AVO INTERNATIONAL

Instruction Manual AVTM651050

for

L1050 Portable Locator

Catalog No. 651050

High Voltage Equipment
Aparato de Alto Voltaje

Read the entire manual before operating.
Antes de operar este producto lea este manual enteramente.

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L1050 Portable Locator
Instruction Manual

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

Section 1
Introduction

Receiving Instructions

Check the equipment received against the packing list to ensure that all materials are present. Notify AVO International of any shortage. Telephone (215) 646-9200 and ask for the customer service department.

Examine the instrument for damage received in transit. If damage is discovered, file a claim with the carrier at once. Prepare a detailed description of the damage and notify AVO International.

This instrument has been thoroughly tested and inspected to meet rigid specifications before being shipped. It is ready for use when set up as indicated in this manual.

General Information

Thanks for purchasing the BIDDLE® L1050 Portable Locator. The portable locator will help you detect and trace the routes of buried power cables, CATV cables, gas and water pipes, sewer lines, telephone cables, and fiber-optic cables.

The transmitter applies a tracing signal onto a cable or pipe. The receiver detects the tracing signal and indicates how strong it is. You can locate the path of a buried pipe or cable by following the tracing signal.

Supplied Components

1. Transmitter unit (built into carrying case)
2. Receiver unit
3. Red/black test cord
4. Ground rod
5. Instruction Manual
6. Eight AA-size alkaline batteries
7. Eight D-size batteries

Optional Flexible Coupler

Preparation for Use

Remove the receiver from the case, and turn it face-down. Locate the battery compartment on the back of the receiver. Install the eight AA-size batteries as marked on the case.

The transmitter battery compartment is situated under the receiver storage well, in the bottom of the case. Install the eight D-size transmitter batteries as marked on the case.

Section 2
Safety

The L1050 Portable Locator and the recommended operating procedures have been designed with careful attention to safety; however, it is not possible to eliminate all hazards from electrical test equipment or to foresee every possible hazard that may occur. It is therefore essential that the user, in addition to following the safety rules in this manual, also carefully consider all safety aspects of the test before proceeding. Safety is the responsibility of the user.

Use suitable barriers, barricades, and warnings to keep people not actually engaged in the test at a safe distance. Make sure that no one can make contact with energized parts of the test equipment and the specimen under test.

Treat all terminals of power equipment as a potential electric shock hazard. There is always the possibility of voltages being induced at these terminals because of proximity to energized high-voltage lines or equipment.

Always turn the transmitter power off before touching any terminals.

Always disconnect test leads from the cable under test before attempting to disconnect them from the portable locator.

Never connect the test leads to a cable that does not have a safety ground strap in place. Never disconnect the test leads from a cable that does not have a safety ground strap in place. The safety ground connection must be the first made and the last removed. Any interruption of the grounding connection can create an electric shock hazard.

Do not use this equipment to fault locate on any cable which is likely to be near enough to an energized cable to allow a burn through of the insulation of the energized cable. This situation may occur when the cables are located in a common trench, duct or tray (for example, three-phase systems).

Do not operate the equipment with protective covers removed. Operation without the protective covers presents an electric shock hazard.

Use all practical safety precautions to prevent contact with energized parts of the equipment and related circuits.

Use the recommended grounding and connection procedures. Make sure that the equipment is grounded properly. Any interruption of the grounding connection can create an electric shock hazard.

Refer to IEEE 510-1983 "IEEE Recommended Practices for Safety in High-Voltage and High-Power Testing" for additional information.

Do not use the portable locator or its accessories with any device or for any purpose other than as specifically described in this manual. Misuse of this equipment can be extremely dangerous.

Never connect the portable locator to energized equipment.

Do not use in an explosive atmosphere.

If the portable locator is operated in accordance with the safety precautions described, and if all grounds are correctly made, rubber gloves are not necessary. As a routine safety procedure, however, some users require that rubber gloves be worn, not only when making connections to the high-voltage terminals but also when manipulating controls. AVO International considers this an excellent safety practice.

Users of high-voltage equipment should note that high-voltage discharges and other sources of strong electric or magnetic fields may interfere with the proper operation of heart pacemakers. Personnel having heart pacemakers should obtain expert advice on possible risks before using this equipment or being close to equipment while it is in operation.

Section 3
Specifications

Receiver

Operating frequency:	82.315 kHz and 815 Hz, switch selectable
Antenna mode:	Peak responding horizontal antenna
Operating and storage temperature range:	-4 to +133°F (-20 to +55°C)
Battery type:	Eight AA-size alkaline cells
Battery life:	120 hr on 815 Hz and 100 hr on 82.315 kHz
Dimensions:	13 x 3 x 3 in (33 x 7.6 x 7.6 cm) (L x W x H)
Weight:	1 lb, 4 oz (0.568 kg)

Transmitter

Operating frequency:	82.315 kHz and 815 Hz
Output power:	100 mW directly connected 100 mW inductively coupled
Battery type:	Eight D-size alkaline cells
Battery life:	150 hr
Operating and storage temperature range:	-4 to +133°F (-20 to +55°C)
Dimensions:	17 x 7.5 x 6.5 in. (43 x 19 x 16.5 cm) (L x W x H)
Weight:	6 lb, 3 oz (2.8 kg)

Section 4
Setup and Operation

Controls and Indicators

Follow all safety precautions in Section 2 of this manual.

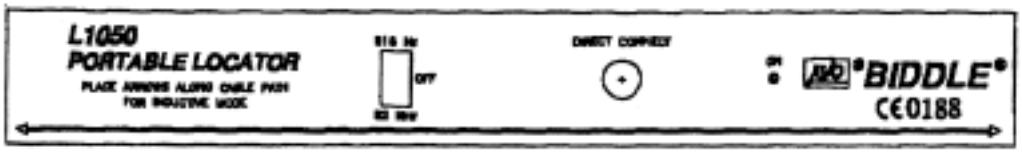

Figure 1:Transmitter Controls and Indicators.

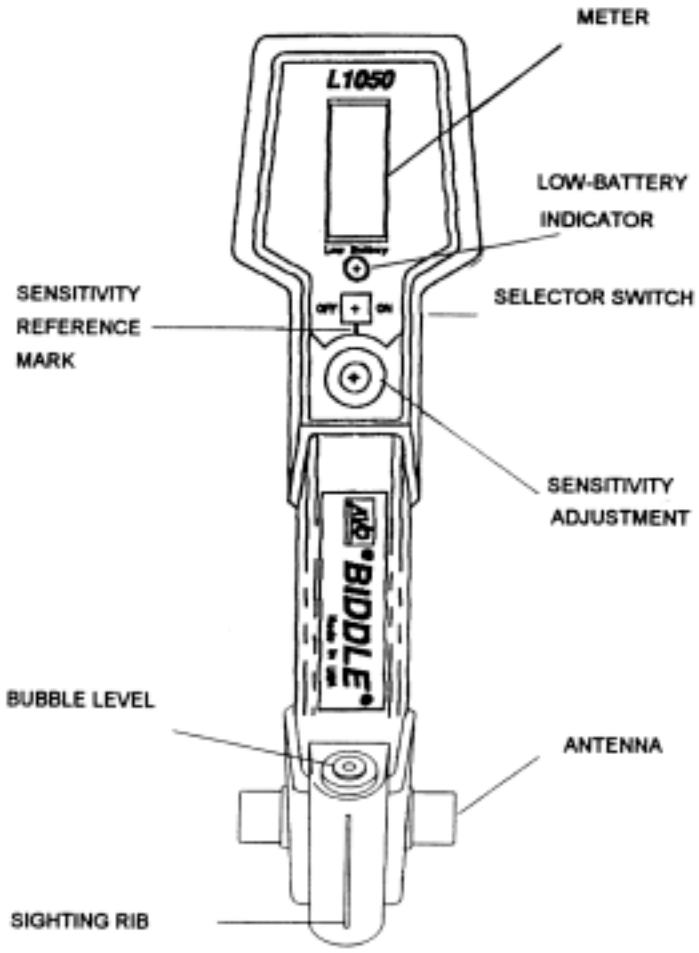

Figure 2: Receiver Controls and Indicators

Select the Locating Method

Find the heading below that matches your job, then select the locating method. The methods under each heading are listed in order of preference. The first method is easiest, and usually gives the best results. The second method listed is next best, and so on. After selecting the locating method, turn to the page that tells how to connect the equipment.

ELECTRICAL CABLE AND CABLE TV (CATV)
Multiple Grounded Circuit
Flexible Coupler Connection
Inductive Connection
Direct Connection

GAS AND WATER PIPE
Continuously Grounded Circuit
Flexible Coupler Connection

TELEPHONE CABLE
Multiple Grounded Circuit
Telephone Direct Shield Connection
Telephone Direct Pair Connection

FIBER-OPTIC CABLES
Multiple Grounded Circuit
Inductive Connection
Telephone Direct Shield Connection

NOTE: The flexible coupler and inductive connection methods require using the 82 kHz high frequency setting.

Multiple Grounded Circuit

This method uses the existing ground points that are already exposed and available to you. It is not necessary to disconnect the service. The range of operation is up to 0.5 mi (0.8˚km). Connect as shown in Figures 3, 4, and 5.

Connect the red test cord to an existing ground point. Place the ground rod approximately 10 ft (3 m) from this point, at an angle of 90 degrees to the buried cable or pipe. Push the ground rod into the ground 8 to 10 in. (20.3 to 25.4 cm). Connect the black test cord to the ground rod.

Plug the red/black test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 815 Hz position. The ON indicator will start blinking.

Turn to Section 5, Locating the Cable or Pipe.

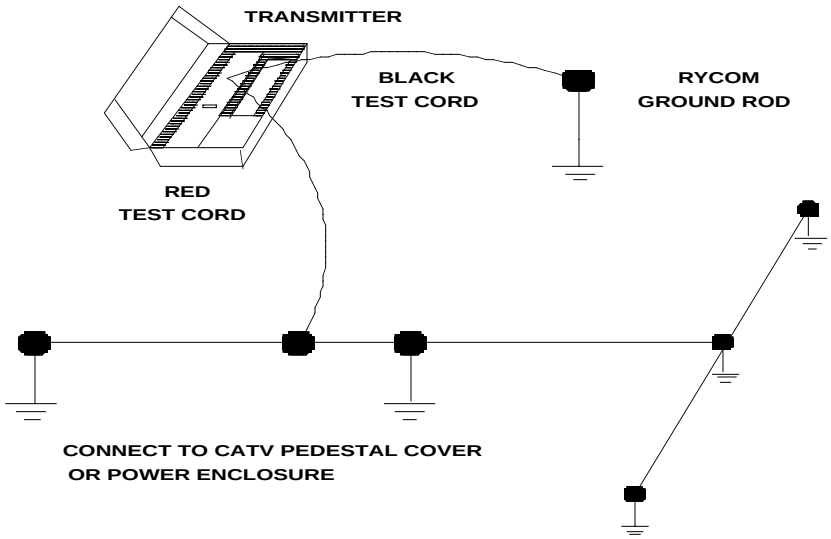

Figure 3: Multiple Grounded CATV or Power Enclosure Connection

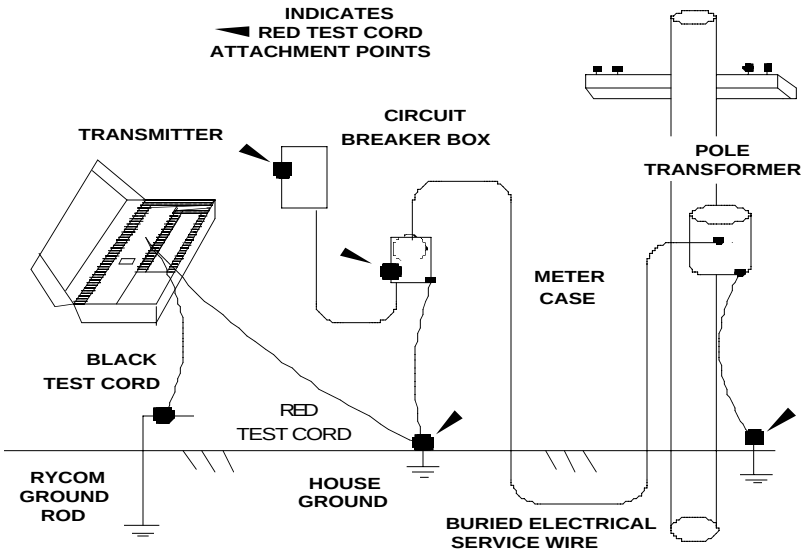

Figure 4: Multiple Grounded Secondary Circuit Connection

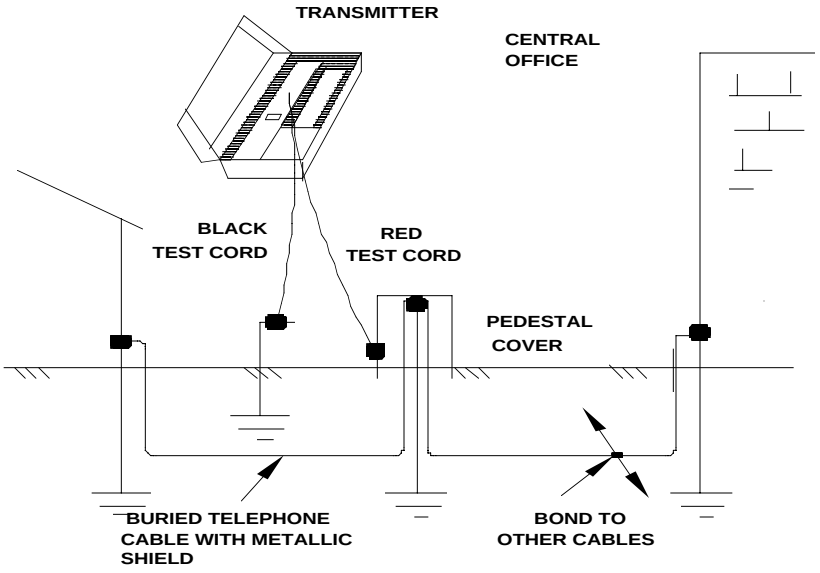

Figure 5: Multiple Grounded Telephone Pedestal Cover Connection

Flexible Coupler Connection

The flexible coupler is easy to use, and services do not have to be interrupted. The operating range is shorter than for direct connection methods. The tracing signal can be affected by neighboring cables and pipes. Neither the red/black test cord nor the ground rod are needed for this method.

Loop the flexible coupler around the cable and connect the two ends. It is important to connect the flexible coupler around the cable you want to trace, as shown in Figure 6. Connecting it around a commonly bonded cable (dashed line in the figure) will cause the tracing signal to be weaker. The range will be shorter, and you may have trouble telling one cable from another.

Plug the flexible coupler test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 82 kHz position. The ON indicator will start blinking.

Turn to Section 5, Locating the Cable or Pipe.

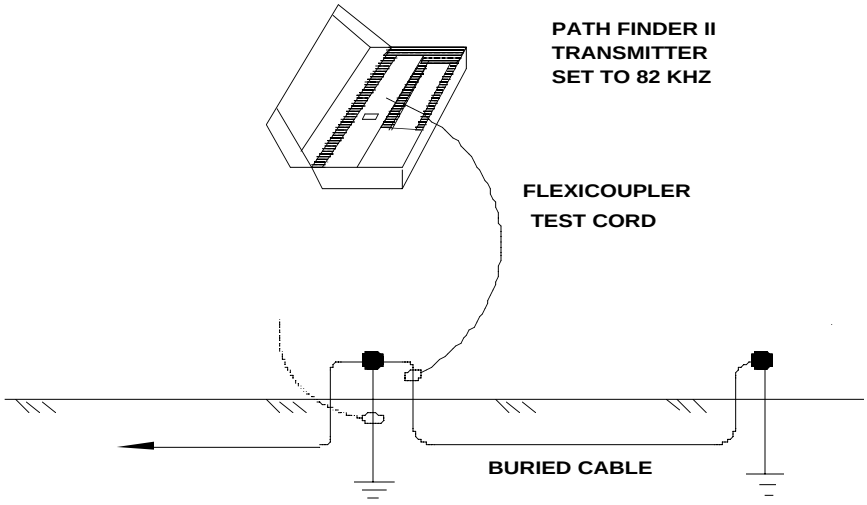

Figure 6: Flexible Coupler Connection

Inductive Connection

This method is convenient to use, and it is not necessary to interrupt services. No test leads are needed. When the cable or pipe has neither good insulation nor nonconductive coating, the operating range will be very short.

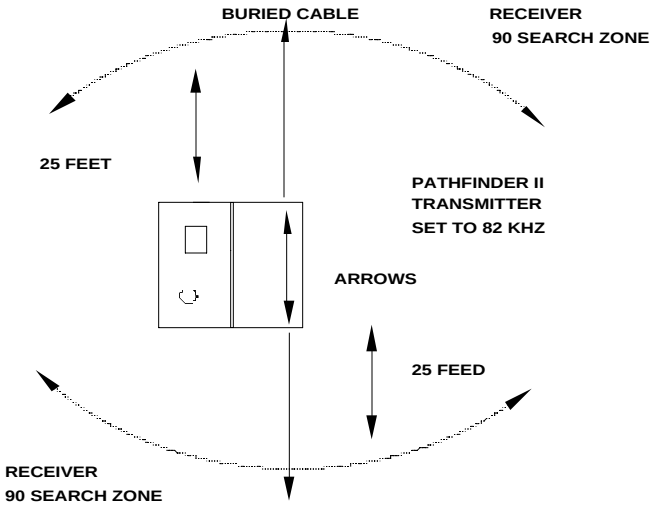

Figure 7: Inductive Connection

Place the transmitter on the ground, as close as possible to the path of the cable or pipe. Align the arrows on the transmitter control panel with the cable or pipe as shown in Figure 7. Set the 815˚Hz/OFF/82 kHz switch to the 82 kHz position. The ON indicator will start blinking.

Start tracing the path with the receiver 25 ft (7.6 m) from the transmitter. Search in the 90-degree zone as shown in Figure 7. Locate the cable or pipe, and follow the path. If the signal becomes weak, move the transmitter to a point 25 ft (7.6 m) behind the last strong signal, and continue searching.

Turn to Section 5 Locating the Cable or Pipe.

Direct Connection

Direct connection is the most reliable method available. It is free of interference and an additional ground rod is not needed. The range of operation is up to 15 mi (24 km). Utility services must be interrupted.

Disconnect the cable shield or neutral wire. Connect the red test cord to the cable shield or neutral wire. Connect the black test cord to the system ground, where the cable shield or neutral wire was previously connected. See Figure 8.

Plug the red/black test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 815-Hz position. The ON indicator will start blinking.

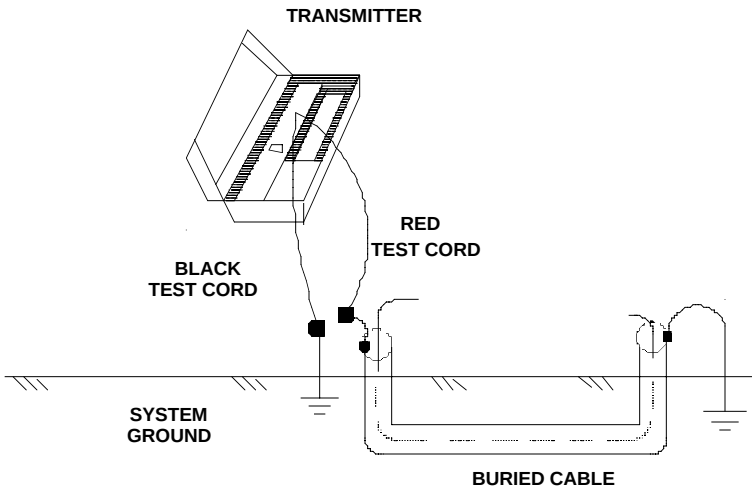

Figure 8: Direct Connection

Notes on Selecting the Tracing Signal

Because the 815 Hz AF and RF signals have their individual advantages, you can use them in sequence to produce the highest locating success. Begin by using the 815 Hz signal, and continue as long as you are confident in the results. If the signal suddenly becomes very weak, disappears, or takes an unexpected turn, change to the 82 kHz signal to correlate your results.

The 815 Hz signal is usually preferred to the 82 kHz signal, because it is less susceptible to locating errors caused by adjacent cables or pipes. The locating range is also much longer than for the 82 kHz signal. The 815 Hz signal will not jump disconnected shield bonds or insulated pipe bushings, so you will have to inspect and correct these problems as you go.

The 82 kHz signal is sometimes better than the 815 Hz frequency for locating sharp corners in cables or pipes. The 82 kHz signal is also better for jumping disconnected shield bonds or grounds, or operating near concrete reinforcing bar. Sudden changes in the tracing signal may indicate one of these characteristics. The locating range is quite short for this signal, however, so the transmitter must be repositioned more often during the tracing operation.

Turn to Section 5, Locating the Cable or Pipe.

Continuously Grounded Circuit

The locating range for bare uninsulated pipe is approximately 150 ft (45.7 m) and may require frequent relocation of the transmitter. If the locating range seems very short or unreliable, there may be an insulated bushing in the buried pipe. Try to bypass the insulated fitting by using a different connection point.

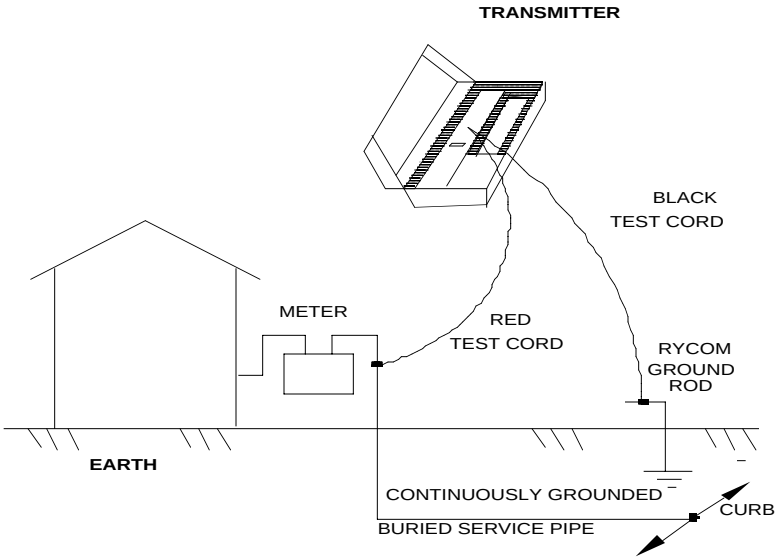

Figure 9: Continuously Grounded Circuit, Cable, Pipe, or Conduit

Connect the red test cord to the shutoff valve wrench surfaces or union fittings near the gas or water meter as shown in Figure 9. Place the ground rod approximately 10 ft (3 m) from this point, at an angle of approximately 90 degrees to the buried cable or pipe. Press the ground rod 8 to 10 in. (20.3 to 25.4 cm) into the ground. Connect the black test cord to the ground rod.

Plug the red/black test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 815 Hz position. The ON indicator will start blinking.

Turn to Section 5, Locating the Cable or Pipe.

Telephone Direct Shield Connection

This method is preferred for telephone service, because there is usually a ground lug available for making connections so damage to the cable is unlikely. It provides good reliability and service is not interrupted. A service company employee is required to make the connections. Readings may be confusing if several cable shields are bonded together.

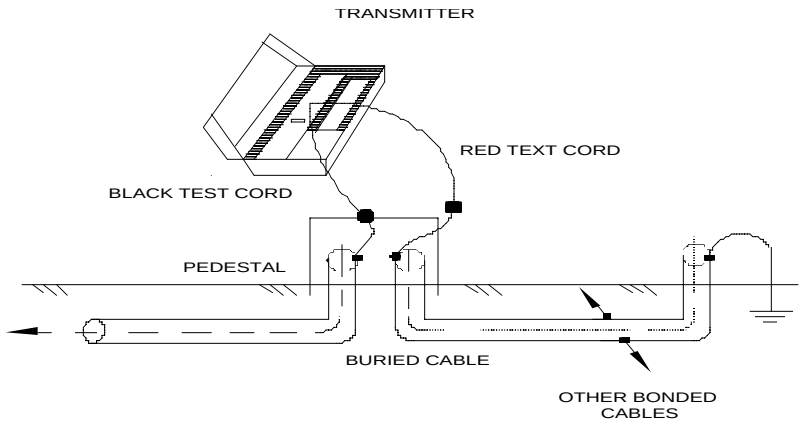

Figure 10: Telephone Direct Shield Connection

Disconnect the shield from the system ground. Connect the red test cord to the cable shield. Connect the black test cord to the telephone pedestal or previous shield attachment point as shown in Figure 10.

Plug the red/black test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 815 Hz position. The ON indictor will start blinking.

Turn to Section 5, Locating the Cable or Pipe.

Telephone Direct Pair Connection

This method provides a very high quality path to the central office. It requires a service company employee to make the connections. Service is interrupted during the tracing operation. Locating errors due to the signal going the other direction or coupling into other cables are unlikely.

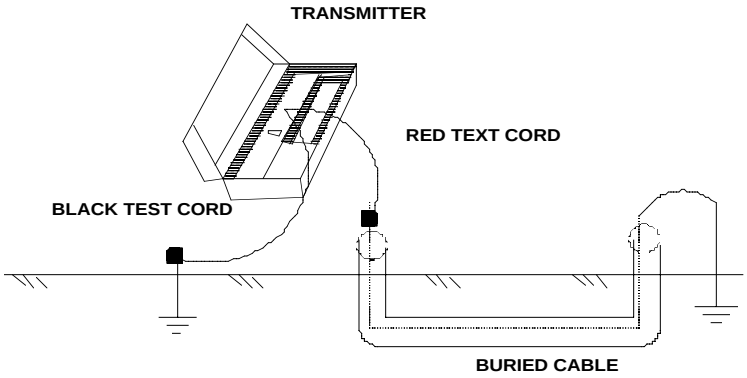

Figure 11: Telephone Direct Pair Connection

Select one of the wire pairs in the cable you want to trace. Connect the red test cord to both wires in the pair as shown in Figure 11. Do not use insulation piercing clips.

Connect the black test cord to the system ground at any convenient point.

Plug the red/black test cord into the DIRECT CONNECT jack. Set the 815˚Hz/OFF/82˚kHz switch to the 815 Hz position. The ON indicator will start blinking.

Turn to Section 5, Locating the Cable or Pipe.

Section 5
Locating the Cable or Pipe

Procedure Using Peaking Antenna

Make sure that the transmitter is connected and turned on. Move about 15 ft (4.6 m) away from the transmitter, along the path. Move about 25 ft (7.6 m) for the inductive search method.

Hold the receiver so that the bubble level is approximately centered, and you can see the meter and controls easily. Set the receiver selector switch to the 815 Hz position. Make sure both the receiver and transmitter selector are set to the same frequency (either 815˚Hz or 82 kHz). Adjust the sensitivity control for a meter and audio response.

The audio output is a variable tone. This variable tone gives you an indication of the meter setting. As the meter setting increases, the pitch increases. As the meter setting decreases, the pitch decreases. The tone will mute at any meter setting below 2.

Keep the bubble level approximately centered. Swing the receiver across the path with the antenna perpendicular to the cable path. When the receiver is directly above the cable or pipe, a peak (highest audio pitch and meter reading) will occur. When you swing the receiver to the left or right of the peak point, the meter reading will drop to a minimum point, and the audio tone will decrease in pitch then mute below 2 on the meter scale. See Figure 12.

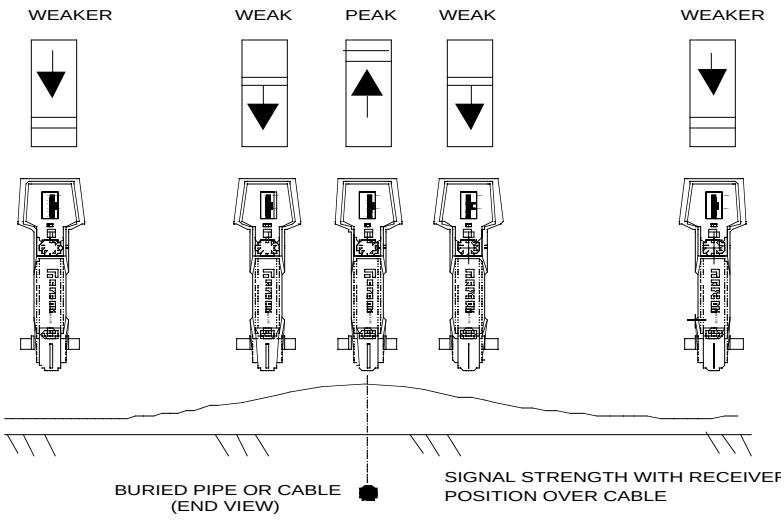

Figure 12: Receiver Meter Readings

Move the receiver to the peak position (directly over the cable). Adjust the sensitivity control until the meter reads 6 to 9.

Trace the path by walking away from the transmitter at a moderate pace. Swing the receiver left and right as you walk, following the peak indications.

When you trace the path, the peak meter reading may slowly fade as you move away from the transmitter. Readjust the sensitivity control to maintain a peak meter reading of 6 to 9. If the peak meter reading suddenly changes in level (higher or lower), you may have found:

a) A junction where the signal divides and goes several directions.
b) A break in the cable or shield.
c) A change in depth of the cable or pipe.
d) An insulated pipe fitting.

If you can no longer trace the path, even with the sensitivity control set to maximum, connect the transmitter to the far end of the path, and trace back.

To locate the path precisely, position the receiver over the cable. Keep the bubble-level centered for the most accuracy. The highest peak occurs when the receiver is directly above the cable. Mark the straight sections of the path every few feet. Mark sharp curves, loops, and cable bundles every few inches.

Sharp changes in the path cause the receiver peak and null indications to behave differently than when tracing a straight path. Practice on a path that you know has turns and laterals in it, so that you will recognize them.

Depth Measurements 70% Method

Move to the spot where you want to measure depth. Stay at least 15 ft (4.6 m) away from the transmitter. Swing the receiver across the path until you locate the peak. Adjust the sensitivity for a meter peak reading of 8. Mark the path on the ground as precisely as possible. Position the receiver on the ground as shown in Figure 13. Adjust the sensitivity control for a meter reading of 8.

Move the receiver slowly away from the path at a 90 degree angle until the meter reading drops to 7. Mark this point. Move the receiver back toward the cable until the meter peaks at 8 then drops to 7 on the far side of the cable. Mark this point. The distance between these points is the approximate depth of the cable.

A false location can be caused by near-by buried metallic objects, such as a second cable or pipe, sewer, fence, or railroad track.

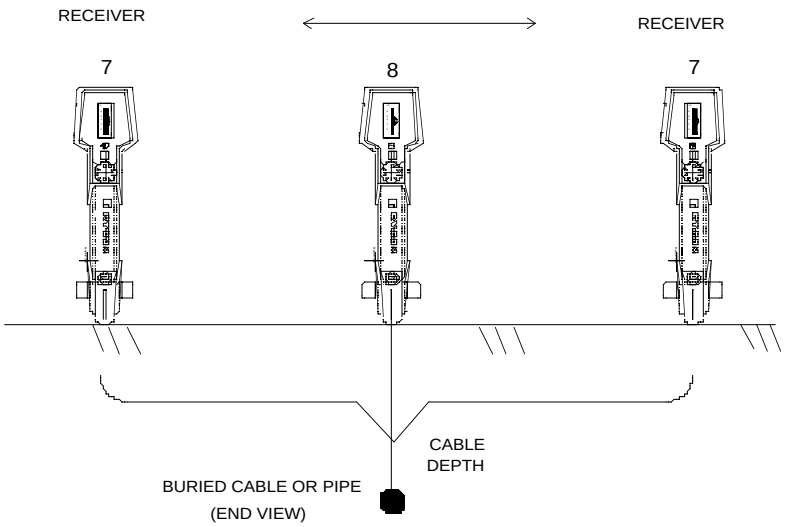

Figure 13: Depth Measurements Using the 70% Method

Depth Measurements Straight Lift Method

Move to the spot where you want to measure depth. Stay at least 15 ft (4.6 m) away from the transmitter. Place the receiver on the ground directly over the buried cable or pipe as shown in Figure 14.

Without moving the receiver, adjust the sensitivity for a meter reading of 8.

Lift the receiver straight up without twisting, turning, or drifting to the left or right of the path. Lift the receiver until a new meter reading of 5.0 is found. The height of the receiver antenna above the ground is the depth of the cable.

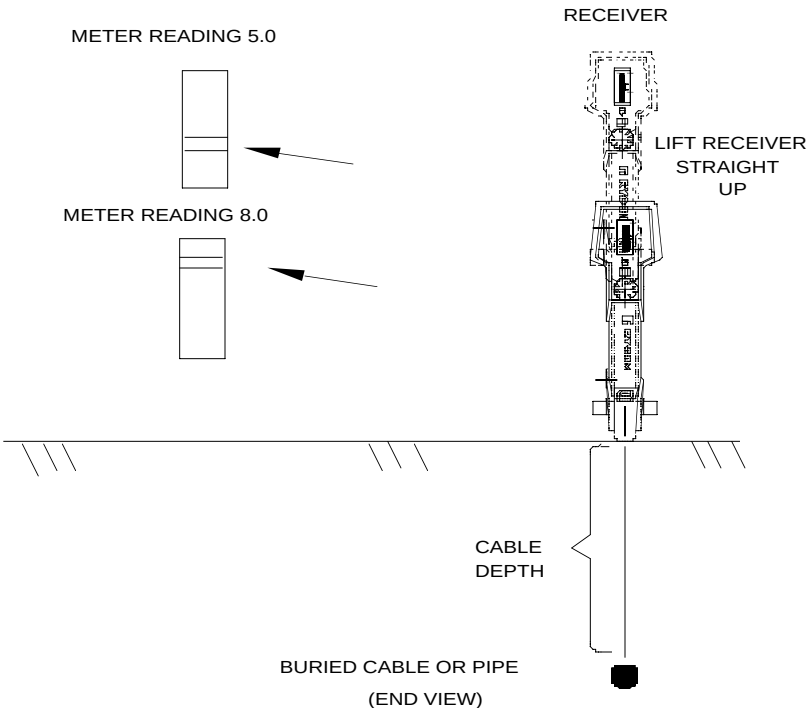

Figure 14: Depth Measurement Using the Straight Lift Method

Section 6
Service

Maintenance

The portable locator is a rugged, durable instrument built to withstand the rigors of day-to-day field use. It requires no periodic adjustments or calibration. It is however an electronic instrument and should be treated as such.

- When not in use, keep the portable locator in its carrying case and store in a safe, dry place, away from extremes in weather conditions.

- Should the unit become dirty, wipe it down with a damp cloth. Do not use cleaning compounds on the transmitter or receiver.

- Periodically inspect the test cord to ensure that it is in good condition.

Repair

If your portable locator is not working properly, please call (800) 641-2349 or (215) 646-9200 for return authorization and shipping instructions.

WARRANTY

Products supplied by AVO International are warranted against defects in material and workmanship for a period of one year following shipment. Our liability is specifically limited to replacing or repairing, at our option, defective equipment. Equipment returned to the factory for repair must be shipped prepaid and insured. This warranty does not include batteries, lamps or similar items, where the original manufacturer's warranty shall apply. We make no other warranty. The warranty is void in the event of abuse (failure to follow recommended operating procedures) or failure by the customer to perform specific maintenance as indicated in this manual.