LD40 User Manual

Inspect your system carefully upon receipt.
Let us know right away of any damage you note.

Introduction

Experience leads to a skill level where leak location specialists are able to identify leaks by their acoustic noise "signature". Even experienced personnel are continually increasing their skill level and improving their techniques.

Using technology originally developed for the nuclear power industry, the LD40 has been modified specifically to pick-up acoustic signals and frequencies commonly encountered in plumbing, water and sewer applications.

The acoustic signal characteristics of leaks vary considerably from one leak to another, even when the leaks have similar water pressure and water leak rate. In some cases, it will be definitely known that there is a leak in a segment of pipe but there will be no visible indication of the specific area of the leak.

Since leaks have a variety of sounds, it is strongly recommended you

- **Practice** with the LD40 on known leaks to gain an understanding of how the unit processes those sounds.
- **Do an initial mapping** of the search area for a leak-type signal. After initial detection of a leak signal, use the other frequency bands to find the best signal with the least interference from environmental background noise.

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Figure 1
Connect one of the tips to the bottom of the sensor.

Add the handle to an extension, then connect the extensions to the top of the sensor as shown.

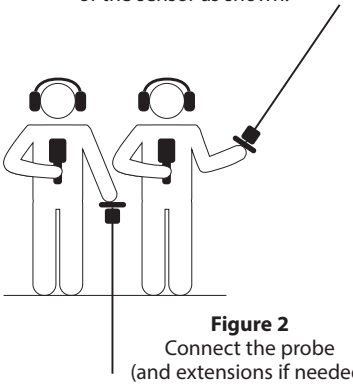


Figure 2
Connect the probe (and extensions if needed) to the bottom of the sensor where the tips normally fit.

Attach the handle directly to the top of the sensor.

To recharge the battery–

Connect the magnetic end of the charging cord to the top of the display, the USB end to the charging port and plug in to wall socket.

Other equipment you may need:

A **pipe locator** capable of locating metal water pipes under concrete slabs, pavement and earth, such our RL8873 and RT8872.

You can reduce the search time by verifying pipe location with the use of a Locating system.

Unfortunately, there is no good way to locate plastic pipes such as used in many pool systems piping, other than inserting a metal fish tape etc. within the pipe to make it act like a metal pipe.

A**ir compressor.** The use of compressed air to stimulate the leak acoustic signal level is discussed later.

Set Up

1. Connect the sensor cable to the jack on the top of the sensor (line up notches), then to the jack on top of the display
2. Plug the head phones into the jack on the bottom of the display.
3. Connect the handle, extensions or probe – 2 configurations (shown left):

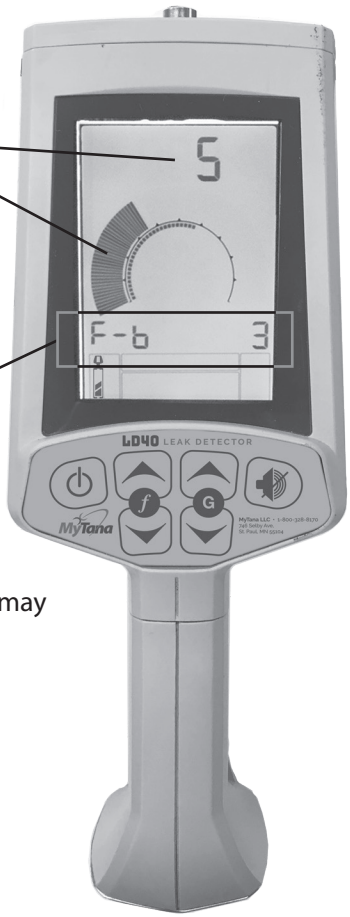
Figure 1 is used mostly for detection on generally flat surfaces, indoors or outdoors. Listen for leaks using one of the 4 different sensor tips that gives you the best but smallest contact with the surface.

- there are 2 points ideal for use with carpeting, depending on it's thickness. You must be able to poke all the way through the carpet and pad to the subfloor.

Figure 2 lets you listen for leaks using the probe extension:

- listen while the probe is pushed against a surface listening for leaks within walls
- localization of the area where the leak exists by listening on faucets, hose bibs, angle stops or wall surfaces
- penetrating into the earth to contact the pipe and listen for the presence of leaks

Display Controls



Digital Response Meter:
Reflects what the sensor is hearing. Calibrate every time you switch frequencies (see steps 3-5 next page)

Power Button The LD40 is powered by a lithium-ion battery. Battery charge is indicated in the lower left corner of the display.

Frequency Band (F-b) :

B = broadband: picks up the entire range of acoustic frequencies

Bands 1 - 4 = each filters out specific frequencies: generally the lower bands (1-3) will give the strongest leak signal but may also pick up the most outside noise

Gain: Works like a volume control for the display meter

Headphone mute Be sure to mute the headphones BEFORE you move the sensor, to avoid a very loud sound

Getting Started

1. Switch on and mute the headphones.
2. Set the frequency band to broadband (B) using the *f* button
3. Set the GAIN completely down using the ▼ button.
4. Set the sensor on the floor surface to be monitored for leaks. The sensor tip should be contacting the surface. The tip is the point where the acoustic signal enters the sensor, similar to the needle on a phonograph.
5. Un-mute the headphones and calibrate the display:
   Turn the GAIN up ▲ (increases the signal strength to the headphones and display) to the point that you can begin to hear the background noise (environmental noises other than the leak noise) present in the floor, and the display meter bounces.

   You should now be able to scratch the floor lightly with your fingernail, at a distance of 2-3 ft from the sensor, and clearly hear the scratch noise. If you cannot hear the scratch noise, the background noises are probably too high. You will need to shut down some of the noise (ex. turn off an air conditioner) or return at another time when there is less environmental noise.

   Adjust the Gain until the meter remains approximately in this position. This lets you know the meter is picking up sound signals, yet allows room for a spike when it picks up a leak type signal. You are now ready to go!

Leak Area Determination

1. Do steps 1-5 above, placing the sensor in the suspected general location of the leak, or in any location if no particular floor area is suspected. Be sure to set the frequency to Broadband.
2. Move the sensor around the area in about 2 ft intervals and keep track of where you have already monitored (mute the headphones before moving the sensor).

   When a change of signal characteristics is heard (such as a hissing sound, radio-static, frying grease, sizzling bacon or even a hollow sound like a fog horn) move the sensor in different directions to determine which direction the sound is coming from. If a pipe has been located, move in steps along the pipe line
3. Move in that direction, constantly checking other directions also, until the point on the floor that gives the maximum signal level is located.

   This signal level peak can usually be seen easily on the display and heard on the headphones, although sometimes one or the other will give a better indication. Adjust the GAIN to give a good audible level and to prevent the meter from pegging high.

As you move the sensor around, make sure the tip continues to make good contact with the surface.

Use the belt hook if you need to move around larger areas

The different frequency bands will detect the leak signals with various degrees of effectiveness.

After initial detection of a leak broadband, the user should step through bands 1-4 to determine which band gives the best signal with the least interference from environmental background noise.

Usually the lower the frequencies (bands 1-3) will give the strongest leak signal but may also pick up the most outside noise. If you are not able to isolate the leak sound, shut off the sources of the background noise, or return to do testing at a time when less environmental noise is present.

Remember to "calibrate" the display every time you change frequency bands.

Additional Tips

- If the leak noise is very high and it is difficult to determine the exact location, a piece of wood or brick etc. can be placed between the sensor and the floor surface to reduce the level of sound that is received by the sensor and thus give a better peak reading.
- Schedule leak detection at the quietest time of the day. This may not be most convenient for you, but it increases your chance of successfully locating the leak by a wide margin.
- Remember to remove hands from sensors. When using the point probe, be sure to hold onto the handle and not the sensor.

Indoors

In a building, readings taken on all angle stops, faucets, exposed pipe, hose bibs etc. will help make a "map" of signal intensity. Often all points will have detectable signal levels, since the leak sound travels well in metal pipes. However, the highest levels will usually indicate the local "area" to search on the slab in detail.

With plastic water pipes, the sound does not travel well and the one or two detectable readings will indicate a nearby location. You may need to use a pipe tracer.

Outdoors

For outdoor leaks, pipe end points are often the only accessible spots and it will be possible only to tell which end the leak is nearest. Usually, the above ground detection by the survey sensor will indicate the exact location of the leak. In those cases where it doesn't, it will be necessary to gain access to points on the pipe by either boring holes to the pipe, or digging up direct access holes using a backhoe. Drilling holes is a popular method of accessing pipes under layers of pavement such as in streets. Direct pipe access is popular in chemical and petroleum plants where there is minimal pavement and access areas can be roped off for a period of time.

Difficulties

In some cases, it will be definitely known that there is a leak in a segment of pipe but there will be no visible indication of the local area of the leak. Sometimes leaking water can travel a long way under concrete slabs or pavement before being visible.

Often, particularly in sandy soil, the leak will go down into the water table and never surface to be visible. In such cases, whether in under-slab or underground piping systems, it is necessary to take measurements at all accessible pipe locations. You may need to gain additional access points.

Leak Stimulation

As previously mentioned, several factors such as the leak hole shape, cavity presence outside the leak hole, etc. can cause a leak sound to vary considerably even when the leaks have similar water pressure and water leak rate.

And, some leaks may emit much less acoustic energy than others and are thus more difficult to hear.

Using compressed air to amplify leak sounds

Injecting compressed air into the water causes the acoustic characteristics of the leak to change drastically with the leak intensity becoming several times higher. This makes any low intensity leak much easier to detect.

Many leak location specialists will use compressed air only on the difficult-to-hear leaks while others will use it if they don't hear a leak sound immediately on arriving at the job. The compressed air is commonly injected via faucet internal threads, hose bibs and pipe disconnects. Many specialists will shut the main water supply off, while others believe a more identifiable leak sound is obtained by leaving the source pressure connected.

Increasing water pressure

If you are not able to use compressed air, it may be possible to increase the water pressure and make the leak noise easier to hear. This is easy when the pipe section can be isolated for a controlled pressure test. This technique is widely used for testing plastic pool system pipes.