AQUA - TRONICS, INC.

SETTING THE STANDARD FOR SERVICE

Cable I.D. Live

- Primary or Secondary
- In or Out of the Trench
- TX-Former to TX-Former
- TX-Former to Meter
- Energized or Grounded

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WARNING

1. ALL CABLES ARE CONSIDERED ENERGIZED UNLESS THEY ARE VISIBLY INSPECTED TO BE GROUNDED.
2. BEFORE A HIGH VOLTAGE CABLE CAN BE CUT, IT MUST BE SPIKED.

DESCRIPTION

This Cable I.D. Live system will allow the identification of one cable from another, in or out of the trench, live or dead if the following instructions are followed. It also must be understood that there are conditions of a cable under test that may be un-known, and those conditions could prevent accurate readings.

Your Cable I.D. Live system consists of three items. One receiver and two inductive couplers. One coupler has a cord on it and one coupler is wireless. The wireless coupler is the transmitting coupler.

When the wireless coupler is installed around a conductor, a tracing tone is also available between the two ground rods on that cable. Any of the Aqua-Tronics active frequency cable locating receivers can be used to trace the route of that cable under test.

Both couplers have a hot stick ring on one side that allows the jaws to be opened and closed using a hot stick. A ¼-20 threaded insert is at the back end so a threaded extension rod can be installed. With a cord tied to the hot stick ring, the opening and closing of the coupler jaws can be remote if a hot stick is not available.

BATTERY TEST

Before starting a cable identification, check all batteries.

THE WIRELESS COUPLER Turn the coupler on. It has a red LED that will blink every 3 or 4 seconds if the battery is good. If the LED fails to blink, remove the four screws holding the battery cover in place. Replace the 9 volt radio battery with any 9 volt alkaline battery that will fit. (Some off shore made batteries may be just a little large for the compartment)

THE RECEIVER Turn on the receiver with the on/off switch. After the receiver has completed its start-up self test, the word **GAIN** will appear in the upper left corner of the display. Push the spring loaded battery test switch. The battery voltage will be provided in the lower center of the display. In the upper right corner of the display, a battery symbol will appear. If the battery voltage drops below the proper level for operation, the battery symbol will start flashing. The battery voltage is also displayed for a few seconds during the start-up self test. To replace the batteries, remove the battery cover at the back end of the handle. Unsnap the battery connector and remove the battery holder. Replace with Alkaline AA batteries for longer life. 6 each.

ONLY USE THOSE INDUCTIVE COUPLER MODELS THAT ARE SUPPLED WITH THE INSTRUMENT FROM AQUA-TRONICS, INC. Other couplers may look similar, but the I.D. Live receiver is not built for their use and their accuracy will not allow proper identification.

TYPES OF CABLES THAT CAN BE TESTED

The methods used to identify one cable from another is slightly different for shielded and unshielded cables. As a result, this manual is divided into three parts.

- **Insulated Cables. ---** Secondary and street light cables.
- **Low voltage Shielded Cables ---** Cable T.V. and telephone.
- **Jacketed High Voltage Primary Cables**

Unlike other methods of applying signal which can place the same amount of signal on every circuit that is electrically connected, the transmitting coupler signal will go to the first ground it can find on both sides of the coupler. The signal will divide down and be much less on the other conductors that are connected to the same ground. The major portion of the signal will be on the conductor the wireless coupler is clipped around, between the grounds at both ends.

If the signal finds a wire connection of two or more conductors at some junction point before it finds the ground, the signal will divide down with much smaller signal being on each conductor. See Fig. 1

When installing the wireless inductive coupler to a cable, the cable must be inside the coupler ring with the coupler closed and the cable must be grounded at both ends. The ground can be through a load on energized cables. This also applies to the conductor of a de-energized primary cable. The neutral and conductor must be

grounded at both ends. If the coupler cannot see a ground at both ends, it will not apply a signal to the conductor.

When making a cable I.D., measure each cable in question. Adjust the receiver gain control for a mid-scale reading on the display for each cable. Once the gain control is set for a mid-scale reading on the cable that has the most signal, all of the other cables under test will have much less signal at that gain setting. That is the cable the wireless transmitter is around.

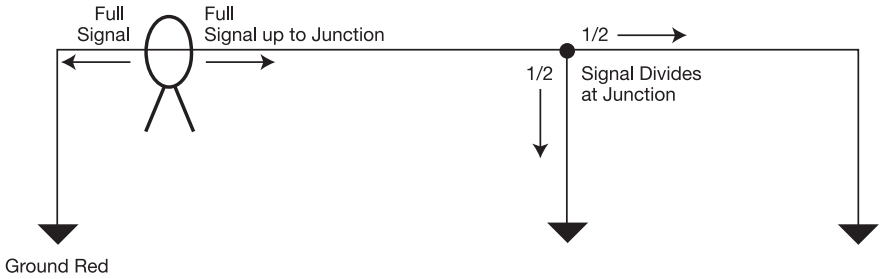

FIGURE 1
Signal Divides at Junction

SECONDARY - STREET LIGHT CABLES.

Place the wireless transmitting coupler around the meter riser conduit, or a single conductor. Turn the coupler on with the low-high power switch on low. High power can be used but in most cases it is not required and low power will reduce the chance of inducing signal into other circuits.

From where the transmitting coupler is installed, signal will travel in both directions to its respective ground. This will allow the receiving coupler to be used at any access point between the two grounds.

Turn on the receiver and install the receiving inductive coupler plug into the phone jack provided. The receiver is now ready to take readings. In the upper left corner of the display above the word GAIN, a number will appear. This number from 0 to 100 is the percentage number of where the sensitivity control is set. A reading of 25 would be 25% of the sensitivity control use. This will allow the operator to identify the different signal levels on each cable under test.

Place the receiving coupler around each cable one at a time. The cable with the highest signal reading on the display will be the cable the wireless transmitter is

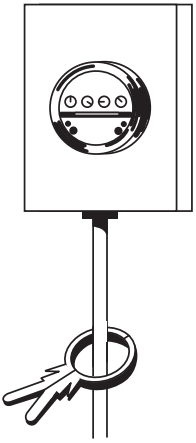

FIGURE 2
Meter Riser

around. All of the other cables could have signal on them, but the signal level will be much lower.

With the receiving coupler around the first cable being tested, adjust the sensitivity control for a mid-scale bar-graph reading. If the second cable has a lower or equal reading, leave the sensitivity control where it is and move the coupler to the next cable. If the reading on the second cable is higher than the first cable, adjust the sensitivity control down for the mid-scale bar-graph reading. When the cable has been found that has the mid-scale reading and all other cables under test have a much lower reading or no signal reading at all at that gain setting. The cable with the highest reading is the cable the wireless transmitting coupler is clipped around.

A numerical signal level is also positioned in the lower center of the display below the bar-graph. This numerical number is tied to the bar-graph and will provide the highest numerical reading on the correct cable.

EXAMPLE With the wireless coupler around a meter riser at the house, the coupler would be around both hot legs and the neutral. At the transformer, the receiving coupler will identify both hot legs and the neutral going to that meter. See Fig. 2

IF THE METER HAS BEEN REMOVED, ONLY THE NEUTRAL CAN BE IDENTIFIED. NO SIGNAL CAN BE PLACED ON THE TWO HOT LEGS BECAUSE THEY ARE ISOLATED AND THE TRANSMIITER CANNOT SEE A GROUND AT THE ISOLATED END.

CATV and TELEPHONE

These cables have a metallic sheath around the outside of the internal conductors. Since the sheath is also a magnetic shield to radio waves, the transmitting coupler must be placed around the outer jacket of the CATV or Telephone cable that includes the sheath.

Since the sheath is a magnetic shield, all receiver readings must be made having the receiving coupler around the outer jacket of the entire cable. See Fig. 3

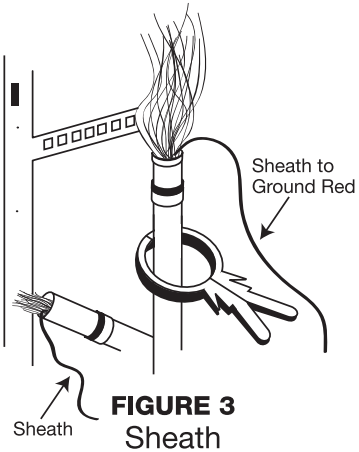

FIGURE 3
Sheath

If for some reason the transmitting coupler was placed around the internal conductors that did not include the sheath, the receiving antenna would only see signal on the conductors at the far end. Signal would not be available anywhere along the cable route because of the sheaths magnetic shielding.

JACKETED PRIMARY

The concentric neutral has a ground rod at both ends and a semi-conductive jacket around the neutral. Since the neutral is isolated from the soil, the transmitting coupler can be placed around the outer jacket and the signal will transmit in both directions to the two ground rods. See Fig. 4 In Fig. 4, the signal should be measured at position # 2 for all cables under test. Position 3 could give incorrect

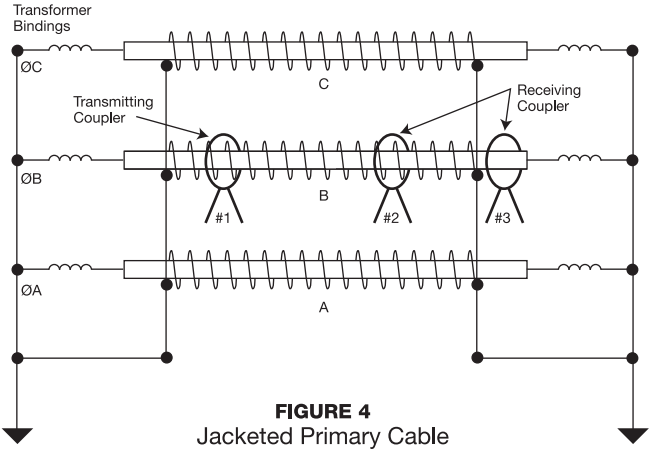

FIGURE 4
Jacketed Primary Cable

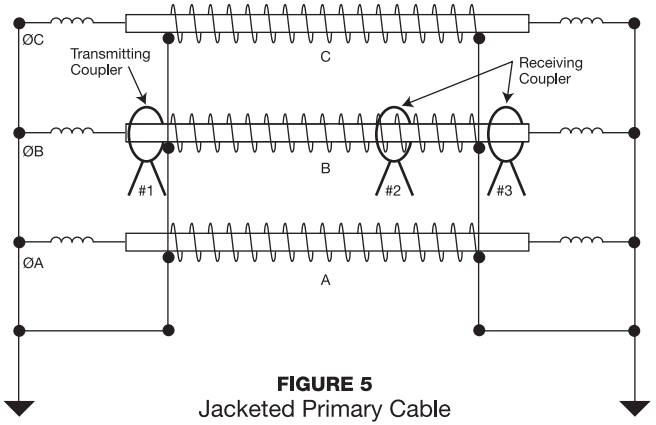

FIGURE 5
Jacketed Primary Cable

readings. In Fig. 5 , the situation is different than Fig. 4 The transmitting coupler is now around the conductor at position # 1. The receiving coupler in position # 3 will receive the strongest signal because of neutral shielding.

NOTE: If the transmitting coupler is placed around the entire cable, the receiving coupler must be placed around the entire cable. If the transmitting coupler is placed around the conductor only, the receiving coupler must be placed around the conductor only for all cables under test.

There are several conditions that could limit the ability to make a positive cable identification.

1. Neutral pigtails touching other pigtails between the neutral break out and the ground bus wire at the base of a transformer. Signal will divide where it touches another conductor before it finds the ground rod. See Fig. 6
On the cable the transmitting coupler is on, the pigtail should go to the ground bus at the base of the enclosure or ground rod without touching other pigtails.

#2. A non-jacketed section of primary spliced into a jacketed primary. Even though the transmitting coupler is around a jacketed cable, at the point where the bare neutral of the non-jacketed cable is touching the soil may look like a ground rod to the signal. All the operator may see is a jacketed cable at both ends and unaware of the non-jacketed section. The readings taken will not be what the operator is looking for in proof positive identification.

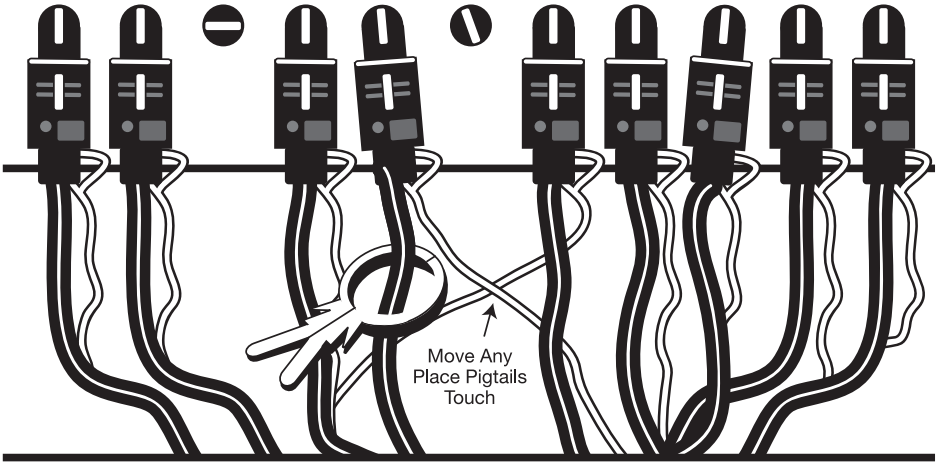

FIGURE 6
Jacketed Primary

Because of the two mentioned and many more problems that could exist.
All cables are considered energized unless they have been physically grounded and all cables are spiked before they are cut.

A good rule of thumb is ---- IF READINGS BEING TAKEN ARE NOT TURNING OUT AS TO WHAT THE OPERATOR THINKS THEY SHOULD BE, STOP ALL TEST AND REVIEW THE SET UP. MOST OF THE TIME, THE OPERATOR WILL FIND A PROBLEM IN THE SET UP SUCH AS THE TRANSMITTER NOT BEING ON THE CABLE THEY THOUGHT IT WAS ON.

NON-JACKETED PRIMARY

This instrument should not be used on non-jacketed primary cables because of the unknown condition of the insulation that could expose the operator to a live conductor arc.

Non-jacketed high voltage cables have three main problems that will prevent identification of one phase from another. For this reason, Aqua-Tronics, Inc. recommends that cable identification is not performed with this instrument on un-jacketed primary cables. 3 examples are given, but there could be many others reasons.

1. The integrity or condition of the insulation cannot be verified and there is a danger of causing a neutral to conductor short when physically handling bare neutral cables.

2. The bare neutral is in contact with the soil along the route of the cable and signal wants to find the first ground available when inductive couplers are applying signal. The neutral is in contact with the soil at the point where it leaves a conduit or a transformer and the signal will no longer provide accurate readings beyond the first ground available.

3. The bare neutral of one cable is touching the bare neutral of the other phases along the route or the pigtails are touching between the neutral break out and ground bus connection at the base of the transformer. As a result, the signal is dividing down and will not be the correct amount for a cable comparison.

SERVICE AND WARRANTY

INSTRUMENT SERVICE

If for any reason assistance is needed with this instrument, contact the nearest Aqua-Tronics, Inc. sales outlet. You may also write, call, or e-mail directly to Aqua-Tronics, Inc. and provide full details of your problem or needs. You can find your nearest sales office at www.aquatronics.com under REP LOCATOR.

WARRANTY

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

The Cable I.D. Live receiver and inductive couplers 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 at 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 products are 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.

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