NaviTrack™

Sonde and Line Locator

Patents Pending

Operator's Manual

⚠CAUTION!

For your own safety, read this Operator's Manual carefully and completely before assembling and operating this unit. Learn the operation, applications and potential hazards to this unit.

RIDGID®

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NaviTrack™

Sonde and Line Locator

NaviTrack™	
Record the Serial Number of your unit below and retain for your records.	
Serial Number	
Software Version	

General Safety Information

CAUTION! Read and understand all instructions. Failure to follow all instructions listed below may result in electric shock, fire, and/or serious personal injury.

SAVE THESE INSTRUCTIONS!

Work Area Safety

- **Keep your work area clean and well lit.** Cluttered benches and dark areas may cause accidents.
- **Do not operate electrical devices or power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or heavy dust.** Electrical devices or power tools create sparks which may ignite the dust or fumes.
- **Keep bystanders, children, and visitors away while operating tool.** Distractions can cause you to lose control.

Electrical Safety

- **Do not operate the system with electrical components removed.** Exposure to internal parts increases the risk of injury.
- **Avoid exposure to rain or wet conditions.** Keep battery out of direct contact with water. Water entering electrical devices increases the risk of electric shock.
- **Do not probe high voltage line.** Aluminum antenna mast is electrically conductive.

Battery Precautions

- **Use only the size and type of battery specified. Do not mix cell types (e.g. do not use alkaline with rechargeable).** Do not use partly discharged and fully charged cells together (e.g. do not mix old and new).
- **Recharge batteries with charging units specified by the battery manufacturer.** Using an improper charger can overheat and rupture the battery.
- **Properly dispose of the batteries.** Exposure to high temperatures can cause the battery to explode, so do not dispose of in a fire. Some countries have regulations concerning battery disposal. Please follow all applicable regulations.

Personal Safety

- **Stay alert, watch what you are doing and use common sense.** Do not use tool while tired or under the influence of drugs, alcohol, or medications. A moment of inattention while operating tools may result in serious personal injury.
- **Gloves should always be worn for health and safety reasons.** Sewer lines are unsanitary and may contain harmful bacteria and viruses.
- **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the tool in unexpected situations.
- **Use safety equipment.** Always wear eye protection. Dust mask, non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.
- **Use proper accessories.** Do not place this product on any unstable cart or surface. The product may fall causing serious injury to a child or adult or serious damage to the product.
- **Prevent object and liquid entry**. Never spill liquid of any kind on the product. Liquid increases the risk of electrical shock and damage to the product.
- **Avoid Traffic. Pay close attention to moving vehicles when using on or near roadways. Wear visible clothing or reflector vests.** Such precautions may prevent serious injury.

NaviTrack Use and Care

- **Use equipment only as directed.** Do not operate the NaviTrack unless proper training has been completed and the owners manual read
- **Always transport the NaviTrack in the hard case provided.** This helps prevent product damage due to shipping.
- **Do not immerse the antennas or case in water. Store in a dry place.** Such measures reduce the risk of electric shock and equipment damage.
- **Store idle tools out of the reach of children and other untrained persons**. Tools are dangerous in the hands of untrained users.

- **Maintain tools with care.** Properly maintained tools are less likely to cause injury.
- **Check for breakage of parts, and any other conditions that may affect the NaviTrack's operation.** If damaged, have the tool serviced before using. Many accidents are caused by poorly maintained tools.
- **Use only accessories that are recommended by the manufacturer for your tool.** Accessories that may be suitable for one tool may become hazardous when used on another tool.
- **Keep handles dry and clean; free from oil and grease.** Allows for better control of the tool.
- **Protect against excessive heat.** The product should be situated away from heat sources such as radiators, heat registers, stoves or other products (including amplifiers) that produce heat.

Service

- **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified repair personnel could result in injury.
- **When servicing a tool, use only identical replacement parts.** Follow instructions in the Maintenance Section of this manual. Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electrical shock or injury.
- **Follow instructions for changing accessories.** Accidents are caused by poorly maintained tools.
- **Provide proper cleaning.** Remove battery before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- **Conduct a safety check.** Upon completion of any service or repair of this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.
- **Damage to the product that requires service.** Remove the batteries and refer servicing to qualified service personnel under any of the following conditions:
  - o If liquid has been spilled or objects have fallen into product;
  - o If product does not operate normally by following the operating instructions;
  - o If the product has been dropped or damaged in any way;
  - o When the product exhibits a distinct change in performance.

If you have any questions regarding the service or repair of this machine, call or write to:

Ridge Tool Company
Technical Service Department
400 Clark Street
Elyria, Ohio 44035-6001
Tel: (800) 519-3456
E-mail: TechServices@ridgid.com
www.ridgid.com/navitrack

In any correspondence, please give all the information shown on the nameplate of your tool including model number and serial number.

Important Notice

The NaviTrack is a diagnostic tool that senses electromagnetic fields emitted by objects underground. It is meant to aide the user in locating these objects by recognizing characteristics of the field lines and displaying them on the screen. As electromagnetic field lines can be distorted and interfered with it is important to verify the location of underground objects before digging.

Exposing the utility is the only way to verify it's existence, location and depth.

Ridge Tool Co., its affiliates and suppliers, will not be liable for any injury or any direct, indirect, incidental or consequential damages sustained or incurred by reason of the use of the NaviTrack.

Introduction to the NaviTrack

The NaviTrack™ sonde and line locator uses multi directional antennas and advanced processing to make pinpointing sondes and tracing buried utility lines fast, accurate and easy.

For the occasional user, the NaviTrack is easy to learn and use. For the experienced user it is the most versatile and sophisticated locator available. The NaviTrack's graphical display allows the experienced user to quickly resolve complex locating problems.

What are Its Unique Features?

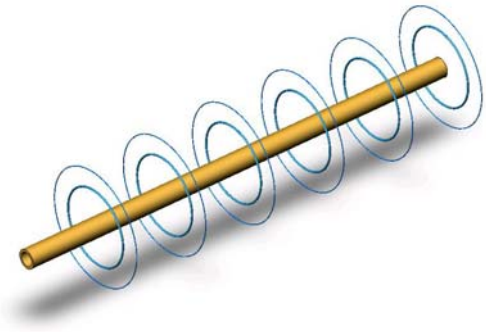
NaviTrack's advanced technology gives many features never before combined in a locator:

- Multi Directional Antenna System
- Map View
- Auto Gain Control
- Large, Auto Backlit LCD Screen
- Real-Time Distance Display
- Field Line Angle Indicators
- Sonde, Pole and Equator Indicator
- Zero Set, 1000 Set and Signal Capture
- 3 information levels

What Does It Do?

The NaviTrack is used above-ground to sense electromagnetic fields emitted from underground lines (electrical conductors like metal wires and pipes) or ***sondes*** (actively transmitting beacons). When the fields are simple and undistorted, then the sensed fields are representative of the buried object. The NaviTrack locates conductive objects emitting a field; it does not directly sense underground objects.

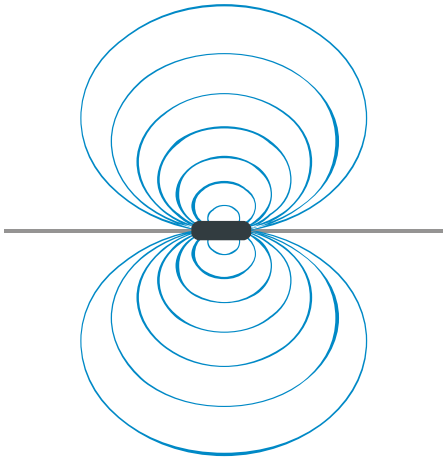
Electrical fields emitted by buried objects can be of two types; the first type, is emitted by long conductors such as energized wires, inspection camera pushcables or pipes. These objects produce a long cylindrical field and this is often referred to as "Line" tracing.



The field emitted by a charged line.

The NaviTrack measures and displays this type of field in **Tracing Mode**. Passive, AC Tracing Mode is just a special case of Tracing Mode where the line is "energized" with electrical power. The NaviTrack can also sense and measure AC fields from 50 Hz to 490,000 Hz (490kHz).

The second type, sondes, (also called transmitters, beacons, or active duct probes) emit a differently shaped field and the NaviTrack is programmed to measure and display this type of field in **Sonde Mode**. The more complex field shape of a sonde, is called a *dipole field,* and is the same as that produced by a bar magnet and our planet Earth.

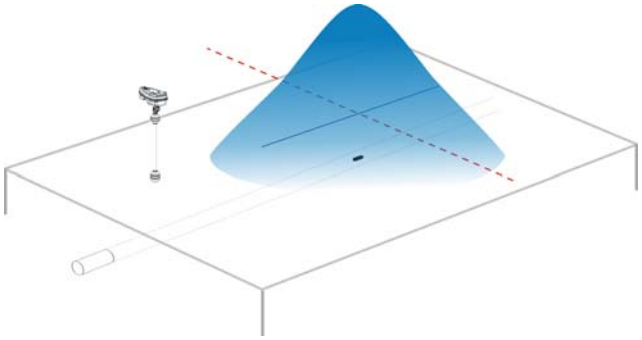


The dipole field emitted by a sonde.

Electromagnetic fields have three (3) important properties, frequency, strength (intensity or amplitude) and angle (direction). Unlike conventional

paddle or stick locators, which can only measure strength in the direction of the individual antenna(s), the NaviTrack measures both signal strength and field angles in three dimensions (3D). This enhanced capability makes the mapping display possible. The experienced operator can use this additional information to speed the locating process and to help sort out complex locating situations. On the other hand, the occasional or novice user, can easily locate effectively using signal strength alone.

The NaviTrack locating rule #1 is make the number big! – Maximizing signal strength is the key, primary locating tool.



Example of how the NaviTrack maximizes directly over the sonde.

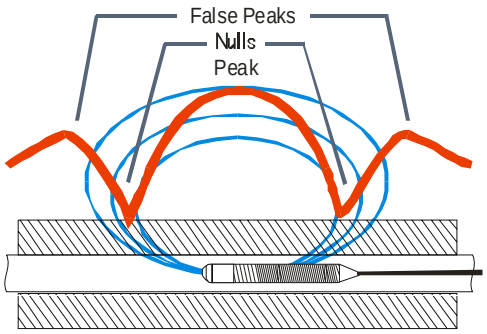
Experienced locators will be familiar with the concepts of peaks and nulls. The NaviTrack "thinks different." On a conventional locator, peaks and nulls are actually special case field angle measurements. A null occurs where the field direction is exactly at right angles to the sensing antenna. A peak occurs where the field and the antenna are exactly aligned. The NaviTrack thinks instead, more generally, in terms of all field angles. In fact, the NaviTrack does not have any antennas that are aligned either horizontally or vertically. It simply senses and pinpoints the strongest signal.

The NaviTrack display offers three (3) modes. The **Sonde Mode,** the **Trace Mode** and the **Passive 50/60 AC Trace Mode**. Each has a *Search* View, focused on signal strength, and a *Map* View, that graphically shows characteristics of the signal.

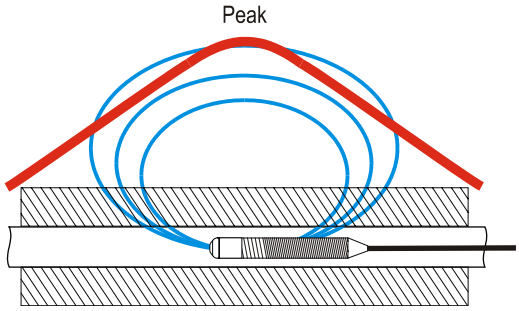
What Is The NaviTrack Multi Directional Advantage?

Viewing all of the signal with Multi directional antennas offers definite advantages:

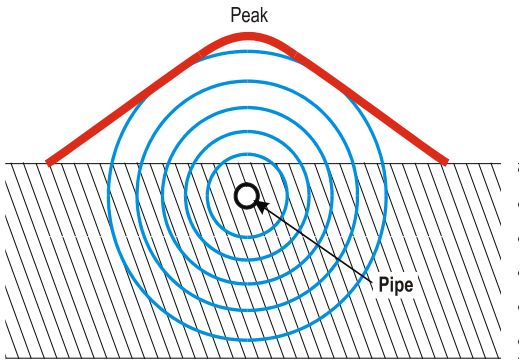
1. Signal always gets stronger as user gets closer.
2. Eliminates Nulls and "Ghost Peaks". With conventional locators it is possible to have signal strength go up as it is moved farther away from the target. A conventional locator signal has a peak then a null and then a smaller peak. This can confuse the operator especially if they interpret a smaller peak as the target (known as "Ghost" or "False" peaks). The NaviTrack has just one peak to draw the user to the target.



sonde signal as "seen" by a conventional locator. Main peak in center and two false peaks outside the two nulls.



Sonde signal as "seen" by the NaviTrack. Only one peak, no nulls.

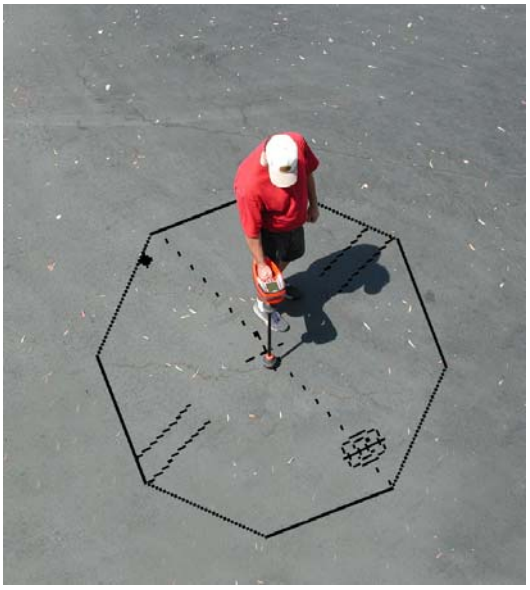


While tracing, the signal peaks directly over the line and has no nulls.

3. How the unit is held does not affect signal strength. The user can approach from any direction and does not need to know the lie of the pipe or wire.
4. Additional tools to identify and solve “difficult” locates include graphical *Map* Views and angle indicators to help interpret signal characteristics.

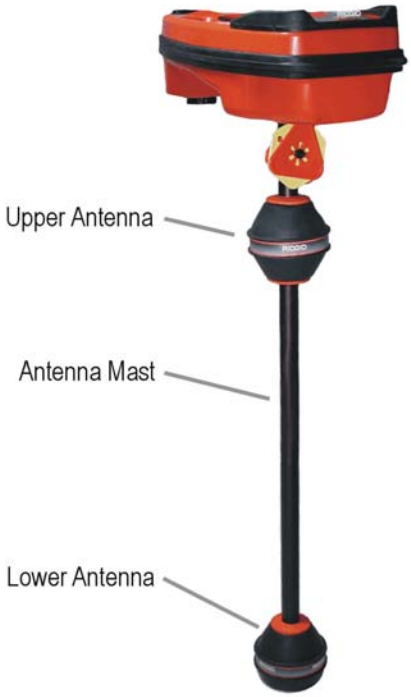
What Is The Map View Advantage?

The *Map* View provides graphics that shows the signal characteristics. It is a bird’s eye view of the signal underground, shown graphically on the screen. It is used for pinpointing underground lines and/or sondes, verifying a locate and also provides more information for complex locates. By moving the locator over the ground the NaviTrack passes over the signal emitted by the underground objects. This allows the user to see on the screen, visualizations of the signal and then mark them. Conventional locators cannot map the underground signal as their antennas cannot see the complete shape of it.

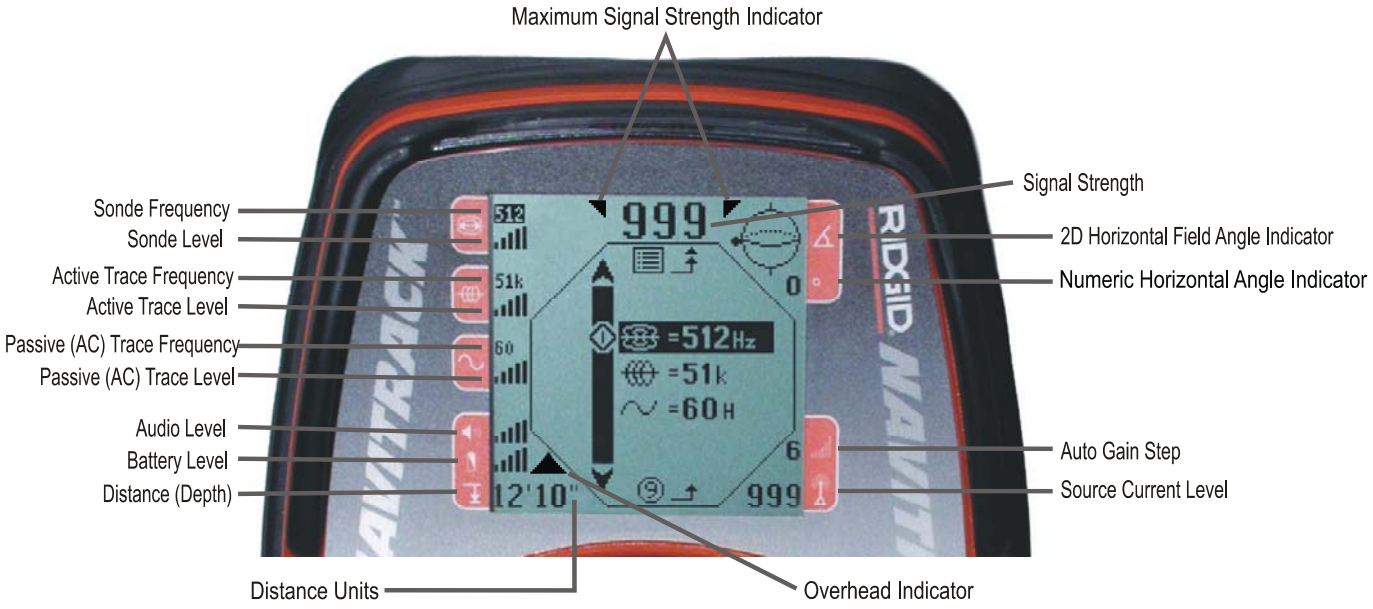


An example of the *Map* View display, illustrated here on the ground.

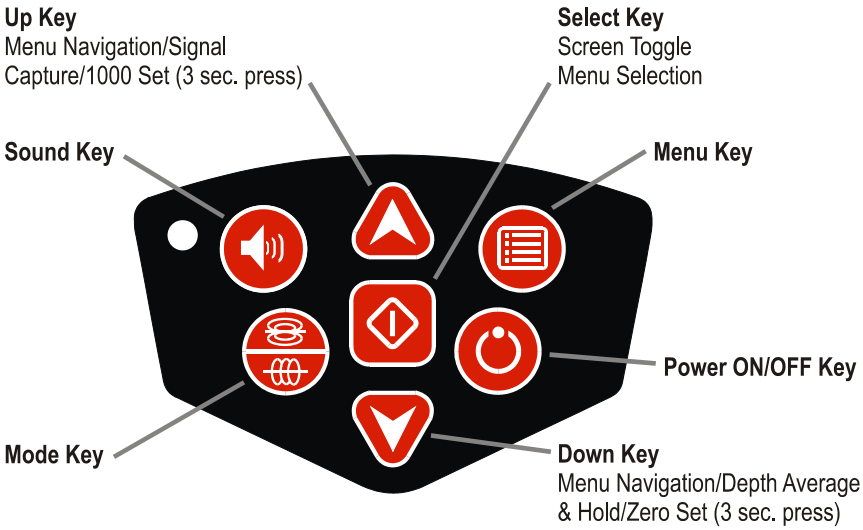
NaviTrack Components



Display Screen



Keypad



Sound Key– opens and closes the Sound Level menu

Mode Key– opens and closes the Operating Mode menu

Up Key– scrolls up through menu choices, initiate signal capture, 1000 *set:* set signal and current level to 1000 (3 sec. press)

Select Key– switches between *Search* and *Map* views; selects the highlighted choice when a menu is open

Down Key - Zero Set, scrolls down through menu choices; depth average and hold; zeroes signal strength display (3 sec press).

Menu Key– opens/closes the Main menu.

Getting Started

Installing/Changing Batteries

To install batteries into the NaviTrack turn the unit over to access the battery compartment. Turn the knob on the battery cover counter clockwise. The compartment door will lift up slightly. Pull straight up on the knob to remove the door. Insert the batteries as shown on the inside decal.

Fit the door into the case and turn the knob clockwise while lightly pressing down to close. The battery cover can be installed in either orientation.

For batteries other than alkaline batteries, set the type of batteries in the Set Up menu under Battery Type. This allows the NaviTrack to correctly monitor battery status and advise when battery power is low.

When the NaviTrack is turned on it takes a few seconds to check the batteries. Until then the battery level will show as “empty”.

⚠WARNING! Do not allow debris to fall into battery compartment. Debris in the battery compartment may short the battery contacts, leading to rapid discharge of the batteries, which could result in electrolyte leakage or risk of fire.

Operation Time

Typical operation time for the NaviTrack locator, when using alkaline cells, ranges from about 8 to 19 hours depending on factors such as sound volume, and how often the backlight is on. Other factors that affect the operation time will include chemistry of the battery (many of the new high performance batteries, such as the “Duracell ® ULTRA” do last 10%-20% longer than conventional alkaline cells under high demand applications). Operation at low temperatures will also reduce battery life.

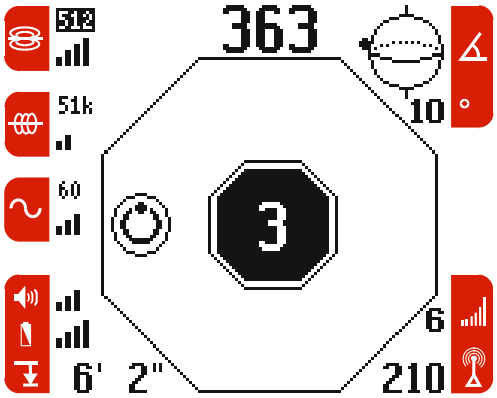
Powering Up

Turn the power on by depressing the Power key on the keypad. The RIDGID® logo displays, the software version number will appear in the lower right corner. The letter D will appear in the lower left corner, if the NaviTrack has just been reset to default settings (Reset All, Tools menu).

The version of software is stated at the front of this manual.

Powering Down

Turn the unit off by depressing and releasing the *Power* key on the keypad. The unit will shut off at the end of the countdown sequence.



This countdown can be interrupted. To keep power on, press any key to cancel the power down sequence.

Auto Power Down

In order to conserve battery life, the NaviTrack will automatically begin a 10 second long, power down sequence after 20 minutes of no key press.

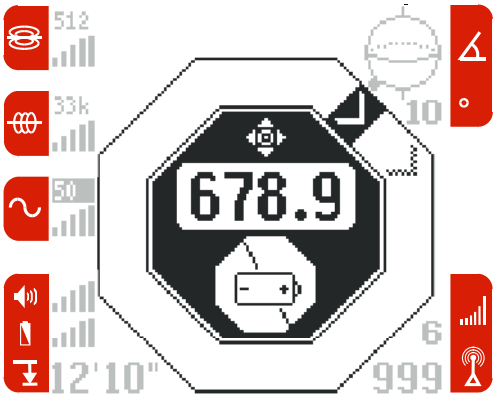
The Auto Power Down sequence can also be interrupted. To keep power on, press any key to cancel the power down sequence.

Low Battery Warning

When the battery gets low, a large battery icon will flash on the screen accompanied by a warning sound (buzz). This will appear on **all** screens in the same place. This indicates that the batteries need to be changed and that the unit will soon shut down.

As the battery power runs out, the battery icon will appear more often. Just before complete shut down there will be a non-interruptable power down sequence.

In some cases the voltage on rechargeable batteries may drop so quickly that the auto shut down may not activate. The unit will turn off and restart. Just replace the batteries and turn the unit back on.



Sounds of the NaviTrack

The NaviTrack can produce two types of sounds, signal sounds and event sounds. The signal sound is related to increasing or decreasing signal strength. It is a reapeating scale that “winds” up when signal increases, or down when signal decreases. Event sounds are associated with some specific occurrence.

Event Sounds Include:

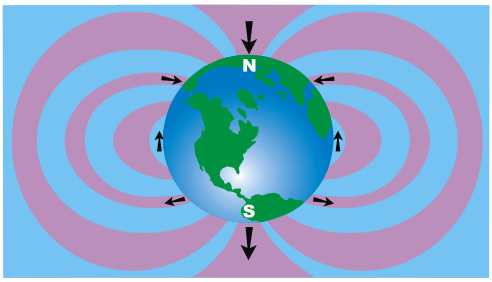
Equator	:	Slot Machine
Pole	:	Clang
Line	:	Slot Machine
Depth Avg & Hold	:	Ding - Success
Depth Avg & Hold	:	Buzz - Failure
Key Press	:	Click
Low Battery	:	Buzz
Power Down	:	Chime Sequence
Startup	:	“Ridgid” (spoken)

If the sound is turned OFF, all sounds except Startup and Power Down are also turned off.

Locating a sonde with the NaviTrack

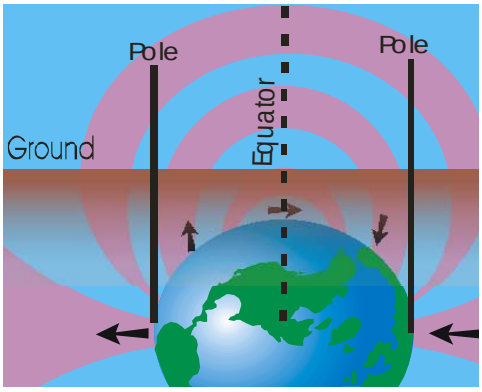
Overview - Understanding sondes and the NaviTrack

Sondes (also called transmitters, beacons or active duct probes) emit an electro-magnetic field very similar to the magnetic field that emanates from the Earth.



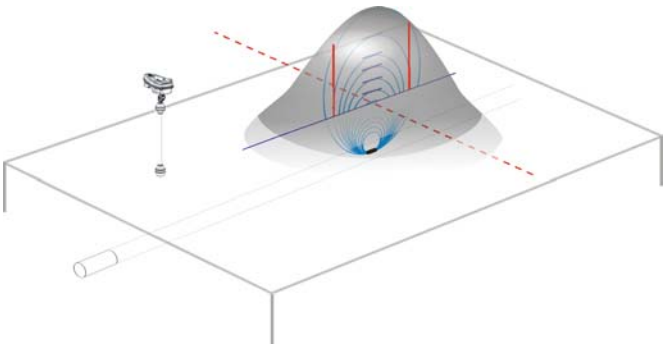
In fact, if the Earth were turned on its side, its magnetic field would look a lot like the field from a sonde.

NaviTrack is unique in that it can measure the shape (angle) of the field lines from a sonde and identify distinct characteristics. The two most important characteristics are the ***POLES,*** which occur at each end of the sonde. Here the field lines are vertical. The ***EQUATOR,*** is a plane that emanates from the center of the sonde. Here the field lines are horizontal. Poles are distinct points in space, while the Equator wraps completely around the sonde. Since these distinct characteristics are constant, they can be used to accurately pinpoint the location of the sonde.



Poles usually occur where conventional locators would experience **"nulls"**, the dead spots that occur when the signal passes through their antennas vertically. The difference is that NaviTrack can "see" the Poles("nulls") and show you where they are, **even when you're not directly over them, and no matter how NaviTrack's antennas are aligned with the signal.** This is one reason why locating with NaviTrack is so much easier than with conventional locators.

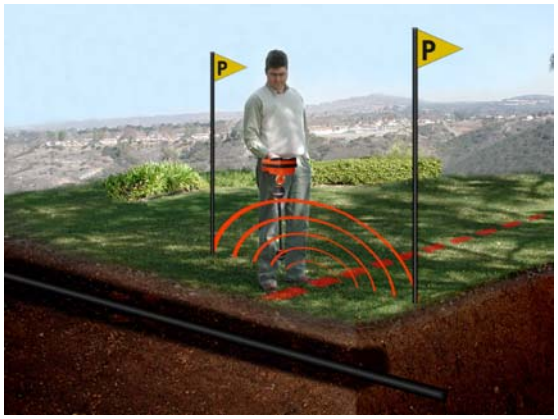
Map View, which is unique to NaviTrack, is the display interface that shows you where you are in relation to the Poles and Equator. *Map* View lets you locate visually by finding and marking the Poles and the Equator. The sonde is located at the point where the Equator passes directly between the two Poles.



Sonde Mode

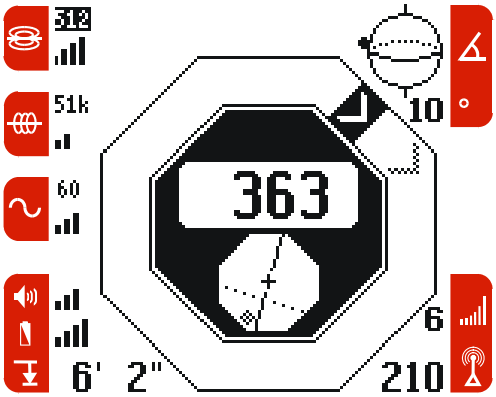
The NaviTrack can be used to locate the signal of a sonde (transmitter) in a pipe, so that its location can be identified above ground. Sondes can be placed at a problem point in the pipe using a camera push rod or cable. They can also be flushed down the pipe. The following assumes that the sonde is in a horizontal pipe, the ground is approximately level and the NaviTrack is held with the antenna mast vertical.

1. Select the Sonde Mode from the operating mode menu.
2. NaviTrack has two standard sonde frequencies, 512Hz and 33kHz (33kHz does not effectively penetrate cast iron. Neither frequency will penetrate ductile iron). Select the frequency that matches your sonde.



Sonde Mode *Search* View

NaviTrack will enter Sonde Mode in *Search* View, the default view for Sonde Mode. *Search* View emphasizes signal strength and is used primarily to get close to the sonde.



Important! - Signal strength is the key factor in determining the sonde's location. To ensure an accurate locate, you MUST take care to maximize the signal strength prior to marking an area for excavation.

Before putting the sonde in the line, make sure it's operating and that NaviTrack is receiving its signal.

With the sonde OFF, zero NaviTrack's display by pressing the Down key until the unit "dings" (~3 sec). (This is optional; eliminates stray electrical signals to make detection easier).

Activate the transmitter; NaviTrack should immediately register its signal. If it doesn't, refer to the Troubleshooting Guide on page 38.

Once the sonde is in position and transmitting:

1. Go to the suspected sonde location. If the area is unknown, push the sonde a shorter distance into the line (~15' from the access point is a good starting point).

2. Hold NaviTrack so the mast is horizontal and extend your arm out away from your body. Make a slow circle while observing the signal strength; it will be highest when the mast is pointed in the sonde's direction. Sweep the lower antenna ball back and forth slowly to find the direction where the signal strength is highest.

3. Lower NaviTrack to its normal operating position (mast vertical) and walk in the direction of the sonde. As you approach the sonde, the signal strength will increase and the audio tone will rise in pitch. When you pass over the sonde and begin moving away from it, the signal strength will decrease and the audio tone will fall in pitch. When this happens, stop walking and switch to *Map* View (press the Select key).

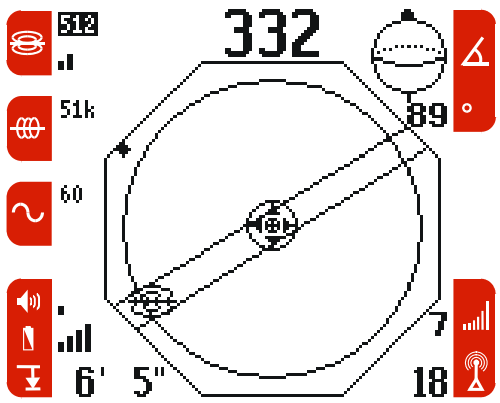
Sonde Mode *Map* View

Map View, which uses the shape (angle) of the signal to determine the location of the Poles and Equator (see previous page), is most effective when you're relatively close to the sonde. The following assumes the sonde is horizontal (the pipe is not tilted).

In *Map* View:

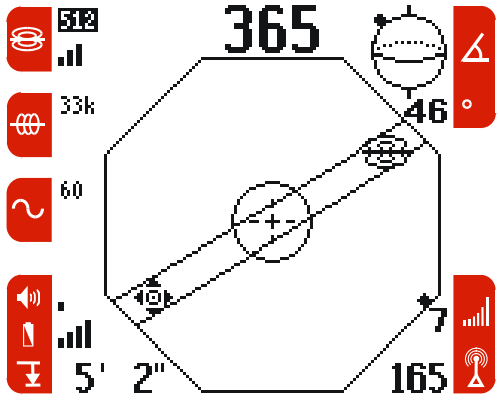
1. The crosshairs in the center of NaviTrack's display represent your location. With the mast vertical, move NaviTrack until the Pole

icon is centered on the crosshairs. NaviTrack will emit a unique sound when you're over a pole. Place one of the triangle orange markers on the ground at this spot.



Map View when NaviTrack is on the pole.

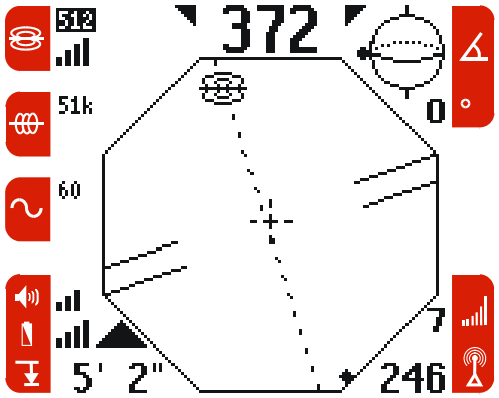
2. The sonde icon near the edge of the Active View Area represents the location of the Equator. Move NaviTrack toward the Equator along the double lines (the estimated pipe axis). Pass over the Equator (dashed line, with the sonde icon alternating from one side to the other), the second Pole will appear. Center the crosshairs on the second Pole icon and mark its position as before.



Map View when NaviTrack is moving towards the Pole and leaving the Equator.

3. Move back along the double lines toward the Equator and center the dashed Equator line on the crosshairs. When you're over the equator, NaviTrack will emit a "slot machine" sound. Make sure the mast is vertical and the lower antenna ball is in line with the Pole markers. Place the yellow sonde marker at this spot.

***Map* View on the Equator –** Notice the maximum signal indicators.



The sonde icon will alternate from one side of the line to the other. This is to remind you that being on the Equator does not necessarily mean that NaviTrack is over the sonde.

Verify the locate

1. Make sure that all three markers are aligned and that the yellow hexagon marker is approximately half way between the Pole markers.

If it is not in the middle, see the section on tilted sondes.

2. Move the lower antenna ball slowly away from the yellow marker in all four directions while observing the signal strength and depth displays. The signal strength should be highest and the depth lowest directly over the sonde.

Important! – Being on the Equator does NOT mean you're over the sonde! The lower antenna ball MUST be in line with the Pole markers or you are not over the sonde. Remember that signal strength is the key factor in locating the sonde. You must be at the point of highest signal strength AND be on the Equator (dashed line).

The mast MUST be vertical when marking the Poles and Equator, or their locations will be incorrect!

3. **While directly above the sonde**, place the lower antenna on the ground. The distance measurement will indicate the depth of the sonde. In rare instances the depth reading may fluctuate. In these cases, Depth Average & Hold may be used to obtain an accurate, averaged, depth reading.

Graphic Angle Indicators In Sonde Mode: The Octagon and The Globe

The grahic angle indicators help tell where the NaviTrack is in the field lines. The octagon in the upper left shows the angles in three (3) dimensions (3D). If more black is showing then there is less angle and the signal is flatter (Equator). If it is clear then that indicates more angle (Pole). Any edge will show how the field lines are running in relation to the NaviTrack.

The Globe indicator is two (2) dimensional (2D) and will show the Pole, the angles in between and the Equator. The number directly beneath the globe indicates the angle numerically.

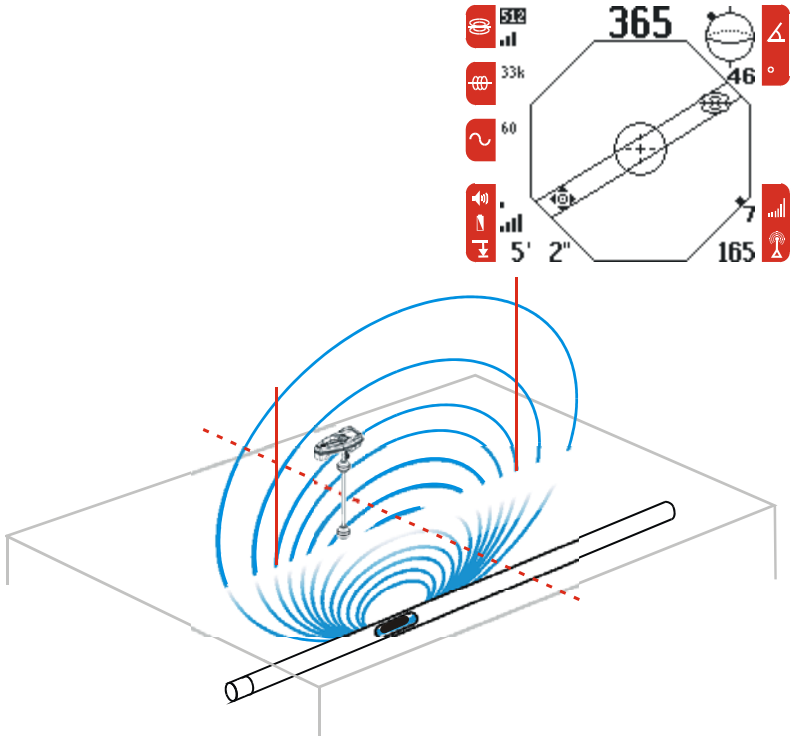
Operating Tips for Locating a Sonde

- Use the sound when possible to help guide the NaviTrack to the maximum signal strength.
- The signal strength can be temporarily "zeroed" by pushing the *down* key for three(3) seconds. In noisy environments it may help to "zero" the indicator and continue to locate from that point. (See Temp Zero Set)
- If the sonde area is obstructed by a vehicle or other object, estimate the depth of the sonde by using the Depth Average and Hold feature directly over the Pole. See *Depth Average and Hold* for more information.
- If the Equator is crossed, and the signal is not maximized, follow the equator to the highest signal strength. When directly over the Equator, the field angle is 0 degrees (Flat). Similarly, Earth's Equator corresponds to 0 degrees latitude. Simply finding the Equator of the sonde, dashed line on the *Map* View, does **NOT** indicate that the sonde has been found, the point of maximum signal strength along this line must also be found. If the sonde is steeply tilted, the Equator will **NOT** lie directly above the sonde and the distance from the sonde to each Pole will not be equal. If the sonde is tilted maximize the signal and minimize the depth. See *Useful Information* for more on tilted sondes.
- Always confirm the point of maximum signal strength. Verify what the map is showing, unless it is known for a fact that all the required conditions have been met. In Sonde Mode, the *Map* View assumes the following conditions:
    1. The ground is level
    2. The sonde is level
    3. The NaviTrack Locator is above ground level
    4. The NaviTrack Locator is held approximately vertical, antenna mast pointing straight down.

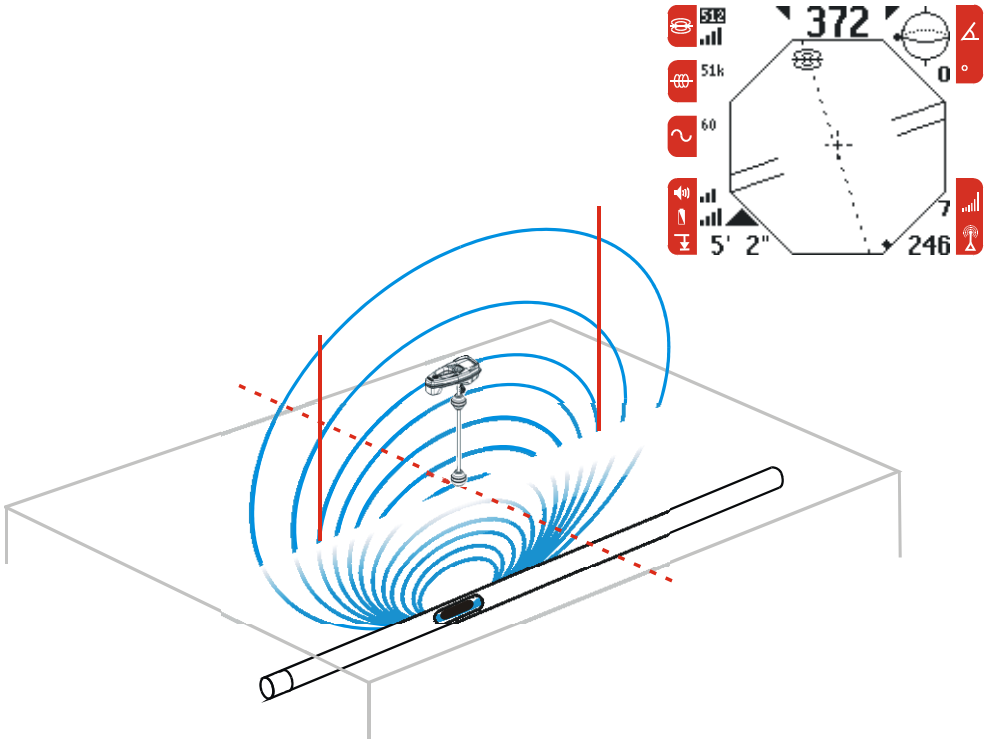
If these conditions are not met, use the *Search* View and pay close attention to maximizing signal strength. In general, if the above conditions are true and if the NaviTrack is within about two "depths" of the signal source, the *Map* View will be useful and accurate. Be aware of this when using the *Map* View if the target or signal source, is very shallow. The useful search area in *Map* View can be small if the sonde is extremely shallow.

Map View -Examples – Sonde Mode

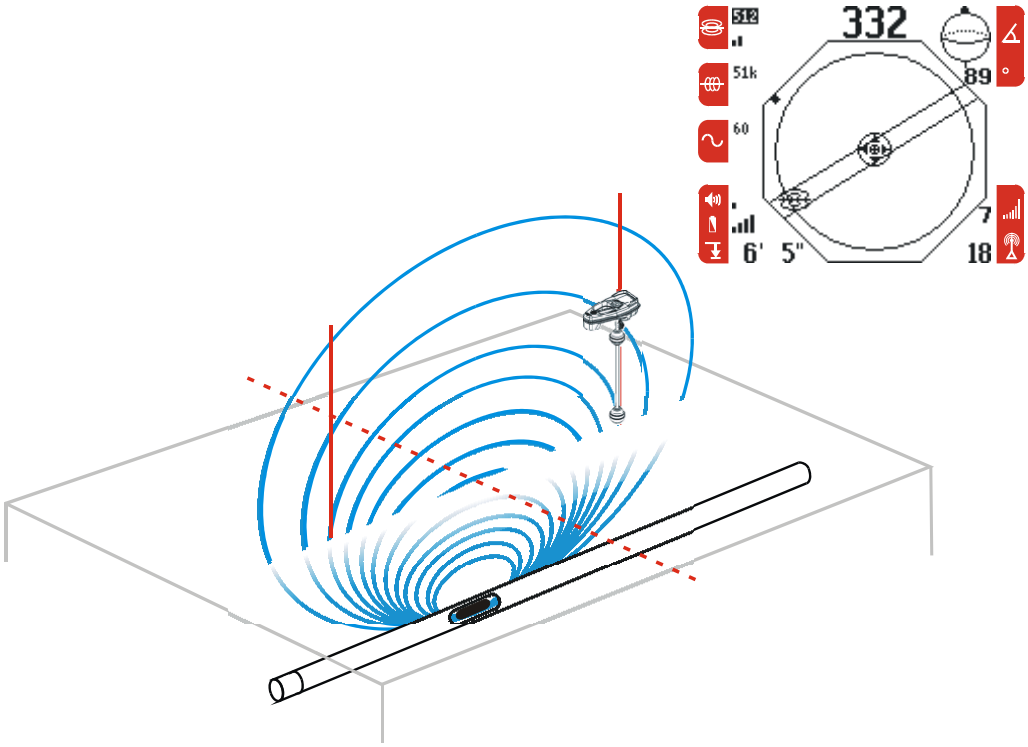
NaviTrack leaves one Pole and approaches the Equator



Navitrack on the Equator



NaviTrack on the Pole



Tracing a Line with NaviTrack

Trace Mode

The NaviTrack can be used to trace a pipe or line so that the ground above it can be marked. This identifies the lines location so that it can be avoided during a dig or exposed for repair or replacement. The NaviTrack can locate energized lines with a variety of frequencies or it can be used passively to locate AC electrical lines.

Underground lines are energized with a line transmitter. This active signal is then traced using a receiver such as the NaviTrack.

1. Attach the line transmitter to the line according to the manufacturer's instructions.

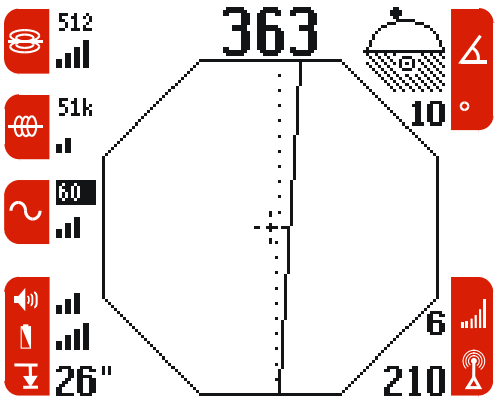
A "transmitter" is a generic name used for anything that generates a locatable signal. While sometimes used to describe a sonde, for line tracing, it describes the device that is used to energize a line or pipe.

2. Select the Active Line Trace Mode from the Operating mode menu and match the frequency used on the line transmitter.

3. There are also many other frequencies available to the user. This way the user can use most of the line transmitters available from other manufacturers on the market. Just choose the line transmitter manufacturer that will be used and those frequencies will be added to the NaviTrack. (See *Main* menu options and Appendix A for more information.)

Trace Mode Map View

1. The default view in Trace Mode is the *Map* View. When tracing, the way the pipe or cable is running will be with two lines, one solid and one dotted. Keeping the lines on the center indicates that the NaviTrack is tracing the line. If the lines move off to the left or right then move the NaviTrack to get the lines back on center. The signal emitted from a line is usually strongest directly over that line.



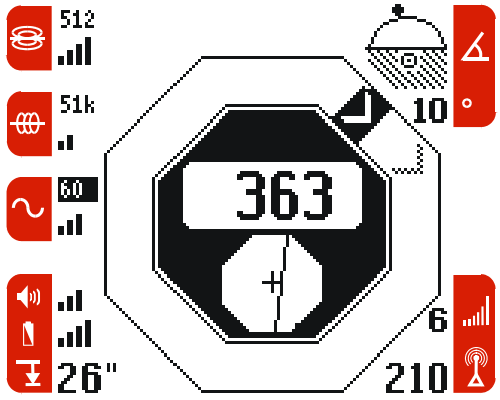
2. There should be two steady lines shown on the view, one solid and one dotted. They are approximately parallel with the line being traced. The solid line represents the line traced by the lower antenna and the dashed line represents the line traced by the upper antenna. Even if the signals are not aligned the lower antenna signal will tend to be the most accurate because it is the closest to the signal source.

3. When beginning the trace it is recommended that signal strength be observed first to see if it drops when the NaviTrack is pulled away(Side to side). It should peak directly over the line and drop off on either side.

4. Depth is shown continuously as the distance from the bottom of the lower antenna to the line. The lower antenna must rest on the ground directly over the line, and the antenna mast must be in line to get a reading of actual line depth.

Caution: Care should be taken to watch for signal interference that may give inaccurate readings. Depth readings should be taken as estimates and actual depths should be verified by exposing the line before digging.

Trace Mode Search View

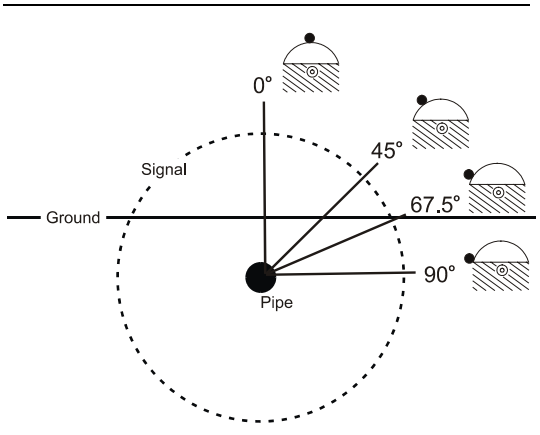


If signal strength is the focus of the operator then the Search View can be used for line tracing. The maximum signal is directly over the line.

Graphic Angle Indicators In Trace Mode: The Octagon and The Globe

The grahic angle indicators help tell where the NaviTrack is in the field lines. The octagon in the upper left shows the angles in three(3) dimensions(3D). If more black is showing then there is less angle and the signal is flatter(Equator). If it is clear then that indicates a more vertical angle(Pole). Any edge will show how the field lines are running in relation to the NaviTrack. The Globe indicator is two(2) dimensional(2D) and will show the Pole, the angles in between and the Equator. The number directly beneath the globe indicates the angle numerically.

Examples of the indicators while line tracing are shown below. Notice that to reach 90 degrees the NaviTrack needs to be at the same level as the energized line. This is possible on an embankment or steep hill.



Information level changes in Trace Mode

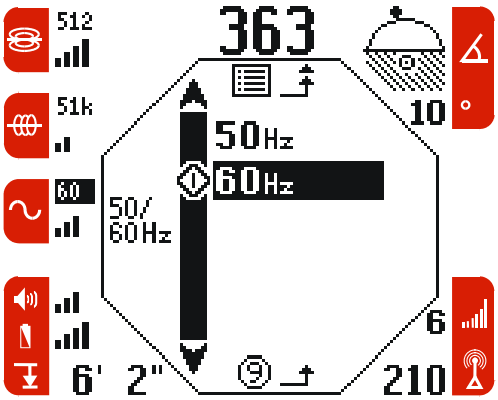
Level	In Addition to the changes to the elements shown on the screen, the information levels will also display differently in Trace Mode. This is to alert the user that the NaviTrack may not be directly over the target line. See *measuring depth* section to understand when the NaviTrack gives an accurate distance(depth) measurement.
ⓘ	• Depth and display lines are **not** shown when distance is greater than 15' and/or the field angle is greater than 15 degrees • No event sounds if depth is greater than 15 feet. • No lines or sounds are present if overhead signal is present.
ⓘⓘ	• Depth and the TOP antenna, dashed line are **not** shown when distance is greater than 30' and or the field angle is greater than 30 degrees. • Bottom antenna ball, solid line, will change to a dashed line if distance is greater than 30 feet. • No event sounds if depth is greater than 30 feet. • No lines are shown if the overhead indicator is lit.
ⓘⓘⓘ	• Bottom antenna ball, solid line, will change to a dashed line if distance is greater than 60 feet. • No event sounds if depth is greater than 60 feet. • Dashed line is shown if the overhead indicator is lit.

Tracing a Passive AC Line

The NaviTrack senses alternating current, or AC fields. In an AC field, the current flow changes direction (alternates) many times per second. A low frequency AC signal changes slowly in time, for example, a 50 or 60 Hz power line (mains) is a low frequency AC signal that is changing direction 50 or 60 times per second respectively. Buried power lines do not emit any traceable signal unless power (electrical current in amps) is flowing in the wires. For example street lights that are turned off are hard to trace passively.

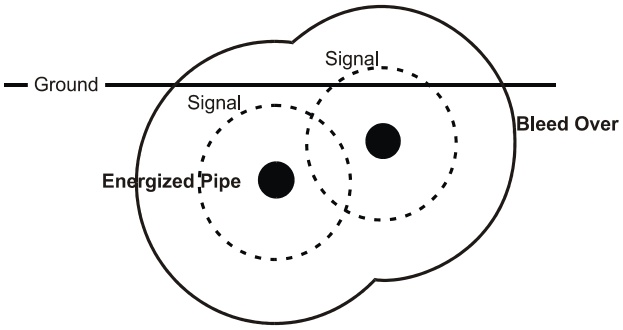
1. Select the Passive AC Trace Mode ~ from the Operating Mode menu.

2. The NaviTrack has two(2) passive AC tracing frequencies that are standard. They are 50Hz and 60Hz.



Operating Tips for Line Tracing

- In Trace Mode if the *Map* View lines are not parallel then it indicates the field on the upper antenna is not aligned with the lower. This suggests interference and distortion. The signal may be bleeding over onto another line or another interference source may be present. When the lines are not parallel, measurements are not as accurate including depth and angle of the line. Also if the lines will not center or if they move across the screen inexplicably, then the NaviTrack may not be receiving a clear signal.
    a) Check the transmitter to be sure that it is operating and well grounded.
    b) Test the circuit by pointing the lower antenna at either transmitter lead (Black or Red).
    c) Check that the NaviTrack and transmitter are operating on the same frequency.
    d) Try different frequencies, starting with the lowest, until the line can be picked up dependably.
- Current flows to the biggest (lowest resistance) conductor. If the line of interest is a smaller line connected to a larger line, it is better to trace smaller lines to larger ones. An example would be tracing a pipe from the house to the street as the lines start smaller and then get bigger.
- While tracing, the signal should maximize, and the depth minimize, at the same place where the line centers on the display. If this is not the case, the line may be turning or other coupled signals may be present.
- Another indicator that is very helpful in line Trace Mode is the Source Current level. As a line is traced the strength of the signal is measured. It indicates the relative amount of how much current is flowing through a line. It is best to do this with the bottom antenna on the ground directly over the line. This is helpful when there are Ts in the line or if there is bleed over onto another line. For example if tracing a deeper pipe that was close to another shallower pipe, the shallower pipe might have signal bleed over to it. It may also indicate the signal strength is just as strong as the original pipe that was being traced. The source current level will not be as high on the non energized line as it is not energized directly by the line transmitter.



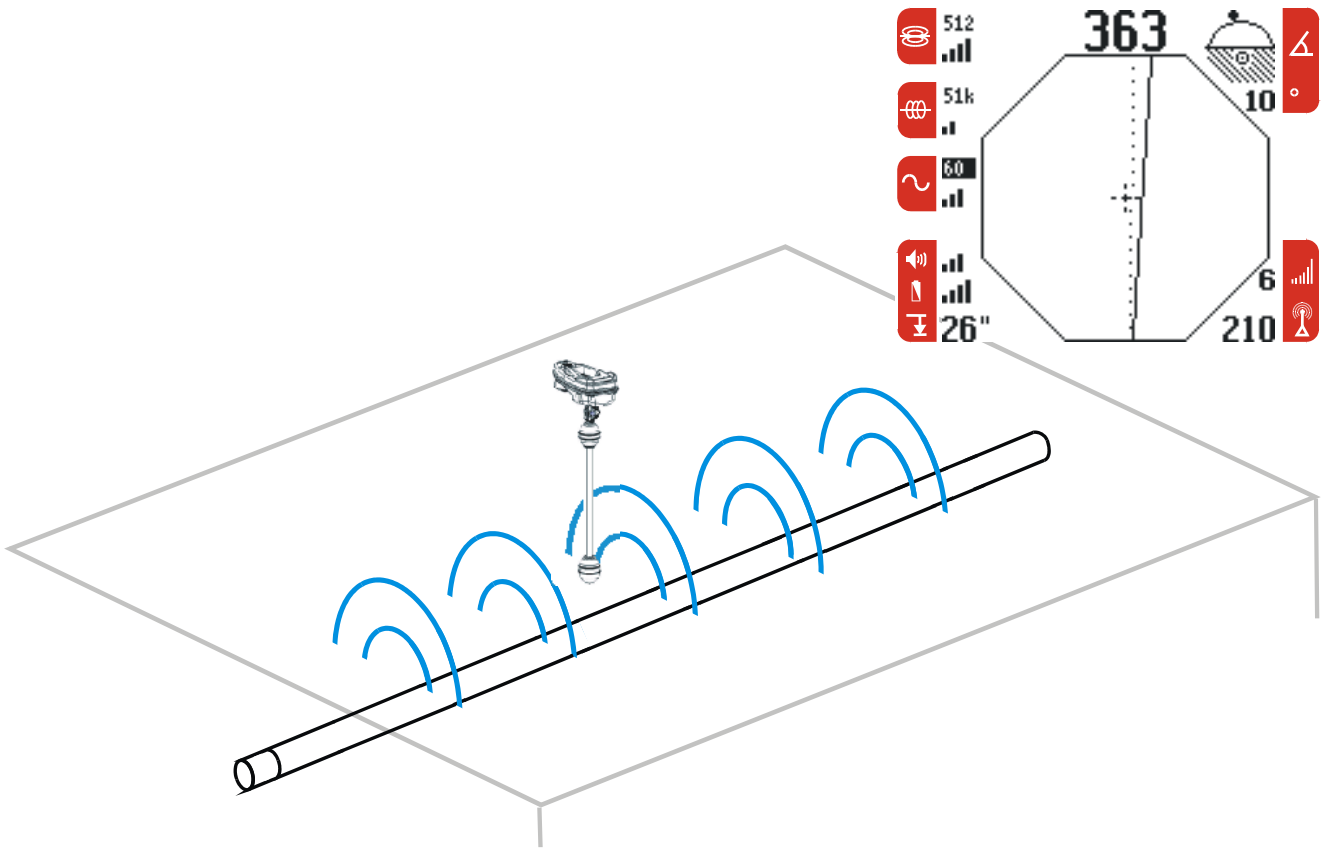
- In Trace Mode the *Map* View assumes the following conditions:
    a) The ground is level
    b) The Line is level

c) The NaviTrack Locator is above ground level

d) The NaviTrack antenna mast is held approximately vertical

- If these conditions are not met, use the *Search* View and pay close attention to maximizing signal strength. In general, if the NaviTrack is within about two “depths” of the line, the *Map* View will be useful and accurate. Be aware of this when using the *Map* View if the target or line, is very shallow. The useful search area in *Map* View can be small if the line is extremely shallow
- The signal strength can temporarily be “zeroed” by pushing the *Down* key for three (3) seconds. In noisy environments it may help to “zero” the indicator and continue to locate from that point. (See Temp Zero Set)
- The 1000 Set can be used as well to help trace a line.

Map View -Example – Trace Mode

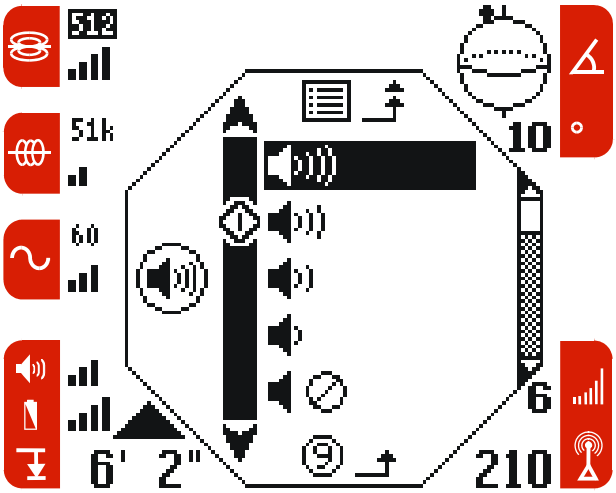


Features and Controls

Adjusting the Sound Level

1. Press the Sound Key to display the Sound menu :

2. Press the Up or Down key until the sound reaches the desired level (volume).



3. Press the Sound Key or Select key to select.

Adjusting the LCD Screen Contrast

LCD contrast is set at the factory and should not normally require adjustment. Optimal contrast is set when the background remains white, but the black pixels are set to be as dark as possible. There are 32 levels to choose from.

Note - The LCD can be adjusted to completely White or completely Black, which will affect readability.

LCD contrast may change slightly with extremes in temperature.

If the display appears too dark or too light when it is turned on, it is likely that the LCD contrast has become misadjusted. First try powering the unit off and then back on, if the problem persists then adjust the LCD contrast. Similarly if the display is too light and only a faint ghost image of the display appears, adjust the LCD contrast darker.

To adjust the LCD Contrast:

1. Press and **hold** down the Sound key.

2. Then press the Up Arrow key to lighten the display or press the Down Arrow key to darken the display

Auto Back Light

The NaviTrack is equipped with an automatic LCD backlight. Low light levels are sensed by a light detector built into the upper left corner of the keypad. The backlight can be forced on by blocking the light to this sensor with a thumb.

Adjusting the Auto Backlight

The point where the backlight switches on can be adjusted by the user. This adjustment does not make the backlight brighter or darker but it will make the backlight come on sooner or later based upon the lighting conditions. There are 32 levels to choose from.

The automatic LCD backlight is factory set to only turn on under fairly dark conditions. This is to conserve battery power. Running the backlight continuously will reduce battery life by about 40%. As

the batteries near depletion, the backlight will appear dim. Near the end of battery life, the backlight operates at a very low level to conserve battery power.

A small light bulb icon will appear against the upper left corner of the Active View Boundary to indicate when the backlight is on.

To adjust the Auto Backlight:

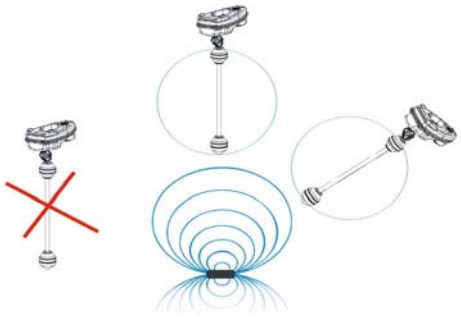
1. Press and **hold** down the *Menu* key:

2. Use the Up or Down keys until the backlight switches on during the desired lighting condition light levels.

3. Press the Menu or Select keys to confirm selection:

Measuring Distance or Depth

The NaviTrack measures distance by comparing the strength of the signal at the lower antenna to the upper antenna. **For accurate depth and distance measurements, the antenna mast *must* "point" at the source of the signal.** (See the examples in the middle and to the right. The example on the left will ***not*** give an accurate distance because the mast is not pointed at the source.)



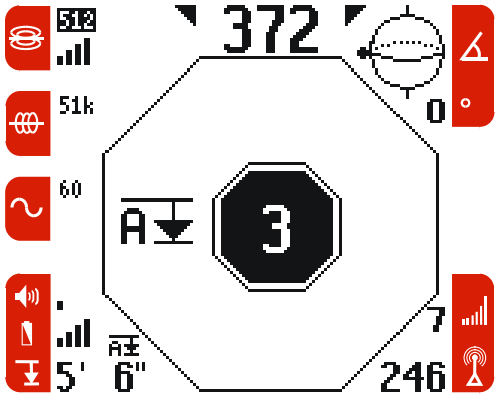
Generally the distance will be smallest (minimized) when the mast is pointing at the signal source. Depth is measured when the bottom antenna is touching the ground directly above the signal source. Distance to the signal source is measured when the bottom antenna is not touching the ground and the mast is pointed at the source.

There are two ways to measure distance:

1. **Real Time Distance** – This is shown continuously in the bottom left hand corner of the LCD screen. Observing the real time distance measurement can be an important locating aid. Often, even in the presence of large interfering noise sources, the target signal can be sorted out, simply by minimizing the distance measurement.

When the Information level is set to 1 the distance (depth) will display when it is less than 15'. In level 2 it will display when the depth is less than 30'.

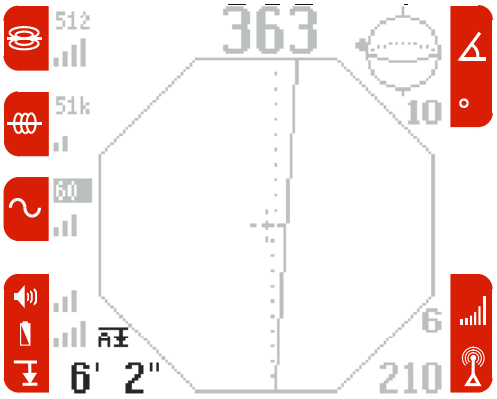
2. **Depth Average and Hold**



a) Make sure the lower antenna is touching the ground and the antenna mast is pointed at the signal source. Then press and release the down arrow key.

b) The screen will "count down" from four. During the countdown it will measure the depth and average it. The result will hold on the screen in the lower left corner.

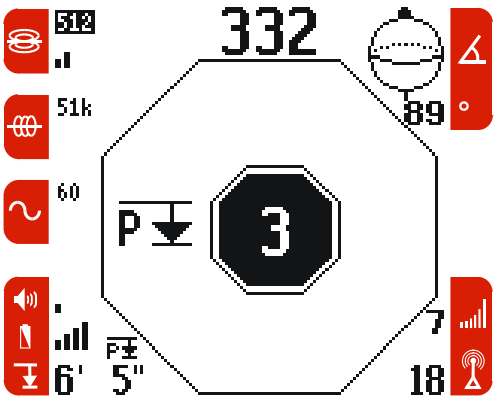
It is important to hold the NaviTrack still while it is averaging depth. For this feature to work properly over the sonde the Numeric Horizontal Angle Indicator must read between 0-4 degrees.



c) Press and release the down key to resume Real Time Distance (Depth) in English or Metric units.

Tip: Point the mast in the general direction of the sonde, then adjust to **minimize** the distance reading. The result is the mast pointing at the sonde or the line.

If the area directly over the sonde is blocked, perhaps by a wall or a vehicle for example, the depth of the sonde may be estimated by taking the measurement over the Pole. The procedure is the same as above but the NaviTrack must be directly over the Pole. The icon will show a **P** rather than an **A**.



For this feature to work properly over the Pole Numeric Horizontal Angle Indicator must read between 86-90 degrees.

Overhead Indicator

The Overhead Indicator will display anytime the upper antenna receives more signal than the lower antenna. Typically this would indicate some interference or another signal source affecting the upper antenna. **Since distance is measured using the top and bottom antennas, a stronger signal reading on the top antenna results in "over head" depth readings.** The Overhead indicator may also display if there is no signal present.

Signal Capture Feature

Pressing the Up Key when in *Search* or *Map* View will save the current signal strength to temporary memory (held until the NaviTrack is turned off). This value is displayed at the top of the Screen in Search View.

To save the signal while in Map View, it will have to be switched to Search View to see it.

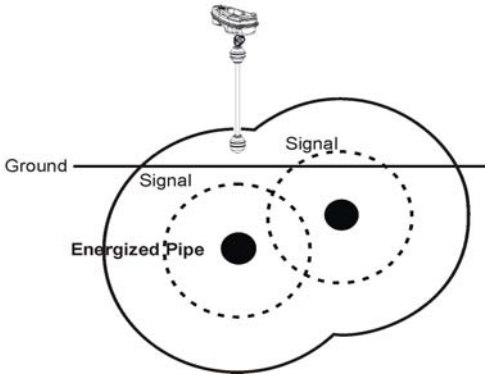
This feature can be used for comparing the signal strengths of the two poles when locating a sonde. A perfectly level sonde underneath level ground will have the same signal at both poles. If the sonde is tilted, the upward tilting end will read a higher signal strength. If the sonde is near a transition in pipe type, e.g. going from ABS Plastic to Cast Iron, the cast iron end of the pipe may have a lower signal strength.

Source Current Level

Displays the relative current level of the source signal. This helps to see any drop in source current that may indicate a junction in the line or if the line splits. It also verifies that the correct line is being traced as signal may bleed over to shallower lines. These shallower lines may give a similar signal strength but the level of current from the source may be lower.

For Source Current Level accuracy, the NaviTrack must be directly over the line

The source current level can be set (normalized) to 1000 when using the 1000 set feature. This makes it easier to see drops or changes in the level of source current. (See section on Line Tracing and 1000 set.)



Signal strength may bleed over to another line. The shallower line may have a higher signal strength but it will have lower source current reading than the original, illuminated line.

Temporary Zero Set

At the beginning of the locate it is helpful to have the NaviTrack read "0.0" for a starting point. Due to other interference signals this may not be the case. The *temporary zero set* is is a valuable tool that can be used for a single locate in environments with some interference. This helps the NaviTrack sense only the signal from the sonde or line transmitter since it zeros out other signals before the transmitter is turned on. When the sonde or line transmitter signals are turned on then the apparent sensitivity will be set to read only those signals.

1. Make sure the sonde or line transmitter is turned off. Confirm that there is a low level of signal to start with.

2. In *Search* or *Map* View press the Down key for three (3) seconds. The signal level number will reset to zero.

Always use Temp Zero set first if 1000 set is to be used with the Temp Zero. See below.

1000 Set

The NaviTrack can be set to read zero when no signal is present. It can also be set to read 1000 when directly over the target. This gives the operator a maximum that can simplify locating. If the 1000 Set is activated the NaviTrack will maximize signal and source current at 1000. During a line trace this makes it easy to stay on the line and also see changes in the signal level.

Signal strength will vary as the line depth changes. If the line splits the source current drops since some of the current goes on one leg of the split and some on the other. For example if the source current reading falls to 500 the measured current has dropped to half (50%).

1. It is important to make sure that the signal is maximized directly over the signal source.

2. Press the Up key for three (3) seconds. Both the signal signal and the source current level will be set to 1000

Each may be used independently but if the 1000 Set feature is going to be used **with** the Temp Zero Set it is important to set the Zero FIRST.

A typical procedure when line tracing would be:

1) Turn on the NaviTrack. Set the mode and frequency.

2) With no target signal present, **Zero Set** the display, long press on the Down Key.

3) Turn on the Line Transmitter, set it to the same frequency and the desired power level.

4) Locate the line.

5) When directly over the line and well away from the Line Transmitter to avoid interference, set the signal level to 1,000 (1000 Set) with a long press on the Up Key.

6) Trace the line and observe how the signal and current vary from the reference level of 1000.

The NaviTrack will *forget* the Temporary Zero Set and 1000 Set values each time the unit is turned off.

Useful Information

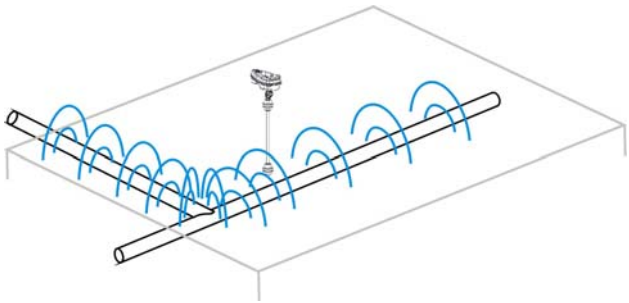
Signal Interference

Distorted Fields

Sometimes a single field may encounter metal or other ferrous material in the ground that may distort the field lines. It may be buried scrap or old unused lines that can shunt or shorten the field lines. In this case the NaviTrack may display a weaker signal around the object and a stronger signal directly above it. The object may act as a lens that amplifies or weakens signal unpredictably.

Composite Fields

Composite fields are also possible. Where a single field meets another, the two, or more, may create a stronger signal. It is important for operators to understand this around "Ts" or right angles in the line, where composite fields are often encountered.



Composite field shown around a connection in the line.

Noise

Interfering signals (noise) are simply part of the locating challenge. The NaviTrack has been designed with an extensive array of analog and digital filters to reduce the impact of interference when locating. Interference can either be at the same frequency being used for the sonde or tracing, or it can be "out of band" at other frequencies. Some of the largest interfering signals are generated by power transmission equipment. Power transformers, large electric motors or generators, lines and switch gear can be the source of very large noise signals. Some computer monitors, for example can be large sources of noise near 512 Hz. The NaviTrack's multi-directional sensing capability can make finding and identifying these noise sources fast and easy. While locating a 512Hz sonde in a room full of computers, quickly placing the lower antenna on top of each nearby computer monitor will allow the user to quickly identify if there is one particularly noisy monitor. That particular monitor could then be briefly turned off to allow the locate to be accurately completed. Alternatively the area around the noisy device can be avoided if that is possible.

If the angle displays are unstable and not steady, and/or if the signal levels are not steady, this is a good indication of either no target signal present (sonde or energized line), or a high level of interfering noise signal. Pay particular attention to the angle displays, if these are steady and stable, the NaviTrack is locked onto some signal. But is it the signal that is being looked for?

Notes on Accuracy

Depth and Signal Strength measurements rely on a strong signal being received by the NaviTrack. Remember that:

> the NaviTrack is used above-ground to sense electromagnetic fields emitted from underground lines (electrical conductors like metal wires and pipes) or ***sondes*** (actively transmitting beacons). When the fields are simple and undistorted, then the sensed fields are representative of the buried object.

If those fields are distorted and there are multiple interacting fields, it will cause the NaviTrack to locate inaccurately. Locating is not an exact science. It does require the operator to use judgement and look for all the information available beyond what the instrument readings may be. The NaviTrack will give the user more information but it is up to the operator to interpret that information correctly. No locator manufacturer will claim that an operator should follow the information from their instrument exclusively.

Conditions where locating accuracy must be questioned:

- The presence of other lines or utilities. "Bleed over" may produce distorted fields and illuminate lines unintentionally. Use lower frequencies when possible.
- Using the transmitter inductively. – This gives the line a weak signal. Use a direct connection whenever possible.

- T's or splits in the line – Can cause distortions in the signal.
- Low Signal Strength – A strong signal is necessary for accurate locating.
- Soil conditions – Extremes in moisture, either too dry or overly saturated, may affect measurements. Ground that is saturated with salty water, that might be found by the coasts, will shield the signal severely and be very difficult to locate in.

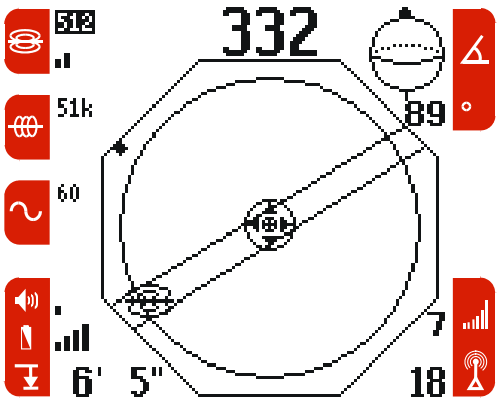
More on Sondes

Sondes produce a more complex field than that produced by an energized line. However, they can be localized to a single point. In addition they do not typically couple onto other objects and produce complex interfering fields that can occur when tracing a line.

Tilted Sondes

If the sonde is tilted, one Pole will move closer to the sonde and the other farther away so that the sonde location no longer lies midway between the two poles. The signal strength of the nearer Pole becomes much higher than that of the more distant Pole. In the extreme as the sonde tilts to vertical, the one Pole moves to a point directly above the sonde and this Pole will also correspond to the point of maximum signal strength. The other Pole will not be seen. Therefore even if the sonde is vertical as it could be if it fell into a break in the line or an underground tank, the sonde can still be located.

What is seen on the screen is a Pole of maximum signal strength when the sonde is vertical. The multi directional antennas allow the distance(depth) to be measured even if the sonde is tilted.



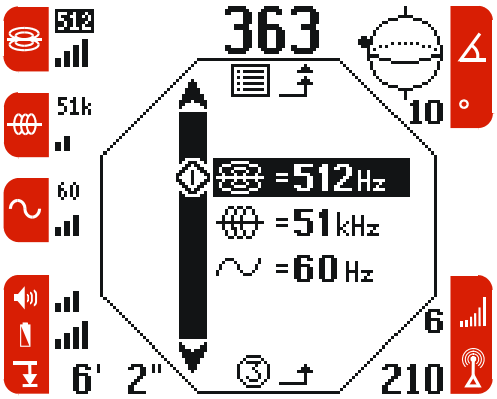
The NaviTrack Display

Menu Specifics

Countdown Timer - Most of the menus make use of a countdown timer, shown as a circled number at the bottom center of the Active View Boundary. Each time a key is pressed, the countdown timer is reset to 10 seconds. When the counter completes its countdown without another key being pressed, the settings that were highlighted will be automatically accepted.

Operating Mode Menu

A few seconds after power up, the Operating Mode menu will appear:



The Operating Mode menu allows the selection of one of NaviTrack's three operational modes:

Sonde mode

Active Line Trace mode

Passive AC Trace mode

The default mode is Sonde Mode 512 Hz; however, the last mode used, is restored on power up.

1. To accept the highlighted default operating mode and frequency, either press the Select key, or wait four (4) seconds and the NaviTrack will automatically enter the highlighted operating mode:

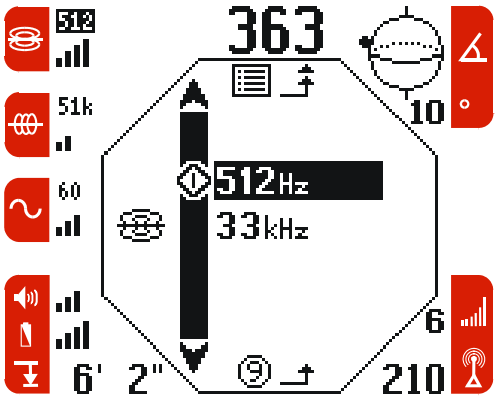
2. To choose a different operating mode, press the Up or Down keys to highlight either Sonde, Active Line Trace, or Passive AC Trace Mode:

3. If the desired frequency is not shown, press the Mode key again or the Menu key to open the Frequency menu for that operating mode:

It is important that the correct mode is selected for the job or the depth measurement and the mapping display will provide incorrect and confusing information. For example, do not select Sonde Mode if the application is line tracing. These modes can be changed from the Main Menu as well.

Frequency Menu

The frequency menu displays the available frequencies for the selected mode. The default frequencies for Sonde Mode are shown below:



The sonde icon  to the left of the frequencies indicates a frequency for Sonde Mode.

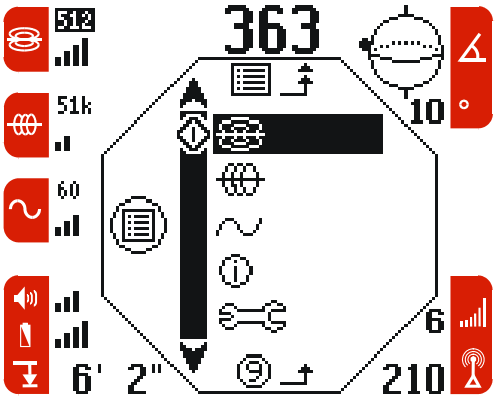
1. To choose a different frequency, press the Up or Down keys to highlight the desired frequency:

2. To accept the highlighted frequency, either press the Select *key*, or wait four(4) seconds and the NaviTrack will automatically enter the highlighted frequency:

Additional frequencies can be selected by accessing the Set Up menu and then a special Frequency menu.

Main Menu

The Main menu has several submenus to customize the settings of the NaviTrack. Menu settings are effective until they are changed. Settings are retained after power down.



Main menu has:

- Sonde mode
- Active Line Trace mode
- Passive AC Trace mode
- Information Level
- Set Up

To get to the Main menu:

1. Press the Menu key:

2. Use the Up and Down keys to scroll through the menu choices:

3. Press the Select key to select the highlighted menu choice:

4. The selected menu will open, and the Up, Down, and Select keys can be used to make menu selections.

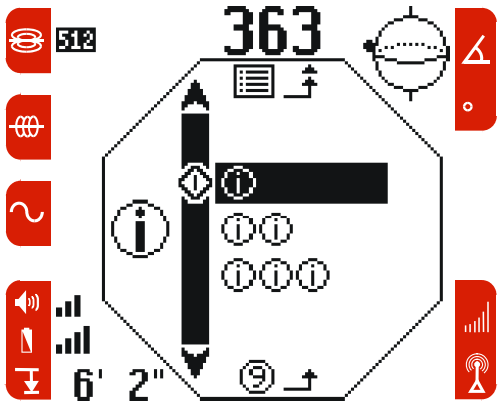
The Sonde, Active Line Trace and Passive AC Trace modes are the same selections found in the Operating Mode Menu. The Main Menu offers the fundamental modes as well as other menu choices for the users convenience.

Information Levels

ⓘ Entering this menu will allow the user to choose the amount of information displayed on the screen. From more information, ⓘⓘⓘ; to less, ⓘ . Level ⓘ is the default when the unit is first used.

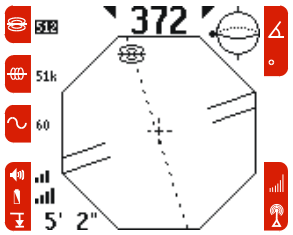
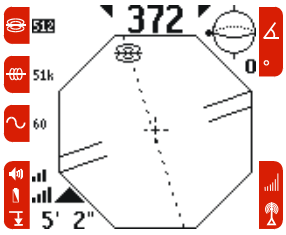
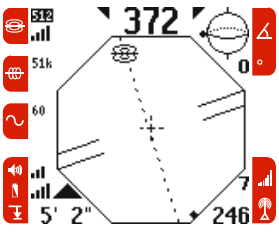
Some users want a simple display. They may do easier locates and prefer to have less on the screen. Others want all of the information they can get. When more information is displayed the user can see if there are any inconsistencies to what is displayed. In other words, if one source of information does not agree with the other then it alerts the user to investigate. An example might be the instruments of an airplane. On a clear day they may not be used as much. More often though it is beneficial to see direction, air speed and altitude at all times. Due to the likelyhood of limited visibility the pilot learns to

use all of the instruments to make sure they understand the situation at all times.



All Screens shown in this manual are shown in level 3. This is to show the full capabilities and also give the user all the information.

The following examples show each level of the *Map* View in Sonde Mode:

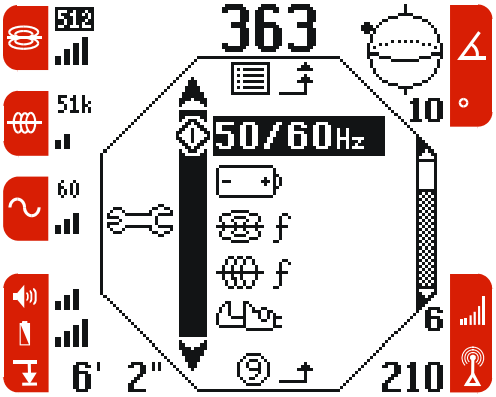
Level	Example of what may be displayed
ⓘ	
ⓘⓘ	
ⓘⓘⓘ	

Set Up Menu

The Set Up Menu accesses settings that can be customized for a specific application:

a) Use the Up and Down keys to highlight the Set Up Menu.

b) Press the select key; the Set Up Menu will open.



c) Choose from the following sub menus:

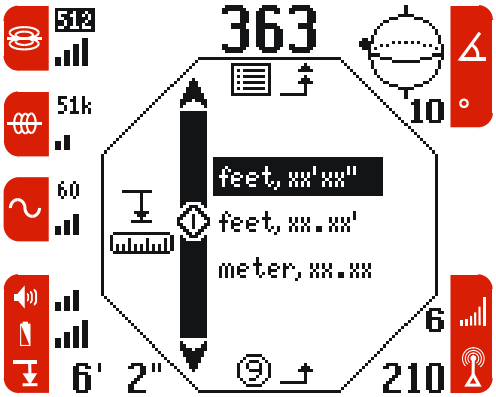
Distance Measurements Units Menu
AC Trace Frequency Menu
Battery Type Menu
Special Frequency Menus – Sonde and Line Trace
Tools Menu

A brief desription of each follows:

Distance Measurements Units Menu.

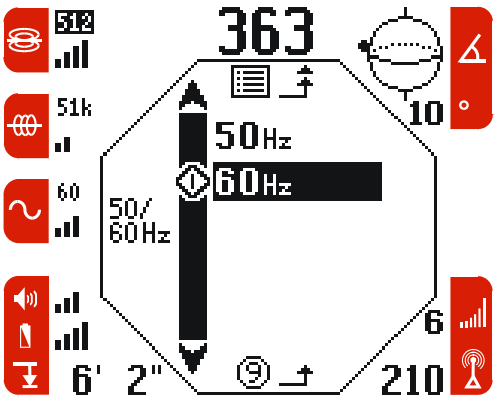
Use the Up and Down keys to select different units. Feet and inches, decimal feet or metric units.

When feet and inches are chosen, inches only will display, up to 24. When meters are chosen then cm will display if less than 1 meter.



AC Trace Frequency Menu

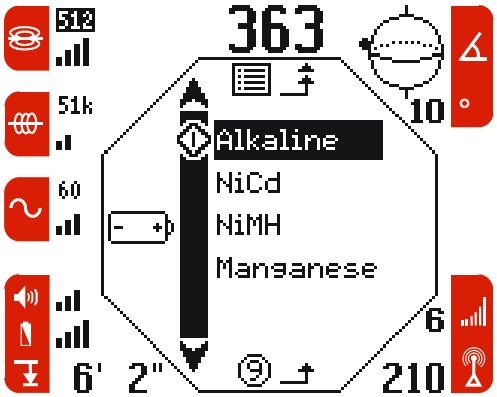
50/60Hz Use the Up and Down keys to select the AC tracing frequency. This is only used in Passive AC Trace Mode.



When the unit is in 50 Hz mode the 200 kHz frequency will switch to 93.696 kHz to meet European requirements. This is set to match the NaviTrack line transmitter's "HF" setting.

Battery Type Menu

Use the Up and Down keys to set the battery status monitor to the type of batteries installed. The default battery type is alkaline.



Alkaline = Alkaline cells (Non Rechargeable)

NiCd = Nickel Cadmium cells (Rechargeable)

NiMH = Nickel Metal Hydride cells (Rechargeable)

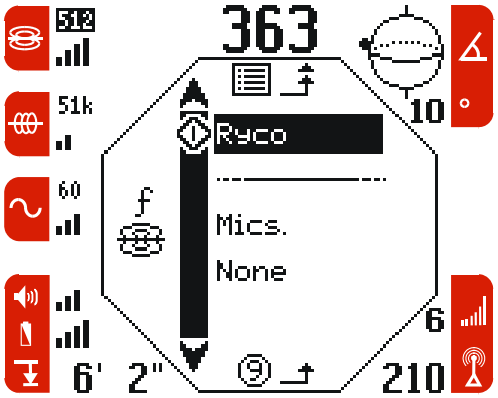
Manganese = "Heavy Duty" type cells.

Special Frequency Menus

The special frequency menus allow the user to install sonde and trace frequencies used by other manufacturers. See Appendix A for more information and limitations.

Sonde

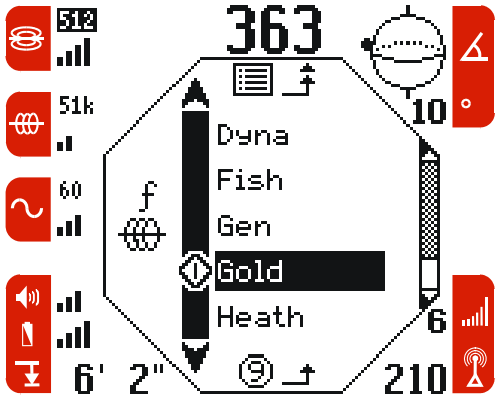
f Use the Up and Down keys to select the abreviated name of the manufacturer. This installs sonde frequencies offered by that manufacturer. When the manufacturer is selected it will make the frequencies available for selection in the Main and Operating Mode menus. To change them, simply select another manufacturer or choose none.



Line Trace

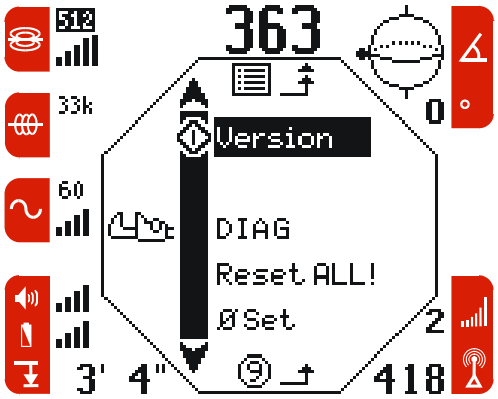
f Use the Up and Down keys to select the abreviated name of the line transmitter's manufacturer. This installs line trace frequencies offered by that manufacturer. When the manufacturer is selected it will make the frequencies available for selection in the Main and Operating Mode menus. To change them, simply select another manufacturer or choose none.

Important! See Appendix A for additional information and limitations on other manufacturer's frequencies

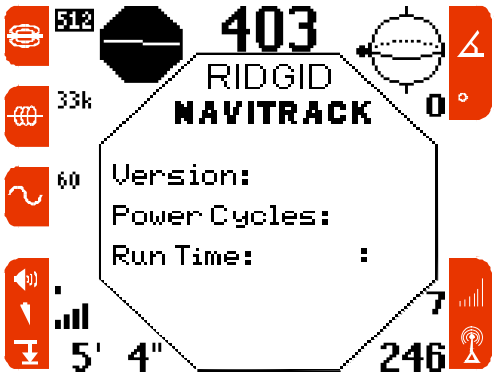


Tools Menu

Use the up and down keys to select one of the following options:



Version – Selecting this tells the user the version of software that came with the unit. The middle number is the number of on off cycles the unit has. The last number is number of minutes of total on time. These numbers start incrementally at the beginning of the factory testing process so new units may have significant accumulated hours.



Diag – This will enter a diagnostics mode used by factory technicians.

Reset All! – will reset all user settings to the factory defaults. Only the LCD contrast and the backlight switch sensitivity are not reset. The letter D will appear briefly in the lower left hand corner of the screen immediately after the unit has been reset to factory defaults. This appears on the power up screen next to the software version during power up. Once the Reset All has been activated the unit will turn off. Simply turn it back on to use.

This is not set by the countdown timer. In order to prevent this from resetting accidentally, it is necessary to hold down the Select key for 4 seconds to activate the reset.

Stored Settings

The NaviTrack is designed to *remember* the current settings each time it is powered down.

The items retained are:

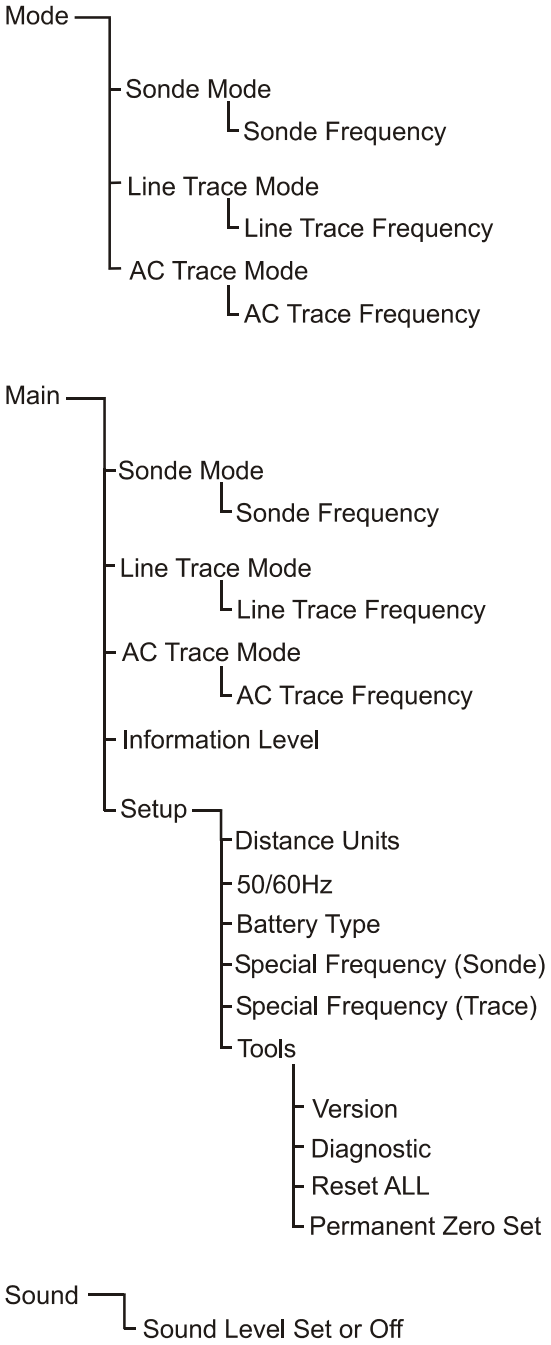
- The active **mode**
- selected frequencies
- distance units
- the last selected items in all the menus.

The items not retained are:

- Depth Average & Hold
- Temp Zero Set
- 1000 Set

The default view (*Search* View for Sonde Mode and *Map* View for Trace Mode) is restored.

Menu Tree

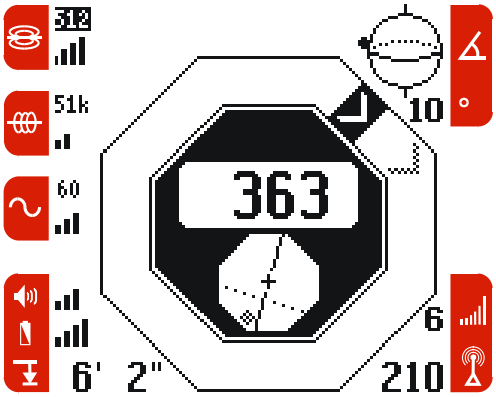

Mode
Sonde Mode
Sonde Frequency
Line Trace Mode
Line Trace Frequency
AC Trace Mode
AC Trace Frequency
Main
Sonde Mode
Sonde Frequency
Line Trace Mode
Line Trace Frequency
AC Trace Mode
AC Trace Frequency
Information Level
Setup
Distance Units
50/60Hz
Battery Type
Special Frequency (Sonde)
Special Frequency (Trace)
Tools
Version
Diagnostic
Reset ALL
Permanent Zero Set
Sound
Sound Level Set or Off

Views

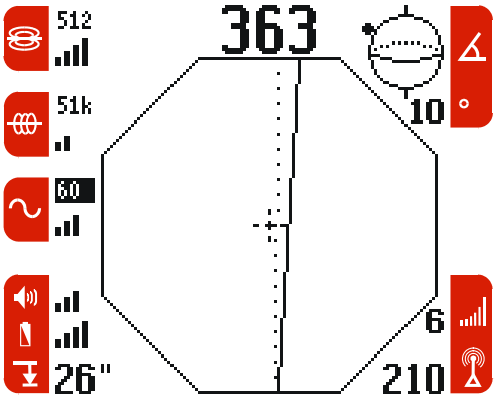
Each of the three operating modes has two views.

1. *Search* View
2. *Map* View

The *Search* View emphasizes locating based on signal strength and is the default view for Sonde Mode:



The *Map* View emphasizes locating based on field angles and is the default view for Trace and Passive AC Trace modes:

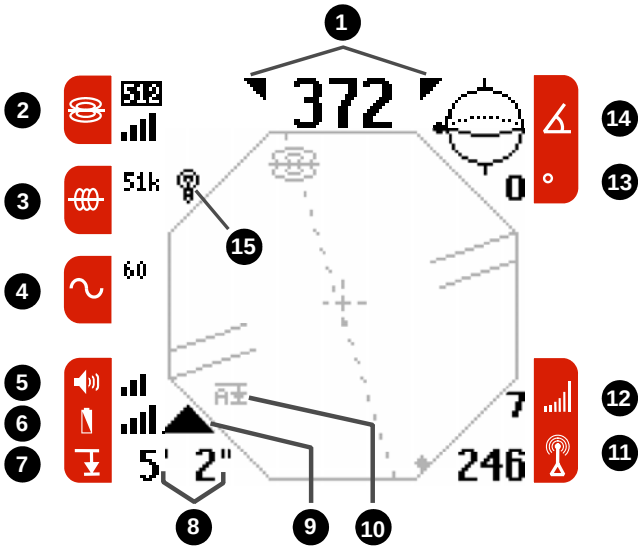


To toggle between *Search* and *Map* views press the Select key.

When the views are switched between the *Search* and *Map* views, only the elements inside the large central Octagon known as the Active View Boundary in the center of the display change. The elements outside the Active View Boundary are common to both views and do not change.

Common Display Elements

Display elements common to all views and operating modes are shown in the figure below. (For illustration purposes the center display area is shown in light gray).



1. **Maximum Signal Indicator** These triangles indicate the NaviTrack is reading the highest signal it has seen for that locate. They will stay on as the Signal is rising and only come on if the signal is higher than any previous reading.

2. **Sonde Status** Shows sonde frequency and signal strength (range 0-5 bars); frequency is highlighted when unit is in Sonde Mode**.**

3. **Line Status** Shows line trace frequency and signal strength (range 0-5 bars); frequency is highlighted when unit is in Trace Mode.

4. **AC Status** Shows Passive AC trace frequency and signal strength (range 0-5 bars); frequency is highlighted when unit is in Passive AC Trace Mode.

5. **Sound Level** Indicates the sound level of the speaker or headphone (0-5 bars).

6. **Battery Status** Indicates remaining battery life. (0-5 bars)

7. **Distance (depth)** Displays the distance to the signal source. (See “Measuring Distance or Depth”.)

8. **Distance Measurement Units** Shows units of the Real Time Depth or Depth Average and Hold.

9. **Overhead Indicator** Indicates the upper antenna is receiving more signal than the lower. May indicate the presence of over head noise or another source of signal, (e.g. power lines). May also display if no signal is present.

10. **Depth Average and Hold** When the average depth is held the icon will display in the space of the Overhead Indicator.

11. **Source Current Level** Displays the relative current level of the signal.

12. **Auto Gain Step** Displays the automatic gain step (range 1 – 8). Low numbers correspond to low gain steps, high numbers to high gain steps. The smaller the number the stronger the signal strength since the gain goes up to read weaker signal.

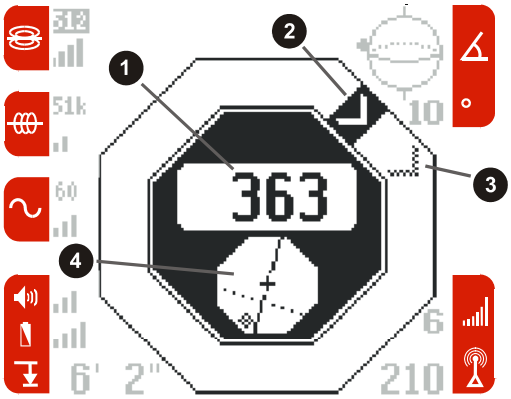
13. **Numeric Horizontal Angle Indicator** Displays the angle (from zero to 90 degrees) of the field lines coming from the signal source as sensed by the NaviTrack.

14. **2D Horizontal Field Angle Indicator (upper right corner)** Shows the angle of field lines from vertical as sensed by the NaviTrack.

15. **BackLight Indicator** Indicates when the backlight is on.

Search View Elements

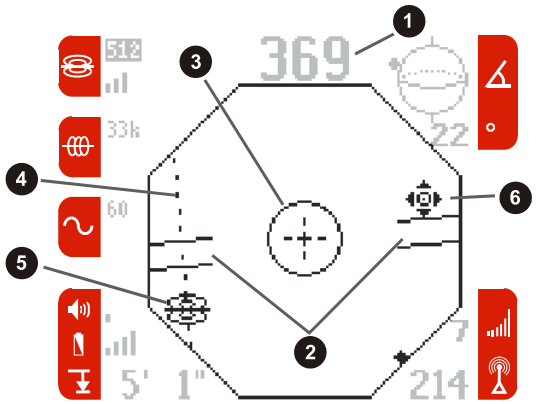
Display elements unique to the *Search* View are shown in the figure below (For illustration purposes, common display elements outside the Active View Boundary are shown in light gray):



1. **Numeric Signal Strength Display** numbers get larger as the signal becomes stronger, smaller as the signal becomes weaker.
2. **Signal Strength Indicator** block wraps around the display continuously (no beginning or ending point) to show CHANGE in signal strength. Clockwise movement indicates increased signal strength, counter-clockwise movement indicates decreased signal strength. Each revolution will have the sound of a repeating scale that corresponds to increases or decreases in signal strength.
3. **Maximum Signal Marker** marks the point of maximum signal strength; appears when signal decreases.
4. **Mini Map** is a condensed version of the Map View. This displays visual cues that guide the user toward the signal source in Sonde and Trace Modes.(See *Map* View below)

Map View Elements in Sonde Mode

Display elements unique to the Sonde Mode *Map* View are shown in the figure below (For illustration purposes, common display elements outside the Active View Boundary are shown in light gray):

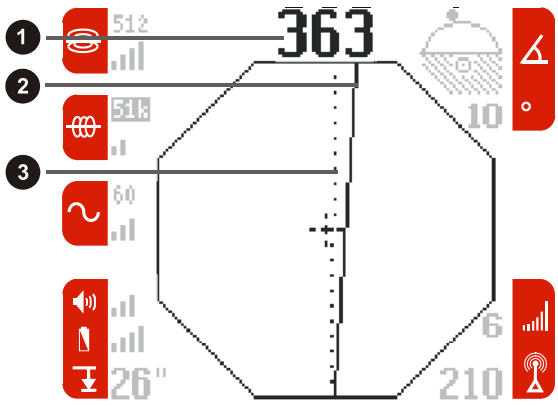


1. **Numeric Signal Strength Display** numbers get larger as the signal becomes stronger, smaller as the signal becomes weaker.
2. **Sonde Axis** – Shows approximate direction of pipe when the NaviTrack is between the poles.
3. **Zoom Ring** – Magnifies area when close to a Pole for a more accurate Pole locate.
4. **Equator –** Dotted line representing signal axis.
5. **Sonde Icon –** Symbol/icon indicating the field angle is horizontal.
6. **Pole Icon** - Symbol/icon representing a fixed point where the field angle is vertical.

For much more on Poles and Equators see the Overview of Locating a Sonde with the NaviTrack

Map View Elements in Line Trace Mode

Display elements unique to the Trace Mode *Map* View are shown in the figure below (For illustration purposes, common display elements outside the Active view boundary are shown in light gray):



1. **Numeric Signal Strength Display** numbers get larger as the signal becomes stronger, smaller as the signal becomes weaker.
2. **Solid line** Shows position of energized line as sensed by the lower antenna.
3. **Dotted line** Shows position of energized line as sensed by the upper antenna. This indicates the presence of signal interference if not aligned with the solid line.

Transportation and Storage

Before transporting make sure that the unit is turned off to preserve battery power. Open the hardcase and place the receiver inside. Adjust the velro strap to make sure that the unit is firmly secured in its case. Place the top on the case and secure it with the bungee cord.

When Transporting make sure that the case is secure and does not bounce around or get bumped by loose equipment.

Whenever the NaviTrack is transported or shipped, **ALWAYS** ship it in its hardcase for protection. Units needing service cannot be returned without a hardcase.

The Navitrack should be stored in a cool dry place.

If storing the NaviTrack for an extended period of time then the batteries should be removed.

Installing/Using Accessories

The NaviTrack is provided with a mini headphone jack. (Headphones are not provided.)

The NaviTrack also comes with markers that can be used to mark Pole or sonde locations above ground. There are two (2) red markers to mark the poles and one (1) yellow marker to mark the sonde.

If further assistance is needed, please call RIDGE Tool Technical Service at 800-519-3456. If appropriate: Replacements can be ordered from your Ridgid dealer.

Maintenance and Cleaning

⚠ WARNING

1. Keep the NaviTrack clean with a damp cloth and some mild detergent. Do not immerse in water.

2. When cleaning, do not use scraping tools or abrasives as they may permanently scratch the display. NEVER USE SOLVENTS to clean any part of the system. Substances like acetone and other harsh chemicals can cause cracking of the Case.

Locating Faulty Components

For troubleshooting suggestions, please refer to the trouble sooting guide at the end of the manual. If necessary, contact RIDGE Tool Technical Service at 800-519-3456. We will establish a plan of action to get your NaviTrack working for you.

Service and Repair

⚠ WARNING

Tool should be taken to a RIDGID Independent Authorized Service Center or returned to the factory. All repairs made by Ridge service facilities are warranted against defects in material and workmanship.

If you have any questions regarding the service or repair of this machine, call or write to:

Ridge Tool Company

Technical Service Department

400 Clark Street

Elyria, Ohio 44035-6001

Tel: (800) 519-3456

E-mail: TechServices@ridgid.com

For the name and address of your nearest Independent Authorized Service Center, contact the Ridge Tool Company at (800) 519-3456 or http://www.ridgid.com

Trouble Shooting Guide

PROBLEM	PROBABLE FAULT LOCATION
NaviTrack locks up during use	Hold down the power key for ~3 seconds (hard reset), until the power shuts off, then release it.
While tracing, lines are "jumping" all over the screen in *Map* mode.	This indicates that the NaviTrack does not pick up the signal or there is interference.
	Make sure that the transmitter is well connected and grounded. Test the ground wire to be sure that you have a complete circuit.
	Try other frequencies starting with the lowest.
	Try to determine the source of any noise and eliminate it.
While locating a sonde, lines are "jumping" all over the screen	Check the batteries in the sonde to see that they are working
	Verify signal by placing lower antenna close to sonde.
Distance between sonde and either Pole is not equal.	Sonde may be tilted or there may be a cast iron to plastic transition.
Unit just shuts down	To conserve batteries, the NaviTrack automatically shuts down after 10 minutes of no motion or 20 minutes of no keys being pressed. Turn the unit back on
Unit acts erratic, won't power down.	Batteries may be low. Replace with fresh batteries and turn on.
Display appears completely dark, or completely light when it is turned on.	Try Powering the unit off and then back on.
	Adjust the LCD screen contrast
There is no sound	Adjust the sound level in the sound menu
Unit will not pick up the signal.	Check that the correct mode and frequency are set for the job. e.g. Set for Sonde Mode when locating sondes.
Unit will not turn on.	Check orientation of batteries. Check that the batteries are charged. Check to see that the battery contacts are OK. Unit may have blown a fuse.
Short vertical line on screen during power down	Press and hold the power button for 4 seconds to reset the unit, and then press power again to shut it off

Specifications

Weight ..... 5.85 lbs.

Dimensions

Length ..... 14.9”
Width ..... 7.1”
Height ..... 33.1”

HardCase

Length..... 17.5”
Width ..... 10.00”
Height ..... 38.3”
Weight ..... 6.00 lbs.

Power Source

4 C-size batteries, 1.5V Alkaline (ANSI/NEDA 14A, IEC LR14) or 1.2V NiMH or NiCad rechargeable batteries

Power Rating: 6V, 550mA

Operating Environment

Temperature..... -4°F to 122°F (-20°C to 50°C)
Altitude..... Up to 6560 ft. (2000 m)
Humidity..... 5% to 95% RH
Pollution Degree 2

Storage Temperature.... -4°F to 140°F (-20°C to 60°C)

Standard Frequencies

Sonde..... 512Hz, 33kHz
Active Line Trace ..... 512Hz, 8kHz, 33kHz, 51kHz, 200kHz (HF in 50Hz mode = 93kHz)
Passive Line Trace 60Hz, 50Hz

Icon Legend

DISPLAY LABEL ICONS

- **Sonde Frequency**
  Sonde Level
- **Active Trace Frequency**
  Active Trace Level
- **Passive (AC) Trace Frequency**
  Passive (AC) Trace Level
- **Sound Level**
- **Battery Level**
- **Distance (Depth)**
- **2D Horizontal Field Angle Indicator**
- **Numeric Horizontal Angle Indicator**
- **Auto Gain Step**
- **Source Current Level**

KEYPAD ICONS

- **Menu Navigation / Signal Capture**
  1000 Set (3 sec. press)
- **View Toggle / Menu Selection**
- **Menu Navigation / Depth Average & Hold**
  Zero Set (3 sec. press)
- **Power ON / OFF Key**
- **Menu Key**
- **Mode Key**
- **Sound Key**
- **Back light Adjustment**
- **LCD Contrast Adjustment**

Additional Frequencies:

512Hz, 575Hz, 577Hz, 815Hz, 820Hz, 982Hz, 8kHz, 8.1kHz, 8.2kHz, 9.5kHz, 9.8kHz, 27kHz, 29kHz, 33kHz, 38kHz, 51kHz, 52kHz, 65kHz, 76.8kHz, 80kHz, 81kHz, 82kHz, 117.5kHz, 200kHz, 480kHz.

Default Settings

The default settings for the locator are:

Sonde Mode
Sonde frequency = 512 Hz,
Line frequency = 51 kHz,
AC frequency = 60 Hz,
Depth units = feet & inches,
Volume = 1 (one setting above mute),
Alkaline batteries,
No extra line or sonde frequencies,

Standard Equipment

- NaviTrack Locator
- Hard Case
- Markers and Mast Holder
- Operator’s Manual
- Laminated Quick Start Guide
- 4 C-cell batteries (Alkaline)

Optional Equipment

- Additional Pole/sonde Markers
- User-supplied Headset (1/8” mini stereo jack)

Appendix A

While we have tested all of these line transmitters for compatibility with the NaviTrack, we cannot guarantee full compatibility. The NaviTrack is an extremely precise narrow band instrument. Transmitters that do not conform to the frequencies we have measured may not provide full strength signals on the NaviTrack.

Under the Set Up menu  , the NaviTrack can be set to receive transmissions from line transmitters, and sondes currently manufactured by different companies. We have tested the models indicated below from different manufacturers. Based on these tests, we have included these frequencies in the NaviTrack to allow the unit to be used with a wide variety of line and sonde transmitters.

Generally, the frequencies that are used by a manufacturer of line transmitters and sondes are common across many of their models. The frequencies listed below are specific to the model that we have tested for compatibility, but many other models with the same indicated frequency, from the same manufacturer should also work.

The frequencies shown below are the frequencies available for each option in the Special Frequency Menus for both sonde and Line Trace. In all cases, the list of frequencies for each option starts with the **Basic Frequencies** (**bolded**). The additional unique frequencies that the specific Model can produce are then listed underneath. *Miscellaneous* and *None* are options as well.

Frequencies indicated below are approximate as measured during testing. Note that some of the units from different companies may indicate the same frequency (for instance 80kHz) but are subtly different from each manufacturer, and incompatible. **Both the correct company and frequency must be selected for proper operation.**

While the NaviTrack is set for a sonde with a frequency of greater than 1kHz, the system will not be able to simultaneously display line and sonde signal strengths. Once the sonde frequency is changed back to something below 1kHz, the system will again be able to concurrently display both sonde and line strengths.

Special Frequency Menu (Sonde):

Option on the display menu.	Full name of the company.	What frequencies are available.	Notes
Ryco	RYCOM	**512Hz** **33kHz** 815Hz 8kHz	
Misc.		**512Hz** **33kHz** 640Hz	**Misc.** indicates the Basic Frequency set (indicated with * and shown in bold), plus additional frequencies that are supported, but are not specific to a manufacturer. Select **Miscellaneous** to have just these frequencies available.

None	**512Hz** **33kHz**	* “None” indicates the **Basic Frequency** set, with no unique frequencies. This **Basic Frequency** set appears in all of the sonde Frequency sets. Select **None** to have just these frequencies available.

Special Frequency Menu (Line Trace):

Option on the display menu.	Full name of the company.	What frequencies are available.	Model	Notes
Dyna	3M Dynatel ™	**512Hz** **33kHz** **51kHz** 577Hz 8kHz 200kHz	2273	
Fish	FISHER	**512Hz** **33kHz** **51kHz** 820Hz 8.2kHz 82kHz	TW-8800	
Gen	Gen-Eye ™	**512Hz** **33kHz** **51kHz** 8kHz 65kHz	LCTX 512/8/65	
Gold	GOLDAK	**512Hz** **33kHz** **51kHz** 117.5kHz	3300	This unit does not have a crystal time base, and as such is not as stable. It is therefore not recommended for use with the NaviTrack. For best performance, when used in conjunction with the NaviTrack, use the pulse mode.
Heath	Heath Consultants Incorporated	**512Hz** **33kHz**	ALLPRO	

	Incorporated	**51kHz** 8.1kHz 81kHz 480kHz		
McLau	McLAUGHLIN®	**512Hz** **33kHz** **51kHz** 9.5kHz 38kHz	VERIFIER	For Best performance, when used in conjunction with the NaviTrack do not use the “9.5kHz + 38kHz” setting. Made by TAKACHIHO SANYO CO., LTD.
Metro	METROTECH ®	**512Hz** **33kHz** **51kHz** 982Hz 9.8kHz 82kHz	990	For best performance, when used in conjunction with the NaviTrack, do not use the “ALL” setting.
MicroE	Microengineering	**512Hz** **33kHz** **51kHz** 76.8kHz	Xmtr-101	
Mytan	MyTana	**512Hz** **33kHz** **51kHz** 76.8kHz	PT20	
RD	Radio Detection (Same as Gen-Eye ™ above)	**512Hz** **33kHz** **51kHz** 8kHz 65kHz	(Same as LCTX 512/8/65 above)	
Ryco	RYCOM	**512Hz** **33kHz** **51kHz** 815Hz 82kHz	8876	For best performance, when used in conjunction with the NaviTrack, do not use the “BOTH” setting.
Schon	Schonstedt Instrument Company	**512Hz** **33kHz** **51kHz** 575Hz	TraceMaster	For best performance, when used in conjunction with the NaviTrack, do not use frequencies other than “575Hz” setting. These other frequencies are modulated and incompatible with the NaviTrack.

Ssurf	SubSurface	**512Hz** **33kHz** **51kHz** 8kHz 27kHz	PL-2000	Made by FUJI TECOM
SubS	SUBSITE ® ELECTRONICS Ditch Witch ®	**512Hz** **33kHz** **51kHz** 1kHz 8kHz 29kHz 80kHz	950	For best performance, when used in conjunction with the NaviTrack, do not use the “F1/F2” setting.
Misc.		**512Hz** **33kHz** **51kHz**		**Misc.** indicates the *Basic Frequency* set (indicated with * and shown in *italics*), plus additional frequencies that are supported, but are not specific to a manufacturer. Select Miscellaneous to have these frequencies available.
None		**512Hz** **33kHz** **51kHz**		**None** indicates the **Basic Frequency** set, with no unique frequencies. This **Basic Frequency** set appears in all of the Line Frequency Sets. Select **None** if to have just these frequencies available.

What is covered

RIDGID® tools are warranted to be free of defects in workmanship and material.

How long coverage lasts

This warranty lasts for the lifetime of the RIDGID® tool. Warranty coverage ends when the product becomes unusable for reasons other than defects in workmanship or material.

How you can get service

To obtain the benefit of this warranty, deliver via prepaid transportation the complete product to RIDGE TOOL COMPANY, Elyria, Ohio, or any authorized RIDGID® INDEPENDENT SERVICE CENTER. Pipe wrenches and other hand tools should be returned to the place of purchase.

What we will do to correct problems

Warranted products will be repaired or replaced, at RIDGE TOOL'S option, and returned at no charge; or, if after three attempts to repair or replace during the warranty period the product is still defective, you can elect to receive a full refund of your purchase price.

What is not covered

Failures due to misuse, abuse or normal wear and tear are not covered by this warranty. RIDGE TOOL shall not be responsible for any incidental or consequential damages.

How local law relates to the warranty

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights, and you may also have other rights, which vary, from state to state, province to province, or country to country.

No other express warranty applies

This FULL LIFETIME WARRANTY is the sole and exclusive warranty for RIDGID® products. No employee, agent, dealer, or other person is authorized to alter this warranty or make any other warranty on behalf of the RIDGE TOOL COMPANY.

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