

A full-page photograph of a man in safety gear (hard hat, earmuffs, high-visibility vest, and work clothes) using a handheld electronic device connected to a probe on the ground. The background shows a residential street with trees and a house.

LD-20

Water Leak Detector

Operators Manual

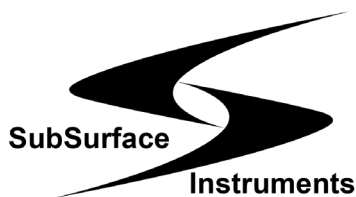
Preface

Thank you for choosing SubSurface Instruments, Inc. Professional Water Leak Detector LD-20.

This manual provides instructions on how to use the LD-20 Water Leak Detector. Please read these instructions before using the equipment to ensure proper usage. If you have any questions about operating or handling the equipment, please contact our official distributors in your country.

Keep this manual in a safe place where the equipment operator can easily access it.

If you misplace this manual, please get in touch with our official distributors in your country.



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Handling Precaution



Caution

While detecting water leaks, pay attention to surrounding traffic.



Caution

Do not use this equipment for any purpose other than water leak detection.



Caution

Install the batteries correctly.

System Precaution



Caution

The pick-up has been designed with precision to capture even very slight vibrations. For this reason, handle the Microphone with care to prevent it from impact.



Caution

Never swing the Microphone.

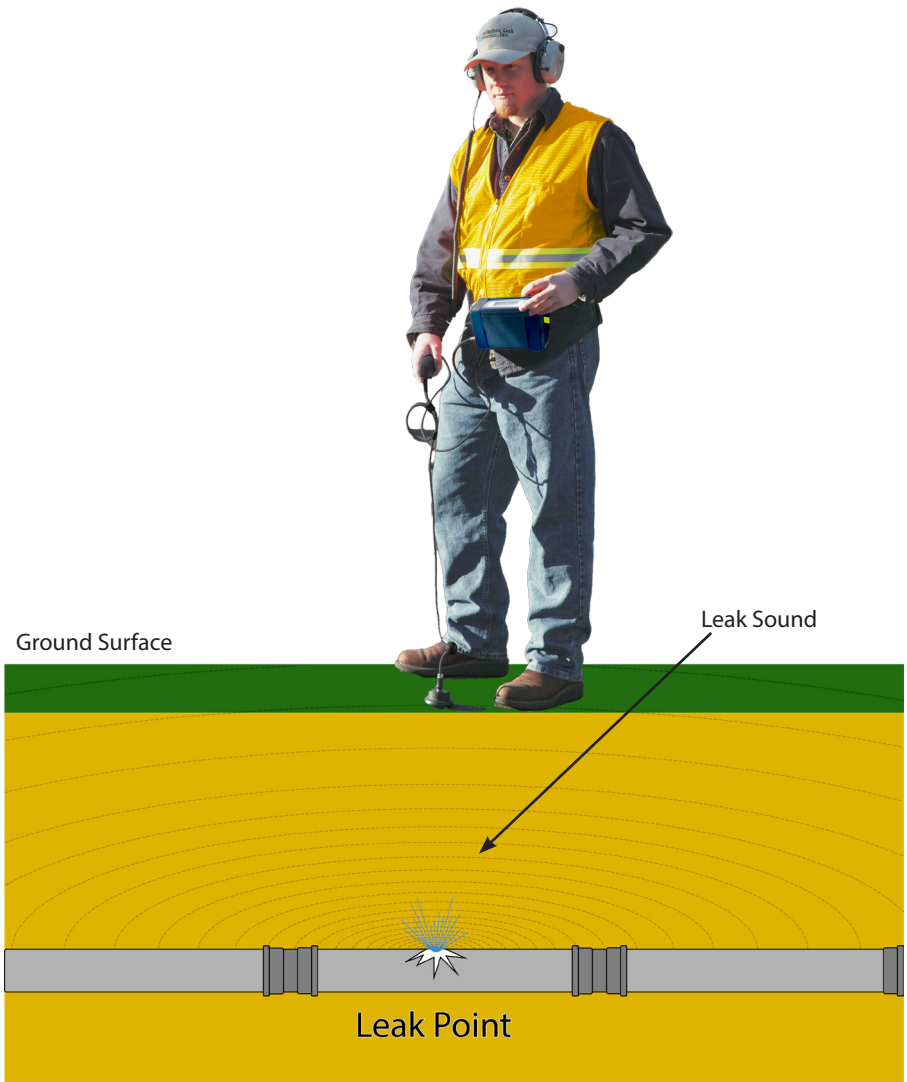


Caution

The main unit (amplifier) cannot be used in water.

Application

This equipment is specifically designed for detecting and pinpointing water leaks in underground water pipes. Utilizing advanced acoustic technology, it listens for the subtle sounds of water escaping from pipes, allowing for precise identification of leak locations.



Equipment Overview

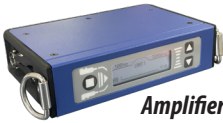
The Water Leak Detector LD-20 listens for leak noise on the road surface to identify water leak points without needing to dig up the road. With 55 available filters, it can detect water leak sounds across a wide range of frequencies more effectively than traditional water leak detectors.

The LCD displays the dB level of the leak, facilitating visual identification of leak points. To locate a water leak, the detector captures above-ground sounds and integrates human perception with on-site conditions to determine the leak's location.

Additionally, you can display a survey trace and generate a report by connecting an Android smartphone to the equipment using a dedicated app, provided in a thumb drive with the equipment.



Components List



Amplifier



**Microphone &
Hand switch**



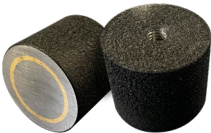
**David Clark
Headphones**



3 Section Rod



Shoulder Strap



Magnet Base



**Soft Case &
Waist belt**

*Adjustment range:
75 to 135 cm



**Connecting
cable for
mobile
Android phone**



10 mm Nut Driver



Storage/Carrying Case

Amplifier Components

OK/ESC button

Press to enter the functions menu, inside of menu press to select the function selection, long press to go back to detection mode.

Amplifier Front Panel



Display screen (with back-light)

This screen displays filter settings, the detected sound level bar graph, remaining battery level, volume level, and limit levels. During setting, this screen displays the various settings.

Up/Down buttons

These buttons are used to adjust the volume in the top menu and make selections in setting menus.

Amplifier Plug Side



Smartphone Plug

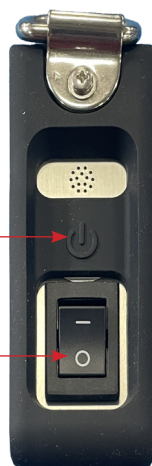
Microphone/ Sensor w/hand-switch connector

Headphones

Amplifier Power Side

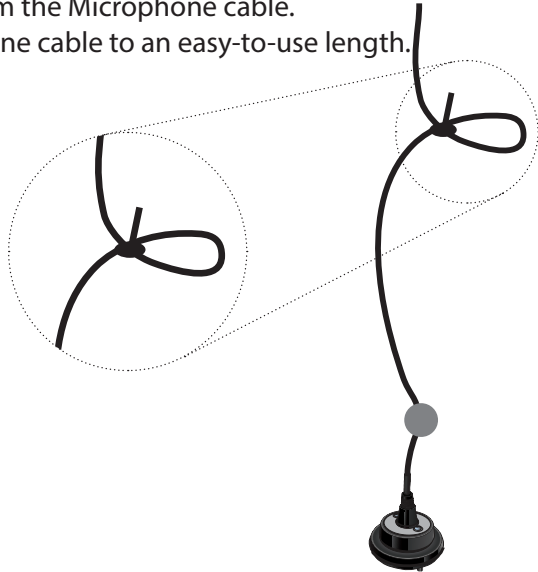
Smartphone Authentication Position

Power Button

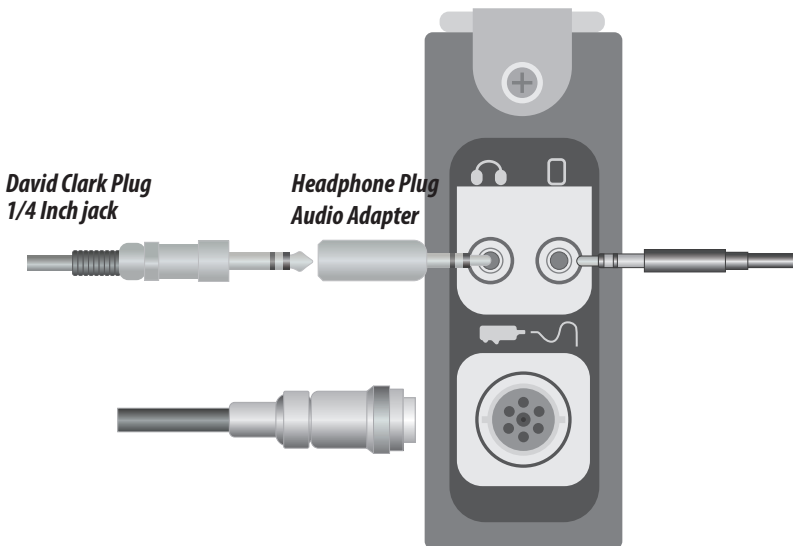


Setting up the Equipment

1. After taking out the Microphone of the storage case, remove any kinks or twisting from the Microphone cable.
2. Adjust the Microphone cable to an easy-to-use length.



3. Insert the Microphone/sensor, headphone, and smartphone plugs into the jacks on the side of the amplifier.



Installing/Replacing Batteries

Follow the instructions below to install 4 AA Alkaline batteries into the equipment or replace them when the battery power indicator displayed at the bottom left of the screen blinks.

To replace the batteries:

1. Pull the metal fitting at the bottom of the main unit and remove the battery case.
2. The battery case holds four AA alkaline batteries. When replacing the batteries, make sure to replace all four of them.
3. Push the battery compartment back into the amplifier to finish the installation.



When installing new batteries, ensure they are inserted with the correct polarity. If the equipment will not be used for an extended period (typically one month, depending on ambient conditions), remember to remove the batteries. It is the operator's responsibility to determine the appropriate duration for battery removal to prevent equipment damage.

How to Detect Leaks

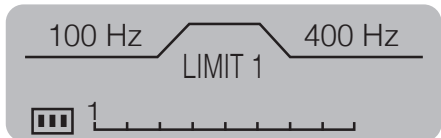
1. Turn on the power switch located on the side of the main unit (amplifier).



Startup Screen



Main Screen



2. When the startup screen changes to the main screen, hold the headphones against your ear, place the Microphone on the ground, and press the trigger on the hand switch.
3. You should be able to hear a vibration sound when you lightly tap the ground with the tip of one foot.
4. Adjust the volume using the appropriate Up and Down buttons. Using the lowest possible volume when listening for water leaks reduces operator fatigue and makes it easier to discern water leak sounds.



Caution

Please be mindful of the volume level when using headphones. Excessive volume can make it hard to hear important sounds such as approaching vehicles or alarms, and it can also damage your ears.

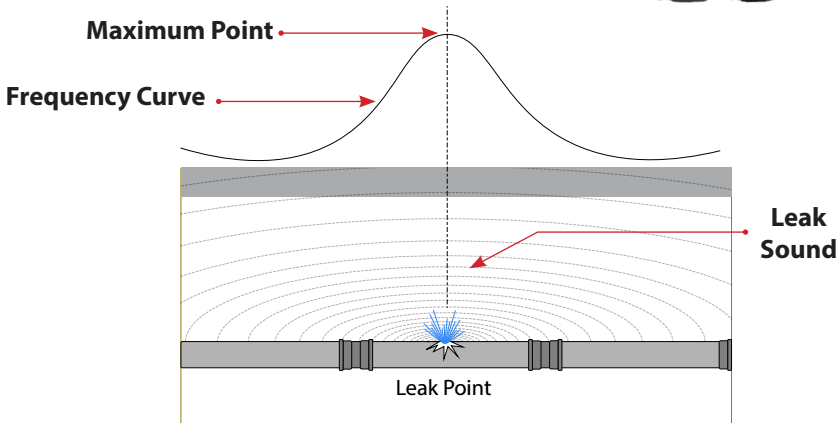
When placing the Microphone on the road, make sure it is stationary before pressing the hand switch trigger. Pressing the hand switch trigger while the Microphone is in motion generates a lot of noise and may also damage your ears.

How to Detect Leaks

1. Attached the amplifier with the waist belt or the shoulder strap provided with the unit.

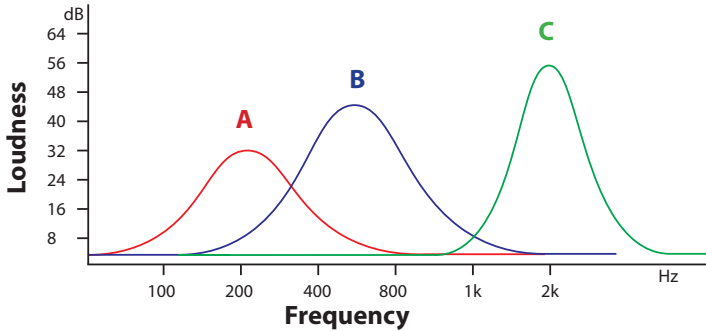


2. Press the hand switch trigger when you place the Microphone along the route of the buried pipe to search for the sound of water leaks. Carefully identify the point at which the level bar on the LCD screen reaches its maximum and mark this point on the ground.



The maximum level point may not always be directly above the water leak point, depending on ground and road conditions.

The lower figure illustrates the characteristics of water leak sound based on the material type of the buried pipe. If you are aware of the material of the buried pipe before detection, you can use the filter values in the table on page 19 as a guide when selecting the filter value.



A-PVC pipe | B-Ductile iron pipe, asbestos pipe | C-Shallow depth metal pipe

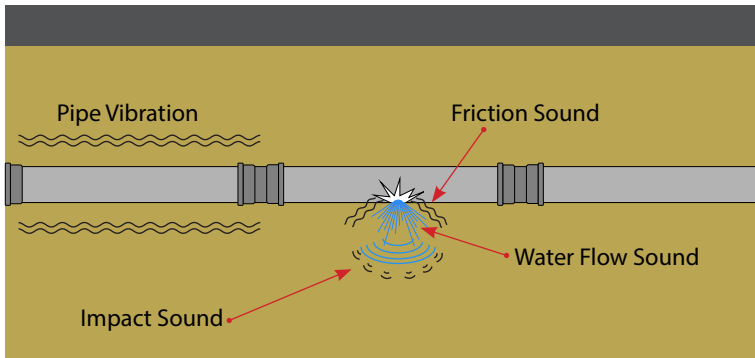
Water Leak Sound

When there are water leaks from a buried water pipe, the water comes out with force due to the pressure in the pipe. These leaks make a complex sound that includes four elements: (1) water flow sound, (2) impact sound, (3) friction sound on the pipe, and (4) pipe vibration sound. This complex sound is generally known as “water leak sound.”

The sound quality of the water leak that travels through the ground varies depending on factors such as the location of the leak, soil quality, type of pipe, water pressure, and depth. In other words, the sound quality varies because the four elements of the complex sound mix with different conditions. The frequency distribution of the water leak sound does not remain constant in every scenario.

Sound Conditions

Water Leak Sound



Conditions that affect water leak detection

1. Size of the crack/hole in the pipe
2. Water pressure
3. Soil quality
4. Pipe material
5. Pavement type
6. Soil moisture content
7. Type of object the water flow is impacting
8. Waste water flow sound, dropping sound
9. Sound of air-conditioners or nearby engines
10. Vehicles traveling sound (friction sound)
11. Wind noise
12. Sound from transformers and automatic vending machines
13. Sound from electricity, telephone cables, motors, and pumps
14. Pool type water leaks

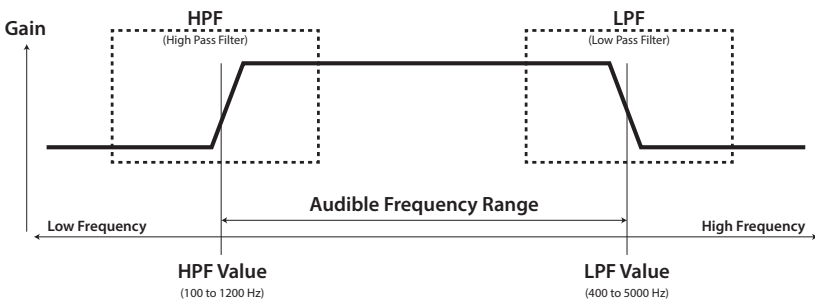
Note: Detection of water leaks is sometimes difficult depending on the above conditions.

Low Pass Filter (LPF) & High Pass Filter (HPF)

LPFs lets low-frequency signals pass through, but blocks high frequency signals.

HPFs remove low-frequency components from signals, allowing only the higher frequencies to pass.

In both cases, the cutoff frequency is a key parameter that determines which frequencies are allowed to pass through the filter.

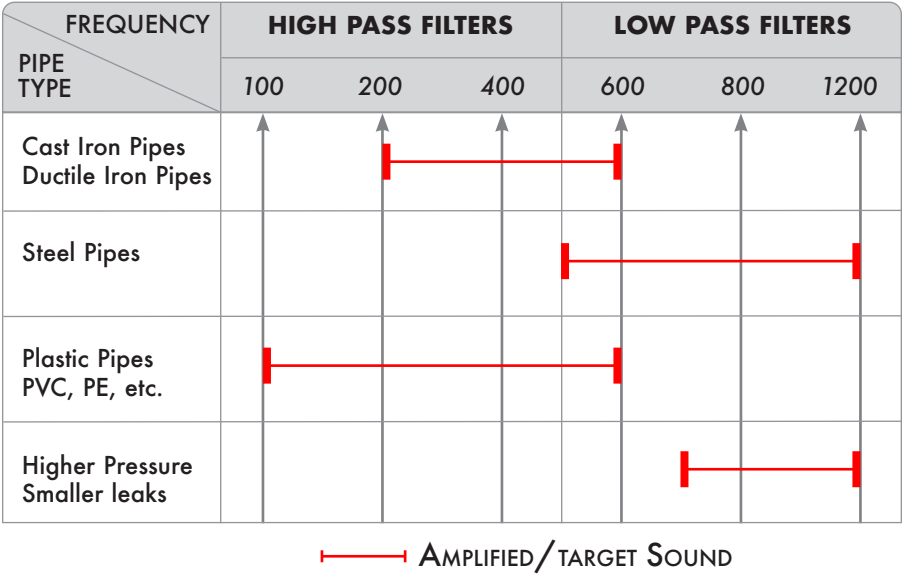


This equipment provides the option to implement two filters: a high-pass filter (HPF) and a low-pass filter (LPF), allowing for the precise selection of audio frequencies. Furthermore, it offers the capability to operate without a filter through the designated Thru function.

Please be advised that the cutoff frequency of the high-pass filter (HPF) should be lower than that of the low-pass filter (LPF).

Frequency Filters




Examples of filter selection according pipe type.








Main Panel Functions

These are the seven available functions in the LD-20:

HPF	To adjust the High Pass Filter
LPF	To adjust the Low Pass Filter
Thru	No filters applied
B. Light	Turn on/off the LCD brightness
Limit	Limits impact sounds
Reverse	Change the orientation of the LCD
Preset	Save current settings

To access the main menu, press the  button on the front panel. Use the Up & Down   buttons to navigate between different functions.

To access the settings for each function, initiate a brief press of the button  Utilize the buttons   to modify the function settings, then promptly press the button  to confirm the selection and return to the main menu for further customization.

Once all adjustments are satisfactory, press and hold the button  to return to the detection mode.

**Menu &
Selection**







Up & Down

Functions

Functions - Filters Settings





To set the **Low Pass Filter (LPF)** frequency, follow these steps:

1. Select "LPF" on the menu and Tap the button  to adjust the values.
2. Adjust the frequency using the UP & DOWN   buttons.
3. Once you've set the desired frequency, press the confirmation button  to apply the changes.

You can choose from the following LPF values: 5000, 2500, 2000, 1600, 1200, 800, 600, and 400. Just keep in mind that the LPF value must be higher than the High Pass Filter (HPF) value.



To set the **High Pass Filter (HPF)** frequency, follow these steps:





1. Select "HPF" on the menu and Tap the button  to adjust the values.
2. Adjust the frequency using the UP & DOWN   buttons.
3. Once you've set the desired frequency, press the confirmation button  to apply the changes.

You can choose from the following HPF values: 1200, 800, 600, 400, 300, 200, 150, and 100. Just keep in mind that the HPF value must be lower than the Low Pass Filter (LPF) value.



Functions - Filters Settings

To set the **Thru Filter**, follow these steps:





1. Select "THRU" on the menu and Tap the button 
2. Indicate whether you would like to use the filters (THRU OFF) or not (THRU ON) by toggling the option OFF and ON with the buttons  
3. Once you've set the desired option, press the confirmation button  to apply the changes.



When the "filter through" setting is set to ON,
both the low and high pass filters are disabled.
To activate the filter settings, set THRU to OFF.

Functions - Back-lights Settings

To set the brightness of the **B. LIGHT**, follow these steps:





1. Select "B. LIGHT" on the menu and Tap the button 
2. Adjust the brightness by pressing the buttons   within the range of 0 to 3. A higher number increases the back-light brightness, but keep in mind that higher brightness settings will drain the battery faster.
3. Then confirm the setting by pressing the button  again.



Functions - Limit Settings

Excessive impact sound can be reduced by using the limiter.




To set the **LIMITER** follow these steps:

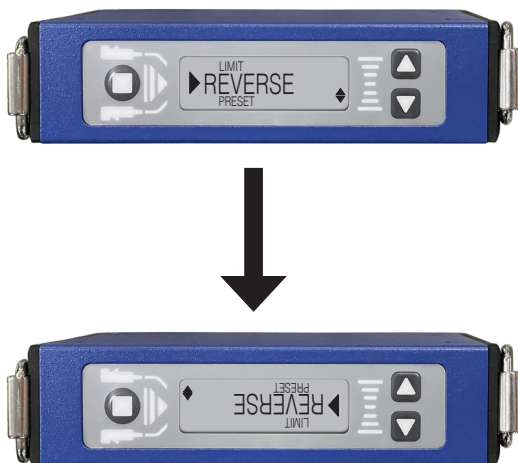
1. Select "LIMIT" on the menu and Tap the button 
2. Use the buttons   to select a setting between 0 and 3, The higher the number, the more impact sound will be suppressed.
3. Then confirm the setting by pressing the button  again.



Functions - Reverse Settings

The display (LCD) and buttons can be inverted or set upside down through the "Reverse" setting.




1. Access the "REVERSE" option in the main menu to initiate the inversion of the LCD.
2. When you press the   the LCD will invert every time you press the buttons.
3. Confirm the setting by pressing the designated  button.



Functions - Preset Settings

You have the option to save your preferred settings on the equipment so that they may be reinstated upon the next startup.

To set the **PRESET** function, follow these steps:

1. Access the "PRESET" function in the top menu
2. Modify the settings with   from NO to YES.
3. Then confirm the setting by pressing the button  again.



The following parameters are available for preservation using the PRESET feature:

- Sound level,
- Reverse display,
- Filter settings, and
- Limiter setting.

Technical Specifications

Amplifier

Display	Graphic LCD display (with back-light)
Filter	BPF(Band Pass Filter) Can be set by the following combinations: HPF(High Pass Filter) 8stages(100 to 1200Hz) LPF(Low Pass Filter) 8stages(400 to 5000Hz)
Frequency range	100 to 5000Hz
External connection	Sensor connector
External connection	Ø 3.5mm stereo
Power supply	4 AA alkaline batteries (4×Ni-MH rechargeable batteries)
Continuous operating time	40 hours or longer (When back-light is OFF and no signal is present)
Operating temperature range	−20°C to +55°C
External dimensions	160mm(W)×40mm(D)×105mm(H) (Excluding protective case and protrusions)
Weight	600g (excluding batteries)
Dust-proof/drip-proof	IP54 or equivalent



Technical Specifications

Sensor

Model	Piezo electric type acceleration sensor
Dust-proof/drip-proof	IP67 or equivalent
Power supply Voltage	DC 3.3 v
External dimensions	78mm x 50mm (excluding cable section)
Weight	580g



Headphones

Model	David Clark Headphones (custom model for LD)
Type	Dynamic, moving coil
Frequency Range	100 to 7,000Hz
Impedance	60Ω, +/- 10% @ 1kHz
Sensitivity	125dB, SPL +/- 3 @ 1kHz, re: 1mW RMS
Distortion	≤ 2% @ 1mW, 300 to 3,500Hz
Maximum Power	100mW
Rub and Buzz	100mW @ 300 to 3,500Hz



Disclaimer of Liability

SubSurface Instruments, Inc. shall not be liable to Distributor, Re-Seller, or any other person for any incidental, indirect, special, exemplary or consequential damages, or injury of any type whatsoever, either caused directly or indirectly by products sold or supplied by SubSurface Instruments, Inc.

This manual contains basic advice for the operation of the LD-20. It is essential that the manual is available for the trained operator to use as a reference. You must read this manual carefully.

Do not drop the device, the electronic components might get damaged with strong impacts.

Limits set in the technical data sheet must not be exceeded.

Original accessories ensure the safe operation of the equipment. The use of non-original accessories are not allowed and will void the warranty if used with this unit.

Maintenance and repairs can only be performed by service centers authorized by SubSurface Instruments, Inc.

Warranty

Warranty

This instrument is under warranty for 4 year from the date of delivery against defects in material and workmanship. We will repair or replace products that prove to be defective during warranty period.



This warranty is void if, after having received the instrument in good condition, it is subjected to abuse, unauthorized alterations or casual repair.

No other warranty is expressed or implied. The warranty described in this paragraph shall be in lieu of any other warranty, including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose. SubSurface Instruments, Inc. will not be liable for consequential damages.

The SubSurface Instruments, Inc. LD-20 is designed for dependable operation without the need for periodic adjustment or calibration. However, if your Detection Unit is not working properly, you can return it to us for repair. While a Return Material Authorization (RMA) is not required, there is some necessary information needed to ensure that your unit is properly repaired and returned. Our repair service department can be contacted by phone, email, or through our website.

Before shipping your unit, please contact us to confirm the most appropriate address for sending it in for repair.

Telephone: 920.347.1788 or 855.422.6346
E-mail: repairs@ssilocators.com
Web: <http://www.ssilocators.com/service>

We will repair and ship the instrument back to you, or provide you with a cost estimate for repairs that are not covered by the warranty.

Please note that there is a minimum charge for repair and handling for units not under warranty.

When shipping your instrument, please ensure that you include the following:

1. Your contact information: name, address, email, and phone number.
2. A brief description of the problem.
3. A return shipping address, billing address, and any special shipping instructions.

Packing Instructions:

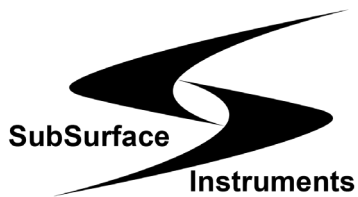
To ensure proper handling and maintain warranty coverage, please place the equipment needing repair in its original shipping box or a similarly sturdy container. Fill all sides of the container with appropriate packing material and securely seal it with strong tape. Additionally, remember to label the container as "Fragile Electronic Equipment" to indicate its delicate nature.

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