit needs to be synchronized with the transmitter." Even if the icon is not flashing it is always good practice to synchronize the system at the beginning of a survey to ensure reliable results and to maximize the distance to the next synchronization point.

- To synchronize the receiver to the transmitter at the beginning of a survey, pinpoint the line very close to the transmitter – be sure that it is the correct line. Then, standing facing away from where the transmitter is attached and press the "i" pushbutton. The unit will now display the information screen showing the depth of line, signal current and a hand with the "SD" icon positioned over the return pushbutton. Pressing the return pushbutton will synchronize the system and return the unit to the locate screen. The top portion of the bezel surrounding the compass will light and not be flashing indicating the receiver is locked onto the signal. The system is now synchronized.

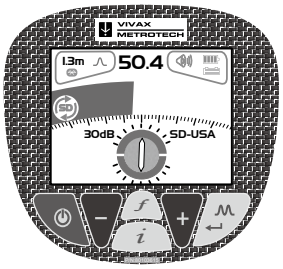


- Proceed to locate, trace, pinpoint as required ensuring at all times the top portion of the compass bezel remains illuminated.

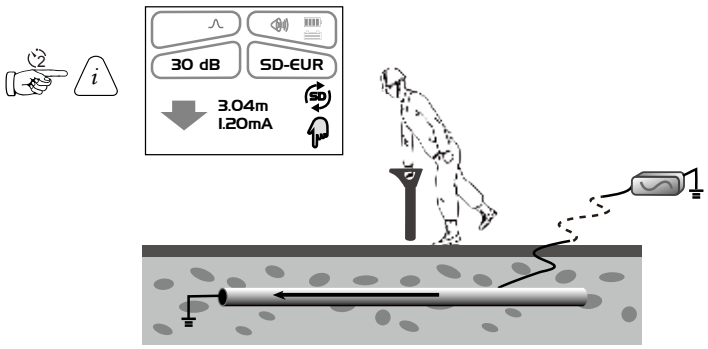
- If at any time top portion of the bezel ceases to be illuminated and the bottom portion of the compass bezel lights up – you are not locating the correct line, you are locating a line which is carrying the return signal.



- At some point you may find that the top or bottom portion of the compass bezel together with the SD icon and start flashing – this is indicating that synchronization with the transmitter has deteriorated and a reset is required.



- Re-trace your line back to a point where a solid signal direction is obtained. Precisely pinpoint the line and stand with your back to the direction of the transmitter as you did when you initiated the original sync and press the "i" pushbutton then the enter pushbutton to re-sync with the transmitter signal.



- Continue to locate, pinpoint and trace.

NOTE:
If several lines are commonly bonded the Signal Direction will carry through to the other lines. This is useful for locating multiple line installations.

When performing a reset, take care to ensure that you have not strayed from the target line.

There will be a point at which it is not possible to reset and continue.

However beware that if a non target line is commonly bonded to the target line that line will also appear as being "in Sync" with the target line.

7.4 Using the Accessories

7.4.1 Using the LPC SeparationFilter

The LPC separation filter (LPC) is used to safely inject a trace tone to a live cable via a domestic mains socket, so that the cable can be traced from the premises to the connection in the street. It is suitable for connecting to voltages between 100V AC and 250V AC.

Method:
Plug the LPC into the output socket of the transmitter. Identify a suitable main socket. If a switch is fitted to the socket, switch off. Plug in the LPC to the mains socket and then switch back on. Set the LPC rotary switch to match the two indicator lights. Set the transmitter to the frequency to be located. (8 kHz or 32 kHz are good frequencies for this application). Set the output to mid range.

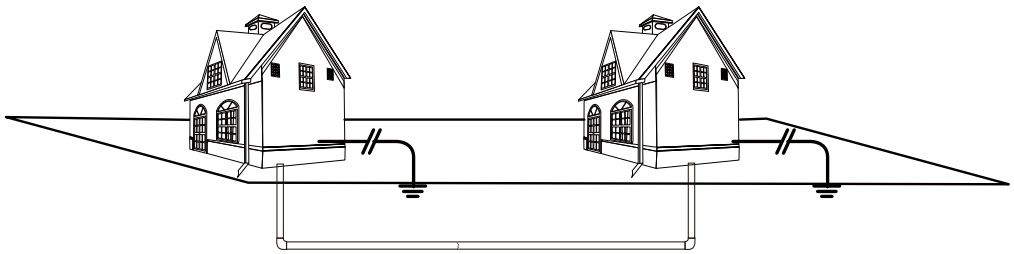
WARNING
Both connection ends contain power voltage. Please handle with care.

7.4.2 Using the A-frame in Fault Finding



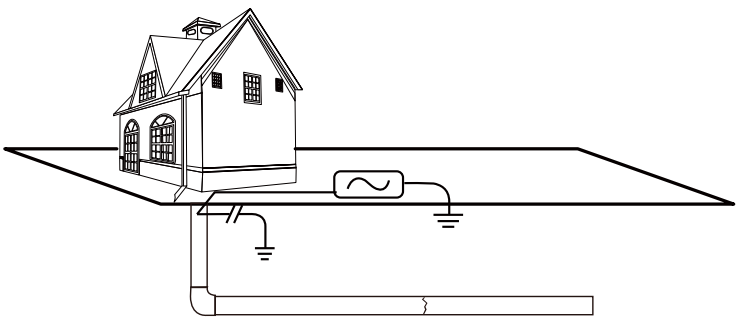
The A-frame accessory is used to detect ground faults on pipes and cables. In the case of pipes, the faults consist of coating defects. In the case of cables, faults are usually caused by insulation damage allowing the metallic sheath (or internal conductor) to become in contact with the ground.

To detect a damaged section, the line should be isolated and have all ground bonding removed. This will ensure that the ground fault is not masked by deliberate bonding to ground. The A-frame cannot distinguish between these two situations.



After isolating the line, use the vLocPro transmitter resistance measuring function, or a dedicated resistance measuring device to confirm that there is a fault to ground. The A-frame will typically detect faults up to 2 mega ohm and above (depending on the distance from transmitter, soil conditions etc).

Connect the transmitter to the target line using the red lead. An earth stake needs to be pushed into the ground and the black cable clipped to it. Try to place the earth stake as far as possible from the line to be evaluated. This ensures return currents do not distort the results. Switch on the transmitter and select either FF low or FF high. Use FF high if the line to be surveyed is long or the fault resistance is high.



Plug in the A-frame to the receiver accessory socket. When the receiver is switched on, it will automatically default to the A-frame screen.

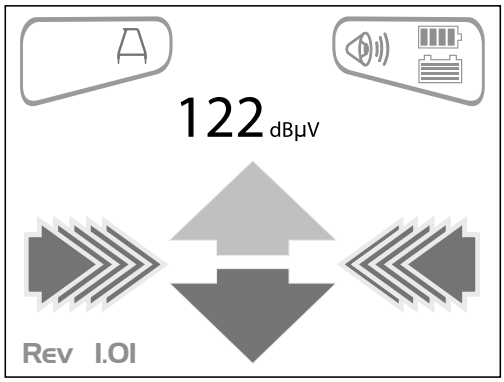
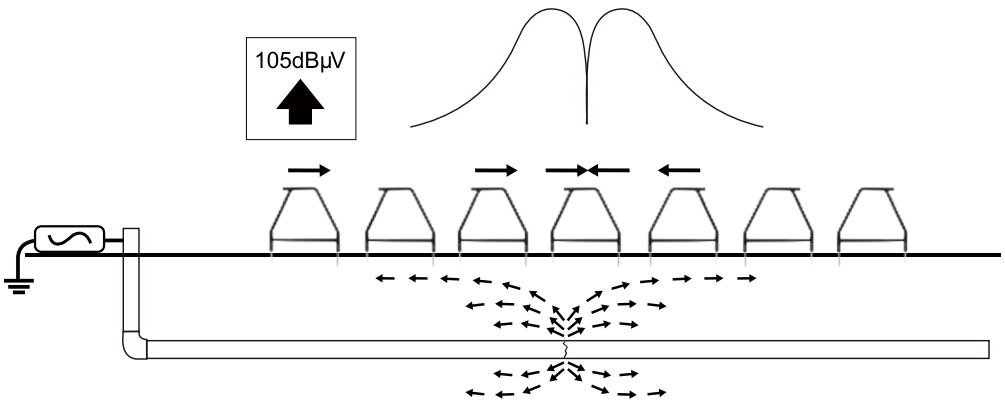
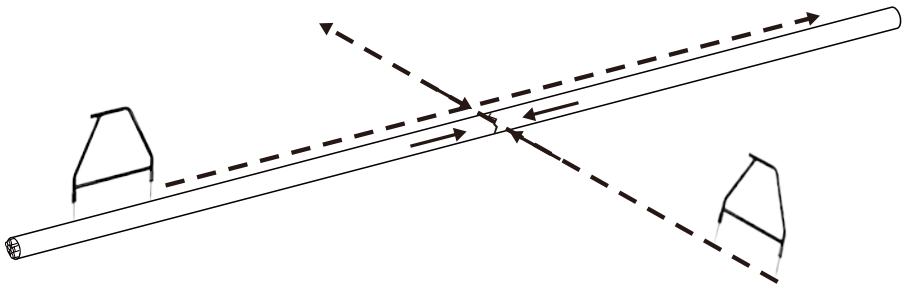


Image for reference only and may differ from actual image

Remove the plastic spike covers from the A-frame. Walk along the route of the line placing the spikes of the A-frame in the ground (with the green leg pointing away from the transmitter connection point) every two or three paces. If starting near the transmitter, the Arrow on the display will point away from the transmitter. As the distance from the transmitter increases, the dBuV reading will reduce and eventually the arrow will fluctuate or disappear all together. This is because the fault location is further along the line. If the left/right arrows are activated, use them to ensure the A-frame is positioned over the line and continue placing the A-frame in the ground every two or three paces. If the left/right arrows are not activated use the "Return" pushbutton to enter the locate screen allowing the user to confirm the position of the target line. Press the "Return" pushbutton again to re enter the A-frame mode.



Eventually the A-frame will detect the fault signal and the "Fault Find" arrow will point forwards. Continue moving forwards, it may be worth reducing the distance between measurements points as the fault is neared. The dBuV reading will increase as the fault is neared. Maximum reading will be just before and just after the fault. When over the fault, the dBuV reading will drop and the arrow will flip backwards indicating that the position of the fault has been passed. Carefully place the A-frame before and after the fault to pinpoint the position. Repeating this across the line direction will pinpoint the fault laterally. Where the two lines cross is the fault position.



TIP

If it is suspected that there is just one fault. Insert the A-frame approximately one meter from the earth stake. Note the dBuV; this is approximately the maximum dBuV reading that will be measured over the fault.

WARNING

Always disconnect or isolate cables before making connections to conductors. Never attach the transmitter to live cables unless authorised. Use the appropriate accessories.

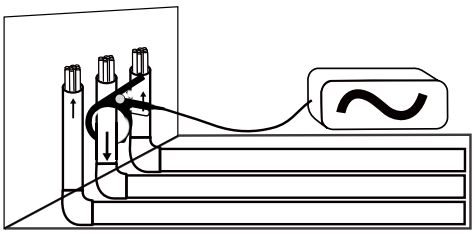
7.4.3 Using the Remote Antenna USB

The remote stethoscope antenna can be used to help identify a particular cable on a cable tray or where cables are bunched together.

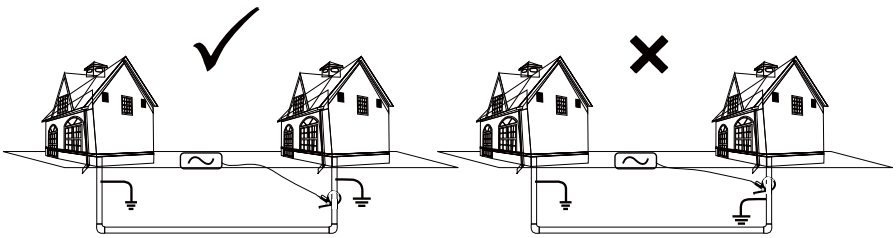
Methods:

1. Connect a signal to the cable to be identified. The remote stethoscope functions has an operational frequency range of 512Hz up to 200kHz, but low frequencies should be a preference in this application as they are less likely to leak or bleed over to other cables.

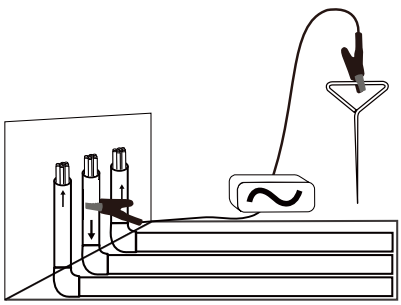
2. The best method of signal application when identifying cables is to use the signal clamp. This is because the signal clamp applies a signal to the target cable and shares an equal amount with other cross bonded cables.



3. When using the signal clamp, both ends of the target cable should be grounded. Apply the clamp below the ground point. Applying the clamp above the ground point will prevent the signal finding the return path through the ground, so is not advised.

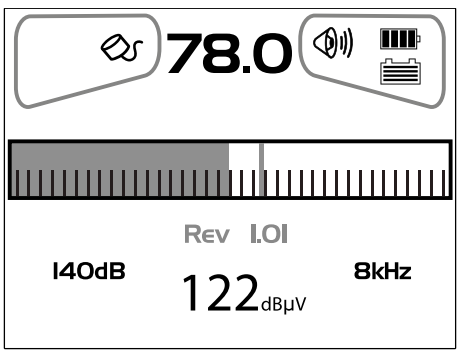


4. If this is not possible use a transmitter signal clamp use a direct connection lead to make an electrical connection to the cable. Removing any cross bonding between cables prevents the signal travelling along commonly bonded cables.



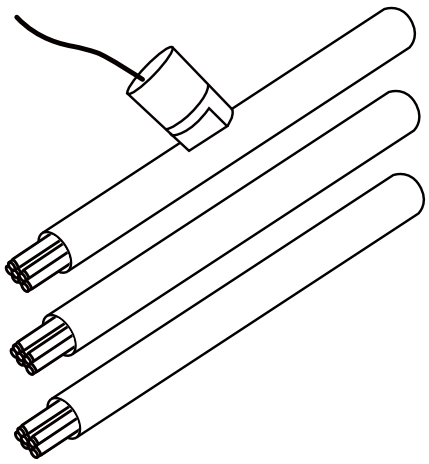
5. Do not use the Induction method as the signal will appear on all cables in the area of the transmitter.

6. Connect the remote stethoscope antenna to the accessory input of the Receiver. The correct settings and user interface will be automatically selected.



7. Ensure the frequency selected on the vLoc is the same as selected on the transmitter.

8. Place the stethoscope on each of the suspected target cables with the flats of the antenna in line with the route of the cable.



9. Note the dB reading of each cable. The one with the largest reading is likely to be the target cable.

10. If necessary adjust the sensitivity of the vLoc so that the signal is within the operating section of the bar graph. This will help identify the cable if the signal levels are similar because of cross coupling of the signal.

WARNING

The remote stethoscope antenna is a useful tool to help identify cables. However, it should not be used as positive identification before an unused cable is cut. Always follow company procedures when cutting disused or isolated cables.

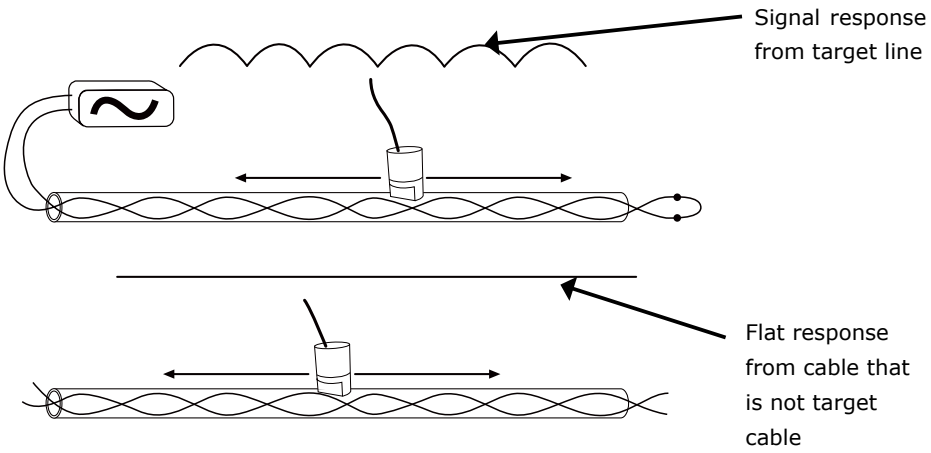
TIP

The remote antenna USB stethoscope can be used to identify disused and isolated cables. This process can be further enhanced if the cable is isolated and is of a twisted cable construction.

Methods:

1. Connect the transmitter to two of the cores of the cable. At the far end short together these two conductors making a loop.

2. Set the transmitter to a low frequency such as 640Hz and set the output to maximum.



3. At the point of interest, run the remote stethoscope antenna along the suspected target cable. If the correct cable is being assessed the signal will increase and decrease in sympathy with the twist of the two conductors within the cable.

4. If the signal is a steady level and does not rise and fall, this is probably NOT the target cable.

Warning:
The remote stethoscope antenna is a useful tool to help identify cables. However, it should not be used as positive identification before an unused cable is cut. Always follow company procedures when cutting disused or isolated cables.

Accessories & Options

8.1 A-frame

The A-frame accessory is used to detect ground faults on pipes and cables. In the case of pipes, the faults consist of coating defects. In the case of cables, faults are usually caused by insulation damage allowing the metallic sheath (or internal conductor) to become in contact with the ground.

8.2 Remote Antenna

The remote antenna can be used to help identify a particular cable on a cable tray or where cables are bunched together.

8.3 Loc-10Tx-Power Lead

- 12V DC, 30ft (10m) lead to power (NOT charge lead) the transmitter from a vehicle.

If it is intended to apply the transmitter to a target line at high output levels and long periods, it may be useful to power the transmitter using the 12V DC vehicle power lead. To power the transmitter from the 12V DC vehicle power lead, connect the lead to the 12V input positioned on the side of the transmitter. Plug the cigarette lighter plug into the vehicle cigarette lighter socket (be sure that the socket is live. Some vehicles only activate the cigarette lighter when the vehicle is running).
It is not necessary to disconnect or remove the standard batteries as the unit will automatically select the external 12V DC supply

8.4 Loc-10Tx - AC Waterproof Power Supply

- 12V DC, 30ft (10m) lead to power (NOT charge lead) the transmitter from a vehicle.

8.5 LPC Separation Filter

The LPC separation filter (LPC) is used to safely inject a trace tone to a live cable via a domestic mains socket, so that the cable can be traced from the premises to the connection in the street. It is suitable for connecting to voltages between 100V AC and 250V AC.

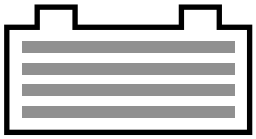
8.6 Charging Lead

- 12ft (4m) long lead to charge the receiver's battery (or Aux battery pack) while on the move.

It is preferable to connect the charger to a cigarette lighter socket that is permanently live. However, do not leave connected to the receiver for excessively long periods.

8.7 Aux Battery

The Aux Battery 12V DC is a useful in addition to the Receiver battery packs. To use this replace the alkaline pack with the Aux Battery pack. If the receiver has two battery indicators the long horizontal battery icon refers to the charge condition of the Aux Battery.



To charge the Aux Battery, remove the pack from the receiver, connect to the receiver battery charger and charge as indicated in the usual way.

8.8 Sonde

8.8.1 D18-33-SR44

- 0.75in (18mm) x 3.1in (80mm) long, 33kHz, range 12ft (4m).
- 2 x button cell batteries.

8.8.2 D38-33-AA

- 1.5in (38mm) x 4.1in (105mm) long, 33kHz, range 15ft (5m).
- 1 x AA battery.

8.8.3 D64-33-LR61

- 2.5in (64mm) x 7.3in (186mm) long, 33kHz, range 24ft (8m).
- 1 x LR61 battery.

8.8.4 D23F-512-AA / D23F-640-AA

- 1in (23mm) x 18in (456mm) long, range 20ft (7m).
- "Flexible (3 section) Sonde with optional 512Hz or 640Hz for use in cast iron pipes".
- 1 x AA battery.

8.9 Clamp

- VX4/100, VX5/125.
- 5in diameter (125mm), 4in diameter (100mm).

An accessory used to apply the transmitter signal to an insulated line, removing the need to connect the transmitter signal directly to a conductor or cable sheath.

Glossary

Active Locate	A locate where a transmitter is used to apply a signal to a buried pipe or cable, the position of which is then located by a receiver tuned to the same frequency.
Active Signal	A signal applied by the locator transmitter to a buried line. Typical this is a very precise frequency.
Attenuation	The reduction of an electromagnetic signal from a pipe or cable.
Clamp (or Coupler)	An accessory used to apply the transmitter signal to an insulated line, removing the need to connect the transmitter signal directly to a conductor or cable sheath.
Compass	Line direction indicator (although visually like a compass, this is the only relation to a compass.)
Coupling	The act of signals transferring to lines to which they were not originally applied. Coupling can be "direct" where the target line has an electrical connection to another line, or "induced" where the signal radiates from the target line to another line or lines.
Display	The information visually available on the dot matrix display.
Line	A generic term for any buried pipe or cable.
Null	A minimum response to a buried line.
Passive Locate	A locate where the receiver searches for a wide range of signals that radiate from buried pipes or cables. These signals come from a variety of sources in the environment and couple to the buried (& overhead) lines. Typical examples 50/60Hz and LF/VLF radio.
Passive signals	A wide range of signales that radiate from buried pipes or cables. These signals come from a variety of sources in the environment and couple to the buried (& overhead) lines. Typical examples 50/60Hz and LF/VLF radio.
Peak	A maximum response to a buried line.
Pinpoint	Using a receiver to identify the exact position of a buried line.
Response	The indication that the receiver gives which is caused by the signals it is receiving. This can be visual, audio or both. Typically it is displayed on the locators dot matrix display and audibly from a loudspeaker in the receiver housing.
Search (sweep)	This describes the act of looking for a buried line within a given area.

Sonde	A small transmitting coil which may be built into a product such as a sewer camera or packaged as a small self contained battery powered transmitter. A receiver tuned to the same frequency can locate the position of the Sonde and hence whatever it is attached to or in. Frequently used for locating sewer cameras, and the non metallic pipes.
Target Line	The buried pipe or cable to be located.
Trace	Using a locator to following the path of a buried line.

Illustrations used in the preparation of this manual will inevitably show some resemblance to similar illustrations from other Manufacturers-some manufacturers have given permission for the use of their graphics (Vivax-Metrotech & Seba) other manufacturers such as Radiodetection is given credit for these use. This statement is intended to attribute such credit.

Notes:

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