TRIPLETT

The Hound 3

Instruction Manual

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1: Introduction

The HOUND 3 is the latest Inductive Amplifier from Triplett Corporation, improving on the features found in the popular HOUND and HOUND 2 designs. Key new features are the white LED illuminators, a Bandpass filter, an earphone jack, and an easy battery access door. Used in conjunction with the FOX or FOX 2 wire tracing signal generators, the HOUND 3 quickly traces hidden wiring through walls and aids in locating a specific wire or wires within a group or wires, without piercing or stripping away their insulation.

2: Product Features:

2.1: Traces FOX and FOX 2 signals through drywall, plaster, and wood frame construction
2.2: Picks up FOX or FOX 2 signals from a foot away
2.3: Identifies target wires without stripping off insulation
2.4: Adjustable Volume / Sensitivity control
2.5: Built in white LED illuminators for use in poorly illuminated areas
2.6: Improved amplifier gain for higher sensitivity traces
2.7: Bandpass filter peaks signal sensitivity while suppressing 60Hz
2.8: Conductive plastic duckbill probe provided for deep wire bundle penetration and non-shorting performance
2.9: Metal probe provided for contact probing
2.10: Rugged, moisture resistant, mylar cone speaker with high strength alnico magnet
2.11: Earphone jack for use in high noise areas
2.12: Improved performance LED signal strength indicator works even when earphone is used
2.13: Uses common 9 volt battery
2.14: Convenient door for easy battery replacement
2.15: Internal shielding suppresses feedback

3: Safety Warnings and Cautions:

3.1:

Review the Safety Warnings and Cautions for the signal generator ("toner") . . . i.e. FOX or FOX 2 . . . that will be used.

3.2:

Use care when using the HOUND 3 to probe any wire or cable. An unexpected dangerous voltage may be present, which may result in injury to the user.

3.3:

Potentials applied to the HOUND 3's probe may appear, greatly reduced, at the earphone jack. This could pose a shock hazard to the user, if for example, the probe is brought in contact with a high voltage potential.

3.4:

The HOUND 3's metal probe can accidentally short out a circuit that is being tested. Use care when testing live circuitry, or an accidental short may result in user injury.

3.5:

Use caution when working with telephone lines. They can support dangerous voltages. 50VDC is often present, and 100VAC may be present during ringing. Additionally, telephone lines may support dangerous levels of common mode voltages. In some circumstances, user injury may result.

3.6:

Use caution when working with any long unconnected wire or cable. Under some conditions, unconnected wires may "float up" to dangerous potentials, and touching them may result in user injury.

4: Specifications:

4.1: Amplifier

High impedance bootstrapped FET input for high gain and sensitivity. Incorporates a bandpass filter to improve sensitivity to FOX signals while suppressing 60Hz.

4.2: Speaker

1 1/2" mylar coned speaker with high strength alnico magnet is rugged and moisture resistant.

4.3: Probes (2 provided)

a) Solid aluminum conical probe for low resistance contact testing

b) Carbon filled nylon duckbill probe with metal threads for sensitive non-shorting testing.

4.4: Earphone Jack

Accepts standard 1/8" (3.5mm) mini phone plug, either mono or stereo. For use with electromagnetic (dynamic) earphones from 8 Ohms to 2000 Ohms. Automatically mutes loudspeaker when earphone is used. An earphone with a shielded cable is suggested to reduce the possibility of feedback from the cable to the probe tip.

4.5: Signal Strength Indicator

Bright red LED signal strength indicator maintains sensitivity, even when the earphone is used.

4.6: Power

A standard 9 volt battery (alkaline is recommended) provides power for all circuitry. The battery is accessible by removing a convenient snap-on door (no tools required). The HOUND 3 is protected against the accidental reversal of the battery polarity.

4.7: Illumination

2 efficient bright white LEDs powered from separate current sources provide constant illumination until battery is mostly depleted (about 6 volts).

4.8: Size

1 7/8" dia at speaker, 1 3/8" dia at body, 8 1/4" long with metal probe, 9 1/4" with conductive plastic probe.

4.9: Weight

Typically 6 ounces including battery

5: Control Locations

- **A** Conductive Plastic Duckbill Tip
- **B** Metal Conical Tip
- **C** LED Headlights
- **D** Signal Strength Indicator
- **E** Power Button
- **F** Sensitivity Control
- **G** Earphone Jack
- **H** Battery Connector
- **I** Battery Strap
- **J** Battery Cover
- **K** Battery (not included)
- **L** Speaker Cover

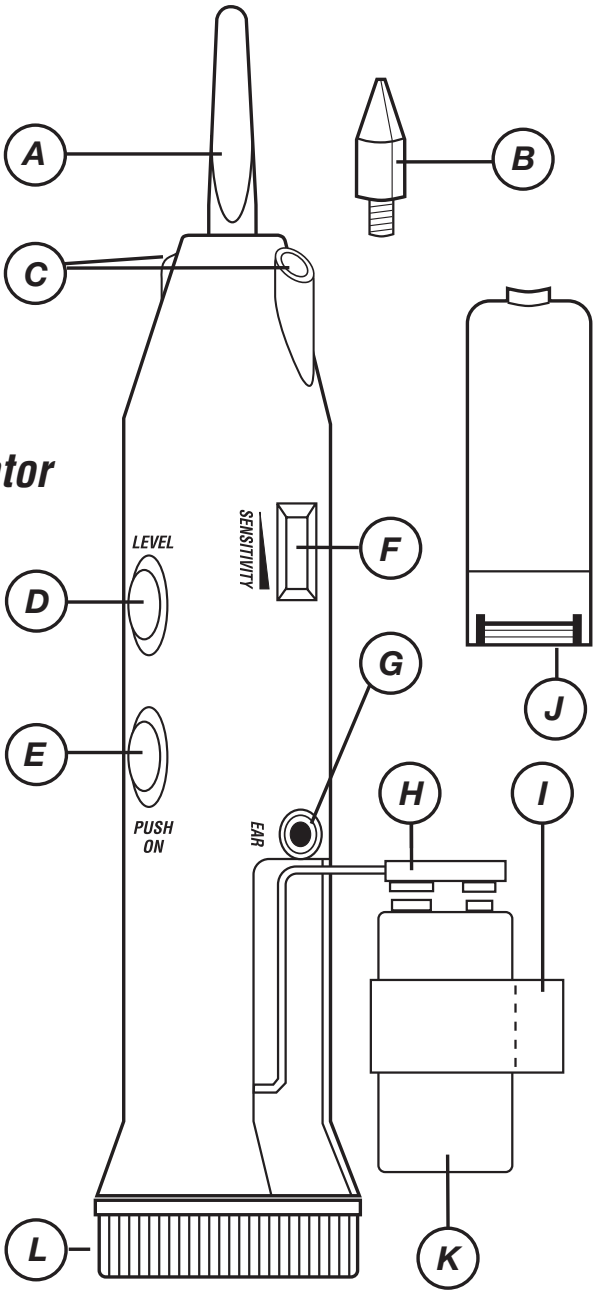

Figure 1

6: General Information

6.1: Installing Battery

Remove Battery Cover (J) by pressing the release tab towards probe end of the case. Remove Battery Connector (H) and Battery Strap (I). Snap Connector to 9 volt battery and slide Strap over battery. Position Strap so that the finger tab is on the side of the battery. Insert battery into HOUND 3 case, placing bottom of battery against foam, and compressing the foam while completing the battery insertion (see Figure 2). Lead wires should be behind battery and "dressed" to allow battery to be fully inserted. The finger tab on the Strap should be sticking out of the Battery Compartment. This tab is used to remove the battery. Fold the tab over, and secure the Battery Cover to the case by inserting the end near the Earphone Jack (G) first, and snapping the opposite end of the Cover to the case.

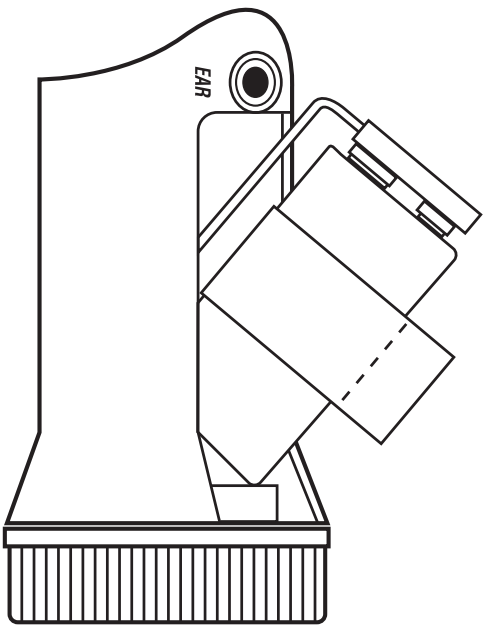

Figure 2

Helpful Hint:
The LED headlights can be used as a low battery indicator. Their brightness is regulated when the battery is good, but as the battery is depleted, a point will be reached where the brightness of the LEDs will begin to decrease. It is a good idea to consider replacing the battery at this time (or at least have a spare one on hand). The HOUND 3 will continue to work for a while, but some reduction in sensitivity and loss of loudness may be noticed. Replace the battery for maximum performance.

6.2: Power Button (E)
The Power Button is typically pressed and held while the HOUND 3 is being used. When pressed, the Amplifier and Speaker is activated, and the LED headlights are turned on. Release the button to turn the product off.

6.3: LED Signal Strength Indicator (D)
The Signal Strength LED is used to indicate the presence of a signal when it may be difficult to hear the signal coming from the speaker (because of high ambient noise levels). It will glow brighter as the received signal strength increases. The brightness will be seen to pulsate with the characteristics of the received signal.

Helpful Hint:
The Signal Strength LED responds to any received signal. Any sound normally heard in the speaker will cause the LED to light. The user will note that the HOUND 3 will "pick up" signals from electrical devices other than the FOX or FOX 2.

Probably the most notable signal, a buzzing sound, comes from fluorescent lights. Other sounds can often be heard when the HOUND 3 is placed near a TV, computer, or other electronic device. The Signal Strength LED can't differentiate between these signals…… so if the user is observing just the LED, without being able to hear the speaker, he may mistake an interfering signal for the target signal. This is where the earphone is handy. By using the earphone, the user can determine if the signal that the LED is responding to is the target signal.

6.4: Volume / Sensitivity Thumbwheel (F)

The Volume / Sensitivity Thumbwheel controls the loudness of the sound from the speaker. Usually, when initially searching for the target signal, the thumbwheel is set to maximum. At this maximum setting, electronic noises from electrical wiring or devices may be heard. When the target signal is heard, the user can track the signal to its source by moving the HOUND 3 in the direction that makes the sound of the target signal get louder. As the loudness of the target signal increases, the thumbwheel setting can be reduced, which will reduce the loudness of the other interfering sounds. Repeating this process will lead the user in the direction of the wire with the target signal on it.

Helpful Hint:

The user can often track the Tone signal to its source without adjusting the Volume / Sensitivity thumbwheel. When the target wire is in a group of wires, adjusting the thumbwheel can help determine which wire is the target wire.

In this situation, it often helps to reduce the Volume / Sensitivity setting, so changes in loudness are easier to discern. Also, the thumbwheel may be used to reduce the loudness of the HOUND 3 in quiet office surroundings, so its use is less obtrusive to nearby workers.

6.5: Earphone Jack (G)

The earphone jack accepts a standard 1/8" (3.5mm) miniplug. This type is often used with portable music playing devices. The earphone may be either a stereo or mono type. For best results, the lead wire should be shielded to reduce the possibility of feedback occurring between the lead wire and the HOUND 3's probe. When the plug is inserted into the jack, the HOUND 3's speaker is turned off, and the sound can only be heard through the earphone.

To use the earphone, ***set the HOUND 3's Volume / Sensitivity thumbwheel to minimum,*** *plug the earphone into jack, and press the Power button. Adjust the thumbwheel for a comfortable sound level in the earphone.*

Helpful Hint:

Setting the Volume / Sensitivity thumbwheel to minimum prior to using the earphone, as previously described, can often save the user from a jarring experience. Sounds that are not very loud in the speaker, can be very loud in the earphone. While the HOUND 3 does provide some compensation for this, the earphone loudness can varying greatly depending on the earphones actually used.

In some situations, the HOUND 3 may have a tendency to "feedback" at high Volume / Sensitivity settings. The feedback may sound like a howling or squealing sound coming from the speaker. To suppress this effect, the Volume / Sensitivity thumbwheel can be reduced, or the user may find that touching an ungloved finger to the earphone jack may help.

6.6: LED Headlights (C)

The white LED headlights provide light for performing tests in poorly lit areas. The LEDs do not interfere with the target signal. If fluorescent lighting is causing a lot of interference with the target signal, the user may find it helpful to turn off the lighting temporarily, and use the non-interfering illumination provide by the LEDs.

6.7: Conductive Plastic and Metal Probes (A & B)

Two probes are provided with the HOUND 3. They are easily changed by screwing and un-screwing them from the tip of the HOUND 3.

The metal conical probe is rugged and durable. If working with low voltage wiring, the metal probe can provide a significant increase in signal loudness when the metal in the target wire, or a metal contact connected to the target wire, is touched. This sometimes aids in identifying the target wire. For example, the metal probe is often used to drag along the contacts on a telephone punchdown block. In situations where the metal probe may short a circuit, leading to disruption of the circuit operation, or may short a power cir-

cuit, possibly causing equipment damage and user injury, use of the conductive plastic probe is recommended. The plastic probe is only slightly conductive, and usually causes no disruption of equipment operation. An additional advantage is its "duckbill" shape, which allows it to penetrate deeply into a bundle of wires.

Helpful Hint:
When using the conductive plastic probe, greater signal pickup will be obtained if the wire being probed is laid against the flat surface of the duckbill. Laying the wire against the tip or edge of the duckbill will not produce the strongest signal.

7: Operation

7.1: Pre-use Testing

Refer to the Instruction Manual of the FOX or FOX 2 (or other Toner) for additional information on using the FOX's and HOUND 3.

Turn on a FOX or FOX 2 and set it to the Tone generation mode. Press and hold the Power Button on the HOUND 3 and adjust the Volume / Sensitivity thumbwheel while placing the probe of the HOUND 3 close to the test leads of the FOX or FOX 2. The Tone being generated by the FOX or FOX 2 should be heard from the speaker of the HOUND 3. Using the Volume / Sensitivity thumbwheel, adjust the loudness to a comfortable level.

Notice that if the HOUND 3 is moved closer to the FOX or FOX 2, the loudness of the Tone from the speaker increases, as does the brightness of the signal LED. This effect will allow you to locate a wire connected to the FOX or FOX 2 leads, even when the wire is hidden in a wall or ceiling.

7.2: Wire Tracing and Finding Faults

The HOUND 3, when used in conjunction with a FOX or FOX 2, can be used to trace and locate wires in cables and in wood frame construction. There are several common test scenarios . . . tracing wires through walls or ceilings, tracing wires in multiwire cables or harnesses, and locating breaks in wires. In additional to obvious residential and commercial uses, the FOXs and HOUNDs has also been used on radio towers, in cars, boats, and even submarines.

7.2.1: General Wire Tracing Information

• "Toners and Probes" like the Triplett FOX and HOUND products, will not trace "live" AC or DC power wires.

• The only type of "live" circuit that the FOXs and HOUNDs will trace is a telephone circuit.

• The FOXs tracer tone will not penetrate electrically conductive materials . . . like any kind of metal or wet earth. This means that the HOUNDs cannot pickup the tone if the target wire is in a metal conduit or is underground. The HOUNDs will pickup the tone at locations where the target wire emerges from the conduit or the earth.

• The FOXs tracer tone will penetrate wood frame walls and ceilings, and plaster and drywall. Under good conditions, a HOUND can pickup the tone from a foot or more away from the target wire.

• The FOXs tracer tone will pass through any electrical circuitry connected to the target wire(s). Hence, to identify a specific wire, it will be necessary to disconnect all loads and circuitry from the wire. This includes switches, capacitors, resistors, coils, transformers, lights, motors, etc.

• The FOXs tracer tone can be shorted out by any loads on the target wire. All loads must be disconnected from the target wire.

• Wet drywall, wet cinder block walls, or any wet wall surface will also shield the FOX signal, preventing the HOUND 3 from detecting its presence.

• The actual wire being wet can shield the signal. The wire can be wet internally, shielding the signal. This phenomena has been observed in "Romex" electrical wire. The internal paper separator can get wet from exposure to the weather. The exterior surface of the Romex can be dry, but because the internal paper separator is wet, it shields the tracer signal.

• Extremely high humidity will reduce the effectiveness of the HOUND 3 in finding the FOX signal. Condensing atmospheres may even cause the products to malfunction until they dry out.

7.2.2: The FOX 2, Crosstalk, and TrueTrace

Crosstalk is the bleeding of the tracer tone from the target wire onto adjacent wires. This often happens in multiwire cables, or in cable harnesses where many wires are bundled together in close proximity to each other. A tracer tone applied to a target wire or wires may crosstalk onto adjacent wires. Some wires/cables are constructed to reduce the crosstalk, but other wire/cables crosstalk readily. So much crosstalk can occur that the tracer tone on the adjacent wires can be almost as large as the original tone on the target wire. This can make it difficult to identify the target wire with any of the HOUNDs. The traditional method of trying to determine if the tone being received is the original tone, or is crosstalk, is to short out the wires with the tone where the HOUND is being used. If shorting the wires only reduces the tone's level, but does not completely kill it, then the shorted wires have crosstalk on them, and are not the target wires. If shorting the wires completely kills the tone, then its likely that the wires are the target wires. Unfortunately, this is not 100% effective. The FOX 2 uses ***TrueTrace*** *. . . a test technique which greatly improves the accuracy of the trace. Shorting the target wires together causes the cadence (the speed at which the tracer tone warbles or pulses) of the tracer tone to change, positively identifying the target wire(s).*

7.2.3: Wire Tracing Methods

There are two basic wire tracing methods . . . "floating" and "grounded".

*In the **floating method (also called Line to Line),** the tracer tone is applied to two wires (a pair) in the cable or wire harness to be tested. See Figure 3. The FOX or FOX 2's red clip is connect to one wire and the green clip is connected to the other wire. This method is often used on telephone, intercom, or alarm wires. The floating method tends to cancel out some of the tracer tone, so a HOUND 3 usually works best when the user has access to the wires, and can place the HOUND 3 right against the wires. This method identifies the wires as a pair. It will not identify which wire is connected to the FOX or FOX 2's green clip or which wire is connected to the red clip.*

If using a FOX, identify the target wire using the "Remote Tone Kill" technique. When the wire or wires (pair) that the FOX is connected to, are shorted out, locally or remotely, the TONE signal from the FOX is "killed".

In situations where it is difficult to identify the target wire, because of crosstalk from other wires, the target wires can be identified by shorting out the wire pair with the TONE on it. If you have found the correct wires, the TONE will be completely killed. If the TONE is still heard, but reduced somewhat in level, you have not found the target wires. This method is not foolproof, and experimentation, common sense, and experience must be used to apply it properly. However, in many instances, it will provide trace verification. A caution . . . if you are at a location where the only wires are not the target wires, but they have a signal on them due to crosstalk . . . it may appear that you have killed the

FOX TONE when you short out the wires. To make sure, leave the short on the wire in question, and go back to FOX, and test the alligator clips with the HOUND 3. If the TONE is still there, you have not shorted the target wire.

Note: Even with the FOX's alligator clips shorted out, the case of the FOX unit will still radiate some TONE. Do not confuse this with the TONE coming from the alligator clips. Perform a few experiments by shorting out the clips and probing the FOX with the HOUND 3 so you know what to expect.

If using a FOX 2, the wires can be momentarily shorted to active the True Trace feature. If this is the target pair, the cadence of the tracer tone will change.

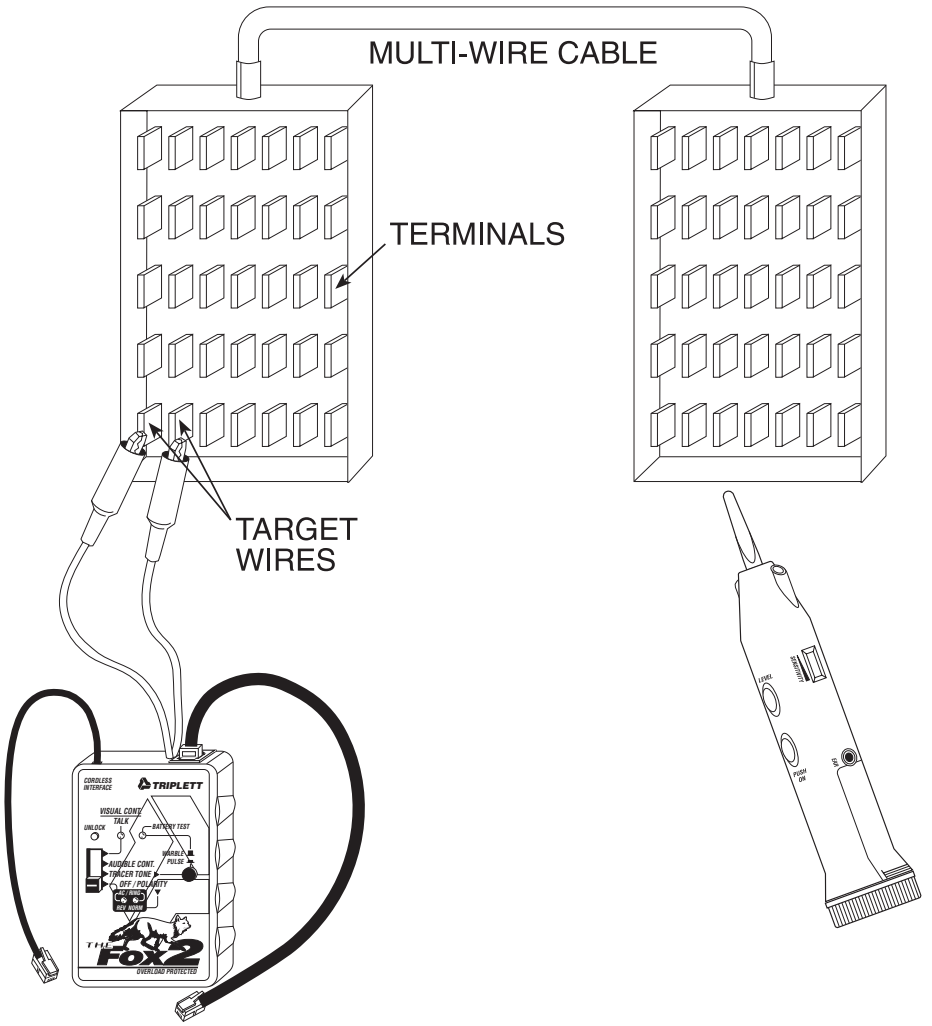

Figure 3
Floating or Line-to-Line Tracing

*In the **grounded method (also called Line to Ground),** one clip of the FOX or FOX 2 (either the red or green) is connected to earth ground or a "fake ground", and the other clip is connected to the target wire. The target wire can be one wire of a pair or a multiwire cable. See Figure 4. This method creates the strongest tracer tone, and is often used when wires are traced through walls or ceiling. It is also useful for identifying a specific wire within a bundle of wires. If*

connection to a true ground is not available, a large metal object can be used as a fake ground. For example, a large metal desk or a metal file cabinet can be used. When tracing wires in a car, trailer, or RV, etc. the metal frame or body can be used as a ground. When tracing wires in a boat (that is in the water) with a wood or fiberglass glass hull, any piece of metal that comes in contact with the water can be used as a ground. Simply connect one clip of the FOX or FOX 2 to the ground or fake ground, and the other clip to the target wire.

To identify the wire, True Trace (only available in the FOX 2) can be used in conjunction with the grounded method of tracing, if the ground that is used at the FOX 2 location is also available at the end location of the wires. Simply short each suspect wire to the ground while listening for a cadence change with the HOUND 3. If water is used as the ground, it usually is not conductive enough to active True Trace at the end opposite of the FOX 2.

To identify the wire, if using a FOX, and a ground is available at the end location of the wires, apply the Remote Tone Kill technique (previously described) by shorting suspect wires to ground, to identify the target wire.

Helpful Hints:
Extension pieces of wire, or long clip leads, can be used to connect the FOX or FOX 2 to a ground or fake ground. The extension wire can be hundreds of feet long if necessary.

To test a fake ground to see if it can be used for wire tracing,

connect one clip from the FOX or FOX 2 to the candidate object (like a metal desk) and the other clip of the FOX or FOX 2 to the target wire. Hold the HOUND 3 near the object. A "good" fake ground will not radiate much tracer tone. The tracer tone should be much stronger on the FOX's other clip. If it is not, the target wire may be shorted to ground, or the fake ground may not be adequate. Generally, the larger the object used as the fake ground, the better it works.

If the target wire is somehow connected to ground, this will greatly reduce or kill the tracer tone.

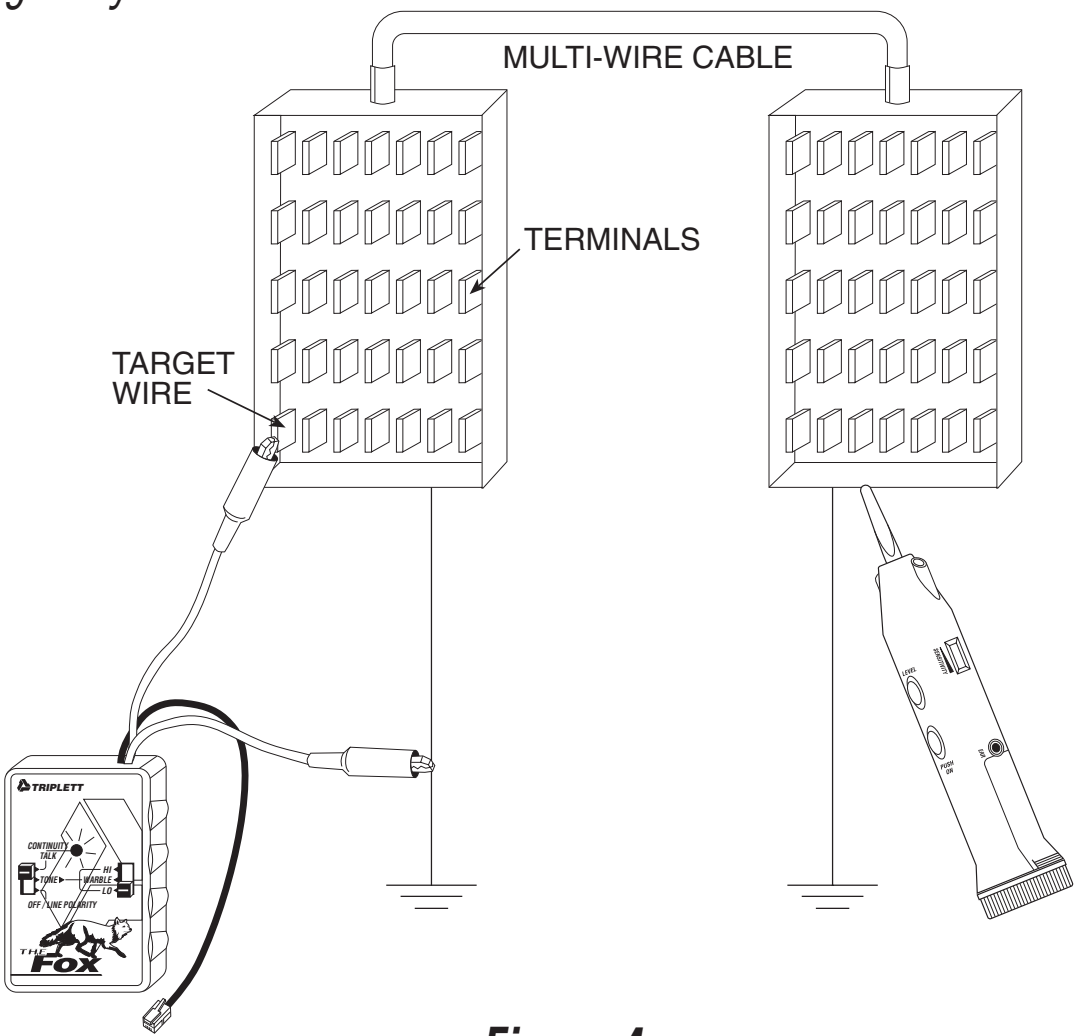

Figure 4
Grounded or Line-to-Ground Tracing

7.2.4: Telephone wires, Tracing and Finding Faults

The floating method is usually used to locate a pair of wires in a telephone junction block. If the wires are already terminated into a modular telephone jack, simply plug the FOX or FOX 2 into the jack. This method works with the phone line connected or disconnected from the wires going to the telephone company. A stronger trace is usually obtained if the wires are not connected to the telephone company.

If the wires are not connected to the telephone company, the grounded method can be used to trace telephone wires through a wall or ceiling. Use the green and red clips to connect to the phone line and ground.

To identify the wires, if using the floating method and a FOX 2, momentarily short the suspect wires together to active True Trace, and listen for the cadence change. If it changes, you've found the target pair. If no change occurs, keep searching.

To identify the wires, if using the grounded method and a FOX 2, momentarily short the suspect wire to ground to active True Trace, and listen for the cadence change. If it changes, you've found the target wire. If no change occurs, keep searching. This will not work if a fake ground is being used. An actual ground is required to activate True Trace.

An "Open Fault" may involve either one or both wires of a telephone wire pair. Finding the open will only work if there are no other faults (like a short to earth ground) in the pair.

If the pair is "live", disconnect the pair from the incoming telephone line before trying to locate the open. Short the wires together at the far end and connect the shorted wires to a good earth ground (a fake ground may not work well). An extension wire may be used. At the other end of the wires, connect one of the clips of the FOX or FOX 2 to a good earth ground. Experimentally connect the other clip of the FOX or FOX 2 to one wire and then the other, while listening to the tracer tone on this clip with the HOUND 3. If the level of the tracer tone drops significantly when the clip is connected to one of the wires, this wire is probably OK and the other wire is open. That is, the open wire is the one that doesn't drop the level of the tracer tone. If neither wire drops the level of the tracer tone, they are probably both open (or a good ground has not been used).

Leave the clip connected to the wire or wires that do not "load down" the tracer tone. See Figure 5. Using the HOUND 3, follow the path of the wires by finding the strongest signal. An abrupt drop in the tracer tone level will occur at the point of the open. Keep in mind, however, if tracing unseen wires in the wall or ceiling, that the wires may pass behind a metal object (like a furnace duct) that prevents the HOUND 3 from picking up the tracer signal, or the wires may diverge from the path of the receiver. Before assuming that the open has been located, try finding the signal nearby or in an adjacent attached wall or ceiling. Also keep in mind that it may not be possible to find the open in all situations, because of the number of variables involved.

Helpful Hints:

A pair of wires with an "open" may allow the tracer tone to appear at the far end of the pair, despite the open fault. In this situation, The FOX 2's True Trace will not work, even though it is applied to the target pair.

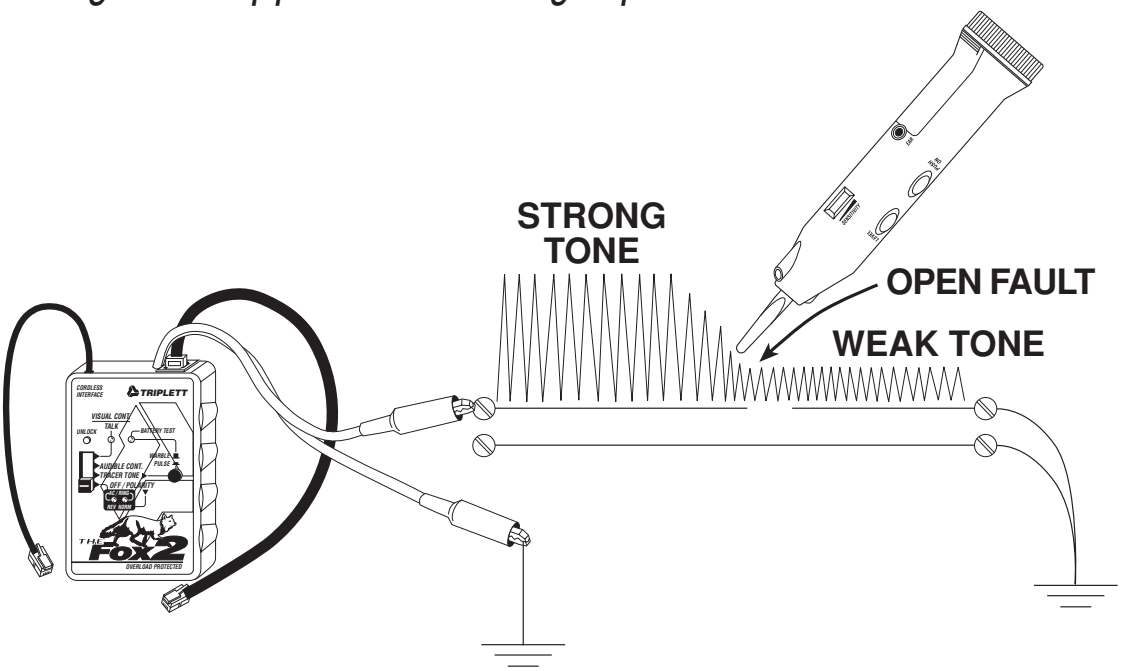

Figure 5
Locating an Open

7.2.5: Coaxial cable, Tracing and Finding Faults

Coaxial cable, like that used for cable TV, satellite TV, closed circuit TV, early LAN systems, etc. is often connected to other cables through splitters, combiners, or amplifiers. In order to trace the cable, it must be disconnected from these "loads". Since coaxial cable is self-shielding, the floating method usually does not work well when tracing the cable. It can be done, but the HOUND 3 must be held very close to the end of the cable to pick up any signal. To apply a floating signal to a coax, connect one clip of the FOX or FOX 2 to the

center conductor of the coax, and the other clip to the shield of the coax.

The grounded method often works better for tracing coaxial cables. Connect one clip of the FOX or FOX 2 to a ground or fake ground, and the other clip to the shield of the coax. This method will cause the coax to radiate enough tracer tone to trace the coax through drywall.

To identify the coax, if using the floating method and a FOX 2, momentarily short the shield and center conductor together to active True Trace, and listen for the cadence change. If it changes, you've found the target coax. If no change occurs, keep searching.

To identify the coax, if using the grounded method and a FOX 2, momentarily short the shield to ground to active True Trace, and listen for the cadence change. If it changes, you've found the target coax. If no change occurs, keep searching. This will not work if a fake ground is being used. An actual ground is required to activate True Trace.

To identify the coax, if using a FOX, use the Remote Tone Kill technique (previously described).

***Note:** It is not unusual for the loose turn-able part of a coaxial connector to have poor electrical contact to the cable shield until it is screwed on to its mating connector. Consequently, True Trace may not activate if this part of the connector is contacted.*

Because of the way that coax is constructed, it is not possible to find an open in the center conductor. It is possible to find an open in the shield, if the shield is not shorted to the center conductor or ground. Connect the center conductor of the coax to earth ground. Connect the shield and center conductor at the far end of the coax to earth ground. Connect one clip of the FOX or FOX2 to an earth ground. Experimentally connect the other clip of the FOX or FOX 2 to the shield of the coax, while listening to the tracer tone on this clip with the HOUND 3. If the level of the tracer tone drops significantly when the clip is connected to the shield, the shield is probably grounded and can't be traced to the open.

If the level of the tracer tone doesn't drop much, leave the clip connected to shield. Using the HOUND 3, follow the path of the coax by finding the strongest signal. An abrupt drop in the tracer tone level will occur at the point of the open. Keep in mind, however, if tracing unseen coaxes in the wall or ceiling, that the wires may pass behind a metal object (like a furnace duct) that prevents the HOUND 3 from picking up the tracer signal, or the coaxes may diverge from the path of the receiver. Before assuming that the open has been located, try finding the signal nearby or in an adjacent attached wall or ceiling. Also keep in mind that it may not be possible to find the open in all situations, because of the number variables involved.

7.2.6: Power Wires, Tracing and Finding Faults

The FOX or FOX 2 and HOUND 3 cannot trace or identify "live" power wires. To use a FOX or FOX 2 and HOUND 3 to

trace a power wire, power must be removed from the wire, and all loads must be removed from the wire. This may be as simple as turning the circuit breaker off, and turning off all of the loads.

NM-B (Non-Metallic wires, sometimes called "Romex") can be traced by putting one clip of the FOX or FOX 2 on the ground or neutral, and the other clip on the hot wire. ***If using a FOX 2 and it starts beeping, remove it from the wires immediately. The wires are live.*** *Remove the power source. Reconnect the FOX 2. Trace the wires using the HOUND 3 in the usual manner.*

If the target wires are in a metal conduit, they cannot be traced until they emerge from the conduit.

To identify the wires, if using a FOX 2, momentarily short the suspect wires together to active True Trace, and listen for the cadence change. If it changes, you've found the target pair. If no change occurs, keep searching. ***Warning, take care not to short together live wires!*** *If this is a possibility, the user may wish to use a light bulb to activate True Trace. Simply connect a 120VAC incandescent bulb (any wattage) across the wires. If the bulb lights, the line is live. If the cadence changes, the target wire has been located. If nothing happens, keep searching.*

An adapter with a standard lightbulb base and clip leads can often be purchased at a local hardware store.

7.2.7: Resistance Heating Wires

The FOX or FOX 2 and the HOUND 3 can be used to trace the path of a resistance heating wire in a plaster wall or ceiling. This is usually performed to find an open in the wire. It is best if the user is familiar with resistance heating techniques, particularly in regard to the typical patterns used for the wire path. The wire is usually in a serpentine pattern, with the wire spacing and orientation varying depending on the amount of heat needed in different areas of a room.

Finding the open can be a challenge. Several techniques can be, and should be, used.

It helps if the user performs a few experiments before trying to find the open. See Figure 6. Attach a few pieces of wire (any kind) more than several feet long to each clip of the FOX or FOX 2. Lay the wires out on a non-conducting surface (a wood floor with no metal in the vicinity . . . nails are OK, but make sure there's no metal furnace duct below the floor) parallel to each other, about 4 " apart. Using the HOUND 3, trace along one of the wires, in normal fashion, noting how the tracer tone becomes stronger as the wire is approached. Now trace along the other wire, noting that it behaves just like the previous wire. Now, slowing move the HOUND 3 from one wire to the other wire. Notice that at approximately the midpoint between the wires, the tracer tone becomes very weak. This is the "null point"..... the place where the signal from one wire cancels the signal from the other wire. Notice how this null differs from simple loss of signal . . . that is, there's a very narrow zone where the null

occurs, and the signal gets stronger quite rapidly on either side of the null. By waving the HOUND 3 back and forth while slowly moving along the length of the wire, the path of the null point can be followed between the wires. These wires can be thought of as being on either side of the open fault . . . so by using this technique, it will be possible to localize the area in which the fault occurs.

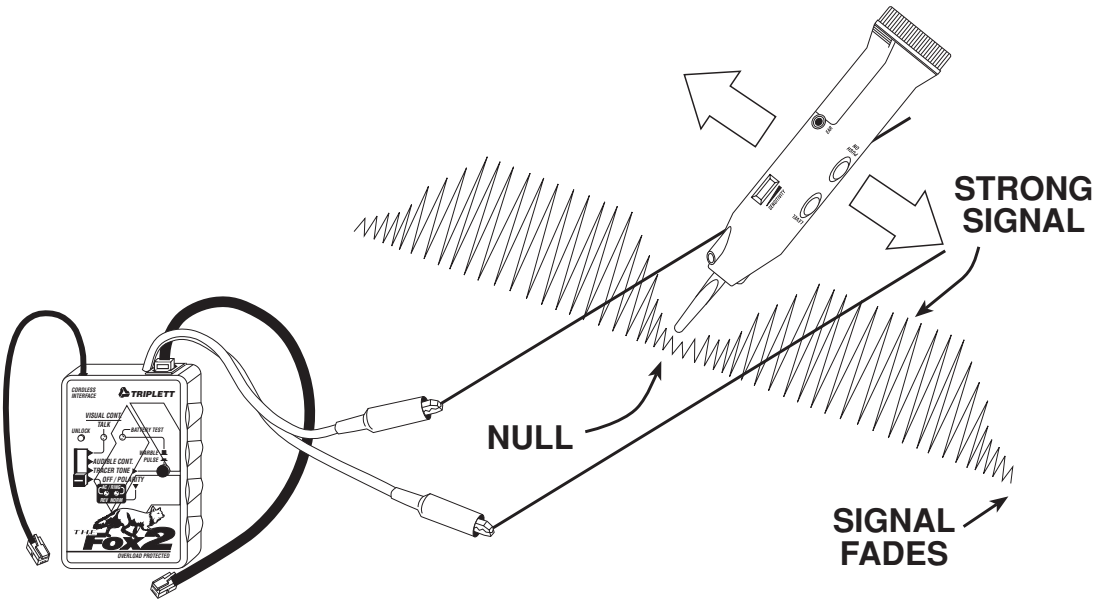

Figure 6

Reposition the test wires so that they are inline with each other, with a small gap between them (1/16" to 1/8"). See Figure 7. Again, trace along the length of the wire and note how a null point occurs at the gap. This technique can be used to find the open fairly precisely, if the spacing of the wires and the location of the open lends its to this approach.

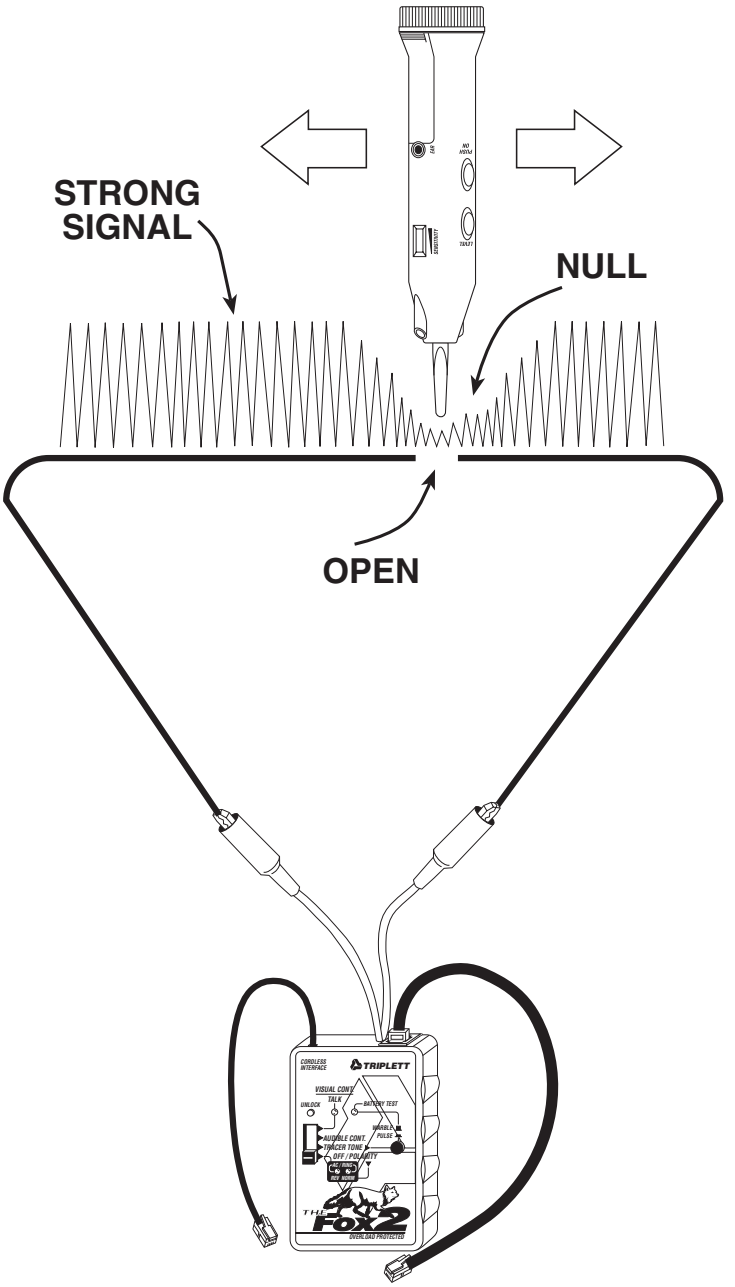

Figure 7

Now, attach one of the clips and the wire attached to it to a good earth ground. See Figure 8. The HOUND 3 should pickup very little signal from the grounded wire. Move the HOUND 3 along the length of the wire and note how a strong signal

is picked up on one side of the open fault, and very little signal is picked up on the other side of the fault.

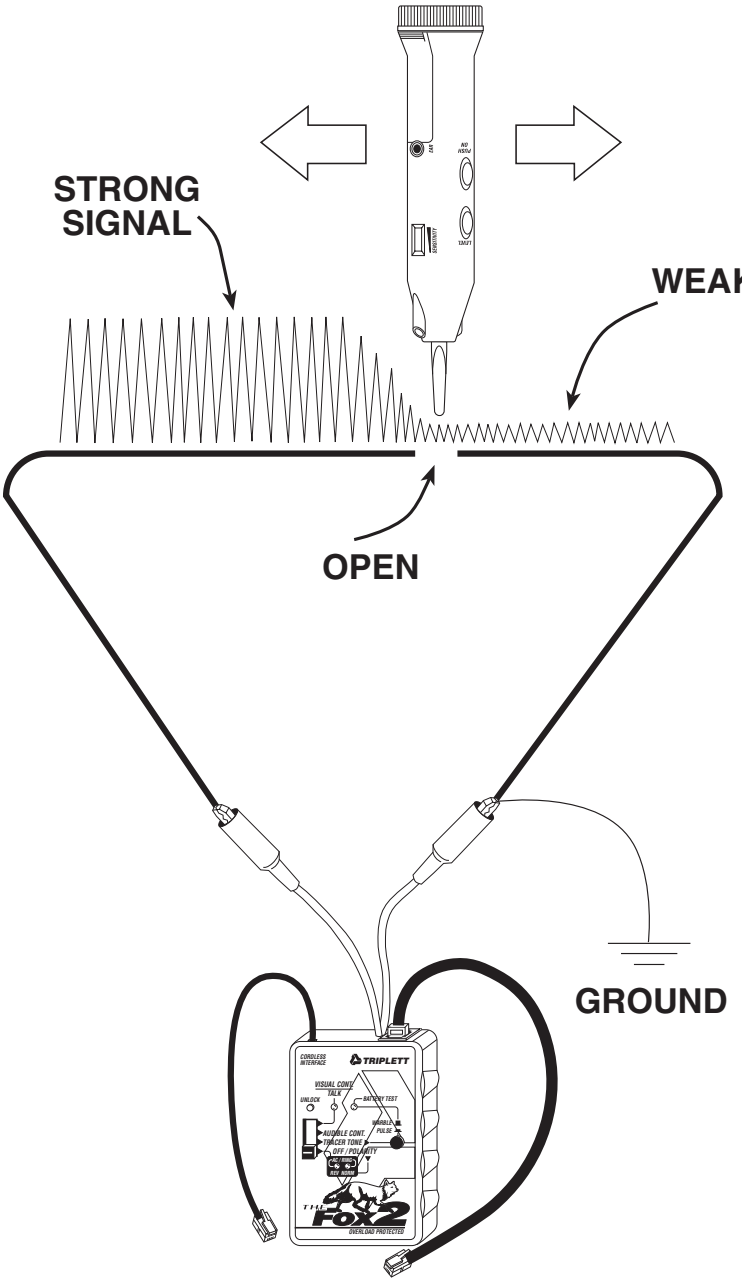

Figure 8

For the most accurate simulation, lay out a serpentine pattern on the floor similar to that in the ceiling, and locate the open in different places, using the nulling and the grounding

technique. Have an assistant position the open fault while you are out of the room, and then cover the wire with cardboard, newspaper, plywood, etc. . . . and see if you can find the open. You'll probably find that the open is sometimes found in the wrong place. Notice what wire configuration causes this to happen and experiment with the nulling and grounding techniques to see if a method can be figured out that will work in these situations.

To test the actual resistance heating circuit, disconnect the ends of the heating wires from the power source. This can usually be done at the thermostat that controls the room. Attach the clips of the FOX or FOX 2 to the wires (one clip to each wire) and use the nulling and grounding techniques discussed above, and any other methods learned from your experiments, to find the open fault.

7.2.8: Cars

Wires can be traced in cars or similar metal bodied vehicles using the grounded method. The metal body of the car acts as a ground, and as a shield. This means that, compared to tracing in a wood frame structure, it will be necessary to place the HOUND 3 closer to the target wire to pick up a tracer tone.

Connect one clip of the FOX or FOX 2 to the metal chassis of the car, and the other clip to the wire to be traced. As in other applications, the far end of the wire must be disconnected from any loads or any other wires, or the tracer tone will be shorted out, or it will migrate into other wires. Be-

cause wires adjacent to the target wire will often acts as shields, and because the wires in cars are often bundled together into harnesses, it may be difficult to follow the target wire through the harness. Try to locate the wire as it emerges from the harness.

If using a FOX 2, use the True Trace feature to identify the target wire. Short the suspect wires to the metal chassis to activate True Trace, and listen for the cadence change. If more than one wire causes the cadence to change, the wires are somehow connected together, either through a short or through a load (like a light bulb, a switch, a motor, etc.).

If using a FOX, use the Remote Tone Kill technique (previously described) to find the target wire.

Find an open fault by tracing along the wire until the tracer tone drops dramatically in level. Shorting the far end of the open wire to chassis ground may help. If the wire is bundled in a harness, it may be difficult, if not impossible to locate the open without unbundling the harness. In these cases, it is sometimes more expedient to run a new wire to replace the open wire.

7.2.9: Boats

Wiring tracing on metal hulled boats is similar to tracing wires in cars (see above).

If tracing wires in a boat with a non-conductive hull (wood or fiberglass) that is in the water, the grounded method can

be used, but the water will act as the ground. Attach one clip of the FOX or FOX 2 to a metal object that is in contact with the water, and the other clip to the wire to be traced. If necessary, attach an extension wire to the FOX or FOX 2 so that the clip will reach the "grounded" metal object. If there is no grounded metal object, simply drop the extension wire overboard into the water.

If tracing wires in a boat that is out of the water, attach one clip of the FOX or FOX 2 to the metal trailer frame, or to a grounded metal object. As before, an extension wire can be used if necessary.

Water is generally not conductive enough to activate the True Trace feature. If the boat is reasonably small, an extension wire can be attached to the grounded clip and run to the far end of the suspect wire. Short the extension wire to the suspect wire to see if True Trace activates.

7.2.10: LAN Cables

Ethernet LAN cables may be traced with the HOUND 3. If using a FOX 2, simply plug the LAN cable into the FOX 2's RJ-45 jack. If necessary, use a LAN jumper cable to connect between the FOX 2 and a wall jack. If using a FOX, the user will need to make his own adaptor, to transition between the FOX's clips or its RJ-11 plug, to an RJ-45 plug/jack.

An adaptor is available that will allow the RJ-45 jack on the FOX 2 to connect to a coax based LAN with BNC connectors. See preceding information on Coaxial cables.

Do not connect a FOX or FOX 2 to a live LAN! *This will not damage the FOX's, but it may "crash" the LAN.*

Due to their construction, LAN cables tend to suppress the tracer tone field. It is often necessary to get close to the cable with the HOUND 3 to locate or trace it. To increase the tracer tone strength, connect either clip of the FOX or FOX 2 to a ground while the target cable is connected to the RJ-45 jack. However, when using this grounded technique, the tracer tone strength may be so dramatically increased that the tone will crosstalk onto adjacent cables, making the path of the target cable difficult to differentiate from the path of the other LAN cables. This is especially true if the LAN cables are bundled together, which promotes crosstalk.

To identify the LAN cable, if using a FOX 2, pair 4/5 must be momentarily shorted to active True Trace. These are the center 2 pins on an RJ-45 connector. These can be shorted out with a small wire . . . or a special user constructed plug/jack made for this purpose.

Specialized LAN testers, like the Triplett PairMaster, WireMaster XR-2, or WireMaster XR-5 can easily identify LAN cable faults. These faults are usually right at the RJ-45 connectors. If an open fault is identified in the LAN cable, make sure that the open is in one of the active pairs. In a typical 568A/B CAT 5 LAN, only pairs 1/2 and 3/6 are used. Pairs 4/5 and 7/8 are not used. Faults in these pairs will not affect the performance of the LAN.

To find an open fault in a LAN cable, first check the RJ-45 connectors on the ends of the cable. If these are OK, some special test cables, or a Break Out Box (BOB) is necessary to find the open along the path of the cable. First, trace the path of the cable using the pre-described methods. Then insert a BOB, our use a special cable to connect the clips of the FOX of FOX 2 to the LAN cable. Connect 7 of the LAN wires together, leaving the open faulted wire as the 8th wire. Connect the 7 wires to one clip of the FOX or FOX 2, and connect this clip to earth ground. Connect the open faulted wire to the other clip of the FOX or FOX 2. Trace along the path of the cable (which has already been located) with the HOUND 3, listening for a sudden drop in the tone level. When this drop is found, note its position. Continue tracing along the path of the cable. If the tone level stays low, the point at which the level dropped is probably the location of the open fault. If the level comes back up, there was probably an unseen obstruction that caused the level to drop. Continue tracing along the cable until the "true" open is found.

2.7.11: Alarm / Security Wires

Alarm and security wires can be traced like other wires. If using a FOX 2, the True Trace feature is convenient when the wires are connected to an enclosed magnetic switch. Simply open and close the protected opening, or use a test magnet, to actuate the sensor. Listen for the cadence to change. If it changes, you've identified the proper wire, and verified that the sensor is working.

If there is an EOL resistor on the line, it may be necessary to remove it for True Trace to work. To find out if the EOL needs to be removed, turn on the FOX 2, set it to TRACER TONE, and connect it's clips to the wires. While listening to the FOX 2's pilot tone, short the clips together several times, noting whether the cadence changes. If it does, the EOL can be left on the line. If the cadence does not change, the EOL must be removed.

7.2.12: Miscellaneous Multiwire Cables

Some general principles are important to keep in mind when locating and tracing wires and cables.

Any wire with a signal on it, which runs parallel to another wire or wires tends to couple its signal to the other wires. The closer the wires are together, and the longer the parallel run, the more signal that is coupled. This situation occurs in multiwire cables, and when cables are bundled together when installed.

Luckily, if the other wires are low impedance (they have loads on them), the coupled signal will be lower in level. So, in general its best to disconnect the cable being traced from its loads, leaving other paralleling cables still connected to their loads. If the other cables do not have loads (like when they are being installed), it helps to temporarily connect one end of the cable to earth ground, so that they do not interfere with the trace.

The loading effect can also be used when trying to locate an open fault in a wire in a multiwire cable. By leaving the loads on the unfaulted wires, the tracer tone will be reduced in level on the unfaulted wires, and make locating the open easier. In fact, if the other wires are unconnected, it helps to temporarily connect them to earth ground, so that they suppress the effect of the coupled signals. It may also help to connect the far end of the open faulted wire to earth ground. Doing this will produce the most distinct change in tracer tone level when the HOUND 3 passes over the location of the open.

8: Maintenance

The HOUND 3 should require little maintenance throughout its life. If the case gets dirty, clean it with a mild soap and water solution.

9: Accessories and Replacement Items

FOX 3380
FOX 2 3382
9 Volt Battery (alkaline) 37-48
Duckbill Plastic Probe 79-798
Conical Metal Probe 2567-79
RJ-45 to BNC Adapter 2455-824
Speaker Cap (shielded) 10-4292
Battery Cover for HOUND 3 10-4286
Instruction Manual 84-865
Carrying Case 10-4291
Earphones 13837

10: Warranty Info

ONE YEAR LIMITED WARRANTY

The Triplett Corporation warrants instruments and test equipment manufactured by it to be free from defective material or workmanship and agrees to repair or replace such products which, under normal use and service, disclose the defect to be the fault of our manufacturing, with no charge within one year of the date of original purchase for parts and labor. If we are unable to repair or replace the product, we will make a refund of the purchase price. Consult the Instruction Manual for instructions regarding the proper use and servicing of instruments and test equipment. Our obligation under this warranty is limited to repairing, replacing, or making refund on any instrument or test equipment which proves to be defective within one year from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons in any way so as, in our sole judgment, to injure their stability or reliability, or which have been subject to misuse, abuse, misapplication, negligence, accident or which have had the serial numbers altered, defaced, or removed. Accessories, including batteries and fuses, not of our manufacture used with this product are not covered by this warranty.

To register a claim under the provisions of this warranty, return the instrument or test equipment to Triplett Corporation, Service Department, One Triplett Drive, Bluffton, Ohio 45817, transportation prepaid. Upon our inspection of the product, we will advise you as to the disposition of your claim.

ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF ONE YEAR FROM DATE OF PURCHASE, AND THE PROVISIONS OF THE WARRANTY ARE EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED.

The purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the product by the purchaser, his employees, or others, and the remedies provided for in this warranty are expressly in lieu of any other liability Triplett Corporation may have, including incidental or consequential damages.

Some states (USA ONLY) do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. No representative of Triplett Corporation or any other person is authorized to extend the liability of Triplett Corporation in connection with the sale of its products beyond the terms hereof.

Triplett Corporation reserves the right to discontinue models at any time, or change specifications, price or design, without notice and without incurring any obligation.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state.