

Instruction Manual

Model GA-92 XT Magnetic Locator

Manufactured By
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Made in USA

Preface

The Model GA-92XT® Magnetic Locator is a product of over fifty years experience in producing the world's finest flux-gate magnetometers and magnetic detectors for aerospace, military and civilian applications. The GA-92XT® incorporates the knowledge obtained from manufacturing under the most rigid quality control standards. The heart of the GA-92XT® is its patented Schonstedt HeliFlux® magnetic field sensors. These sensors, acknowledged to be the world's finest, make possible the unequalled performance of the locator.

December 2002

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Important Notice

Schonstedt believes the statements contained herein to be accurate and reliable. But their accuracy, reliability, or completeness is not guaranteed.

Schonstedt's only obligation shall be to repair or replace any instrument proved to be defective within seven years of purchase. Schonstedt shall not be responsible for any injury to persons or property, direct or consequential, arising from the use of any instrument.

OPERATION

Introduction

The Model GA-92XT family of magnetic locators detect the magnetic field of ferromagnetic objects. They respond to the difference in the magnetic field between two sensors that are spaced approximately 9.5 inches apart. The GA-92XT family has two members, the indicator unit (GA-92XTi) and the display unit (GA-92XTd). The indicator unit provides an audio tone along with the convenience of a battery level meter and a relative gain strength indication. In addition to these features, the display unit shows the signal polarity and a bargraph representing the relative signal strength. Although most objects can be located using the audio indication alone, simultaneous use of the audio and visual responses will provide additional information to help you pinpoint a target and determine its orientation.

Figure 1 illustrates an application of the locator in which it is used to detect an iron marker of the type used for property line identification. As shown, the magnetic field of the iron marker is stronger at sensor A than it is at sensor B. The audio response of your locator is designed so that the frequency of the audio tone increases as the strength of the magnetic field under detection increases. As a result, the frequency of the audio output is higher than the idling frequency (~ 10 Hz) which exists when the field strength is the same at both sensors. This stronger signal also causes the bargraph display (XTd model only) to peak in either the positive or the negative direction when the audio signal is at its highest frequency.

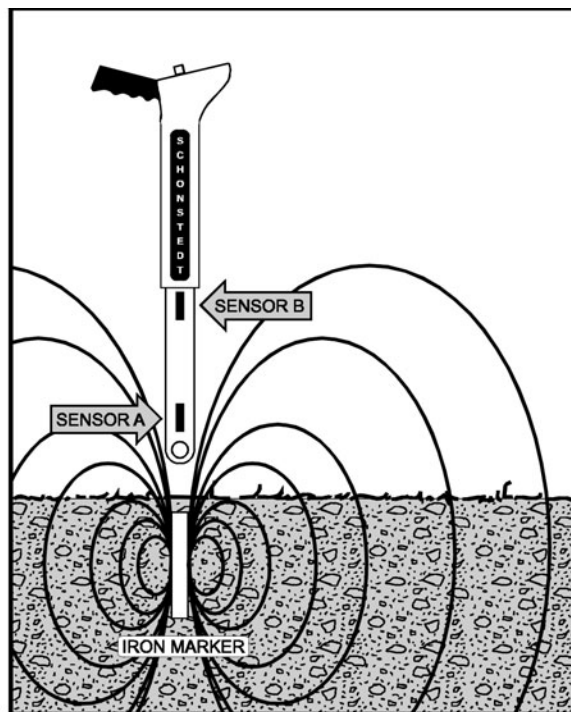


Figure 1. Detecting Magnetic Field of an Iron Marker

The GA-92XT unit can be operated either in the open or closed position and any position in between (see figure 2).

NOTE: In the closed position using non-lithium batteries, a slight signal may be detected in the high gain settings even if no ferrous material is present. This can be avoided by 1) Decreasing the gain of the unit, 2) Operating the unit in the extended position or 3) Using a lithium battery.

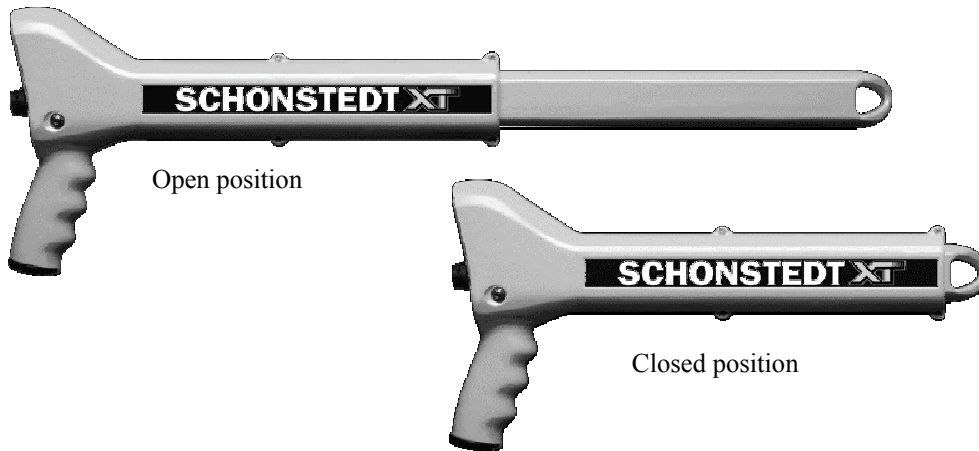


Figure 2. Open and Closed positions

The GA-92XT has an internal detent mechanism to keep the unit in either the fully extended (open) or fully retracted (closed) positions. To extend unit grasp looped end of locator and pull until shaft locks into place. To return unit to the closed position, push looped end back into shaft, unit will lock into place.

Turn-On, Volume and Sensitivity Settings



Figure 3. GA-92XT Face Plates

On-Off and Volume Knob: To turn the unit ON pull the on/off button up. To turn OFF, push it down. The volume of the unit can be increased by turning the knob clockwise.

Gain Knob: The sensitivity of the unit can be increased (to detect smaller objects at greater depths) by adjusting the gain. The gain is increased by rotating the knob clockwise.

Gain Indicator: The gain range is indicated on the GA-92XT locator by a 4-segment LCD at each quarter turn as L (Low), M (Medium), H (High) and XH (Extra High). The "Gain" of the unit is continuous, and therefore the sensitivity will increase as the knob is rotated. The indicator gives the operator a general idea of the currently selected range of sensitivity.

Battery Level Indicator: The GA-92XT locator displays the current battery level with a 4-segment LCD indicator. As shown in Figure 4, when all four segments are black the voltage level is between 100% and 25% (up to 24 hours of operation with intermittent usage). As the voltage decreases, the number of black segments decreases. Battery life varies with usage and the ambient temperature. Cold temperatures reduce battery life. Low temperatures may result in only two or three segments being black. This could be temporary and all segments will change back to black as the temperature increases.

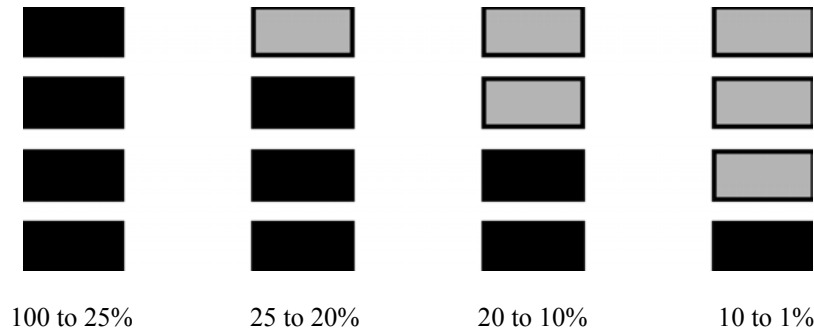


Figure 4. Battery Voltage Status Indications

Headphone Jack: The headphone jack is located on the side of the unit near the face of the locator. The unit does not come with headphones, but they may be purchased from Schonstedt as an accessory. For optimum performance, we recommend using the headphones offered by Schonstedt Instruments. The headphone jack is monaural, and therefore although standard stereo headphones can be used, they will produce sound in only one ear.

When the headphones are plugged in, the sound will decrease to a faint buzzing. The volume knob will also control the volume of the headphones.

Search Procedure

Set the GAIN control for L and grasp the locator as illustrated. Because the upper sensor is near the locator's handle, wristwatches may produce unwanted changes in the audio signal and in the meter indications, and should be removed. Keep the locator away from your shoes since they might contain magnetic material. To obtain maximum area coverage, sweep the locator from side to side. When the locator comes within range of an iron object, the audio signal will peak and in the XTd model the bar graph will expand in the positive or negative direction as shown in Figure 6.

Figure 5. Searching With the Locator



When the GA-92XT is positioned directly over a vertical pipe, the audio indication will peak, and the expanding bar graph will peak at either a positive or negative level (XTd model only).

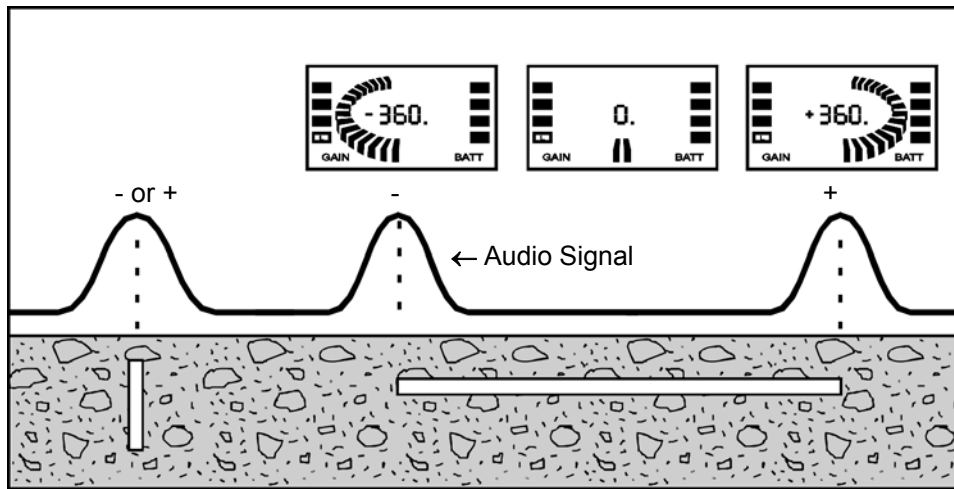


Figure 6. The Meter's Polarity Indications Help to Determine Target Orientation (With the XTd only)

The audio signal and bar graph (XTd Model only) indications peak over each end of a horizontal pipe. One end is positive, the other is negative. This will help you to distinguish between two vertical pipes or one horizontal pipe. Usually two vertical pipes buried in close proximity will produce bar graph indications with the same polarity.

APPLICATION NOTES

Basic Signal Patterns

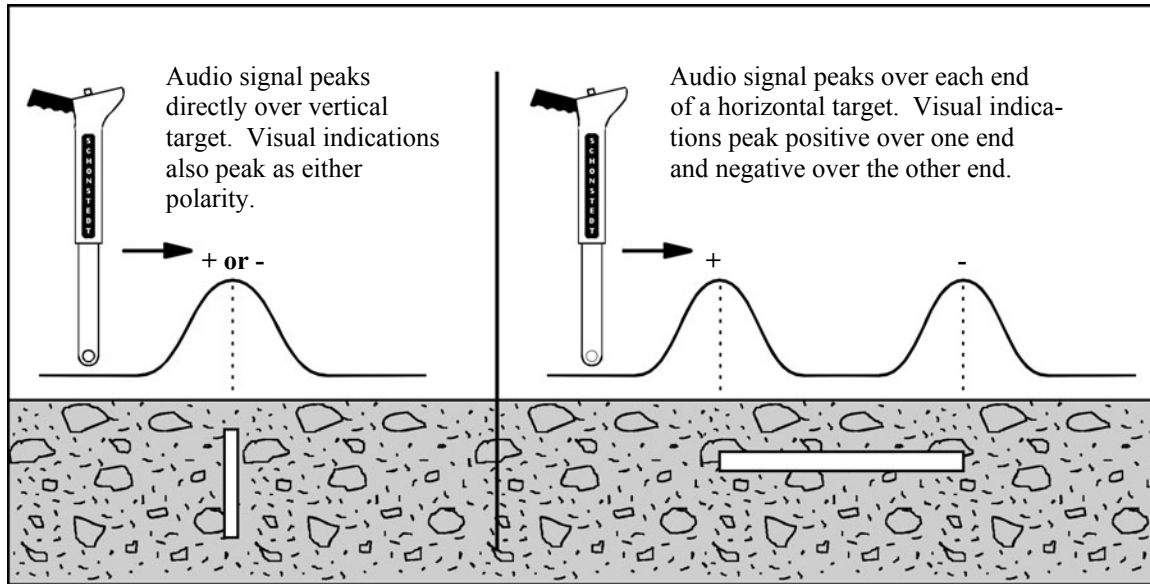


Figure 7. Signals from Vertical and Horizontal Targets

After you have detected the presence of a target, hold the locator vertically and slowly move it back and forth in an "X" pattern while listening to the audio response and observing the bargraph (XTd model only) readout. For a given gain setting the number of bars will be greatest when the locator is directly over a vertical target, and over the ends of a horizontal target. The "X" pattern is ideal for pinpointing small objects. A 1-1/4 inch PK nail buried up to 8 inches can be located so precisely with this technique that it can be uncovered using a 1/2 inch star drill.

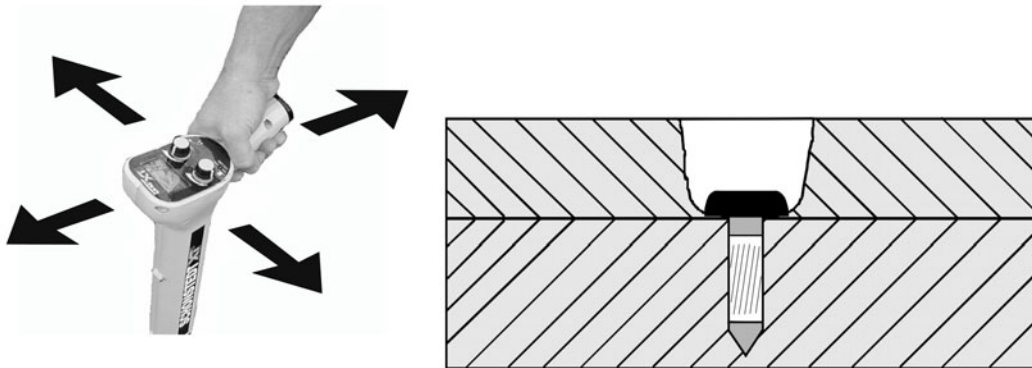


Figure 8. "X" Pattern provides Precision Locating

If you are looking for a corner marker and detect two or three signals in the same general vicinity, decrease the gain setting before you get a shovel. Any signal that disappears when the gain is decreased is probably

coming from a shallow target. The signal from a rusty bolt or other small item (see Figure 9.) is much weaker than the signal from a larger target such as a 18-inch length of 3/4 rebar which can be located at depths up to 7 feet.

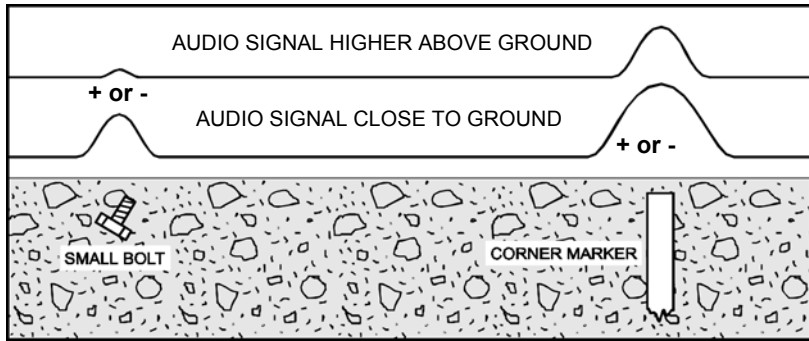


Figure 9. Decreasing gain Eliminates Unwanted Signals

Strongly Magnetized Markers

A strongly magnetized marker at or near the surface provides a weaker indication on both sides of the marker that could be mistaken for the marker.

The heavy line in Figure 10 represents the increase and decrease in the audio and bargraph (XTd model only) indications as you move the locator over a marker. Between points **A** and **B** the signals increase slightly and then decrease. Just beyond **B** the signals increase rapidly, peak directly over the marker and then decrease at point **C**. From **C** to **D** the signals increase and decrease again. So if you do not move the locator completely across the marker you might assume that the weaker indication on either side of the marker is its location.

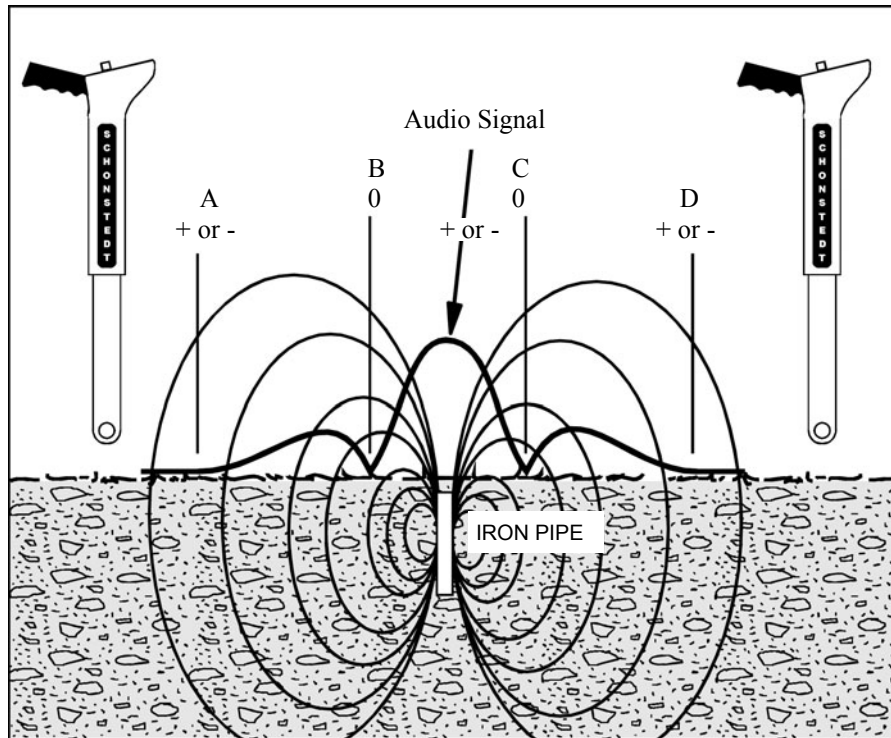


Figure 10. Signal Pattern from a Strongly Magnetized Marker

The two weaker indications occur because the locator is extremely sensitive to the magnetic field components parallel to its long axis. At point **B** and **C** the field is perpendicular to the locator so no peak audio or bargraph (XTd model only) indications are produced at these points.

Correct Stake Orientation

When Placing Stakes, Correct orientation is Important

For checking purposes, the orientation of the pin relative to the locator is shown in Figure 11. Check the pin with one orientation. Then rotate the pin 180°. The orientation which gives the largest reading is the one that should be used. This reading should be positive in the Northern Hemisphere, and negative in the Southern Hemisphere.

An iron pin has two types of magnetization. One is the magnetization induced by the Earth's magnetic field. The induced magnetization is always downward in the Northern Magnetic Hemisphere and produces a positive output no matter which end of the stake is driven into the ground. The other type of field is the permanent magnetization which is fixed to the pin. For maximum detection, the stake should be driven into the ground such that the permanent magnetization is in the same direction as the induced magnetization.

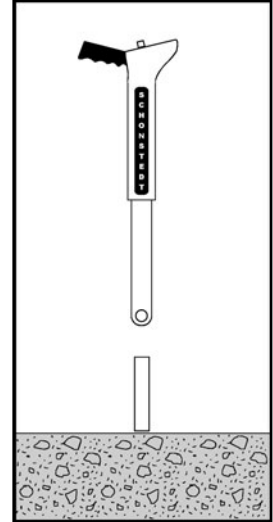


Figure 11. Checking a Stake's Orientation

Locating Manholes, Septic Tanks and Well Casings

The magnetic field is strongest at the edge of a shallow manhole cover. You can easily trace the edges of covers near the surface. Locating depth ranges up to 8 feet.

The great length of a well casing provides a strong field at the surface that makes it easy to locate casings buried up to 15 feet deep.

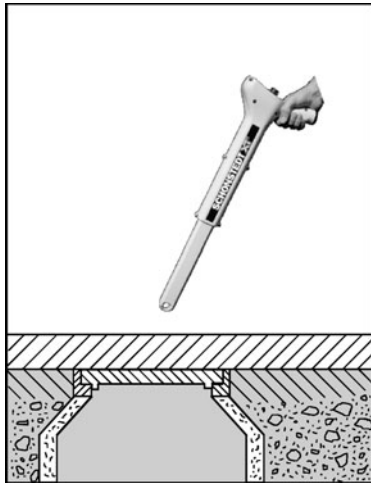


Figure 12. Locating Manhole Covers

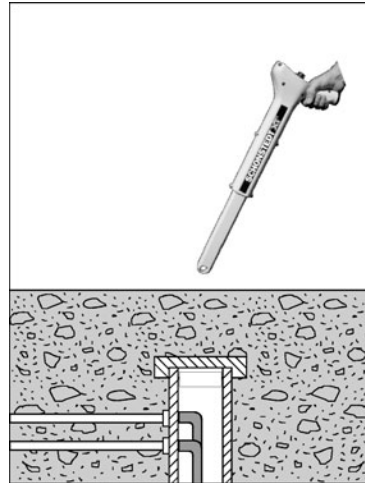


Figure 13. Locating Water Well Casings

The GA-92XT can be used to precisely locate the metal handles or reinforcing bars on septic tank covers at depths up to 4 feet.

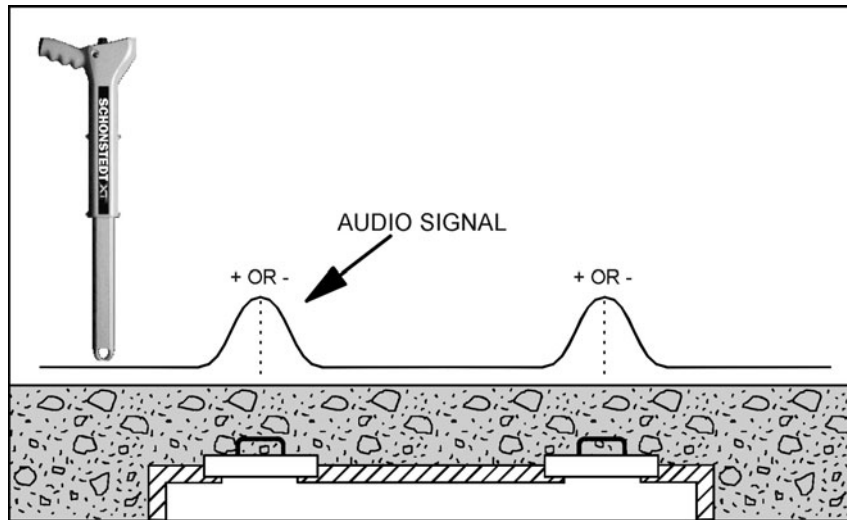


Figure 14. Signal Patterns Provided by Septic Tank Covers

Locating Objects Under Snow or Water and Tracing Barbed Wire

Although it is not recommended, the locator can be used in snow or in flooded areas as long as the unit is not submerged beyond the length of the retractable tube.

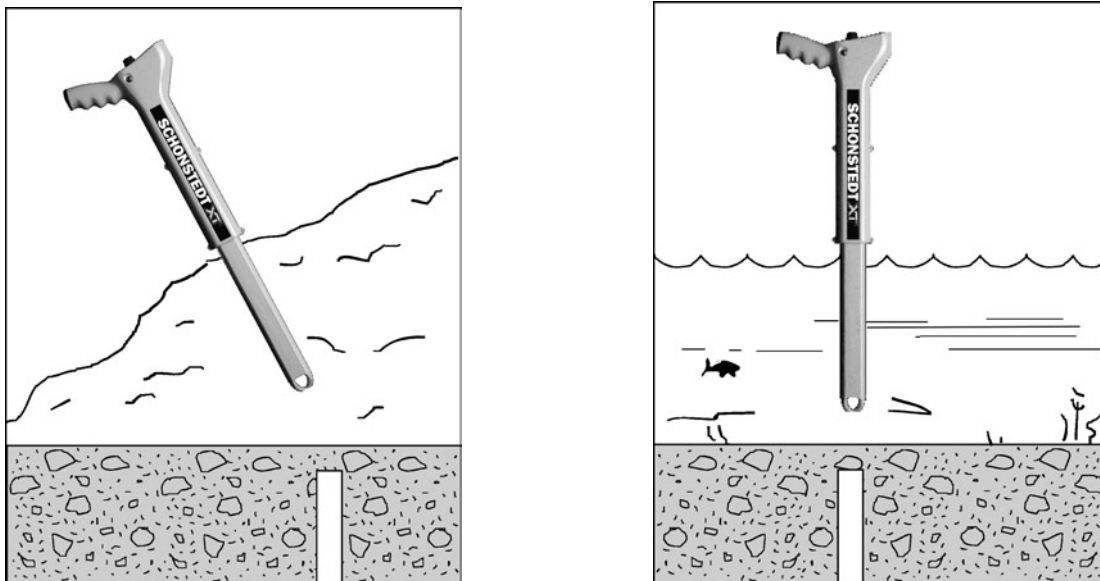


Figure 15. Locating Objects under Snow or Water

You can often trace barbed wire (from old fence lines) buried just beneath the surface. Even if the wire is only a trail of rust, it can still be detected near the surface. Tip the locator a little lower than usual - but not parallel with the ground.

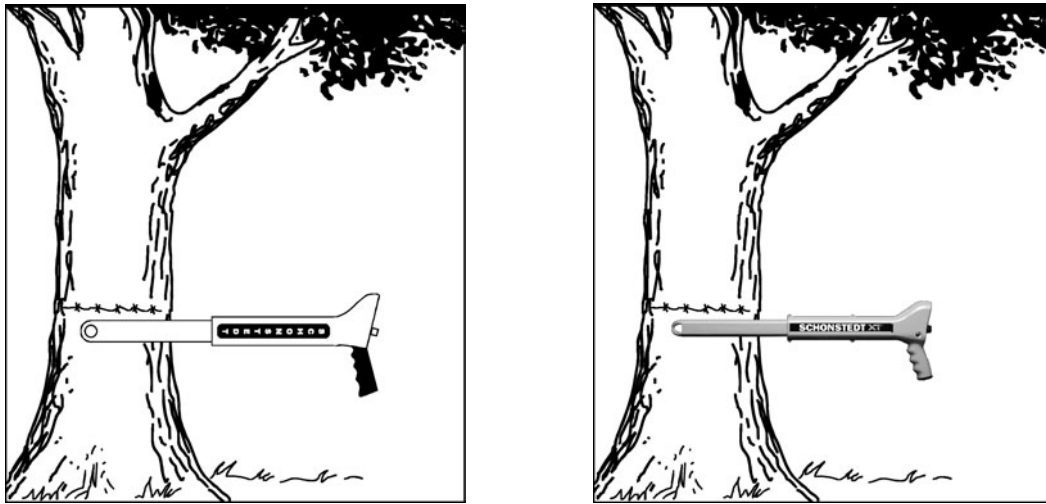


Figure 16. Tracing Barbed Wire from Old Fence Lines

Examine trees for bench marks and bits of embedded barbed wire. Hold the locator parallel with the direction of the wire.

Searching Areas Along a Chain Link Fence

Searching in the vicinity of a chain link fence requires a reduced sensitivity setting and some control over the orientation of the locator. Position the locator horizontally with its long axis perpendicular to the fence as illustrated in Figure 17. This insures that the upper sensor is kept away from the fence.



Figure 17. Searching in the Vicinity of a Chain Link Fence

Perform the search by slowly moving the locator forward along the fence while also moving it to the right and to the left. This technique allows you to search an area several feet wide as you move forward. Listen

for an abrupt drop in the signal (as shown by the null in Figure 18) that will occur when the lower sensor, located 1-1/2 inches from the end of the locator, is directly over the stake. Any variation in the position of the locator will produce an abrupt rise in the frequency of the signal.

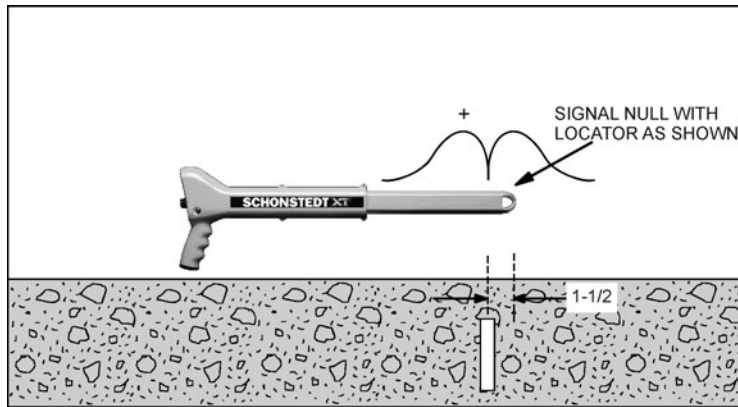


Figure 18. Placement of Locator while Searching along a Chain Link Fence

Locating Valve Boxes

Both the valve and its casing, when iron, provide strong magnetic fields which make them easy to locate. Plastic enclosures containing magnets are easily located at depths of 6 feet or more.

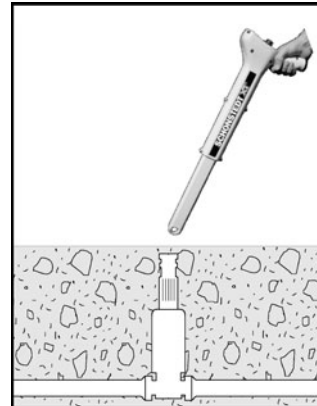


Figure 19. Locating Valve Boxes and Casings

Locating Cast-Iron Pipes

As illustrated in Figure 20, cast-iron pipes produce the strongest magnetic signals at their joints.

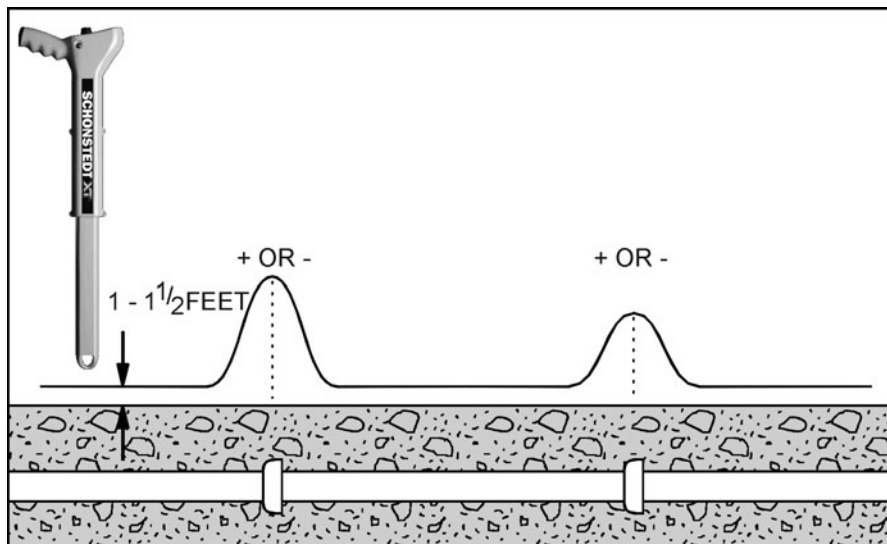


Figure 20. Signal Patterns Provided by Cast-Iron Pipes

The initial search should be performed as follows:

1. Set the Sensitivity control for maximum (XH indication).
2. Hold the locator vertically approximately 1 to 1-1/2 feet above the surface.
3. Walk along without turning or tilting the locator.
4. Mark the locations where the maximum signal levels occur.
5. Return to an area of maximum signal strength and hold the locator several inches above the surface. The sensitivity will probably have to be reduced during this second pass. Four-inch pipes can be located at depths up to 9 feet.

Locating Steel Drums

As shown in Figure 21, the GA-92XTd's signal pattern will vary depending on the vertical or horizontal orientation of the drum and also how deep it is buried. A fifty-five gallon drum can be located at depths up to 8 feet.

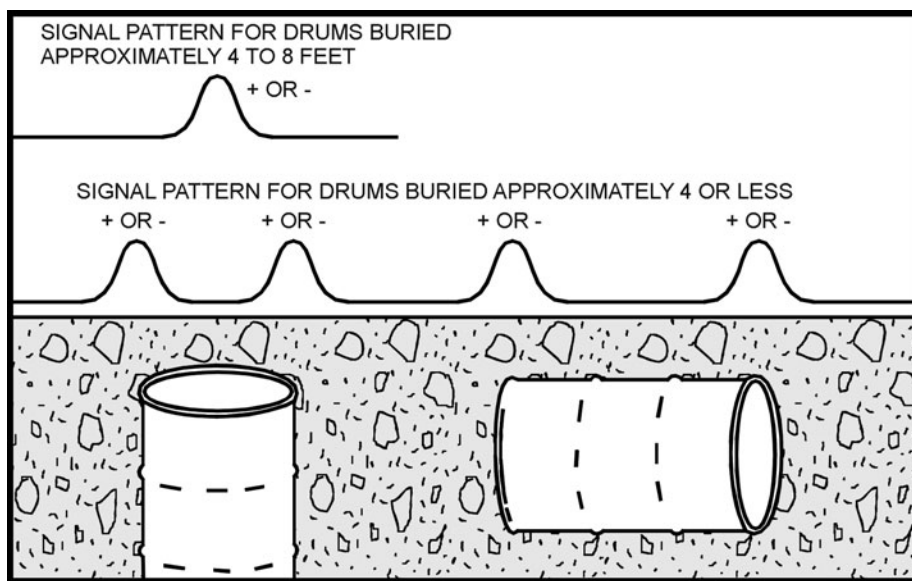
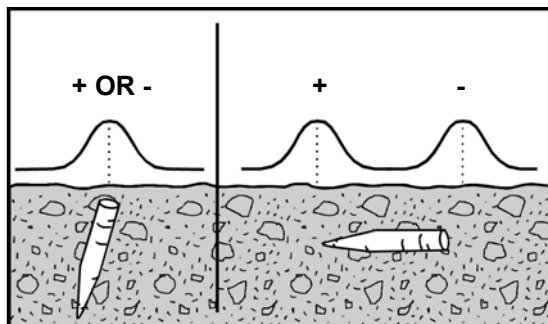


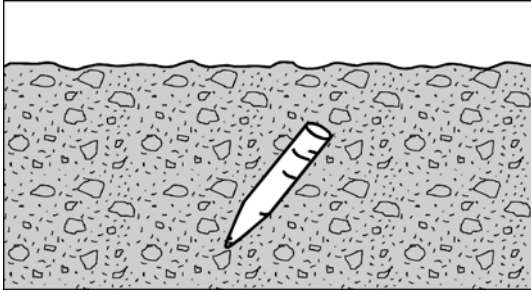
Figure 21. Signal patterns provided by steel drums

Locating Ordnance and Weapons

The versatile, lightweight, cost-effective GA-92XT is also designed to aid EOD technicians and law enforcement officers during area search operations.

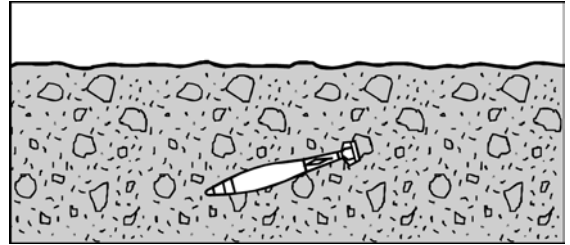
Basic signal patterns from vertical and horizontal targets help to determine target orientation.



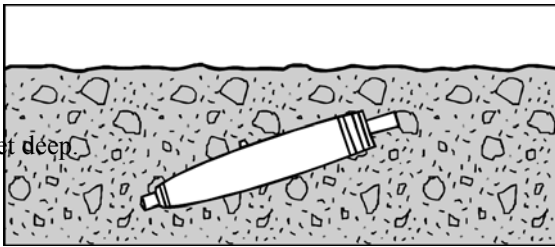


A 175mm projectile can be located up to 4 feet deep.

An 81mm mortar can be located up to 12 inches deep.

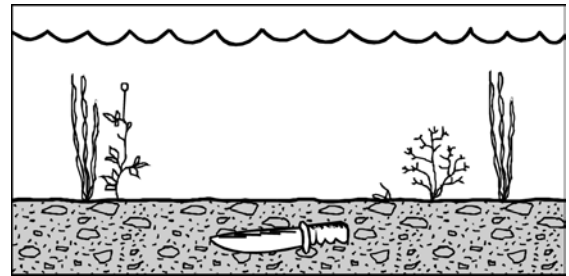


feet deep.

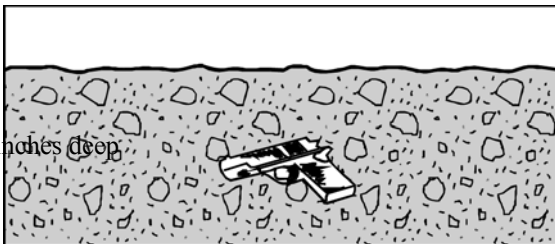


MK81 Low drag bombs can be located up to 7

A hunting knife under water can be located in up to 14 inches of silt.



inches deep.



A discarded hand gun can be located up to 12

Other Notes

1. A burbling sound indicates the presence of an energized power line. This will not influence the meter indication unless associated with a magnetic structure.
2. The instrument will not respond to nonmetallic materials such as gold, silver, copper, brass and aluminum.

MAINTENANCE

The GA-92XT is designed and built to give trouble-free operation. Normally, maintenance is limited to the occasional replacement of the batteries. In the event a malfunction does occur, refer to the Troubleshooting Guide on page 16 for a few problems that you can correct in the field.

Replacement of Battery

The GA-92XT is powered by one 9-volt lithium battery that has a shelf life of ten years, and provides twice the operating life of an alkaline battery. The battery is located in the handle of the instrument and can be accessed by turning the screw counterclockwise by hand or with the use of a screwdriver or coin. To remove the battery, simply tilt the unit so that the handle is pointing down, and the battery will slide out. When replacing the battery, look at the inside of the battery door for the proper battery orientation. (The positive terminal should be on the right on the inside of the unit) As a safety measure the unit has been "Keyed" so that the battery will only make contact when in the correct orientation. For this reason you should never have to force the battery door closed. If the battery does not seem to be going in all the way, remove, reverse and then replace.

CAUTION

The locator is shipped with a spare lithium battery conveniently stored in the carrying case. It is recommended that when you use the spare battery you replace it as soon as possible so that you will never be without a spare battery in the field.

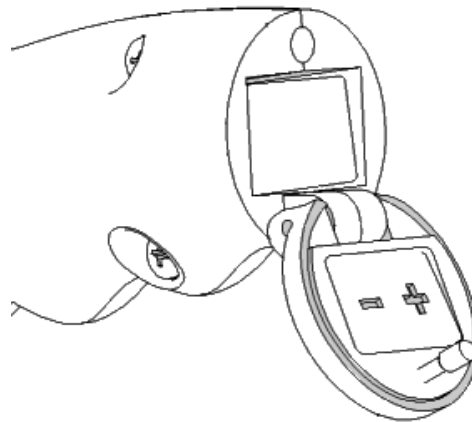


Figure 22. View of Battery Door and Compartment

Troubleshooting Guide

Symptoms	Possible Cause	How to Check	How to Fix
Dead	Dead Batteries	Replace	-----
	Batteries not making contact	Check for contact corrosion	Clean contacts
	Battery leakage	Do not remove*	Return unit to factory
Intermittent	Batteries not making good contact	Check for corrosion	Clean contacts
Uncontrollable screaming	Weak batteries	Replace	-----

*Most battery manufactures' warranties cover the cost of repair or replacement of any device damaged by their batteries. Removing batteries that leak will void their warranty.

SERVICE INFORMATION

If your locator needs service, please return it to the factory along with the following information: Name, Address, Telephone, Fax number, Where Purchased, Date, and Description of Trouble(s). An estimate will be provided prior to service work being done.

**FOR SERVICE OR REPAIR
Please ship locator (in its case) to:**

**Schonstedt Instrument Company
100 Edmond Road
Kearneysville, WV 25430**

SPECIFICATIONS

(Specifications subject to change without notice)

Output	Audio: Signal increases in frequency with gradient field intensity. Idle frequency = 10 Hz. Visual: Expanding bar-graphs indicate polarity (positive or negative) and relative signal strength
Battery Indicator	4-segment LCD
Gain	Continuous control, with range indicated by a 4-segment LCD at each quarter turn, L @ 0-1/4, M @ 1/4-1/2, H @ 1/2-3/4, XH 3/4-Full
Volume	Continuous control
Input Power	Supplied by one 9 V battery (Lithium recommended, but not required)
Battery Life	24 Hours (intermittent usage)
Operating Temperature	-13° F to 140° F (25° C to 60° C)
Water resistant Length	11.5 in (~29 cm) Unit extended only
Overall Length	Unit extended: 26 in (~66 cm) Unit collapsed: 15.5 in (~39 cm)
Nominal Sensor Spacing	9.5 in (~24 cm)
Weight	Approximately 2.4 Lbs (1.1 Kg)
Construction	30% glass-filled, high impact ABS, .2" (~5 mm) wall thickness

LIMITED WARRANTY

The Schonstedt Instrument Company (Schonstedt) warrants each product of its manufacture to be free from defects in material and workmanship subject to the following terms and conditions. The warranty is effective for 7 years (with the return of the Customer Registration Card) after the shipment by Schonstedt to the original purchaser.

Schonstedt's obligation under the warranty is limited to servicing or adjusting any product returned to the factory for this purpose and to replacing any defective part thereof. Such product must be returned by the original purchaser, transportation charges prepaid, with proof in writing, to our satisfaction, of the defect. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost. Prior to repair, in this instance, a cost estimate will be submitted. Service or shipping information will be furnished upon notification of the difficulty encountered. Model and serial numbers must be supplied by user. Batteries are specifically excluded under the warranty.

Schonstedt shall not be liable for any injury to persons or property or for any other special or consequential damages sustained or expenses incurred by reason of the use of any Schonstedt product.

FOR SERVICE OR REPAIR
Please ship locator (in its case) to:

Schonstedt Instrument Company
100 Edmond Road
Kearneysville, WV 25430

PATENTS

Manufactured under one or more of the following Patents: United States: 4,163,877; 4,258,320; 4,803,773; 4,839,624; 5,097,211; 5,136,245; 5,138,761; 5,239,290. Other United States and foreign patents pending.