DYNATEL 500 CABLE LOCATOR

CONTENTS PAGE

1. GENERAL

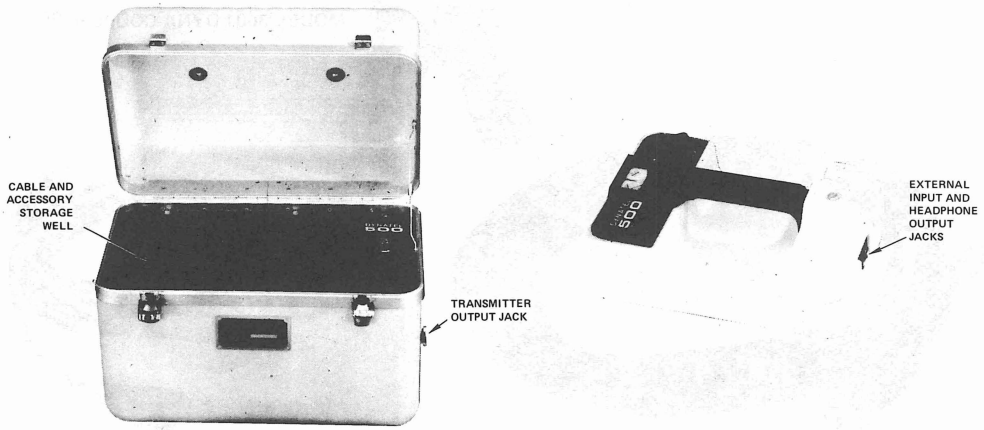
1.01 This section covers the description, use and battery replacement of the Dynatel 500 Cable Locator (Figure 1).

1.02 Whenever this section is reissued, the reason(s) for reissue will be shown in this paragraph.

1.03 This portable, battery-operated tone set locates the path of buried or underground (UG) cables. Applications include locating service drops, and encapsulated closures. The cable locator can also be used for positive cable or conductor identification, for finding the depth of buried or UG cables accurately, and for finding clear or severed cable ends.

1.04 This test set can be used without interruption of service. The transmitter generates a high-frequency tone that can be put on a cable or pair without opening it or noising it up. The tone does not interfere with signals or conversations already on the cable, and it is not sensitive to a-c power-induced noise. The transmitter has two power ranges: normal (for most applications), and high. Power level can be selected for soil conditions or cable length. Ground connections are generally unnecessary for the transmitter setup, and no connections are required for the receiver, which can be operated with one hand at normal walking speeds.

1.05 The tone receiver is a very sensitive, turned unit that receives only the signal from the transmitter. The receiver output can be heard either through the built-in loudspeaker, or through headphones. In addition, the receiver meter indicates the strength of the tone. The volume knob controls the speaker output level, the headphone output level, and the meter sensitivity. Headphones are optional with the Dynatel 500.



A. TRANSMITTER UNIT B. RECEIVER UNIT

Fig. 1 — Dynatel Cable Locator

2. DESCRIPTION

2.01 The Cable Locator consists of a transmitter, receiver, and accessory units (Figure 2). The transmitter and receiver are made of durable yellow fiberglass for light weight and high visibility, and water-resistance in wet-weather operation. For compact storage and carrying, the receiver and accessory units fit into the transmitter case when not in use. (Opt. Eqpt. - Figures 14, 15 and 16)

2.02 The TRANSMITTER has a single switch located on the panel next to the accessory storage well, as shown in Figure 3 and described below:

(a) The TRANSMITTER output selector is a 4-position switch for testing batteries and setting the transmitter output power level. The selector performs the following functions:

OFF: Turns off transmitter power.

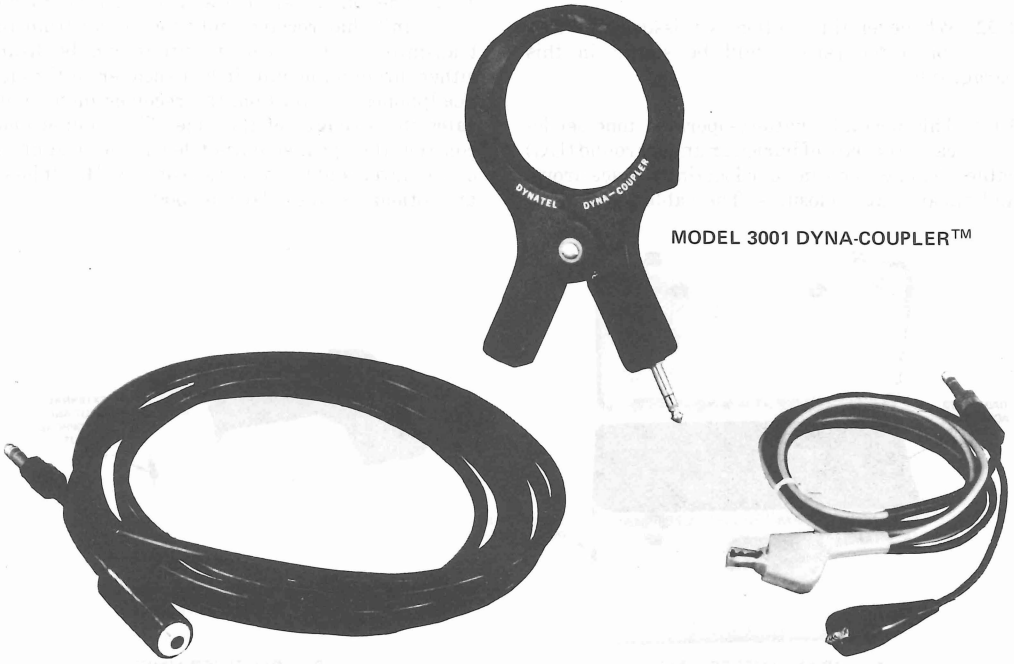
NORMAL: Sets transmitter output power at NORMAL level. Use this level for maximum battery life.

HIGH: Selects HIGH transmitter output level. Use this position for HIGH transmitter output power; for lead sheath cables, cable location over long distances, etc. High power operation reduces battery life. See also Paragraph 5.05.

BAT TEST: Battery test position; spring-return, momentary-contact switch puts load on the transmitter batteries. See Section 5.

(b) The Transmitter output connector (not shown) is a standard phone jack.

(c) The BATtery TEST indicator is used with the BATtery test position of the TRANSMITTER output selector (above). See Section 5 for battery test procedure.



MODEL 3001 DYNA-COUPLER™

MODEL 9011 ACCESSORY CABLE

MODEL 9012 TRANSMITTER OUTPUT CABLE

Fig 2. — Dynatel 500 Accessories

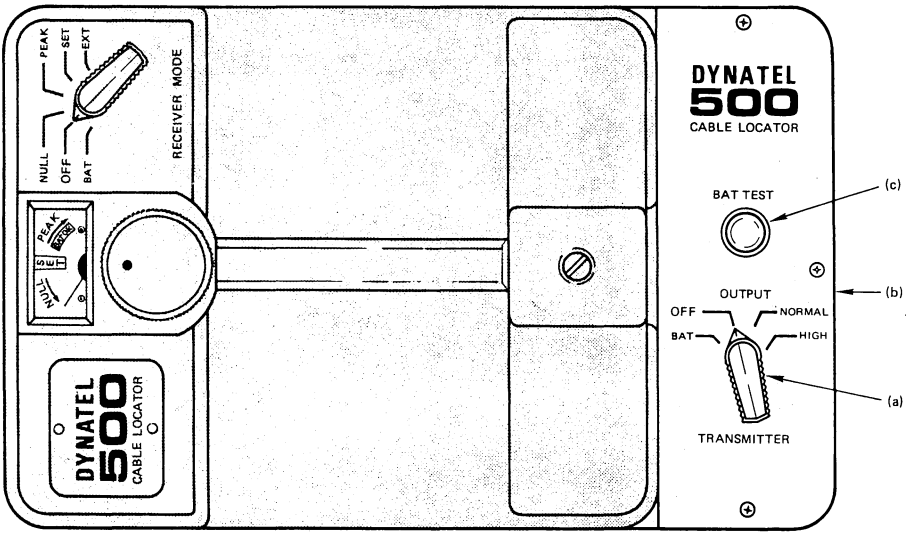


Fig. 3 — Transmitter Unit Panel. Functions are Keyed to Text in Paragraph 2.02.

Receiver Functions

2.03 The Receiver Functions are shown in Figure 4 and described below:

(a) The RECEIVER MODE selector is a 6-position switch that controls the receiver operating modes. The selector performs the following functions:

OFF: Turns off receiver power.

BAT: Battery test position; momemtary-contact, spring-return switch puts load on receiver batteries. See Section 5 for battery test procedures.

NULL: Selects receiver NULL mode operation; for use in cable location. See Paragraph 3.08. In NULL mode, receiver meter reading and the tone from the loudspeaker both decrease sharply when receiver is directly over the cable.

PEAK: Sets the receiver for PEAK mode operation; for use in cable location. See Paragraph 3.13. In PEAK mode, both the tone from the loudspeaker and the meter reading are the highest when the receiver is directly over the cable. This is not as sharp (definite) an indication as the NULL. Note that for best results in PEAK mode, the receiver handle must be PARALLEL to the cable.

SET: SET mode operation is used for cable depth location. See Paragraph 3.15.

EXT: EXT position used for operation of receiver with Dyna-Coupler™. See Paragraph 3.17.

(b) The Receiver Signal Level Meter indicates the strength of the tone being received. Needle deflects to the right for strong signal (PEAK); needle deflects to the left for NULL or weak signal. Yellow center zone (SET) is for cable depth finding (SET mode). BAT OK zone is used for battery testing.

(c) The Volume Control Knob controls the meter sensitivity, loudness of tone from the receiver loudspeaker, and the headphone output level at the headphone jack.

(d) The Loudspeaker provides an audible tone level indication. An overlapping cover protects the speaker in wet weather.

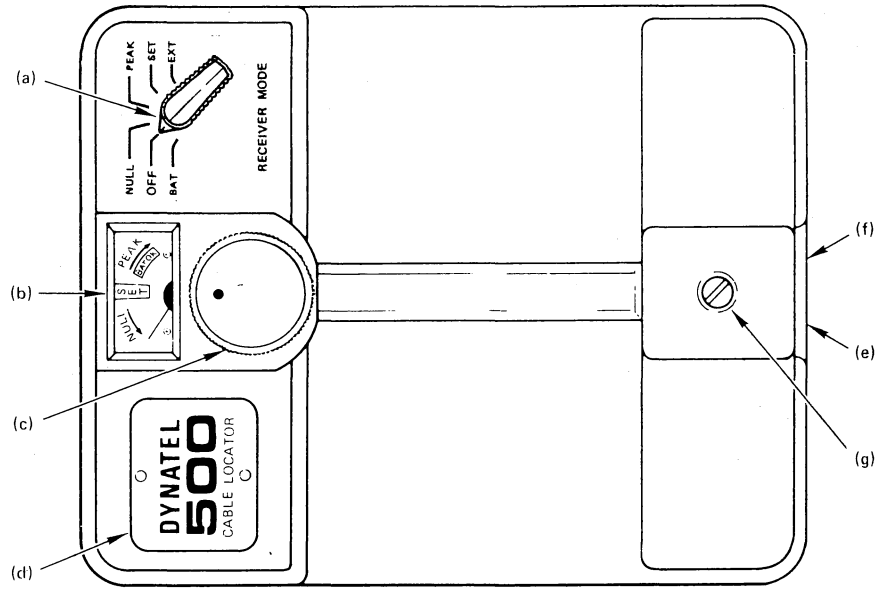


Fig. 4 — Receiver Unit Panel. Functions are Keyed to Text in Paragraph 2.03.

(e) The PHONE Jack (not shown) is an output connector for use with a 600-ohm headset (optional).

(f) The EXT Jack (not shown) is a signal input jack for use with Dyna-Coupler™ or Probe (in EXT mode).

(g) The Battery Access Code Screw secures the battery access cover. For the battery changing procedure, see Section 5.

3. OPERATION

Transmitter Setup

3.01 GENERAL. There are three ways for the transmitter to put tone on a cable: by induction, by direct connection, or with the special Dyna-Coupler™ . Instructions for all three methods are included in the following paragraphs. Remove the receiver unit from the transmitter carrying case; close the carrying case in rain or snow.

3.02 INDUCTION.

NOTE: The Induction method is non-standard in IBT and should not be used.

3.03 DYNA-COUPLER™ . If access to the cable is available, this is the easiest and most accurate way to put tone on only one cable. Connect the coupler assembly to the Transmitter Output Jack with the 12-foot cable assembly (Figure 5). Then open the coupler jaws and place them around the desired cable (or conductor). The tone will be loudest on just that one cable. It is unnecessary to remove common bonding or ground, or to open the cable or conductor.

NOTE: Be sure the Dyna-Coupler™ jaws are fully closed all the way around the cable. If the jaws do not close around the cable, very little tone will be on the cable. If the jaws do not close, the cable is too big. There is no minimum cable size.

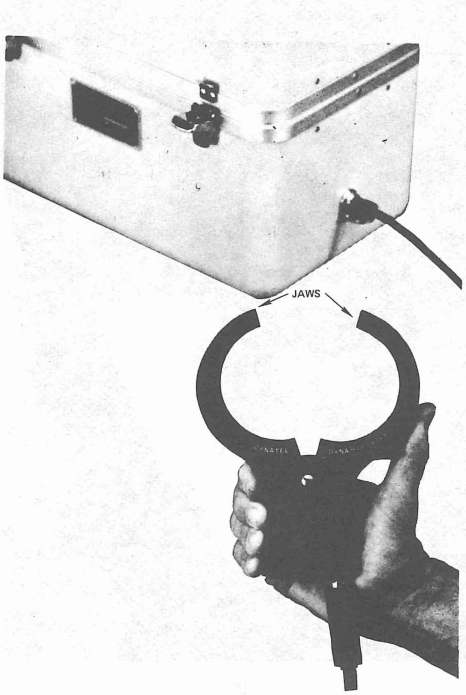


Fig. 5 — Opened Dyna-Coupler™. In the background, the Coupler Cable is shown connected to the Transmitter Output Jack.

3.04 For best results, do not use the Dyna-Coupler™ on a cable that is clear at both ends. Connect a jumper between one of the conductors (or the sheath) and ground. If no ground point is available, or if the cable length is short, use a direct connection to the sheath or to one conductor. See Paragraph 3.05.

3.05 DIRECT CONNECTION. Connect the phone plug on the 5-foot output cable to the TRANSMITTER OUTPUT jack, then connect the red clip lead of the output cable to the cable shield. If the cable is not shielded, use any one conductor in the cable, and connect the red clip lead to that conductor. Keep the black clip lead clear. Then set the transmitter on the ground. If the transmitter cannot be placed on the ground, then connect the black clip to ground. This completes the transmitter setup instructions. See Section 4, Special Applications, for suggestions on using the Cable Locator.

Cable Locator Operation

3.06 TRANSMITTER. The only transmitter control in the TRANSMITTER output selector. Turn the transmitter ON by turning the selector either to NORMAL or HIGH. See also Section 2. The NORMAL and the HIGH positions on the TRANSMITTER output selector determine the transmitter output power. For most situations, set the switch to NORMAL. Use HIGH power only for extra power, such as locating cable paths over very long distances, in very wet ground when the signal falls off rapidly, or when the soil is sandy and dry, and it is difficult to put tone on the cable.

3.07 RECEIVER. The receiver has only two controls: a VOLUME control and a RECEIVER MODE selector. See Section 2. To turn the receiver ON, set the RECEIVER MODE selector to any one of the four positions clockwise from OFF.

Cable Location Procedure

NULL MODE

3.08 In NULL mode, the tone received is least when the receiver is directly over the cable; the loudspeaker is the quietest, and the meter indicates a null (the needle goes to the left side of the meter). When the receiver is moved to either side of the cable, the tone from the loudspeaker increases, and the meter needle swings to the right. See also Section 2.

3.09 To operate in NULL mode, set the RECEIVER MODE selector to NULL, and bring the receiver into the general area of the cable. The cable can then be located by moving the receiver to the point where the tone is minimum, and the level meter is NULL. FOR BEST RESULTS, HOLD THE RECEIVER LEVEL. When the cable has been located, it can be followed with the receiver in NULL mode. See Figure 6.

3.10 The control knob at the front end of the handle controls both the loudspeaker volume and the meter sensitivity. Cable location accuracy is increased by turning up the volume control (this also increases the meter sensitivity). As the volume control is increased, the null becomes sharper.

3.11 For best results, put the tone directly on the cable with the Dyna-Coupler™ or with a direct connection. This eliminates the possibility of the

A

B

Fig. 6 — A. Receiver Unit in operation.
B. Receiver Unit in NULL mode; note thumb operation of Volume Control Knob.

receiver indicating a null in the wrong position. Another possibility is to double check the cable position by switching from NULL mode to PEAK Mode. THIS IS ALWAYS RECOMMENDED WHEN USING NULL MODE.

3.12 Generally, the NULL mode is the most sensitive, but can be affected by other cables or pipes in the area. The PEAK mode is not affected by other cables or pipes and proves to be the most accurate.

NOTE: If you use NULL mode, check your location in PEAK mode before you dig.

PEAK MODE

3.13 To operate the receiver in PEAK mode, set the RECEIVER MODE selector to PEAK. In this mode, the tone from the receiver is the loudest when the receiver is right over the cable. Similarly, the meter indication is the highest when the receiver is right over the cable. Use the volume control knob to control receiver sensitivity. FOR BEST RESULT, HOLD THE RECEIVER LEVEL.

NOTE: When using the receiver in PEAK mode, be sure that the handle is PARALLEL to the cable run. If you turn the handle so that it is ACROSS the cable run, the receiver output will decrease, and it won't be as accurate. See Figure 7.

3.14 Caution must be used to make sure you know which mode setting you are using when locating with this test..

Finding Cable Depth

3.15 To find the depth of a buried or underground cable, use the following procedure:

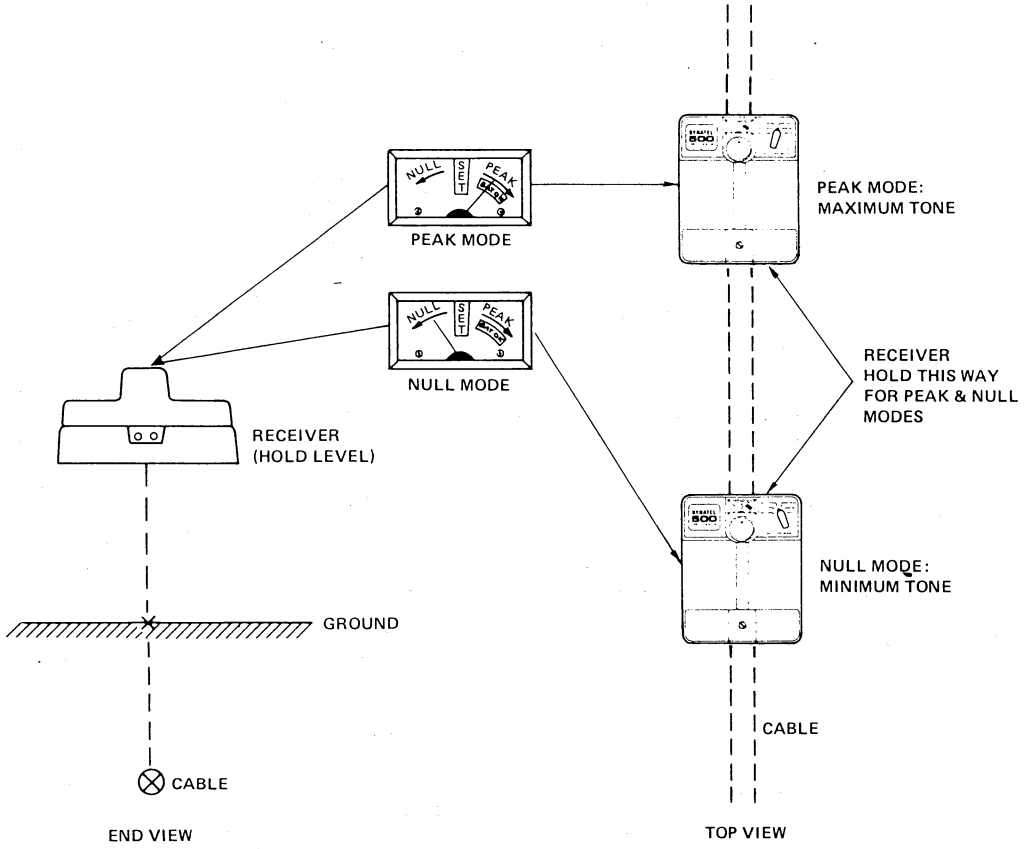


Fig. 7 — Cable Location for Peak & Null Modes.

(a) With the receiver in PEAK mode and the receiver handle in line with the cable path, carefully locate the cable position; then place the receiver on the ground directly over the cable.

(b) Put the RECEIVER MODE selector in SET, and adjust the receiver VOLUME control so that the meter needle is centered on the meter in the yellow area labeled SET.

(c) Set the RECEIVER MODE selector to PEAK. Note that the meter reading and the tone from the loudspeaker will both increase.

(d) Raise the receiver straight up from the ground until the meter needle returns to the SET area on the dial.

(e) Measure the distance from the bottom of the receiver to ground. This is equal to the depth of the cable below the surface of the ground. See Figure 8.

(f) To locate the depth of underground cable in a duct, be sure to subtract the diameter of the duct from the depth of the cable. This helps prevent damage to the duct.

3.16 The above cable depth location technique is limited by how high the operator can hold the receiver. If the cable goes under a drainage ditch, for example, it may be too deep to use the above method. In this case, use the following triangulation method:

(a) With the transmitter in NULL mode, locate the cable position. Double check it in PEAK mode.

(b) Mark the position on the ground.

(c) Hold the receiver so that the handle is PARALLEL to the cable path, and the bottom of the receiver is at 45 degrees relative to the ground. See Figure 9.

(d) Walk to one side of the cable until receiver indicates a NULL again.

(e) Mark the position on the ground beneath the receiver.

(f) The distance between the first mark and the second mark equals the depth of the cable.

NOTE: The accuracy of this method depends on two things:

(1) The handle of the receiver must be parallel with the cable path.

(2) The bottom of the receiver must be held at exactly 45 degrees.

If the receiver is held incorrectly, the cable depth measurement may be incorrect.

4. APPLICATIONS

Cable Location Applications

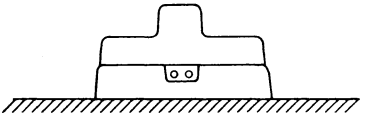
4.01 For best results, review Sections 2 and 3 for basic operation and cable location techniques. Once the basic operating techniques are understood, the Dynatel 500 will be extremely useful in the following situations.

4.02 KNOWN SLACK LOOPS AND BUTT SPLICES. To find slack loops or butt splices, first locate and mark the path of the cable. Then with the RECEIVER MODE selector set to PEAK, retrace the cable path. HOLD THE RECEIVER SO THAT THE HANDLE IS PERPENDICULAR TO THE CABLE PATH, and the tone from the receiver is minimum (see Figure 10). When the receiver passes over a slack loop or a butt splice, the tone from the receiver will increase, and the meter needle will go to the right. This indicates a sudden curve in the cable path, and it could be a butt splice or a loop.

NOTE: The receiver can sense loops and butt splices only if the handle is held perpendicular to the cable path; if it is parallel, the receiver senses the cable itself, and misses the loops, etc.

This method also locates buried closures with laterals. Whenever a slack loop or a splice is located, it is also a good idea to check it for unknown laterals. See Paragraph 4.03.

1) FIRST THIS. . .
   PLACE RECEIVER ON GROUND OVER CABLE (SEE PARA. 3.16).
   SET RECEIVER MODE TO SET.
   ADJUST THE VOLUME CONTROL SO THE METER INDICATES SET.



⊗ CABLE

2) THEN THIS. . .
   SET RECEIVER MODE TO PEAK.
   LIFT RECEIVER UNTIL METER NEEDLE RETURNS TO SET.

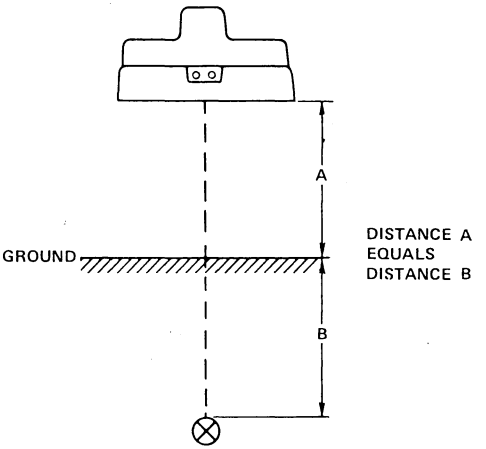
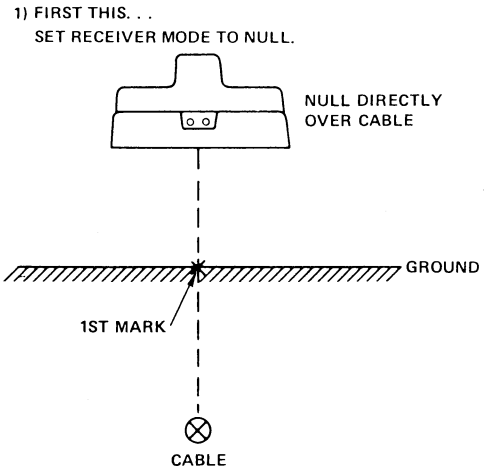


Fig. 8 — Cable Depth Location



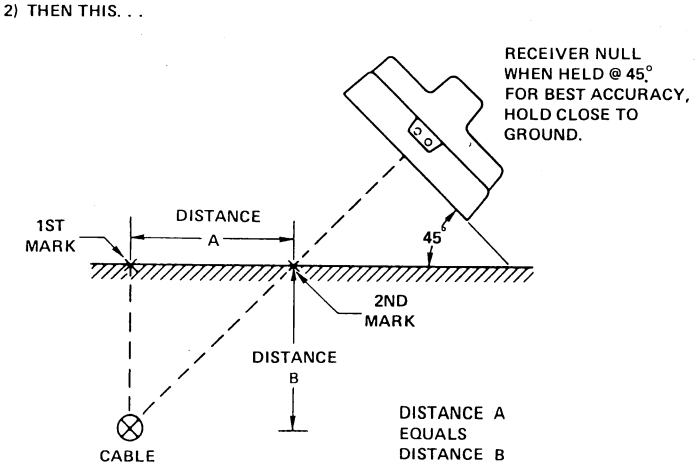


Fig. 9 — Cable Depth Location (Triangulation Method)

4.03 UNKNOWN LATERALS. To check for unknown laterals from a closure, first set up the transmitter and locate any splices of loops as outlined in Paragraph 4.02. Mark each splice or loop.

4.04 To find laterals, splices or drops from any of the places marked, switch the receiver to PEAK mode. Then walk about 10 to 25 feet away from the mark, and circle the mark. BE SURE TO HOLD THE RECEIVER SO THAT THE METER END OF THE HANDLE POINTS AWAY FROM THE MARK. If the receiver is held any other way, it may miss any laterals or service drops. See Figure 11.

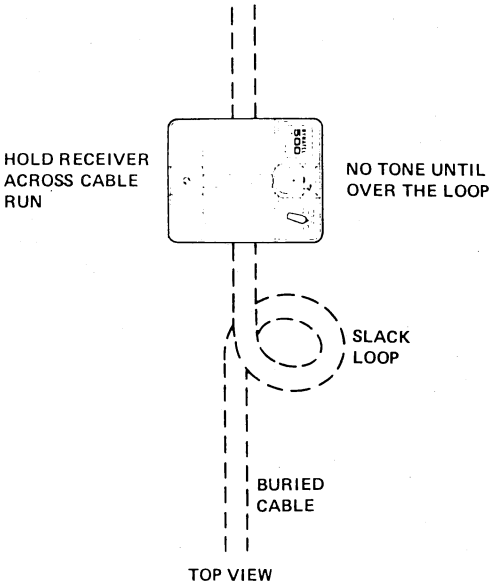


Fig. 10 — Slack Loop or Butt Splice Location

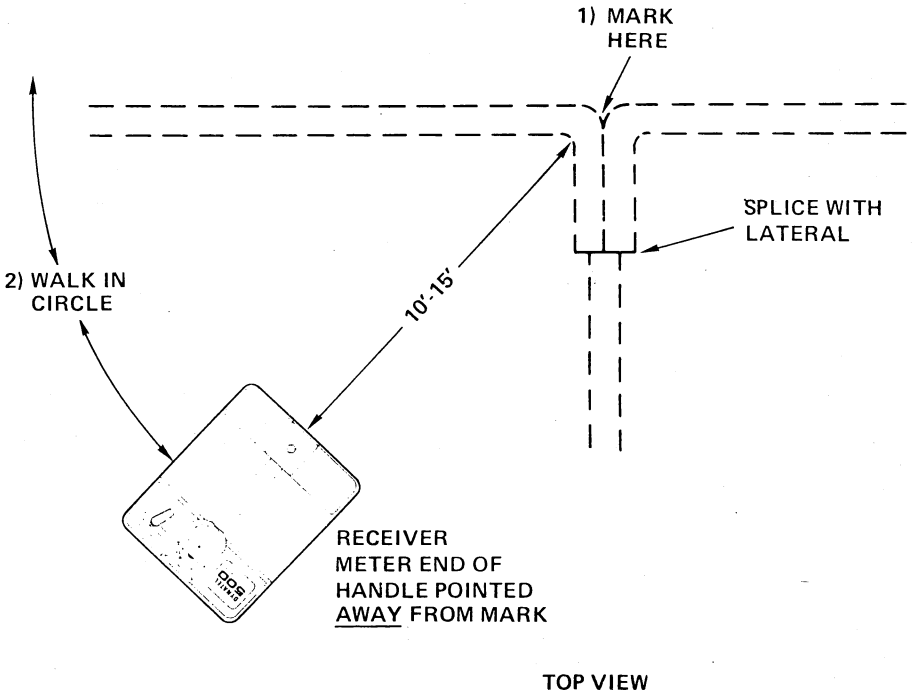


Fig. 11 — Locating Laterals, Drops from Splice, Encapsulation, Riser, etc.

4.05 The receiver will remain relatively quiet until it crosses a lateral. The tone will be loudest directly over the lateral. There may be more than one lateral, so be sure to walk all the way around the mark. After all laterals are located, the paths can be located and marked.

4.06 LOCATING CABLES FROM PEDESTALS OR ACCESSIBLE CLOSURES. To locate cables or service drops coming out of ready access closures or pedestals, use the Dyna-Coupler™ if possible to put tone on the one cable to be located. BE SURE TO PLACE THE COUPLER BETWEEN THE COMMON BOND AND THE POINT WHERE THE CABLE GOES UNDERGROUND. Set the transmitter power to NORMAL, unless the cable is to be traced a long distance.

4.07 To locate the cable, set the RECEIVER MODE selector to PEAK. Then circle the closure at a distance of 10 to 15 feet. BE SURE TO HOLD THE RECEIVER SO THAT THE METER-END OF THE HANDLE POINTS AWAY FROM THE CLOSURE. If the receiver is held any other way, it may miss the cable.

4.08 The receiver will remain relatively quiet until it crosses a cable. The tone will be loudest when the receiver is directly over the cable. Note that the meter will also point to the right of the scale. There may be more than one cable, so be sure to walk all the way around the pedestal or closure. The strongest meter signal indicates the proper cable; its path can then be located.

NOTE: If a direct connection is made to a common bond, the signal will be relatively the same on all cables leaving the closure.

4.09 SERVICE DROP PATH LOCATION. To locate the path of a servie drop from a house or other building, use the standard cable location procedure. In this case, it may be more convenient to make a direct connection to the service drop at the protector. Connect the transmitter output cable (red clip) to the protector, and place the transmitter on the ground (or connect the black clip to ground). Set the transmitter output power to NORMAL. Then locate the drop path using the standard NULL or PEAK mode techniques outlined in Section 3.

4.10 CLEAR END LOCATION. To find the clear or severed end of a cable or service drop, put the tone on the cable with the transmitter. If the cable is bonded at one end, or otherwise connected, put the Dyna-Coupler™ around the cable between the bonding (or connecting) point, and the point where the cable goes underground. If the cable is clear at both ends, the direct connection is suggested. Set the receiver in PEAK mode and follow the cable path until the tone suddenly decreases. That will be the clear (or severed) end of the cable.

Cable Connection Tips

4.11 RISERS. To locate a cable going underground from a riser, use the Dyna-Coupler™. Reach above the U-guard and pull the cable away from the pole, and place the Coupler around the cable. Once the coupler is connected between the transmitter and the riser, turn the transmitter on to the NORMAL power mode. The path of the cable can now be located.

4.12 PRESSURIZED CABLES. To put tone on a pressurized buried or toll cable, locate a pressure valve. Then make a direct connection from the transmitter to the valve. Use the transmitter output cable, and connect the red clip lead to the valve assembly. For best results, place the transmitter as far away from the valve assembly as possible. It may be necessary to use the Coupler cable assembly (12 ft) as a cable extension. See Paragraph 3.05.

Cable/Conductor Identification Applications

4.13 By putting tone on a cable or conductor, it can be identified. Use the following procedure to identify cables:

(a) Connect the transmitter tone to the cable using either a Dyna-Coupler™, or make a direct connection. See Paragraphs 3.03 and 3.05.

NOTE: 1) If a Dyna-Coupler™ is used to put the tone on the cable, then a second coupler will be required for identification purposes.

2) For underground or buried cable, put the coupler between any common bonding point, and the point where the cable goes underground.

(b) With the coupler cable, connect the Dyna-Coupler™ to the receiver EXT input jack. Set the RECEIVER MODE selector to EXT. See Figure 12.

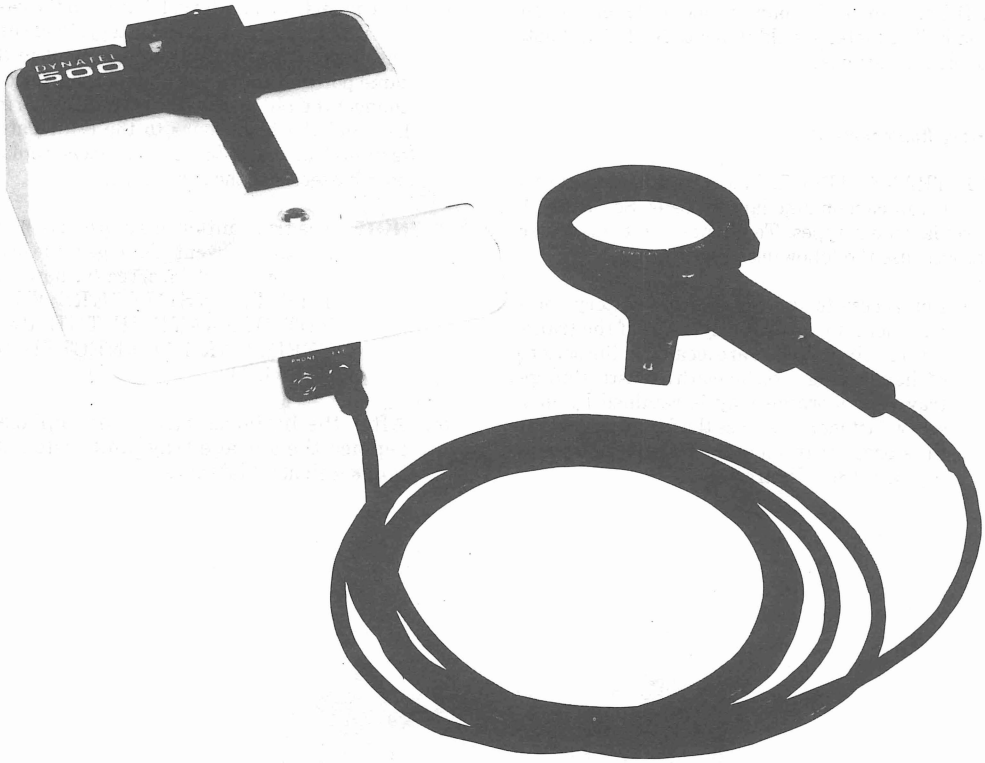


Fig. 12 — Receiver Setup for Cable Identification

(c) To identify the cable, place the Receiver Dyna-Coupler™ around each cable one at a time to locate the one with the greatest tone. This identifies the cable positively.

4.14 Use the following procedures to identify conductors:

(a) Connect the transmitter tone to the cable using either a Dyna-Coupler™, or make a direct connection. See Paragraphs 3.03 and 3.05.

(b) Connect Inductive Probe 3007 (see Figure 14) to receive EXT input jack. Set the RECEIVE mode selector to EXT and probe for conductor as covered in BSP.

(c) When direct metallic contact is to be made, such as would be made at a fixed count terminal or CO frame, use a 3008 Capacity Probe (see Figure 15.).

5. BATTERY OPERATION AND REPLACEMENT

Battery Tests

5.01 TRANSMITTER. The TRANSMITTER output selector has a momentary-contact BAT TEST position. To check the batteries, hold the switch fully counter-clockwise for 5 to 10 seconds. The batteries are good if the BAT TEST light turns ON (see Section 2). As the batteries age and the light gets dimmer, the transmitter output power decreases. When the light is barely visible, replace the batteries. Note that the transmitter will operate, if necessary on low batteries.

5.02 RECEIVER. Remove the receiver from the transmitter case and hold the RECEIVER

MODE selector fully counter-clockwise for 5 to 10 seconds. The meter should indicate BAT OK; if not, replace the batteries.

Battery Replacement

5.03 TRANSMITTER. The transmitter uses two 6-volt carbon-zinc lantern cells. See Table A for replacement types. To change the transmitter batteries, use the following procedure:

(a) For access to the transmitter battery compartment, take the receiver out of the transmitter. The batteries are located in the bottom of the carrying case, beneath a plastic storage tray. The storatge tray is retained by four screw fasteners. Release the fasteners and lift the storage tray out of the transmitter carrying case. (See Figure 13)

(b) Disconnect each battery; lift it from the case, and replace it with a fresh battery. Place new batteries in the battery compartment in the same position as the old batteries. Be sure to connect the red wire to the (+) positive terminal, and the black wire to the (–) negative terminal on each battery. Always replace both batteries at the same time.

NOTE: The transmitter has a protection circuit that prevents damage if the leads are connected incorrectly; however, THE TRANSMITTERS WILL NOT OPERATE IF THE BATTERIES ARE CONNECTED INCORRECTLY.

(c) After the batteries have been replaced, replace the storage tray, and fasten the quick-release fasteners.

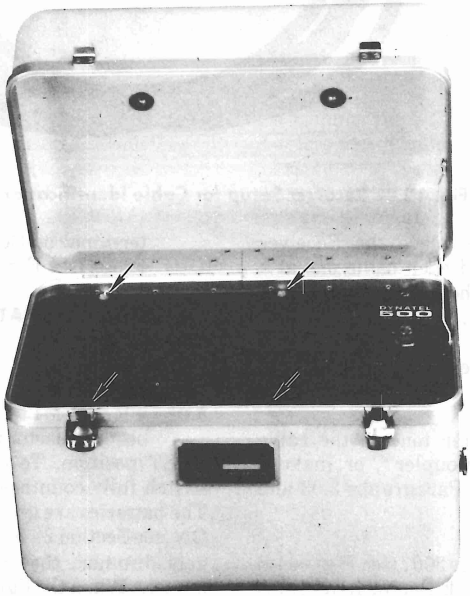


Fig. 13 — Transmitter Battery Access. For access, release ¼-turn screws (arrows); lift out plastic storage well.

Table A
Cable Locator Replacement Batteries

Unit*	Voltage	NEDA	Eveready	Burgess
Transmitter	6V	915	510S	F4BP
Receiver	9V	1602	246	2N6

*Each unit requires two batteries.

5.04 RECEIVER. The receiver uses two 9-volt carbon-zinc batteries, which are located under the access cover at the opposite end of the Receiver from the controls. See Table A for replacement types. To change the batteries, use the following procedure:

(a) Loosen the battery access cover screw, and remove the access cover (see Paragraph 2.03(g)).

(b) Disconnect each battery; lift it from the receiver, and replace it with a fresh battery. Always replace both batteries at the same time.

(c) Replace the battery access cover, and tighten the cover screw.

5.05 TRANSMITTER. The Transmitter battery life is normally greater than 500 operating hours, providing that the transmitter is used in a NORMAL power mode (TRANSMITTER OUTPUT switch set to NORMAL). In the HIGH power mode, battery life is approximately 100 hours. Note that the transmitter will continue to operate until the batteries are nearly exhausted. However, the transmitter tone output drops as battery voltage decreases.

NOTE: For maximum battery life, be sure to:

-Always turn transmitter power off when transmitter is not in use.

-Use the NORMAL operating mode whenever possible.

5.06 RECEIVER. Under normal service conditions, receiver battery life is longer than 100 hours.

NOTE: For maximum Receiver battery life, always turn off the Receiver when not in use.

OPTIONAL EQUIPMENT

3007 INDUCTIVE PROBE

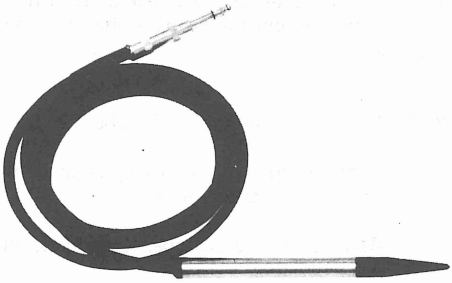


FIGURE 14

To be used with Dynatel Receiver for positive conductor identification where there is no direct access to metallic connection. Tuned to 300 KHz.

3008 LOW-CAPACITY PROBE

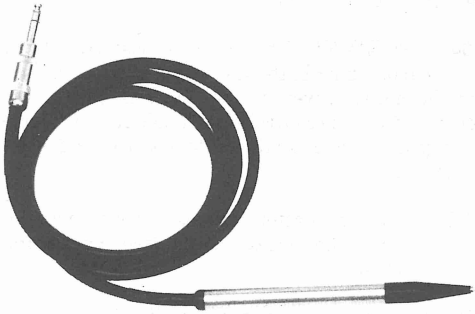


FIGURE 15

To be used with Dynatel Receiver for positive conductor identification where direct metallic contact is available. Tuned to 300 KHz.

3005 DYNA-COUPLER T.M.

FIGURE 16

This coupler is smaller than the 3001 coupler. It can be used in compact areas where it is impossible to use the 3001.

FACTORY SERVICE

Dynatel instruments are designed for dependable operation without periodic adjustment and calibration. However, if your instrument is not working properly, return it to the factory for repair. Send it to:

DYNATEL™
CORPORATION
380 North Pastoria Ave., Sunnyvale, Calif. 94086
408/733-4300

If you need information call the Dynatel Corporation Customer Service Department at (415) 965-3310. If you return an instrument for service or repair, be sure to include the following information.

(a) Name and address of owner.

(b) Brief discussion of symptoms or trouble.

(c) If possible, send the name and telephone number of someone familiar with the problem, and who may be contacted if more information is necessary.

(d) Special shipping instructions, if any. Include your return shipping address and department mail address, if necessary.

PACKING INSTRUCTIONS

(a) Wrap the entire unit in plastic.

(b) Place the unit in a sturdy container. Add packing material around all sides of the unit.

(c) Seal the shipping container with strong tape.

(d) Mark the shipping container to indicate that it contains fragile electronic equipment.