

MODEL 501 CABLE LOCATOR SYSTEM FOR POWER/UTILITIES, CATV and ELECTRICAL APPLICATIONS

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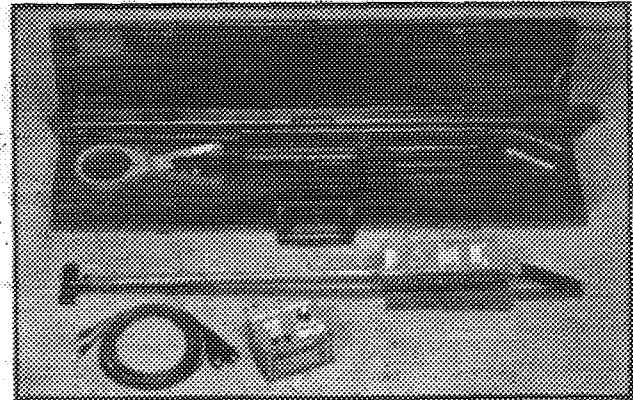


Figure 1 The Model 501 Tracker II

The Model 501 consists of:

- | | |
|-------|---|
| 500HP | TRANSMITTER |
| 500R | RECEIVER |
| 500CA | CARRYING CASE with
INDUCTIVE ANTENNA |
| CS6 | CORD SET |
| IC-1 | INDUCTIVE COUPLER |

- A. **TRANSMITTER:** The transmitter is housed in an aluminum case measuring 3"x3"x4", weighs 2 lbs. and is powered by eight (8) 1.5V AA size batteries. The transmitter has an on/off control knob which is also used to adjust the output level and a meter for monitoring the output level and battery condition. Effective range is greater than 4,000 feet in length and for depths up to 7 feet.
- B. **RECEIVER:** The receiver is encased in an aluminum housing, mounted to an antenna and is 33" long. It is powered by one (1) 9V, NEDA type 1604 battery and weighs one pound. The receiver has a speaker for listening to the signal, a meter for monitoring the signal level, a headset jack, an on/off volume control knob and an antenna for detecting the tone over the cable.
- C. **CARRYING CASE WITH INDUCTIVE ANTENNA:** The case is used for storing and transporting the Tracker II system and measures 34"x4"x8", weighs 4 lbs. and is constructed of high impact plastic.

1. GENERAL

This section provides information on the Tracker II system, Model 501 and accessory manufactured by Progressive Electronics, Inc. (See Figure 1)

2. DESCRIPTION

The Tracker II Model 501 is designed to locate the path and depth of buried cable, service wires, metallic pipe or conduit and locate the end of a cut cable.

D. **CORD SET:** An 8 foot pair of leads with plugs and clips is included for connecting the transmitter to the cable or pipe.

E. **INDUCTIVE COUPLER:** Induces a tracing tone on a cable, wire or pipe to be traced, by clamping the *Inductive Coupler* around it.

3. OPTIONAL ACCESSORY

HEADSET: The headset can be used to monitor the received signal in high noise level areas and is plugged into the receiver jack provided.

4. OPERATION

A. TESTING TRANSMITTER BATTERIES

Plug cord set leads into transmitter and clip leads together. Turn transmitter control on and rotate fully clockwise. Transmitter meter should read at least 8. For battery replacement refer to Section 7.

B. CONNECTING TRANSMITTER LEADS

IMPORTANT: THE TRANSMITTER IS PROTECTED AGAINST DAMAGE FROM INADVERTENT DIRECT CONNECTION TO VOLTAGES UP TO 240 VAC. HOWEVER, DIRECT CONNECTION TO ENERGIZED CABLE IS NOT RECOMMENDED. THE INDUCTIVE COUPLER MODEL IC-1 IS INCLUDED FOR SUCH APPLICATIONS.

The following methods are recommended to insure best results.

SINGLE CONDUCTOR: Connect one lead to the conductor and the other lead to earth ground via screwdriver.

UNSHIELDED CABLE: Connect each lead to separate conductors within the cable.

SHIELDED CABLE (COAXIAL): Connect one lead to the shield and the other lead to a single conductor within the cable.

METALLIC PIPE OR CONDUIT: Connect one lead to the pipe or conduit and the other lead to earth ground via screwdriver.

GAS PIPES: Connect one lead to the "IN" line of the gas meter and the other lead to the "OUT" line.

PVC PLASTIC OR NON-METALLIC PIPES: A fish tape or plumber's snake must be inserted into the pipe first. Connect one lead to the fish tape or snake and the other lead to earth ground via screwdriver.

Connecting the transmitter leads to conductors or shield within the cable will minimize the

bleeding effect or the tracking signal into adjacent utilities in congested areas.

Connecting one lead to a conductor or shield and the other lead to earth ground via screwdriver will insure maximum distance. This method can be used in all applications. However, it may increase the chances of the bleeding effect.

C. TESTING RECEIVER BATTERIES

Turn receiver control knob on and rotate clockwise to the 12:00 position.

Turn transmitter on to #3 position and pass receiver antenna close to the transmitter.

Any tone or meter indication from the receiver indicates acceptable battery condition.

For battery replacement refer to Section 7.

D. OPERATING RECEIVER

Turn receiver control knob on and rotate clockwise to the 12:00 position.

If optional headset is to be used, plug headset in to receiver jack provided.

A peak meter indication will be seen and a strong tone will be heard when the receiver antenna is directly over the cable or pipe. (See Figure 2)

The antenna or T-end should be oriented perpendicular to the path of the subject utility. (See Figure 2)

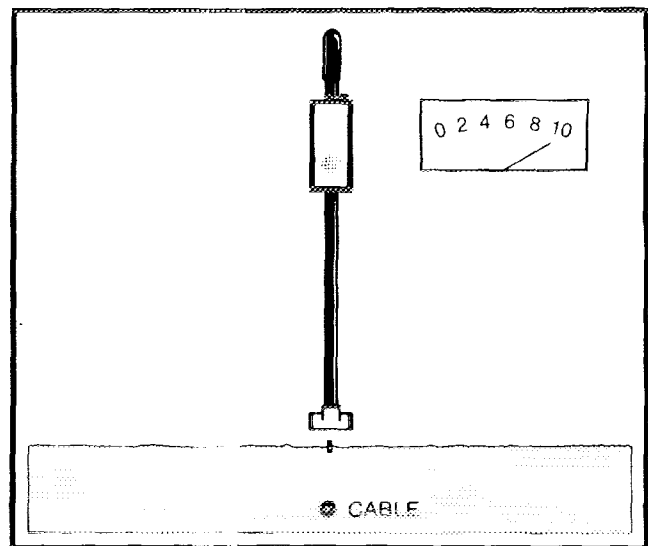


Figure 2 Locating Cable Path

E. LOCATING PATH

Connect transmitter properly and set output level to #3.

Radius the area approximately 10' to 15' from the transmitter location with the receiver.

Proceed down the path following the peak meter indication and the tone from the speaker or the headset.

As progress is made down the cable path, gradual increases in the receiver gain control will be necessary to maintain reception.

The receiver control knob should be adjusted so that the meter needle is at approximately 1/2 scale to insure that any increase or decrease in signal can be detected and accuracy maintained.

Return to the transmitter and increase the output level as needed for the distance and depth required.

F. DETERMINING DEPTH

Mark the ground directly over the path (See Figure 3) and hold the receiver at a 45-degree angle close to the ground. (See Figure 3) Maintain this angle and slowly move the receiver away from path opposite the handle. (See Figure 4) The tone will decrease to a minimum, then increase again. Mark the spot where the signal is at its minimum.

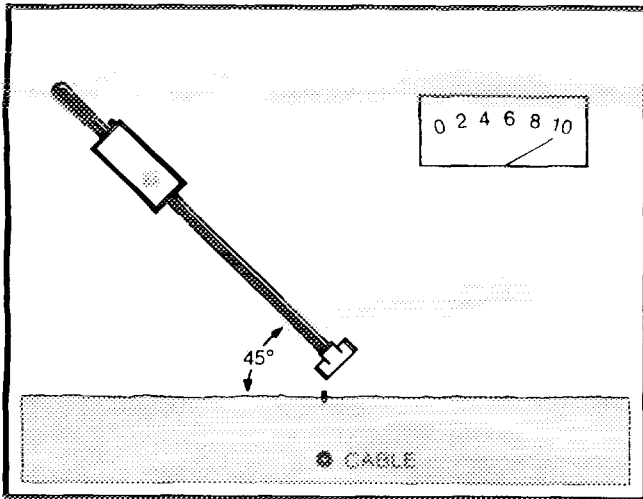


Figure 3 Determining Depth

The depth of the cable will be the distance between the two points marked.

G. LOCATING THE END OF AN OPEN CABLE

Follow the peak receiver indications as outlined in Section D.

Reception of the signal will diminish rapidly and be lost once past the end of the cable. (See Figure 5)

5. INDUCTIVE COUPLER

DESCRIPTION

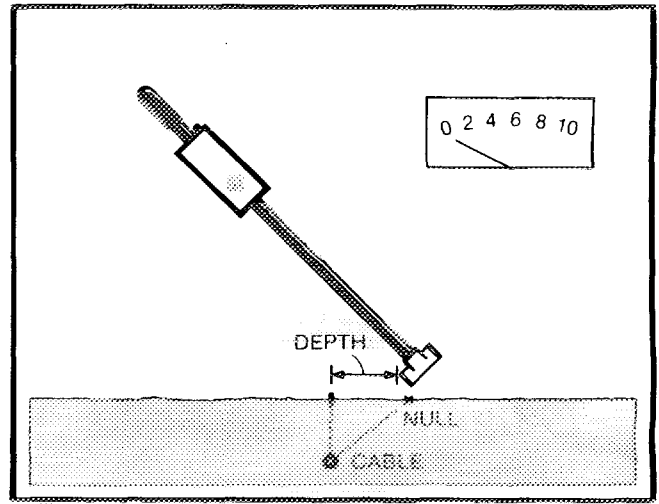


Figure 4 Determining Depth

The Inductive Coupler is designed to induce a tracking tone into a subject cable or wire without establishing metallic contact or removing bonds. (See Figure 6)

The Inductive Coupler is constructed of plastic and iron, measures 4.5"x10"x.75", weighs 1 pound and can accommodate up to a 3" cable.

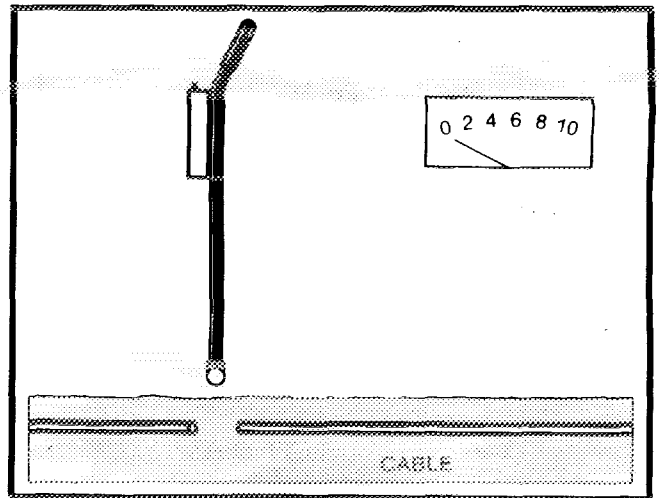


Figure 5 Signal Over the End of an Open Cable

A. OPERATION

Clamp the Inductive Coupler around the insulation of the buried cable to be tracked. Connect both transmitter leads to the two terminals on the face of the coupler. Turn transmitter on and radius the immediate area with the tracker receiver to determine path.

1. COUPLING POINTS: The bond is one aspect which enables the inductive coupling method to work. Place the clamp between the bond and the point where the cable goes into the ground. In CATV applications, these

positioning points would be at the end of the main line or at the subscriber's house. (See Figure 7)

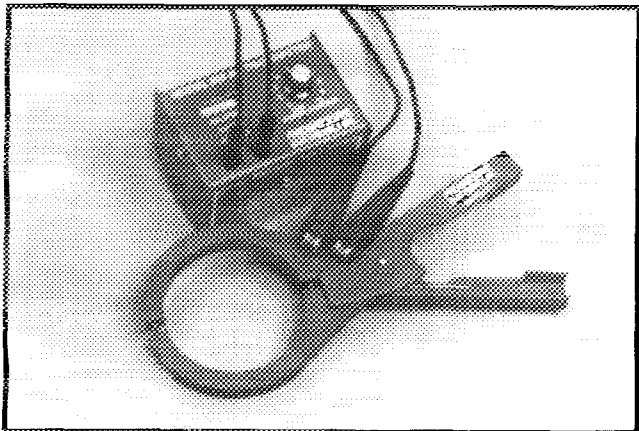


Figure 6 The Inductive Coupler

2. **MID RUN COUPLING:** If the subject cable is relatively long, current is permitted to flow back through earth as tone is transmitted in both directions. (See Figure 8)

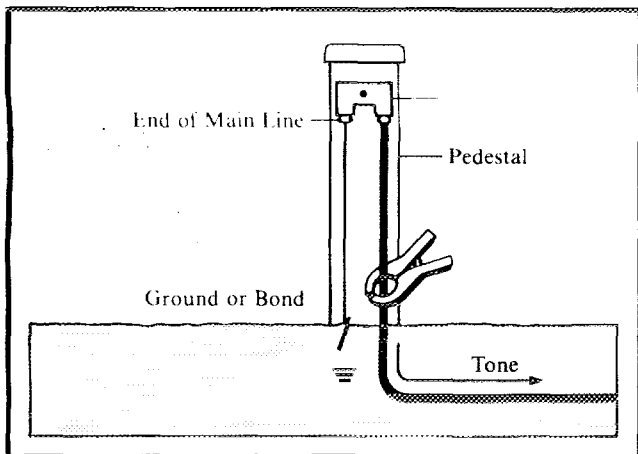


Figure 7 Coupling Points

3. **NEAR END COUPLING:** To supply tone from the end of a cable, the end of the cable must be bonded or grounded. (See Figure 7)
4. **REDUCED TONE AT BRANCH:** When tone is applied to a cable which has a branch, the tone will be split and be effectively decreased relative to each conductor's length and size. (See Figure 9)

6. INDUCTIVE ANTENNA

DESCRIPTION

The Inductive Antenna (See Figure 10) is used to apply a tracking tone into a cable, wire or metallic

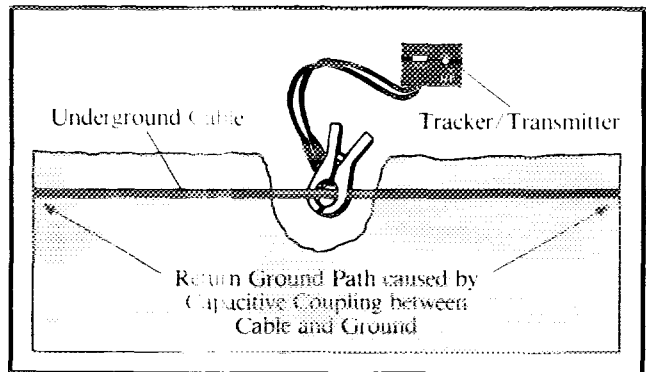


Figure 8 Mid Run Coupling

pipe by radiating a signal from the ground surface. This method is used when there is no accessible way to make a direct connection.

The Inductive Antenna or transmitter loop is fitted inside the carrying case of the 501 System and is powered by the Model 500HP transmitter.

A. OPERATION

Plug the two antenna leads into the 500HP transmitter. (See Figure 10)

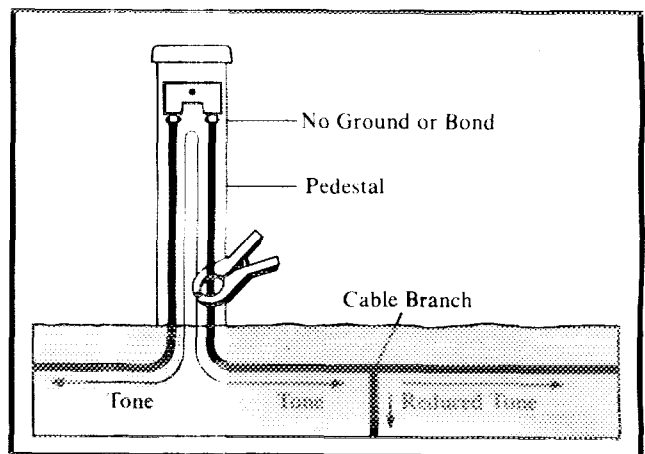


Figure 9 Reduced Tone at Cable Branch

Turn transmitter to full power, place the transmitter in its compartment with the leads facing to the rear of the case. Close the carrying case. (See Figure 11)

Place activated antenna on the ground parallel with and approximately one foot to either side of the utility to be tracked. (See Figure 11)

Radius the area approximately 20 feet away from the Inductive Antenna with the Tracker receiver to determine the path.

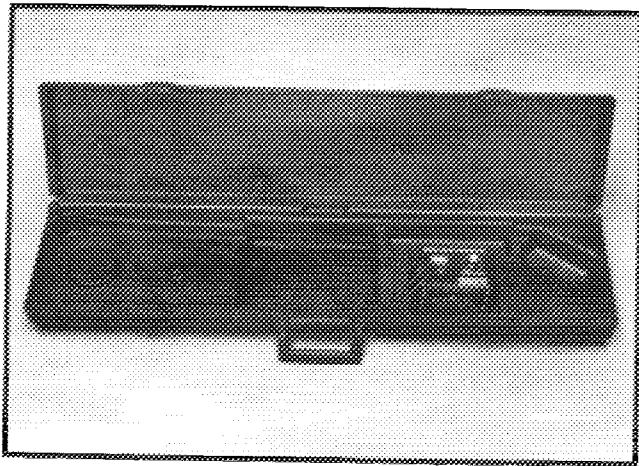


Figure 10 The Inductive Antenna

Proceed down the cable path following the peak signal.

NOTE: AS PROGRESS IS MADE DOWN THE CABLE PATH, GRADUAL INCREASES IN THE GAIN CONTROL OF THE RECEIVER WILL BE NECESSARY TO MAINTAIN RECEPTION.

Eventually reception will be effectively lost, even at the maximum transmitter setting. Retrieve the antenna and place it at the point where the signal was last effectively received.

Resume tracking the line and repeat the relocation of the Inductive Antenna as necessary.

B. SEARCHING FOR UNDERGROUND UTILITIES

The activated Inductive Antenna will radiate the tracking signal through the ground surface and the target utility will receive the signal and effectively transmit it down its path.

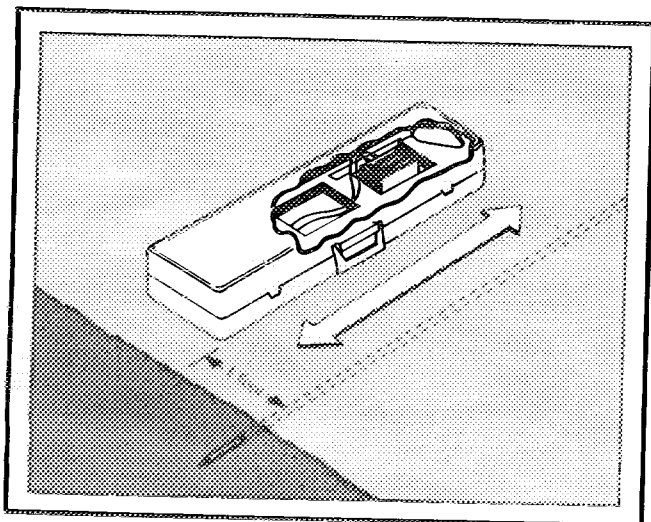


Figure 11 Placement of Antenna

One craftsperson will carry the antenna case close to the ground and move in a specified direction.

Another craftsperson will hold the receiver (500R) a distance of at least 20 ft. away and simultaneously move parallel with the first person.

When the receiver is directly over a utility, a strong signal will be detected. (See Figure 13)

Keep in mind that even though this is the easiest and most convenient way to locate, caution should be used because the radiated signal may be induced into the other utilities.

C. APPLICATION TIPS

Remember that any conductive line in the immediate area can collect the radiated signal. In locations such as trailer parks or other areas with congested facilities, minor reductions in the transmitter output level may eliminate unnecessary signal bleed.

The very nature of the Inductive Antenna may be a problem to the operator if he is not prepared to pick up the tone from the antenna itself. Begin using the receiver 20 feet or more away from the antenna to avoid receiving signal on a direct basis.

Figure 11, applies to situations involving shorter runs or work relatively close to the antenna.

To Achieve Maximum Distance, orient the activated antenna parallel to the suspect path, only set the Tracker II case up on its back, as shown in Figure 12.

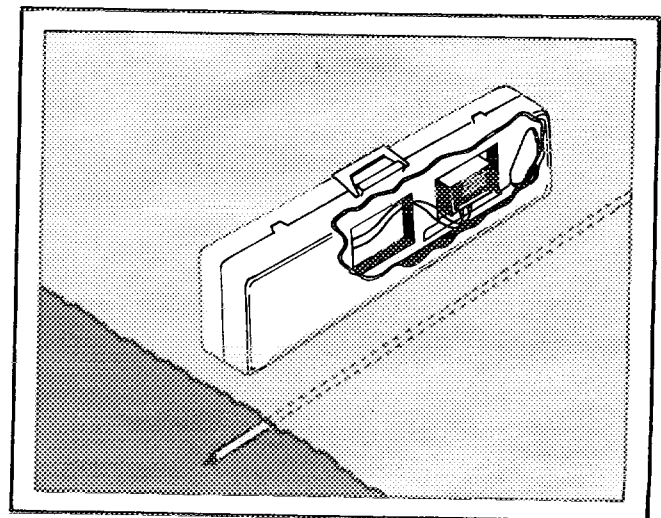


Figure 12 Placement of Antenna For Longer Distances

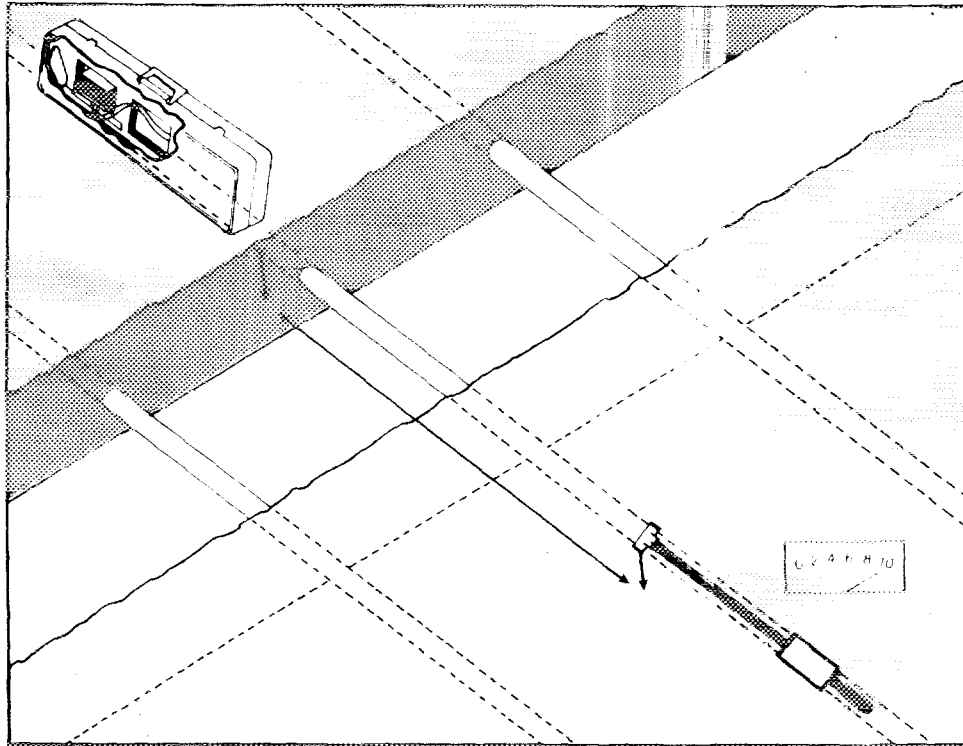


Figure 13

The Inductive Antenna is permanently installed and is weather sealed, no attempt should be made to field repair the unit.

Provisions have been made to retrofit existing carrying case with the Inductive Antenna.

7. MAINTENANCE

The only service required for maintaining proper operation is the periodic replacement of the batteries in the transmitter and receiver units. Remove screws, separate each half, snap in new batteries and reassemble. (Receiver uses one 9V and the transmitter uses (8) 1.5V AA cells.)

Compatible Products:

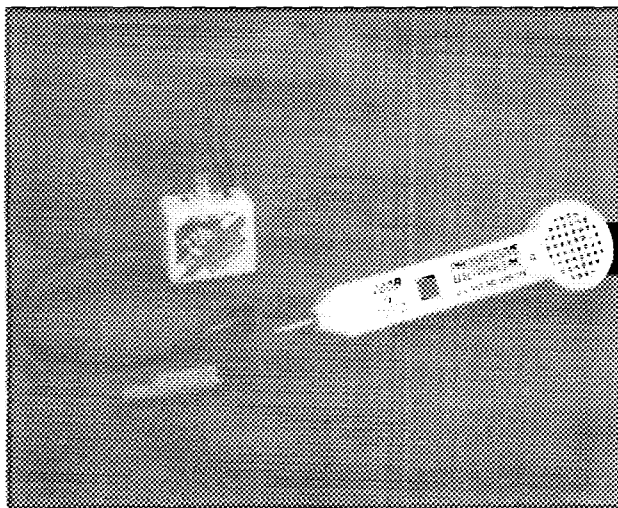


Figure 14 Model 77A & 200B
Used to identify one conductor out of a bundle.

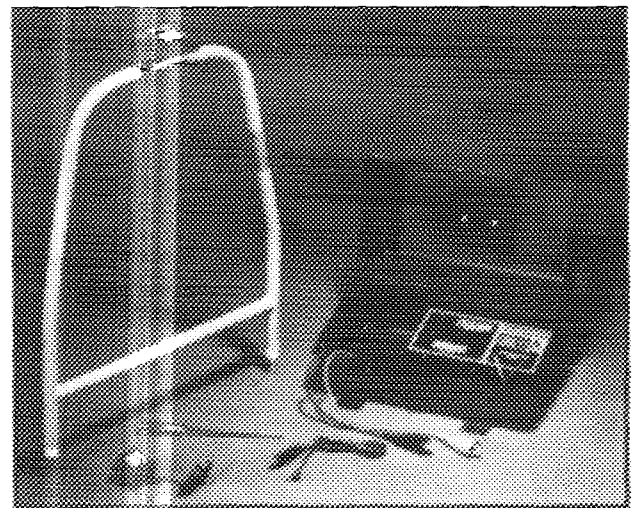


Figure 15 Model 2003
Earth Ground Fault Locator