

INSTRUCTION MANUAL ON

(MODEL A-700) CABLE LOCATOR

including instructions on the
Inductive Coupler & Non-Metallic Pipe
Locator, The Sewer & Mini-Snooper

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	PAGE#
I. ACCESSORIES	
a. Inductive Couplers	1
b. Sewer Snooper and Mini Snooper	1
II. BATTERY TEST	1
III. OPERATING INSTRUCTIONS	2
a. Direct tracing	2
b. Definition of a NULL	3
c. Locating by the NULL method	3
d. Definition of a MAXIMUM or PEAK	4
e. Locating by the MAXIMUM or PEAK method	4
f. Inductive tracing	5
g. Tracing with the Inductive Coupler	5
h. Correcting a wide or broad peak Reading	6
i. Determining depth	7
IV. OPERATING INSTRUCTIONS FOR SEWER SNOOPER OR MINI-SNOOPER	8
1. Description	2
2. Familiarization	3
3. Tuning the Snooper to your receiver	3
4. A procedure to locate the exact position of the Snooper	4
5. Summary locating procedure	4
6. Determining depth of Snooper	5
7. Locating non-metallic pipe	5
8. Locating metal inside a non-metallic pipe	6
V. SERVICE AND WARRANTY	11

I. ACCESSORIES FOR THE MODEL A700 LINE LOCATOR

- a. The Model I.C. 49, I.C. 56, or I.C. 56WT Inductive Couplers are used to isolate a line from other utilities even though they are sharing a common ground.
- b. The Sewer Snooper and Mini Snooper are used for locating non-metallic pipe and duct. These accessories are covered in this manual.

II. BATTERY TEST

RECEIVER: The receiver must be turned on to test the battery. Signal being received by the receiver will work the receiver battery as it is worked in normal operation, thus, the transmitter should also be turned on and the receiver sensitivity control turned up when testing the receiver battery. Push the spring loaded BATT button for a battery voltage indication on the meter. Any meter reading in the Batt. OK scale indicates a good battery. A meter reading below the Batt OK scale indicates the batteries are low and should be replaced with an 6 each "AA" batteries..

TRANSMITTER: Set the function control to BATT TEST. Rotate the power control from the OFF position to any power setting. A small light on the face of the transmitter indicates good batteries. If the light fails to light, the batteries are low and should be replaced. 6 each "D" cells. Three batteries per side. the (+) side of the batteries face "in" on both sides when being installed. See Fig. 1.

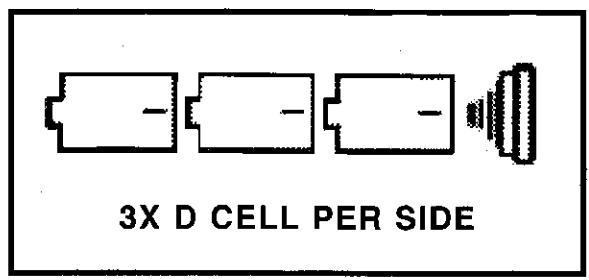


Figure 1

III. OPERATING INSTRUCTIONS

a. DIRECT TRACING

The transmitter is attached directly to an exposed portion of the line to be traced. Use the cable clip and the ground plate supplied with each instrument. Be sure cable clip is attached to clean bare metal. For maximum tracing range, the ground plate should be as far away from the transmitter as possible and at right angles to the direction of the conductor being traced. Since most locates are a short distance, the ground plate can be placed near the transmitter.

Figure 2

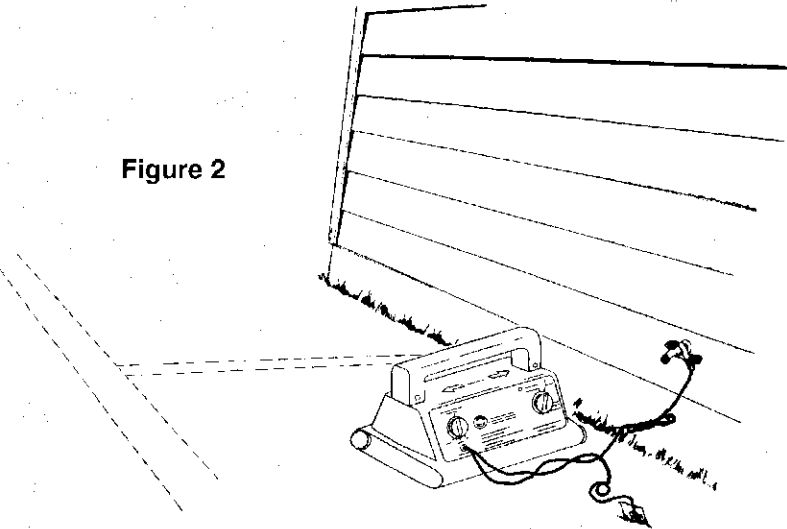


Figure 3

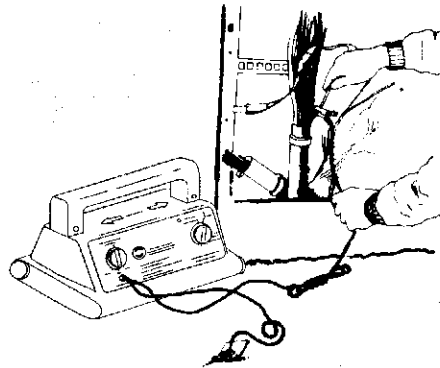
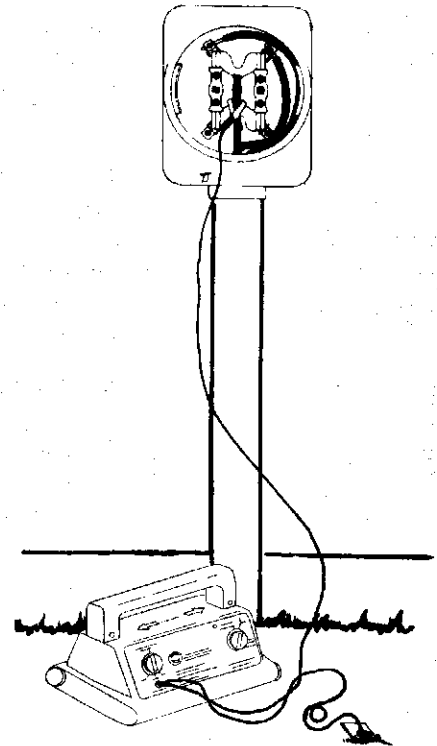


Figure 4



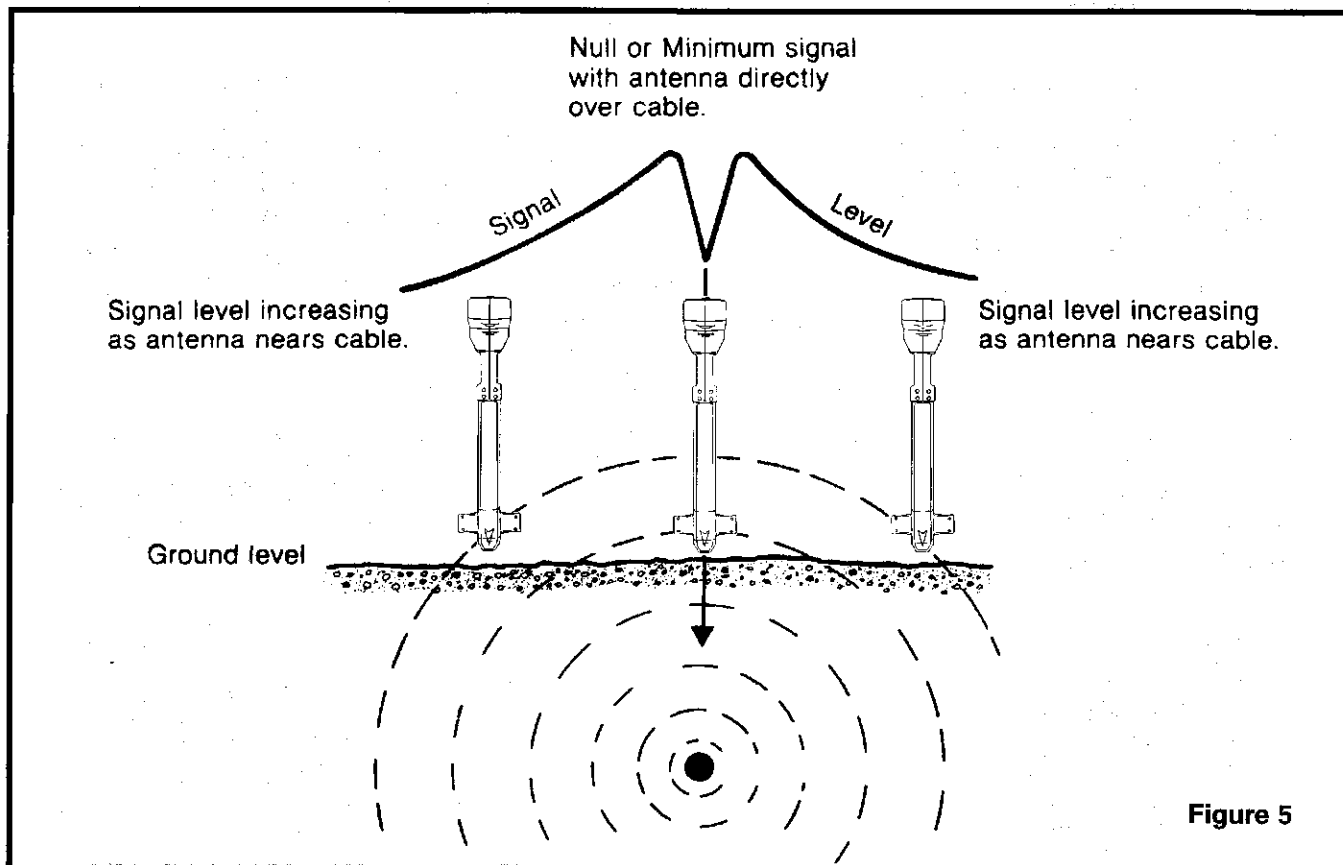
A GOOD GROUND NEAR THE TRANSMITTER WILL PRODUCE BETTER LOCATES THAN A POOR GROUND FARTHER AWAY FROM THE TRANSMITTER. NEVER PLACE THE GROUND ACROSS OTHER UTILITIES. THIS WILL INDUCE A TONE ON THEM EVEN WHEN THEY ARE NOT USING A COMMON GROUND.

Connect ground plate assembly to the transmitter Direct Output phone jack. If possible, push a corner of the ground plate into the ground for a good earth connection. Pouring water on the ground where the ground plate is trying to make connection will help insure a good earth connection. (If on asphalt or concrete, lay the ground plate out flat and pour water on it.)

Switch the transmitter function control to either tap # 1, 2, or 3 depending on soil conditions. Note: See transmitter face-plate decal for reference. Turn the transmitter power control to the LOW POWER setting. For greater tracing range and deep locates, a higher power level may be required, but most locates can be made with the power on low.

For extremely long locates, it may be necessary to match the transmitter output to the line being traced. With the transmitter connected and operating, turn on the receiver and set it down 5 or 6 feet away from the transmitter so the meter can be observed. Turn the sensitivity down for a MID-SCALE meter reading. Rotate the transmitter function control to the tap switch number that provides the highest meter reading on the receiver. At that tap #, the transmitter's output is now matched to the load resistance it is connected to. See Fig. 2, 3, and 4.

- b. DEFINITION OF A NULL – See Fig. 5. A high signal reading is found on both sides of the conductor, and a loss of signal is found directly over the conductor. The sensitivity control setting will determine how sharp or broad the null will be.

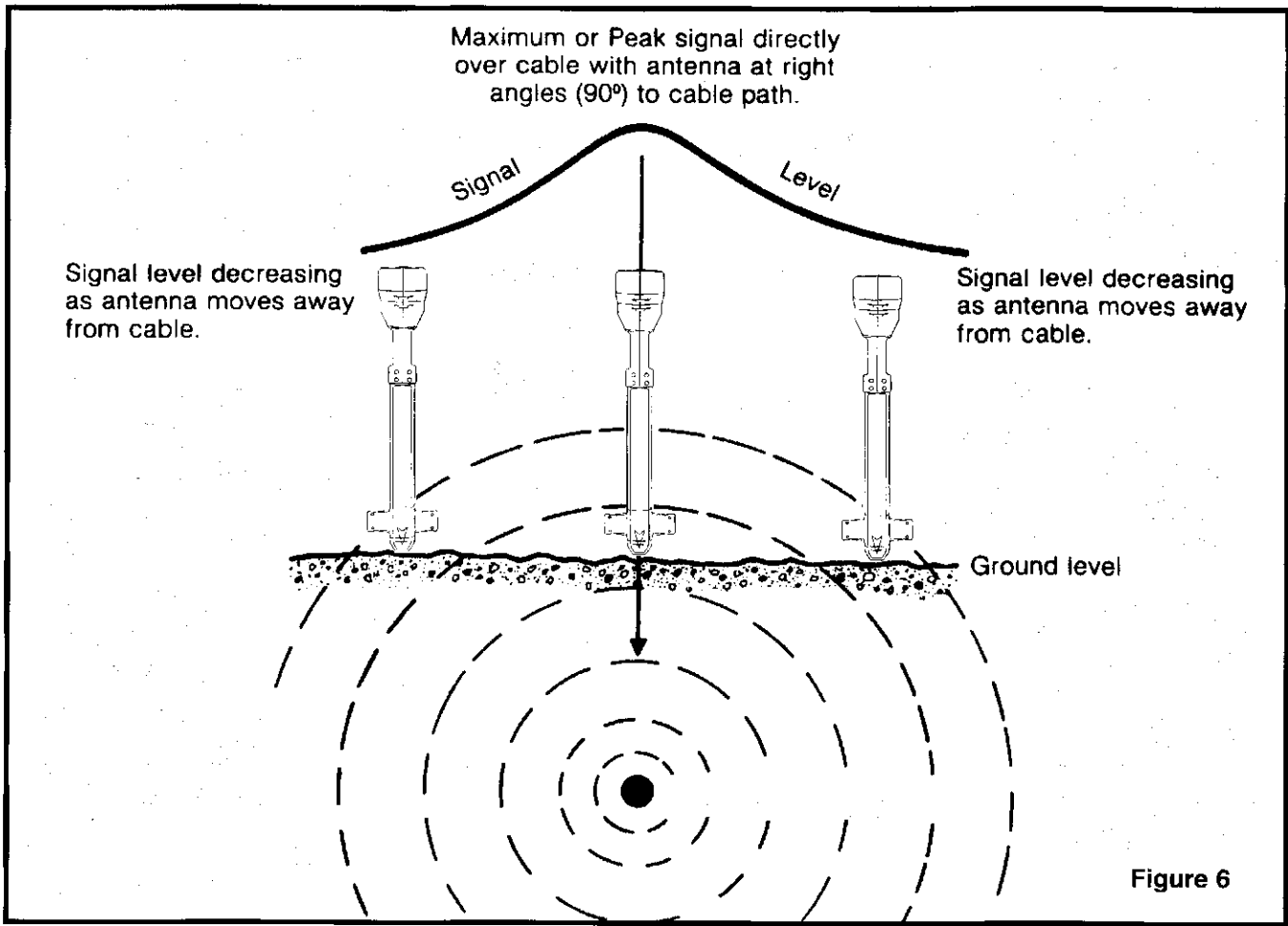


c. LOCATING BY THE NULL METHOD:

With the transmitter connected to the conductor and turned on, move out away from the transmitter 5 to 10 feet. Push the NULL, PEAK button, between the handle and the meter, to NULL. Turn on the receiver by rotating the sensitivity control knob under the handle grip from the off position. Adjust the sensitivity control for a mid-scale meter reading. Walk a half circle around the transmitter in the direction the meter starts to increase. When a location is found where the meter drops to "0" and an increase in signal is found on both sides of the "0" location, this will be a locate to mark. When two positions or Nulls have been found, the operator knows the direction of the run.

THE OPERATOR CANNOT SEE THE LOWEST READING IF THE METER IS AT A "0" READING. IF THE NULL IS BROAD, INCREASE THE SENSITIVITY CONTROL UNTIL A SHARP NULL IS FOUND. IF THE NULL IS SO SHARP THAT THE METER DOES NOT HAVE TIME TO RESPOND, THE OPERATOR COULD WALK OVER THE LOCATE AND NOT SEE THE NULL; HOWEVER, A SMALL LOSS OF TONE MIGHT BE HEARD. THE SENSITIVITY SHOULD BE REDUCED TO WHERE A SHARP NULL CAN BE SEEN ON THE METER.

Now that two null points have been found, the route of the conductor can be walked by moving the A700 back and forth over the line being traced. NEVER SWING THE LOCATOR. The receiver should be moved back and forth over the line being traced with the bottom of the antenna area remaining approximately the same distance from the ground at all times.



- d. **DEFINITION OF A MAXIMUM OR PEAK** – See Fig. 6. A maximum meter reading will be found directly over the line being located and with the receiver antenna at right angles to the conductor's path, the meter will decrease to lesser readings as the instrument moves away from either side. When the locator is directly over the line and at right angles to the line, the locate has been made. **IN THE PEAK METHOD, THE RECEIVER PROVIDES THE DIRECTION OF THE LINE BEING TRACED FROM ONE LOCATING POINT. THE LINE BEING LOCATED WILL BE AT RIGHT ANGLES TO THE RECEIVER.** In other words, if the operator would lay an arrow on top of the receiver handle with the shaft crossing #5 on the meter dial, the arrowhead would be pointing down the route of the locate. Unlike the null mode that can be made with the receiver pointing at any axis of a compass, the peak mode cannot. In the peak mode, no reading can be taken if the instrument is parallel to the direction of the conductor run.

c. **LOCATING BY THE MAXIMUM OR PEAK METHOD:**

With the transmitter connected and operating, move out 5 or 10 feet from the transmitter. Turn on the receiver and push the Null, PEAK button to the PEAK position. Adjust the sensitivity control for a mid scale meter reading. Walk a half circle around the transmitter in the direction the meter indication starts to increase. If the meter goes off-scale or past 10, reduce the sensitivity to where the meter movement can be seen increasing or decreasing. Meter movements cannot be seen if the meter movement is at "0" or at "10."

When a location has been made, the meter will show its highest point directly over the spot to be marked and the receiver is at right angles to the line being located. A movement of the receiver to the right or left side of this highest meter reading will produce a meter reading that is decreasing from the high point.

Now that the conductor has been located, turn the sensitivity down to a very small meter movement above "0" on the meter dial when the antenna is directly over and at right angles to the line being located. Keep moving the instrument from one side of the peak reading to the other. Each time a peak reading is found, the line will be directly below the center of the receiving antenna. Do not swing the antenna from side to side.

NOTE: If you obtain a wide or broad peak reading from the receiver when locating your conductor near the transmitter, see item (h) page 6.

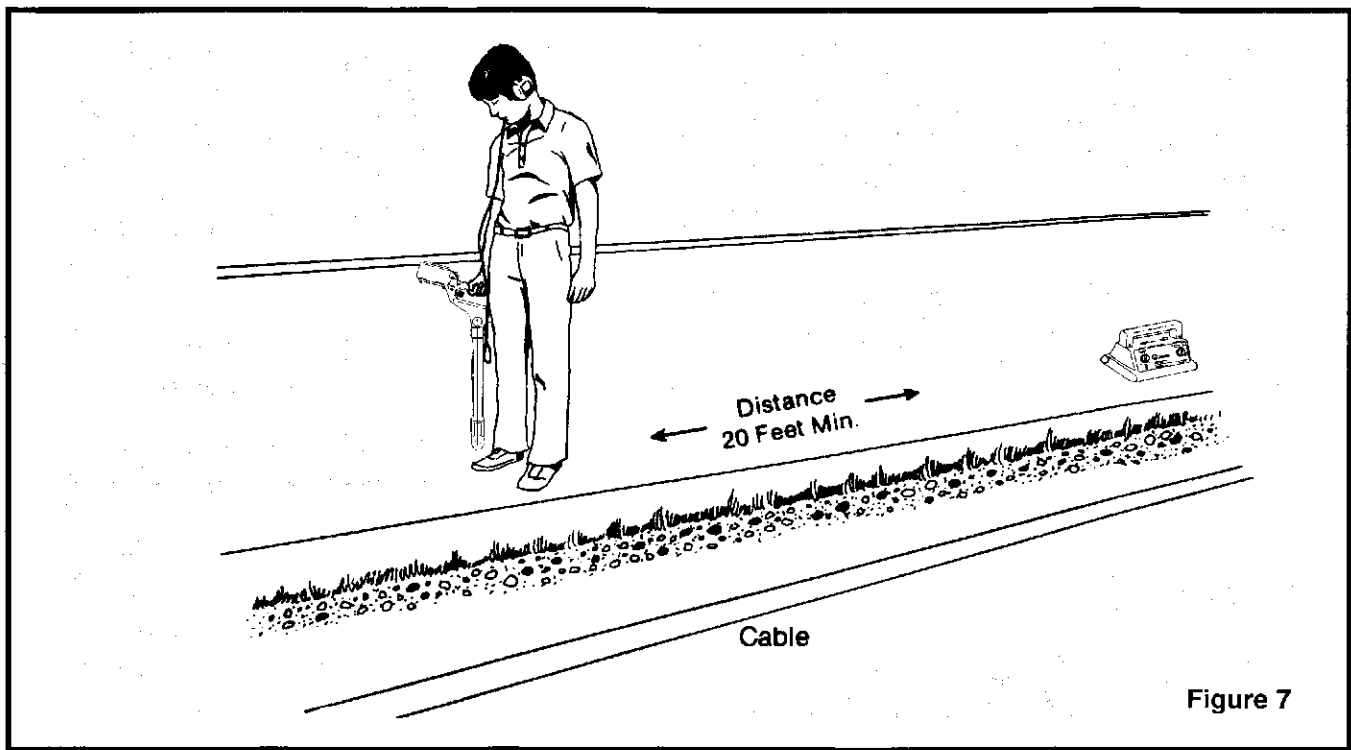


Figure 7

f. INDUCTIVE TRACING

Set the transmitter directly over and in-line with the conductor to be traced. The "CONDUCTOR PATH" decal should be over and in-line with your target. Set the function control to INDUCTIVE. Turn the transmitter on by rotating the power control to LOW. More power can be used if needed, but low power will help reduce signal being applied to other utilities that may be in the same area.

The operator can locate closer to the transmitter in a low power setting than a higher power setting because at a higher power setting, the transmitter is radiating more signal into the surrounding area.

On low power, the receiver should be at least 20 feet away from the transmitter. The strongest signal will be found along the axis that is in-line with the end of the transmitter case. If you have doubt as to having located a pipe or cable, or the transmitter itself, rotate the transmitter about 20 degrees off the line being energized. If you still locate a line in the same position as before, you have a good locate. If you cannot locate the line in the same place, check to see if you are now locating a new line that is in-line with the transmitter case. If you do find this new location, you are too close to the transmitter and no line exists in that area.

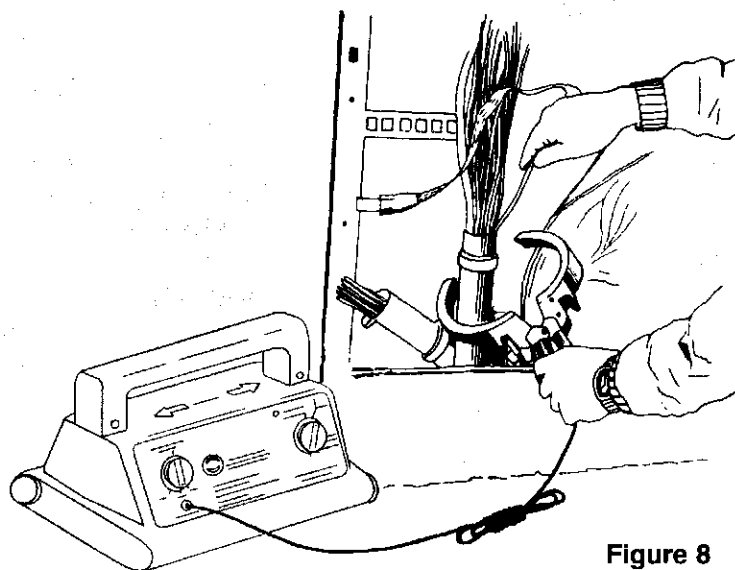


Figure 8



Figure 9

g. **TRACING WITH THE INDUCTIVE COUPLER**

To use the Inductive Coupler, the line being traced must be grounded at both ends. This ground can be through a load of some type like a transformer winding to the ground rod. Since the circulating signal from the Inductive Coupler must pass from one end of the ground to the other end through the earth, it cannot do so unless both ends are grounded.

Insert the Inductive Coupler phone plug into the phone jack below the transmitter's On-Off Power Control. Set the transmitter function control to tap #1. This will match the transmitter's output to the coupler and inject the best signal on the line being traced. Turn on the transmitter to low power and proceed with your locate.

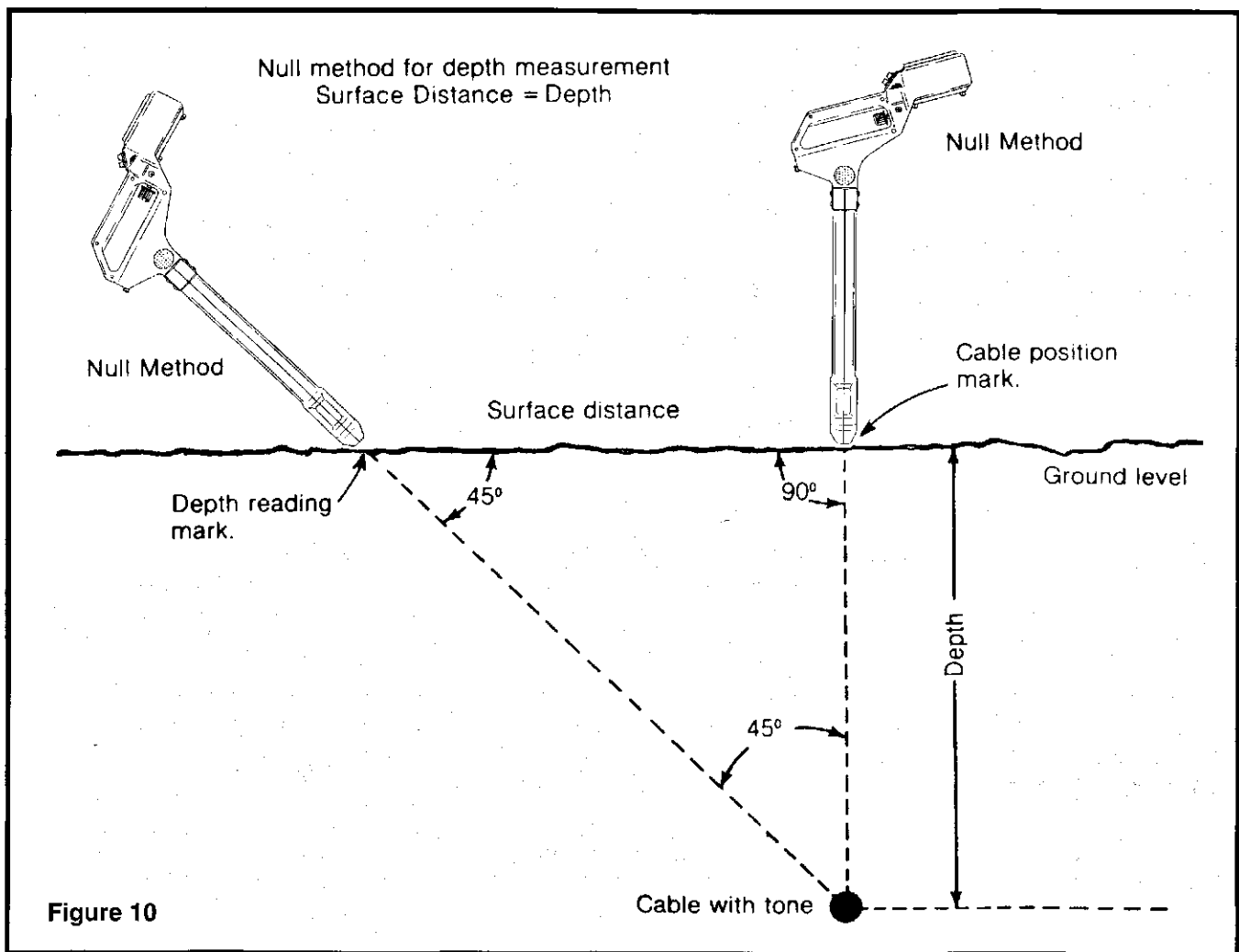
On a telephone cable, always clamp around the cable before the sheath bond breaks out to ground. See Fig. 8. This will induce tone to the sheath. The Coupler can be place around a telephone or CATV service drop without removing the house protector cover. See Fig. 9. The coupler can be place around metallic or non-metallic ducts as long is there is some type of metal conductor inside the non-metallic duct.

For best results, the mating parts of the core material should be free of dirt or contamination at all times. Some limited tracing range may be obtained if the coupler is not closed, but maximum tracing range will require the coupler to be completely closed with both sides of core material touching each other.

h. **CORRECTING A WIDE OR BROAD PEAK READING**

When using the Inductive Coupler or the Direct Output mode of tracing, there may be times when a wide or broad peak reading is found near the transmitter. The receiver is being flooded with too much signal.

Reducing the amount of signal the transmitter is placing on the line can be accomplished by mismatching the transmitter output. Switch the transmitter function control to tap # 4 or 5. This will reduce the transmitter signal output and un-flood the receiver. You will not have the ability for a long or deep trace on tap # 4 or 5, but it will allow you to locate near the transmitter.



i. DETERMINING DEPTH

The null or peak method can locate the depth of a line being traced, but the null method is easiest to use. The position of the receiving antenna is critical in the peak mode and is not the case in the null mode.

On a 45° right triangle, two of the sides will always be equal. There is a bubble level to the left of the receiver's NULL-PEAK switch. When the bubble is half way between the center ring and the outer black housing, the instrument is at a 45° angle.

When the line has been located and marked, move off to one side of the location with the bubble set at 45°. Move away until a null point has been found with the nose of the antenna touching the ground. Mark that spot. See Fig 10. Measure the distance between the LOCATION MARK, and the DEPTH MARK. The depth of the line will be the distance between these two marks.

The sensitivity control may have to be adjusted while making a depth reading. The null found should be sharp enough to pinpoint the spot you want to mark. Also, bear in mind that the distance is calculated at a 45° angle from the receiving antenna. The calculation will have to take into account any slope of terrain, or the height that the receiving antenna is held above the ground when the depth measurement is being made.

When possible, a depth reading should be made from both sides of the line being traced. If both measurements agree with each other, the operator can assume a good depth measurement has been made, and the locate is fairly accurate. If the two depth readings do not agree with each other, relocate the line and then repeat the two depth measurements. This will verify if there is an error with this locate. If the two depth readings are still not the same, care should be used when digging this locate. Other utilities are in the same area, creating a distorted field pattern. This distortion means your locate could be marked off to one side of the line actually being traced.

IV. OPERATING INSTRUCTIONS FOR THE SEWER SNOOPER OR MINI SNOOPER

1. DESCRIPTION

The Sewer Snooper and Mini Snooper are used for Non-Metallic pipe or duct location. The Snooper is a small radio transmitter that will attach to a conventional rodding machine or fish tape. The snooper is forced through the pipe or duct while the model A700 receiver is used to accurately trace its position and depth. This method of locating non-metallic lines is far more effective than energizing a metal tape inside the line.

THE SEWER SNOOPER: 2" dia. x 6 1/2" long and can be located up to 50' deep. It will negotiate a 4" clean out and should be used in 4" dia. pipes and larger.

THE MINI SNOOPER: 1 1/2" dia. x 4" long and can be located up to 25' deep. It will negotiate a 90° bend in a 3" pipe if connected to a flexible leader of some type.

BATTERIES:

The Sewer Snooper uses a 9 volt radio battery. Eveready #216 or equivalent. The alkaline type is recommended. The Mini Snooper battery is a 6 volt photo-flash battery. Eveready # 544 or Mallory PX-28 or equivalent. The alkaline or silver oxide types are recommended.

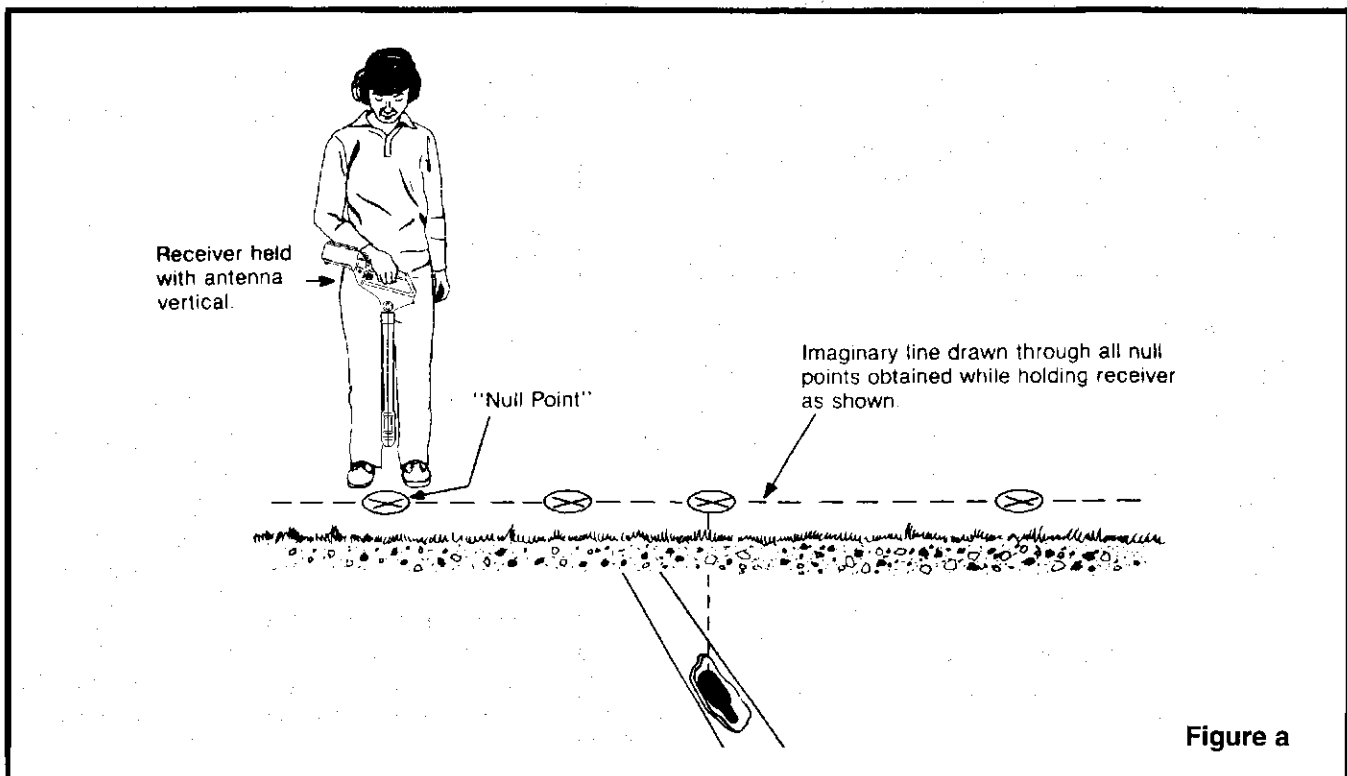
2. FAMILIARIZATION

Before trying to locate an underground pipe, familiarize yourself with the basic operation of the transmitter and the receiver. Practice locating the Snooper while it is laying on the ground in plain view. It will be a lot easier to understand this manual if you learn to locate the Snooper in plain view first.

3. TUNING THE SNOOPER TO YOUR RECEIVER

Turn on the receiver and Snooper and listen for the tone.

Use a small screw driver and adjust the small screw inside the snooper in the direction tone or pitch DECREASES. Adjust the screw until the tone in the receiver decreases to a point where you have no tone coming from the receiver. At this point, an adjustment in either the counter-clockwise or clockwise direction of the small screw will bring the tone back. From the no-tone position, adjust the screw in the "Counter-Clockwise" direction until a good rich audio tone in the receiver is heard. Hold a watch or a piece of aluminum near the antenna of the snooper. If the tone pitch increases when the metal is near the antenna, the snooper is tuned and ready for use. If the tone decreases as the metal is placed near the Snooper antenna, start over. You did not adjust counter-clockwise from the no-tone position.



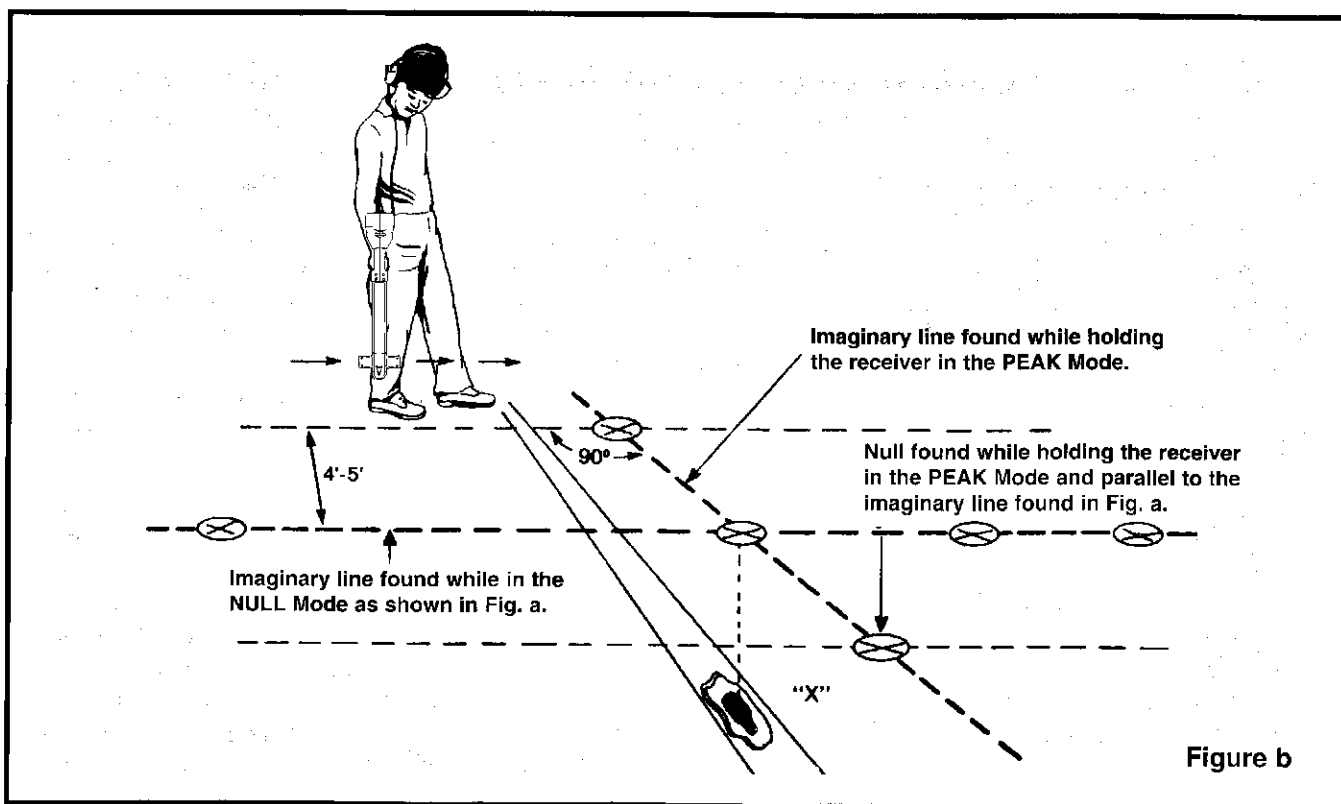
4. A PROCEDURE TO LOCATE THE SNOOPER'S EXACT POSITION IS DESCRIBED AS FOLLOWS.

STEP 1: WITH THE RECEIVER IN THE "NULL" mode, walk a large circle around the snooper which was placed on the ground. Adjust the receiver for a mid-scale meter reading.

STEP 2: Notice that when the receiver is moved past a point exactly at a right angle to the snooper, the meter will drop to zero, then move quickly back up-scale. This sudden drop in signal will be referred to as a "NULL" throughout the rest of this manual. Move the receiver back to the point where the null was obtained.

STEP 3: Increase the sensitivity control and repeat Step #2. Notice that as the sensitivity is increased, the null becomes very sharp. However, if the sensitivity is set too high, you may pass through the null point without seeing any indication on the meter because the meter is a mechanical device and cannot respond fast enough. You will probably hear a change in the audio even though the meter did not respond. Increase the sensitivity only enough to produce a sharp null. Once this null point has been found, mark the ground directly below the receiver antenna.

STEP 4: Continue walking a circle until a second null is found on the opposite side of the snooper. Mark this spot. Note that a line connecting these two null points would pass through the transmitter and 90° from the direction the snooper is pointing. See Fig. a. Anywhere along this imaginary line drawn across the snooper, and at right angles to the direction it is pointing, a null will be found if the receiver is in the null mode of operation.



STEP 5: SWITCH THE RECEIVER TO "PEAK" mode, move 4 or 5 feet off to one side of the imaginary line found in the null mode. Hold the receiver so it is facing, and parallel to, the null point line found in step #4. If the imaginary locate line is running North and South, the front of the receiver should be pointing East or West, or at right angles to the direction the Snooper is pointing.

Walk in a direction parallel to the null point line, keeping approximately the same distance from it with the receiver facing the line as shown in Fig. b. As the receiver is moved parallel to the null point line, a "NULL" will be found on an imaginary line drawn through the Snooper. This line will run on the lengthwise axis of the Snooper. This "NULL" will be found even though the receiver is in the "PEAK" mode of operation. Where these two imaginary lines cross should be the exact center of the Snooper.

NOTE: A good proficiency check is to have someone hide the transmitter under a large piece of cardboard or newspaper spread out on the ground. Locating the Snooper when you can see it is easy. When you can go through steps 1 through 5 and not only locate the Snooper's position, but the direction of its axis and do all this with only information the receiver is providing, you are ready to locate the Snooper when it is below ground and out of sight.

5. SUMMARY OF PRECEDING STEPS

- A. Hold receiver in "NULL" mode. Walk a circle until two or more null points have been found and marked as shown in Fig. a.
- b. Draw an imaginary line through all points found in null mode.
- c. Hold receiver in "PEAK" mode 5 feet off to one side and facing null point imaginary line.
- d. Walk a route, in peak mode, parallel to null point line, keeping 4 or 5 feet away from it. The receiver should be facing the null point line. In the peak mode, a null will be found along a line cutting the in-line axis of the Snooper.
- e. Where the two imaginary lines cross as in Fig. b, "X" will mark the spot.

NOTE: Three or four null points in Step 1 should be used for the imaginary line. Two null points will not prove a straight accurate line. One null point could be inaccurate, and this would create a missed locate. With three or more null points that are in a straight line, you know your marks are accurate. If the line is not straight, you know one or more of your null points are in error.

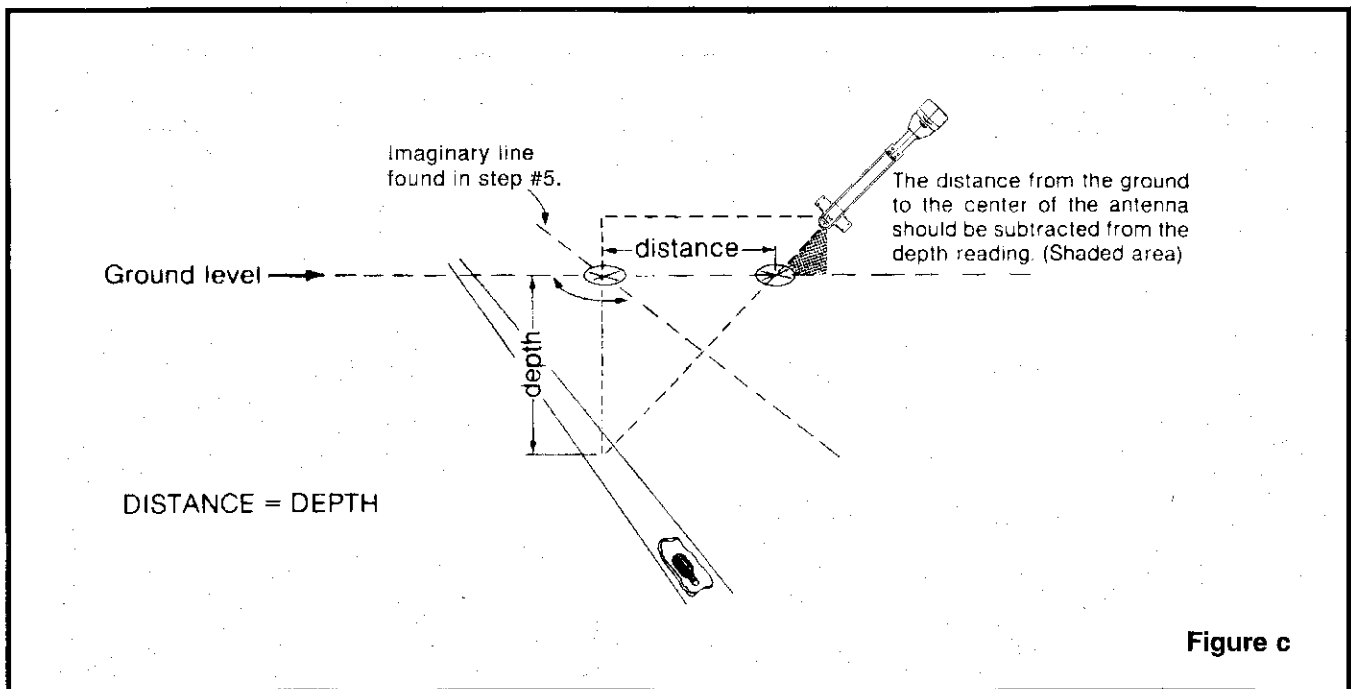


Figure c

6. Determining Depth of the Snooper

Once the location of the Snooper is precisely determined, hold the receiver at a 45° angle as shown in Fig. c, and move away from the imaginary line found in step #5, Fig. b. The receiver should be in "PEAK" mode. When you find a null in this position, mark this null spot on the ground. The distance from this null spot and the imaginary line found in Step #5, is the actual depth of the Snooper. (Note that this depth is to the Snooper, not the pipe.) When working on a rough ground, bear in mind that the distance is calculated at a 45° angle from the receiver antenna and these calculations will have to take into account any slope of the terrain or height the receiver was held above ground when the depth measurement was taken.

NOTE: If trouble is encountered in finding a null with the receiver held at a 45° angle, go back and check your null points found using steps 1 through 5 when you were practicing making a location above the ground. (Found on page 9-10 of this manual.)

7. Locating a Non-Metallic Pipe

Remove the end cap from the Snooper, and attach this cap to the rodding machine, snake, or tape. Turn on the Snooper by installing its battery. Turn on the receiver and turn up the sensitivity control and listen for the proper tone. Screw the Snooper back onto the end cap and make sure it is on tight. The Snooper can now be injected into the pipe.

- a. Wrapping the Snooper with electrical tape or duct tape will do several things for you. It will make sure the Snooper does not un-screw the electronics from the end cap inside the line. It will insure a better moisture proofing if water is in the pipe and it will take the abuse from rubbing on the pipe wall instead of the Snooper housing. Tape of some type is very cheap insurance for a longer life of your Snooper.

8. LOCATING METAL INSIDE A NON-METALLIC PIPE

This ability can be demonstrated by turning on the Snooper and receiver and placing the nose (front end) of the Snooper near a metal object like your watch. Notice the change in frequency or pitch of the tone being heard from the receiver.

The Snooper should not respond to metal outside the pipe if the separation of metal to Snooper antenna is 6" or more from each other. This feature is very useful in locating such items as a root saw, or a broken tool of some type in the pipe. Magnetic metals like iron or steel will make the tone decrease in pitch. Metals that are non-magnetic like your watch, copper, brass and aluminum will make the tone increase in pitch.

V. SERVICE AND WARRANTY

Instrument Service

If for any reason you have trouble, or require assistance with your instrument, contact the nearest Aqua-Tronics sales outlet. You may also write, call, or e-mail directly to Aqua-Tronics Inc. manufacturing plant and provide full details of your problems or needs.

Warranty

All Aqua-Tronics products are warranted against defective materials and workmanship.

The Model A700 line locator, the Sewer Snooper and Mini Snooper have a one-year warranty period from date of purchase.

Aqua-Tronics Inc. will repair or replace all products which prove to be defective during the warranty period. All warranty repair will take place at our manufacturing plant or one of our field service centers. The decision of determining warranty defects from abuse or breakage, and where the instrument is to be repaired, lies with Aqua-Tronics Inc.

If product is sent to Aqua-Tronics Inc. for service, please send it pre-paid. If the service is covered under warranty, the product will be returned pre-paid. No other warranty is provided or implied.