(continued) alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a Radio Shack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Radio Shack Customer Relations, Dept. W,
100 Throckmorton St., Suite 600, Fort Worth, TX 76102

We Service What We Sell *03/97*

RADIO SHACK
A Division of Tandy Corporation
Fort Worth, Texas 76102

811014750H
Printed in China

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Cat. No. 33-2050

OWNER'S MANUAL

Please read before using this equipment.

SOUND LEVEL METER

Radio Shack®

INTRODUCTION

Your Radio Shack Sound Level Meter is an extremely versatile device for measuring sound intensity in just about any acoustic environment — loud or soft; high-pitched, low-pitched, or broad-band; intermittent or continuous. You can use it to measure noise levels in factories, schools, offices, and airports, or to check acoustics of studios, auditoriums, and home theater installations.

Your meter features a large, easy-to-read indicator for taking quick measurements anywhere. Power is supplied by a 9-volt rectangular battery, so the meter is completely portable.

The meter's other features include:

Seven sound-level ranges — allow measurements from 50–126 dB (referenced to 0.0002 µbar).

A and C weightings — lets you check compliance with safety regulations as well as make acoustic analysis.

Slow and fast response settings — let you check peak and average noise levels.

Built-in battery condition indicator

Phono-type output jack — for connection to home theater or test equipment.

Threaded insert — lets you attach the meter to a camera tripod for increased accuracy.

SPECIFICATIONS

Range:

Switch Setting	Range of Measurement
60 dB	50–66 dB
70 dB	60–76 dB
80 dB	70–86 dB
90 dB	80–96 dB
100 dB	90–106 dB
110 dB	100–116 dB
120 dB	110–126 dB

Accuracy ..... ±2 dB @ 114 dB

Standard ..... 0 dB = 0.0002 µbar

Weighting ..... A and C

Response ..... Fast and Slow

Signal Output ..... 1.0 volt (peak) minimum into open circuit, with full-scale meter deflection at 1 kHz

Load Impedance ..... 10 kohm minimum

Distortion ..... Less than 2% at 1 kHz, 0.5-volt

Microphone ..... Electret condenser omnidirectional becoming slightly directional with increase in frequency

Battery ..... One 9-volt rectangular type

Battery Check ..... Tests "good" from 7.0 to 10.5 volts

Expected Battery Life .....110 working hours (alkaline battery)

Size (HWD) ..... $6\frac{1}{4} \times 2\frac{7}{16} \times 1\frac{3}{4}$ inches ($160 \times 62 \times 44$ mm)

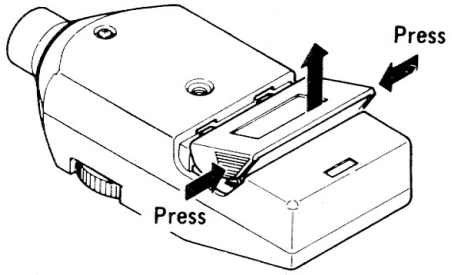
Weight ..... 6.6 oz (about 185 grams)

Specifications are typical; individual units might vary. Specifications are subject to change and improvement without notice.

INSTALLING A BATTERY

The meter uses a 9-volt battery. For the longest life and best performance, we recommend an alkaline battery such as Radio Shack Cat. No. 23-553 (not supplied).

Open the battery compartment cover by pressing both sides at the lower striped portion and lifting the bottom. Insert a battery into the compartment as indicated by the polarity markings (+ and –) marked inside.

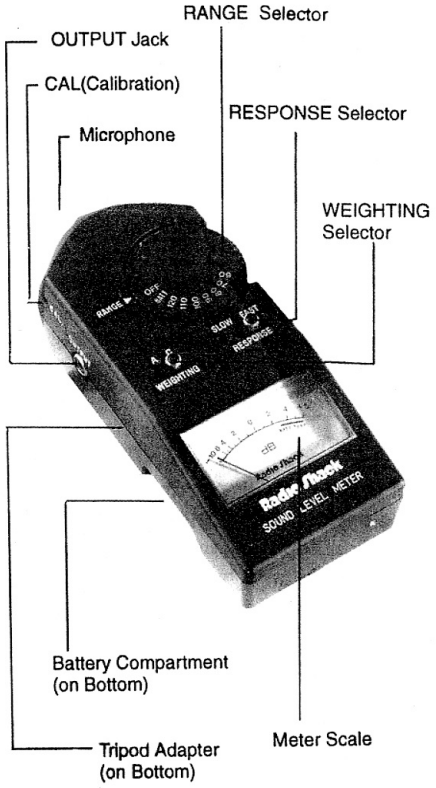


To test the battery, set **RANGE** to **BATT**. If the meter shows a reading in the red **BATT TEST** region, the battery is still good.

Notes:

- Leave **RANGE** in the **OFF** position when the meter is not in use to conserve battery power.
- Remove the battery if you are not going to use the meter for a week or more.

CONTROLS



RANGE

The **RANGE** selector lets you select one of seven sound level ranges, each spanning 16 dB. The numbers on **RANGE** refer to the center points of the seven ranges. The needle indicator shows the actual sound level as a displacement from the center point. For example, if **RANGE** is set to **80** and the meter scale reads **−3**, the actual sound level is 77 dB (80–3). If the meter scale reads 0 (same as the value where **RANGE** is set), the actual sound level is 80 dB (80+0).

OUTPUT

The phono–type **OUTPUT** jack lets you connect the meter to recording or other measurement equipment. For example, you might use an audio patch cord to connect the meter to the AUX or high-level input of a recorder. Note that the meter response will not be flat, due to the A- and C-weighting networks.

Set **RANGE** so the maximum needle deflection is never greater than +4, to prevent the built-in amplifier from clipping. Use A-weighting for voice recordings, or C-weighting for full-range musical material. The **OUTPUT** jack can also be connected to high-impedance headphones, or an oscilloscope, a frequency analyzer, or other test equipment.

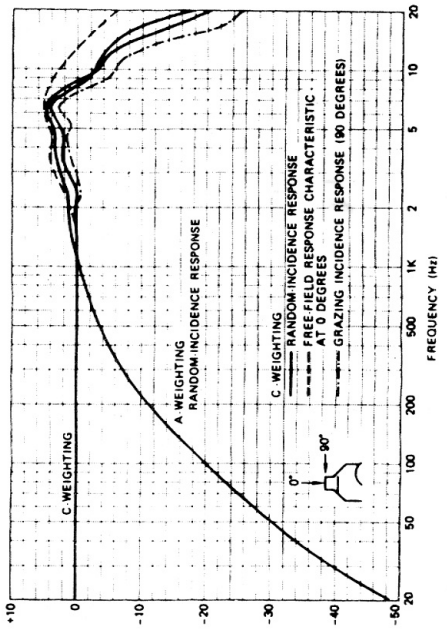
RESPONSE

The **RESPONSE** selector has two settings: **FAST** and **SLOW**. In the **FAST** position, the meter reacts quickly to changes in the sound level, showing you the peak sound levels present in the environment. In the **SLOW** position, the meter is damped and indicates an average-value sound level. The effect of brief sound peaks is minimized in this position.

WEIGHTING

Set **WEIGHTING** to weight the sound measurement for a particular frequency range. When set to **A**, the meter primarily measures frequencies in the 500–10,000 Hz range, which is the area of greatest sensitivity to the human ear. When set to **C**, the meter measures uniformly over the frequency range from 32–10,000 Hz, giving an indication of the overall sound level.

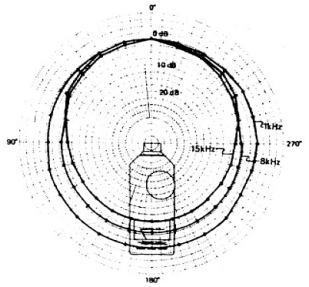
The chart on Page 10 shows the meter's frequency response for A- and C-weighting.



Typical A- and C-weighted response curves (A-weighted with random-incidence)

MICROPHONE

The meter's built-in microphone works best when you point it directly at a sound source.



TRIPOD ADAPTER

You can mount the meter on a camera tripod (standard 1/4–20 thread) to eliminate hand noise and minimize the effects of sound reflected from your body. This makes it easy to use the meter with auxiliary recording or test equipment.

CAL (CALIBRATION)

Your meter has been accurately calibrated at the factory and normally will not require further adjustment. If necessary, an audio professional can use the **CAL** hole on the meter with special equipment, including a sound generator, to calibrate it.

MEASUREMENTS

Important:

- Do not hold the meter directly between you and the sound source, as this might produce an error of several decibels in the frequency range above 100 Hz. Position the meter so an imaginary line between you and the meter is perpendicular to a line between the meter and the sound source.
- Handle the meter carefully. The microphone and meter movement are fragile and might be damaged if the instrument is dropped. Do not operate the meter at a range setting that causes "pegging" of the needle. This could damage the movement.

Follow these steps to select the desired response, weighting, and range.

1. Set **RESPONSE** to **FAST** if the sound source you want to measure consists of short bursts or if you want to measure only peak values. Or, set **RESPONSE** to **SLOW** if you want to measure average sound levels.
2. Set **WEIGHTING** to **A** if you want to measure noise level or **C** if you want to measure sound levels of musical material.
3. Set **RANGE** to the highest setting (**120 dB**) then adjust it downward until there is

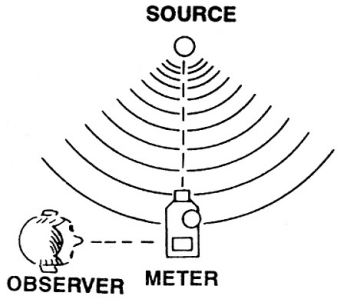
significant deflection of the needle. For the greatest accuracy, always use the lower of any two possible settings.

For example, if **RANGE** is set to **80 dB** and the meter reads around −5, reset **RANGE** to **70 dB** so the meter reads +3, for an actual sound level of 73 dB.

Important: For meaningful readings, any particular sound to be measured must be at least 10 dB louder than the background noise level.

While taking measurements, minimize the effect of your body's presence. When the sound is coming mainly from one direction, the level reading might be significantly affected by reflections from your body.

For the most accurate readings and the best polar response, point the meter's microphone toward the sound source when possible.



CHECKING NOISE LEVELS

This chart, gathered from Federal, state, and local agencies, shows standards for just how much noise is acceptable.

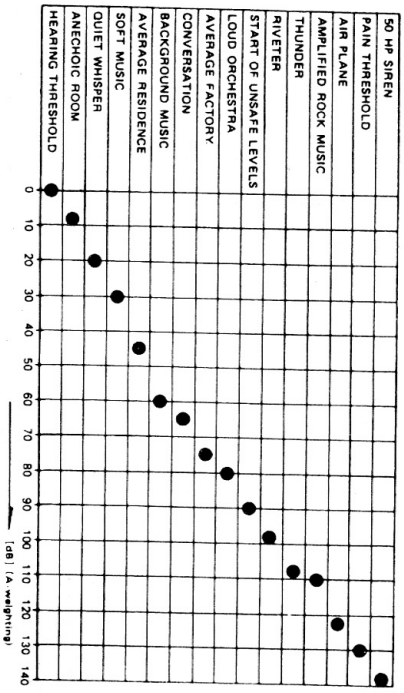
Sound Level (dB) (A-weighting, SLOW response)	Maximum Duration per Day (hours)
90	8
92	6
95	4
97	3
100	2
102	1 1/2
105	1
110	1/2
115	1/2 or less

Permissible noise exposures. Extracted from U.S. Department of Labor Noise Regulations.

Noise is inevitable in almost any environment. Depending on the level and duration, noise can be a minor irritant, a definite disturbance, or even a threat to your hearing.

To use your meter to check noise levels, set **WEIGHTING** to **A** and **RESPONSE** to **SLOW**. Take measurements at several points in the test area, with the meter positioned properly.

This chart shows the average dB levels of some common activities.



CHECKING ROOM ACOUSTICS

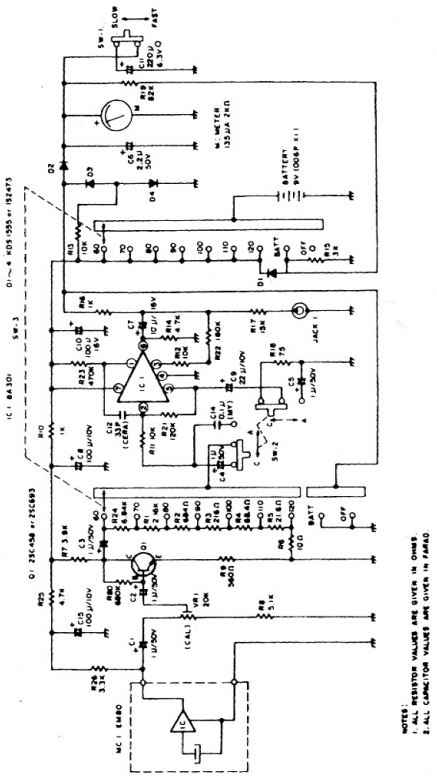
The size, shape, and furnishings of a room can have a tremendous effect on a home theater system's performance. A "hard" room with bare surfaces tends to exaggerate treble response, sometimes giving the music a strident quality. A "soft" room with curtains, overstuffed furniture, carpet, etc. might reduce high-frequency response so the bass sounds dominant, giving you a "mushy" sound. Depending on the speaker placement, standing waves might also develop in the room, giving your system a "peaky," eccentric response.

The first step in solving this problem is to analyze the room's acoustics with your meter and a suitable test recording. The test recording should produce pure tones, one at a time, at intervals spanning the audio spectrum. Make a graph or table showing the sound levels generated by the individual tones. This gives you a clear idea of the frequency response of your "total system" —home theater equipment and room included.

The next step is to smooth out the response. Adjusting tone controls and varying speaker placement might improve the sound significantly. But, to approximate the ideal, "flat response," you could add a frequency equalizer to your home theater system. Your local Radio Shack store carries frequency equalizers that let you boost or cut response in different ranges, as indicated by your frequency response analysis. Properly equalized, your system can sound like one costing considerably more!

Note: If **WEIGHTING** is set to **C**, the meter's frequency response is flat from 32 to 10,000 Hz (±3 dB). Above 10 kHz, the frequency response of the meter drops off rapidly. Be sure to consider this when you use a test recording that includes tones at the extreme high end of the audio spectrum.

SCHEMATIC DIAGRAM



Limited Ninety-Day Warranty

This product is warranted by Radio Shack against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from Radio Shack company-owned stores and authorized Radio Shack franchisees and dealers. EXCEPT AS PROVIDED HEREIN, Radio Shack MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, Radio Shack SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF Radio Shack HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow the limitations on how long an implied warranty lasts or the exclusion of incidental or consequential damages, so the above limitations or exclusions may not apply to you. In the event of a product defect during the warranty period, take the product and the Radio Shack sales receipt as proof of purchase date to any Radio Shack store. Radio Shack will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of Radio Shack. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, *(continued)*