

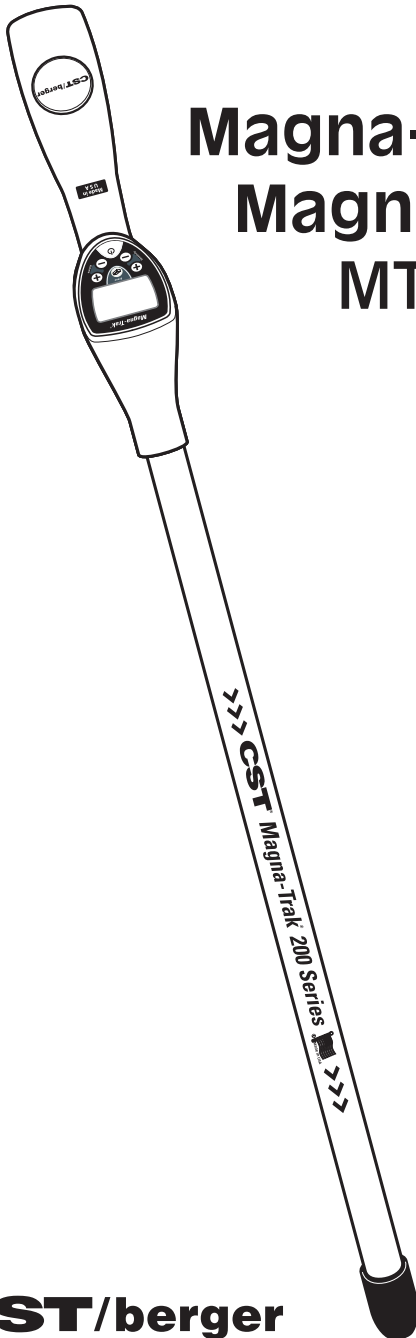
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# INSTRUCTION MANUAL

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## Magna-Trak® Series Magnetic Locator MT200 • **MT202**



**CST/berger**

Thank you for purchasing the Magna-Trak<sup>®</sup> Magnetic Locator. Please read this manual thoroughly before operation.

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## CONTENTS

<b>1. Introduction</b> .....	<b>2</b>
<b>2. Theory of Operation</b> .....	<b>3</b>
<b>3. Features</b> .....	<b>5</b>
<b>4. Basic Operation and Description</b> .....	<b>6</b>
4.1 Power On/Off Switches .....	6
4.2 Volume and Sensitivity Control Knobs .....	6
4.3 Speaker .....	6
4.4 LCD Visual Display .....	7
4.5 Erase Button .....	7
<b>5. Battery Replacement</b> .....	<b>8</b>
<b>6. Field Operation</b> .....	<b>9</b>
6.1 Water Locations .....	9
6.2 Locating Near a Steel Fence .....	9
6.3 Searching Under An Unattended Vehicle .....	9
<b>7. Signal Response</b> .....	<b>9</b>
7.1 Typical Signal Responses .....	11
<b>8. Specifications</b> .....	<b>4</b>
<b>9. Warranty &amp; Service</b> .....	<b>4</b>

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## 1. INTRODUCTION

The Magna-Trak 200<sup>®</sup> Series magnetic locator is a flux-gate type of magnetometer which incorporates a unique patented technology that enables the factory to balance the magnetic sensing coils to a finite condition. This patented method of magnetic balancing is advanced in the state of the technology.

The Magna-Trak 200<sup>®</sup> Series implements

“peak response” over ferromagnetic objects by yielding an increasing audio signal as the object is approached and passed over.

This instrument is the product of many years of experience and service provided by CST to the industry.

This Owner’s Instruction Manual covers the operation of both the MT-200 and MT-202 magnetic locators. The primary difference between both locators is the Erase feature available only on the MT-202 model.

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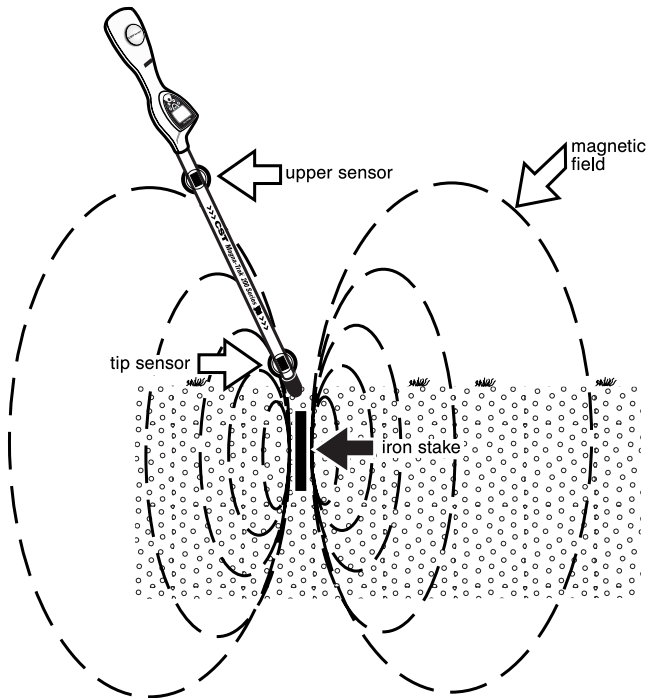
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## 2. THEORY OF OPERATION

The locator finds ferromagnetic objects by sensing the magnetic field radiated by the object. The locator contains two sensor coil assemblies that are precisely spaced and electronically balanced to achieve a near magnetically-balanced operating condition. In a uniform magnetic field, such as the earth's field, the two sensor coils maintain a magnetically-balanced status, because both of the coils experience the same magnetic lines of force. However, when a ferromagnetic object is approached, the field strength and angle of the magnetic lines upon each sensor is different. This difference, although minute, is enough to offset the critical balance and produce an audible indicating signal (Fig. 1).

When no ferromagnetic objects are present, the speaker emits a steady low frequency tone. As the object is approached, the audio frequency increases until the center of the object is directly beneath the locator's lower tip sensor. The frequency peaks and then decreases as the object is passed. The peak indicates the exact location of the object.

Nonferrous objects do not affect the locator. Objects made of brass, aluminum, copper, etc. are ignored.



**Fig. 1**  
*Sensor coils unbalanced by magnetic field of iron stake.*

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## 8. SPECIFICATIONS

**Power:** Six "AA" (1½ volt) batteries

**Battery life:** 100 hours of intermittent operation (alkaline batteries)

**Output:** Powerful magnetic speaker with molded cover to protect from direct contact.

**LCD Display:** Numeric digital, analog Bar-graph, power line indicator and low battery indicator feature

**Weight:** Approximately 2.5 lbs. with batteries

**Operating temperature:** 0°F to 120°F (-18°C to 49°C)

**Length:** 42¾ inches (108.6 cm)

**Construction:** High-impact water resistant plastic, epoxy painted. Aluminum sensor tube waterproof to just under the plastic case.

**Patent:** United States #4,439,732.

**Nominal Sensor:** 20 inches (50.8 cm)

*Specifications subject to change without notice.*

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**CST**

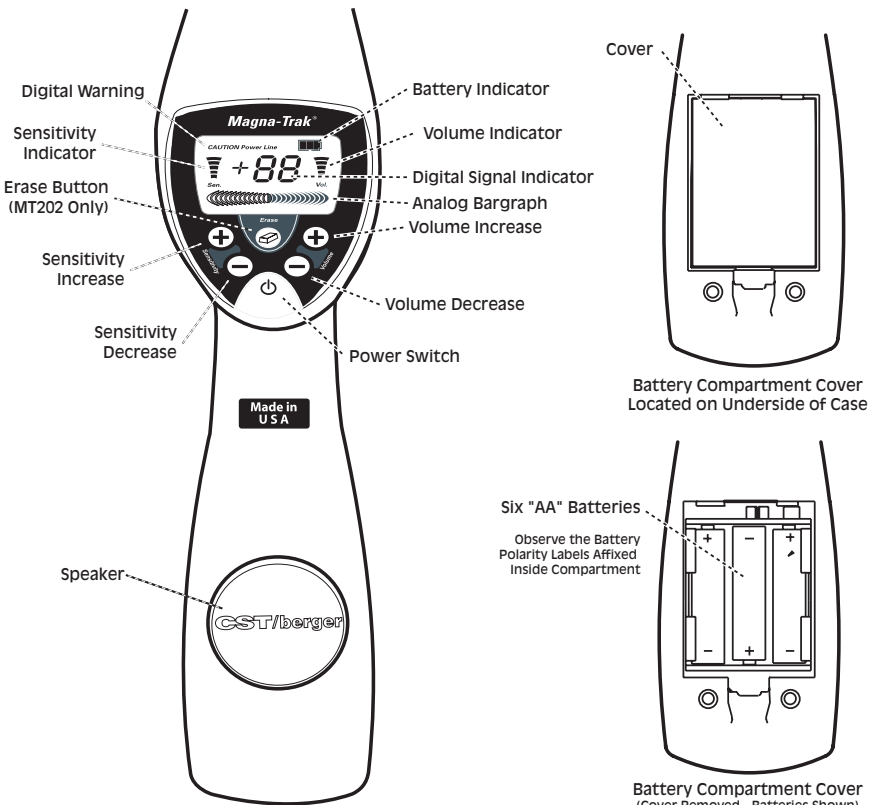
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### 3. FEATURES

- Rugged high-impact plastic enclosure with aluminum sensor pole
- Powerful magnetic speaker with molded cover to protect speaker from direct contact of water and dust
- Lightweight, comfortably balanced for easy handling
- Six "AA" (1½ volt) battery operation; ±100 hr battery life
- Quick-access battery compartment
- Deep tone audio under search conditions; signals "peak" over magnetic objects
- Full depth capability
- Includes padded carrying case with shoulder strap or hard case
- Instrument Control Panel features LCD visual display and water-repellant push button switch operation:

LCD Visual Display includes a two-digit numeric signal indicator, an expanding analog bar graph signal indicator, battery indicator, and "Caution: Power Line" alert flashing indicator. Displays "ferrous" model operation.

"ERASE" button (Model MT202)– Interferences such as a nearby fence are "Virtually erased" which enhances the detection of the target of interest.



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## 4. BASIC OPERATION AND DESCRIPTION

### 4.1 Power On/Off Switches

Press "ON" once to activate the locator circuitry. Press again to turn the battery power off.

### 4.2 Volume and Sensitivity Control

**Sensitivity Setting:** The sensitivity or depth range can be varied using the "UP" and "Down" buttons while observing the associated bar graph and two-digit numeric display. When the "UP" or "Down" buttons are pressed, the two-digit numeric display changes from a signal level indication to a sensitivity level indication. The two-digit numeric display can be incremented or decremented by one by pressing and releasing the "UP" or "Down" button. If the "UP" or "Down" button is pressed and held, the two-digit numeric display will continue to increment or decrement until the button is released. The associated bar graph will give a coarse indication of sensitivity level.

- 1-bar, lowest sensitivity: 0-14 numeric
- 2-bars, higher sensitivity: 15-30 numeric
- 3-bars, next higher sensitivity: 31-45 numeric
- 4-bars, highest sensitivity: 46-99 numeric

The microcontroller will remember and return to the last sensitivity level selected the next time the instrument is placed the "ON" position. The optimal setting is determined by each particular application.

**Volume Setting:** The volume can be varied using the "UP" and "Down" buttons while observing the associated bar graph and two-digit numeric display. When the "UP" or "Down" buttons are pressed, the two-digit numeric display changes from a signal level indication to a volume level indication. The two-digit numeric display can be incremented or decremented by one by pressing and releasing the "UP" or "Down" button. If the "UP" or "Down" button is pressed and held, the two-digit numeric display will continue to increment or decrement until the button is released. The associated bar graph will give a coarse indication of volume level.

- 1-bar, lowest sound: 0-33 numeric
- 2-bars, quieter tone: 34-48 numeric
- 3-bars, below maximum: 49-73 numeric
- 4-bars, maximum sound: 74-99 numeric

### 4.3 Speaker

When no ferrous metal is present, the audio sound heard will be a low frequency tone. As ferrous metals are approached, the audio tone will increase.

## 4.4 LCD Visual Display

Several visual display functions, provided for ease of operation, are defined below:

### Digital Signal Indicator

A two digit numeric display shows the signal level as related to the audio signal response being heard from the speaker. At the lowest signal level, when no ferrous metal is present, a small number will be viewed (between "0" and "5"). As metal is approached, the numbers will increase, reaching "99" at its maximum peak. Deeply buried objects or lower sensitivity levels will yield a lower peak number to aid in pinpointing the object. A "+" in front of the two-digit numeric display indicates north polarity field detected from object. A "-" in front of the two-digit numeric display indicates south polarity field detected from object.

### Analog Bar-Graph Signal Indicator

The bar graph display expands outward from the center "oval" as related to the audio signal response being heard from the speaker. The signal level bar graph expanding right indicates north polarity field detected from object. The signal level bar graph expanding left indicates south polarity field detected from object.

### Power Line Indicator Feature

The electromagnetic fields radiated from buried or overhead power lines are picked up by the sensitive electronic circuitry and internally transformed into a visually flashing indicator in the display window as shown. (Fig. 2).

The distance or detection range from the cables where the locator responds depends on the energy being carried by the electrical conductors. The higher the energy, the greater the distance the locator will respond to it. If the cables are dead (no electrical connection or energy transfer), then no visual indication will appear.

When the locator is turned ON, this feature is activated immediately. This feature only responds to 50 or 60Hz power line frequencies and not to telephone or TV cables. This feature is intended as an aid only and not to be used for locating or pinpointing electrical cables.

The magnetic detection operation and performance of the magnetic locator are completely independent from the power line indicator feature.

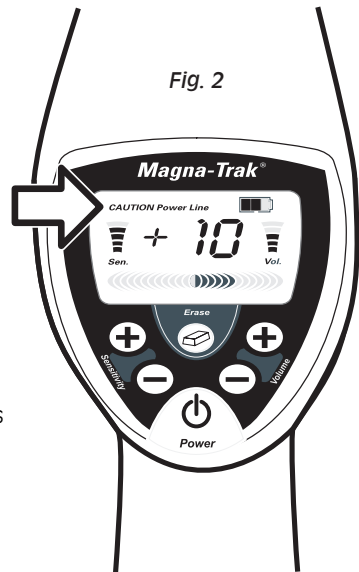


Fig. 2

## 4.5 Erase Button

This is an optional button that is primarily used in locations where large metal objects normally interfere with the desired operation of magnetic locators. Cyclone fences, metal buildings, vehicles and other large magnetic objects can be electronically erased with this button.

The operation of this feature is best defined by explaining the typical locator without this feature. For example, typical magnetic locators will normally yield a screaming audio tone when they are being operated in close proximity to a metal fence. The magnetic field from this fence will usually override the signal being sought from the

buried object in search of. The only option is to reduce the sensitivity until the interference from the fence is minimized. However, the locator's sensitivity to the buried object is also minimized and usually undetectable.

The Magna-Trak 202 and its "Erase" feature solves this problem by providing an Erase Button; simply press this button when an object is interfering with the object of interest.

The sensitivity is automatically adjusted to enhance the detection of the object of interest. As the ferrous properties of the interfering object changes, the ERASE button can simply be pressed again to either increase or decrease sensitivity to enhance the detection of the object of interest.

Pressing the ERASE button adjusts the sensitivity level to 60. If the interfering object causes the sensitivity reading to approach 99, pressing the button will reduce sensitivity to a reading of 60. If the sensitivity reading drops below 60, pressing the button will increase sensitivity to 60.

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## 5. BATTERY REPLACEMENT & TIPS

**Battery Status Indicator** - The battery condition is displayed with a bar-graph. As the battery loses power, the bar graph displays less segments. Four levels of battery condition are displayed as follows:

**3-bars**, full battery voltage

**2-bars**, sufficient battery power remains

**1-bar**, sufficient battery power remains, but they are approaching a replacement condition

**0-bars**, batteries are exhausted. Replace batteries as soon as possible.

**Note:** When there is no active display icons, no sound or basic operation has ceased- Batteries are dead and must be replaced immediately.

### **Replace the batteries as follows:**

**1:** Turn the power off.

**2:** Turn the locator over, so battery compartment is facing up.

**3:** Squeeze the cover clip to release the compartment cover and open. Turn locator over, so the battery compartment is facing down.

**4:** Place hand over the opening and tap the case...the battery pack will drop out into your hand. Replace all of the batteries with new AA cells. Observe polarity markings.

**5:** Place the battery pack into the battery compartment with the two battery snaps facing down. Press the pack into position. Press the cover down, until you hear a 'click' sound... the cover is securely in place...the locator is ready to use.

**NOTE:** Never attempt to replace batteries selectively. Always replace all six cells at the same time. Preferably use Alkaline cells for longer operating and storage life. Dead batteries must be removed or replaced immediately.

## 6. FIELD OPERATION

The recommended search position is a 45° angle from the earth's surface. Scan the locator pole from side-to-side in a slow sweeping motion while walking in a steady direction. Maintain a consistent height above the ground during the side-to-side sweeping motion.

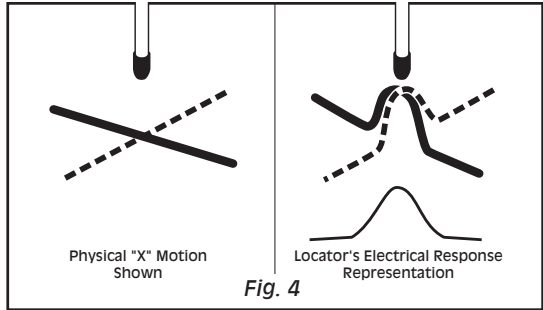


Fig. 4

Once the object being searched is located, pinpointing the object's location can be accomplished by holding the locator vertically and sweeping it in an "X" pattern until the absolute signal peak is found (Fig. 4). The audio sound and visual LCD display will provide the pinpointing results.

Please note that your magnetic locator is not only sensitive to buried ferrous objects, but also to items in your possession. Ferrous objects such as steel tipped shoes, a pocket knife, some wrist watches, key chains or other objects containing ferrous material can cause false signals during your search.

The locator is not affected by the presence of nonferrous objects, such as copper, aluminum pull tabs or foil, and other forms of trash that may be present in the ground. Snow, ice, water, wood, plastic, concrete, stones, and the ground itself have no effect on the performance of the locator.

### 6.1 Water Locations

The pole section of the locator can be submerged into water, up to just under the plastic case (Fig. 5).

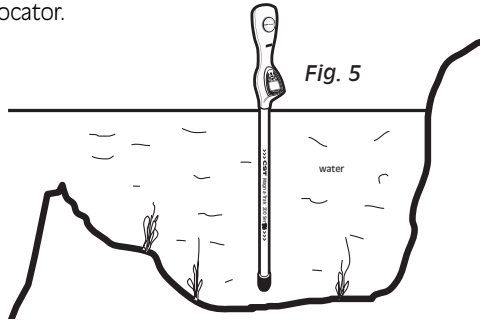


Fig. 5

### 6.2 Locating Near a Steel Fence

Approach the fence and stop at the distance at which you wish to begin your search. While holding the locator in a vertical position (Fig. 6), press and release the "erase" button on the membrane panel. Begin sweeping the locator side to side parallel to the fence. As you move toward or away from the fence during the sweeping motion, at some point you may have to press the "erase" button again.

Continue this process throughout the search. The need to reactivate the "erase" circuitry depends on the proximity from the fence and the magnetism of the fence itself.

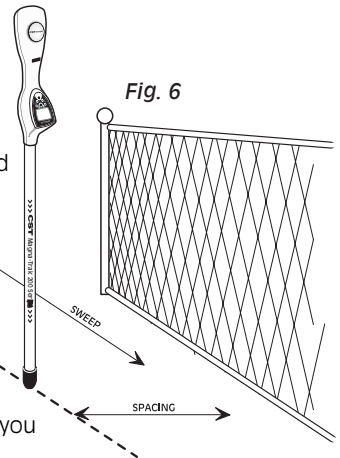


Fig. 6

### 6.3 Searching Under an Unattended Vehicle

In the event you must search under an parked vehicle that is unattended, you can simply slide the sensor pole under the vehicle and activate the "erase" feature. Slide the sensor pole side to side until you locate the target.

## 7. SIGNAL RESPONSE

Figure 7 shows audio and LCD visual signal response to:

- 1: no object,
- 2: one small deeper metal target, and
- 3: a second larger and shallower metal object.

The LCD display indicates both the numeric  $\neq$ digital and analog bar-graph response as the locator passes over the ground.

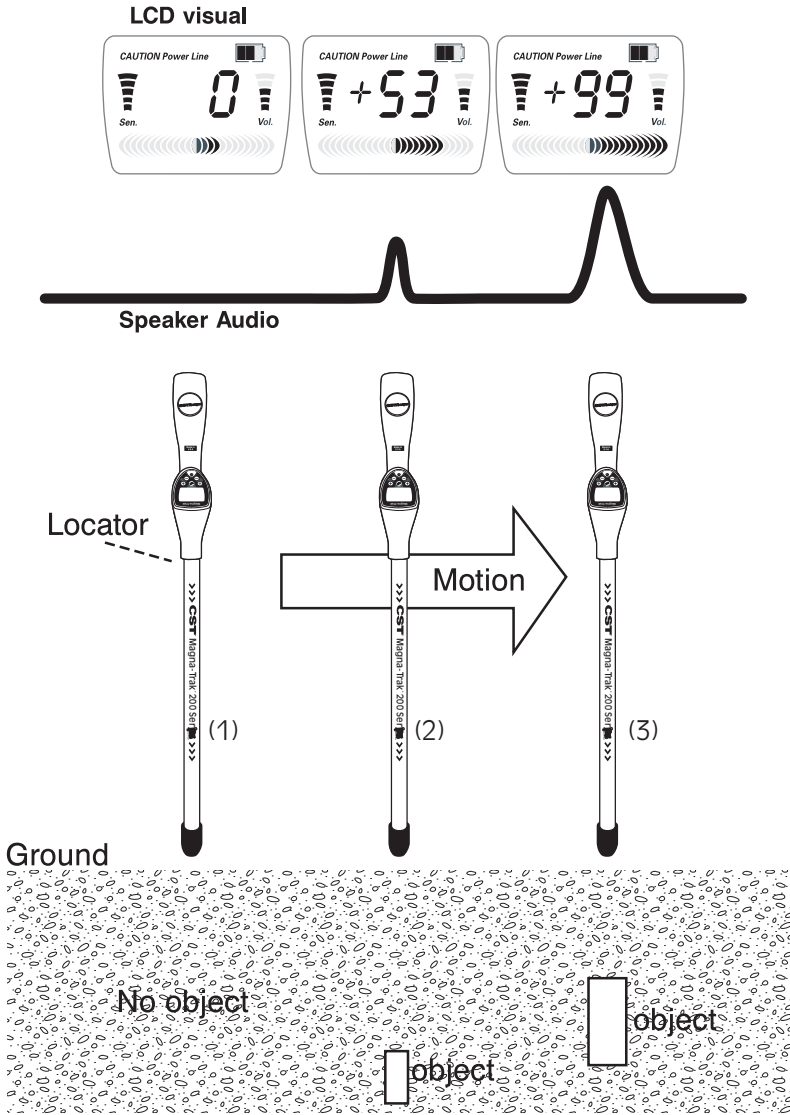


Fig. 7

## 7.1 Typical Signal Responses

The metal handles on the septic tank cover will provide a usable signal to determine the location of the actual cover (Fig. 8).

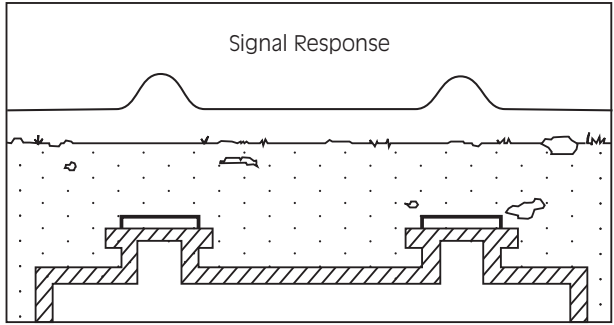


Fig. 8

Large metal objects may cause double signals as indicated (Fig. 9).

The center of the cover is found by sweeping the locator back and forth to create a ring pattern response. The center null will designate the cover's center.

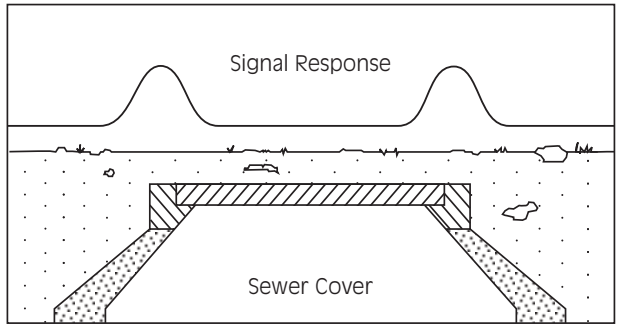


Fig. 9

The joints, elbows and ends of iron pipes will create the strongest signals (Fig. 10). Hold the locator in a vertical position while searching to produce the best results.

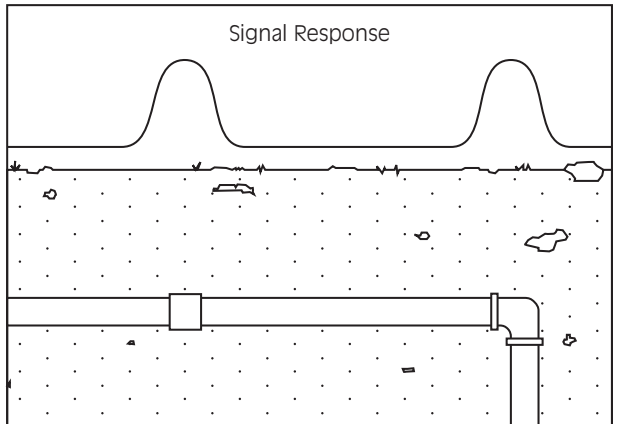


Fig. 10

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