



Manufacturer

TLV. CO., LTD.

Kakogawa, Japan

is approved by LRQA LTD. to ISO 9001/14001



Instruction Manual

Ultrasonic Leak Detector **SonicMan: SN1**

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Introduction

Thank you for purchasing the **TLV** Ultrasonic Leak Detector **SN1**.

This product has been thoroughly inspected before being shipped from the factory. When the product is delivered, before doing anything else, check the specifications and external appearance to make sure nothing is out of the ordinary.

To ensure safe and correct use of this product, be sure to observe the safety precautions listed in this manual as they relate to installation, operation, maintenance and repair of the product.

Particularly, as this product employs a laser pointer, proper handling and attention are required.

Furthermore, **TLV** accepts no responsibility for any damage or accidents occurring as a result of failure to observe these safety precautions.

Be sure to read these instruction manuals carefully before use and follow the instructions to be sure of using the product properly. Additionally, as these manuals are necessary not only for initial software setup but also for subsequent troubleshooting, please keep them in a safe place for future reference.

This product has undergone strict quality management and product inspection before being shipped from the factory. However, in the event of malfunction or defects, please contact your local **TLV** representative or the **TLV** customer service center.

TLV accepts no responsibility for incorrect use of the product by the customer or any third-party, malfunction occurring during use, other defects and any damaged caused by this product, excluding cases in which it is under obligation to pay reparations by law.

This instruction manual and product are subject to modifications without notice, for the purpose of improvement.

Unauthorized reprinting or reproduction, in whole or in part, of this instruction manual or this product's hardware or software is strictly prohibited.

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1 **SonicMan** Standard Set



2 Observe These Precautions to Ensure Safety

- Read this “Observe These Precautions to Ensure Safety” section carefully before use and be sure to follow the instructions.
- Installation, inspection, maintenance, repairs, disassembly, adjustment and valve opening/closing should be carried out only by trained maintenance personnel.
- The precautions listed in this manual are designed to ensure safety and to prevent equipment damage and personal injury. For situations that may occur as a result of erroneous handling, three different types of cautionary items are used to indicate the degree of urgency and the scale of potential damage and danger: **DANGER**, **WARNING** and **CAUTION**.
- The three types of cautionary items above are very important for safety: be sure to observe all of them as they relate to installation, use, maintenance and repair. Furthermore, **TLV** accepts no responsibility for any accidents or damage occurring as a result of failure to observe these precautions.

Symbols

	Indicates a DANGER, WARNING or CAUTION item.
	Indicates an urgent situation which poses a threat of death or serious injury
	Indicates that there is a potential threat of death or serious injury
	Indicates that there is a possibility of injury or equipment / product damage

The meanings of the various categories of precautionary symbols are as follows:

 PROHIBITED	This precautionary symbol indicates an item or action that must not be used or performed	 NO MOISTURE	This precautionary symbol indicates an item that must not be allowed to become wet
 DISASSEMBLY PROHIBITED	This precautionary symbol indicates an item that must not be disassembled	 NO WET HANDS	This precautionary symbol indicates an action or item that must not be performed or touched with wet hands
 MANDATORY	This precautionary symbol indicates an action or precaution that MUST be performed or observed		

2. Observe These Precautions to Ensure Safety

2.1 SonicMan: SN1 Precautions

 DANGER			
<p>Do not use any components other than those included. Use the included battery pack, charger and communications cable. Use of other items could result in excessive heat generation, ignition, rupture, electrical shock, fire or other undesirable situations.</p>	 PROHIBITED	<p>Take measures to prevent entanglement. Operating the unit with the strap, earphones cord or communications cable hanging loosely could result in accidents caused by their becoming caught in rotating equipment. Hold them close to the body and take measures to prevent entanglement during operation.</p>	 MANDATORY
<p>Do not direct the beam of the laser pointer at people. If the beam of the laser pointer shines into eyes, it may result in deterioration or loss of vision. When not in use, turn the laser pointer OFF.</p>	 PROHIBITED	<p>Unit does not have an intrinsically safe rating. Do not use in areas requiring explosionproof equipment. Failure to observe this precaution could result in ignition or accidental explosions.</p>	 PROHIBITED

 WARNING			
<p>Do not disassemble or modify. Failure to observe this precaution could result in injury, electrical shock, ignition or fire.</p>	 DISASSEMBLY PROHIBITED	<p>Do not operate the buttons or stare at the screen while walking. Failure to observe these precautions could lead to accidents such as tripping or collisions.</p>	 PROHIBITED
<p>Be attentive to the background noises in the surrounding area. When wearing the earphones, it becomes difficult to hear noises from the surrounding area. Operate the unit together with a person who is not wearing any earphones or take measures during operation to ensure advance awareness of potential dangers in the surrounding area.</p>	 MANDATORY	<p>Do not place components in microwave ovens or high-pressure vessels, and do not place components in the vicinity of electromagnetic devices. Such handling could result in excessive heat generation, smoke, damage to circuitry, battery fluid leakage, rupture or ignition.</p>	 PROHIBITED
<p>Do not subject the unit to strong impact and do not throw it. Such handling could result in leakage of the battery fluid, excessive heat generation, rupture, ignition or injury.</p>	 PROHIBITED	<p>Do not turn the power ON while wearing the earphones. A sudden loud sound may be emitted, leading to hearing impairment or injury. After turning the power ON, check to see whether a loud sound is being output before putting on the earphones.</p>	 PROHIBITED

 CAUTION			
<p>Make sure no foreign matter gets inside the unit. In areas with a great deal of metal powder or other fine foreign matter, take measure to prevent this foreign matter from getting inside the unit. The presence of such foreign matter could result in fire or unit failure.</p>	 PROHIBITED	<p>Do not let the unit become wet. If liquid gets inside the unit, it may result in excessive heat generation, electrical shock or unit failure. Be careful of the location of use and the method of handling.</p>	 NO MOISTURE

2.2 Battery Pack Precautions

 DANGER			
<p>Do not use any charger other than the charger provided with the unit. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition.</p>	 PROHIBITED	<p>Do not disassemble, modify, solder, etc. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition.</p>	 DISASSEMBLY PROHIBITED
<p>If fluid leaks from the battery and gets in the eyes, flush it out. Do not rub the eyes, and after immediately flushing out thoroughly with clean water, see a doctor.</p>	 MANDATORY	<p>Refrain from touching the terminals to other metal items, to avoid causing a short in the battery pack. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition. When transporting the battery pack, carry it in the soft case, etc.</p>	 PROHIBITED
<p>Do not cause the unit to become wet by immersing in water, salt water or liquid chemicals. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition.</p>	 PROHIBITED	<p>Do not apply heat to the unit or throw it into a fire. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition.</p>	 PROHIBITED
<p>Do not leave unit where it will be exposed to direct sunlight or in areas that will become very hot, such as interiors of cars, near heating equipment, etc. Failure to observe this precaution could result in leakage of the battery fluid, excessive heat generation, rupture or ignition.</p>		 PROHIBITED	
<p>Do not forcibly insert the battery pack. The battery pack must be inserted into the SonicMan and the charger with the proper orientation. Forcible insertion could result in fluid leakage, excessive heat generation, rupture or ignition.</p>	 PROHIBITED	<p>Do not use the battery pack in devices other than the SonicMan unit. Failure to observe this precaution could result in battery pack failure, rupture or fire.</p>	 PROHIBITED

 WARNING			
<p>Cease use of the battery pack immediately if the unit exhibits abnormal operation. If during battery pack use, charging or storage, irregularities such as fluid leakage, an unusual smell, unusual heat generation, discoloration or deformation are noticed, cease use of the unit immediately. If use is continued under such conditions, excessive heat generation, ignition or rupture may result.</p>		 PROHIBITED	
<p>If full charging does not occur even after the prescribed charging time has been exceeded, stop charging. If use is continued under such conditions, battery fluid leakage, excessive heat generation, ignition or rupture may result.</p>	 MANDATORY	<p>If battery fluid leaks and comes into contact with the body, rinse it off immediately. There is danger of resultant damage to the skin. Immediately rinse any battery fluid off with clean water.</p>	 MANDATORY

2. Observe These Precautions to Ensure Safety

 CAUTION		
<p>When not intending to use for extended periods of time, remove the battery pack from the unit and store in a dry, cool, dark location. Failure to observe this precaution could result in fluid leakage, rust, deterioration in performance or a reduction in service life.</p>	 MANDATORY	<p>Charge the battery pack within the temperature range of 5° C to 35° C. If charged at a temperature outside of this range, fluid leakage, abnormal heat generation, ignition or rupture may result. Additionally, deterioration in performance or a reduction in service life may result.</p>
<p>Do not dispose of the battery pack with normal garbage. The SonicMan battery pack is recyclable. If at any time, whether before or after use, the battery pack becomes unnecessary, observe your company regulations and, after insulating the contact terminals by covering them with tape, return the battery pack to a TLV office.</p>		 PROHIBITED

2.3 Charger Precautions

 WARNING		
<p>Use only with the specified voltage. Failure to observe this precaution could result in smoke, ignition, rupture or fire from the charger or battery pack.</p>	 MANDATORY	<p>Do not disassemble or modify. Failure to observe this precaution could result in excessive heat generation, ignition, electrical shock or injury.</p>
<p>Refrain from touching the charger terminals to other metal items, to avoid causing a short in the unit. Failure to observe this precaution could result excessive heat generation, ignition or electrical shock.</p>	 PROHIBITED	<p>Do not operate the unit with wet hands. Failure to observe this precaution could result in electrical shock.</p>
<p>Do not use the unit in humid areas or in areas in which it could become wet from water or liquid chemicals. Failure to observe this precaution could result in electrical shock, excessive heat generation or ignition.</p>	 NO MOISTURE	<p>Do not charge a battery pack other than the SonicMan battery pack. Failure to observe this precaution could result in excessive heat generation, ignition, rupture or fire.</p>
<p>Do not charge in areas that have a great deal of dust or metal powder. The presence of dust or metal powder could result in excessive heat generation or fire.</p>		 PROHIBITED

 CAUTION		
<p>Do not touch the electrode contacts. Failure to observe this precaution could result in electrical shock, deformation or injury.</p>	 PROHIBITED	<p>Do not cause the electrical cord to have sharp bends, place heavy items on top of it or cut it. Failure to observe this precaution could result in failure of the electrical cord, electrical shock, excessive heat generation or fire.</p>
<p>Cease use immediately if the unit exhibits abnormal operation. If the unit does not charge, there is smoke, unusual heat generation or an unusual smell, immediately pull the power plug out of the outlet. If use is continued under such conditions, fire or electrical shock may result.</p>		 PROHIBITED

2.4 Earphones Precautions

 WARNING	
<p>Do not use earphones while driving. Be sure not to use the earphones while driving a fork lift, car, motorcycle, bicycle, etc. Even while walking, be careful not to have the volume set too high since it may block out the surrounding background noise.</p>	 PROHIBITED

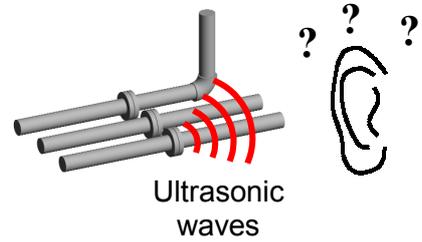
 CAUTION		
<p>Do not have the volume set too high. Listening to a high volume setting for prolonged periods of time may result in damage to or loss of hearing.</p>	 PROHIBITED	<p>If you feel any irritation in your skin, cease use of the earphones immediately. If your skin feels irritated or uncomfortable, cease use of the earphones immediately and consult a doctor.</p>
		 PROHIBITED

3 SonicMan's Principle of Detection

3.1 Leak locations generate a warning sound by their very nature

There are many cases in the field where large amounts of fluid are leaking from the screwed or flanged areas of piping joints or from gaskets.

An ultrasonic signal is generated at these types of leak locations. ("Ultrasonic" is used here to refer to sounds in high frequency bands that cannot be heard by the human ear.)

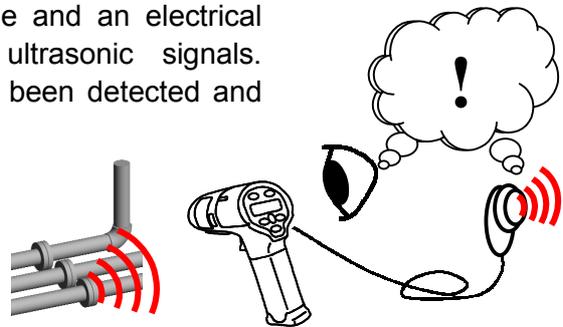


This ultrasonic signal is generated even in the case of very small leaks, and offers a much higher chance of leak location detection than does relying on the spectrum of sound that is audible to the human ear.

3.2 Detecting ultrasonic signals and converting them to audible sound

SonicMan employs an ultrasonic microphone and an electrical band path filter to isolate and detect ultrasonic signals. Furthermore, the ultrasonic signals that have been detected and converted to audible sound can then be heard through the earphones.

Additionally, concentrating the directional ability of the ultrasonic microphone facilitates the identification of leak locations, and the added use of the laser pointer effects a great increase in the efficiency of leak detection and location identification.



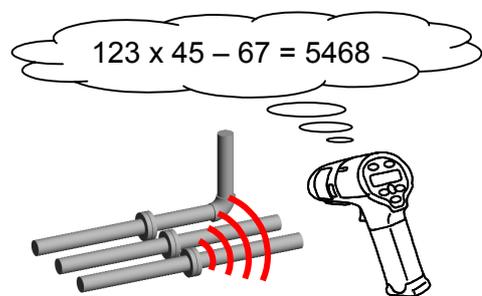
3.3 Automatic Calculation of Estimated Leakage Level

When the reading's distance and relevant information about the object being tested have been input, **SonicMan** displays an automatic calculation of the estimated leakage level (within 4 levels), based on the reading gained during detection. This can be used as a rough measure of the total quantity of losses.

The calculation of leakage level is made possible by using information, stored in **SonicMan**, that has been gained from previous laboratory experiments.

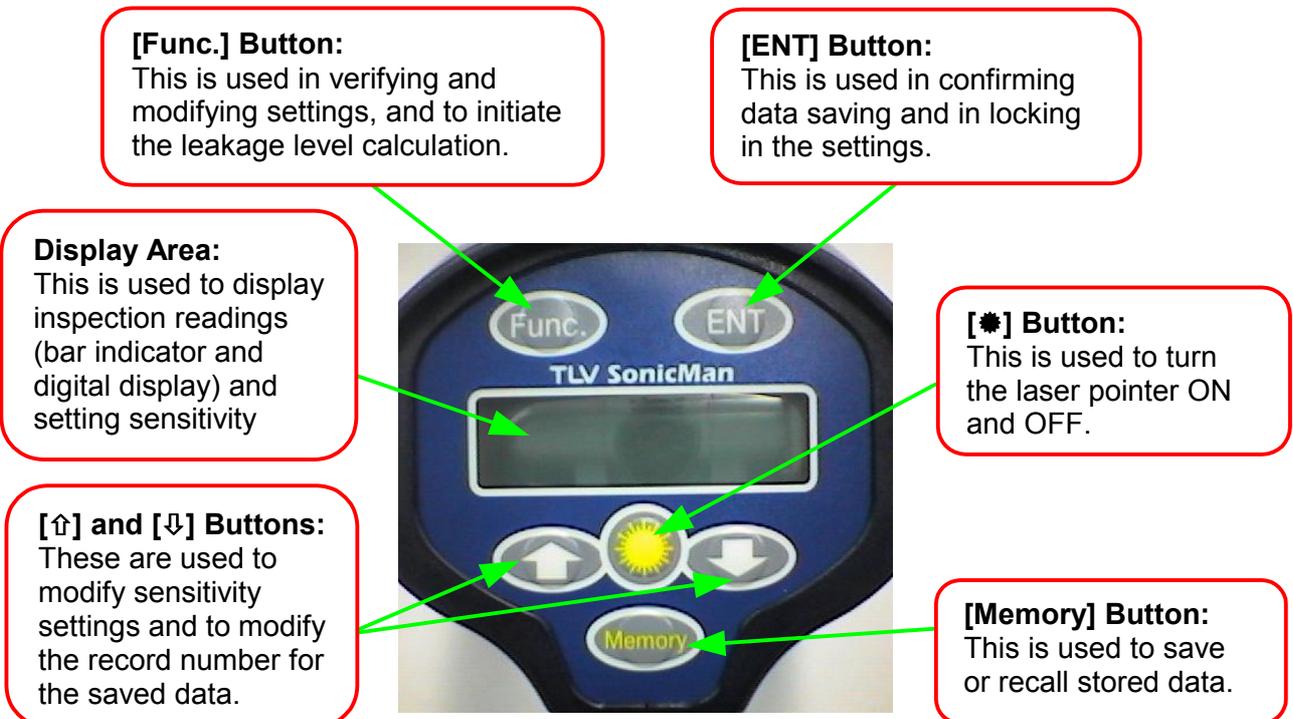
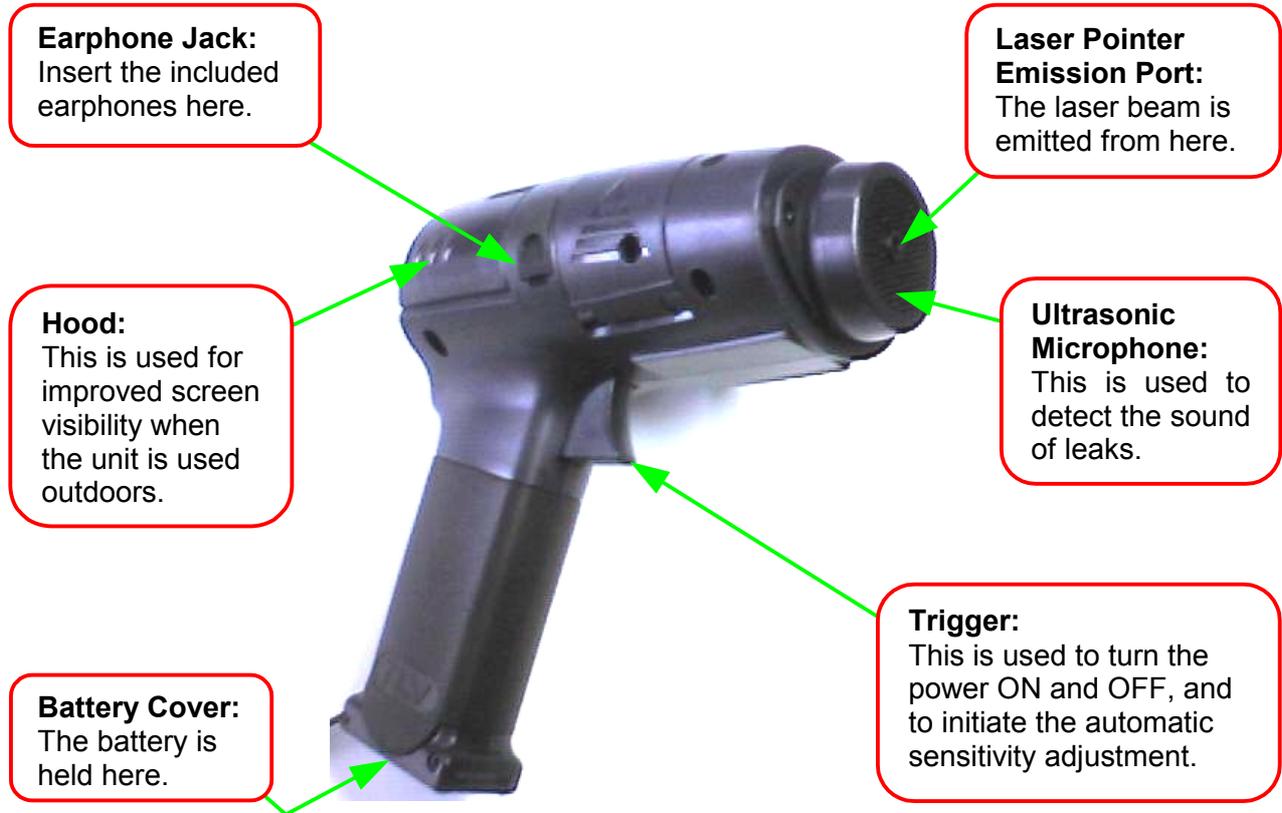
The relation between leak level and the leakage amount is approximately as shown below.

Leak Level	Leakage Rate	
	Gas (N·m ³ /h)	Steam (kg/h)
1	0.3 or less	1.0 or less
2	From 0.3 to 1.0	From 1.0 to 2.0
3	From 1.0 to 2.5	From 2.0 to 5.0
4	Over 2.5	Over 5.0



Note: The estimation of leak level includes a variety of factors such as the condition of the generated ultrasonic signal, fluid type and error due to measuring distance. Therefore these values are only estimates for reference.

4 **SonicMan** Components and Features



5 Procedure for Gas Leak Detection

5.1 Preparation for Gas Leak Detection

- 1) Using the supplied charger, charge the battery and then insert into the **SN1** (see section 6 “Battery Pack Instructions”).
- 2) Prepare all items required for the inspection. Items may include tags, piping layout maps, record/note paper, camera, etc.
- 3) If necessary, preset **SonicMan** functions as desired (see section 10 “Optional Settings and Adjustments”)

5.2 Using **SonicMan**, Searching for Leak Locations

- 1) While listening to the sound output through the earphones, move in the direction of the source as indicated by **SonicMan**. Adjusting the sensitivity setting (see section 7.4 “Increasing and Decreasing the Sensitivity”) or using the automatic sensitivity adjustment (see section 7.5 “Using the Automatic Sensitivity Adjustment”) may help you to locate the source of the leak.
- 2) Approach the area where the sound is generated and identify the leak location. Use the nozzle and laser pointer to pinpoint the source of the leak.

5.3 Recording the Detection Reading and Leak Location

- 1) Estimate the leak level by using the inspection data (see section 8.2 “Estimating Leakage Level”). By entering the distance and fluid type, 1 of 4 leak levels can be determined.
- 2) Save the inspection data and leak level in **SonicMan**’s memory (see section 8.4 “Saving the Inspection Data in the Internal Memory”). A 3-digit record number is given to the saved data. A total of 310 records can be stored in the **SonicMan**.
- 3) Attach a tag with the record number to the leak location. This allows the location to be easily located again for repair at a later date.
- 4) Take photographs and record the leak locations. Photographs of the tag locations can assist record keeping and reporting as well as help identify the location at repair time. Plotting the leak on a piping layout map can further assist this process.

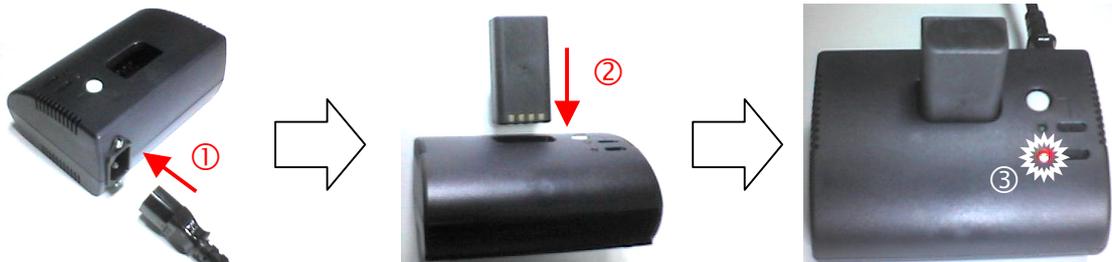
5.4 Reporting Data and Making a Maintenance Plan

- 1) Recall the saved data from **SonicMan** and make a report along with other data (photo’s maps, etc.). A report of inspection results can be useful for analyzing the effects on energy conservation.
- 2) By referring to the leak levels, make and implement a maintenance plan.

6 Battery Pack Instructions

6.1 Charging the Battery Pack

- 1) Connect the power cord for the included charger ①.
- 2) Insert the battery pack securely into the charger ②.
- 3) The red “charging” indicator light comes on and the charger automatically begins charging ③.



- 4) Pushing the white button causes the battery pack to be discharged (green light) before charging. Charging (red light) begins automatically after discharging is completed.
- 5) To stop the discharging process (green light) before it is completed, press the white button again. Discharging ceases (the green discharge light goes out), and charging (red light) automatically begins.
- 6) When charging is fully completed, the red “charging” indicator light begins blinking on and off.

6.2 Inserting and Removing the Battery Pack

- 1) Slide back the latch ① and open the **SonicMan** battery cover ②.
- 2) Insert the battery pack with the end on which the contacts are located going in first ③.
- 3) Close the battery cover ④ and slide the latch to fasten the cover in place ⑤.
- 4) When the battery pack is inserted, the power on the **SonicMan** may automatically turn ON. If this occurs, double-click the trigger to turn the power OFF.
- 5) Remove the battery pack by following the above steps, except remove the battery pack in step 2 instead of inserting it.



7 Operation

7.1 Turning the Power ON and OFF

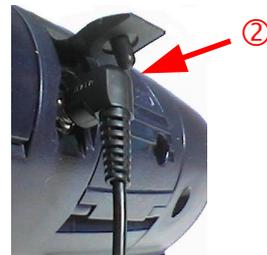
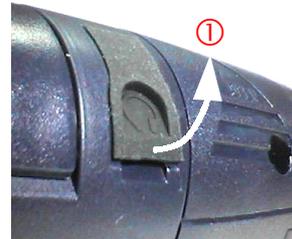
- 1) Pulling (clicking) the trigger once turns the power ON.
- 2) After turning the power ON, you may immediately begin to search for leaks. It is not necessary to pull the trigger again.
- 3) Pulling the trigger twice in a less than 1-second interval (double-clicking) turns the power OFF.

Note: The power can only be turned OFF when **SonicMan** is in detection mode. The power cannot be turned OFF if it is in setting-modification mode, data recall mode, etc.



7.2 Attaching the Earphones (In Quiet Areas)

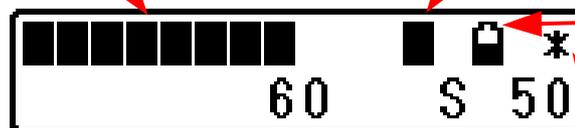
- 1) Lift up the cover for the **SonicMan** earphone jack ①.
- 2) Insert the earphone plug into the **SonicMan** earphone jack ②.
- 3) The earphone with the “R” is for the right ear and the one with the “L” is for the left ear.



7.3 How to Read the Screen

The reading is displayed by a bar indicator. The bar length (number of squares shown) indicates level presently being detected.

This marks the maximum level reached during leak detection. If the sensitivity setting is modified, this reading is deleted.



This icon displays battery voltage in 4 levels. It blinks when battery strength becomes weak.

This displays the current sensitivity setting as a quantitative value.

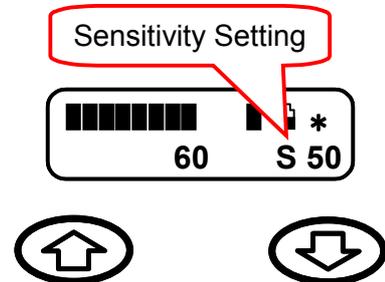
This displays the reading as a quantitative value from 0 to 100.

This is displayed when the laser pointer output is ON.

7.4 Increasing and Decreasing the Sensitivity

To increase the audibility of the sound of a small leak, or in the opposite case, to decrease it when the sound of a leak is too loud, adjust the sensitivity to the desired level using the [↑] and [↓] buttons.

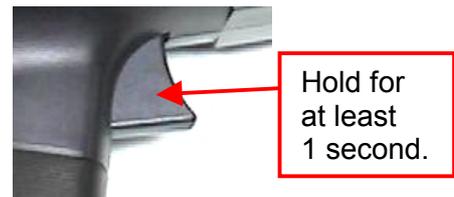
- 1) Pressing the [↑] button one time increases the sensitivity setting by 1. Holding down the [↑] button rapidly increases the setting (in single increments) until the button is released. The level can increase to a maximum of 100.
- 2) Pressing the [↓] button one time decreases the sensitivity setting by 1. Holding down the [↓] button rapidly decreases the setting (in single decrements) until the button is released. The level can decrease to a minimum of 0.



7.5 Using the Automatic Sensitivity Adjustment

It is possible to automatically set the sensitivity to an easy-to-hear level without the use of the [↑] and [↓] buttons.

- 1) Pull and hold the trigger for at least 1 second.
- 2) The sensitivity setting is automatically altered until the current reading reaches a level that is easy to hear.
- 3) When the trigger is released, the setting becomes fixed at the last automatically assigned sensitivity setting.



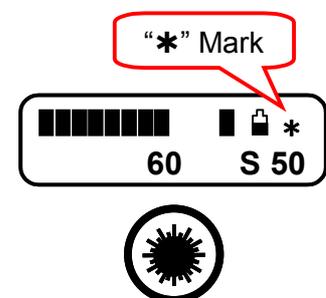
7.6 Turning the Laser Pointer ON and OFF

The laser pointer assists in identifying the location of a detected leak.

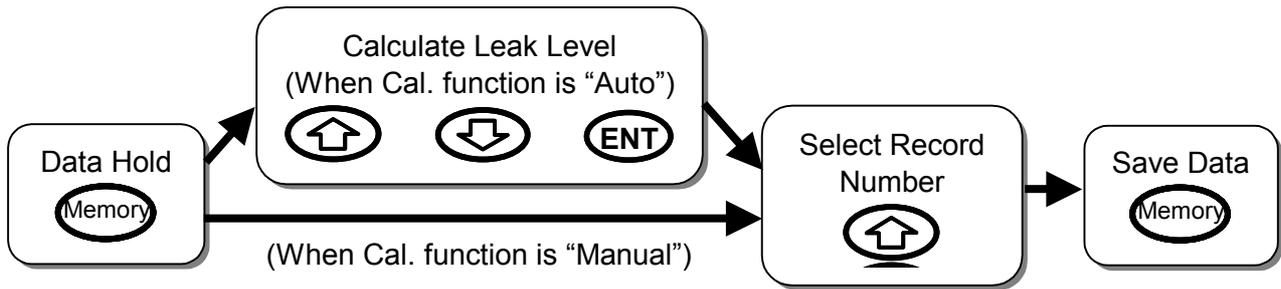
- 1) Pressing and holding the [*] button causes the laser pointer to emit a laser beam, and a "*" mark appears in the display.

Note: The laser pointer only emits a laser beam while in detection mode. When modifying settings, saving data, recalling data, etc., it does not emit a beam.

- 2) When the [*] button is released, the laser pointer beam is turned OFF and the "*" mark disappears from the display.



8 Estimating Leak Level, Saving and Recalling Data



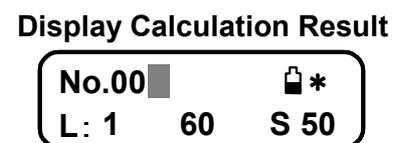
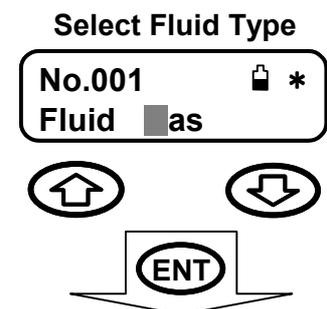
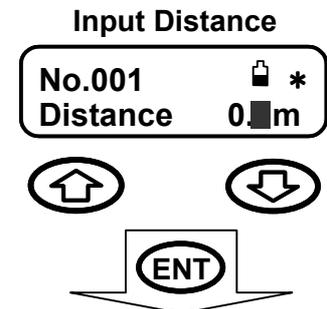
8.1 Hold the Inspection Data

- 1) Press the [Memory] button while detecting a leak.
- 2) If the automatic leak level calculation function is set to “Auto” (see section 10.4 “Setting Leak Level Calculation”), the display changes to the screen for input of the estimated leak level calculation conditions.
- 3) If the automatic leak level calculation function is set to “Manual” (see section 10.4 “Setting Leak Level Calculation”), the display changes to the record number selection screen without calculating the leak level.

8.2 Calculate Leak Level

Leak level can be calculated after saving the **SonicMan** reading (see section 8.5 “Recalling Saved Data”).

- 1) Enter the distance from the leak to **SonicMan**’s lead edge.
 - (a) Pressing either the [↑] or the [↓] button 1 time increases or decreases the distance by 0.1 m, respectively. Pressing and holding increases or decreases the distance in 1.0 m increments. The distance input range is from 0.1 m to 25.5 m.
 - (b) Press the [ENT] button to confirm the data and then move to the next data item.
 - (c) When the nozzle is attached, the distance to the front the nozzle is 0.1 m.
- 2) Select Fluid Type. Select either “Steam” or “Gas”.
 - (a) Scroll through the choices for fluid type by pressing the [↑] and [↓] buttons.
 - (b) Select the type of fluid that is leaking, then press the [ENT] button.
 - (c) The result from the leakage amount calculation is displayed, then the display changes to the record number confirmation screen.
 - (d) For revising Calculation Conditions: Pressing the [Func.] button again allows for re-input of the calculation conditions as many times as desired.



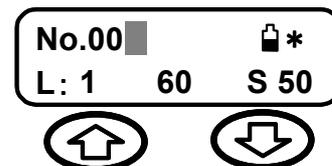
- 3) Canceling the Input of Calculation Conditions before Input is Complete
Pressing the [Func.] button causes the display to skip the conditions input screen and to jump to the record number confirmation screen.

8.3 Record Number Selection

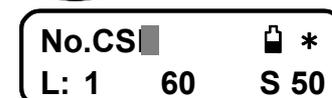
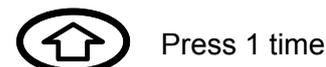
It is possible to select any three-digit number from 000 to 999 as a record number for the data. Record numbers do not have to be continuous.

- 1) The cursor will begin blinking in the record number box. A number that is sequentially higher than the highest currently in memory is automatically displayed.
- 2) Pressing the [\uparrow] or [\downarrow] buttons causes the record number to increase or decrease by one.
- 3) Pressing the [\uparrow] button once while the automatically displayed record number is visible causes “CSL” (cancel) to be displayed. This indicates that you do not wish to save this held record (discarding the data).

Record Number Selection



Cancel Data Store

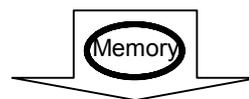
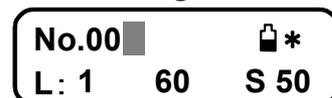


8.4 Saving the Inspection Data in the Internal Memory

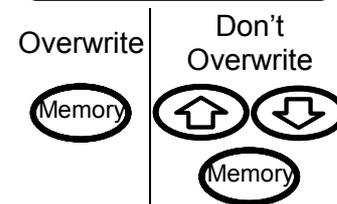
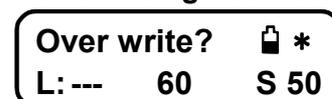
The reading value, sensitivity setting, estimated leakage amount and its conditions can be saved together with the record number in the internal memory.

- 1) Confirm the record number to be used, then press the [Memory] button.
 - (a) The message “Complete Data Store” is momentarily displayed while the unit saves the inspection data. The **SonicMan** will then return to detection mode.
 - (b) If the selected record number was “CSL”, the data is discarded without saving. **SonicMan** then returns to detection mode.
 - (c) Measurement data can be stored even if the leak level was not calculated.
- 2) If the selected record number has already been used, **SonicMan** will query: “Over write?”
 - (a) To destroy the previous data and save the new data (overwrite), press the [Memory] button once more. The message “Data Store” is momentarily displayed while the unit saves the data. **SonicMan** then returns to detection mode.
 - (b) To save without overwriting, use the [\uparrow] and [\downarrow] buttons to select a different record number, then press [Memory] to save the data.
 - (c) To cancel a data save, press the [\uparrow] and [\downarrow] buttons to change the record number to “CSL” for cancellation and press the [Memory] button one more time. Then, **the SonicMan** will return to detection mode without the message, “Data Store”.
SonicMan will return to detection mode without displaying the data saved message.

Saving Data



Overwriting Records



8.5 Recalling Saved Data

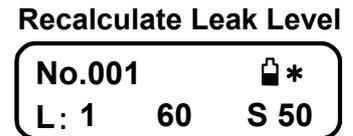
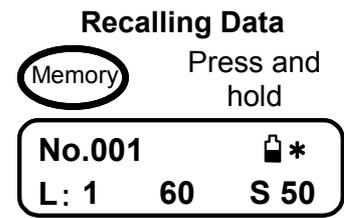
It is possible to recall and display data that has been saved in the internal memory.

- 1) While in detection mode, press and hold the [Memory] button for at least 1 second. The saved record with the highest record number will be displayed. Press [Memory] again to return to detection mode.

Note: The cursor in the record number is not blinking.

This action cannot be performed while modifying settings, saving data, etc.

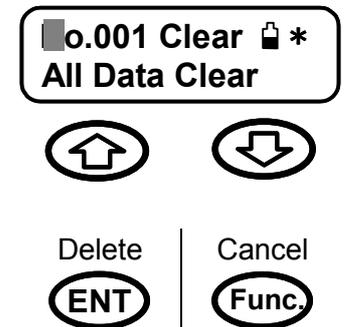
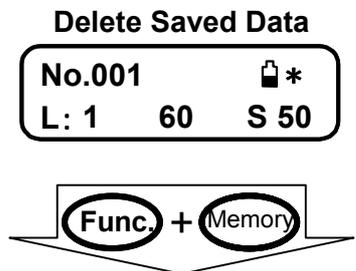
- 2) A different record can be displayed by using the [↑] and [↓] buttons. Record numbers that contain no saved data are skipped and not displayed.
- 3) It is possible to recalculate the leak level. When the desired record has been recalled, press the [Func.] button. This will take you to the estimated leak level calculation conditions input screen.



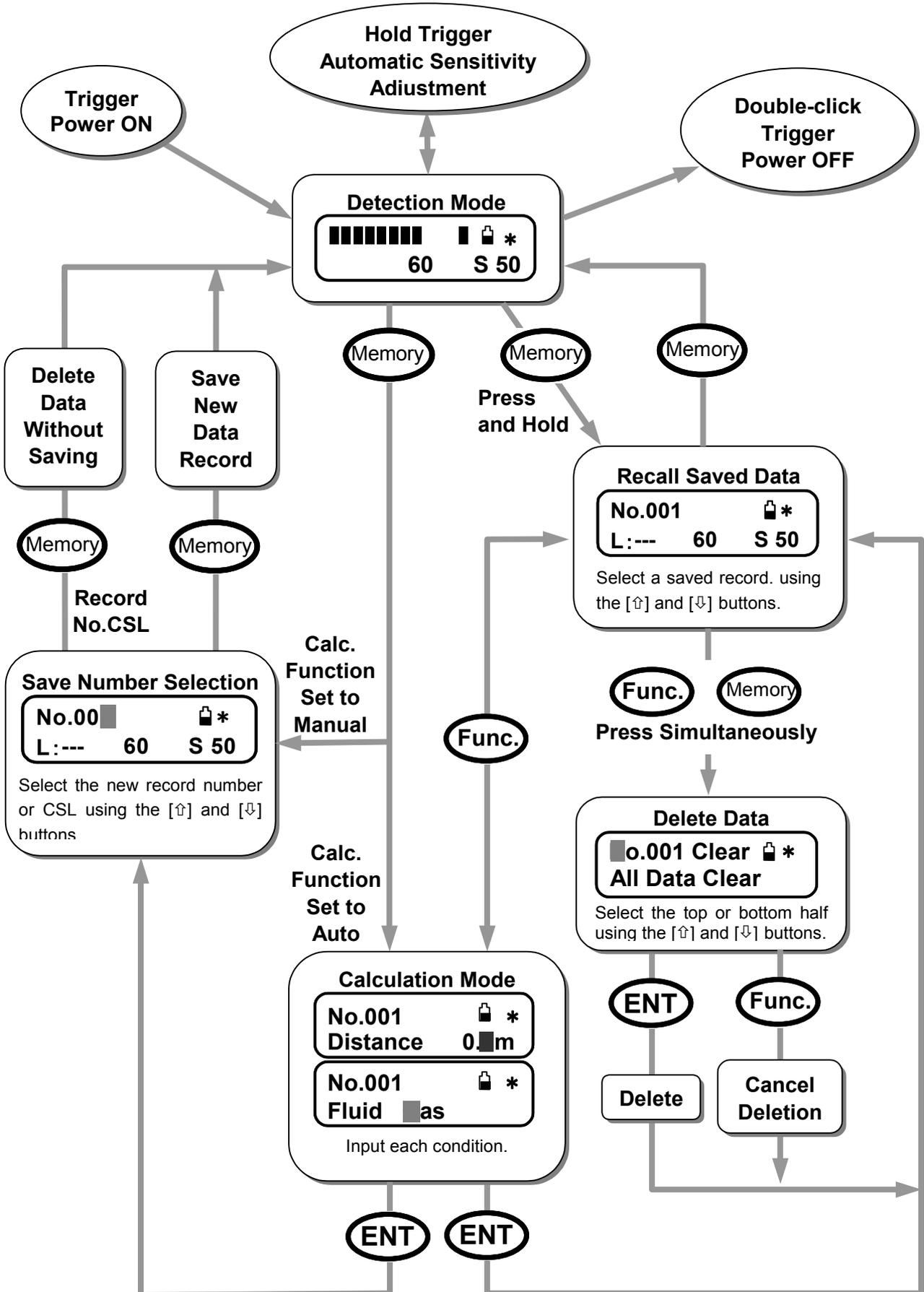
8.6 Deleting Saved Data

The data in the internal memory can be deleted one record at a time, or all saved data can be deleted at once.

- 1) Recall and display the record you wish to delete. If you wish to delete all saved data, select any record. There is no need to select a specific record number.
- 2) Press both the [Func.] and the [Memory] button at the same time. A menu offering the following choices will appear:
 - Delete only the selected record number ("No.### Clear")
 - Delete all saved data ("All Data Clear")
- 3) Use the [↑] and [↓] buttons to move the cursor to the desired action, in either the upper half or the lower half of the screen.
- 4) Press the [ENT] button to delete the data.
 - (a) After deleting one data record, the display returns to the data recall screen displaying the record with the highest number.
 - (b) When there is no more saved data or when all data has been deleted, the unit returns to detection mode.
- 5) To cancel the deletion, press the [Func.] button (before pressing [ENT]). The display will return to the saved data recall screen.



9 Operation Flow Chart



10 Optional Settings and Adjustments

How to Set the SonicMan Functions

All **SonicMan** functions have been preset before shipping. These settings can be changed to meet the user's requirements.

10.1 Enter Settings Mode

While in detection mode, press the [Func.] button.

Enter Settings Mode



10.2 Display Battery Strength

A 10-level indicator of current battery charge is displayed.

- 1) Press the [ENT] button to move the display to the next setting item.
- 2) Press the [Func.] button to return to detection mode.



10.3 Turning ON and OFF the Backlight

(Factory default is "ON")

To set the screen backlight to "ON" and "OFF":

- 1) Press the [↑] and [↓] buttons to switch between "ON" and "OFF", which turns the backlight on and off.
- 2) Press the [ENT] button to move to the next setting item.
- 3) Press [Func.] to return to detection mode.



10.4 Setting Leak Level Calculation

(Factory default is "Auto")

To set whether to enter calculation mode automatically ("Auto") when a reading is taken, or to enter data manually ("Manual") at some other time:

- 1) Press [↑] and [↓] to switch between "Auto" and "Manual".
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to detection mode.



10.5 Setting the Automatic Volume Control

(Factory default is "OFF")

When it is turned ON, this feature is designed to protect the ear by instantaneously throttling the earphone output volume when a sudden loud sound is generated. The earphone volume is independent of the sensitivity setting function. Therefore, throttling the earphone volume has no influence on the leak detection reading. Once the loud sound ceases, the volume reverts to its normal setting. However, if the loud sound is continuously generated, the earphone volume is repeatedly throttled and the sound may grow very small.

- 1) Press [↑] and [↓] to switch between "ON" and "OFF".
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to detection mode.

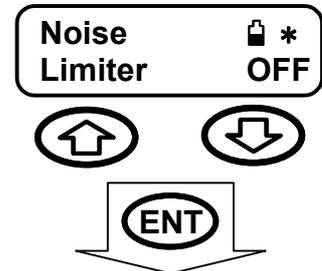


10.6 Setting the Noise Limiter

(Factory default is “OFF”)

When it is turned ON, this feature is designed to protect the ear by cutting ONLY the sound of sudden loud sounds when they are generated. It is different than an automatic volume control in that the earphone volume is not throttled, thus the volume of normal sounds does not become reduced. There is also no effect on the leak detection reading. Use this feature in combination with the noise level adjustment.

- 1) Press [\uparrow] and [\downarrow] to switch between “ON” and “OFF”.
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to detection mode.

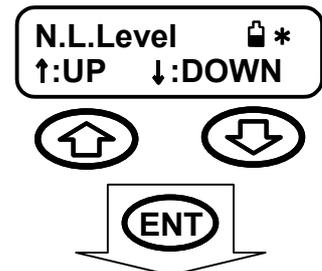


10.7 Adjusting the Noise Level

(Factory default is “Maximum”)

This feature is used to set the cut level of the noise limiter. If the cut level is lowered too much, the sound may break off. Use at a level at which the sound does not break off. As there is no level indicator, perform the adjustment while monitoring the sound from the earphones.

- 1) Pressing the [\uparrow] or [\downarrow] button one time adjusts the level one step. If the button is pressed and held down, the level is continuously adjusted until the button is released. To go from the minimum to the maximum, the button must be held down continuously for approximately 7 seconds.
- 2) Pressing the [\uparrow] button raises the cut level, and pressing the [\downarrow] button lowers the cut level.
- 3) Press [ENT] to move the display to the next setting item.
- 4) Press [Func.] to return to detection mode.

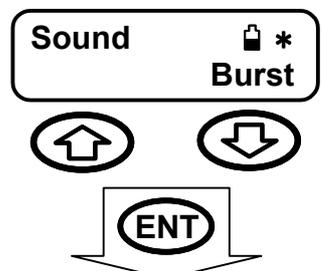


10.8 Selecting Earphone Output Type

(Factory default is “Beat”)

The earphone output may be set to either “Burst” or “Beat”. “Beat” means that the ultrasonic signal from the leak has been converted to an audible frequency, which is a natural sound. “Burst” means that the intensity of the ultrasonic signal from the leak has been converted to a pulsing signal that allows the assessment of the size of the leak to be made based on the speed of the pulse.

- 1) Press [\uparrow] and [\downarrow] to switch between “Burst” and “Beat”.
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to the detection mode.

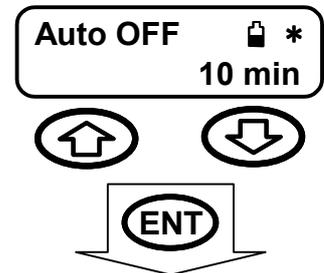


10.9 Setting the Automatic Power OFF Time Delay

(Factory default is “10 min”)

This feature automatically turns the **SonicMan** power OFF, after the prescribed length of time has elapsed in which the **SonicMan** has not been operated.

- 1) Press the [↑] and [↓] buttons to raise or lower the power OFF time delay from 0 to 60 minutes.
- 2) If the time delay is set to 0 minutes, the automatic power OFF feature is disabled.
- 3) Press [ENT] to move the display to the next setting item.
- 4) Press [Func.] to return to detection mode.

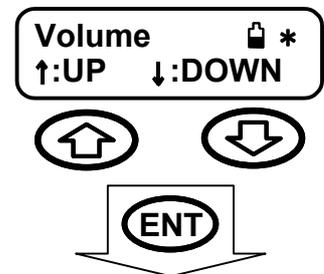


10.10 Adjusting the Earphone Output Volume

(Factory default is “Maximum”)

This feature allows the adjustment of the earphone output volume. As there is no level indicator, perform the adjustment while monitoring the sound from the earphones.

- 1) Pressing either the [↑] or the [↓] button one time adjusts the level one step. If the button is pressed and held down, the level is continuously adjusted until the button is released. To go from the minimum to the maximum, the button must be held down continuously for approximately 7 seconds.
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to detection mode.

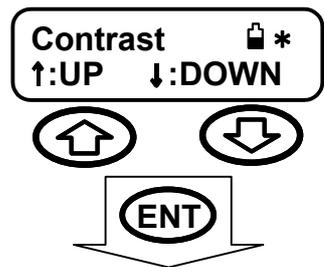


10.11 Adjusting the Display Contrast

(Factory default is “Maximum”)

This feature allows the screen contrast to be adjusted. As there is no level indicator, perform the adjustment while observing the screen.

- 1) Pressing either the [↑] or the [↓] button one time adjusts the level one step. If the button is pressed and held down, the level is continuously adjusted until the button is released. To go from the minimum to the maximum, the button must be held down continuously for approximately 7 seconds.
- 2) Press [ENT] to move the display to the next setting item.
- 3) Press [Func.] to return to detection mode.

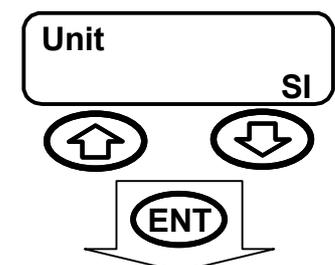


10.12 Unit Setting

(Factory default is “SI”)

This feature is used to set the units for calculating detected value, switching between “SI” (m for length and kg for weight) and “Imperial” (ft for length and lb for weight).

- 1) Pressing either the [↑] or the [↓] button one time switches between “SI” and “Imperial”.
- 2) Press [ENT] to return to the battery strength display.
- 3) Press [Func.] to return to detection mode.



11 Using Accessories

11.1 How to Use the Nozzle

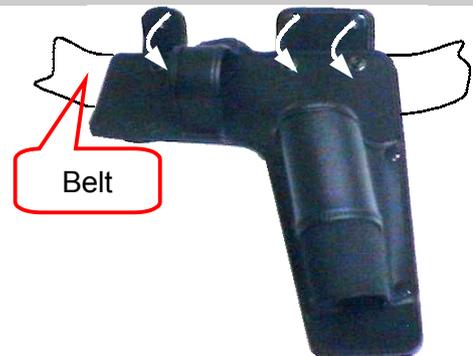
Use the nozzle to help pinpoint the leak location. Using the **SonicMan** with the nozzle attached greatly enhances its directional properties, which is useful for locations where there is a great deal of background noise, or for cases in which one wishes to further home in on the leak location. Use of the nozzle makes it possible to collect the ultrasonic waves in the direction in which the **SonicMan** is pointing with greater accuracy.

- 1) Attach the nozzle to the tip of the **SonicMan**.
- 2) When not using the nozzle, store it in the holster.



11.2 How to Use the Holster

- 1) Take out the holster's belt loop and attach it to the belt.



- 2) Insert the **SonicMan** unit into the holster and close the band.



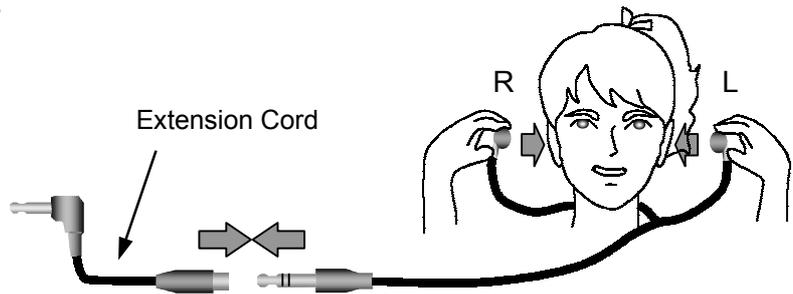
- 3) The nozzle can be removed by pulling it out of the bottom of the holster.



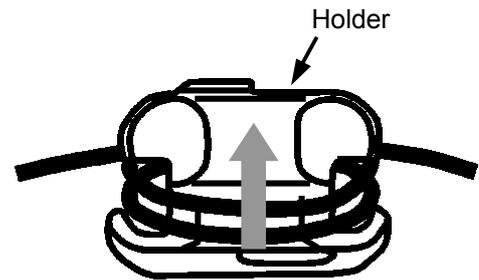
11.3 How to Use the Earphones

- 1) Attach the extension cord.

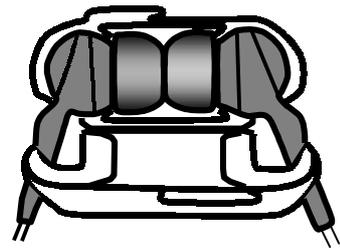
- 2) Put on the earphones. The earpiece marked "R" is for the right ear, the one marked "L" is for the left ear. Place the cord behind your neck.



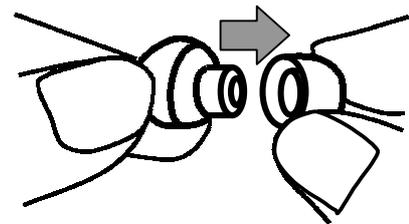
- 3) Wind the cord holder to adjust the cord to an appropriate length.



- 4) Wind Place the earphones properly in their holder when not in use.



- 5) Ear pieces are replaceable.



12 Troubleshooting

When the product does not perform as it should, troubleshoot the problem using the following list. After checking the following items and performing the prescribed corrective actions, if the product still does not perform as it should, contact the local **TLV** technical sales representative with details of the malfunction status.

Problem	Cause	Remedy
The battery does not charge.	Are the specialized charger and battery pack being used?	Use only the included charger and battery pack.
	Is the charger power cord connected properly?	Check both the outlet side and the charger. Insert the included power cord securely into the unit and into the power outlet.
	Is power being supplied to the electrical outlet?	It may be that the main power source is turned off. Make sure that it is turned on.
Even though the power is ON, nothing is displayed	Is the battery pack attached?	Attach the included battery pack, making sure that it is fully charged.
	Is the battery pack being used the one that was supplied with SonicMan ?	Attach SonicMan 's specialized battery pack.
	Is the battery pack fully charged?	Charge the battery pack with its charger.
	Is the trigger being pulled all the way?	Pull the trigger until a "click" is heard.
	Is the screen contrast set too light?	Press the laser pointer button. If a laser beam is emitted, the power is ON. This means that the screen is simply not visible. Readjust the screen contrast setting. Note: Pressing [Func.], [ENT] 9 times while holding down the [↑] button causes characters to appear on the screen.
The unit does not turn off, even when the power is OFF (continued next page)	Is the unit in Detection mode?	The power cannot be turned OFF when the unit is in a mode other than detection mode, for example when it is in calculation mode, recalling saved data or any of the various setting modes. Return to detection mode before turning the power OFF.

Troubleshooting continued next page

12. Troubleshooting

The unit does not turn off, even when the power is OFF (continued)	Is the trigger being double-clicked?	Double-click the trigger, with both clicks occurring within a 1 second time period. A double-click that takes longer than 1 second for both clicks will not turn the unit OFF.
	Is the trigger being pulled all the way?	Pull the trigger until a “click” is heard.
No sound can be heard through the earphones	Are the earphones being used the ones that were included in the SonicMan set?	There may be no sound output if earphones other than the included earphones are used. Be sure to use only the included earphones.
	Are the earphones inserted snugly into the earphone jack?	Insert the earphones firmly all the way into the earphone jack.
	Is there any dirt or foreign matter in the earphone ear piece?	Clean the earpiece with a soft, dry cloth.
	Is the noise level set too low?	Increase the setting to a proper level (see section 10.7 “Adjusting the Noise Level”).
No laser beam is emitted from the laser pointer	Is the unit in detection mode?	Even if the laser pointer is set to ON, if the unit is in a mode other than detection mode, no laser beam will be emitted. Return the unit to detection mode and again check the status of the laser beam.
	Is the “*” mark displayed on the screen?	When the laser pointer is ON, the “*” mark is displayed on the screen. Press the [*] button, causing the “*” mark to be displayed, and again check the status of the laser beam.
Automatic sensitivity adjustment does not function properly	Is the trigger being held?	The automatic sensitivity adjustment only works if the trigger is pulled and held.
	Is the body of the SonicMan being moved?	If SonicMan is moved, the sound will vary with the adjusted sensitivity. Do not move the body during automatic sensitivity adjustment.
	Is there any variable noise generated in the reading direction?	When the reading sound varies, The adjustment sensitivity also varies. Set sensitivity with a read sound that is relatively stable.
When saving, the automatically created record No. does not begin at 001	Has inspection data been saved previously?	The automatically generated record number is one number larger than the highest existing record number. Using the saved data recall function, check the saved data and delete all unnecessary data that is found.

13 Specifications

13.1 SonicMan (Model SN1)

Detection-related	
Sensor	: Ultrasonic microphone
Detector Center Frequency	: 40 kHz
Detector Sensitivity	: 125 dB
Sensitivity Adjustment	: 100 levels
Laser Pointer	
Classification	: Class 2 laser product
Maximum Output	: 1 mW continuous
Medium	: Laser diode
Emission Wavelength	: 657 nm
Display	: 16 characters x 2 lines dot matrix LCD (with yellow backlight)
Earphone Output	
Jack	: ϕ 3.5 mm, stereo
Impedance	: 16 Ω
Output Sound	: "Beat" or "Burst" sound (interchangeable)
Power Source	: Specialized battery pack; rechargeable nickel-metal-hydride battery 2.4 V, 1650 mA·h
Continuous Use Time (After full charge)	
	: Approx. 11 hours (both backlight and laser pointer OFF)
	: Approx. 8 hours (backlight ON, laser pointer OFF)
	: Approx. 6 hours (both backlight and laser pointer ON)
Allowable Temperature Range	
When in Use	: 0 – 40 °C
When in Storage	: -5 – 50 °C
Dimensions (Approximate)	: Length = 175 mm (260 with nozzle), height = 180 mm, width = 85 mm
Weight	: 550 g

13.2 Charger (Model SO1-201)

Charging Time	: Approx. 1 hour maximum
Full Charge Detection System	: Δ V Detection system; After full charge is completed, it moves to trickle charge
"Refresh" Feature	: Discharge Time – approximately 1 hour maximum; after completing the discharge, it automatically switches to charging mode
Input	: 100 – 240 V AC, 50/60 Hz
Dimensions	: Length = 130 mm, width = 90 mm, height = 60 mm
Weight	: 270 g

14 Product Warranty

14.1 Warranty Period

One year following product delivery.

14.2 Warranty Coverage

TLV CO., LTD. warrants this product to the original purchaser to be free from defective materials and workmanship. Under this warranty, the product will be repaired or replaced at our option, without charge for parts or labor.

This product warranty will not apply to cosmetic defects, nor to any product whose exterior has been damaged or defaced; nor does it apply in the following cases:

- 1) Malfunctions due to improper installation, use, handling, etc., by other than **TLV CO., LTD.** authorized service representatives.
- 2) Malfunctions due to dirt or scale.
- 3) Malfunctions due to improper disassembly and reassembly, dropping or other impact, or due to inadequate inspection and maintenance by other **TLV CO., LTD.** authorized service representatives.
- 4) Malfunctions due to disasters or forces of nature.
- 5) Accidents or malfunctions due to any other cause beyond the control of **TLV CO., LTD.**

14.3 Concerning Calibration

SonicMan is a precision measuring instrument.
It is recommended that it be calibrated periodically.

- Interval Between Calibrations : 2 years
- Calibration Method : Calibration is performed using a specialized calibration apparatus at the **TLV** plant.

Contact the local **TLV** technical sales representative.

Manufacturer

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Kakogawa, Hyogo 675-8511 JAPAN
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