

## VM-550/VM-560 User Guide V1.5

### Introduction

This guide describes the operation of the VM-550 Rx/VM-550FF Tx and VM-560 Rx/VM-560FF Tx pipe and cable locators. Both are general purpose locators used to detect buried pipe and cable services in a variety of situations.

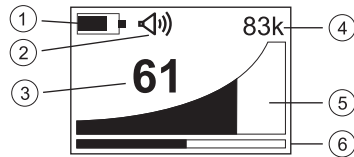
The operations of the two systems are very similar. The main difference is in the operational frequencies:

- VM-550 Receiver Frequencies: 50 or 60Hz, 512 or 640Hz, 8 kHz, 83 kHz
- VM-560 Receiver Frequencies: 50 or 60Hz, 512 or 640Hz, 8 kHz, 480 kHz

The VM-550/VM-560 is supplied with 1 watt transmitter (either VM-550FF or VM-560FF) with both direct connection, induction and ground fault capabilities. An inductive clamp, LPC live separation filter, and a standalone A-frame (VM-510FFL) are also available as optional accessories.

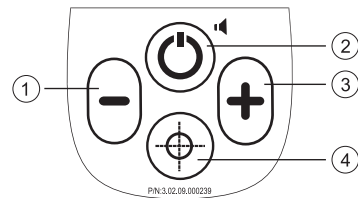


### Receiver Display Functions



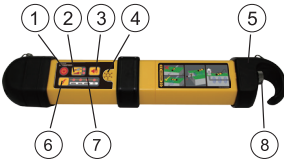
1	Battery Level Indicator
2	Speaker Level Indicator
3	Percentage Signal Level
4	Selected Locate Frequency
5	Signal Level Indicator
6	Sensitivity Setting Indicator

### Receiver Operational Controls



1	Sensitivity Control (reduce sensitivity)	Increment sensitivity down, or auto scale down to 50% if off scale. When in frequency select menu, use this button to scroll backwards through available frequencies.
2	On/Off Control	Short press to switch on, long press to turn off. When on, short press to change speaker volume.
3	Sensitivity Control (increase sensitivity)	Increment sensitivity up, or auto scale to 50% if off scale. When in frequency select menu, use this button to scroll forwards through available frequencies.
4	Depth Measurement / Frequency Selection	Short press to initiate depth measurement. Long press to enter frequency select menu then short press to exit menu.

### Transmitter Operational Controls



1	ON/OFF
2	Output power select and indicator
3	Speaker volume select
4	Speaker
5	Battery Housing Cover
6	Frequency Select
7	Frequency Selected Indicators
8	Battery Cover Retaining Screws

### Accessories

<b>Direct Connection Leads</b> 	To make a direct connection to a pipe or a de-energized cable conductor or cable sheath.
<b>Ground Stake</b> 	To make a ground connection to complete a direct connection circuit.
<b>Signal Clamp (Optional)</b> 	To make an inductive coupling connection to a live cable or pipe.

<b>LPC Separation Filter (Optional)</b> 	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.
<b>Standalone A-frame (510FFL) (Optional)</b> 	Fault Find A-frame used to detect faults to ground. Typical applications: To find sheath faults on cables or coating defects on pipelines.

### Power Mode Operation

Switch on the unit by pressing the on/off pushbutton. Allow a few seconds to switch on.

The frequency selected as shown on the display. If this is not the desired locate frequency (ie 50 or 60Hz) change as indicated below.



#### NOTE

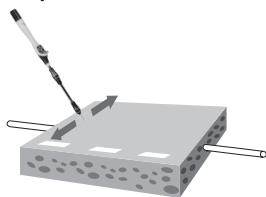
The battery condition as indicated on battery icon. Replace batteries if necessary. See Changing Batteries Section.

### Changing the Receiver Locate Frequency

Press and hold the depth measurement/frequency selection pushbutton until the frequency menu is entered. The display will show the present frequency selected in large numbers in the center of the screen. Use the "+" or "-" pushbuttons to select the desired frequency. Press the depth measurement/frequency selection pushbutton to re-enter the locate screen.

### Locating a Cable in the Power (50/60Hz) Mode

1. Hold the locator vertically in the area that is required to be searched. Press the "+" or "-" pushbuttons to set the gain so that the bar graph reads approximately 50%.
2. Hold the locator in front of you in the orientation shown below.



3. Sweep the locator left to right along the suspected route of the cable. As the locator approaches the cable the meter reading will increase. Pinpoint the position by detecting the largest signal. Adjust the sensitivity of the locator by pressing the "+" or "-" pushbuttons to keep the signal on scale.
4. To confirm the direction of the cable, rotate the locator until the largest signal is detected. The direction of the cable is then directly ahead.
5. Continue to locate the cable along the route.

6. Depth measurements are not possible in the power (50/60Hz) mode, if pressed by accident it will show N/A.



#### WARNING

The power mode is used to detect signals radiating from cables or services that are carrying a 50 or 60Hz load. It is possible for a cable to be live but not carry a load. In this case there may not be a signal to be detected. Similarly, if a cable is exactly balanced the resulting signal radiating from the cable may be zero and therefore not detectable. Do not use the VM-550/VM-560 to identify if cables are live. Always dig with caution.

### Active Cable and Pipe Locating

Detecting a cable or pipe can be achieved by applying a locate tone to a cable or pipe from a transmitter. This is called active locating.

The locate tone can be applied by either.

- Direct Connection
- Induction Mode (high frequency only)
- Signal Clamp Mode

#### Direct Connection Mode

This method involves making a direct connection to the cable or pipe.

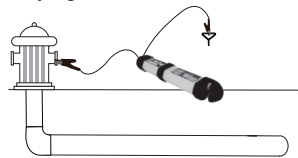


#### WARNING

DO not attempt to make a connection to a live conductor. Only make a connection to de-energized or dead cables. It is possible to connect to the sheath of active cables but this should only be attempted by qualified and authorized personnel.

#### Method:

Plug the direct connection leads to the transmitter. Connect the red lead to the cable or pipe and the black one to a suitable ground. Ideally this should be a ground stake placed at right angles to the probable route of the target line. If it is not possible to use a ground stake, connect the black lead to a grounded structure such as the rim of a manhole cover or other buried metallic structure. Try to avoid fencing as this will create interference from the return signal travelling along the fence. A good connection will be indicated by a change in speaker tone. The larger the tone change the better the connection. If there is no tone change, re check the connections and if necessary clean the connection point with a wire brush and try again.



Select the desired frequency by pressing the "f" pushbutton. As a general rule the higher frequency will have a cleaner more stable reading and will jump insulation joints on pipes but has the disadvantage that it is more likely to jump

to other utility nearby. The lower frequency is better for tracing a particular utility as it is more likely to keep to the utility line the transmitter is attached to. If in doubt, start with the lower frequency and switch to the higher one if it is not possible to detect a stable reading.

The same applies to setting the signal level. A short press on the output level pushbutton will alter the output from low to high. Always start with the low setting and switch to high if it is not possible to detect a stable reading on the receiver. Using the low setting will also prolong the battery life.

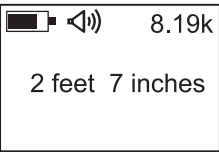
To trace the cable use the same method as described in the "Locating a Cable in the Power (50/60Hz) Mode" section.

#### Depth Measurements (Available in 512 or 640Hz and 8.19 kHz mode only)

To take a depth measurement pinpoint the position and direction as previously described. Now hold the locator vertically and in line with the cable or pipe.



Now press the depth measurement/frequency selection button. There will be a short delay before a depth estimate will be displayed.



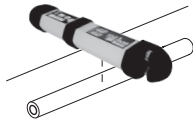
#### NOTE

The depth measurement is an approximation. Depth indications can be effected by field distortion caused by adjacent utility lines or changes in direction and depth. Always use depth measurements as an aid to line verification but never use them to decide if mechanical digging is safe. Always dig with care.

An aid to determining if the depth is correct is to repeat a depth measurement with the locator a known distance (for example 1ft) above the ground and to note if the depth has increased by this amount. If it is different from what is expected treat the data as suspect.

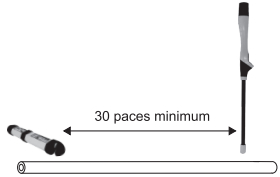
#### Induction Mode

The induction mode is useful in situations where access to a cable or pipe is not possible. Remove the direct connection leads so that the transmitter automatically sets itself into the induction mode. Place the transmitter over and across the suspected position of the target utility line as below.



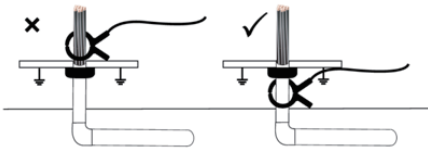
Switch on the transmitter and set to low output. Only switch to high if the signal received is too low. Only the high frequency is available in induction mode.

Start locating the line a few paces from the transmitter. Starting too close will be difficult as the signal radiated through the air from the transmitter will be greater than that from the cable. Trace the cable in the normal way.



#### Signal Clamp Mode

1. Connect the signal clamp to the transmitter.
2. Place the clamp around the cable to be located. Ensure that clamping is done below the earthing point of the cable otherwise a signal will not be induced efficiently.
3. Make sure the two halves of the clamp close properly.



4. Switch on the transmitter and set to 8 kHz for optimum clamp performance. Follow the locating instructions as in “the Direct Connection Mode” section.



**NOTE**  
Using the clamp **does not** require a ground connection from the transmitter. However, the signal quality will be better if there is a ground at both ends of the cable.

#### LPC Separation Filter



The LPC separation filter 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:

1. Plug the LPC into the output socket of the transmitter.
2. Identify a suitable main socket. If a switch is fitted to the socket, switch off.

3. Plug in the LPC to the mains socket and then switch back on.
4. Set the LPC rotary switch to match the two indicator lights.
5. Set the transmitter to the frequency to be located.
6. Locate the line as described in the “Direct Connection Mode” section.



**NOTE**  
A transmitter ground connection is not required with this method as the ground is made within the mains socket.

#### 8kHz Fault Find Mode

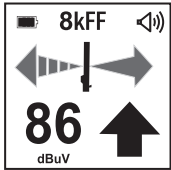
The transmitter is also capable of energising a line with a fault find signal. The standalone A-frame (VM-510FFL) or an appropriate A-frame accessory with a vLoc receiver can then be used to identify the position of a ground fault. These faults tend to be cable sheath to ground faults or coating defects on pipelines. More information can be found in the user information for the particular accessory used, this manual instructs the user in how to apply the fault find signal from the VM-550FF or VM-560FF transmitter and gives an overview of the standalone A-frame VM-510FFL.

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.

Connect the transmitter to the target line using the red connection lead. A ground stake needs to be pushed into the ground and the black connection lead clipped to it. Try to place the ground 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 make sure the A-frame and transmitter are both set to 8kHzFF. Note the 8kHzFF defaults to the high setting on the transmitter. It is not possible to select low output when in the 8kHzFF mode.

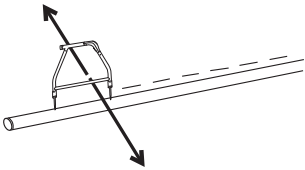


Remove the rubber spike covers from the A-frame. Make a momentary push on the on/off button of the A-frame. It will automatically default to the A-frame screen.



Note that if the spikes are not in the ground or there is only a very small signal, the db reading and arrow may not be visible. These are only shown when there is a valid fault find signal.

Use the left/right indicator to position yourself over the cable. The correct position is indicated by the bar being centralised on the display. Note that if using the default FF screen as indicated above, there is no need to adjust the gain using the “+” and “-” buttons as the unit does this automatically for you.

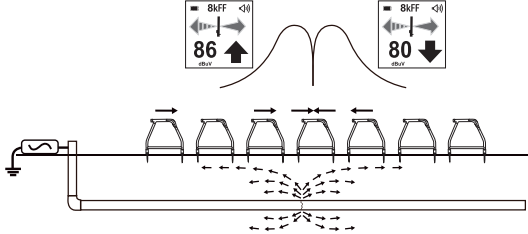


Also the speaker will emit a pulsed tone one side of the cable and a solid tone the other, so it is possible to locate without looking at the screen. If necessary, adjust the volume by using short presses on the on/off button.

Hold the A-frame in line with the suspected route of the cable.

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. Allow a couple of seconds for the electronics to settle before moving off to the next position.

If starting near the transmitter, the arrow on the display will point away from the ground point. As the distance from the transmitter increases, the dBuV reading will reduce and eventually the arrow will fluctuate or disappear altogether. This is because the fault location is further along the line. Use the left/right indicator to ensure the A-frame is positioned over the line and continue placing the A-frame in the ground every two or three paces.



Eventually the A-frame will detect the fault signal and the “fault direction indicator” arrow will point forward.

Continue moving forward, 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 backward 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. The fault will be at the point where the lateral fault is identified.

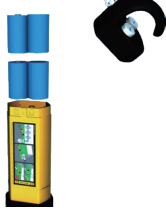
#### Transmitter Batteries

The transmitter is supplied with alkaline batteries. It can also be powered from a bespoke Li-ion battery pack.

#### Alkaline Batteries

A low battery is indicated by a flashing on/off LED. The transmitter requires four D type alkaline batteries. To replace the batteries unscrew the two retaining fasteners of the battery compartment. Remove the old batteries and replace all of them. Mixing good and discharged batteries may result in excessive heat or even fire.

Note the retaining screws should only be hand tight. Only use a screw driver to undo the screws. It is not necessary to use a screw driver to tighten them.



#### Charging the Transmitter Li-ion Batteries



Remove the battery pack by unscrewing the two fasteners of the battery compartment. Align the red dot on the charger with the dot on the charging socket, situated at the base of the battery, and connect together. Connect the charger to the mains and switch on. The charging LED on the charger will illuminate red until the batteries are charged. The LED will then turn green indicating a full charge.



**WARNING**  
Only use the charger supplied. Using non recommended charger may result in damage to the equipment or even fire and explosion.

#### Receiver Batteries

1. A low battery is indicated by the icon of the receiver display.

2. To replace the batteries unscrew the end cap on the handle end of the VM-550/VM-560.
3. Remove and replace **both** batteries with fresh 1.5V alkaline AA (LR6)
4. Replace end cap.



#### Service Center Information

If the equipment does not function properly, replace the batteries as described above. If the equipment still malfunctions, contact one of the Vivax-Metrotech Customer Service departments, or call the factory for the nearest authorized Vivax-Metrotech repair station.

**Disclaimer:** Product and accessory specification and availability information is subject to change without prior notice.

#### EMC Compliance (for VM-550FF/VM-560FF Tx only)

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

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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