Gen-Ear™

WATER LEAK LOCATION SYSTEM

Operating Instructions

Your Gen-Ear is designed to give you years of trouble-free service. However, no tool is better than its operator. We therefore suggest you read these instructions carefully before using your tool on the job. This will enable you to operate the Gen-Ear more safely and effectively.

Although the Gen-Ear is the most advanced leak location system you can buy, it takes patience and practice to master the art of finding hidden water leaks. Read the instructions carefully to save time in becoming a leak location professional. Failure to follow these instructions may cause personal injury to the operator or damage to the equipment.

SAVE THESE INSTRUCTIONS

General
PIPE CLEANERS

Components

1. **Digital Spectrum Analyzer (DSA)** – Has 16 filter combinations, LED display, low battery indicator light, and volume control housed in a heavy-duty case. System automatically shuts down when the headphones are removed to extend battery life. Power light blinks when batteries are low. Includes neck strap. Operates on six "AA" batteries.
2. **Headphones** – Designed to give the clearest sound with the least interference from surrounding ambient noise. **Note:** Spectrum Analyzer will not work unless headphones are plugged in.
3. **Handle with Safety Switch** – On/off switch protects operator from sudden loud noises by muting the sound when the button is released. Hook-up cables connect Handle Switch to Spectrum Analyzer and Ground or Probe Sensors.
4. **Ground Sensor** – For locating water leaks through hard surfaces, concrete, asphalt, tile, etc. Windproof housing prevents outside noises from interfering with leak sounds from buried pipe.
5. **Probe Sensor** – For locating water leaks under soft surfaces such as grass or carpet or as a contact probe on above ground pipes or hydrants. Windproof, shock resistant housing protects against handling noise interfering with location process.
6. **Probe Bars** – Three one-foot probe bars thread into bottom of Probe Sensor to allow easy sound sampling while operator is in a comfortable position.
7. **Probe Bar Extension** – Permits operator to attach the Ground Plate from the Ground Sensor to the Probe Sensor making both sensors interchangeable.
8. **Sound Amplification Manifold (SAM)** – Optional module helps to amplify hard to hear leaks by pressurizing the water line with air. (Not shown.)
9. **Carrying Case** – Made of high-density polyethylene. Designed to withstand heavy use. Foam cutouts to hold all components listed above.

SAFETY INSTRUCTIONS

- Avoid possible damage to your hearing by always starting out with the volume control at the lowest setting (counter-clockwise).
- Use the Safety Switch to protect your hearing. Release the push button when you experience sudden loud noises.
- Do not press the Safety Switch push button while sensor is in motion. Wait to press the push-button until sensor is in place.

SAVE THESE INSTRUCTIONS.

Introduction to Leak Location

Leak sounds are created by three different situations:

1. The vibration of the pipe caused by water forced through a crack in the pipe. Pipe vibration is the loudest and easiest to detect. It sounds like a "whoosh" or a "hiss."
2. Water forced through the crack and hitting the surrounding soil sounds quieter and is affected by the type of material around the pipe. If it's rock or gravel, a "hammering" or "knocking" sound may be heard. If loose soil surrounds the pipe, it may be difficult to hear anything at all.
3. Water flowing through the soil cavity will create a "gurgling" sound like a small stream or brook.

The loudness and frequency of leak noise is affected by water pressure, pipe material, soil density and type, depth of the pipe, and type of surface (i.e. concrete, grass, etc.) The higher the water pressure, the louder the leak sounds will be. If you are having difficulty finding a leak, use the optional Sound Amplification Module (SAM) that injects air into the water line in order to increase the water pressure at the site of the leak. (See below).

Knowing the type of pipe is helpful. Metal pipes transmit sounds at a higher frequency. In cast iron, copper and steel pipes, you are most likely to hear leak sounds in the range of 500 Hz to 1500 Hz. In PVC pipe, leak sounds resonate in the range of 70 Hz to 850 Hz.

Frequency Chart		
Type of Pipe	**Low Frequency**	**High Frequency**
Cast Iron	500 Hz	1500 Hz
PVC Pipe	70 Hz	850 Hz

Choosing the right combination of high-end and low-end filtering will remove the extraneous noises of equipment, wind, traffic, etc. To filter out all the higher and lower frequencies, push the high and low frequency buttons on the Digital Spectrum Analyzer until the indicator lights are on those frequencies.

The leak vibration travels down the length of the pipe as well. In 6" cast iron main lines leaks can be detected as far as 500 to 1000 feet away, while a 6" PVC pipe may only transmit the vibration 200 to 300 feet down the line. The probe must be placed *directly on the pipe wall* to detect the leak at these distances.

Main Line Sound Transmission Chart		
Pipe Material	**Pipe Diameter**	**Maximum Distance**
Cast Iron	6"	500 to 1000 feet
PVC Pipe	6"	200 to 300 feet

Pipe size, no matter what material, affects frequency and sound levels as well. Water leaks from larger pipes transmit less sound and at lower frequencies than smaller pipes.

Loose or sandy soil, swampy or water-saturated areas, as well as newly buried pipe produce muffled leak sounds that can be harder to find. Thus, a pipe that's been leaking for some time will absorb the leak vibrations making it much more difficult to find. Pipe in hard or rocky ground transmits leak sounds best.

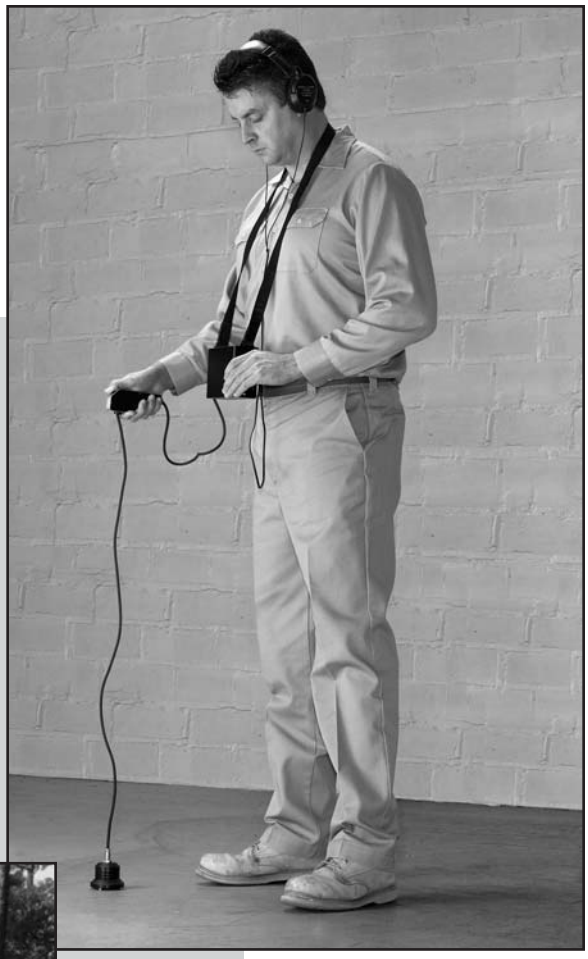
The deeper the pipe, the harder it will be to find the leak because soil absorbs leak sounds quickly. It's difficult to find leaks in lines buried deeper than 8 feet. To find leaks in deeper lines, the water pressure must be increased to amplify the sound.

The surface material also will affect the amplification of leak noises. A hard surface like concrete will resonate with the sound of a leak for 5 to 10 feet around the water pipe, while grass and earth do not assist in the amplification of leak noise. Select the proper sensor for the surface on which you are locating.

Set Up

1. Plug headphones into Digital Spectrum Analyzer (DSA).
   Note: The unit will not work unless headphones are plugged in.
2. Plug the short cable from the Handle into the DSA and tighten locking collar.
3. Select either the Ground Sensor or the Probe Sensor, depending upon the surface on which you are locating. Select the Ground Sensor when locating water leaks through hard surfaces, concrete, asphalt, tile, etc. Select the Probe Sensor when locating water leaks under soft surfaces such as grass or carpet or as a contact probe on above ground pipes or hydrants.
4. Plug the long cable from the Handle into the connection on top of Sensor and tighten the locking collar.
5. If using the Probe Sensor, thread the three Probe Bars together. Then thread the assembly into the bottom of the Probe Sensor. **Note:** There is no need to drive the Probe Bars deep into the ground. A good ground contact with the point of the Probe Bar is all that is required to get a good location reading.

Note: Disconnect the cable from the Ground or Probe sensor before placing it back in the carrying case.



Ground Sensor

Probe Sensor

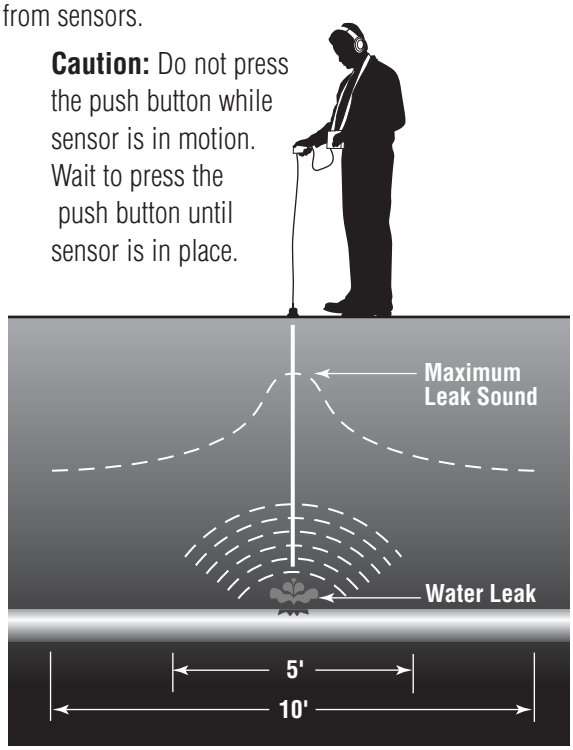
Operation

Turn DSA on/off switch on. The light in the switch will blink when the batteries are low. Replace with six "AA" Alkaline batteries by unscrewing the side screws and removing the back plate at the rear of the unit.

> **Caution:** The Gen-Ear has a high level of output. Always start with the volume control at the lowest setting (counter-clockwise), then proceed slowly, adjusting upward for the maximum sound.

Depress and hold the Handle Safety Switch to listen to sound from sensors.

> **Caution:** Do not press the push button while sensor is in motion. Wait to press the push button until sensor is in place.



Leak Sounds Audible Within 5' to 10'

1. Start by setting the filters to 700 Hz Low and 1500 Hz high, the most common leak sound frequency.
2. Make direct contact with Probe Sensor and Probe Bar to all sink lines, hot water heater lines, and hose bibs. This only gives you a general location of the leak.
3. Once location is found, attach either the Ground Sensor or the Probe Sensor, depending upon the surface on which you are locating. The Ground Sensor is used when locating water leaks through hard surfaces, concrete, asphalt, tile, etc. Select the Probe Sensor when locating water leaks under soft surfaces such as grass or carpet. It can also be used as a contact probe on above ground pipes or hydrants.

4. Start the pinpoint process by moving the sensor directly over the water line in one-foot increments. As you get closer to the actual leak, the sound will increase in the headphones and the LED meter indicator.
5. Once the leak has been pinpointed, mark its location. You should be within one foot of the leak.
6. If the leak sound isn't loud enough for positive location or outside noise is interfering, use the optional Sound Amplification Manifold (SAM).

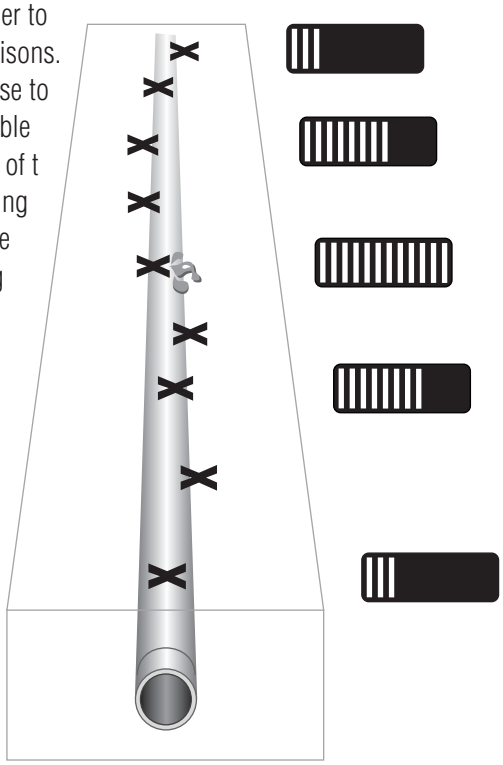
Pinpointing a Leak

The most common indicators of a domestic water leak are a dramatic increase in a water bill or hearing water running all the time.

If you don't see any obvious evidence of a major water leak, like "ponding" or loud leak sounds, then start a water leak survey. Use the Probe Sensor and Probe Bar to survey the hydrants and main valves. If you hear the sound of a leak at one location, check lines running in all directions from that point. The leak location is usually found between the loudest and second loudest survey locations. Then you can begin to narrow down your search.

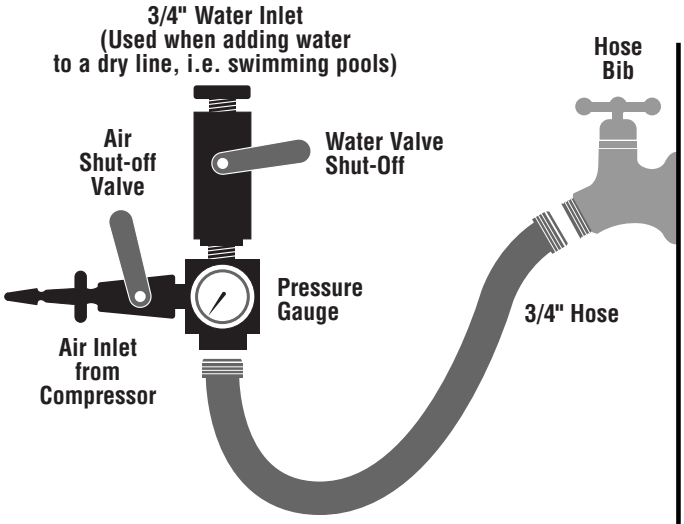
Start by locating the route of the water line by using General's Gen-Eye Pipe Locator and Transmitter (Cat # G2-180). Attach the Transmitter leads to each end of the pipe to be located, then turn the Transmitter on. Turn on the Locator and set the frequency to Pipe Location Mode (middle indicator). Make sure the blade of the Locator is perpendicular to the ground and across the pipe (rather than in-line). Mark the surface as you locate the path of the water line. (For more information, see Gen-Eye Pipe Locator Instruction Manual)

Select the appropriate sensor. Then walk the line, taking a reading every 3 or 4 feet. Follow the flow of the water line, from upstream to downstream, and note each reading. **Do not adjust the volume control.** The volume must remain constant in order to make accurate comparisons. When you are very close to the leak, you may be able to discern the location of t he leak with your hearing alone. If you are unable to rely on your hearing alone, use the LED display on the DSA to assist in locating the strongest signal in the area.



SAM – Sound Amplification Manifold

The Gen-Ear Sound Amplification Manifold adds air to the water line, which increases the leak pressure and thus increases the leak sound making it much easier to pinpoint even the most difficult leak.



1. Attach one end of the hose to a nearby hose bib, and the other to the outlet of the SAM.
2. Then, attach the air compressor to the inlet of the SAM.
3. Turn the pump on and open both valves on the SAM.
4. Then open the hose bib valve. You should hear an instant amplification of the leak noise.

Once you've pinpointed the leak and marked its location, it's a good idea to double-check your mark by turning off the air while listening to the marked area. If you've got the right location, the leak sound should dissipate. This assures that you've found the leak, not some other outside noise.

Tips for Beginners

If you are new to leak location, you must learn the sound of a leak before you start your search. Set up the Gen-Ear with the Probe Sensor attachment. Touch the tip of the Probe bar to the cold water line under a sink. Then turn on the valve just a little bit so the water is dribbling out of the faucet. This simulates the sound of a leak. Turn the valve on and off as you listen until you hear the difference.

The rest of leak location is a process of elimination. Assume that you've got a leak if the water meter is registering water flow, yet all the valves in the house are closed. The rest of your job is to isolate the leak. Use the Probe sensor on all sink lines, hot water heater lines, and hose bibs to get a general location of the leak. Suspect older parts of the system or areas with a history of leaks, and of course, any recent excavations.

Trouble Shooting Guide	
Fault	**Remedy**
Digital Spectrum Analyzer will not turn on	Check that the headphones are plugged in.
	Check the battery strength.
No sound from sensors	Check all connections.
	Check that the Ground Sensor plate or Probe Sensor Bars are tight.
	Press and hold Safety Switch when locating.
Ground Sensor failure	Substitute Probe Sensor by unscrewing Ground Plate from bottom of Ground Probe. Screw Probe Extension Bar into Probe Sensor, then screw on Ground Plate.
Probe Sensor failure	Substitute Ground Sensor by unscrewing Ground Plate from bottom of Ground Probe, then screw Probe Bars onto base of Ground Probe. (Use caution when pressing Probe Bars into soil.)

QUESTIONS

If you have any problems or questions, call the "Leak Freaks™" at 877-754-3435.

General's Limited Warranty

General's Gen-Ear carries a two year limited warranty to be free of defects in workmanship and material except as noted below. Should any part fail to work properly in the two years following purchase, it will be repaired or replaced at our discretion at no charge.

Damage due to negligence, improper usage, failure to follow instructions, accidents or alteration from original design is not covered by this warranty.

In order to handle any adjustment with a minimum of delay, please follow this procedure:

1. Return the part to your wholesaler, and have them notify us immediately with complete information on the problem.
2. We must have the serial number, the date of purchase, and the name of the wholesaler from whom your machine was purchased.
   To activate your Gen-Ear warranty, your warranty card must be filled out and sent to us immediately after your machine is purchased.
3. We will then advise your wholesaler if the part should be returned to us and assign a return merchandise authorization (RMA) number.

T**his warranty is made in place of other warranties, expressed, statutory or implied, including those of merchantability and of fitness for purposes. General shall not be responsible for any incidental or consequential damages.**

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so these limitations may not apply to you.

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