

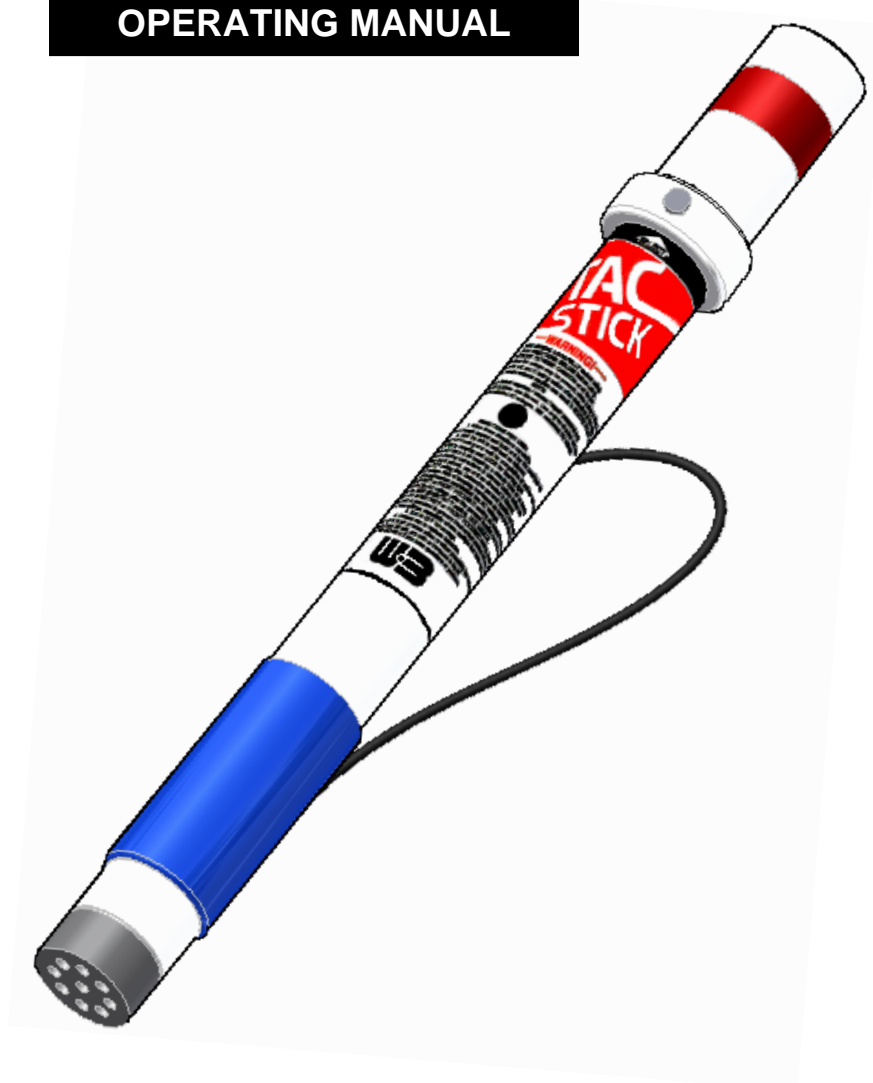
# Will-Burt

# TAC<sup>TM</sup>

(Tester Alternating Current)

# Stick

**OPERATING MANUAL**



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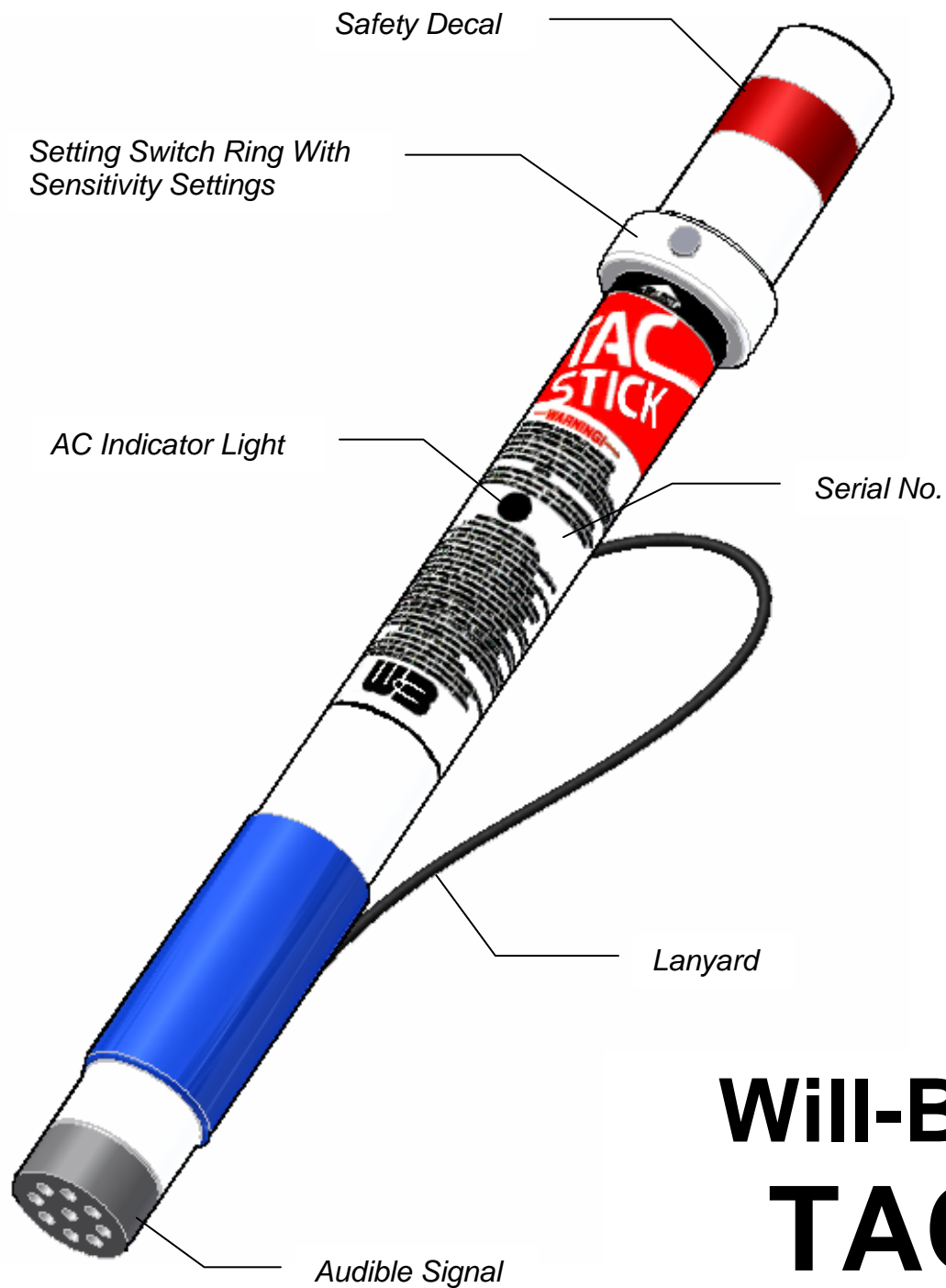
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# Will-Burt TAC™

(Tester Alternating Current)  
**Stick**

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# Will-Burt TAC™ (Tester Alternating Current) Stick

## 1. INTRODUCTION AND SAFETY SUMMARY

### DANGER

The user should EXERCISE EXTREME CAUTION at all times when approaching areas where live voltage may be present, while trying to detect live voltage (with or without the use of the Will-Burt TAC™ Stick) and in taking action after detection of the live voltage. Failure to exercise extreme caution or to use the TAC™ Stick in strict accordance with the directions in this manual can result in SEVERE INJURY OR DEATH.

### WARNING

Before using your Will-Burt TAC™ Stick, you should READ THIS MANUAL CAREFULLY. You should EXERCISE EXTREME CAUTION at all times when approaching areas where live voltage may be present, while trying to detect live voltage (with or without use of the Will-Burt TAC™ Stick), and in taking action after detection of live voltage. Failure to follow the directions contained in this manual and failure to exercise extreme caution can result in SEVER INJURY OR DEATH.

### WARNING

One of the greatest dangers to rescuers comes from sudden reapplication of AC voltage through safety/fusing circuits. These automatic retries are computer programmed and will try to reconnect AC voltage after a short. There are no firm rules at what interval and frequency these automatic retries will occur. They usually cease after three or four retries in the first minutes after a short.

### WARNING

The rescuers must make sure that in case wires have been found, the power company has actually disconnected that section of their circuit. Downed wires should always be treated as if they were voltage-carrying. Only the power companies have qualified personnel to ground out circuits and to assure their safe handling. The TAC™ Stick does not warn of hazards from DC (subways, car batteries).

### WARNING

The TAC™ Stick also does not warn of shielded AC voltage. Extreme caution should be exercised when using the TAC™ Stick in areas where multiple live voltages may be present. In such situations, care must be taken, especially when using the LOW SENSITIVITY or FRONT FOCUSED settings, to avoid inadvertent contact with one source while pinpointing another source.

*See Section 3 for basic operation.*

## 2. DESCRIPTION

The TAC™ Stick consists of a high sensitivity AC 50/60Hz amplifier. The special logarithmic amplifier is capable of receiving AC signals over a very wide amplitude range. Such signals, emanating from unshielded, voltage-carrying surface, can be made audible and visible as a warning.

The warning signals (beeps and LED flashes) will increase as the signal amplitude increases. This makes it possible to locate the source of the signal quickly.

Rotating the plastic ring at the front (subsequently referred to as the setting switch) turns the unit on and off and provides three sensitivity settings. Each of the four settings click into position.

A small magnet in the ring actuates magnetic read switches inside the device.

The HIGH SENSITIVITY setting allows the detection of AC from the greatest distance. In the LOW SENSITIVITY setting, the overall sensitivity is reduced. This aids in detecting the source of the signal. Finally, the FRONT FOCUSED setting allows pinpointing a source. In this mode, a small sensor in the front is shielded from signal coming from the sides. This makes the unit directional, and the influence of high voltage wires overhead is greatly reduced.

The unit features a complete self test circuit: Immediately after turn-on, a built-in low frequency oscillator will operate for about three seconds simulating power line signals. This provides a separate test signal to the input. Rapid beeping indicates proper operation of the TAC™ Stick.

A low voltage watchdog circuit monitors the built-in batteries. It will make the unit beep continuously and prevent its use in case of weak batteries. The TAC™ Stick does not require warm-up after turn-on. In normal use with intermittent operation, a set of alkaline batteries will typically provide one year service. If left on continuously, the batteries will run down in about 300 hours. In order to assure operation and to prevent battery leakage, the batteries should be changed annually. After unscrewing the lanyard screw, the batteries can be removed and changed; however, this should be done in a non-explosive atmosphere.

The electronic circuitry and the batteries are mounted on a printed circuit board and housed in a sturdy, fully insulating plastic pipe. TAC™ Stick has been designed for operation in potentially explosive atmospheres.

TAC™ Stick is splashwater-proof.

### 3. BASIC OPERATION

- Hold the TAC™ Stick by the unstriped lanyard end with arm through strap. The red striped area in the front indicates the sensing section.
- Turn unit on: Rotate the ring of the mode switch to the HIGH SENSITIVITY setting.
- Allow the unit to self-test as follows:
  - After turning switch to HIGH SENSITIVITY, wait for completion of the self-test cycle (at least three seconds).
  - Listen for beeping and LOOK for flashing light.

#### CAUTION

DO NOT USE unit if there is no beeping, no flashing, or a steady tone of “chirps” as it goes through self-test when tapped. Follow the trouble shooting instructions in Section 14.

- After the self-test has stopped, move the TAC™ Stick around slowly.
- Continue to use the HIGH SENSITIVITY setting until the general location and direction of unshielded AC voltage is determined.

- As the TAC™ Stick is brought closer to the exposed AC, the unit will start to beep and the LED will flash.
- Beeping and LED flashing will become more rapid as the sensing section comes closer to the source. The unit may beep occasionally even when no AC is around. This is normal and frequently occurs while the stick is in motion. It can be caused by electrostatic charges for other fields. Hold unit still while checking.
- The higher you hold the TAC™ Stick (or the higher the wires are above the ground), the earlier a source can be detected.
- Once AC has been clearly detected and the TAC™ Stick beeps rapidly, select the LOW SENSITIVITY setting or the FRONT FOCUSED setting to pinpoint the sources. Do not contact conductions with unit. Do not place the unit in liquid.

**⚠ WARNING**

In the front focused setting, the unit will pick up signals only from the front tip end. Do not use this setting or the low sensitivity setting when starting a search. The sensitivity is greatly reduced and the TAC™ Stick will no longer pick up signals from certain distances and directions. Extreme caution must be exercised to prevent inadvertent contact with live wires which may not be detectable in these settings, especially where multiple live wires may be present.

#### 4. SENSITIVITY / RANGE

Aside from the setting switch, a number of factors will influence the distance between the first signal indication generated by the TAC™ Stick and the dangerous AC

voltage source. The detection range/sensitivity will be different depending on a number of factors:

1. Shielding: If AC signals are fully enclosed in grounded metal shielding, they will generate no indication on the TAC™ Stick. Metal doors or plates may also prevent the AC fields from emanating. Only if the metal parts are in contact with or are very close to the AC signal source will the TAC™ Stick indicate the presence of AC potential. Some shielding is also provided through wet leaves, brush, and trees. They will reduce the range. However, if a tree or water puddle is on AC potential, the TAC™ Stick will give warning from a distance.
2. The height of the TAC™ Stick above ground as well as the height of the signal source will affect the distance between AC source and point of first warning indicated on the TAC™ Stick. The higher the TAC™ Stick is held above the ground, the further it will see and the wider its horizon will be. The horizon of a TAC™ Stick laying on the ground is very limited. The same holds true for wires in the air compared to wires laying on the ground. Wires high above the ground will be noticed from a much greater distance than wires on the ground.
3. The AC Voltage signal amplitude which is present will also affect the distance at which the first warning will occur. The higher the voltage, the earlier the warning.
4. The physical size of the conductor will also affect the distance at which the first warning will occur. A car

contacting AC will be detected much earlier than a short piece of wire.

## 5. TYPICAL USE

*Note: Always select the HIGH SENSITIVITY setting to start.*

- A. Site Assessment: Hold the stick on the lanyard end, and move it sideways and up and down. Move slowly forward. Observe the LED, and listen to any beep. If a signal is noticed, hold still. If it persists, try to find the direction from where the signal comes. The signal will increase, meaning the TAC™ Stick will beep more and more frequently as the TAC™ Stick is brought closer to the AC voltage source. Reduce the sensitivity or switch to FRONT FOCUSED setting when needed to better pinpoint the source.
- B. Vehicular Accidents: When a vehicle has struck a pole, transformer, building, traffic light or other unknown structure, the TAC™ Stick should always be used to verify that the vehicle, guidewires, fences, or other sections around it are not voltage-carrying. If there is any suspicion of AC voltage being present, make sure the power company has taken steps to assure power disconnect in the area.

### **WARNING**

Be especially aware of the dangers of automatic retries. Use the TAC™ to determine if wire fences or guidewires are truly without power and danger.

- C. Swimming Pools: Frequent causes of electrocution are defective swimming pool lights or electric appliances which have fallen into a swimming pool. Even

if there is not visible indication that this may have happened, use the TAC™ Stick to verify that no dangerous AC potential exists prior to removing a victim from a pool.

### **WARNING**

Do not contact water in or around the pool with your body or with the unit while checking to determine that no AC potential exists.

- D. Night Searches: During searches conducted at night, especially when severe wind or ice storms may have damaged trees and power lines, the TAC™ Stick can be used successfully. Search or rescue operations can verify that no dangerous AC signals exist in the path of the rescuers or on the site to be searched.

### **WARNING**

Cases have been reported where highway wire fences carried dangerous AC voltages caused by downed wires from several miles away, creating extreme hazard to responders.

- E. Building Collapses: Collapsed buildings in the aftermath of explosions, earthquakes or storms may still be connected to power lines through underground or secondary circuits. The site should be checked for the presence of AC voltage prior to any rescue operations especially in confined spaces.
- F. Fires: In case of fires, disconnection of the AC can be verified. Dangerous high tension wires can be identified with the TAC™ Stick.

- G. Clean-Up Operations: Significant danger from AC voltages exists for rescue workers or helpers doing clean-up operations from so-called backfeeding of power lines from auxiliary generators used as emergency power supplies.

**⚠ WARNING**

Again, it is absolutely mandatory to verify the absence of AC voltages, even when the wires to network are clearly disconnected. Voltage may emanate from the user's location when emergency power supplies are in operation or alternate feeds are used. Note that 7200V may be created when a secondary wire of a pole-transformer is back fed with 120 VAC.

## 6. STANDARD OPERATING PROCEDURES

It is important that the TAC™ Stick is incorporated into the available tool arsenal with proper standard operating procedures. Good, safe operating procedures should be established. The training should point out dangers of intermittent contacts and automatic retries, and avoid giving the rescuer the incorrect impression of absolute safety. The TAC™ Stick is a highly sensitive warning device, but is not a measuring tool and certainly not a replacement for good, safe operating procedures.

## 7. BATTERY CHANGE

Batteries: 4

Type: Standard AA Alkaline, NEDA 15A;  
Duracell MN 1500 or equivalent

Life: Typical Usage: 1 year  
Continuous Usage: 3000 hours

To change batteries:

- Select a clean dry area. It is good practice to change batteries only in a non-explosive, safe atmosphere.
- Place the TAC™ Stick flat on the table
- Unscrew the knurled lanyard screw. The grey end-cap which contains the beeper is spring loaded and will push out as the screw is removed.
- Note the polarity and location of the batteries.
- Two pairs of electrical contacts near the positive terminal of the upper battery set make the electrical connections to the beeper.
- Lift up the front of the TAC™ Stick and let the batteries slide out.
- Hold the TAC™ Stick horizontally, and slide the fresh batteries in. Do not drop the batteries in – the terminals are soft.
- Replace the end-cap carefully. Note the position of the insert for the lanyard screw. It must line up with the hole in the housing.
- Hold the stick vertically and push the end-cap fully in. Tighten the lanyard screw.
- Check operation. If self-test does not work, recheck direction of the batteries installed.

Low Battery Indications: Your TAC™ Stick is equipped with a low battery

watchdog circuit. If the battery voltage drops below approximately 4.8V or if one of the batteries is installed backwards, the TAC™ Stick will emit a constant tone until the batteries are fully exhausted. This prevents the use of the TAC™ Stick when batteries are low or installed incorrectly.

## 8. SERVICE

- A. If you want to have the unit checked, or if the TAC™ Stick does not behave normally, contact the Will-Burt Company at 169 South Main Street P.O. Box 900, Orrville, Ohio 44667 – 0900. Contact in writing, by fax (330-684-1190), or phone (330-682-7015).
- B. When contacting us for service, make sure you have the serial number of the unit, and the approximate date sold. Returned unit should be accompanied by a brief description of the problem, the return address, a phone number and person who can be contacted for an explanation.
- C. If it is a warranty repair, state so. If not, provide a purchase order number. Repairs usually do not exceed \$100. If you require an estimate before proceeding with the repair, let us know.

We will always reserve the right to exchange a unit completely at our option rather than repair a TAC™ Stick. The replacement unit will usually carry a different serial number.

When cleaning the TAC™ Stick, use soap and water. Avoid getting water inside the unit. The area near the beeper end-cap may not be fully watertight.

If static electricity on the unit becomes a problem in very dry areas, wipe or spray

the inside of the pouch and the outside of the housing with a Static Guard spray.

## 9. SPECIFICATIONS

Sensitivity: Externally switchable, 3 settings.

Detection Range: The detection range or sensitivity is defined as the distance between the TAC™ Stick and the wire conductor with the TAC™ Stick positioned for maximum indication. Signal “detection” shall be defined as a beeping rate of at least one indication every two seconds.

*The chart on the following page shows typical detection distance in meters (feet).*

Signal Indication:  
Audible (beep) and visual (LED).  
Beep rate will increase (or decrease) with proximity to conductor.

Frequency Range:  
AC voltages 50/60Hz

Self Test:  
Built-in, 3 second self-test after turn on.

Insulation:  
PVC plastic housing  
*Note: Direct contact with tension wires should be avoided.*

Batteries:  
4x AA alkaline batteries,  
NEDA 15 A Duracell MN  
1500 or equivalent.

Battery Life:  
Continuous use, 300 hours  
Typical intermittent use, 1 year

Battery Check:  
Built in low voltage warning

Battery Change:  
Requires removal of lanyard

Water Resistance:  
Splashwater-proof

Temperature Range:  
Operating:  
-30 to +50 C (-22 to +122 F)  
Storage and transport:  
-40 to +70 C (-40 to +158 F)

Size:  
45mm (1 3/4") diameter  
x 521 mm (20 1/2") long

Weight, including batteries:  
570 grams (1lb. 4oz.)

Shipping Weight:  
820 grams (1.8 lbs.)

## 10. ORDERING INFORMATION

Will-Burt TAC™ Stick 900848 includes padded pouch and 4x AA alkaline batteries (installed).

## 11. REPLACEABLE PARTS

TAC™ Stick Assembly.....	900848
Padded Pouch.....	900849
Lanyard.....	900850
Manual.....	900851
Batteries.....(4x AA Alkaline)	900852 or Purchase Locally
Warning Label Set.....	900853

## 12. LIMITED WARRANTY

The manufacturer warrants its products to be free from defects in material and workmanship for a period of one year from the date of shipment from the factory. The manufacturer shall not be responsible for any damage resulting to or caused by its products by reason of installation, improper storage, neglect or abuse, or use of the product in a manner inconsistent with its design. This warranty does not extend to any component parts not manufactured by Manufacturer, however Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which may extend to Buyer.

The foregoing warranty is in lieu of all other warranties and no representations, guarantees or warranties, expressed or

Voltage	Setting	Mode Switch Setting		
		High	Low	Focused
120/240 VAC	Single Conductor (6' above ground)	5m (15')	1m (3')	7.5cm (.25')
	Conductor laying on wet soil	1m (3')	0.3m (1')	2.5cm (0.1')
7.2 kV (12.5 kV P to P)	Distribution line (single insulator)	65m (210')	21m (70')	6m (20')
46 kV and higher	Transmission line (several insulators)	>150m (>500')	>60m (>200')	>20m (>70')

implied (including but not limited to, a warranty of merchantability or fitness for a particular purpose), are made by Manufacturer in connection with the manufacture or sale of its products. No employee, distributor, or representative is authorized to change this warranty in any way or grant any other warranty on behalf of Manufacturer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within thirty days of the discovery of defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. If judged by Manufacturer to be defective in material

or workmanship, the product will be replaced or repaired at the option of the Manufacturer, free from all charges except authorized transportation.

The remedies of Buyer set forth herein are exclusive and are in lieu of all other remedies. The liability of manufacturer whether in contract, or, under warranty, or otherwise, shall not extend beyond its obligation to repair or replace, at its option, any product or part found by Manufacturer to be defective in material or workmanship. Manufacturer shall not be liable for cost of installation and/or removal or be responsible for direct, indirect, special or consequential damages of any nature

### 13. IN CASE OF DIFFICULTIES

PROBLEM	CAUSE	REMEDY
Keeps on beeping	AC nearby	Choose low-sensitivity setting or move TAC™ Stick away from AC sources
Steady tone	Low batteries or one battery reversed	Change the batteries or Check polarities
No sound or LED light after turn on	Low batteries	Change the batteries
	Batteries installed incorrectly	Reinstall batteries, observe polarity
	Unit defective	Return to service center
LED light on but no tone or Unit turns on in "OFF"	Circuit failure, Bad contact or Defective beeper	Return to service center
	Strong magnet near mode switch	Normal, move TAC™ Stick
Unit "CHIRPS" or goes through self-test when shaken	Batteries make poor connection	Change batteries or Return to factory
Dropped Unit		Return to Factory for complete AV calibration with record of drop