



Information Security Associates, LLC.

*Information Security Associates, LLC*

***BOOMERANG™***

NON-LINEAR JUNCTION DETECTOR

MODEL NJD-4

# **OPERATOR'S MANUAL**

Rev: January 8, 2008

# Table of Contents

<b>Section 1</b>	Boomerang Overview .....	1
	<i>Recognition of False Alarms</i> .....	2
<b>Section 2</b>	Boomerang Components .....	3
	<i>Electronics Package</i> .....	4
	<i>Antenna</i> .....	4
	<i>Cables</i> .....	5
	<i>Headset</i> .....	5
	<i>Handle and Poke Stick</i> .....	5
	<i>Carrying the NJD</i> .....	5
<b>Section 3</b>	Initial Setup .....	6
<b>Section 4</b>	Operation .....	9
	<i>Important Notes On Full Scale Readings</i> .....	10
	<i>Use of Attenuator</i> .....	11
<b>Section 5</b>	Operational Notes and Hints.....	12
	<i>“Phantom” Returns and Interfering Signals</i> .....	12
	<i>Resolving Indications of Semiconductors</i> .....	13
	<i>Devices Hidden in Walls</i> .....	14
<b>Section 6</b>	Miscellaneous Notes.....	15
<b>Section 7</b>	Maintenance and Accessories.....	16
	<i>Battery Charging</i> .....	16
	<i>Fuse Replacement</i> .....	16
	<i>Replacement of Antenna Cloth Covering</i> .....	16
	<i>Accessories</i> .....	17
	<i>Warranty</i> .....	18

## SECTION 1

### **BOOMERANG™ OVERVIEW**

The BOOMERANG™ utilizes a known physical principle that states that any rectifying junction with sufficient length of conductor attached to act an antenna will not only detect a radio signal and rectify it, but also will create harmonics of that signal. A harmonic is a whole number multiple of the original signal. Since the BOOMERANG™ transmits on a frequency of 915 MHz, its 2<sup>nd</sup> harmonic is at 1830 MHz (2 times 915) and its 3<sup>rd</sup> harmonic is at 2745 MHz (3 times 915).

Over the years methods of detecting the presence or location of objects have been developed that use a radio frequency beam to indicate the presence of targets that contain rectifying junctions. The method of detection involves detecting changes made to the radio signal by the rectifying junction target. Rectifying junctions are PN type semiconductors and the change that they make is to multiply the frequency of the signal beamed at them. Semiconductors create harmonics or whole number multiples. Targets are often designed into tuned circuits for maximum detection efficiency. Applications have included devices to locate skiers trapped in avalanches and more commonly are seen in electronic article surveillance systems to deter shoplifting. Detectors of this sort consist of a transmitter and a receiver that is tuned, for instance, to the second harmonic of the transmitted frequency. When the detector's receiver detects a signal at the harmonic frequency, it can be assumed that the target is within the pattern and range of the antenna.

The BOOMERANG™ utilizes this same harmonic creation and detection phenomena to locate devices containing semiconductors: transistors, diodes and integrated circuits used in eavesdropping devices and other electronic products. These semiconductors do not have to be operating in order to be detected.

Target detection range of the NJD-4 is a function of several things: the power of the transmitter, the sensitivity of the receiver including the antenna gain, and the nature or design of the devices being detected. The NJD-4 has a transmitter output of 500 milliWatts. Its receiver has a sensitivity greater than -105dB, meaning that it can detect extremely low levels of second and third harmonic signals picked up by its antenna

The BOOMERANG™ NJD-4 is capable of detecting certain circuits containing semiconductors for a distance of up to 20 feet. An attenuator is built into the NJD-4 to limit the detection range when it is too great.

## Recognition of False Alarms

The NJD-4 design is based on the analysis of PN junctions and the non-linear region of DC current/voltage characteristics. These junctions radiate several harmonics of the fundamental frequency applied to them. The levels of harmonics radiated by such junctions vary with respect to the type of material and are similar for specific classes of junctions.

The values of electromagnetic field intensity (the total amount of energy reflected as harmonics) for common semiconductor junctions such as Germanium (Ge) PN junctions, Silicon (Si) PN junctions and Gallium Arsenide (GaAs) PN junctions are all different from each other. The respective difference in levels of the second and the third harmonics are similar, but the total amount of energy returned as harmonics will differ. This parameter will affect the range at which a device can be detected.

For the classes of junctions represented by these common semiconductors, the level of the third harmonic is 20 dB less than the level being radiated by the second harmonic. For our purposes, this means that almost all of the energy returned as harmonics from these semiconductors will be second harmonic. Only a small amount will be third harmonic.

There is another class of semiconductor-like junctions that consists of naturally occurring dissimilar metallic oxides. These metallic oxides commonly occur in building and furniture construction and are found in furniture and other office-type products like three ring binders and paper clips. In this type of junction, the ratio of the levels of second harmonic to third harmonic is inverted. That is, the level of third harmonic is approximately 20 dB higher than the second harmonic level. Commonly known as "false returns", radiations from this class of junctions can be recognized by the higher level of third harmonic compared to second harmonic.

The nonlinear region of PN junctions is physically stable. This means that jarring or physical shock, etc., does not alter the nature of their response to RF illumination. The 2<sup>nd</sup> to 3<sup>rd</sup> harmonic ratio remains the same and the semiconductor remains steady. No changes are seen on the NJD's meter.

The dissimilar metallic oxide junctions that cause "false" returns are, on the other hand, generally much less stable. Physical jarring will very often affect the nature of the response of the junction to RF illumination. Such changing responses are easily recognized on the NJD-4's meter as changes in the levels of the harmonics and can be heard as static in its headset.

Thus, the operator can almost always distinguish between a semiconductor and a false return that is in the field of view of the NJD-4's antenna. Determination of the type of junction detected can usually be made by observing the levels differences between the detected levels of harmonics on the NJD-4's meter display.

## SECTION 2

# **BOOMERANG™ COMPONENTS**

### **ELECTRONICS PACKAGE**

The NJD-4's circuitry is contained in the electronics package. All aspects of operation are controlled here.

There are receptacles for the antenna's coax cables, the meter cable, and headphones. Controls include power on/off, headphone volume, and trip (threshold for the target detection tone).

A meter for battery charge level is located next to the on/off switch. It will indicate battery level only when the NJD is turned on.

There are also two slide switches. One, marked "Normal/ Receiver Only" turns the NJD-4 transmitter on and off. This aids in determining if a strong interfering signal is being created by the NJD-4 interacting with some sort of circuitry in the area being examined or if the NJD-4 is detecting another transmitter operating on 1830 or 2745 MHz.

The switch marked "Normal/2<sup>nd</sup> Only" is used to turn off the 3<sup>rd</sup> harmonic receiver. This is useful when a return needs to be evaluated in depth. The audio section of the NJD-4 switches between the 2<sup>nd</sup> and 3<sup>rd</sup> harmonic receivers at a rate of about two times per second. Sometimes there is clear (or at least perceptible) audio on the harmonic returns from listening devices. By listening to only the second harmonic return, information regarding the nature of the detected device can be gathered.

The battery charger jack and the fuse holder are located on the back panel.

## **ANTENNA**

The BOOMERANG™ antenna assembly consists of a rectangular housing that contains the actual antennas. The design and size of the antenna is to eliminate any reflections coming from the side or rear. The antenna housing also contains band pass filters for the 2<sup>nd</sup> and 3<sup>rd</sup> harmonic frequencies to prevent any unwanted signals from reaching the receivers.

The antenna may be mounted on the collapsible handle or used as a hand-held unit.

Two LED barograph meters are mounted on the antenna in a meter box. The meters give an indication of the strength of the received signals. The red LED indicator is for the 2<sup>nd</sup> harmonic and the green LED is for the 3<sup>rd</sup> harmonic. Visual comparison of the strengths of the 2<sup>nd</sup> and 3<sup>rd</sup> harmonics will indicate whether the NJD has detected a semiconductor (very high 2<sup>nd</sup> harmonic, low 3<sup>rd</sup>) or a corroded metallic oxide (3<sup>rd</sup> harmonic is equal to or greater than 2<sup>nd</sup>).

The NJD-4 antenna is connected to the handle by means of an adjustable swivel. The swivel is screwed onto the threads of the mounting bracket on the antenna.

The male thread of the bracket on the antenna has two slots machined into it to be used to lock the antenna in certain orientations.

## **CABLES**

The NJD-4 electronics package contains a transmitter and receiver. These are connected to the antenna by means of coaxial cables. The cables are 8 feet in length. Connectors for the various elements are configured in such a way that it is not possible to connect the cables incorrectly. The transmitter cannot be connected to the receiver's antenna and vice versa.

Coaxial cables used at BOOMERANG™ operating frequencies are very critical. Care should be taken that the cables are not overly strained by bending at the connectors, being stepped on, etc.

If a cable-connector junction becomes frayed or if a degradation of performance occurs, switch to the other set of cables supplied with the NJD-4 until the connector can be repaired. The NJD is supplied with two sets of coaxial cables.

The NJD-4 antenna mounted display is driven from the electronics package via the meter cable. The NJD-4 is supplied with an 8 foot long meter cable. This cable also serves a battery save purpose. Power to operate the NJD-4 is routed through the meter cable. When the cable is removed from its jack on the NJD electronics package, the battery is disconnected, making it impossible for the NJD-4 to consume battery power while in the storage case.

## **HEADSET**

The NJD-4 has one headset jack on the electronics package. The jack is a 1/4" mono jack.

## **HANDLE AND POKE STICK**

The antenna is mounted to a telescoping handle. The handle is adjustable in length from 19" to 57". Cables are attached to the handle by means of Velcro straps. The antenna swivel couples to the handle in a twist lock method.

The poke stick is a telescoping rod that is used to tap on surfaces to try to dislodge corroded metallic junctions.

## **CARRYING THE NJD**

The NJD-4 is supplied with a backpack style carrying harness. Use of a single shoulder strap is not recommended because it leads to rapid operator fatigue and discomfort. The backpack harness allows the NJD-4 to be carried on the lower back where controls are accessible and weight is evenly distributed across the shoulders.

## **BATTERY CHARGER**

The NJD-4 is supplied with a plug-in battery charger/external power supply. The supply can operate the NJD-4 while charging its battery. The supply operates over a range of 100-240 Volts AC, 50 or 60 Hertz and requires no switch selection by the user for primary AC voltage.

The NJD-4 is designed to operate from its battery. Continued operation using the AC power supply/battery charger may overcharge the battery and shorten its useful life. Do not charge the NJD-4 for more than 8 hours when fully discharged.

## **ATTENUATOR**

The attenuator is a barrel shaped device approximately 1.75" long that can be installed in line with the coax cable from the transmitter. It is used to lower the power of the NJD-4's transmitter power when there are too many targets in the area being examined. The attenuator lowers the transmitter power by 6 dB. The affect of the attenuator is to reduce the detection range by 40-60%. When using the NJD-4 with the attenuator installed, be more careful in the search since the NJD-4 will not detect targets as easily.

Connect the attenuator only to the transmitter output connector on the electronics package. Do not connect it to the receiver input connector. The attenuator is stored in the accessory pouch.

## SECTION 3

### **INITIAL SETUP**

1. Remove the electronics package from the storage case.
2. Remove the antenna assembly and swivel mount from the storage case.
3. Attach the swivel mount to the antenna.
  - A. On the rear of the antenna, note the 5/8" male thread below the display. Locate the two V shaped slots. Note that they are 90° apart and remember where they are.
  - B. Note the nylon thumbscrew on the swivel assembly. Back it out far enough so it does not protrude into the 5/8" female thread.
  - C. Screw the swivel far enough onto the antenna so that the thumbscrew can be seated in one of the slots. The slots allow the user to select either vertical or horizontal polarity and to lock the antenna to keep it from rotating. Line up the thumbscrew with either one of the slots and tighten it down.
  - D. Do not disassemble the swivel with the thumbscrew tightened. It must be loosened.
4. Connect a set of coaxial cables to the antenna. The coaxial cable assembly is built with male and female connectors to prevent incorrect connection of antenna elements.
5. Connect the meter cable to the electronics package and to the meter display box on the antenna. Also connect the coaxial cables to the electronic package.
6. Remove the extendible telescoping antenna handle from the storage case. It is stored in the foam padding in the lid.
7. Extend the handle to a convenient length, usually about 3 feet. To do so, loosen the knurled lock rings by twisting them to the right and slide out the sections one at a time, starting with the bottom section. Do not pull the telescoping sections out too far or with too much force or they may bind and make it hard to collapse the handle. Tighten the lock rings firmly by hand. Insert the bayonet fitting on the antenna swivel mount into the socket on the end of the handle. The fitting is a twist lock type, and will click into place when secure. To remove, push down and twist the opposite direction.



8. Attach the coaxial cables and the meter cables to the handle using the Velcro strips provided with the NJD-4.
9. Insert the headset plug in the jack on the side of the meter box.
10. To check the operation of the BOOMERANG™, first turn the VOLUME control to 12 o'clock and turn the TRIP knob all the way clockwise.
11. Switch the ON/OFF switch to the ON position.

Adjust the volume on the headset to a comfortable level with the VOLUME control.

Now set the alert tone threshold with the TRIP control:

- When adjusting the TRIP control, make sure the antenna is not pointed at any electronic equipment or at the electronics package, as a return signal will be received and indicated.
  - Turn the TRIP control counterclockwise. As you turn past a certain point, the 800 Hertz tone will come on. Turn the knob slightly back clockwise until the tone stops.
12. Remove the test target from its envelope. Hold it between thumb and forefinger in front of the antenna. If it is held close to the antenna, both meters will go full scale and the tone heard in the headset will be steady. As the target is moved away from the antenna, the tone lessens in intensity and the meters begin to drop.
  13. The NJD-4 must be capable of detecting the test target held between thumb and forefinger for a distance of at least 2 feet when the target is oriented parallel to the short side of the. This test will give you a future indication as to whether the sensitivity of your BOOMERANG™ has decreased.
  14. Practice with targets such as the test target supplied with the NJD-4, portable radios, telephones and any other common objects containing semiconductors to develop a feel for the performance of the NJD-4.

15. The antenna has a detection pattern which is not symmetrical, and experimentation with the test target and other devices will show you what the pattern is. If the antenna is within 2 feet of a target, the pattern is not as important. This is the reason the antenna is held close to the surface being searched.
16. The NJD-4's antenna radiates a polarized signal, meaning that the signal from the target will give different results when the antenna is rotated 90 degrees. The signal is oriented vertically, parallel to the short side of the antenna. Try different orientations of the antenna and the target to get the strongest return signal.
17. Attach the backpack style carrying strap. Clip the short ends of the strap to the ring-like handles on the electronics package. Clip the long ends to the side opposite the short ends so the strap forms an "x".

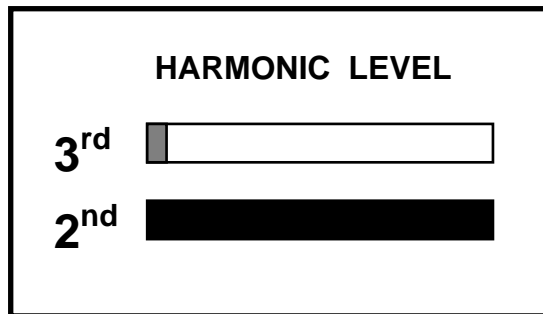
Keep the strap fairly long so the NJD-4 electronics package rides low on the back. This way the controls can be reached without having to take off the back pack.

Use the loop-like chest strap to adjust the shoulder strap location on the shoulders for more comfort.

## SECTION 4

### **OPERATION**

1. Refer to Section 3 to assemble and activate the BOOMERANG™.
2. Investigate each wall by starting in one corner and "painting" the wall with the antenna from the top down in vertical rows, moving to the other corner of the wall. The antenna can be moved at a rate of approximately 2 times the antenna's vertical size per second over the surface. Response to semiconductors is nearly instantaneous. Examine other room surfaces including furniture in a similar manner.
3. If a 2<sup>nd</sup> harmonic is received and no 3<sup>rd</sup> harmonic is present, a semiconductor device is in the signal path. The meter will look something like this:



Meter showing  
return from  
semiconductor

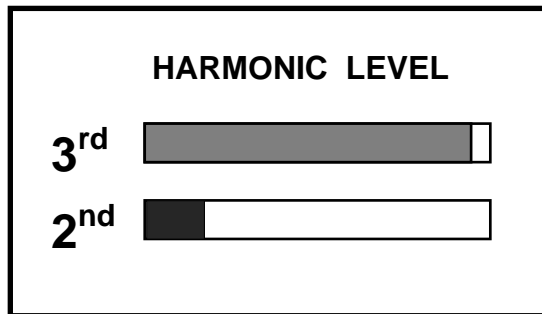
In most instances, when a semiconductor is detected, the 2<sup>nd</sup> harmonic meter will be full scale before the 3<sup>rd</sup> harmonic meter displays any return at all.

4. If the non-linear junction you have detected is a metal-to-metal contact such as a sheetrock screw in a steel stud or two dissimilar metals, there will be a significant amount of 3<sup>rd</sup> harmonic showing on the display. See the figure on the next page. Thumping the wall with your fist or the poke-stick will cause either an intermittent noisy sound in the headset or the signal may disappear altogether if you have dislodged the junction. If either occurs, a corrosive joint type non-linear junction has been encountered. If only a 3<sup>rd</sup> harmonic signal is received, it should be ignored.

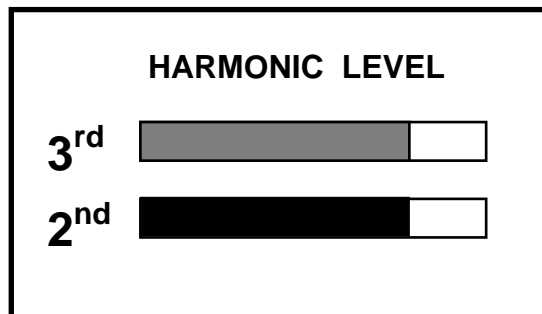
Commonly encountered sources of 3<sup>rd</sup> harmonic false returns include the following:

- Paper clips in desk drawers
- Ball bearing drawer slides in desks
- File cabinets and credenzas
- Springs in upholstered furniture and mattresses
- Wire hangers used to support suspended ceilings
- Three ring binder type notebooks.

Detection of corroded metallic objects will produce a meter display that looks like the following two drawings, one where the meter shows a high level of 3<sup>rd</sup> harmonic with little 2<sup>nd</sup>, and one where the meter shows an equal level of 2<sup>nd</sup> and 3<sup>rd</sup>. What is important to note is that there is a high level of 3<sup>rd</sup> harmonic in both cases.



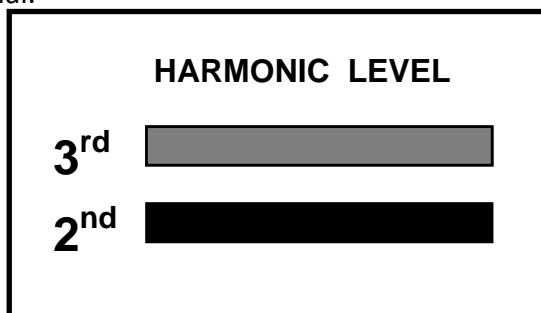
High 3<sup>rd</sup> harmonic level indicates corroded metallic junction



Both meters show a strong return. This indicates a corroded junction because of the high level of 3<sup>rd</sup> harmonic.

IMPORTANT NOTE ON FULL SCALE READINGS

If both 2<sup>nd</sup> and 3<sup>rd</sup> harmonic displays are full scale when looking at a target, the operator can not know which is stronger. All semiconductors radiate a small amount of 3<sup>rd</sup> harmonic. If the antenna is right on top of a strong return, it is quite possible to peak both meters or even overload the receiver. The operator must then determine which has the strongest signal.



Both meters are full scale. The operator can not tell which is the stronger signal.

To determine which has the strongest signal, keep the antenna aimed at the target and simply back it away from the target. The further away it is from the target, the weaker the signals become. Keep backing away until the meters are back on scale and the strongest signal can be determined. Or use the attenuator to lower the transmitter power.

### **Use of the Attenuator**

The NJD-4 is very sensitive and can detect certain types of electronic devices from several feet away. Occasionally the NJD-4 will be used in an environment where there are a lot of readily detectable electronic devices. They may be detected in many directions from some distance away. When this is the case, it may be difficult to determine what exactly the NJD-4 is detecting.

The solution to this dilemma is to lessen the power of the transmitter, which in turn limits the detection range of the unit. The barrel shaped attenuator supplied with the NJD-4 does just that.

Connect the attenuator to the TRANSMITTER output on the NJD-4. Do not connect it to the RECEIVER. It has the same type of connectors as the NJD-4's coax cables, so it is connected the same way they are. Screw it onto the TRANSMITTER connector and screw the coax cable into it.

The attenuator will cut the detection range by 40-60%. Keep this in mind and be more painstaking in the use of the NJD-4 since it cannot see as far with the attenuator.

Remove the attenuator from the TRANSMITTER connector before returning the NJD-4 to the storage case. DO NOT put the electronics package back in the storage case with the attenuator attached.

## SECTION 5

# OPERATIONAL NOTES AND HINTS

### "Phantom" Returns and Interfering Signals

#### **Reflected Signals**

Radio waves bounce or reflect off of metal objects. This is true for the signal transmitted by the NJD-4 and for signals radiated by nonlinear junctions. Occasionally, there will be a metal surface on the opposite side of a wall, for example, or perhaps in the field of view of the NJD-4. This object, which could be a mirror or a metal cabinet, will reflect the NJD-4's signal. It is possible that the signal could illuminate a nonlinear junction that is actually in back and off to one side of the antenna and the radiated harmonic might be strong enough to reflect off the metal surface and be detected. If one of these "phantom signals" is detected, changing the angle of the antenna should eliminate it. Visually inspect the other side of the wall if there is a metallic surface that you can not see from the area being swept.

#### **Interfering Signals**

In rare circumstances, there may be a signal being detected by the NJD-4 which appears to come from all directions and changing the direction the antenna is pointing in does not eliminate the signal. This is caused by a signal from another transmitter operating at exactly 1830 or 2745 MHz.

To determine if this is the case, place the NORMAL/RECEIVE ONLY switch on the panel of the electronics package in the RECEIVE ONLY position. This turns off the NJD-4's transmitter. If the interfering signal is caused by a target creating a strong 2<sup>nd</sup> or 3<sup>rd</sup> harmonic of the NJD-4's transmitted signal, turning off the transmitter will eliminate it and the NJD-4's LED meters will drop to a low position.

If the interfering signal is being radiated by another transmitter, the meters will not drop when the transmitter is turned off. The operator must then locate the source of the interfering signal by using RF detection equipment. The operator must determine whether the signal is emanating from the area being investigated or whether it is emanating from outside of the area.

If the interfering signal can not be turned off, the effectiveness of the NJD-4 will be greatly reduced.

Return the switch to the NORMAL position after completing this evaluation.

### **Pager Interference**

Pagers are another source of interference. Certain pagers have circuitry that amplifies the radiated harmonics and can be detected for up to 20 feet. Wearing a pager when using the NJD-4 is not recommended because of the false returns they can cause.

Certain types of stationary electronic equipment can cause similar problems of long distance detection. If this is encountered, either remove the equipment from the area or use the NJD-4 pointing away from the offending equipment.

### **Resolving Indications of Semiconductor Devices Hidden in Walls**

When searching a wall, bear in mind the office on the other side of the wall might have electronic devices such as a television set, telephone, radio, calculator, etc. close to the wall. The NJD-4 will often detect such targets for 5-8 feet, even through a wall. If a strong 2<sup>nd</sup> harmonic return is encountered while searching a wall, it must be determined whether the NJD-4 is detecting an object hidden in the wall or an object in the adjoining room.

To do this, visually examine the adjoining area, looking for legitimate electronic devices. Keep in mind the point where the return was located and that the NJD can often see several feet into the adjoining room. If it is suspected that a legitimate electronic device is the cause of the return, move the device and use the NJD-4 to look from the adjoining area back into the room under investigation at the spot of the return. Keep the NJD's antenna close to the wall. If there is no return detected, the legitimate device was what was found, and not something hidden in the wall.

If the return is still present, more investigation is required. The following steps may be taken:

- Perform a careful visual inspection for a pinhole opening at the target area which would allow a microphone to pick up the room audio.
- Try to get audio from the return. Turn the TRIP knob on the electronics package fully clockwise and set the receiver selection switch to the 2<sup>nd</sup> ONLY position. This will disable the tone, allowing you to listen to the 2<sup>nd</sup> harmonic receiver only. Occasionally a return will contain room audio and it can be heard in the headset. Whistling, clapping your hands, or making other sharp loud noises can help you identify room audio pick up.
- If you must look inside the wall, a small diameter borescope can be used with little destruction to the wall. Walls or partitions built of steel or wooden stud-wall construction often extend above the ceiling. If this is the case, and the ceiling is a suspended type, lift out a ceiling tile. Make a small opening in the wall above the ceiling and inspect the wall cavity from above.

Wall cavities can be inspected from below by removing the baseboard. In many offices this molding is a rubber or plastic strip that can be removed and re-installed.

If the wall has a papered surface, make a slit in the paper and peel it back enough to create a small opening into the cavity.

An angled inspection mirror and flashlight can be used for these inspections.



## SECTION 6

### **MISCELLANEOUS NOTES**

1. It takes approximately six hours to fully charge the battery with the NJD-4 turned off. No cables, except for the charger cable need to be attached.

Should the batteries run low during use, the BOOMERANG™ can be used with the charger/external supply plugged in.

2. The fully charged BOOMERANG™ will operate for approximately eight hours before recharging is required.
3. **Battery Level Meter.** Next to the on/off switch is a meter indicating the level of charge in the battery. When the meter is fully in the green section, the NJD is charged. When the meter moves from the green to the red section, there is less than 1 hour of operating time left.

The NJD also has a feature that turns off the LED meters when the battery reaches a certain level of charge. This avoids the gradual deterioration of detection ability that occurs when the battery reaches a critical level of discharge.

4. Take care when connecting cables to the NJD. If there is an attempt to plug the headset into the charge jack, the battery will be shorted and the internal fuse will blow.
5. The NJD-4 coaxial cables use TNC connectors. Looking at the inside of the connector will show that there are leaf spring fingers on the inside of the male connector. If you have trouble attaching the connector to the panel fitting, inspect the connector for a leaf spring which may have become bent; if so, press gently forcing the leaf spring back against the center of the connector.
6. The NJD-4 is supplied in a rugged foam lined carrying/storage case. The case protects the NJD while in transit. When in this case, it can be safely checked as airline luggage or shipped via air freight.

## SECTION 7

# **MAINTENANCE AND ACCESSORIES**

### **BATTERY CHARGING**

The battery will indicate a need to be charged by one of 2 ways.

1. The LED pilot light next to the power on/off switch on the front panel of the electronics package will be flashing.
2. The BOOMERANG will not detect a target. It stops functioning when its battery voltage decreases to 11 volts. This is due to an internal regulator in the electronics package.

To charge the battery, connect the charger to the CHARGE jack on the rear panel of the NJD-4's electronics package. Plug the charger into an AC outlet. The charger is rated for 110-240 V AC primary voltage. A full charge will be made in 6 hours. Charging for more than 8 hours can overcharge the battery and shorten its useful life.

The BOOMERANG™ is designed to use its battery as the primary power source. The BOOMERANG™ may be used while charging. Extended operation using the external charger/power supply will damage or shorten the life of the battery.

### **FUSE REPLACEMENT**

If the LEDs on the antenna meter box do not light and the meter cable is properly connected and the power switch is on the ON position, check the fuse. The fuse holder is located on the rear panel of the NJD-4 electronics package near the serial number. Spare fuses are supplied with the NJD-4. Fuse is 2.5 amps, Type GMA (5x20mm).

### **REPLACEMENT OF ANTENNA CLOTH COVERING**

1. Remove the old covering which is held on with Velcro strips. Do not remove the Velcro from the antenna or tamper with the antenna cover plate.
2. Install the new covering. Use only an ISA replacement covering. Some cloth material may contain metallic threads and will affect the operation of the BOOMERANG™.

## ACCESSORIES

Quantity	Part No.	Item
2	5258	Fuse- 2.5 amp 5x20mm
1	41068	Boom Handle
1	41077	End Bolt and Antenna Swivel Mount
1	41079	Target
4	41069	Velcro Strips
1	41055	Manual
1	41075	Small Accessories Pouch
1	41080	Mono Headset w/ 1/4" Plug
1	41085	Poke Stick
1	41166	3 foot AC Cord
1	41164	Switching DC Power Supply/Charger
1	41165	Backpack Harness
2	41071	8 ft. Coax Cable
1	41140	8 ft. Meter Cable
1	41066	Antenna / Meter
1	42014	Storage/Carrying Case
1	1843	6dB Transmitter Attenuator

## 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.

INFORMATION SECURITY ASSOCIATES, LLC, SHALL NOT BE LIABLE FOR LOSS OR DAMAGE CAUSED EITHER DIRECTLY OR INDIRECTLY BY USE OF ITS PRODUCTS. THIS WARRANTY SUPERSEDES AND IS IN LIEU OF ALL OTHERS EXPRESSED OR IMPLIED. NO OTHER LIABILITIES MAY BE ASSUMED UNLESS AUTHORIZED IN WRITING BY INFORMATION SECURITY ASSOCIATES, LLC.

For service, technical questions and problems contact:

Information Security Associates, LLC.

6 Spruce Brook Road

Seymour, CT 06483

USA

Tel: 203 736-9587

Fax: 203 736-9639

[www.isa-technology.com](http://www.isa-technology.com)

[isa-hre@comcast.net](mailto:isa-hre@comcast.net)