

MODEL 2003 PULSER GROUND FAULT LOCATOR

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1. GENERAL

1.01 This section provides information on the Pulser Fault Locator, Model 2003, manufactured by Progressive Electronics Inc.

2. DESCRIPTION

2.01 The Pulser (Figure 1) is a Ground Fault Locator based on the earth gradient principle. It will find the precise location of a path to ground fault in any buried wire or cable. Broken insulation, severed cable and other buried cable faults with ground leakage can be easily and accurately located with the Pulser.

2.02 The Pulser consists of:

- 1 Transmitter
- 1 Receiver
- 1 "A" Frame assembly
- 1 Cigarette lighter DC adapter charger
- 1 AC charger
- 1 Carrying case. The Model 2003 case measures 17"x9"x9", weighs 13 pounds and is constructed of polyethylene plastic.

(a) **TRANSMITTER:** The transmitter generates voltage from a self-contained rechargeable gel-cell type battery. This voltage is applied to the output leads briefly every few seconds as indicated by the internal beeper, which also indicates the battery condition. Charging of the transmitter battery is necessary and advisable for maximum battery life, when the beeper tone becomes weak. Use the AC charger to recharge from a 120 VAC outlet. Overnight charging (12-16 hours) is advisable. The Pulser transmitter may also be



Figure 1 - Standard Unit

charged by using the 12 volt automotive system cigarette lighter adaptor supplied.

- (b) **RECEIVER:** The receiver indicates the polarity and intensity of minute currents with a center zero meter. It has an on/off sensitivity control and a battery check button to examine the condition of the replaceable 9 volt battery.
- (c) **THEORY:** The transmitter pulses between the faulted conductor and ground. This establishes a DC current flow down the cable, through the fault to ground, and back through the ground to the transmitter ground stake. The current flow through the earth is measured by probing the ground along the cable path with the receiver "A" Frame. Since the current is directional, the receiver meter pulses or kicks with each transmitter pulse in the direction of the fault. The fault will be located midway between the receiver "A" frame probes when the receiver meter indication nulls.

3. OPERATION

3.01 Start at either end of the faulted conductor. The power should be removed from the conductor under the test and all loads should be disconnected to prevent damage from high voltage and false readings.

3.02 With the transmitter off, connect the clip of the black transmitter lead to the ground probe. Insert the ground probe deeply into the earth. (See Figure 2)

3.03 With the transmitter off, place the receiver in the "A" Frame mounting bracket and connect the "A" Frame receiver leads to the receiver input jacks, the black lead to the black jack and the red lead to the red jack.

Now that the "A" Frame and receiver assembly has been completed, the red probe is identified by the red band around the right leg of the "A" Frame.

3.06 Move the "A" Frame in line with and down the faulted conductor path. Be sure to insert the "A" Frame probes deeply enough to insure good ground connection. Always lead with the red probe, working away from the transmitter. Strongest indications will be present at the transmitter and at the fault. If the signal begins to fall off or decrease in strength while probing down the faulted conductor path, continue until it comes back up again.

3.07 While probing the path, a reversal in the receiver meter, a "black" kick, will be observed.

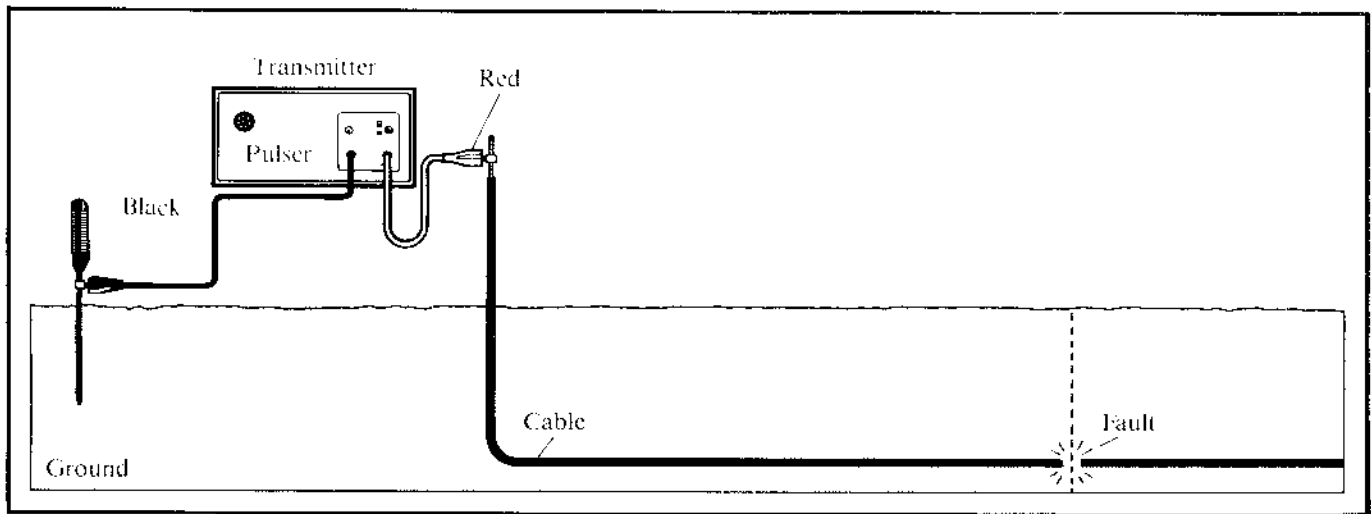


Figure 2 Transmitter Set Up

3.04 Turn on the transmitter by pulling up on the plunger switch. Pulses will commence after a short delay at approximately three second intervals as evidenced by the transmitter beeper.

NOTE: DO NOT HANDLE TRANSMITTER LEADS, CLIP OR CONDUCTOR UNDER TEST WHEN THE TRANSMITTER IS ON.

3.05 Turn the receiver on. Verify the battery condition by pressing the battery test button and observing the meter. Insert the "A" Frame probes into the earth, orienting the black receiver probe closest to the transmitter ground stake. (See Figure 4) If all probes are making good ground connection, the receiver will kick toward the red probe in step with the transmitter beeper.

Always adjust the receiver sensitivity for a less than full scale reading and correlate the transmitter beep with the receiver meter indication.

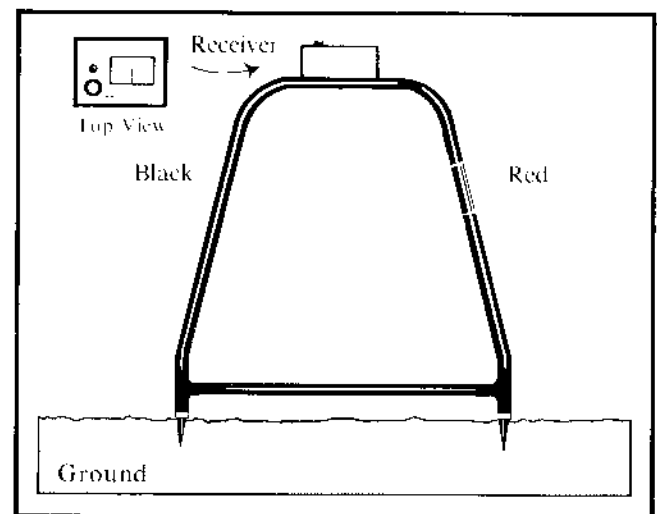


Figure 3 Receiver Set Up

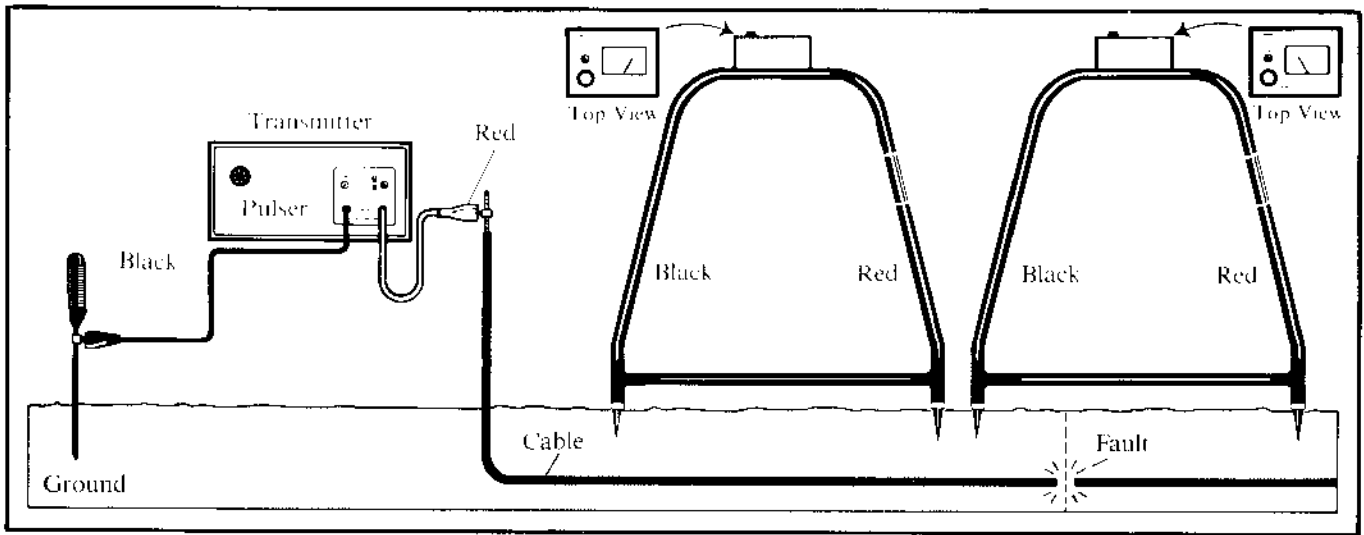


Figure 4 Probing Cable Path-Reversal

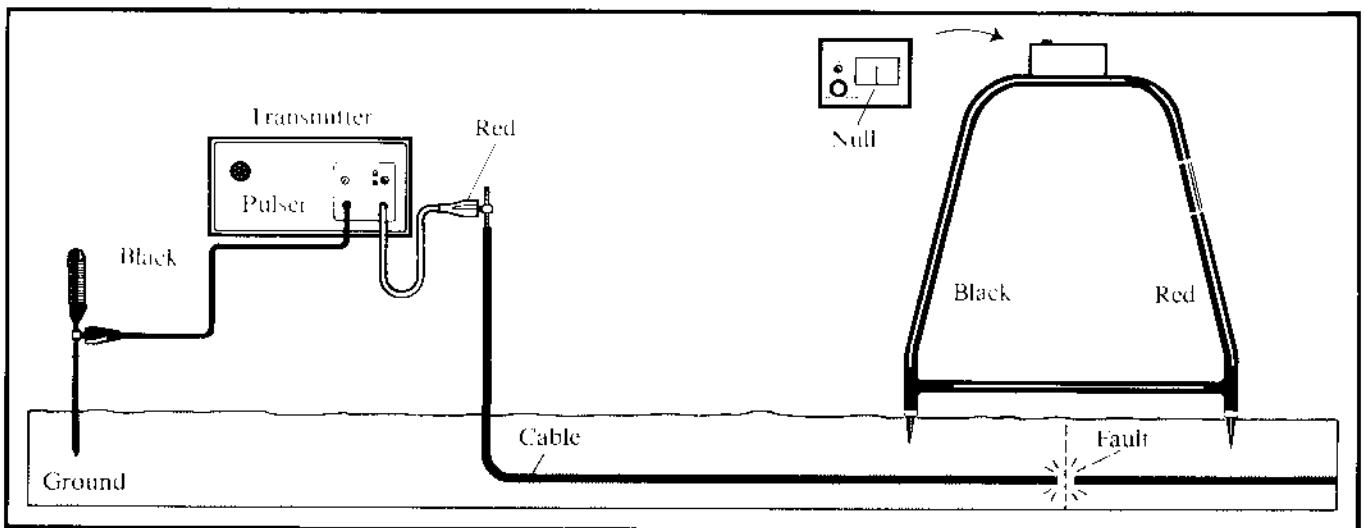


Figure 5 Nulling Receiver First Time

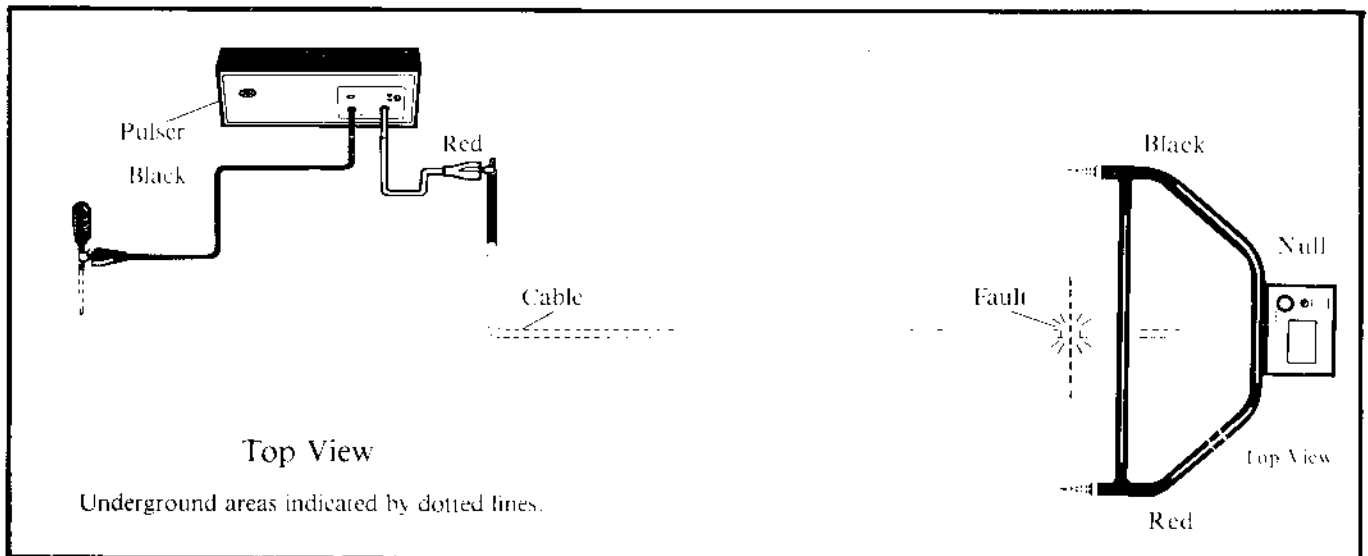


Figure 6 Nulling Receiver Second Time

To determine the exact location, move the "A" Frame in the direction of the black kick until the kick reverses to red. (See Fig. 4) Now move the "A" Frame in small increments back to the red kick until it reverses to a black kick or it nulls. (See Fig. 5)

NOTE: RECEIVER WILL NULL WHEN PROBES EVENLY STRADDLE THE FAULT. MARK THIS SPOT (See Figure 6)

3.08 Insert the "A" Frame at right angles or perpendicular to the cable path, through the point of the first null. Repeat procedure outlined in 3.07 until a second null occurs.

NOTE: RECEIVER WILL NULL WHEN PROBES EVENLY STRADDLE THE FAULT. MARK THIS SPOT (See Figures 5 and 6)

4. SPECIAL FAULT LOCATING PROBLEMS:

4.01 Finding faults under concrete. Dissolve approximately $\frac{1}{4}$ cup of salt in one gallon of water. Soak two large sponges in the salt water. Wrap the sponges over the end of each probe and attach with a rubber band. Now proceed as described in 3.07. Resoak sponges often and dampen area where sponges are placed.

4.02 Obstructions over the drop. It is not necessary to be directly over the drop path to indicate the fault location. The drop path could be under a street, driveway, or sidewalk. In this case if the soil parallel to the drop path can be probed (up to 15 feet away) you can locate the fault. Accuracy will not be exact compared to following the path.

4.03 Multiple faults will cause the receiver to reverse at each fault, the most solid fault will produce the strongest signal, kick or reversal. The best policy is to repair the first fault you locate then reconnect the Pulser and locate the next one, until you have cleared all the trouble.

4.04 High resistance faults. A very high resistance may produce a weak kick. To help make this fault easier to locate, simply turn the sensitivity all the way clockwise. Pouring water on ground probes will increase sensitivity.

4.05 Long distances to the fault. Extreme distances between the transmitter and the fault can cause you to lose signal for a distance between the transmitter and the fault. This is no real

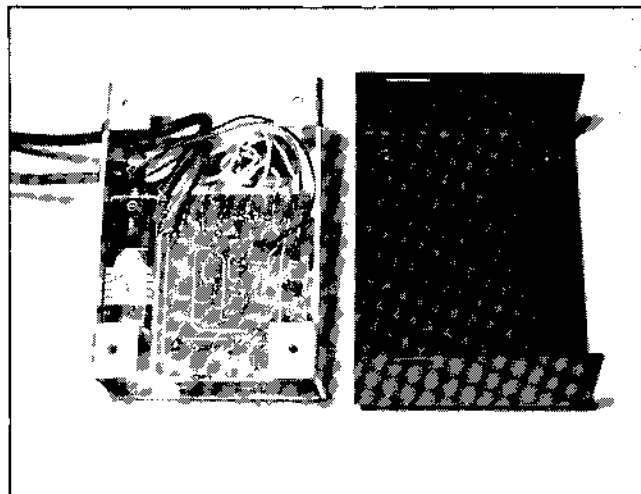


Figure 7 - Receiver Battery Replacement

problem. Note the distance from the transmitter to the point you lose signal, you will pick the pulse up the same distance from the fault. For example, we will use a distance of 100 feet between the probings. The pulse will be received 100 feet on either side of the fault.

5. MAINTENANCE

- (a) Charge the transmitter battery before storing unit. Never allow the unit to sit for any length of time with a low or discharged battery.
- (b) Replace receiver meter battery with a NEDA type 1604 as needed.