Superior

AccuTrak®

Ultrasonic Leak Detectors

# Models: VPE & VPE-GN
# 3rd Generation

# USER'S MANUAL

# The NEW **Superior *AccuTrak*® VPE**

## ***Featuring 3rd Generation Ultrasonic Technology***

CONGRATULATIONS! You have received the latest version of our most popular ultrasonic instrument – the 3rd Generation VPE and VPE-GN. Featuring ALL-NEW internal circuitry, the improved ***AccuTrak*® VPE** stands out above all other Ultrasonic Instruments in its class. With even greater sensitivity and a number of new features unique to the VPE, no competitive ultrasonic instruments even come close.

Even with all the improvements shown below, Superior Signal has priced all New 3rd Generation VPE instruments at the same level as the previous generation of instruments. This provides an amazing value for the new and improved version of what was already the top-performing, best value instrument in its class. As always, **Superior *AccuTrak*®** Instruments are made to the highest quality standards, right here in the USA.

<u>The New 3rd Generation ***AccuTrak*® VPE** offers the following improvements:</u>

1. **20% Greater Sensitivity** – our all-new 3rd Generation digital circuitry is clearer and quieter, allowing you to detect smaller leaks and faults than ever before. The VPE already had the best sensitivity in the industry – and now it's even better.
2. **Peak Hold Display** – the new Peak Hold function on the display allows you to find leaks and faults faster and better, so you get the job done quicker and easier. This great feature can be found on instruments costing several times more – but it is unique for this class of instrument.
3. **Over Range Audio Alarm** – this unique new feature allows you to keep your eyes on what you are measuring rather than on your instrument display, and still know that you have exceeded the range setting and need to adjust the sensitivity for optimum performance. This gets the job done quicker, easier, ***and safer***.
4. **Improved Battery Life** – up to 200 hours of operation on one standard 9-Volt Alkaline battery – about twice as much as before!
5. **Smart Battery Management** – low battery notification via audio and visual signals, auto shutdown for low battery prior to reduction in performance, abort power-up on weak or defective battery. Audio visual signals on power-up confirm battery in good condition.
6. **More Rugged Design** – internal components have been redesigned to make the instrument more shock resistant, resulting in an even more reliable instrument.
7. **Smart Button Control** – one button controls all functions, with audio and visual signals to indicate function selection and status. Simple operation with greater functionality!
8. **Persistent Power ON** – no need to hold down the power button during operation, allowing greater flexibility to hold or place instrument as desired, and easier use.

# TABLE OF CONTENTS

# INTRODUCTION

Congratulations on your purchase of the Superior ***AccuTrak*®** Model VPE or VPE-GN ultrasonic leak detector! The ***AccuTrak*®** VPE is just one model in the ***AccuTrak*®** line of high quality ultrasonic instruments that are available exclusively from Superior Signal Company LLC. The Superior ***AccuTrak*®** line offers an incredible range of capabilities, using patented technology that provides real-world performance far superior to any other instruments in their class, yet at amazingly affordable prices. That's why we say: *You have to Hear it to Believe it!* With ***AccuTrak*®** you simply get the job done faster, easier, and at a lower cost.

The Superior ***AccuTrak*®** Model VPE-GN is a special version of the VPE, with all the same technology and specifications – plus the unique ability to place the actual sensor head directly into hard-to-reach places. This 9" flexible GooseNeck allows you to find even the smallest leaks in blind spots behind obstructions or inaccessible places inside machinery. The VPE-GN cannot use the Touch Probe accessory to hear internal ultrasound, so references to this capability / option in this manual do not apply to the VPE-GN instrument. Also please note that the **GooseNeck is NOT removable**, and any attempt to remove or modify the GooseNeck will cause damage and void the Warranty.

The ***AccuTrak*®** VPE is the only ultrasonic instrument specifically designed for air-conditioning and refrigeration leak detection. Refrigeration is a unique field that requires very high performance leak detectors. It requires both vacuum and pressure leak detection at very low flow rates. Ultrasonic inspection is the only test system that can simultaneously detect both. The ***AccuTrak*®** is a unique solution to the many problems typically encountered with traditional methods of leak detection. The instrument offers advantages which will result in significant time and cost savings. The ***AccuTrak*®** VPE is the ideal tool for detecting both vacuum and pressure leaks of any refrigerant. Because the instrument detects sound, it is gas independent. This means the ***AccuTrak*®** can even detect dry nitrogen gas leaks.

Enjoy your new instrument! It will eliminate the many hours of frustration that you have experienced while trying to locate a leak in a gas saturated area, on a windy roof top unit, or on a system under negative pressure (vacuum). It will also eliminate the need to use tracer gasses which can be ozone depleting when vented. The ***AccuTrak*®** VPE is very easy to use because it uses a totally different technology than the "sniffers" and torches that you probably are used to. To eliminate any future frustration, please take a few minutes to read this manual and understand the operation of the ***AccuTrak*®**.

# DESCRIPTION

The Superior ***AccuTrak*®** VPE is a non-invasive leak detector that can detect both pressure and vacuum leaks. It is a classical ultrasonic leak detector, however, it contains a technology level that sets a new standard for the state of the art. Only ten years ago a similar instrument was thirty times its size and ten times its price.

Remember, the ***AccuTrak*®** VPE detects ultrasound – not refrigerant. It is a listening device not a sniffer. Because of this fact, the ***AccuTrak*®** can function in areas where heavy wind or a concentration of fumes from leaks has rendered other detectors inoperable.

A leak is any unwanted flow of a substance out of a system, or in a vacuum the flow is into the system. Friction in flow generates sound. Water flow in pipes creates sound as well as air out of a tire. The sound we can hear is less than a third of the total spectrum of frequencies generated. The sound in small leaks is mostly ultrasonic. Humans cannot hear this because it is above the human hearing range. In order for a leak to generate ultrasound, the flow through the leak path must be turbulent. For this to happen the velocity that a gas is moving through the leak point must be high in relation to the orifice.

The ***AccuTrak*®** VPE receives the ultrasonic sound that escapes from a leak point, processes it, and displays its strength. The larger the leak, typically the higher the indication will be on the instrument. In addition to the display, the VPE also produces an audio reproduction of the leak sound. The intensity of the audio will change proportionally to the display. This is why when you use the Superior ***AccuTrak*®** VPE you can <u>see</u> the leak, and also <u>hear</u> the leak. This allows you to easily identify leaks, distinguish them from other sources of ultrasound, and then quickly pinpoint the exact location of the leak.

**VPE**

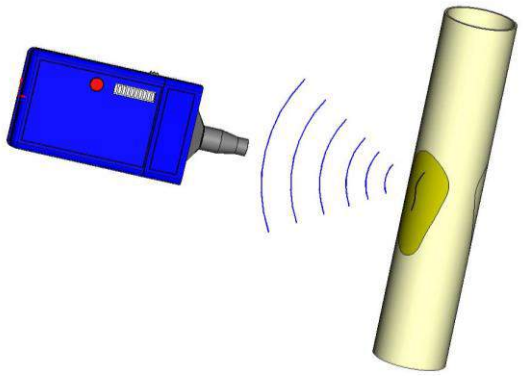

**VPE-GN**

# PRINCIPLE OF OPERATION

The principle of operation of the ***AccuTrak*®** VPE is based on the turbulent flow of fluids and gasses. Turbulent flow has a high content of ultrasound. This sound is above the human hearing range, but it can be heard with the ***AccuTrak*®** VPE, and then traced to its source.

Imagine air leaking from a tire. Because this is such a **large** leak, your ear **can** detect this sound, however your ear hears only about 1/3 of the actual spectrum of sound which exists. The sound of small leaks is mostly ultrasonic which your ear can **not** detect.

> ***It is important to remember this example:*** *A piece of straight tubing connected to a gas supply and left free to exhaust into the atmosphere will not generate sound if the volume of gas through it is such that turbulence does not take place. Yet for that same flow, an opening as small as 0.005 of an inch could generate enough sound to be heard several feet away.*



For a leak to happen there must be an opening in the system that carries a gas or fluid. Normally, these openings are not clean smooth holes, but passages through cracks with many jagged edges and internal chambers. Fluid or gas escaping through an "orifice" like this is forced into turbulence, random circular-like motions. Inside a tube where a gas may be flowing, the flow is normally laminar which means that a given layer of gas does not mix with layers above it. This condition happens in a straight long tube when the velocity of the fluid is not high. A gas leaking out of a straight and long tube will not generate as much sound as if it were leaking out of a small crack because the flow is not turbulent.

The intensity of sound generated at a leak is a very complex function of the viscosity, the temperature, the speed the fluid is moving, the Reynolds number, the pressure differential across the leak, and the physical dimensions and characteristics of the orifice. This is why it is possible for a **smaller** leak to generate **more sound** than a larger one.

## What this all means...

The ***AccuTrak*®** VPE detects ultrasound – NOT refrigerant, or the presence of a specific gas. It is NOT a sniffer. Because of this fact, the ***AccuTrak*®** can function in areas where heavy wind or a concentration of fumes renders other detectors useless.

➔ **WARNING !**

Ultrasonic detectors will not indicate a leak if there is no turbulent flow producing sound when you check it. If you suspect a toxic gas, combustible gas, or other dangerous gas leak, but you cannot find it with the ***AccuTrak*®** VPE, do not assume that it does not exist, as it may not be turbulent at the time when you check for it. Use another method (like a sniffer) as verification that there is no leaking dangerous gas present.

## A NOTE ABOUT SENSITIVITY

Ultrasonic leak detectors "hear" leaks, therefore the sensitivity can **not** be accurately stated in terms of *cc/sec, parts per million, or* ***ounces per year***. The proper specification for these types of detectors is *decibels*. **The amount of sound pressure created by the leak will determine its ability to be detected ultrasonically**.

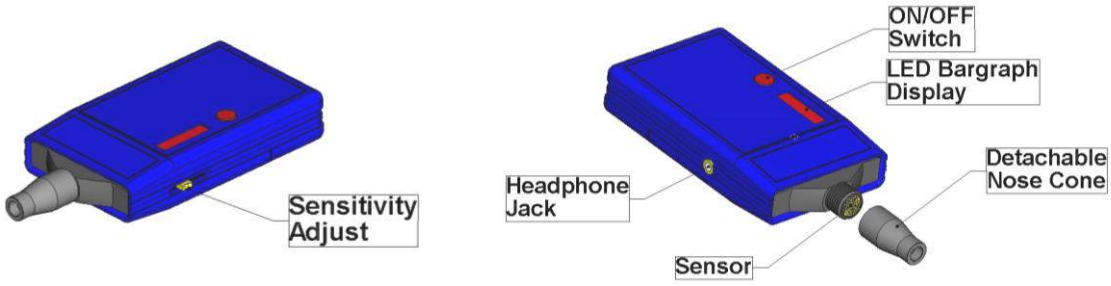
When comparing to traditional refrigerant detectors that are rated to detect 0.5 oz. per year, remember, these instruments were tested under controlled laboratory conditions, and the ability to actually locate such a small trace of gas, especially in a windy outdoor environment is extremely limited. It is physically impossible for **any** ultrasonic detector to locate a leak this small because there is no turbulent gas flow involved. *A leak of .5 oz. per year is equivalent to a loss of* ***1 pound in 32 years!***

The ***AccuTrak*®** VPE **will detect** most of the leaks you encounter on a regular basis – usually pounds per year rather than ounces. The ultrasonic detector is the **only** detector which will pinpoint a **vacuum leak**, or detect **any** pressurized gas leak in **any** system – including **compressed Air or Nitrogen** leaks. It is also **more accurate** for detecting larger leaks because its sensor will not become saturated or false alarm from the presence of gas in the atmosphere. Because **ultrasonic detectors do not "sniff"** out the gas, they can easily locate a leak under windy conditions**. Superior *AccuTrak*® ultrasonic instruments work best where other detectors fail!**

# OPERATION

***NOTE:*** **Do NOT hold the button down while using the instrument**, as was necessary with the previous versions. Please read all instructions below.

To use the system, plug the headphones into the jack located on the right side of the instrument. Slide the sensitivity adjustment all the way forward, towards the nose of the sensor. The ***AccuTrak*®** VPE is now set at full sensitivity. To turn on the instrument press the "ON/OFF" button for about one second - until the display shows activity and you hear a beep in the headphones – and ***then release the button***. Do NOT hold the button down while using the instrument, as was necessary with the previous versions. Always start at full sensitivity, then if necessary, gradually reduce the sensitivity to reduce background noise. Pressing the "ON/OFF" button again momentarily will toggle on or off the "Peak Hold" function of the display, together with a confirmation beep in the headphones. Peak Hold can be useful to better observe the maximum strength signals being detected, and help find Leaks and Faults. To turn off the instrument, press and hold the "ON/OFF" button for at least two seconds, until it goes off. When using the instrument, if you hear a high pitch tone and see the LED meter going to maximum this is the "Over Range Audio Alarm" – you need to reduce the sensitivity to a lower setting if you want to properly interpret these stronger ultrasonic signals.




The ***AccuTrak*®** VPE is capable of hearing leaks from over forty feet away, but it is best to hold the instrument as close to the test area as safely possible. Check around fittings and piping using a zigzag motion, carefully covering all suspected areas. If there is no ultrasonic sound present, the display should not have any lights on. When an ultrasonic signal generated from a leak is

detected, it will be indicated by an increase in the LED meter, and a rushing sound will be heard in the headset. This sound will become more intense, and the meter reading will increase as the instrument is pointed closer to the leak point.

If there is ultrasonic noise in the area and the display is at maximum, or you hear the hi-pitch beep of the Over Range Audio Alarm, reduce the sensitivity until the alarm stops and the lights nearly disappear. The display reading is only for relative measurements (comparisons). Two lights versus ten can mean two things: either you are far from a given leak, or the leak is smaller than the one that produces ten lights. Use the sound intensity in the headset and the varying lights to guide you toward the leak point. Reducing the sensitivity as you approach the leak will verify that you are on the right path since the indications will increase in the direction of the leak.

**Other Important Information:**

- Remember to turn off the instrument when you are done using it, or the battery will run down.
- When the battery becomes weak enough that performance may be reduced, the instrument will provide a visual signal on the display, and a beep in the headphones, and then the instrument will shut off. The instrument will not re-start until you insert a fresh new battery. Always use a good quality 9-volt Alkaline battery (same as used in smoke detectors).
- When inserting a new battery the instrument will perform a quick check of the battery – if the battery has adequate charge and is properly installed there will be a visual signal on the display, and a beep in the headphones. If this does not happen, and the instrument does not function, then the battery may be dead or weak, or it may not be properly installed.
- When storing the instrument after use, we recommend removing the battery from the battery compartment, to prevent the instrument from turning on accidentally, and running down the battery.

# BACKGROUND NOISE

The ***AccuTrak*®** VPE detects a narrow band of ultrasonic sound, therefore although there may appear to be overwhelming background noise, the sound may not be within the detection range of the instrument. Notice that you can yell directly into the sensor and your voice will **not** be translated in the headset.

The patented circuitry of the ***AccuTrak*®** VPE is capable of reproducing the sound signature of the signal it detects. This means that the sound you hear is closely related to the actual sound. It is an **actual translation**, not an electronically synthesized tone, or "beep".

***Leaks*** sound like a "hiss" or rushing sound, while ***compressors*** "chatter" a rhythmical mechanical pattern. ***Fans*** should not produce enough wind noise to interfere with leak detection. The ***fan motor*** may produce a "buzz" or "hum" which is a different sound than that of the leak.

> ***Example:*** *Mechanical vibrations sound very different from leak sounds. Shake a set of keys, then take a short quick breath through your nose. Listening to both sounds through the AccuTrak® is a good example of how the direct translation process of the AccuTrak® helps you to distinguish the difference between the two signals.*

Practice listening to different components of your system, as this will help you to identify the sound of a leak from other normal operational sounds.

## Methods of reducing background noise interference:

Placing the flexible wave guide into the sensor port makes the reception of the ***AccuTrak*®** more directional. This shields the sensor from competing sounds entering from other directions. You can further shield background noise by using something as simple as a clipboard or piece of foam from inside the carrying case. Your angle of approach also effects results in loud areas. If possible, always aim the instrument away from the source of background noise and toward the suspected leak area.

Reducing the sensitivity suppresses the effect background noise has on the display and headset. This helps make the leak sound more identifiable.

The most difficult background sounds come from areas of high turbulence within a pipe. This can be where high velocity flow changes direction, or is restricted such as within a partially closed valve. These situations naturally produce high frequency sound which is *very similar* to the sound of the leak. Use the standard methods for reducing background noise. If you are still unsuccessful, then shut the system down. Although the pressure may be somewhat reduced, it should still be sufficient for leak testing.

# TIPS ON USE

- If you are trying to find a leak in a tight area, use the flex tube on the front of the ***AccuTrak*®** VPE. You can use any length of tube (it is standard 1/4 in.) but remember the sensitivity is slightly reduced the longer you go.
- When leak testing, use as much pressure as permissible for the system. Increasing the pressure can double the flow through the same orifice, therefore increasing the ultrasound created by the leak.
- If the system permits it, spray distilled water on the suspect area. Before the water runs off, scan with the ***AccuTrak*®** VPE. Water on a pressurized leak can increase the amount of sound created.
- When searching for vacuum leaks, remember the majority of the sound created by the leak is internal. If the system seals permit, you may need to pressurize the system with dry nitrogen in order to increase the sound of the leak.

# TROUBLESHOOTING GUIDE

**Humming sound?** Certain electrical products such as computer terminals emit a high frequency "humming" sound. This is not an electrical field interfering with the operation of the ***AccuTrak*®** VPE, it is an actual sound that the unit is "hearing". To confirm this place your finger over the sensor hole and the sound will disappear. In almost all cases, this sound is not severe enough to interfere with leak detection.

**Hissing noise?** There is a certain amount of hiss which is normal for an ultrasonic detector. You should expect to hear some hissing, however if it is so loud that you can not hear anything else, then it is a problem which deserves attention.

**The signal in the head set cuts in and out?** There are two reasons this may happen. First, a low battery will cause this problem. Secondly, a bad headset connector could be to blame. If you have another headset available, such as that from a portable radio (with a 3.5 mm plug), try it. If you determine that the headset is defective, contact Superior Signal or your wholesaler for replacement.

**Not sure unit is working?** Can the unit hear the blink of your eyes? If it can, chances are it is working fine. The leak you are trying to hear may not be turbulent. See "Calibration" if you further suspect a problem.

# OTHER APPLICATIONS

The ***AccuTrak*®** VPE is probably one of the most versatile test instruments you can own. Keep in mind that ultrasonic sound is generally produced by **F**riction, **A**rcing, and **T**urbulence (F A T). Therefore any pressurized gas, vacuum, moving machinery, or electrical system can be tested. ***Use your imagination*,** and you will find many additional uses to save time, prevent failures, and save money using the Superior ***AccuTrak*®** VPE.

## ***Electrical Arcing***

A jump in electrical current or Arc, will make a popping, frying, or buzzing noise in the ultrasonic range. The ***AccuTrak*®** VPE can be used to locate electrical failures which are causing a decline in power quality. Use to test circuit breakers, buss bars, relays, corrosion in contacts, or poor insulation.

**Warning:** ***Be careful, and use common sense around electrical currents! Use the plastic waveguide, and keep at a safe distance!***

## ***Ductwork***

Leaking ducts can be a significant source of energy loss. The ***AccuTrak*®** VPE can be used to identify the sound of air leaking from a pressurized duct system.

## ***Pneumatics and Hydraulics***

Leaks are quite common in pneumatic systems (controls, hoses, tools, fittings). The ***AccuTrak*®** VPE can easily find the rushing sound of the leak.

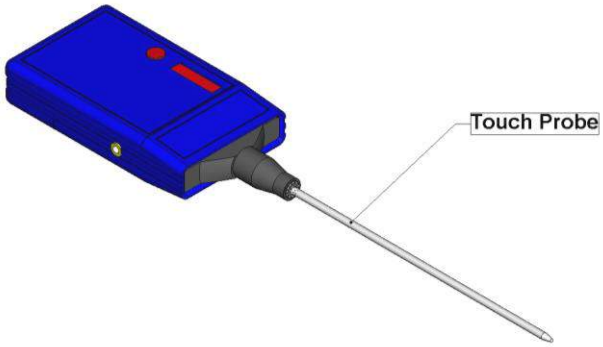
Small hydraulic leaks can be difficult to find, but the ***AccuTrak*®** VPE will allow you to hear these leaks with ease. When testing for hydraulic leaks use the yellow waveguide to prevent any fluid from entering the sensor. Internal hydraulic leaks can be easily identified using the Touch Probe accessory.

## ***Bearings, Valves, Steam Traps & Mechanical Systems***

Listen to the internal sound of bearings, valves, and other mechanical systems using the Touch Probe accessory *(not applicable to the VPE-GN)*. With just a little practice, the ***AccuTrak*®** VPE will help you to easily identify bad bearings, internally leaking valves, and bad steam traps. Troubleshoot expansion valves in just 5 to 10 minutes! Save money by identifying a bad steam trap in seconds. Hear if gas or liquid is leaking past a "closed" valve. While many Plant Maintenance applications are better done with the more advanced ***AccuTrak*®** instruments, the VPE can provide a basic solution for small operators with even the most limited budgets. For more advanced applications please ask about the ***AccuTrak*®** VPE-1000, the ***AccuTrak*®** VPE-2000, and the ***AccuTrak*®** VPX-WR.

# Touch Probe Accessory *(Not applicable to the VPE-GN)*

Ultrasound not only travels through air but solid materials as well. The patented ***AccuTrak*®** VPE Touch Probe accessory is used to detect sound which is ***internally*** generated. Such sounds include leaks through bad valve seats and steam traps. Other applications include the detection of friction, lack of lubrication, and worn bearings, motors and gears.




Being careful not to cross the threads, simply unscrew the existing nose piece and replace with metal probe. Place the tip of the probe on the item being tested with just enough force to hold it in place. Be careful around moving equipment.

# Optional Sound Generator

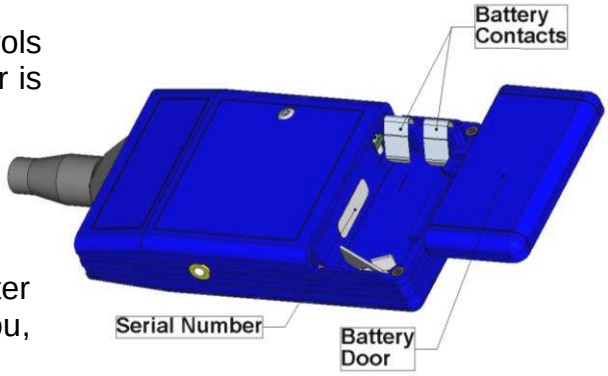

The ***AccuTrak*® SG-2** ultrasonic Sound Generator is a very useful accessory to detect leaks in enclosures, gaskets, or seals which are not under pressure. The Sound Generator has a selectable output: Constant tone can be used in most situations, while the Burst Tone® mode is more easily identified in loud industrial environments.

Place the Sound Generator inside a vessel such as a walk-in freezer, or refrigerated trailer. It emits a powerful 115dB ultrasonic tone which will follow the empty passage a gas or liquid would travel to produce a leak. The tone can then be identified at the point of exit by using the ***AccuTrak*®** VPE. Other SG-2 Sound Generator applications include locating **roof and window leaks** in buildings for Energy Audits and Surveys. Find air/water leaks in **automobile** windshields, sunroofs or doors. Locate potential leaks around **waterproof hatches** on boats or ships, and locate faults in **gaskets** that seal nearly any type of waterproof enclosure.

Together, the ***AccuTrak*® VPE** and **SG-2** make a very powerful team.

# BATTERY INSTALLATION

There is a sliding battery door located on the back of the ***AccuTrak*®** VPE. To install or change the battery, please follow these instructions:




- Turn the unit over so that the controls are facing the floor, and the sensor is facing away from your body.
- At the opposite end from the sensor nose (the end closest to you) there is a sliding panel.
- Apply minimal pressure to the center of the panel and slide it towards you, exposing the battery compartment.
- Install a new 9 volt alkaline battery, noting the (+) and (-) positions which are indicated on the inner label.
- When a good battery is properly installed & accepted the display will blink.

The Serial Number of your ***AccuTrak*®** VPE is printed on a label located inside the battery compartment.

# CARE & MAINTENANCE

The ***AccuTrak*®** VPE can be cleaned with a towel using dish soap and damp cloth. Remove the battery and close the door before cleaning. Do not allow water to enter the unit, especially the front where the sensor is located. After cleaning, dry the unit with a paper towel. Any automotive vinyl cleaner (on a piece of cloth) will restore the luster. The same procedure can be used on the carrying case. If you plan to store the instrument for an extended period of time, remove the battery.

# Calibration

Superior ***AccuTrak*®** instruments are designed in a way to minimize the need for regular calibrations. They are constructed with components of very tight tolerances, and do not age rapidly. If there is a need to know for sure that the instrument is consistent with manufacturer specifications, or if you suspect a problem, we will perform the calibration at a fixed cost. Call the factory for instructions and current calibration costs.

<u>For service & repairs contact:</u>

# Superior *AccuTrak*® Warranty

Superior ***AccuTrak***® products are warranted unconditionally for 30 days, and may be returned for any reason during that time for a full refund of the purchase price. Instruments must be returned with all supplied components and accessories in "like new" condition. Note: Shipping charges and return shipping are not covered under any warranty. Please contact us for instructions prior to returning any product for any reason.

Superior ***AccuTrak***® products are additionally warranted for 1 year to be free of manufacturing defects that adversely affect performance. Warranty does not cover any shipping charges to and/or from Superior. Should an instrument fail within the 1 year warranty period, the unit will be repaired or replaced, provided the instrument has not been tampered with or abused. All determinations are at the sole discretion of Superior Signal Company LLC. A minimum diagnosis fee will apply to warranty returns which are determined to have no flaws. Please contact us for instructions prior to returning any product for any reason.

All warranty eligibility determinations are at the sole discretion of Superior Signal Company LLC. Maximum liability under any circumstance shall be limited to replacement of unsatisfactory product.

Recommendations and product information are believed to be accurate, but the furnishing of it does not constitute the making of a good process warranty of Seller. Superior warrants that this product conforms to the product description contained in this literature. Superior Signal Company LLC makes no other warranty, whether expressed or implied, including warranties of merchantability or of fitness for a particular purpose or application. No statements or recommendations contained herein are to be construed as inducements to infringe any relevant patent, now or hereafter in existence. Superior neither assumes nor authorizes any representatives or other person to assume for it any obligation of liability other than such as expressly set forth herein. Under no circumstances shall Superior Signal Company LLC be liable for incidental, consequential or other damages from any alleged negligence, breach of warranty, strict liability or any other theory, arising out of the use or handling of this product.

**For Warranty questions, claims or assistance please contact us directly:**