

**Pipe & Cable Locator - Track Tracer Series** 



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Congratulations on the purchase of your new PL-TT Locator. The PL-TT Locator is specially designed to detect buried utilities. This device may detect buried power cables, CATV cables, gas and water pipes, sewer lines, telephone cables, fiber optic cables with sheath, sondes, inspection camera transmitters.

The basic principle of the locator's operation is as follows:

The Transmitter emits a signal, the Receiver detects the signal. You can locate the relative position of the buried utility, sonde or camera by following the tracing signal.

To help ensure the best locating results, please read & understand the manual in its entirety before using the product.

#### DISCLAIMER OF LIABILITY

SubSurface Instruments, Inc. Shall not be liable to Distributor, Re-Seller, or any other person for any incidental, indirect, special, exemplary or consequential damages, or injury of any type whatsoever, and caused directly or indirectly by Products sold or supplied by SubSurface Instruments, Inc..

#### IMPORTANT NOTICES

MARNING! Electric shock hazard:

- Tool is designed to detect electromagnetic field emitted from Camera Sondes and buried metallic utilities. There are buried cables, pipes, and utilities this instrument CANNOT detect.
- LOCATING is not an exact science. The only certain way to be sure of the existence, location, or depth of buried utilities is to carefully expose (dig up) the utility.
- De-energize any circuits in or around the work area.
- Do not expose tool to rain or moisture.
- Use tool only for intended purpose as described in this manual. Failure to observe these warnings could result in severe injury or death.



Unpack your new PL-TT Cable & Pipe Locator . Make sure there is no shipping damage and all the parts are included.

Locate the battery compartment on the top of the Receiver. Open the compartment by unscrewing the gray cap. Install the six Duracell® "AA" batteries as marked. Reattach the battery cap making sure not to over tighten it.

Locate the battery compartment on the bottom of the Transmitter. Open the compartment using a Phillips screwdriver. Install the eight Duracell "C" batteries as marked. Reattach the battery door compartment.

Note: For longer battery life and reliable operation under adverse conditions, use only Duracell® alkaline batteries.

## REGISTER EXTENDED WARRANTY

This instrument is under warranty for 1 year from the date of delivery against defects in material and workmanship (EXCEPT BATTERIES). We will repair or replace products that prove to be defective during warranty period.

By registering your unit online at http://www.ssilocators.com/warranty-registration within one month (30 Days) of purchase, SubSurface Instruments, Inc. will extend the warranty period from 1 year to 4 years.



This warranty is void if, after having received the instrument in good condition, it is subjected to abuse, unauthorized alterations or casual repair.

No other warranty is expressed or implied. The warranty described in this paragraph shall be in lieu of any other warranty, including but not limited to, any implied warranty of merchantability or fitness for a particular purpose. We are not liable for consequential damages.

## SCAN THE QR CODE TO REGISTER ONLINE



Please Fill up all the fields on our online registration to keep better track of your warranty and allow us to help you with any questions or concerns in a better and accurate way.

SubSurface Instruments Team.

Note: This setup procedure is not required unless the user desires to change factory settings.

The PL-TT operating programs and frequency sets are user programmable and can be changed at anytime through a quick selection process.

## RECEIVER

To select the programming options for the **RECEIVER**:

- Press and hold depressed the Power On Button.
- Pressing the FREQUENCY Button will toggle through available frequencies. Passive 512Hz, 8kHz, 33kHz, 82kHz.
- To select a frequency, press the MODE Button toggle. At the top of the LCD the count of frequencies selected will tally up one each time a frequency is selected.
- Pressing the GAIN UP Button will change the depth reading from inches/feet to centimeter.
- A long press of the Mode Button will toggle on and off the optional ferrous locating feature (Fe).
- Releasing the Power On Butt on will exit the setup menu and save the selected frequencies for availability during normal operation.

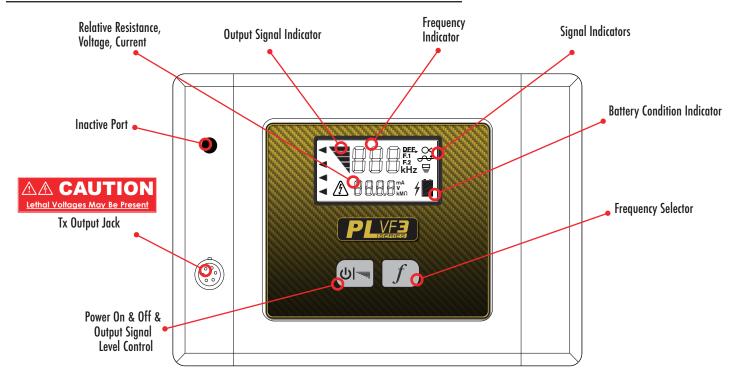
# 

To select the desired frequency set for SOFTWARE VERSIONS 3.43 AND GREATER:

- Press and hold depressed the Power On Button.
- Pressing the **FREQUENCY BUTTON** will toggle through available configurations. Repeat pressing until 'U5' is displayed in the Frequency Indicator section of the LCD. *f*
- Release the **Power On** Button. 'PRD' will be displayed on the LCD.  $\bigcup$
- Press the FREQUENCY BUTTON to toggle through the available frequencies. f
- To select and store the desired frequency press and hold the **FREQUENCY BUTTON** for 2 seconds. The count of the selected frequency will be displayed on the LCD. *f*
- Continue to toggle through and select the desired frequencies,
- Press the Power ON Button to shut the unit off. This will save the selected frequencies for availability during normal operation.



## PL-VF3 TRANSMITTER CONTROLS & INDICATORS



#### **TX OUTPUT JACK**

The Red/Black Cord and HARD COUPLER connects here to create a circuit on the buried utility.

#### FREQUENCY SELECTOR

This button toggles through the available frequencies. The selected frequency is displayed on the LCD. When dual frequency transmission options are selected, indicated by the F1 & F2 icons to the right large numeric segments, the frequencies will flash from one to another.

#### SIGNAL INDICATOR (visual & audible)

The Signal Indicator symbol flashes to indicate signal output.

The quick triple beep audible tone indicates the circuit is open and no signal is being transmitted. A steady continuous beep indicates a closed circuit and signal is transmitted. When the indicator blinks 4 times per second, it is indicating a nearly short circuit. When the indicator blinks 1 time every 10 seconds, it is indicating a nearly open circuit.

#### **ON/OFF & OUTPUT SIGNAL LEVEL CONTROL**

The ON/OFF & OUTPUT SIGNAL LEVEL CONTROL turns the unit on. With a short press it will adjust the power output from the **TRANSMITTER**. There are 3 selections on the standard power settings. Holding down the Output Signal Level button for 2 Seconds will turn the unit off.

**WARNING!** 

High Power Output is a SHOCK HAZARD - Lethal voltages at the transmitter's output. Turn off transmitter before touching test lead or any un-insulated conductor. Make connection to ground and target conductor before turning on transmitter.

#### SIGNAL INFORMATION SELECTOR

The unit can display the relative resistance, current and voltage of the transmitted signal. The resistance is based on the feed back from the selected frequency and is not an actual impedance meter. The selections can be toggled by pressing the **SIGNAL INFORMATION** button.





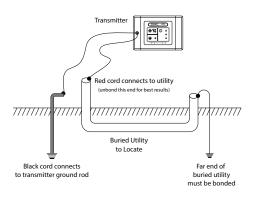


N DO NOT CONNECT TO LIVE OR ENERGIZED POWER CABLES

Direct Connection is the most reliable method of signal application. This method is relatively free of interference. The greatest amount of signal strength can be achieved by this method. Low, mid, and high frequency may be used. The far end of the utility must be grounded.

Connect the **RED TEST CORD** to an existing ground point or an exposed metallic section of the utility. Place the GROUND ROD approximately 10 feet from this point, at an angle of 90° to the buried cable or pipe. Push the GROUND ROD into the ground 8 to 10 inches. Connect the **BLACK TEST CORD** to the GROUND ROD.

Plug the RED/BLACK TEST CORD into the **TX OUTPUT JACK**. Select the desired frequency. The Signal Output Indicator will flash once signal is established.



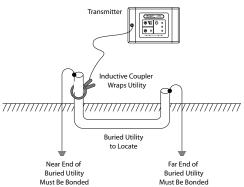
## HARD COUPLER CONNECTION

The Hard Coupler is very easy to use, and services do not have to be interrupted. The operation range is shorter than for Direct Connection methods. The tracing signal can be affected by neighboring cables and pipes. The Red/Black Test Cord or the Ground Rod Prove (GPR) are not needed for this method.

Successful coupler operation requires an insulated conductor that is grounded on both near and far ends.

Clamp the **HARD COUPLER** around the cable. It is important to connect the coupler around the cable needing to be traced. Connect the coupler around the wire closer to the outgoing cable not near the system ground. The result will be a stronger signal. By connecting near the grounding, the range will also be shorter, and difficulty may arise determining one cable from another.

Plug the Coupler into the **TX OUTPUT JACK**.



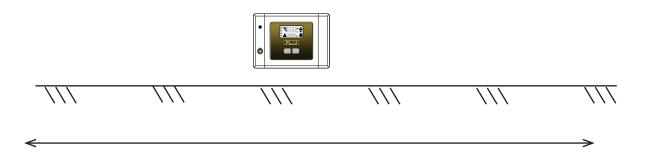
Some couplers are frequency specific, others can operate on medium and high frequencies.



This method is convenient to use, and services are not interrupted. No test cords or connections are needed. The cable or pipe must have good insulation or non-conductive coating, or the operating range will be short.

Turn the **TRANSMITTER ON**. This method of signal application only works on frequencies from 33kHz through 478 kHz. Place **TRANSMITTER** ON ITS SIDE as close as possible to the path of the cable or pipe. Align the **ARROWS** on the side of the **TRANSMITTER** in line parallel with the cable or pipe. First, locate the broad TRANSMITTER Null, then move toward the expected cable path while looking for the signal carried by the cable.

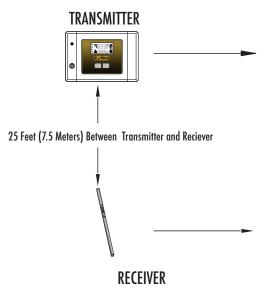
Start tracing the path with the RECEIVER 25 feet from the **TRANSMITTER**. Search in the 90° zone as shown above. Locate the cable or pipe, and follow the path. If the signal becomes weak, move the **TRANSMITTER** to a point 25 feet behind the last strong signal, and continue searching.



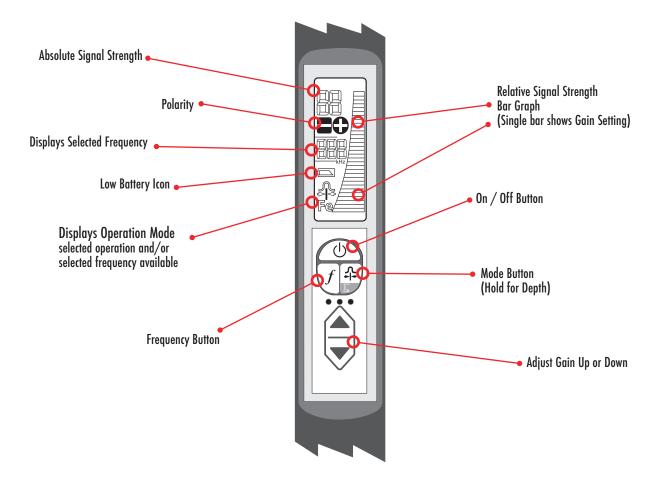
## BLIND SEARCH

The Blind Search locating technique is used if the operator is not aware if a buried utility exists. Two people are needed for this technique. The **TRANSMITTER** and the **RECEIVER** are Held 25 feet away from each other. Each operator walks at the same speed keeping a distance of 25 feet from each other.

When the **RECEIVER** gives an audio response, then a buried utility is present between the **RECEIVER** and the **TRANSMITTER**.









#### **ON/OFF** Button

The unit will load settings from previous usage.



#### **Frequency Button**

Toggles through available frequencies (model specific) 512Hz, 8kHz, 33kHz & 82kHz.



#### Mode/ Depth Button

Mode selects between 3 modes, peak locating mode, left-right guidance mode and ferrous metal detection mode. Depress and hold for 3 seconds for depth reading.



#### Gain Button (Up or Down)

Adjusts the gain up or down. Gain level displayed as solid or missing bar on bar graph.



The PL-TT Locator **RECEIVER** provides the operator with a direct measurement of the **RECEIVER's** signal strength. The measurement is displayed with two numerical digits located at the top of the LCD display. The measurement ranges from 0 (weak) to 99 (strong) signal strength. Absolute Signal Strength is independent of the GAIN setting or meter reading. It gives the operator information about the actual amount of signal being radiated from the conductor and received by the **RECEIVER**.

The Absolute Signal Strength will not be displayed if the gain is too high or too low. Adjust the GAIN to move the meter reading to mid-scale. The numerical display will change from '-' to a valid measurement.

## GAIN CHANGE INDICATOR

The GAIN up and down buttons are used to increase and decrease the gain in small amounts.

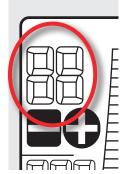
The Gain is represented by a solid line on the top of the bar graph when the unit is in Direct Mode, Inductive Mode or TRANSMITTER Induction Mode.

The Gain is represented by a missing line on the bottom of the bar graph when the unit is in Ferrous Metal Detection Mode.

LOW BATTERY

The PL-TT Locator will indicate low battery condition by displaying the low battery icon on the LCD screen.







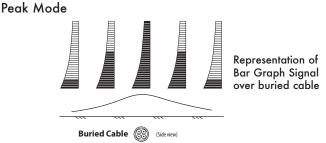
Gain Indicator





Make sure the **TRANSMITTER** is connected and in the ON position. Then move approximately 15 feet (4.5 meters) away from the **TRANSMITTER** along the path. (Move about 25 feet (7.5 meters) for the Inductive search mode.)

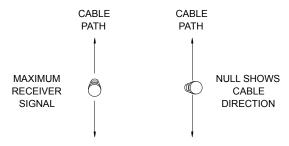
Hold the **RECEIVER** so that you can easily see the LCD bar graph and the control panel. Make sure the **RECEIVER** and the **TRANSMITTER** Frequencies are both set for the same Frequency, 8kHz, 33kHz or 82kHz.





Keep the **RECEIVER** in a vertical position. Move the **RECEIVER** left to right across the path. When the **RECEIVER** is directly above the cable or pipe, rotate the **RECEIVER** for a maximum signal. As you move the **RECEIVER** away from the cable path, the meter reading (and audio frequency response) will drop off.

If you rotate the **RECEIVER** while over the cable, a sharp NULL will identify the cable's direction. It is aligned with the flat side of the **RECEIVER**.



Trace the path by walking away from the **TRANSMITTER** at a moderate pace. Move the **RECEIVER** to the left and right while walking, following the PEAK indications.

As you trace the path, the PEAK meter reading may slowly fade as you move away from the **TRANSMITTER**. Press and release the GAIN buttons as needed to compensate for changes in level (higher or lower). One of the following may occur:

- a) A junction where the signal divides and goes several directions.
- b) A break in the cable or shield.
- c) A change in the depth of the cable or pipe.
- d) An insulated pipe fitting.
- e) A slack loop of cable.

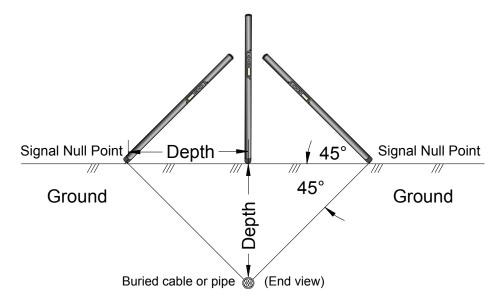
If you can no longer trace the path, even with the GAIN set to maximum, connect the **TRANSMITTER** to the far end of the path and trace back to the point where you lost the signal.

Mark the straight sections of the path every few feet. Mark sharp curves, loops, and cable bundles every few inches. Sharp changes in the path cause the **Receiver** PEAK and NULL indications to behave differently than when tracing a straight path. Practice on the path that you know has turns and laterals in it. This will help you to recognize the conditions within the field.



Move to the location you want to measure depth. Stay at least 15 feet away from the **TRANSMITTER.** Move the **RECEIVER** left to right across the path until the cable is located.

- 1. Mark the path on the ground as precisely as possible using the Null method.
- 2. Place the **RECEIVER** on the ground with the LCD meter facing up. Position the unit so that the sight lines on the lower tube are straight up and down orienting the unit at a 45° angle.
- 3. Pull the **RECEIVER** away from the cable path (at 90° to the cable path) keeping the unit at 45°.
- 4. When the **RECEIVER** indicates a Null reading, mark the location of the **RECEIVER**'s foot.
- 5. The distance between the **Receiver** and the cable path is the depth of the pipe or cable. A false depth reading may be caused by nearby buried metallic objects, such as a second cable, pipe, sewer, fence or railroad track or from the signal conducting on multiple lines.
- 6. Confirm the depth measurement by repeating the above steps on the opposite side of the pipe or cable.
- 7. A variance greater than 5 inches in depth measurement may indicate interference from adjacent cables, pipes or other objects.



## TILTED MAGNETIC FIELD IDENTIFICATION

When adjacent cables or pipes are present, they will sometimes create locating errors. Some of the **TRANSMITTER** signal is picked up by the adjacent conductors and is redirected so that it combines with the original signal. The result is a Tilted Magnetic Field. This is often the reason that numeric depth readouts are sometimes created in error.

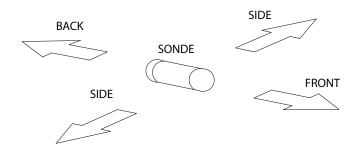
The operator can verify the accuracy of path locate by performing the 45° Angle Method locate on both sides of the cable path. If the right and left side depth readings agree to within 5 inches, the path locate is accurate. If the two depth readings do not agree, then dig with care. A closer locate would be halfway between the two outside depth locate marks.

This is an important technique that should be used to ensure the most accurate location possible.

Before you begin, you must choose a Sonde or Camera Head that will match the same frequency as the **RECEIVER**. You will need a Sonde with a frequency of 512Hz to use with the **PL-TT Locator RECEIVER**.

To select SONDE locating mode press the MODE key until the SONDE ICON is displayed on the LCD. Once in SONDE mode press the FREQUENCY button to select the available SONDE frequency (512Hz).

The key to Sonde locating success is practice and patience. Before going out on your first locate, it is a good idea to take your **Receiver** and Sonde out and try locating the Sonde and calculating the depth.



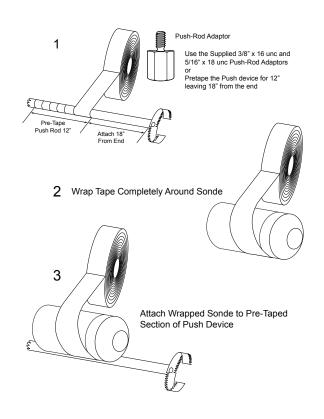
#### ATTACHING A PUSH DEVICE TO THE SONDE

Attaching a push rod to the Sonde can be accomplished by using the coupling on the end of the Sonde.

A spring coupling is recommended to allow the Sonde to move easier. Or, if you need to attach the Sonde to a sewer auger, it is recommended you use duct tape and apply as shown in the figure below.

If taping the Sonde on a metal pushing device, it is recommended to place the battery side of the Sonde closest to the device. This will allow for the best performance. Wrap the snake for approximately 1 foot in the location where the Sonde is going to be attached.

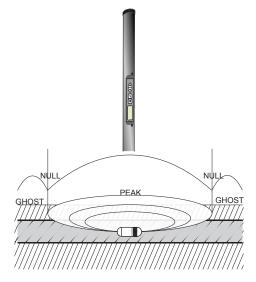
Also attaching the Sonde 18 inches behind the cutting head is recommended. First, wrap the Sonde in the duct tape and then attach the Sonde to the snake using the duct tape.



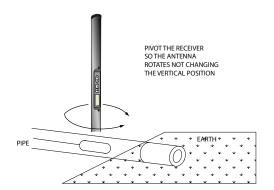


Hold the **RECEIVER** antenna directly above and in line with the SONDE, as shown below. The **RECEIVER** sensitivity needs to be adjusted for a meter reading indication between 60% to 80%.

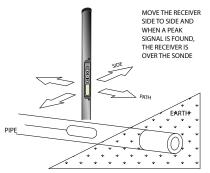
The radiation pattern of the SONDE is shown below. The PEAK signal is when the **RECEIVER** is held directly over the SONDE with the antenna in line with the SONDE. Both Ghost signals can be located behind and in front of the SONDE. By locating the ghost signals, the user is confirming the accuracy of the locate.



Start by following the suspected path of the pipe. Stop locating when the PEAK reading is found. Then rotate the **Receiver** as shown in the figure below. When pivoting the **Receiver**, do not change the vertical position. The **Receiver** will indicate a peak when the **Receiver** antenna is in line with the Sonde.



Now move the **RECEIVER** side to side (across the path of the pipe) as shown below. When the PEAK is found, the **RECEIVER** is directly over the Sonde. Mark this location. Next, check for ghost signals in front of and in back of the Sonde to confirm the location.

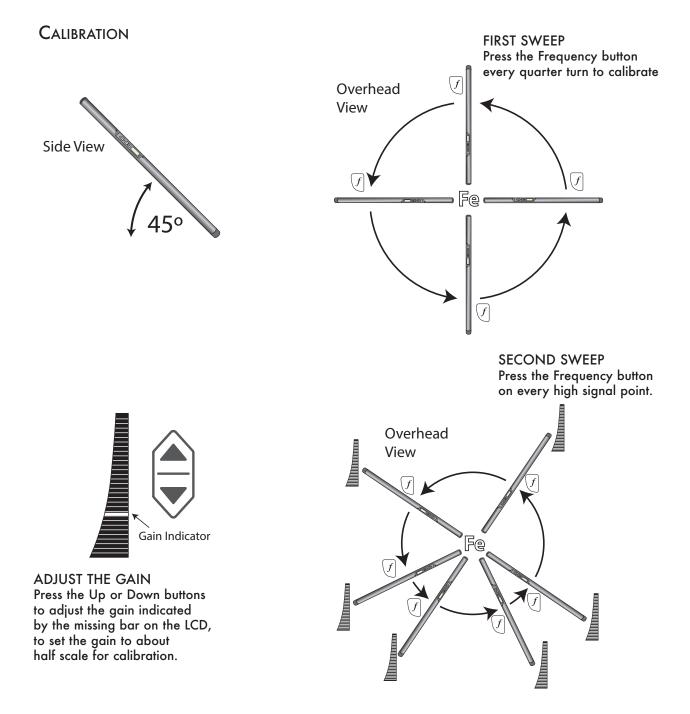




The PL-TT offers a ferrous metal detection capability. To select this mode press the Mode key until the Fe is shown on the LCD. The gain controls will adjust the sensitivity. This mode will only detect ferrous metals containing iron.

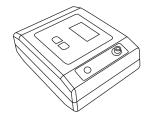
This mode may need to be calibrated after shipment from the factory due to the change in the earth's magnetic field. To calibrate first move to a location free of any metal and select the Fe mode.

Then press and hold the Frequency button until CAL appears on the LCD. Turn the gain to about half scale on the bar graph. With the PL-TT held at a 45° angle to the ground rotate in a circle. Pause every quarter turn and press the Frequency key, continue around the full circle. Do one additional sweep pressing the frequency one more time at every point where the unit indicates high signal. Now turn the unit off, the calibration procedures is finished and the unit is ready to locate.





## TRANSMITTER



Operating Frequency	200Hz - 480kHz
Operating Temperature	-4°F to 133º (-20ºC to +55ºC)
Hook-up Method	Direct Connection Inductive Coupling (with optional coupler) Transmitter Induction
Load Matching	Automatic from 5 $\Omega$ to 20,000 $\Omega$
Output Power	3 Watts (High) 250 Milliwatts (Low)
Battery Types	8 - "C" alkaline batteries
Battery Life	Greater than 30 hours*
Dimensions	8.4" x 5.57" x 2.6"
Weight	2.2 Lbs (2.8kg)

\*Depending on load, frequency and power setting

## RECEIVER

Operating Frequency		512Hz, 8kHz, 33kHz, 82kHz
Antenna Mode		Null (left and right) • Peak (horizontal coil)
Audio Indicatior	1	Variable pitch audio
Operating Temp	perature	-4°F to 133º (-20ºC to +55ºC)
Battery Type		6 - "AA" alkaline batteries
Battery Life	Continuous Intermittent	40 hours 82 hours (10 minute auto shut off)
Dimensions		Tube 33.0" x 1.38" Tee 1.38" X 3.25"
Weight		1.62 pounds (0.734 kg)
Signal Strength		LCD bar graph Absolute Signal Strength readout 0-99
Gain Control		Up/Down button for manual control
Depth Measurement	Automatic	Digital Depth Estimate
	Manual	Triangulation Method
Dynamic Range		126 dB



#### FACTORY SERVICE

The SubSurface Instruments, Inc. Model PL-TT was designed for dependable operation without periodic adjustment and/or calibration. If, however, your PL-TT is not working properly, return it to the factory for repair. A RMA (Return Material Authorization) is not required, but there is some necessary information needed to ensure your unit is repaired and returned properly. The required information may be obtained by phone, e-mail, fax or through our website.

 Telephone:
 920.347.1788 or 855.422.6346

 Fax:
 920.347.1791

 E-mail:
 info@ssilocators.com

 Web:
 http://www.ssilocators.com/service

#### SEND IT PREPAID TO:

SubSurface Instruments Inc. Attn.: Service Department 1230 Flightway Dr. De Pere, WI 54115 USA

We will repair and ship the instrument back, or advise you if the instrument is un-repairable.

**Note:** There is a minimum charge for repair and handling.

When shipping your instrument, be sure to include:

- 1. The name, address, and phone number of your contact.
- 2. A brief description of the trouble.
- 3. A return shipping address & billing mail address & any special shipping instructions.

#### **PACKING INSTRUCTIONS:**

Remove and discard all batteries. Place the unit to be repaired in the original shipping carton, or equivalent sturdy container. Add packing material around all sides of the unit. Seal the shipping container with strong tape. Failure to package the equipment properly may result in voiding warranty. Mark the shipping container:

#### FRAGILE ELECTRONIC EQUIPMENT



This instrument is under warranty for 1 year from the date of delivery against defects in material and workmanship (EXCEPT BATTERIES). We will repair or replace products that prove to be defective during warranty period.

By registering your unit online at http://www.ssilocators.com/warranty-registration within one month (30 Days) of purchase, SubSurface Instruments, Inc. will extend the warranty period from 1 year to 4 years.

This warranty is void if, after having received the instrument in good condition, it is subjected to abuse, unauthorized alterations or casual repair.

No other warranty is expressed or implied. The warranty described in this paragraph shall be in lieu of any other warranty, including but not limited to, any implied warranty of merchantability or fitness for a particular purpose. We are not liable for consequential damages.





#### AN INNOVATIVE DESIGN FORCE IN SUBSURFACE DETECTION & LOCATION

SubSurface Instruments is an innovating force that engineers, manufactures and distributes high-frequency and magnetic locators, pipe and cable locators, leak detectors, leak correlators, bore hole gradiometers and specialty locators.

SSI's most recent innovation, the AML or All Materials Locator, locates buried PVC pipes, PE Pipes, plastic or nearly any other subsurface object more efficiently than ever before. Using patent-protected technology re-engineered by SSI, the AML detects buried PVC pipes and almost every object that other locators can't find.

SSI features a vast line of professional underground and underwater locator products for every need including surveying, construction, ordnance removal, excavation and exploration. Our customers from the petroleum, water, sewer, power, telecom, cable and gas industries rely on SSI's reliability and dependability to make crucial measurements in the world's most challenging conditions. SubSurface Instruments' products are proudly made in the U.S.A. and offer an industry-leading warranty.



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