

8874PLS

Sonde & Pipe Locator

User Manual

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Introduction Congratulations on the purchase of your new 8874PLS Locator. The 8874PLS Locator is specially designed to detect pipes, sondes, telecommunication lines 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 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.

WARNING



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.

DISCLAIMER OF LIABILITY

RYCOM INSTRUMENTS, INC. SHALL NOT BE LIABLE TO DISTRIBUTOR, RESELLER, 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 RYCOM.

Prepare for Use

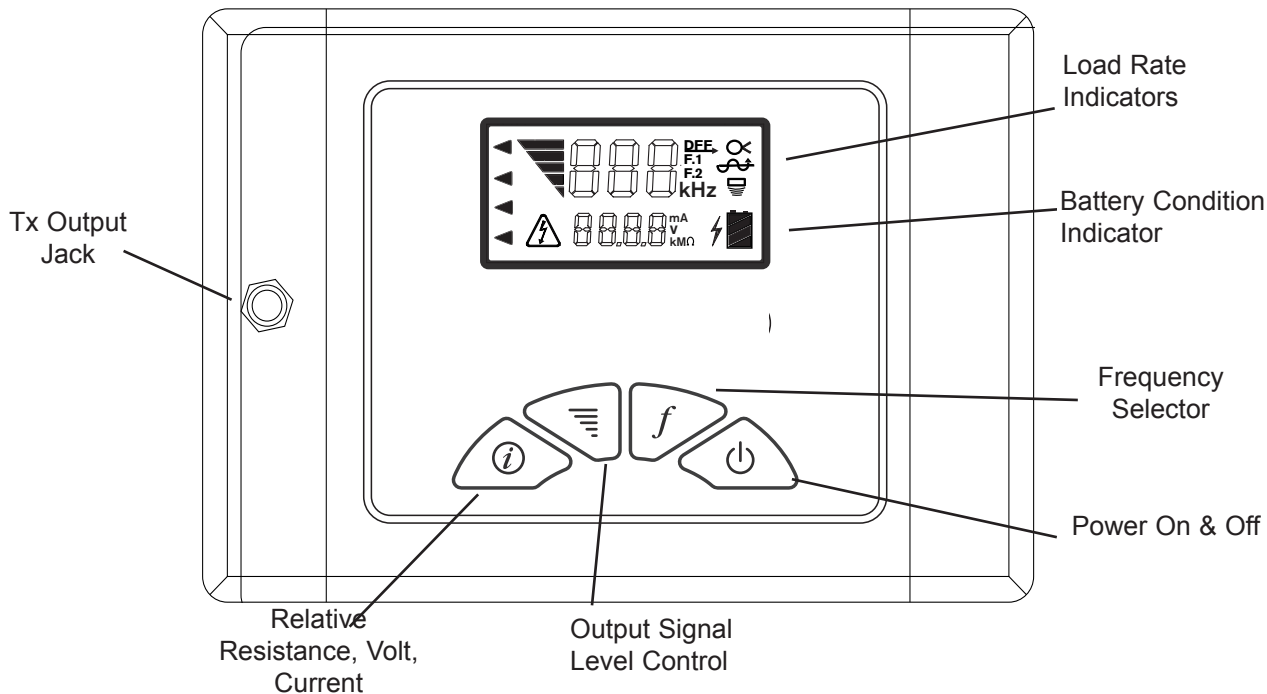
Unpack your new **8874PLS** Locator . Make sure there is no shipping damage and all the parts are included.

Locate the battery compartment on the back of the “head” of the RECEIVER. Open the compartment using a phillips screwdriver. Install the six Duracell® “C” batteries as marked.

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

8874PLS Locator Series

Transmitter Controls and Indicators



TX OUTPUT JACK

The RED/BLACK CORD, Coupler and FLEXICOUPLER connects here to create a circuit on the buried utility.

TX ON

A Frequency light and Output level light indicates unit is on.

FREQUENCY SELECTOR

The 82 kHz reading indicates that the 82 kHz frequency is in use. This frequency is the higher of the four. The 82 kHz frequency is often used to locate sharp corners in cables or pipes and is capable of jumping disconnected shield bonds or grounds. The 512 Hz reading indicates that the 512 Hz frequency is in use. The 512 Hz is the lower frequency. It is less susceptible to locating errors caused by adjacent cables or pipes. Also, by using the 512 Hz frequency, the locating range is greater. The 8 kHz and 33kHz are mid-range frequencies used when the 512Hz is too weak and the 82 kHz is bleeding off to easily.

LOAD RATE INDICATOR

The Load Rate Indicator symbol flashes to indicate the output circuit impedance. When the indicator blinks 4 times per second, it is indicating a nearly short circuit. When the indicator blinks 1 time every 3 seconds, it is indicating a nearly open circuit.

Note: Holding down the Power Output button for 2 Seconds will Mute the Audio Load Rate indicator.

OUTPUT SIGNAL LEVEL CONTROL

The OUTPUT SIGNAL LEVEL CONTROL adjusts the power output from the TRANSMITTER. The two selections include: LOW, MEDIUM, HIGH.

Direct Connection



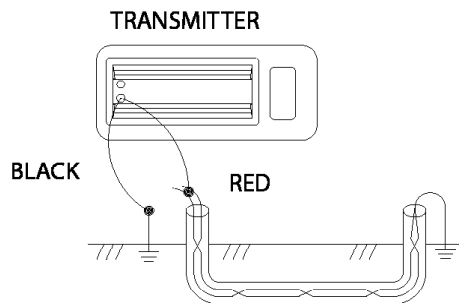
CAUTION

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. Press the FREQUENCY Button for 512 Hz, 8 kHz, 33 kHz or 82 kHz. The Power Output Indicator and the Frequency light of the chosen frequency will light up.



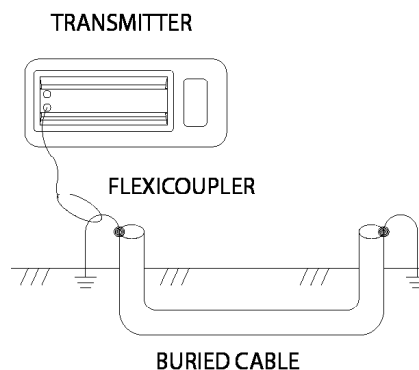
Flexicoupler Connection

The optional FLEXICOUPLER and HARD COUPLER are 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 are not needed for this method.

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

Loop the FLEXICOUPLER around the cable and connect the two ends, or 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 TEST CORD into the TX OUTPUT JACK. Always use the 82 kHz FREQUENCY on the RECEIVER and the TRANSMITTER.

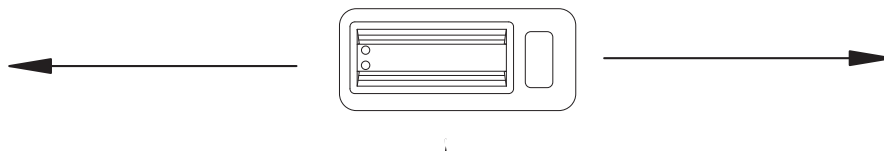


Inductive Connection

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.

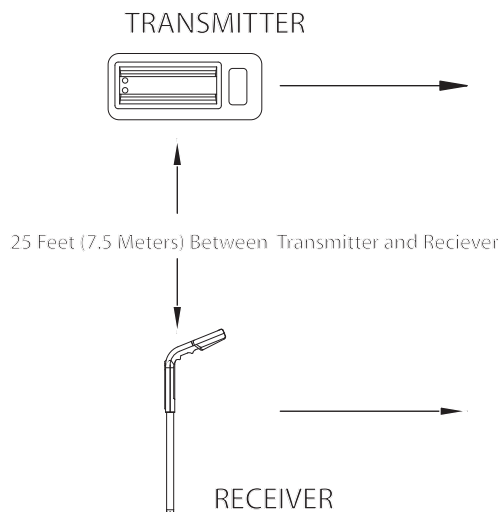
Turn the TRANSMITTER ON. Press the 82 kHz button. **Place TRANSMITTER ON ITS SIDE** as close as possible to the path of the cable or pipe. Align the ARROWS on the SIDE OF THE TRANSMITTER in line with the cable or pipe. First, locate the broad TRANSMITTER Null, then move toward the expected cable path 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.



Selecting the Tracing Signal

The choice of 512 Hz, 8 kHz, 33kHz or 82 kHz Frequency is dependent on the conditions of the locate.

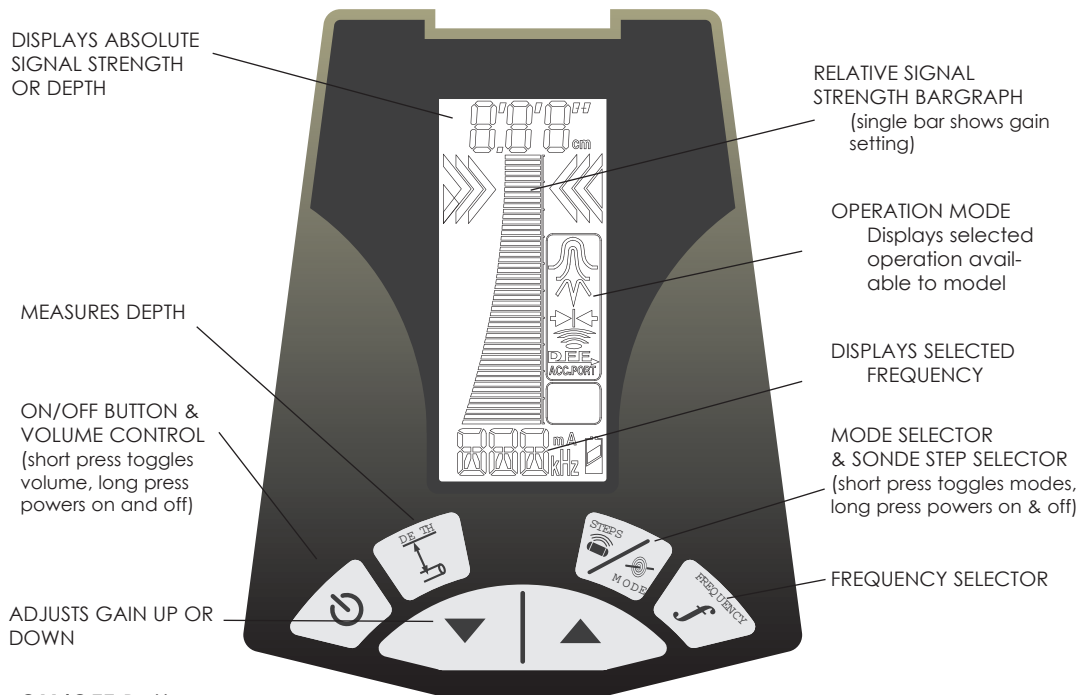
The 512 Hz, 8 kHz, 33kHz and 82 kHz signals each have their advantages. It is recommended to begin by using the 512 Hz signal, and continue as long as you are confident in the results. If the signal is very weak try to adjust the connection or grounding. If there is no improvement in signal then try 8 kHz. Repeat adjustments of ground and connection point again until switching to 33 kHz and then 82 kHz.

512 Hz (lower frequency) signal is usually preferred to the 8 kHz (mid-range frequency) and 82 kHz (high frequency) signal, because it is much less susceptible to locating errors caused by nearby cables or pipes. The 512 Hz locating range is also much longer than the 82 kHz signal. The 512 Hz signal will not travel well through disconnected shield bonds or insulated pipe bushing.

8 kHz and 33kHz takes the best of both high and low frequency. This mid range frequency is not very susceptible to bleed off or coupling, but it can jump impedance on the utility better than the 512 Hz. It is still best to use 512 Hz, but 8 kHz is one of the most common frequencies used to locate coaxial cable and telecom pairs.

The 82 kHz (higher frequency) is sometimes better than the 512 Hz (lower frequency) for locating sharp corners in cables or pipes. The 82 kHz signal is also better for "jumping" disconnected shield bonds or grounds, or tracing signal may indicate one of these characteristics. The locating range is quite short for the 82 kHz signal so the TRANSMITTER must be repositioned more often during the tracing operation. This FREQUENCY is also useful for applying a signal using the FLEXICOUPLER OR THE HARD COUPLER.

8874PLS Receiver Controls and Indicators



ON/OFF Button

The unit will load settings from previous usage. Short press toggles through volume settings & long press turn the unit off. Toggle volume through High, Medium, Low and Off.

FREQUENCY Button

Toggles through available active and passive frequencies (model & mode specific).
8874PLS - 82 kHz, 33kHz , 8 kHz, 512 Hz, 50Hz and RF.

MODE Button

Toggle through available mode (model specific). Holding the Mode key for 5 seconds will enable Line Locate mode. Holding the Mode key for 10 seconds will enable the AUTO STEP Sonde Locating Mode.

Line Locate Mode Options

When in line locate mode (hold Mode Key for 5 seconds) the available options are - Peak, Pinpoint, Null & Left Right Guidance.

The available Line Locate Frequencies are 8k, 33k, 65k & 82k.

Step Sonde Mode

Frequency defaults to 512Hz, the frequency options are 512, 640, 33. The Sonde insignia is displayed. Unit is set to NULL with S1 displayed in the bottom lcd numerics. (if the frequency is changed the new frequency is temporarily displayed, but then toggles back to S1)

Pressing the Mode key will toggle to Peak and S2 will be displayed

Pressing the Step Button again will toggle back to S1

DEPTH

DEPTH function will first momentarily display the depth mode (Line [LIN] or Sonde [SON]) and then display depth measurement at the top of LCD.

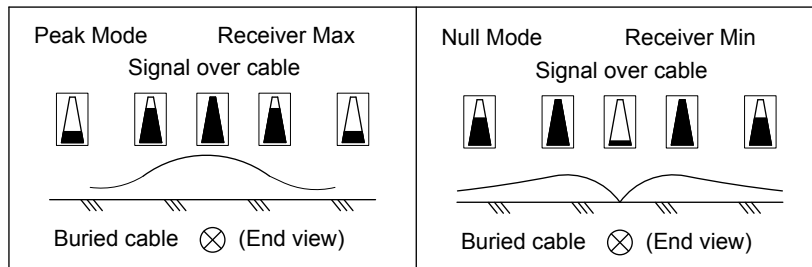
Locating the Cable or Pipe

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 see the LCD bargraph and controls easily. Make sure the RECEIVER and the TRANSMITTER FREQUENCY are both set for the same FREQUENCY, either 512 Hz (lower), 8 kHz, 33kHz or 82 kHz (higher). Or select the passive locating mode which do not require the transmitter

Selecting the Locating Mode (Peak or Null)

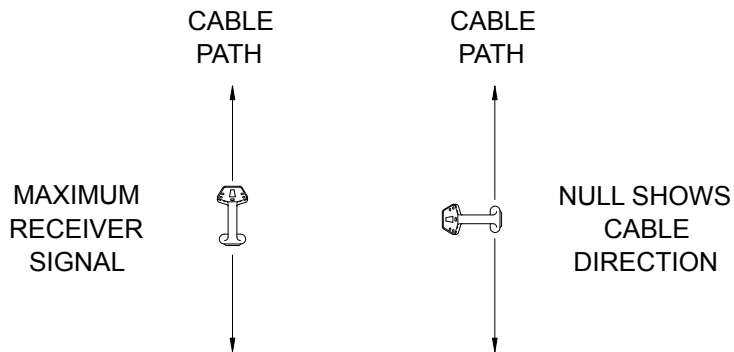
Press the MODE button to select the desired Peak or Null locating method.



Peak Mode Locating

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.



Peak Mode Locating Continued

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.

Null Mode Locating

Move the RECEIVER left to right across the cable path. When the RECEIVER is directly above the cable or pipe, a NULL (lowest meter reading and lowest audio tone) will occur. When moving the RECEIVER to left or right of the NULL point, the meter reading will rise to a maximum point (PEAK). The audio tone will also be at its highest pitch. When the RECEIVER is moved beyond the PEAK, the meter reading will begin to fade.

Trace the path by walking away from the TRANSMITTER at a moderate pace. Move the RECEIVER to the left and right when walking, following the NULL 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 signal level. If the PEAK meter readings suddenly changes in level (higher or lower), one of the following may have occurred:

- 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 control set to maximum, connect the TRANSMITTER to the far end of the path, and begin tracing the path back.

Mark the straight section of the path every few feet. Mark sharp curves, loops, and cable bundles every few inches. Sharp changes in the path causes the RECEIVER PEAK and NULL indicators 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 in recognizing the conditions within the field.

Absolute Signal Strength

The 8874PLS RECEIVER provides the operator with a direct measurement of the RECEIVER's signal strength. The measurement is displayed with three numerical digits (ex: **485**) located at the top of the LCD display. The measurement range is from 0 to 999 indicating a very weak signal (0) to a very strong signal (999). 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.

Measuring Absolute Signal Strength at any time is done by reading the number at the top of the LCD display. The Absolute Signal Strength will not be displayed if the meter reading 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.

Absolute Signal Strength measurements are more sensitive to signal changes than the meter display. PEAKS and NULLS can be more precisely pin-pointed. This measurement can also be used to monitor signal loss as the conductor is being traced.

Gain Change Indication

The GAIN up and down buttons are used to increase and decrease the gain in small amounts. If the meter reading is very low, pressing the GAIN up button will center the meter reading to mid-scale. Likewise, if the meter reading is very high, pressing the GAIN down button will center the meter reading to mid-scale.

Passive 50/60 Hz Locating

The 8874PLS RECEIVER is capable of locating power utility frequencies. This MODE is useful for locating underground primary and secondary power utilities. In certain circumstances, this MODE will also locate water pipes, sewer lines, cable television, and telephone. The reason is that common electrical grounds are sometimes found among these various utilities. Select the 50/60~ (Hz) frequency on the RECEIVER. Select PEAK mode. Locate the conductor using the PEAK mode.

This method is useful because of its speed and convenience. Start at a known reference point and keep in mind that other conductors in the area may produce this same locating signal.

The TRANSMITTER is not required to locate in this mode.

Passive Radio Frequency Locating

The 8874PLS RECEIVER is capable of passively locating metallic utilities where radio frequencies have coupled to the utility. This mode is useful for sweeping a green area for utilities. In certain circumstances, this mode will locate water pipes, cable television, gas lines and telephone. This locating option does not always detect buried utilities even when radio frequencies are present. This method is useful because of its speed and convenience. Start at a known reference point and keep in mind that other conductors in the area may produce this same locating signal.

The TRANSMITTER is not required to locate in this mode.

Push Button Depth

**The only way to be sure of the depth of a utility is to expose the utility.
At any given time, the depth readout may be inaccurate.**

The 8872PLS RECEIVER can measure depth with the push of a button. The depth is displayed at the top of the LCD display in meters and centimeters. Push button depth is useful in quickly determining the depth of the conductor during path locating.

Begin this measurement by locating the path of the cable or pipe. Move to the location where you want to measure the depth. Stay at least 15 feet (4.6 meters) away from the TRANSMITTER. Pin-point this location as accurately as possible (see Peak Mode Locating page 19, Null Mode Locating page 20 and Absolute Signal Strength page 21). Place the RECEIVER vertically over the conductor and rest the foot of the locator on the ground. While holding the RECEIVER vertical, press and release the DEPTH button. The RECEIVER will briefly indicate a measurement is being performed and then display the depth at the top of the LCD display.

Caution must be exercised when using the push button depth feature, as tilted magnetic fields and adjacent conductors can significantly influence this measurement. The operator should periodically check for adjacent conductors and tilted magnetic fields when taking push button depth readings. For information on identifying tilted magnetic fields, refer to Tilted Magnetic Field Identification and Depth Measurement 45° Method.

Note:

The 8874PLS is designed to alert the operator of potential current and depth measurement errors. If the display reads **'Err'** during a current and depth measurement, the RECEIVER has detected a condition that could produce inaccurate readings.

Errors can exist when the conductor signal flow is too small. Check TRANSMITTER hookup and far end access point for poor connections. This cause of error can be identified by a high GAIN setting (80 or greater on the bargraph display).

The RECEIVER may also be detecting adjacent cables or is not directly over the target conductor. Verifying target conductor path precisely before measuring current again.

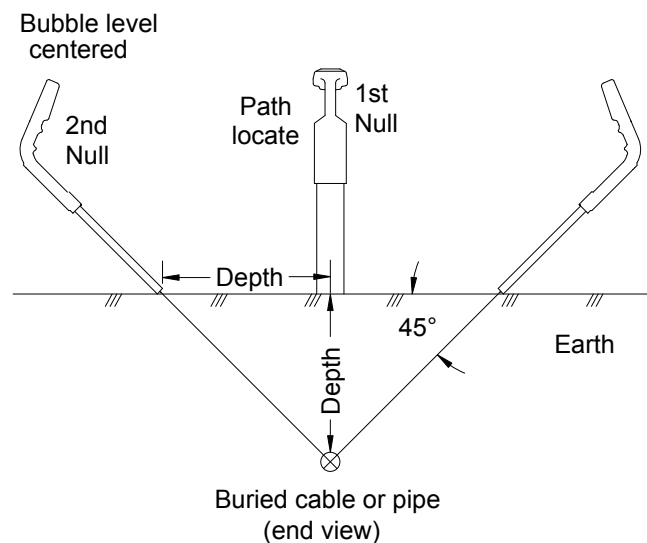
Depth Measurement 45° Angle Method

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. Mark the path on the ground as precisely as possible using the Null Method.

Place the RECEIVER on the ground with the LCD meter facing up. Position the unit so that the BUBBLE LEVEL on top of the meter is centered (45°). Pull the RECEIVER away from the cable path (at 90° to the cable path) keeping the BUBBLE LEVEL centered. When the receiver indicates a NULL reading, mark the location of the receiver's foot. 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. Confirm the depth measurement by repeating the above steps on the opposite side of the pipe or cable.

A variance greater than 5 inches in depth measurement may indicate the presence of additional buried 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.

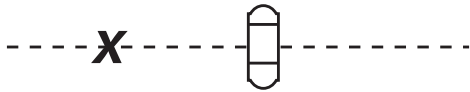
This is an important technique that should be used to ensure the most accurate location possible.

Locating a Sonde or Camera Head Using the STEP Method

Select the Sonde STEP Locating Mode. Select the matching frequency of the sonde. Begin with S-1 displayed at the bottom of the LCD.

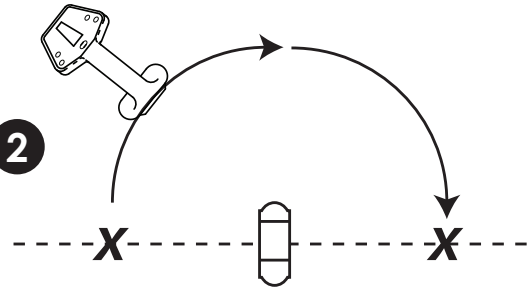
S1 - Equator Search

1



In the S1 Mode sweep the area. When the receiver signal nulls out mark the location. This is the first point on the equator axis

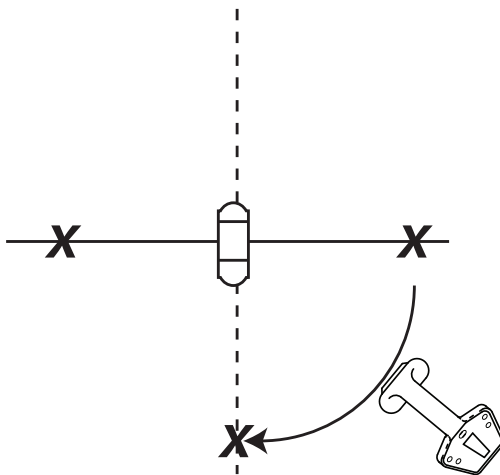
2



From the first point of the equator axis, sweep the locator in any direction. When the next null is detected mark the spot. A line drawn through the two points will dissect the equator of the sonde.

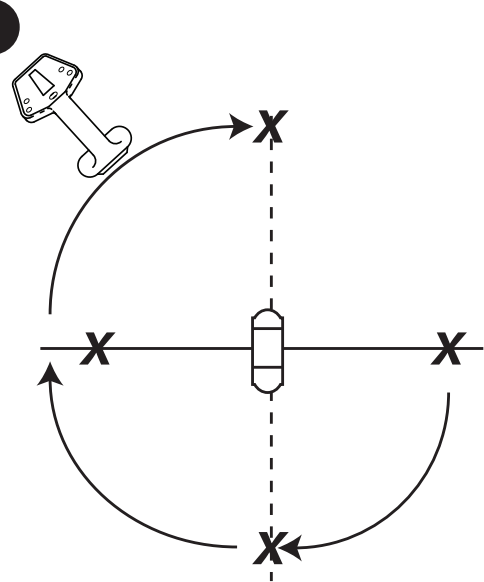
S2 - Pole Search

3



Toggle the unit to the S2 step and following an arc sweep the locator in a direction above or below the equator line. When the receiver signal nulls out mark the location. This is the first point on the polar axis

4

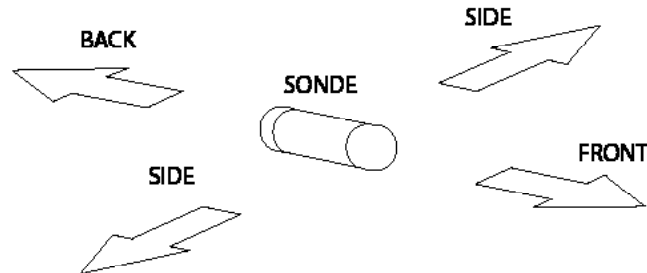


Again following an arc pattern, sweep the locator to the opposite side of the equator line from where the first pole was detected. A line drawn through the two points will dissect the poles of the sonde.

Locating a Sonde Using the Standard Sonde Method

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 82kHz to use with the **8874** Locator Receiver.

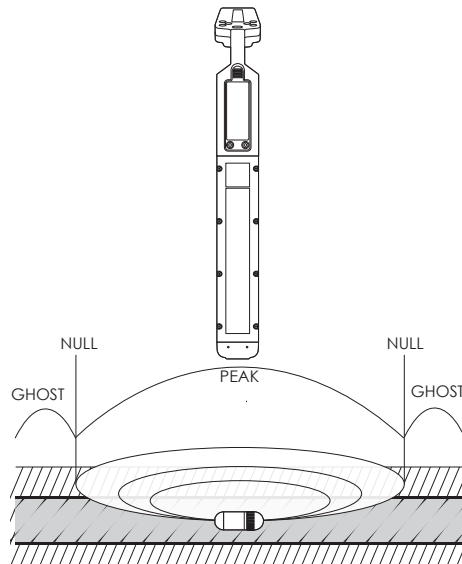
The key to SONDE locating success is practice and patience. Before going out on your first locate, it is a good idea to take your RECEIVER and SONDE out and try locating the SONDE and calculating the depth.



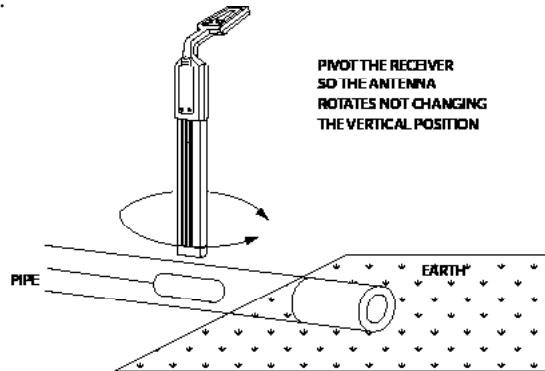
Locating a Sonde

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%.

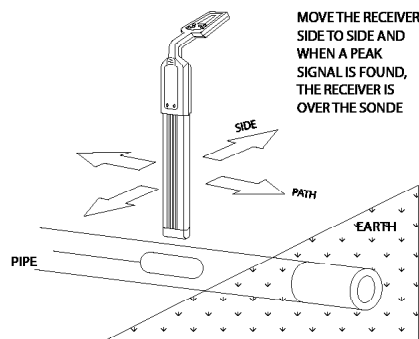
The radiation pattern of the SONDE is shown below. The PEAK signal is when the RECEIVER is held directly over the SONDE with the antenna in line with the SONDE. Both Ghost signals can be located behind and in front of the SONDE. By locating the ghost signals, the user is confirming the accuracy of the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



Start by following the suspected path of the pipe and use the **8810** Locator to locate the **SONDE**. 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**.



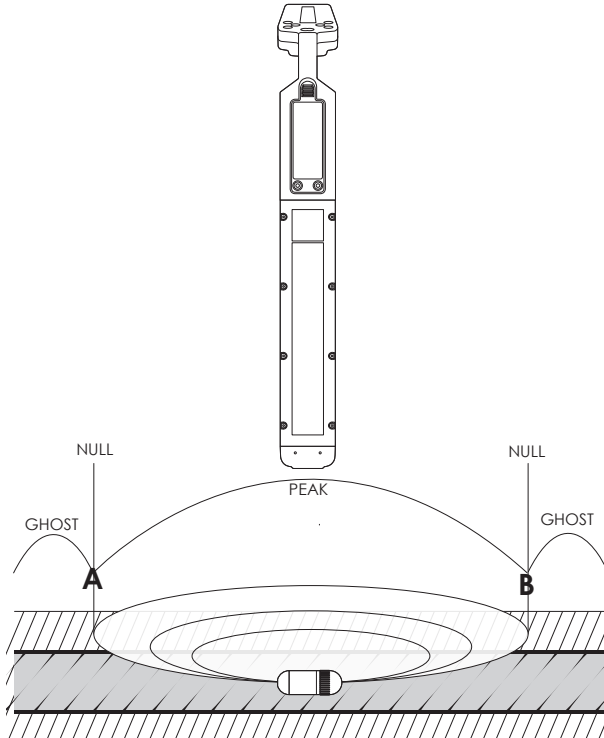
Now move the **RECEIVER** side to side (across the path of the pipe) as shown below. When the **PEAK** is found, the **RECEIVER** is directly over the **SONDE**. Mark this location. Next, check for ghost signals in front of and in back of the **SONDE** to confirm the location.



Depth Measurement of Camera Head or Sonde

Once the LINE has been located, the depth can then be found. Refer to the figure below for a reference. Start by moving the RECEIVER along the path behind the SONDE with the antenna in line with the SONDE and find a NULL between the PEAK ghost signals. Mark this point (A). Then move the RECEIVER along the path in front of the SONDE and find another NULL. Mark this point (B). Next, measure the distance between these two points. The depth of the pipe is 0.7 times the distance between the two points.

DISTANCE BETWEEN **A** AND **B** TIMES 0.7 EQUALS DEPTH OF SONDE.



8874PLS Pathfinder Specifications

Transmitter

Operating Frequency	82 kHz • 33kHz • 8 kHz • 512 Hz
Operating Temperature	-4°F to 133° (-20°C to +55°C)
Hook-up Method	Direct Connection Inductive Coupling (with optional coupler) Transmitter Induction
Load Matching	automatic from 5 Ω to 20,000 Ω
Output Power	1 Watt (High) 500 Milliwatts (Low)
Battery Types	8 - "C" Duracell 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

8874PLS Specifications

Receiver

Operating Frequency	82 kHz • 33kHz • 8 kHz • 512 Hz • 50/60~ • RF
Antenna Mode	Null (vertical coil) • Peak (horizontal coil)
Audio Indication	Variable pitch audio
Operating Temperature	-4°F to 133° (-20°C to +55°C)
Battery Type	6 - "C" Duracell alkaline batteries
Battery Life Continuous Intermittent	40 hours 82 hours (10 minute auto shut off)
Dimensions	30.3" x 3.75" x 9.4"
Weight	3 pounds
Signal Strength	LCD bar graph Absolute Signal Strength readout 0-999
Gain Control	up/down button for automatic centering and manual control
Dynamic Range	126 dB
Depth Measurement Automatic Manual	Digital depth readout to 15 feet (feet/ inches & metric) Triangulation for verification of automatic readout in congested environments

Factory Service

If your 8874PLS Locator is not working properly, first call RYCOM Tech Support for assistance. If the locator is in need of repair, Tech Support will provide instructions for sending your locator to the closest factory approved service center. The instrument will be repaired and shipped back or you will be advise if the instrument is un-repairable.

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

Warranty

THIS INSTRUMENT IS UNDER WARRANTY FOR ONE 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.

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.