

DIVISION OF TINKER & RASOR



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PRODUCT INSTRUCTIONS MODEL 505 "Go-FER"

CONTROLS AND FUNCTIONS

RECEIVER

- A. Headphone Receptacle
 - Allows for use of headphones. Inserting headphone plug turns receiver "On".
- B. Power "On-Off" Switch
 - "Pull" to turn receiver "On" when loudspeaker operation is desired.
- C. 45° Depth Level Indicator
 - Provides a fast and accurate means of positioning the receiver at 45° for determining depth of buried pipes or cables.
- D. Gain Switch
 - Battery test position gives an indication of battery condition on signal intensity meter. "L", "M", and "H" positions program the receiver for low, medium or high gain.
- E. Sensitivity Control
 - Controls the amount of sensitivity during operation.
- F. Visual Indicator — Battery Test Meter
 - Gives direct visual indication of signal intensity. Also used for visual indication of receiver battery condition.
- G. Handle Mounting Receptacle
 - Threaded receptacle for mounting Receiver on carrying handle.
- H. Audio Loudspeaker
 - Given audio indication of signal intensity.
- I. NEW! Volume Control
 - Regulates volume without affecting sensitivity.
- J. Handle Mounting Receptacle
 - Threaded receptacle for mounting receiver on carrying handle
- K. Input Terminal
 - For use with accessories such as the TS/8 and the 501 Induction Clamp.

TRANSMITTER

- L. Handle Mounting Receptacle
 - Threaded receptacle for mounting transmitter on carrying handle.
- M. Battery Test Lamp
 - Gives lighted indication of Transmitter battery condition.
- N. Conductive-Inductive Switch and Signal Identifier
 - Function switch for desired method of operation. "Conductive" position for direct coupling to pipe and "Inductive" position for "On-handle" operation and inductive coupling to pipe. Center position provides for testing battery. Note: This switch also activates the signal interrupter, allowing easier identification of transmitted signals under conditions of foreign noise and high interference.
- O. Power "On-Off" Switch
 - "Pull" to turn Transmitter "On".
- P. Output Jack
 - Jack for attaching the ground plate cable, providing a transmitter ground for direct connection (conductive) operations and for attaching ground plate and other accessories.
- Q. Carrying Case

ACCESSORIES

- R. Headphones
 - For optional use. Built-in loudspeaker in Receiver is automatically disconnected when headphones are used.
- S. Ground Plate and Conductive Clamp
 - Provides transmitter ground for direct connection (conductive) operations and means of direct coupling the transmitter to the pipe.
- T. Carrying Strap
 - Used to operate instrument "on-handle" at ground level for greater depth penetration and sensitivity.
- U. Carrying Handle (Transmitter End)
- V. Carrying Handle (Center Section)
- W. Carrying Handle (Receiver End)

PRODUCT INSTRUCTIONS

ASSEMBLY INSTRUCTIONS (ON HANDLE) OPERATION

STEP ONE:

Assemble instrument as illustrated.



STEP TWO:

Read condensed instructions on RECEIVER panel and page 3 of operating instructions. Make adjustments accordingly.

STEP THREE:

When crossing a metal pipe or conduit at right angles you will note an increased tone and meter reading. For best results the pipe should be crossed from each side and position marked where the indication is the strongest. The true location of the buried pipe is exactly between the two marks. If the indication is too broad, reduce the sensitivity to narrow the width of the indication.

GENERAL INFORMATION

These instructions have been prepared to help you obtain the maximum usefulness and results from your DETECTRON PIPE & CABLE LOCATOR. It would be extremely difficult, if not impossible, to describe each and every step in detail for all applications because of the variations of environmental conditions and operator skills. With the aid of suggested procedures outlined in this manual and a brief familiarization period, the operator can expect to obtain excellent results.

THEORY OF OPERATION

DETECTRON PIPE & CABLE LOCATORS provide, in practical form, an electronic instrument for locating and accurately “pinpointing” concealed metal objects such as metallic pipe, cables, conduit, etc. and determining their true course.

The locator consists of two basic units: a directional radio frequency TRANSMITTER and a RECEIVER. The TRANSMITTER generates an electromagnetic field which surrounds the buried metallic object or, in the case of a pipe, travels along it. The locator may be operated INDUCTIVELY coupled through air and/or ground to the concealed pipe or other metal object. A direct wire connection between the TRANSMITTER and pipe may be used. The RECEIVER detects and traces the electromagnetic field. By this means, the exact location and orientation of the pipe can be determined. A thorough understanding of the theory of operations is extremely valuable. The operator should be aware of the fact that unusual changes in soil conductivity or random metal objects can cause misleading indications

METHODS OF OPERATION

INDUCTIVE OPERATION (WITH HANDLE)

The location of unknown metal pipe, cable and conduits can best be accomplished with the RECEIVER and TRANSMITTER coupled together by means of the provided carrying handle.

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1. Attach handle to RECEIVER and TRANSMITTER as shown on page 2.
2. Pull RECEIVER power switch to "ON" for loudspeaker operation. If headphones are desired, simply plug in headphones and RECEIVER will be turned on automatically.
3. Turn RECEIVER sensitivity control knob to the "STAR". Set gain switch to "L".
4. Pull TRANSMITTER power switch to "ON". Set CONDUCTIVE-INDUCTIVE switch to "INDUCTIVE".
5. To tune, hold instrument at proper operating height (pg. 2) with the handle parallel to surface being investigated. CAUTION: Tuning operation must be conducted over an area free from all metallic objects, i.e. vehicles, wire fences, etc., otherwise improper tuning will result.
6. Rotate knob "T" to the right (CLOCKWISE) until spring starts to tighten. At this point, a full scale meter reading and loud audible signal shall be noted. Now rotate knob "T" left (COUNTER-CLOCKWISE) until meter reads zero and audible signal disappears. Then continue rotating knob "T" left (COUNTER-CLOCKWISE) until faint visual and audible signal is observed. The instrument is now properly tuned and ready to operate. When instrument is passed over metallic pipes, or other conductive objects, a sharp increase of audible and visual signal will result.
7. If unable to "tune" per above directions, reduce "SENSITIVITY" control slightly.

The pipe or cable under surveillance should be approached at an approximate right angle to the assumed direction of its course. As the pipe or cable is approached and crossed, an increase in audio and visual indications will be noted from the RECEIVER. The maximum indication shall be when the TRANSMITTER is directly over the object. Once the pipe or cable is found, the SENSITIVITY control can be readjusted to govern the amount of signal indication received. It will originally be noted that the signal indication over a buried pipe is very wide. By reducing the setting of the SENSITIVITY control, the width of indication can be narrowed and pipe location pinpointed. The effectiveness of your locator is largely dependent on proper usage of the SENSITIVITY control. If SENSITIVITY is adjusted to narrow one point of investigation-retune before proceeding with investigations at other points.

INDUCTIVE OPERATION (WITHOUT HANDLE)

Accurate tracing of concealed pipes, cables and conduits can best be accomplished by using the RECEIVER and TRANSMITTER uncoupled.

In this method of operation, the RECEIVER and TRANSMITTER units are employed separately without the connecting handle. This can be done as a one or two man operation.

When using TRANSMITTER and RECEIVER separately, the maximum energy is induced and detected, respectively, in the pipe or cable when the orientation of the individual units is vertical and parallel over the pipe to be located. See illustration (PAGE 5).

To get the maximum induced energy into the buried pipe or cable, the TRANSMITTER must be placed directly over it in a vertical and parallel position. The proper method of determining TRANSMITTER PLACEMENT over a buried pipe or cable is illustrated in (FIGURES 3 and 4).

Operation of the RECEIVER and TRANSMITTER inductively should not be conducted within 25 feet of each other or air coupling of the units may exist. Air coupling refers to the transmittal of the radio frequency energy through air without the presence of a buried conductor. It may be possible to shorten these distances by reduction of the SENSITIVITY control. However, to eliminate false indication the operator should use caution when operating the units in close proximity of one another.

1. Pull TRANSMITTER power switch to "ON" position.

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2. Pull RECEIVER power switch to "ON" for loudspeaker operation. If headphones are desired, simply plug in headphones and RECEIVER will be turned on automatically.
3. Set RECEIVER "GAIN" control switch to "L".
4. Set TRANSMITTER "CONDUCTIVE INDUCTIVE" switch to "INDUCTIVE" position.
5. Place the TRANSMITTER in a vertical and parallel position over the pipe to be traced (FIGURE 5).
6. Starting at a distance of 25 feet from the TRANSMITTER, the RECEIVER may be used to trace the buried pipe or cable (FIGURE 5). The initial traverse should be conducted by holding the RECEIVER in a vertical and parallel position to the pipe or cable. Short oscillations of the RECEIVER at right angles to the pipe will allow the operator to maintain his position over the pipe and map its true course (FIGURE 5). The SENSITIVITY control can be used to govern the desired width of indication over the concealed pipe. Always bear in mind that the operation of the SENSITIVITY control is the most important single factor in the operation of a pipe locator. When the RECEIVER signal becomes weak, with the SENSITIVITY control full "ON", advance the "GAIN" selector switch to "M", and when necessary to "H".

CONDUCTIVE OPERATION

This method is used when tracing a single pipe, cable or conduit which lies in close proximity to additional concealed electrical conductors.

Experience will dictate which method is best for a given situation and by using one of the suggested methods, it is possible to solve practically any pipe locating problem.

The operation of a pipe locator conductivity is appreciably the same as operation inductively without handle. This method is usually applied when it is necessary to locate a pipe or cable that is in close proximity to additional parallel underground piping systems. In this operational method, the pipe or cable is directly coupled to the TRANSMITTER by means of a connecting cable.

1. Plug DIRECT CONNECTING CABLE and GROUND PLATE CABLE into the jack marked "OUTPUT". Place the TRANSMITTER as far away from the pipe as the connecting cable permits.
2. Connect the GROUND PLATE CABLE to the GROUND PLATE and place the ground plate as far from TRANSMITTER as ground plate cable allows. The ground plate should be laid flat on the ground. Proper positioning of ground plate will increase efficiency of conductive operation.
3. Pull RECEIVER and TRANSMITTER power switches to "ON" position.
4. Set RECEIVER "GAIN" control selector to "L" position.
5. See TRANSMITTER "CONDUCTIVE-INDUCTIVE" control selector to "CONDUCTIVE" position.
6. The RECEIVER is operated in the same manner as described under inductive operation without handle. One advantage of conductive coupling method of operation is that the RECEIVER may be operated within a closer range to the TRANSMITTER than the inductive method of operation. The effectiveness of the RECEIVER is controlled by proper manipulation of the SENSITIVITY and GAIN controls.

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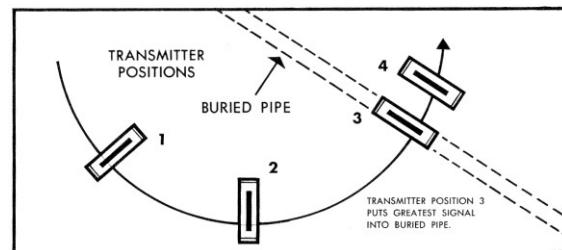
TYPICAL PIPE DETECTION PROBLEMS AND THEIR SOLUTIONS

1. Locating unknown pipe using the locator inductively with handle (PAGE 6).
2. Locating unknown pipes and determining their general direction inductively without handle (PAGE 7).
3. Tracing a pipe inductively without handle (PAGE 8).
4. Tracing a pipe conductivity without handle (PAGE 8).
5. Centering a pipe to determine exact location inductively without handle (PAGE 8).
6. Determining the depth of a pipe inductively without handle (PAGE 9).
7. Locating pipe stubs, lateral services or bends inductively without handle (PAGE 10).
8. Locating dead ends inductively without handle (PAGE 10).
9. Locating in-line valves, risers, Tees and Laterals inductively with handle (PAGE 11).
10. Locating and centering isolated metallic objects inductively with handle (PAGE 11).

TRANSMITTER POSITIONS:

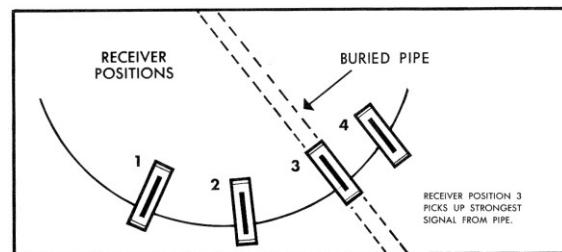
Amount of signal transmitted into buried pipe. (fig. 1)

1. Almost none—when TRANSMITTER is perpendicular to pipe.
2. Very small signal.
3. Maximum signal when TRANSMITTER is parallel to pipe and over it.
4. Very strong when TRANSMITTER is parallel to pipe and close to it.



Amount of signal detected by RECEIVER. (Fig. 2)

1. Minimum signal when RECEIVER is perpendicular to pipe.
2. Very small signal with RECEIVER in this position.
3. Maximum signal when RECEIVER is over and parallel to pipe.
4. Very strong signal when RECEIVER is parallel to pipe and close to it.



LOCATING UNKNOWN PIPE USING THE LOCATOR INDUCTIVELY (WITH HANDLE)

The pipe or cable under surveillance should be approached at an approximate right angle to the assumed direction of its course. As the pipe or cable is approached and crossed, an increase in audio and visual indications will be noted from the RECEIVER. The maximum indication shall be when the TRANSMITTER is directly over the object. Once the pipe or cable is found, the SENSITIVITY control can be readjusted to govern the amount of signal indication received. It will originally be noted that the signal indication over a buried pipe is very wide. By reducing the setting of the SENSITIVITY control, the width of indication can be narrowed and pipe location pinpointed. The effectiveness of your locator is

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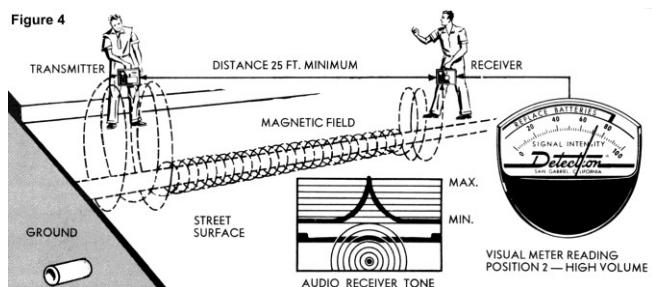
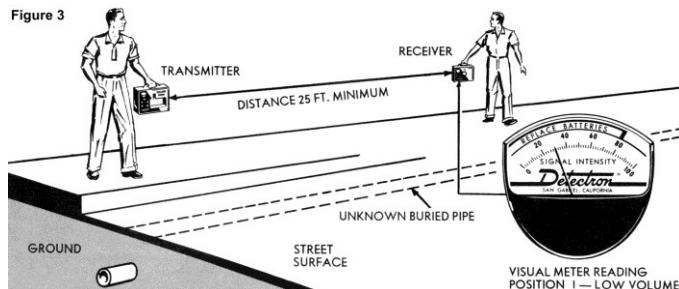
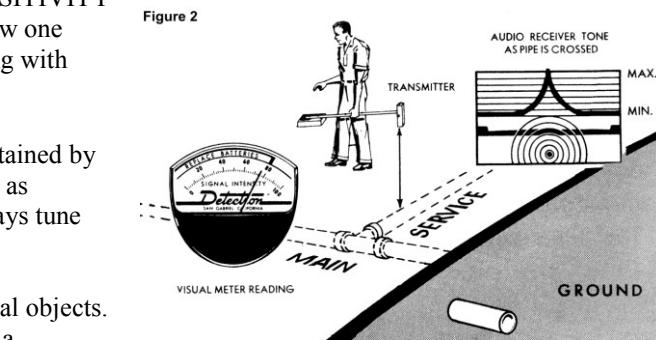
largely dependent on proper usage of the SENSITIVITY control. If SENSITIVITY is adjusted to narrow one point of investigation—retune before proceeding with investigations at other points.

Greater depth penetration and sensitivity is obtained by lowering the instrument as close to the ground as practical by means of the carrying strap. Always tune the instrument at the height you operate it.

Experiment with your locator over known metal objects. Observe that surface or shallow objects create a maximum indication when they are directly under the RECEIVER. The deeper buried objects cause maximum indication more directly under the TRANSMITTER. Once an object is indicated, approach this point from opposite direction to insure accuracy.

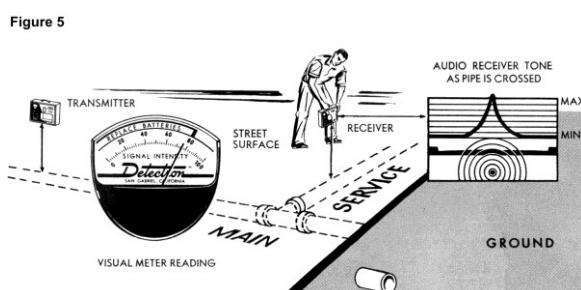
LOCATING UNKNOWN PIPE USING THE LOCATOR INDUCTIVELY (WITHOUT HANDLE)

Both the RECEIVER and TRANSMITTER are held in a vertical position and parallel to the assumed location of the sought pipe. The two operators proceed in unison from the curb line toward the opposite curb (FIGURE 3). When both operators are directly over the pipe, a maximum signal will be noted by the operator carrying the RECEIVER (FIGURE 4). This function can be performed by one operator by placing the TRANSMITTER over the assumed pipe location and traversing the RECEIVER over the assumed course of the pipe, maintaining a minimum distance of 25 feet between RECEIVER and TRANSMITTER. It may be necessary to relocate the TRANSMITTER several times before accurate positioning the TRANSMITTER directly over the pipe.



TRACING A PIPE INDUCTIVELY (WITHOUT HANDLE)

Place TRANSMITTER on ground over pipe and parallel to it (FIGURE 5). Set RECEIVER for maximum gain without tone while at some distance from the assumed pipe location. Make short oscillations back and forth over the



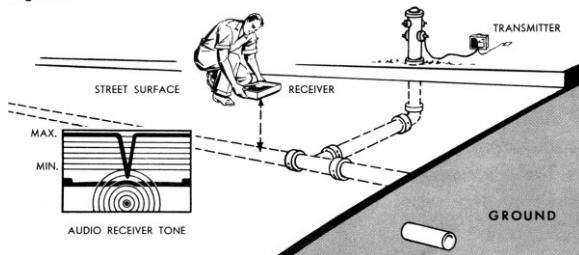
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suspected pipe location keeping the RECEIVER vertical and parallel to the direction of the pipe. Signal will be at maximum when RECEIVER is directly over pipe.

TRACING A PIPE CONDUCTIVELY (WITHOUT HANDLE)

Direct couple the TRANSMITTER to exposed surface of the pipe (FIGURE 6). Operate RECEIVER as described in above paragraph.
NOTE: As distances between TRANSMITTER and RECEIVER increase, the RECEIVER signal decreases. Move TRANSMITTER to the last definite location and proceed with RECEIVER over the pipe.

Figure 6

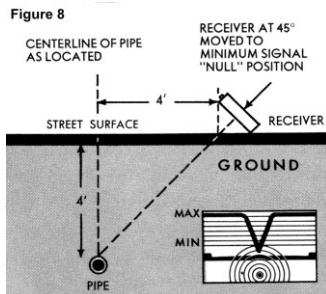
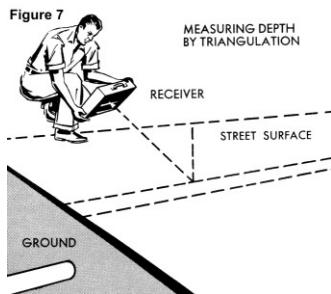


CENTERING A PIPE TO DETERMINE EXACT LOCATION CONDUCTIVELY OR INDUCTIVELY (WITHOUT HANDLE)

Place TRANSMITTER over the pipe or direct coupled to the pipe as illustrated (FIGURES 5 and 6). The operator, at a distance of 25 feet from the TRANSMITTER, then holds the RECEIVER in a horizontal position parallel to the ground surface. By moving the RECEIVER back and forth over the general pipeline location, a very pronounced "null" or minimum signal will be noted. The point of the "null" is the exact center of the pipeline (FIGURE 6).

DETERMINING THE DEPTH OF A PIPE INDUCTIVELY (WITH OUT HANDLE)

To determine the depth of a pipe accurately, the exact center must first be determined as pre-described. Once the centering of the pipe has been accomplished, it is relatively easy to measure the depth by triangulation. The RECEIVER is equipped with a depth level indicator. In order to determine depths of pipes, it is necessary to position the RECEIVER in a 45° angle to the ground surface. This is accomplished by tilting the RECEIVER until the air bubble in the depth level gauge lies between the outer edge of the center ring and the black border of the depth level indicator. Starting at the point directly above the pipe center line, move slowly away from the pipe at a right angle maintaining the RECEIVER at 45°. When new "null" or minimum signal is obtained, the depth of the pipe below the surface is the same as the distance from the center



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line of the pipe and the leading edge of the RECEIVER. NOTE: In (FIGURE 8) the RECEIVER is operated on ground surface. Study (FIGURES 7 and 8) so that the 45° position will be obtained in the proper manner.

LOCATING PIPE STUBS, LATERAL SERVICES OR BENDS INDUCTIVELY (WITHOUT HANDLE)

Using the locator inductively (without handle), the TRANSMITTER should be positioned directly above and parallel to the known pipe position. the RECEIVER is carried vertically above and at right angles to the main. A pipe stub, lateral service or bend shall be indicated by means of increased audio tone and meter reading (FIGURES 5 and 9).

LOCATING DEAD ENDS INDUCTIVELY (WITHOUT HANDLE)

Place TRANSMITTER directly above and parallel to the known pipe position. The RECEIVER is carried vertically above and parallel to the position of the pipe. A maximum meter reading and audible tone shall be obtained as long as the RECEIVER is directly above the pipe. When the end of the pipe is reached, the operator will note a sharp decrease in signal (FIGURE 10). To more accurately determine the exact "dead end", it is necessary to determine the depth of the pipe. After depth of pipe is determined, subtract the depth distance from indicated dead end for accurate location of pipe end.

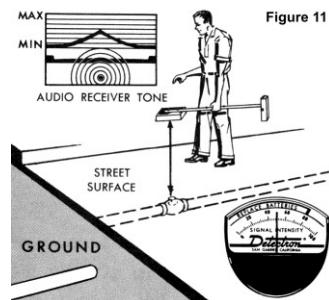
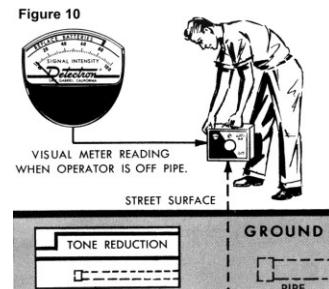
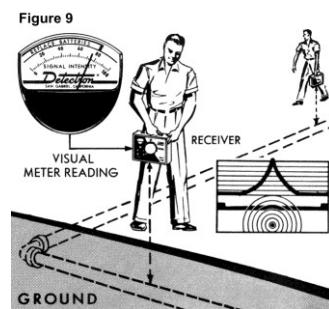
The use of the instrument conductively is identical to that described above, except the TRANSMITTER is directly connected to the pipe under surveillance.

LOCATING IN-LINE VALVES, RISERS, TEES, ETC., INDUCTIVELY (WITH HANDLE)

The pipe course must be predetermined using one of the methods previously described. With the instrument coupled with handle, stand directly over and in line with the pipe. Properly tune instrument while in this position. During the pursuant traverse over the pipe, a valve, riser, tee or lateral shall be denoted by an increase in signal strength.

LOCATING AND CENTERING METALLIC VALVE BOXES, MANHOLE COVER AND ISOLATED OBJECTS INDUCTIVELY WITH HANDLE

The suspected area should be investigated systematically. Tune the instrument in a non-metallic area while the instrument is in normal operating position. A traverse is made over the suspected area in a grid pattern of passes approximately three feet apart. The presence of a metallic object shall be noted by sharp signal response. To locate the center of the metallic object hold the instrument in vertical position (RECEIVER down) and approach the indicated area from multiple



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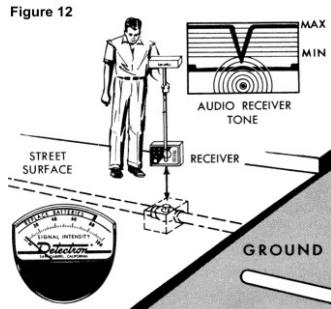
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directions. the exact center of the metallic object shall be determined by the "null" or minimum signal (FIGURE 12).

MAINTENANCE

Battery life expectancy under normal use exceeds one year. To replace batteries on locators with serial number through 56455, remove four brass screws on the edges of both panels; for access to battery compartment on locators with serial number 56456 and higher, back off single screw on battery access door at the rear of each instrument until door opens. Replacement: 12 each "C" Alkaline Batteries.



Note: "C" cell conversion kits are available for older models.

SERVICE

Your Detectron Model 505 has been carefully inspected and tested. The possibility of the instrument requiring servicing other than battery replacement is extremely remote; however, the mechanical design permits a qualified technician to quickly diagnose and correct any malfunction. Circuit boards are plug-in type, designed for easy servicing. For quantity users, we suggest low cost replacement circuit boards be carried in stock. However, they, like all other parts, are readily available from factory.

The DETECTRON MODEL 505 Carries a Full One Year WARRANTY

It is warranted to be free from mechanical and electrical defects due to faulty workmanship and materials. Any locator proven defective under this warranty within one year from date of sale to original purchaser will be repaired or replaced free of charge at our plant; batteries and transportation charges excepted.

Manufacturer assumes no responsibility other than to the original purchaser for repairs made outside our factory.

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