

SR-1 Precision

Camera / Sonde Cable & Pipe Locator User Manual



SR-1 Precision


Introduction

Congratulations on the purchase of your new SR-1 Precision Locator . The RS-1 Precision is specially designed to pinpoint sewer lines (inspection camera transmitters & sonde) and detect buried power cables, CATV cables, gas and water pipes, telephone cables, fiber optic cables with sheath.




The Transmitter is a multi-frequency active signal generator . The Receiver is a multi-frequency locator used to locate the relative position of inspection camera transmitters, sondes and buried utilities by active signal or passive signals.

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WARNING



Electric shock hazard:

- Follow appropriate safety procedure and your companies policies.
- Tool is designed to detect electromagnetic field emitted from cables 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
- Turn off transmitter before touching test lead or any un-insulated conductor.
- Do not connect to live voltage or active utility lines.

Failure to observe these warnings could result in severe injury or death.

Prepare for Use

Unpack your new SR-1 Precision Camera / Sonde, Cable and Pipe Locator . Make sure there is no shipping damage and all the parts are included.

Locate the battery compartment on the back of the Receiver and back of the Transmitter . Open the compartment using a phillips screwdriver . Install the “C” batteries as marked.

Locate the battery compartment on the back of the Transmitter . Remove the battery compartment door . Install the “C” batteries as marked.

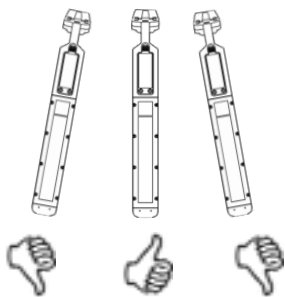


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Tip #1

Always keep the receiver as vertical as possible while performing a line location. Waving the receiver side to side will produce inaccurate locations.



ON/OFF Button

Press the ON/OFF button to turn the Receiver on or off. Upon turning the unit on, it will load the settings from the previous usage.

Note: Unit will automatically shut off if no keys are pressed within a 10 minute period.



DEPTH Button

Pressing the DEPTH button will cause the Receiver to first display the depth measured. To change the Depth Measurement from English to Metric, hold the Depth Key for ten seconds and the next setting will appear.



Steps /Mode Button

Used to change Sonde Locate (STEP -1 and STEP-2) or Line Trace (Peak, Null, Pinpoint Peak)



Freq. Button (*)

Used to change locate frequencies.

Sonde - 512Hz, 8KHz, 33KHz, 116KHz

Line - 512Hz, 8KHz, 33KHz, 65KHz, 116KHz, RF, 60Hz

(*)Press and hold for 5 sec. to turn on back lighting on/off



Gain Buttons

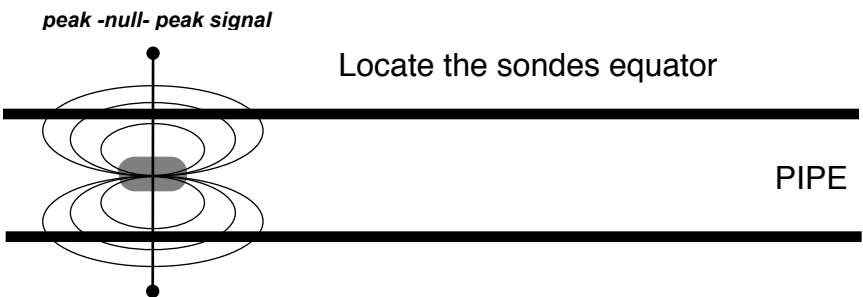
Adjusts the gain up or down . If the signal strength shows as " --- " on the display, pressing the GAIN will automatically adjust to 85% on the scale display .



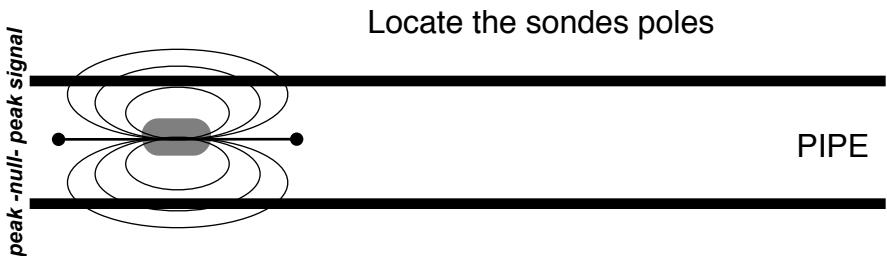
SR-1 Precision

How to pinpoint a camera sonde in three easy steps
with the SR-1 Precision

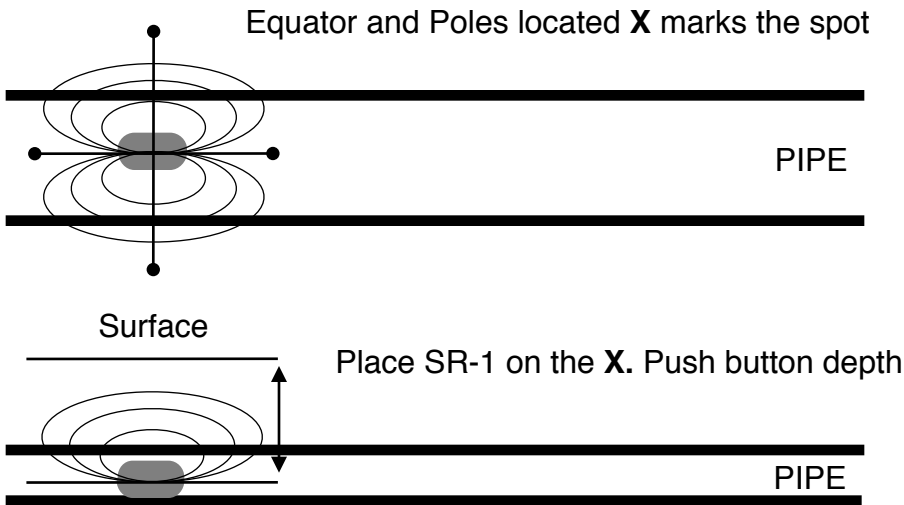
Step 1



Step 2



Step 3



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Step 1 (S-1)

Press the **Steps** button so S-1 is displayed below the graph bar.



1. Walk along the suspected path of the pipe. When you're within proximity of the sonde, your receiver will produce a tone that is known as a **peak signal**. When the receiver passes over the equator of the Sonde the tone will suddenly become void which is called a **null**.

You're looking for a peak -null- peak signal when you are passing the Equator of the sonde during step 1.

3. Place a marker on the surface where you just located your first null.
4. Walk in a circular motion no more than 6ft towards the other side of the suspected path of the pipe. The receiver will produce a **peak -null- peak signal** again when you pass over the other side of the sonde.
5. Place a marker on the surface where you just located your second null and have completed step 1.

NOTES:

The receiver can be at any rotation along during Step 1.

The deeper or further away you are from the Sonde, the wider the **peak -null- peak signal** will be. Adjust signal strength up or down with the gain control as needed to narrow your **peak -null- peak signal**. This step is usually performed only for Step 1.

Tip #2

A **peak -null- peak signal** will be found along the equator line from marker to marker.

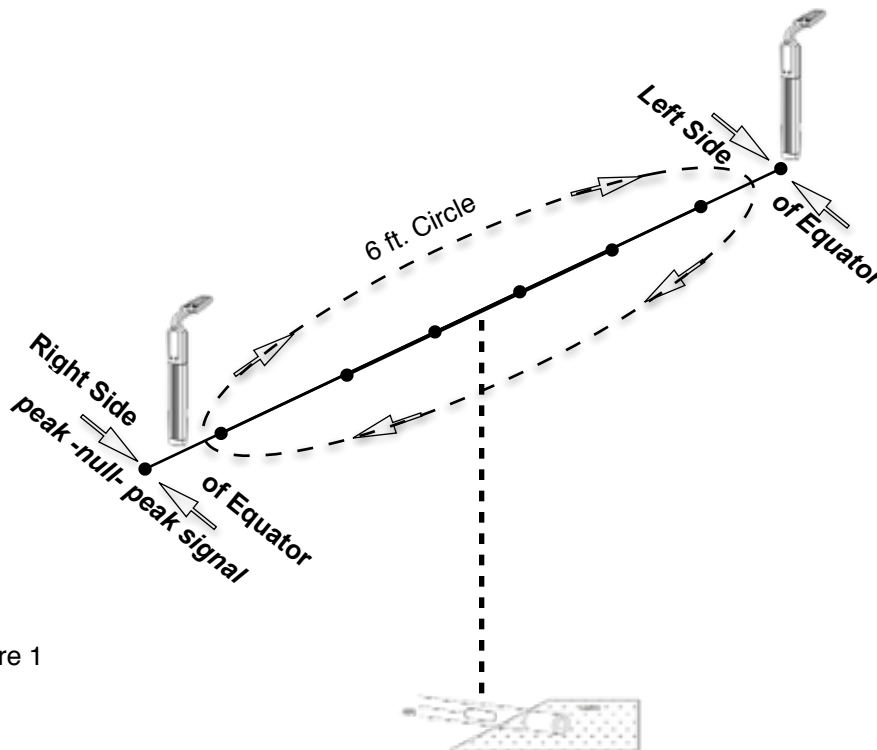


Figure 1

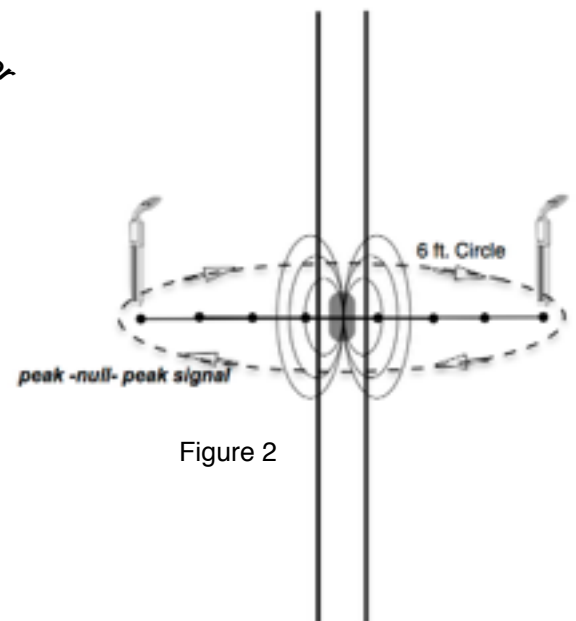


Figure 2



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Step 1 (S-1)



When you can not get on both sides of the Equator?

The Equator is an invisible straight line. Markings can be placed anywhere along one side of the Equator to show this invisible straight line.

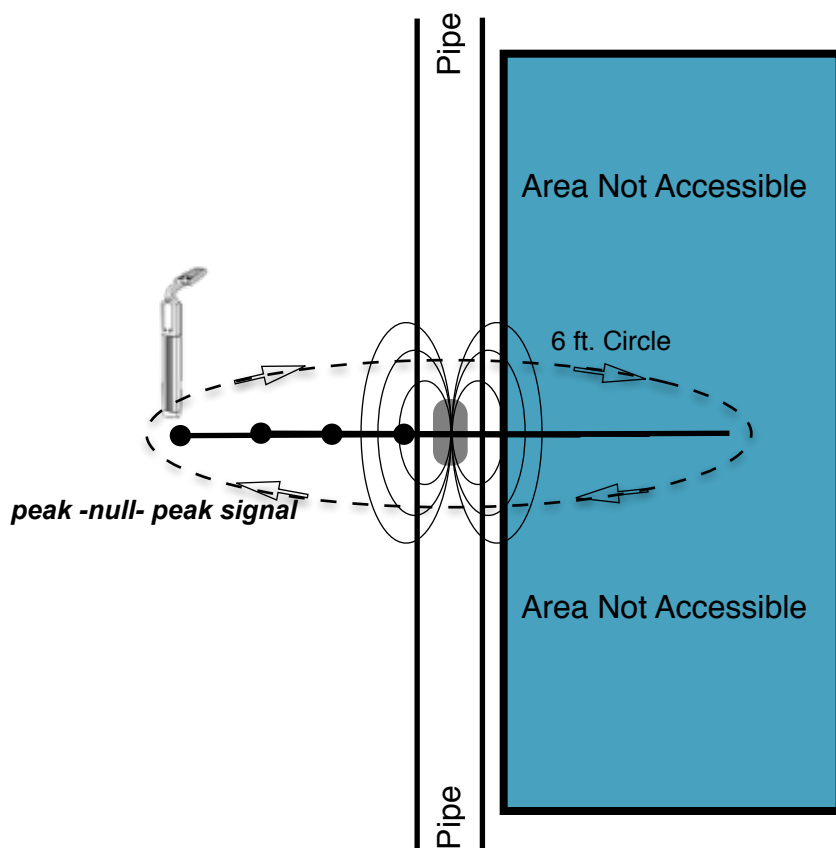


Figure 3



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Step 1 (S-1)



When diving down on a 45° the Equator?

Locating the Equator is no different than if the Sonde was laying flat. It is however necessary to go back and adjust your location for pinpoint accuracy.

This adjustment is performed only after completing all the steps. In Step 2 you will discover the Sonde is not laying flat.

After completing all the steps, calculate the depth into inches and divide by 2 as shown in Example 1.

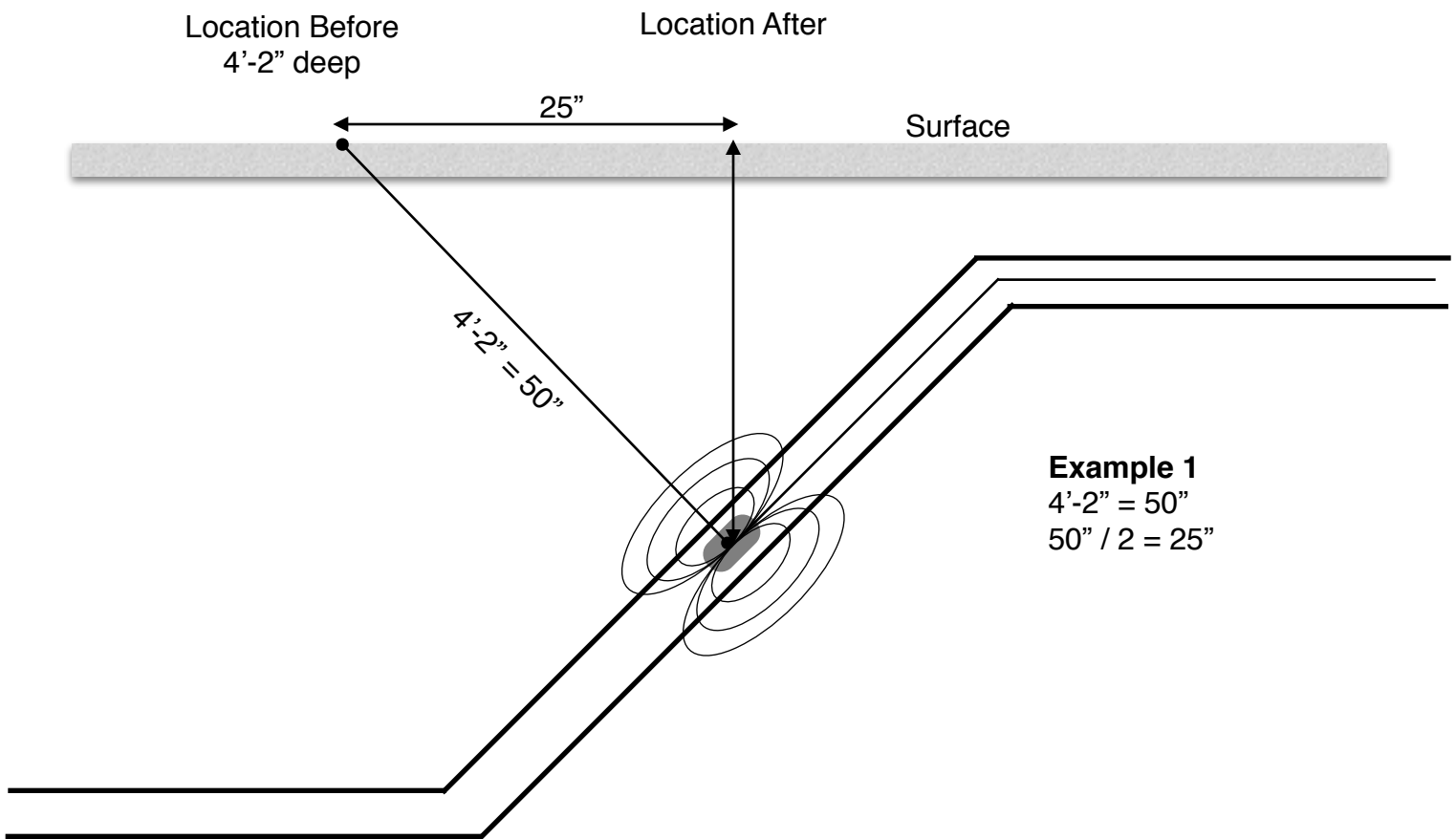


Figure 4



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Step 2 (S-2)



Press the **Steps** button so S-2 is displayed below the graph bar.

When the receiver is directly in front of or behind the Sonde the tone will suddenly become void which is called a null. You're looking for a **peak -null- peak signal when you are directly in front of or behind the Sonde during step 2.**

1. Step 2ft. - 3ft. towards the front the sonde to locate the **peak -null- peak signal** as shown in figure 2.
 - A. (For accurate **peak -null- peak signal** location in step 2 it's best to have the receiver parallel to the right and left side markers as shown in figure 2.)
2. Place a marker on the surface where you located front null.
4. With the receiver 2ft - 3ft. towards the back side of the sonde, look for a **peak -null- peak signal** again on the back side of the sonde as shown in figure 2.
5. Place a marker on the surface where you located back null.

NOTES:

The deeper or further away you are from the Sonde, the wider the **peak -null- peak signal** will be. Adjust signal strength up or down with the gain control as needed to narrow your **peak -null- peak signal**.

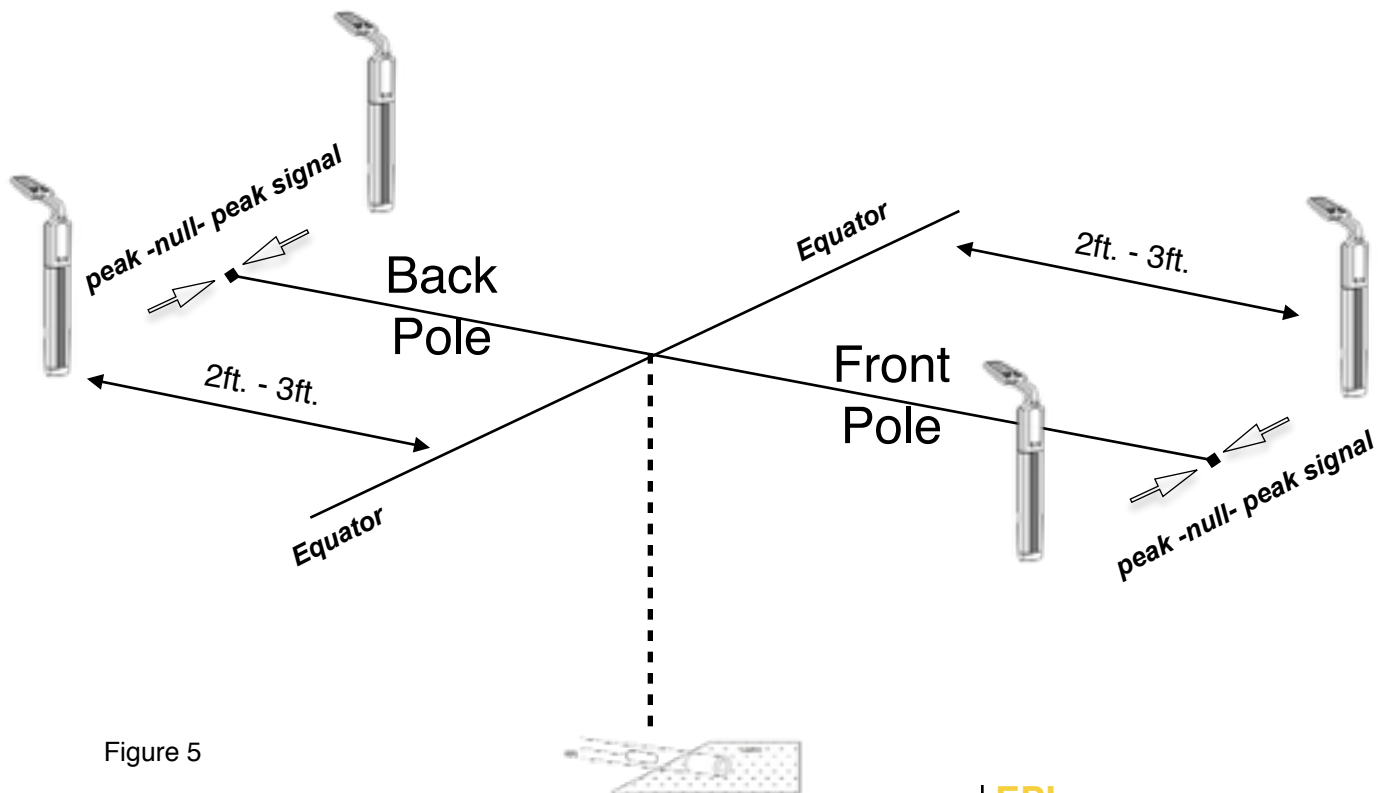


Figure 5



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Step 2 (S-2)



When you can not get on both sides Poles?

The poles are an invisible straight line. Markings can be placed anywhere in **front side** or the **back side** of the Sonde to show this invisible straight line.

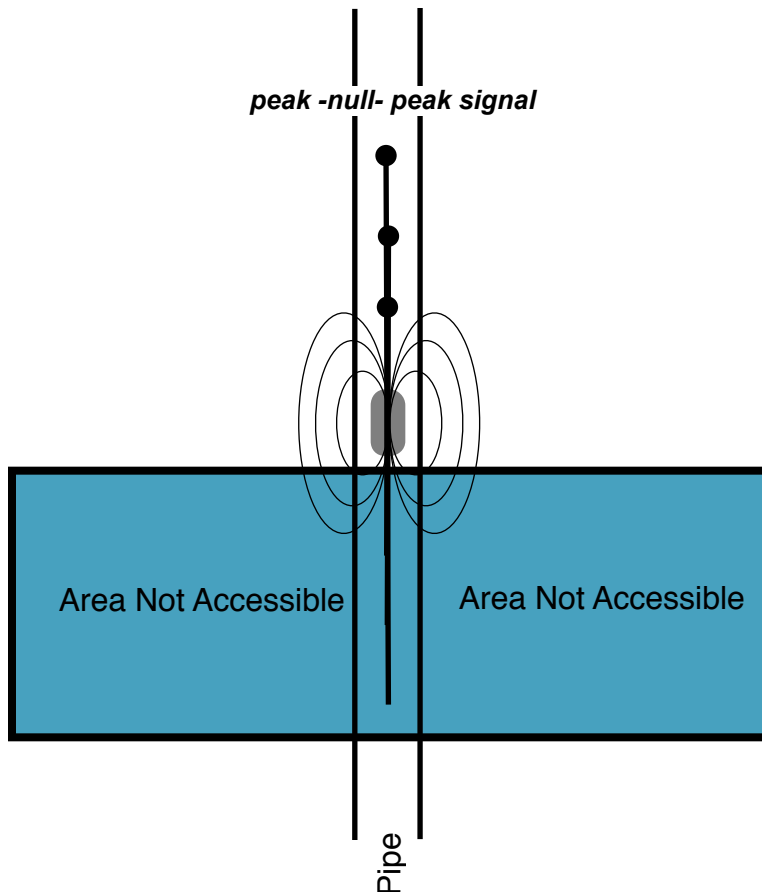


Figure 6



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Step 2 (S-2)



When diving down on a 45° ?

The Front Pole as shown will be a weaker and wider Peak-Null-Peak signal than the Back Pole.

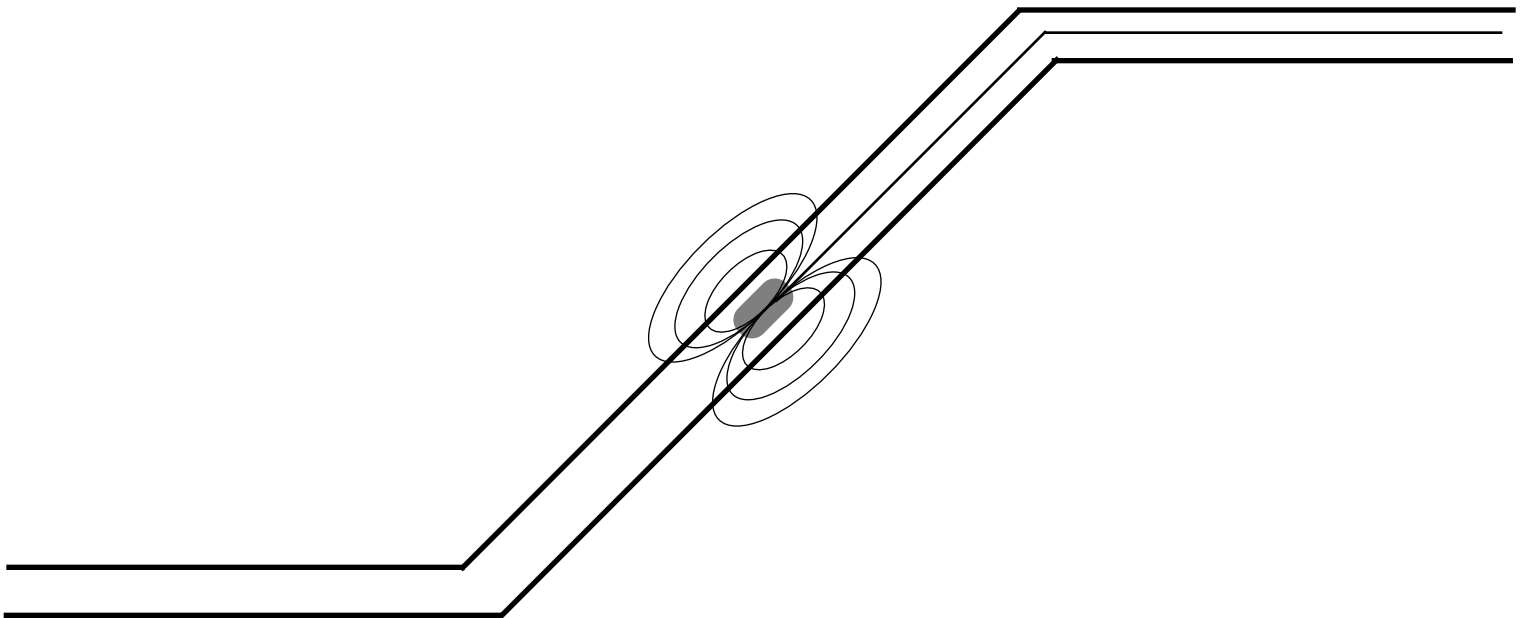
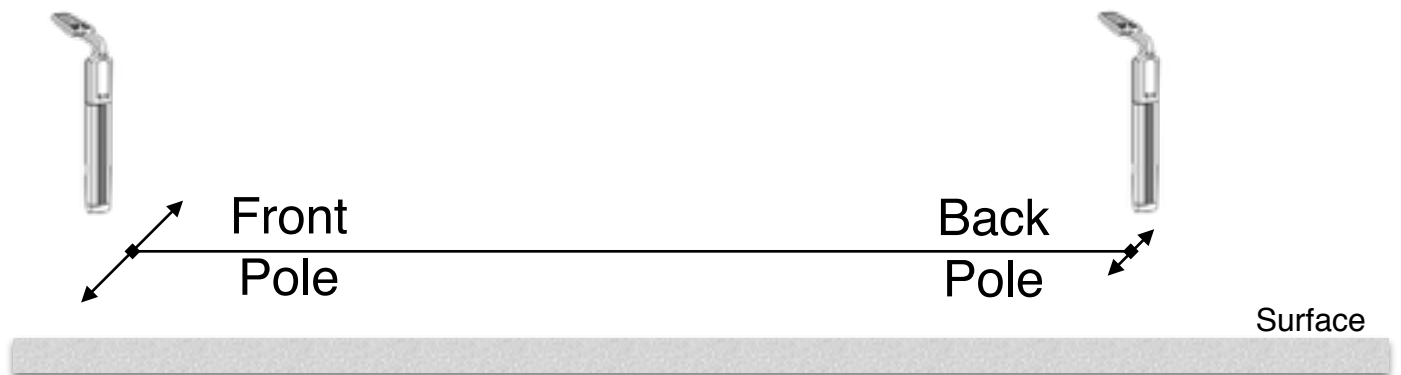


Figure 7



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Step 3 Depth

With the receiver over Step 3 as shown in figure 3 push the depth measurement button for the invert depth (bottom inside) of the sewer pipe.

NOTE:

For best depth measurement results, keep the receiver at a right angle to the step 1 side markers as shown in figure 3.

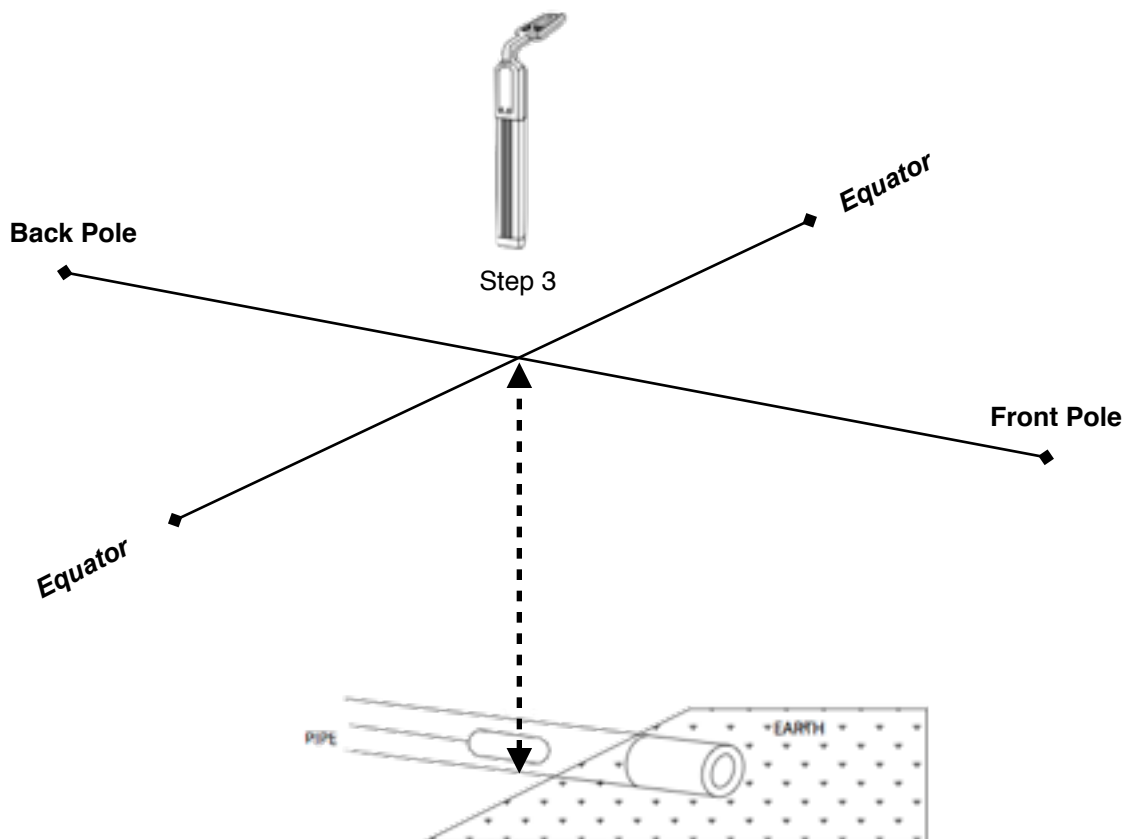


Figure 8



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When you can not get over sonde on?

Locate your Equator and Poles around all sides of the Sonde as shown if possible. If all sides are not accessible move sonde backwards or forwards a few feet to confirm location accuracy.

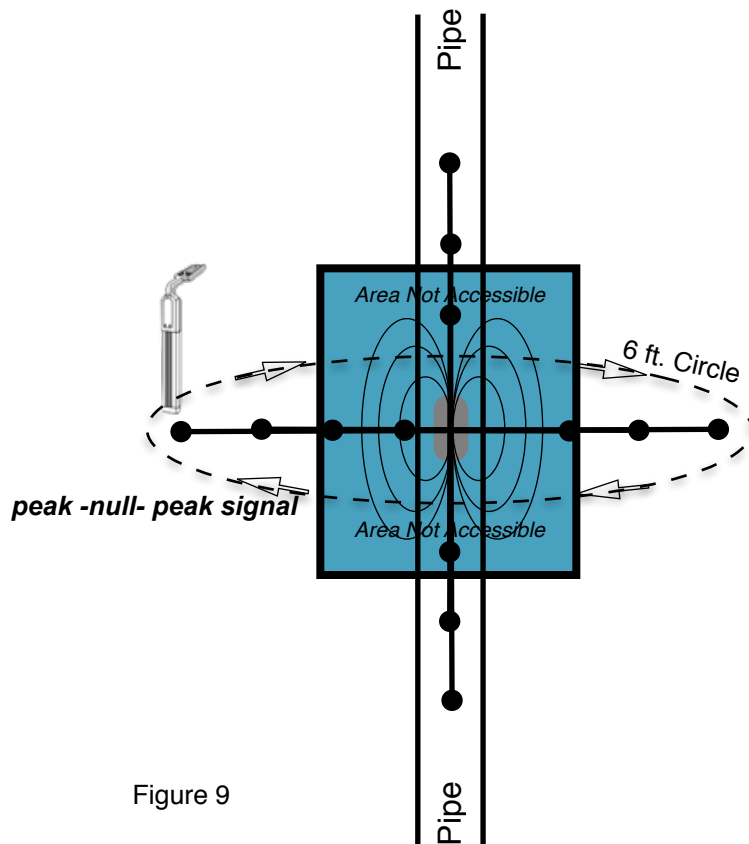


Figure 9



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How to locate a vertical sonde.

1. Select Step-2.
2. Walking in a circle and facing towards the center of the circle locate the 4 peak-null-peak signals as shown.
3. Confirm the accuracy of the locate by locating the 5th peak-null-peak signal in the center as shown

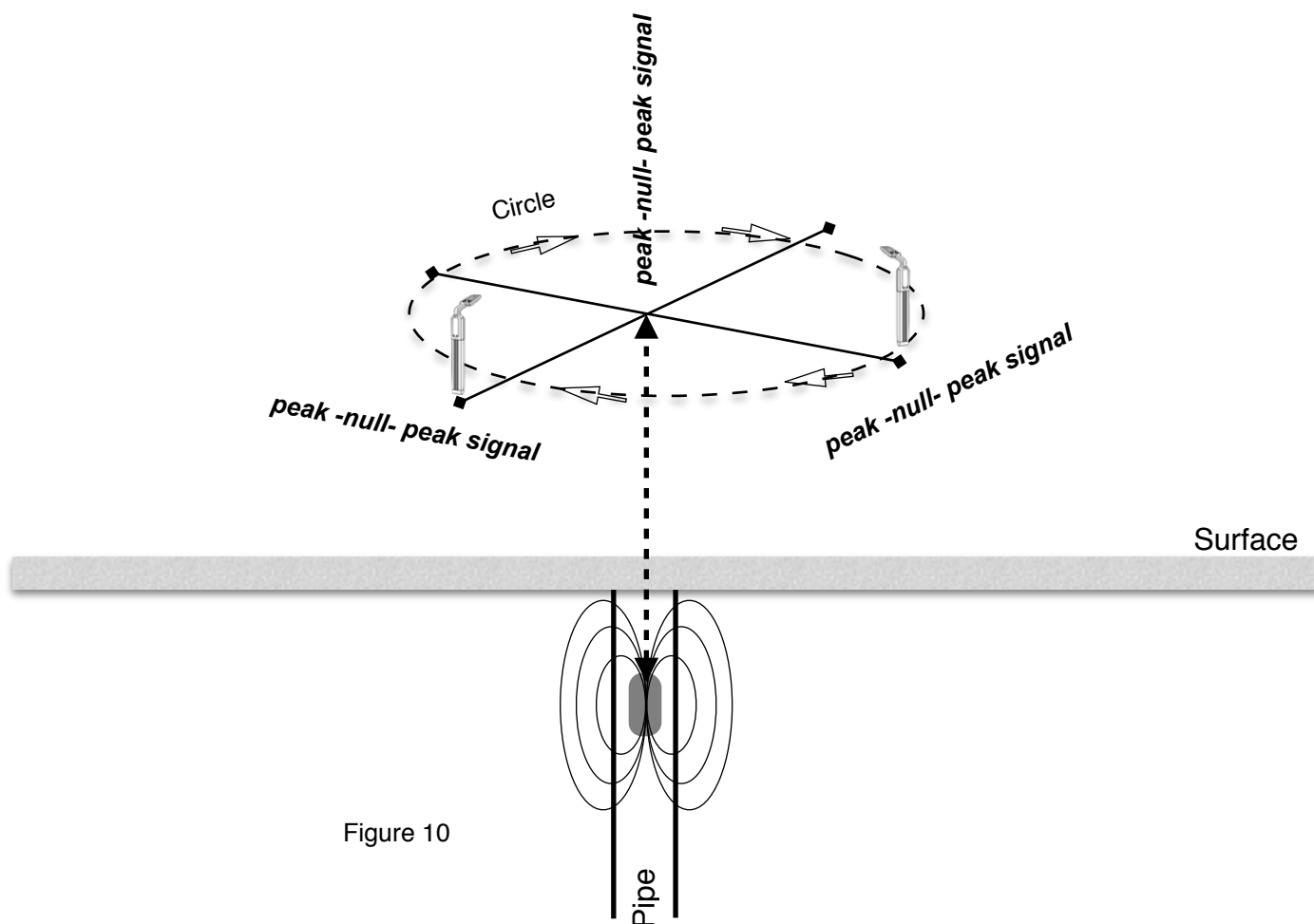


Figure 10

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Depth Measurement By Calculation

(Horizontal Location Only!) (Depth Nulls are not to be confused with Front and Back Poles)

Once the sonde has been located the depth can be checked for accuracy.

1. Select Step-2.
2. Moving the SR-1 towards the Front Pole keeping the SR-1 inline (as shown) locate and mark a peak-null-peak signal (Depth Null A)
3. Moving the SR-1 towards the Back Pole keeping the SR-1 inline (as shown) locate and mark a peak-null-peak signal (Depth Null B)
4. Measure the distance in inches between Depth Null A & B and multiply by .7

Example: Distance between Depth Nulls A & B is 100" X .7 = 70" deep (surface to center of sonde)

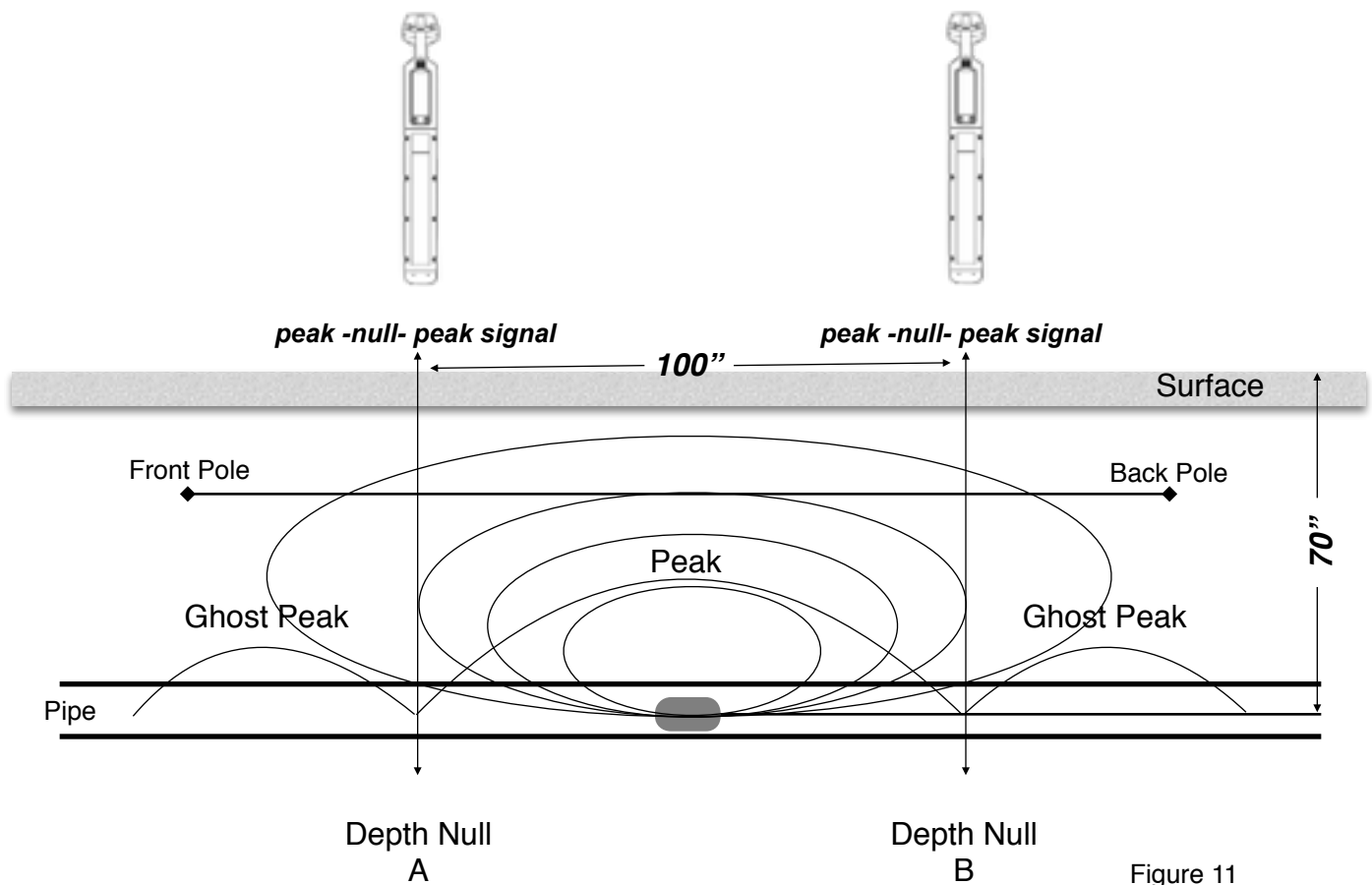


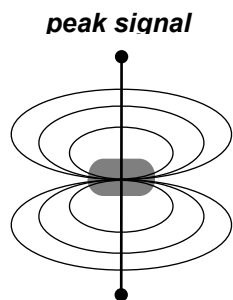
Figure 11



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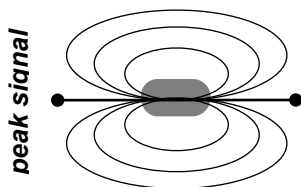
How to locate a **Deep** (15- 25 feet plus)
sewer or drain line with the SR-1 Precision

Step 2



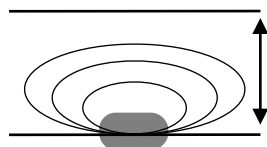
Locate the sondes equator

Step 1



Locate the sondes poles

Step 3



Push button depth



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How to locate a **Deep** (15- 25 feet plus) sewer or drain line with the SR-1 Precision



Step (S-2)

1. Walk along the suspected path of the pipe holding the receiver in line with the general direction of the path of the pipe. When you're within proximity of the sonde, your receiver will produce a tone that is known as a **peak signal**. When the receiver passes over the equator of the Sonde a tone will be found which is called a **peak signal**.

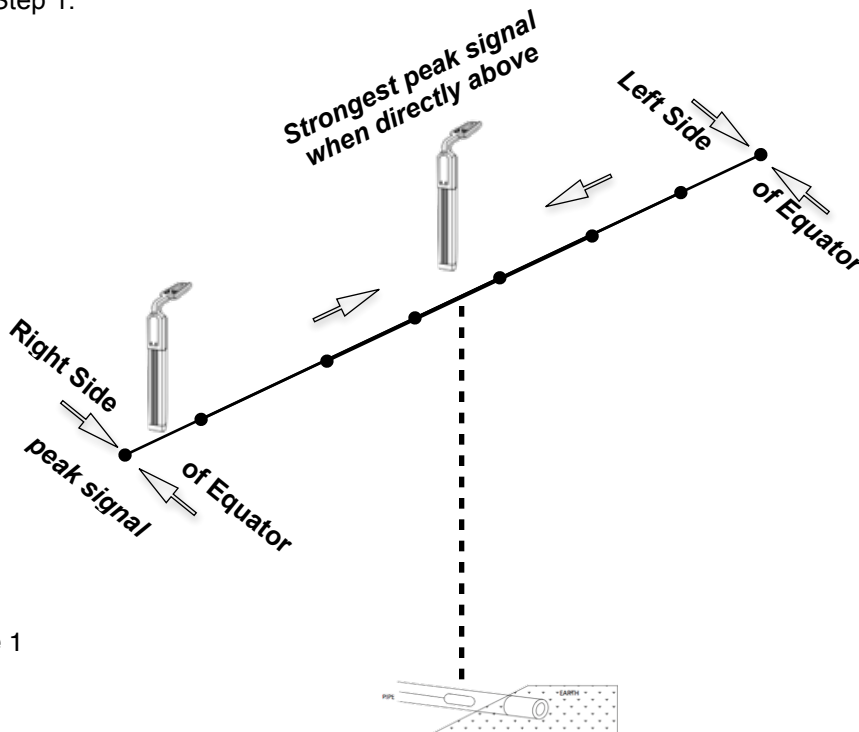
You're looking for a peak signal when you are passing the Equator of the sonde during this step.

3. Place a marker on the surface where you just located your first peak.
4. Walk in a circular motion no more than 6ft towards the other side of the suspected path of the pipe. The receiver will produce a **peak -null- peak signal** again when you pass over the other side of the sonde.
5. Place a marker on the surface where you just located your second null and have completed step 1.

NOTES:

The receiver can be at any rotation along during Step 1.

The deeper or further away you are from the Sonde, the wider the **peak -null- peak signal** will be. Adjust signal strength up or down with the gain control as needed to narrow your **peak -null- peak signal**. This step is usually performed only for Step 1.



Tip

A **peak signal** will be found along the equator line when the SR-1 is in-line with the sonde.

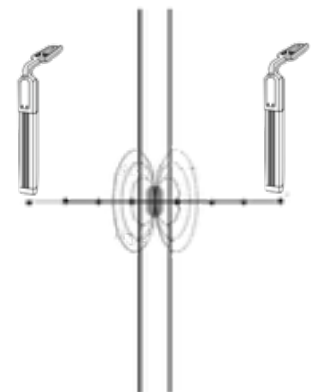


Figure 1

1. Move slowly when locating deep.
2. Pay attention to the signal strength.
3. The signal will be strongest directly above the sonde.

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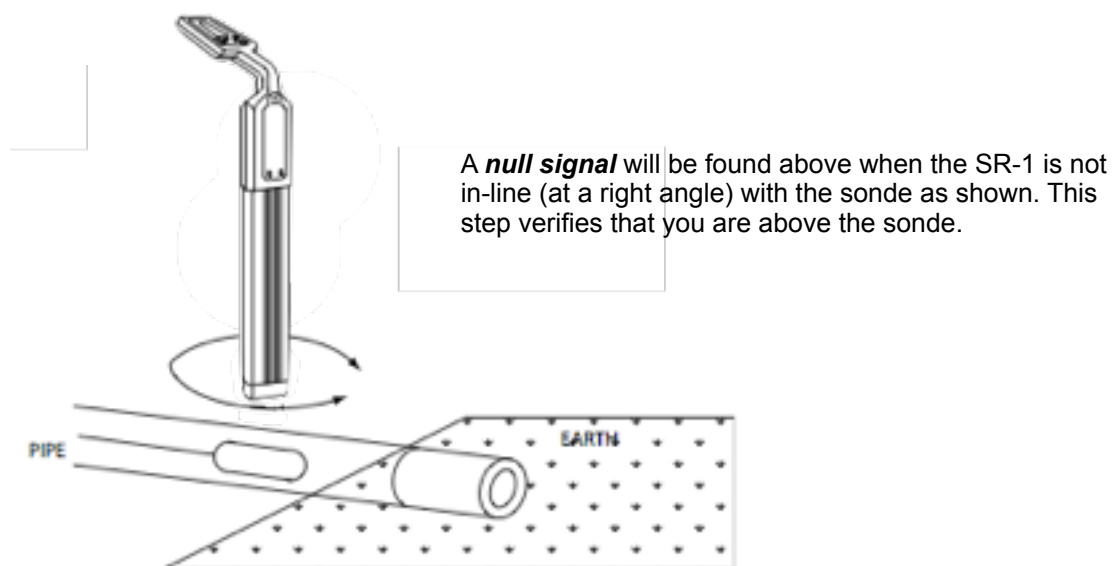
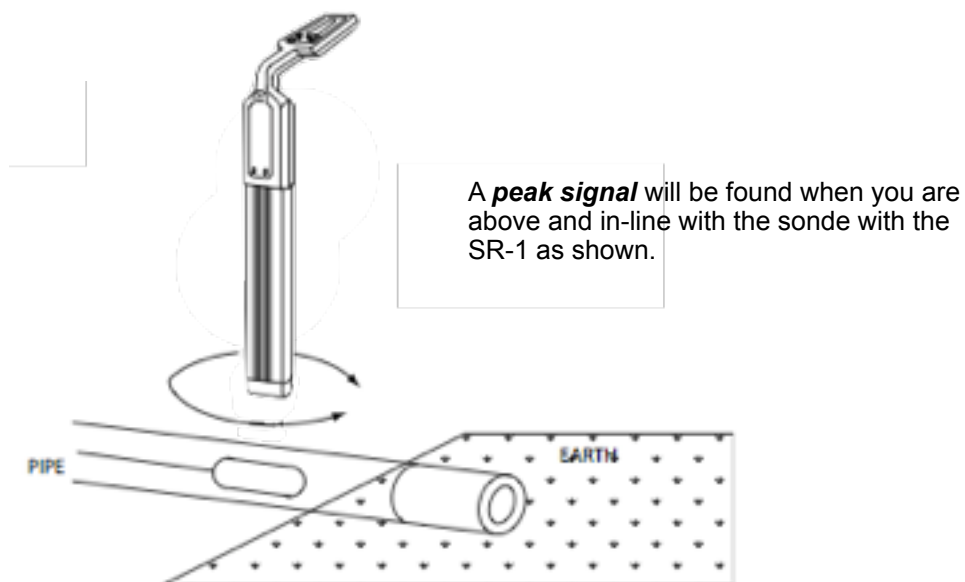
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Step 1 (S-2)

1. Move slowly when locating deep.
2. Pay attention to the signal strength.
3. The signal will be strongest directly above the sonde.



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How to locate a **Deep** (15- 25 feet plus)
sewer or drain line with the SR-1 Precision



Step 1 (S-1)

Press the **Steps** button so S-1 is displayed below the graph bar.

When the receiver is directly in front of or behind the Sonde the tone will be a peak signal only when you are directly in front of or behind the Sonde during step 1.

1. Step 3ft. - 4ft. towards the front the sonde to locate the **peak signal** as shown in figure 2. (For accurate **peak signal** location in step 1 it's best to have the receiver parallel to the right and left side markers as shown in figure 2.)
2. Place a marker on the surface where you located front null.
4. With the receiver 2ft - 3ft. towards the back side of the sonde, look for a **peak -null- peak signal** again on the back side of the sonde as shown in figure 2.
5. Place a marker on the surface where you located back null.

NOTES:

The deeper or further away you are from the Sonde, the wider the **peak -null- peak signal** will be. Adjust signal strength up or down with the gain control as needed to narrow your **peak -null- peak signal**.

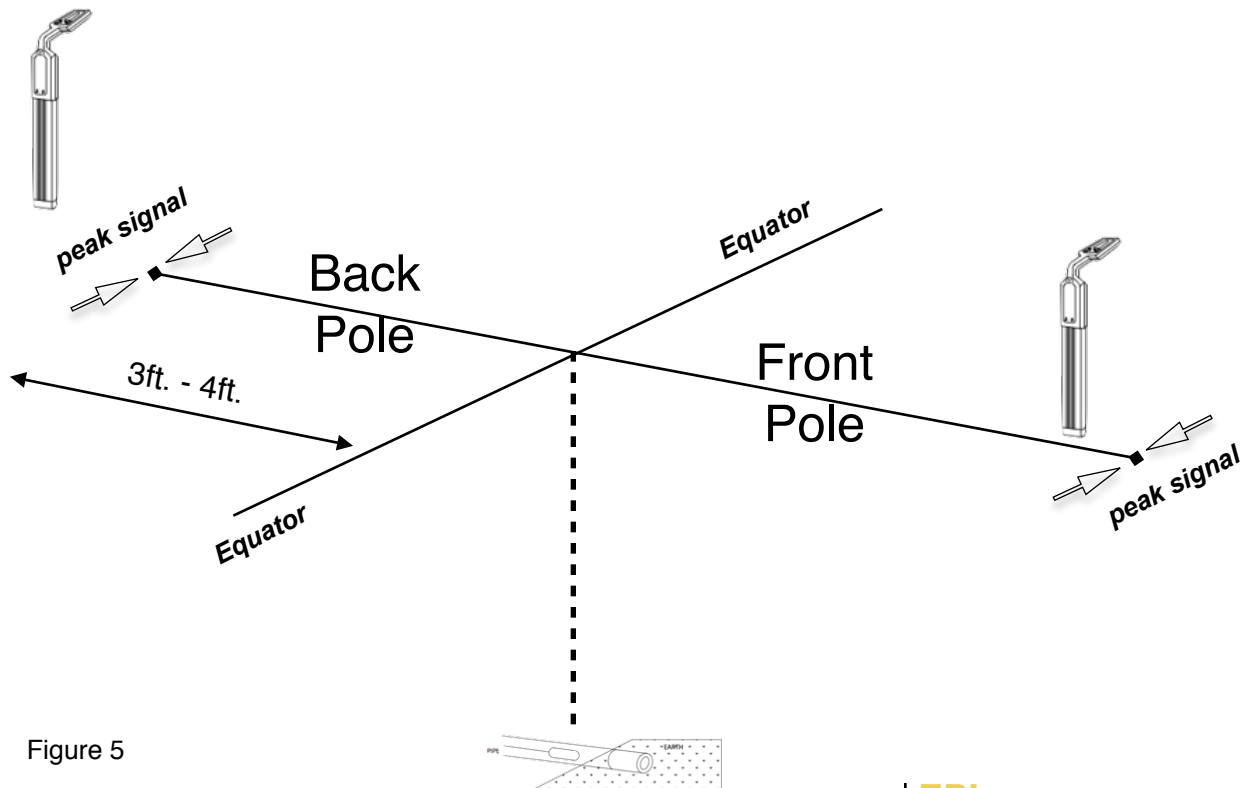


Figure 5

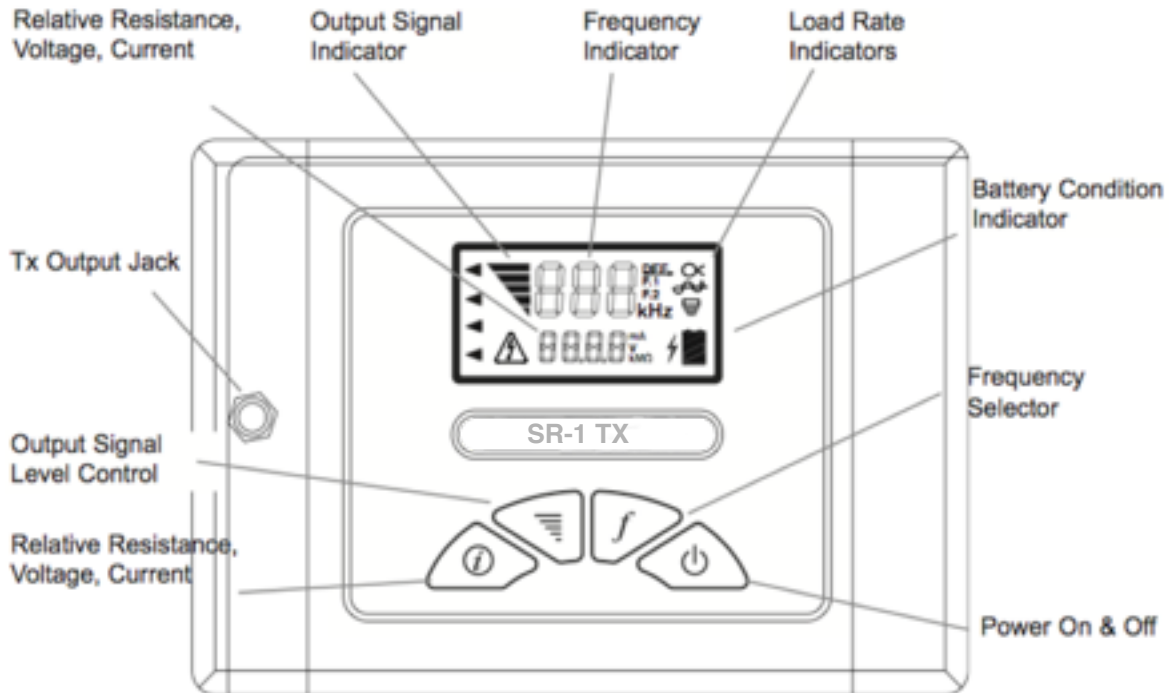
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SR-1 TX

Transmitter Controls and Indicators



TX OUTPUT JACK

The Red/Black cord, Inductive Coupler connects here to create a direct connect or coupler inductive circuit on the buried utility.

TX ON

Frequency and other LCD segments visible indicates unit is on .

FREQUENCY SELECTOR

Selects frequencies by toggle through available frequencies . 512Hz, 8kHz, 33kHz, 65kHz, 116KkHz are standard on the SR-1 Tx .

LOAD RATE INDICATOR

The Load Rate Indicator symbol flashes to indicate signal transmission via coupler induction or direct connection .

OUTPUT SIGNAL LEVEL CONTROL

The OUTPUT SIGNAL LEVEL CONTROL adjusts the power output from the Transmitter .

RELATIVE RESISTANCE, VOLTAGE AND CURRENT METER

The transmitter can display the resistance, voltage and amperage of the transmitted frequency . NOTE: This is a relative measurement based on the feedback from the transmitted signal .



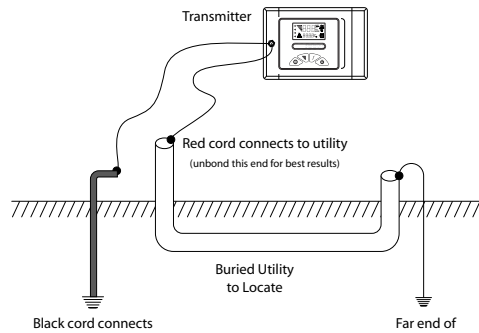
SR-1 TX



CAUTION
DO NOT CONNECT TO LIVE OR
ENERGIZED POWER CABLES



CAUTION
ALWAYS TURN OFF TRANSMITTER BEFORE
CONNECTING AND DISCONNECTING TEST LEADS

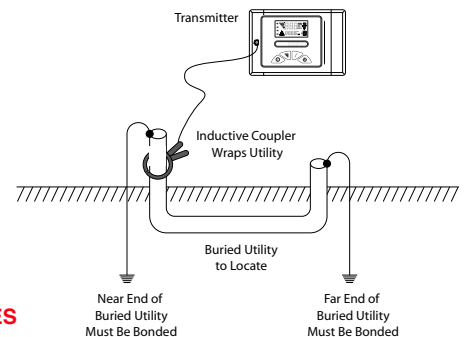


Direct Connection

Direct Connection is the most reliable method of signal application. The greatest amount of signal strength can be achieved by this method. All frequencies may be used. For best results the far end of the utility should be grounded .

Connect the red 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 90o 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 FREQUENCY . The Power Output Indicator, Load Rate Indicator and the Frequency will be displayed.



CAUTION
NEVER BOND ACTIVE POWER CABLES

Inductive Coupler Connection

Plug the Inductive Coupler cord into the TX OUTPUT JACK . The Inductive Coupler performs at 8kHz, 33kHz, 65kHz & 116kHz frequencies. The most commonly used is 65kHz.

The optional Inductive Coupler is very easy to use, and services do not have to be interrupted . The operation range is shorter than for Direct Connection methods and the tracing signal can be affected by neighboring cables and pipes.

It is best to use the Inductive Coupler around a group of *LIVE CABLES* needing to be traced, the result will be a stronger signal . Connecting the Inductive Coupler around *PIPE AND CONDUIT, DISCONNECTED OR INACTIVE CABLES*, will produce poor results and difficulty will arise.

Note:

When a ground wire is present it is always best use the *Direct Connection Method* only after the ground wire has been checked for an absence of power with a voltage meter.

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SR-1 TX

Selecting A Trace Signal Frequency

The choice of 512Hz, 8kHz, 33kHz, 65 kHz and 116kHz Frequency is dependent on the conditions of the locate .

The 512 Hz, 8 kHz, 33kHz, 65kHz and 116 kHz signals each have their advantages . It is recommended to begin by using the 8 kHz 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 33kHz. Repeat adjustments of ground and connection point again until switching to 116kHz. The 512Hz signal 8 kHz and 33kHz takes the best of both high and low frequency.

512Hz (lower frequency)

- Signal is usually preferred for a loop trace.
- Has a long locating range.
- Not very susceptible to bleed off or coupling
- Less likely to jump impedance on the utility than mid-range and high-range frequencies.
- Susceptible to locating errors caused by nearby high voltage electrical cables (50Hz- 60Hz).
- Will not travel well through disconnected shield bonds or insulated pipe bushing .

8 kHz (mid-range frequency) 33kHz (high frequency)

- Less susceptible to locating errors caused by nearby high voltage electrical cables (50Hz- 60Hz).
- Has a better locating range than higher frequencies.
- Not very susceptible to bleed off or coupling
- Less likely to jump impedance on the utility than high-range frequencies.
- Mid range frequency is not very susceptible to bleed off or coupling but can jump impedance on the utility better than the 512 Hz
- 8 kHz is one of the most common frequencies used to locate coaxial cable and telecom pairs .

65kHz and 116kHz (high frequency)

- Less susceptible to locating errors caused by high voltage electrical cables (50Hz- 60Hz) .
- Locating range is shorter than the 512Hz, 8kHz and 33kHz signal .
- 65 kHz (higher frequency) is sometimes better than the 8kHz (mid-range frequency) and 33kHz (high frequency) for locating sharp corners in cables or pipes.
- 65kHz and 116kHz 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 116kHz signal so the Transmitter must be repositioned more often during the tracing operation.
- High Frequencies are useful for applying a signal using the Inductive Coupler.



SR-1 TX

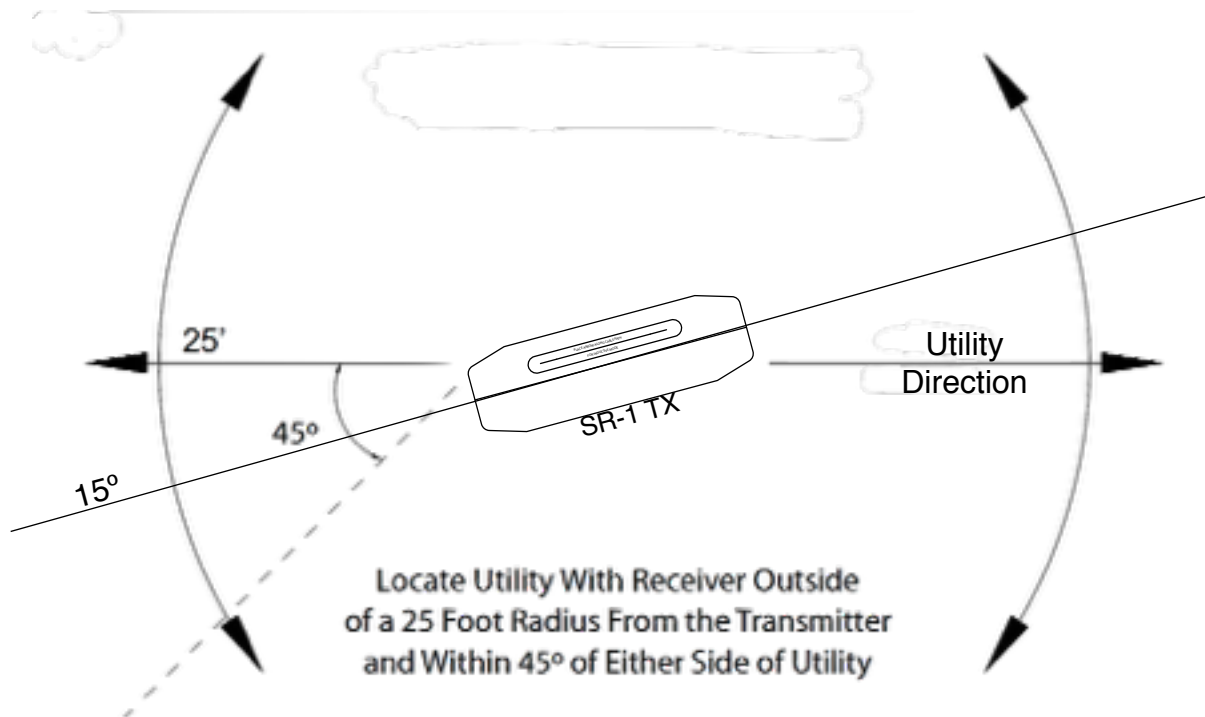
Inductive Coupler Connection

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 SR-1 TX ON . The Inductive frequencies are 33kHz, 65kHz & 116kHz frequencies. The most commonly used is 65kHz.

Place SR-1 TX on its side . Align the ARROWS on the SIDE OF THE TRANSMITTER at a 15° angle to the cable or pipe.

Start tracing the path with the receiver 25 feet from the SR-1 TX . Search in the 45° of either side of the utility as shown below. Locate the cable or pipe, and follow the path . If the signal becomes weak, move the SR-1 TX to a point 25 feet behind the last strong signal, and continue searching .



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How to locate cable or pipe using the SR-1 Precision

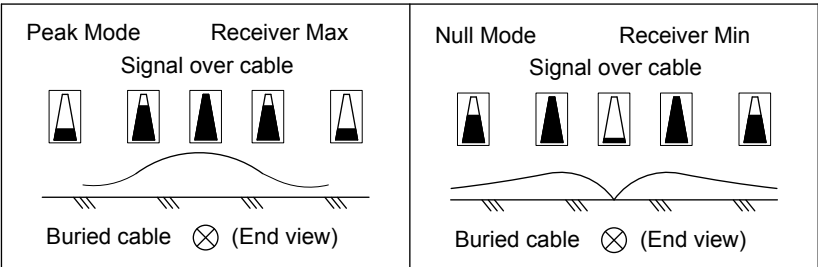
Locating Cable or Pipe

Make sure the SR-1 TX signal generator is connected and in the ON position . Then move approximately 15 feet (4 .5 meters) away for conductive search mode from the SR-1 TX signal generator along the path . (Move about 25 feet (7 .5 meters) for the Inductive search mode.)

Hold the SR-1 Precision Receiver so that you can see the LCD bar-graph and controls easily . Make sure the Receiver and the Transmitter FREQUENCY are both set for the same FREQUENCY, either 512 Hz (lower), 8 kHz, (mid-range) 33kHz, 65kHz or 116kHz (high-range) . Or select the passive locating modes, RF or 60Hz which do not require a transmitter.

Selecting the Locating Mode (Peak, Sharp Peak or Null, Target Null)

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

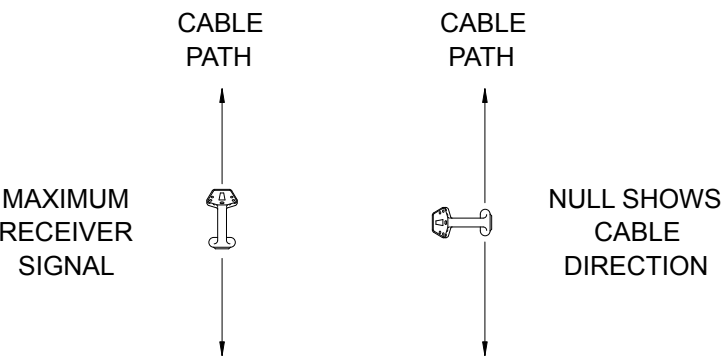
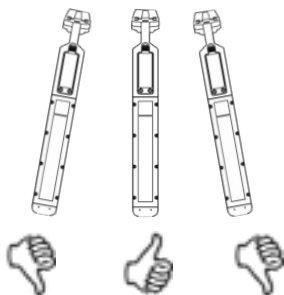


Peak Locating Mode

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 when aligned with the flat side of the receiver.

Tip #1
Always keep the receiver as vertical as possible while performing a line location. Waving the receiver side to side will produce inaccurate locations.



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Peak Locating Mode 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 signal .

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 junction where the signal divides and goes several directions.
- a break in the cable or shield.
- a change in the depth of the cable or pipe. d) an insulated pipe fitting.
- 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 foot or so. 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 Locating Mode

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 junction where the signal divides and goes several directions.
- a break in the cable or shield.
- a change in the depth of the cable or pipe.
- an insulated pipe fitting.
- 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 .



SR-1 Precision

Absolute Signal Strength

The SR-1 Precision 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.

Absolute Signal Strength

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 midscale. Likewise, if the meter reading is very high, pressing the GAIN down button will center the meter reading to midscale.

Passive 50Hz / 60Hz ~ Locating

The SR-1 Precision 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 60Hz mode. The SR-1 will locate conductor using the Sharp 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 SR-1 TX transmitter is not required to locate in this mode.

Passive Radio Frequency Locating

The SR-1 Precision 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 SR-1 TX transmitter is not required to locate in this mode.



SR-1 Precision

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 SR-1 Precision Receiver can measure depth with the push of a button. The depth is displayed at the top of the LCD display in feet and inches. Push button depth is useful in quickly determining the depth of the utility 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 SR-1 TX transmitter. Pin-point this location as accurately as possible (see Peak Mode Locating page, Null Mode Locating page and Absolute Signal Strength page). 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 SR-1 Precision Receiver 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 SR-1 TX 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 bar-graph 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.

If at anytime the display reads 'CAL', contact EPL Solutions, Inc at (714) 453-9760.

Current Measurement

The SR-1 Precision Receiver later models contain a feature that is very useful in identifying a desired cable in a field of various conductors and/or utilities.

It is not unusual for the target conductor (the conductor connected to the SR-1 TX transmitter) to induce a signal into nearby conductors in a crowded field. In these instances, the radiated signal on the conductors close to the surface of the earth, may be stronger than the transmitter signal on the target conductor buried deep in the ground.

The operator will find two or more paths and must determine which is the target conductor. By using the current measurement feature of the SR-1 Precision Receiver, the operator can determine the amount of 512 Hz, 8kHz, 33kHz 65kHz or 116kHz current flowing on the conductors, regardless of the depth.

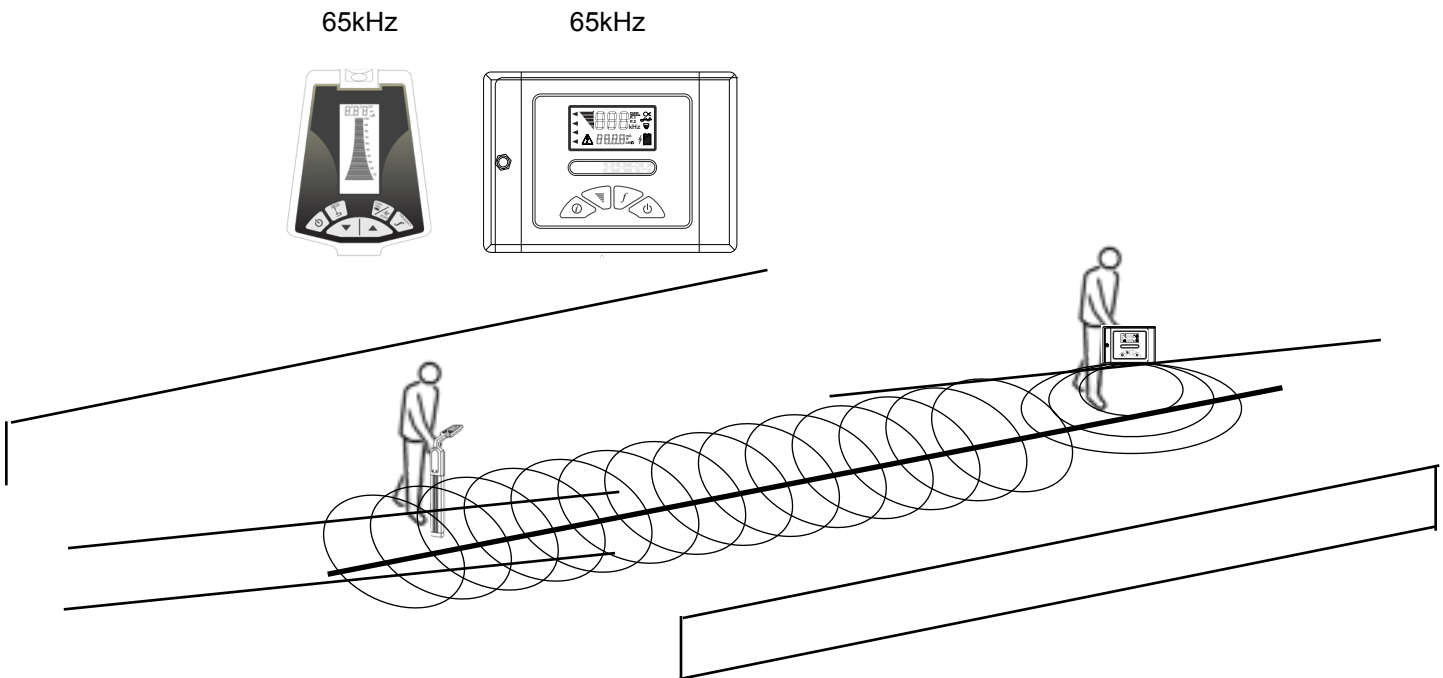
The highest current flow indicates the target conductor.



SR-1 Precision

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 . Using 65kHz keep the Transmitter and the Receiver 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.



SR-1 Precision

Tilted Magnetic Field Identification

When adjacent cables or pipes are present, they will sometimes create locating errors. Some of the SR-1 TX 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 and the Depth Measurement Calculation. If 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.

Depth Measurement 45° Angle Method

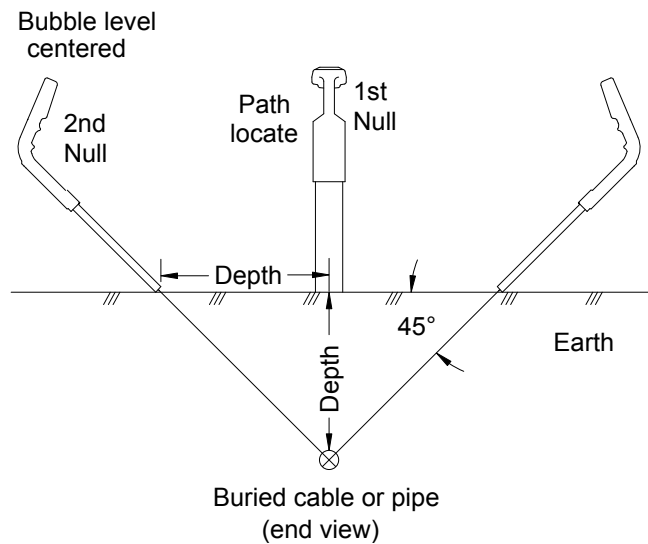
Move to the location you want to measure depth. Stay at least 15 feet away from the SR-1 TX transmitter. With the SR-1 Precision Receiver in Peak Mode sweep the receiver left to right across the path until the utility is located. Mark the path on the ground as precisely as possible using the Peak Locating Method.

The Depth measurement 45° Angle Method should be performed at different areas along the path of the utility and is effective for checking accuracy of location.

Place the receiver on the ground with the LCD meter facing up. Position the unit so that the BUBBLE LEVEL (if equipped) 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 (if equipped) centered. When the receiver indicates a Peak-Null-Peak signal, 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.



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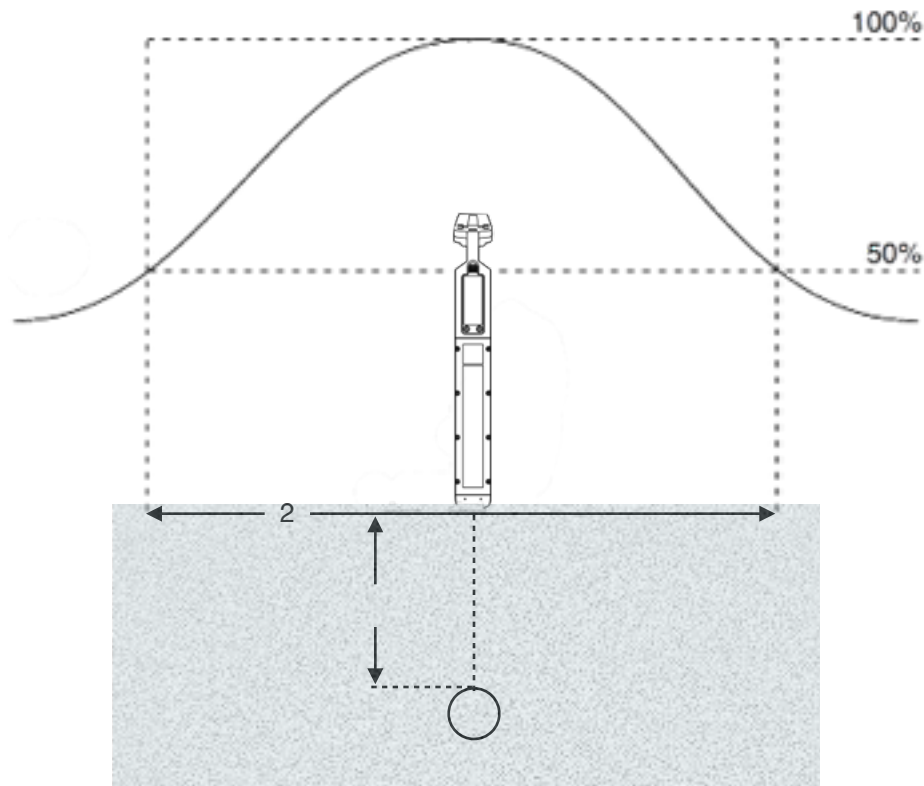
SR-1 Precision

Depth Measurement Calculation

Move to the location you want to measure depth. Stay at least 15 feet away from the SR-1 TX transmitter. With the SR-1 Precision Receiver in Peak Mode sweep the receiver left to right across the path until the utility is located. Mark the path on the ground as precisely as possible using the Peak Locating Method.

The measurement calculation should be performed at different areas along the path of the utility and is effective for checking location accuracy because it is unlikely to have the signal distortion in each direction of the utility path.

Adjust the gain up so the bar-graph is at the 100%. Move left of utility until the bar-graph drops to 50% and mark this point. Perform the same to the right of the utility. They should be about equal distance from center. Measure the distance from both marks, they should be twice the depth of the utility.



SR-1 Precision

Two-Thirds Plus One Third Rule

When adjacent cables or pipes are present, they will sometimes create locating errors. Some of the SR-1 TX 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.

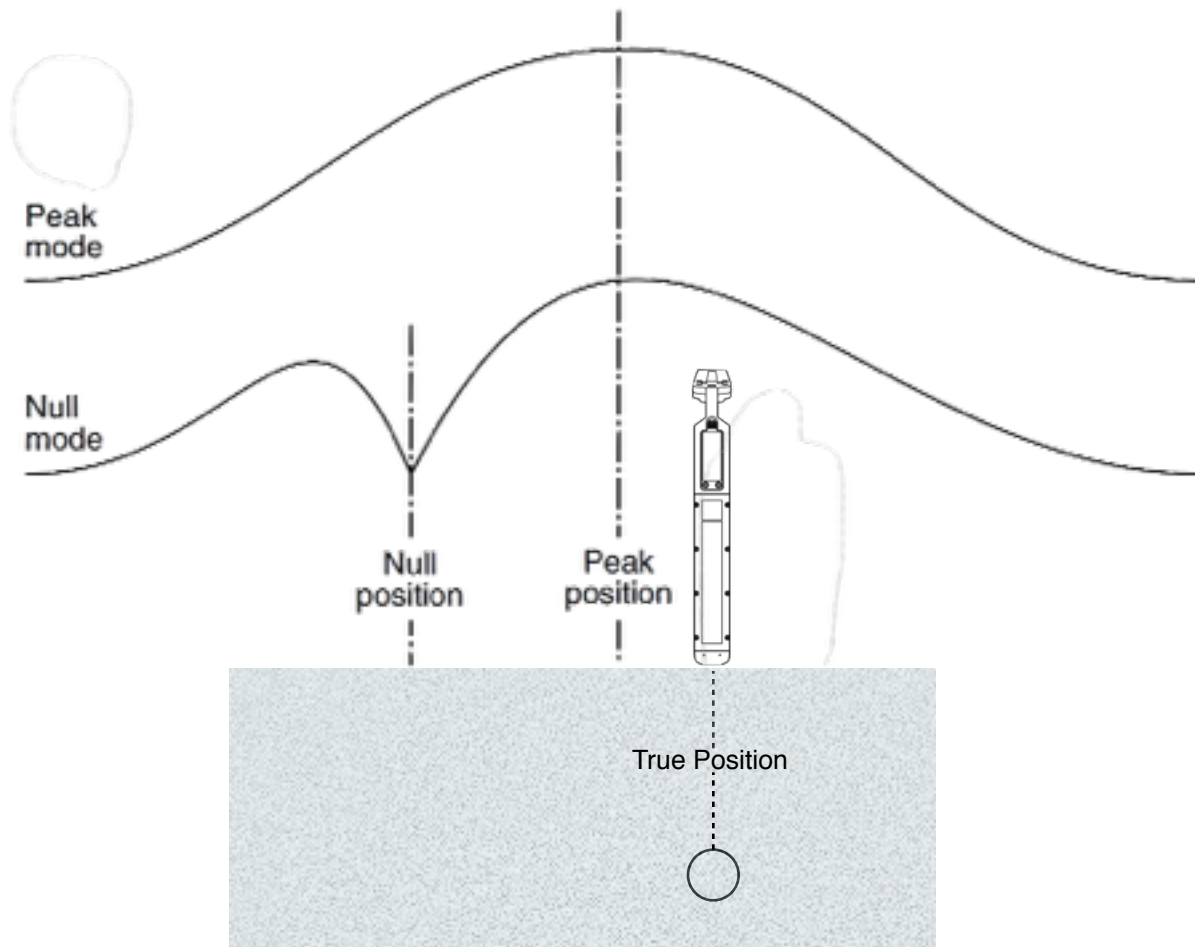
The operator can verify the accuracy of path locate by performing the Two-Thirds Plus One Third Rule.

Move to the location you want to measure depth. Stay at least 15 feet away from the SR-1 TX transmitter. With the SR-1 Precision Receiver in Peak Mode mark the path on the ground as precisely as possible using the Peak Locating Method.

With the SR-1 Precision Receiver in Null Mode mark the path on the ground as precisely as possible using the Null Locating Method.

If the Peak and Null marks are the agree (in the same location) it can be assumed you location is accurate and precise.

The location is not accurate and precise if the Peak and Null marks do not agree. Both marks will show the error on the same side of the utility. True utility line position will be close to the peak location. The utility line is half as far to the side of the peak position as the distance between the Peak and Null.



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