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Information Security Associates, LLC.

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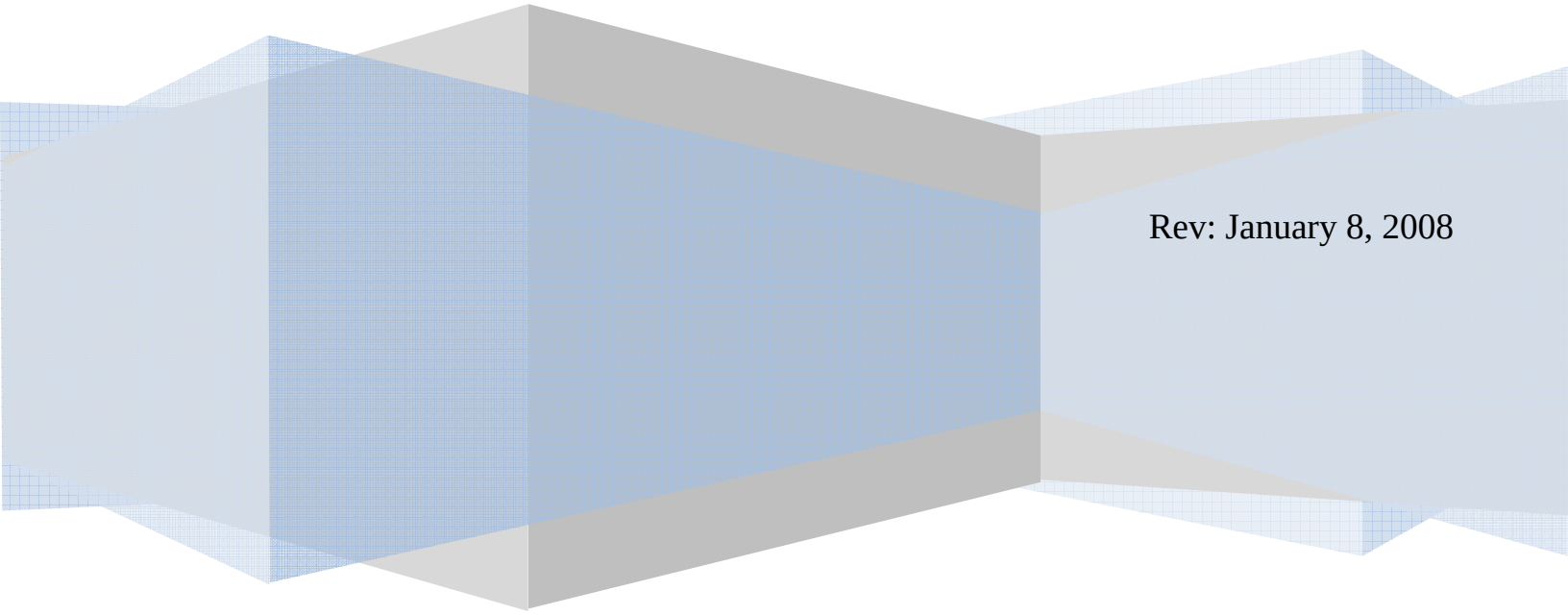
LIT-1

LINE IMPEDANCE TESTER

OPERATOR'S MANUAL



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USER INSTRUCTIONS

Introduction

The LIT-1 is a telephone line analyzer designed to measure the impedance of each wire in a telephone pair. Results of the test will indicate either a clean line, or the presence of a series-type radio transmitter or a parallel listening device such as a drop-out relay type tape recorder switch.

Series transmitters are powered by the telephone line and are connected to only one wire of the pair that makes up the telephone line. Series transmitters broadcast telephone conversations and only operate when the phone is off-hook. They can be located anywhere the telephone line is accessible.

Parallel devices are connected to both wires in the phone line. Parallel devices are usually tape recorder interfaces. Radio transmitters are seldom parallel devices because a parallel radio transmitter will require a battery to operate.

All of these devices generally have an affect on the voltage of the telephone line if measured with a digital volt meter. Differences from one phone to the next in off-hook readings indicate the presence of a series transmitter and different on-hook readings indicate parallel devices. Traditional telephone testing techniques require comparing one telephone line against another to develop a baseline voltage standard of a known clean line. When testing a telephone line using these traditional methods at a residence or in a business with only a few lines, there is no way to develop a such baseline. Also, with the tremendous vari.ety of types of telephones available, different off-hook voltages are frequently measured on different extensions of the same line, making voltage tests unreliable. Line impedance tests do not require a baseline; each line can be tested and evaluated without regard to any other line.

The LIT-1 can be used at each telephone in a residence and at the demarcation point where the telephone service enters the residence. When used in a business, testing can be done at each instrument and at the demarcation point.

Testing at the telephone instrument is the best choice, since a series transmitter installed between the telephone and the demarcation will be detected. If testing is done only at the demarcation block, series devices inside the building WILL NOT BE DETECTED.

Please remember that the LIT-1 has been designed to work with telephone company central office lines. It is not engineered to work with electronic business telephone systems.

Connection

The LIT-1 is connected to the telephone line and to a local earth ground. It is supplied with a variety of connection cables to make this easy.

1. Connect the LIT to local earth ground. The ground connection cable is equipped with a "banana" plug on one end that plugs into the GROUND connector on the LIT. The other end of the cable has a "banana" plug and a heavy duty alligator clip. Use the "banana" plug to plug into the ground contact of a nearby AC receptacle. Other ground connections that can be used are:

    - Cover plate metal screw on an AC receptacle or switch.
    - Electrical conduit or BX cable sheath.
    - Cold water pipe.
    - Heavy gauge wire leading to a ground rod, if you are testing at the demarcation point.

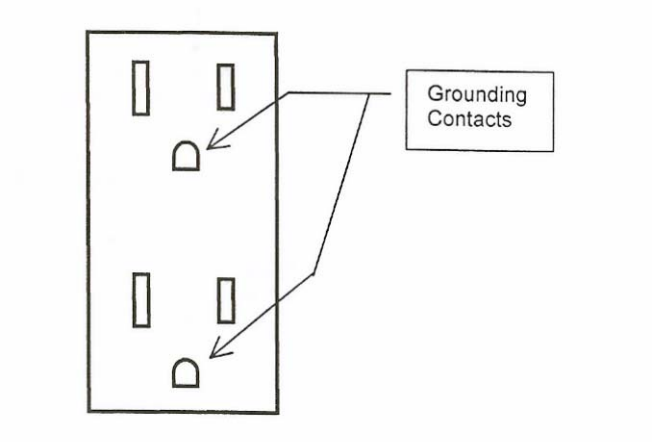

FIGURE 1 - GROUND CONNECTION ON AC RECEPTACLE

2. If your site is equipped with modular connectors for the telephones, use the modular cable to connect the LIT to the line.

3. If modular connectors are not used, connect the LIT by using the cable with the Green and Red alligator clips.

Connect the green lead to one of the telephone terminals at the junction box. Connect the red lead to the other wire. Match the colors of the wires and the alligator clips if possible.

Testing

Sample Line Impedance Test Readings

Sample: normal line
Phone Number: 357-9235

Step 1.	-50.0 VDC
Step 2.	-0.4 VDC
Step 3.	-50.4 VDC
Step 4.	25.2 VDC
Step 5.	50.4 VDC

Line impedance is in balance. No need for further testing.
Sample: Drop-out Tape recorder switch across line Phone Number: 357-9235

Step 1.	-45.2 VDC
Step 2.	- 5.2 VDC
Step 3.	-50.4 VDC
Step 4.	25.2 VDC
Step 5.	50.4 VDC

Both wires have the same impedance!. Significant reading in Step 2 indicates parallel device across line.

Sample: Series transmitter added to line.
Phone Number: 357-9235

Step 1.	-48.8 VDC
Step 2.	- 1.6 VDC
Step 3.	-50.4 VDC
Step 4.	29.6 VDC
Step 5.	59.2 VDC
Step 6.	8.8 VDC
Step 7.	0.006 mA
Step 8.	1466 ohms

The difference of 8.8 volts calculated in Step 6 indicates a significant impedance difference. An inspection of the line would reveal the series transmitter.

Step 1	Turn the LIT-1 on by rotating the On/Off switch to the NORMAL position. Place the FUNCTION SWITCH (left hand switch) in Position 1. The meter should show a voltage in the (-) 48-52 volt range. If the voltage shown is very low, move the Function Switch to the REVERSE position. (If the voltage still is not in the (-) 48-52 volt range, you do not have a good ground connection.) Record the voltage. Include the polarity of the reading; if it is negative, record it as a negative number.
Step 2	Now turn the Function Switch to Position 2. Record the reading. Again, include polarity of the voltage. This reading should only be a few tenths of a volt if the line is ok. A reading of a few volts indicates leakage from one wire in the line to the other. Leakage can be caused by parallel devices or by water in the cable.
Step 3	Add Step 1 & Step 2 algebraically. -48 volts added to +.5volt equals -47.5 volts; and -48 volts added to -.5 volt equals -48.5 volts.
Step 4	Place the Function Switch in the Position 3. Record this reading.
Step 5	Multiply the Step 4 reading by 2. Record this number. If each wire in the telephone line has the same impedance, this voltage should be the same as the number calculated in Step 3.
Step 6	Subtract the voltage in Step 3 from Step 5. If the difference is 0.5 volts or greater, continue on.
Step 7	Place the function switch in Position 4. This will measure the current flowing through the line. The reading will be in milliamperes. Since we want the answer in the next step to be in ohms, change this reading into amperes by moving the decimal point three places to the left (a reading of 5.2 milliamps will be recorded as .0052 amperes).
Step 8	To determine the degree of impedance difference, divide the voltage of Step 6 by the current measured in Step 7. The number calculated here is the amount of impedance difference in the two wires. A figure of 90 ohms or more indicates that a series transmitter is installed on the line.

Warranty

Information Security Associates, LLC, warrants to the original user that its products are free from defect in workmanship and material for a period of one year from the date of purchase. Information Security Associates, LLC, under this warranty, is limited to correcting or replacing without charge, at its factory, any part or parts thereof which shall be returned to its factory, transportation prepaid, and upon examination by Information Security Associates, LLC, shall be found to have been originally defective.

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