

CAL250

User Manual



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Record of Serial Number and Purchase Date

CAL250 Serial #: _____

Purchase Date: _____

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Larson Davis, Inc. is an environmentally friendly organization and encourages our customers to be environmentally conscious. When this product reaches its end of life, please recycle the product through a local recycling center or return the product to:

Larson Davis, Inc.

Attn: Recycling Coordinator

1681 West 820 North

Provo, Utah, USA 84601

where it will be accepted for disposal



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Using the CAL250 Calibrator

The Larson Davis Model CAL250 is a battery operated precision microphone calibrator used for the calibration of sound level meters and other sound measurement equipment. The CAL250 delivers a full 114.0 dB level output signal @ 251.2 Hz. It has been designed for field or laboratory use and its accuracy has been calibrated to a reference traceable to the National Institute of Standards and Technology (NIST).

Features of the CAL250

- Automatic compensation sensors provide accurate calibrations in extreme environments
- An effective volume of $> 100 \text{ cm}^3$ (6 in^3) ensures an accurate calibration, even if the microphone and microphone adapter are not fully seated
- An accurate tone is measured even with a weakened battery
- Special adaptors make possible the use of $1/4$, $3/8$, $1/2$ inch microphones, as well as 1 inch microphones without an adaptor

CAL250 Accessories

The CAL250 includes the following accessories:

- ADP019: Adapter for 1/2" microphone
- CCS003: Storage case
- 9 V alkaline battery

Optional Accessories

The following optional accessories are available:

- ADP020: 3/8" adaptor
- ADP021: 1/4" adapter

Installing the Battery

The CAL250 will run for approximately 100 hours on one 9 volt battery. This will give you nearly 4200 calibrations.

The CAL250 uses a 9 volt battery and it is recommended that you use an alkaline battery to extend the running time of your calibrator.

Follow the steps below to install the battery:

- A. The end cap of the bottom of the calibrator functions as the battery door).
- B. Unscrew the cap. by hand, in a counterclockwise direction until battery is exposed.



FIGURE 1-1 Unscrew Battery Cap

- C. Pull the battery out of the compartment and undo the battery from the clip.



FIGURE 1-2 Remove Battery

- D. Snap a new battery onto the clip and place the battery back into the compartment.
- E. Replace the battery cap and tighten using only finger/hand strength.



FIGURE 1-3 Replace Battery Cap

If using a 1" microphone remove the 1/2" adaptor in order to place the calibrator over the microphone. Place the microphone inside the calibrator opening.

Microphone Calibration

The CAL250 provides a nominal tone of 250 Hz at 114 dB +/- 0.1 dB. If the device being calibrated has only A-weighting, it should be calibrated to read 105.4 dB.

To calibrate the microphone, follow the steps below:

- A.** Insert the proper microphone adapter fully into the calibrator. Make sure it fits snugly.
- B.** Insert the microphone fully into the adapter. Make sure it fits snugly.
- C.** With the microphone connected to the instrument being calibrated, press the CAL250's ON button. With a fresh battery, the calibrator will issue a tone for more than 60 seconds before automatically shutting off (see note below).
- D.** Make a reading. If the reading is not within tolerance, refer to the instrument's manual for instructions on how to adjust the instrument.

As the battery becomes weaker, the calibration tone will not deteriorate, but the operating time will decrease until the time is too short to accomplish an adequate calibration.

When making a sequence of measurements, a calibration check and an adjustment (if necessary) of the instrument should be made at the beginning. At the end of the measurement sequence, the calibration should be checked again. The inaccuracy of the measurements will be at least as large as the difference between the level measured for the initial calibration (or calibration check) and the level measured for the final calibration check.

NOTE: Each time the ON button is pressed, the CAL250 calibrator will run approximately 60 seconds on a fresh battery. In order for the calibrator to turn off do not press the ON button again. Wait until the calibrator times out. It is not an ON/OFF button.

Calibration History

Larson Davis strongly recommends that a history of each calibration adjustment be kept for each piece of equipment. Normally, most modern equipment requires little or no adjustment once the initial calibration is performed. Systematic drifts are possible, and these should be recorded for corrective action.

The Larson Davis Models 706, 720, 812, 814, 820, 824, 870 and LxT sound level meters keep a history of each calibration change that can be printed before an overall reset.

Environmental Precautions

While the CAL250 will perform normally under a wide variety of gradually changing environmental conditions, some precautions should be taken when sudden changes occur:

- The temperature of the CAL250 should be stable. If the temperature changes suddenly, provide a stabilization time of 15 minutes. This will ensure that the temperature compensation sensors are at the same temperature as the rest of the unit.
- While humidity will not affect the CAL250, avoid condensing moisture. Also, avoid environments over 90% relative humidity because condensation can easily take place.
- The CAL250 is insensitive to magnetic fields; however, the instrument being tested may not be. Therefore, calibration should not be done near motors, dynamos, high voltage wires, or other sources of electromagnetic fields.

Calibrator Calibration

The American National Standards Institute says, “An acoustical calibrator should be recalibrated at least annually by the instrument manufacturer or an acoustical test laboratory qualified to perform calibration.” (American National Standards Institute. Specifications for Acoustical Calibrators. ANSI S1.40, 1984, par. 5.2)

Larson Davis believes the frequency of recalibration depends on the number of calibrators being used and the number of instruments being calibrated. With this in mind, the following guidelines are presented for your consideration:

- For one calibrator and one measurement instrument, the CAL250 should be certified at least yearly.

NOTE: If a systematic drift of several dB occurs, there is no reliable way to verify which instrument is at fault, even though it is more likely to be the measurement instrument.

- For one calibrator and several measurement instruments, one calibration a year is recommended. but if no systematic drift occurs, every two years might be satisfactory.

***NOTE:** If the CAL250 is being used to calibrate several instruments, then the history of calibration adjustments can usually pinpoint which instrument is drifting. If all the measurement instruments are drifting in the same direction by an amount you consider significant, the CAL250 should be recertified.*

- For several calibrators and several instruments, one calibration a year is recommended.

NOTE: If several instruments and several calibrators are in use, then the history of calibration adjustments would precisely pinpoint any problem pieces of equipment. Furthermore, it is probably satisfactory to recalibrate only one of the calibrators each year.

A

CAL250 Specifications

The specifications contained in this chapter are subject to change without notice. Please refer to calibration and test results for data on a specific unit.

Standards Met:

- ANSI S1.40-1984, Specifications for Acoustic Calibrators
- IEC 60942-2003, Class 1, Sound Calibrators

Technical Specifications

Calibration sound pressure level (factory specification)	114.0 ± 0.1 dB SPL re: 20µPa @ 1013 mBar, 23 ° C and 50 % RH
Calibration sound pressure level after one year	114.0 ± 0.2 dB under same conditions as above
Frequency	251.2 ± 2 Hz
Harmonic distortion	< 2 %
Stability	± 0.1 dB after 2 seconds
Barometric pressure range	650 to 1080 millibars, SPL variation will be < ± 0.3 dB

Table A - 1 Technical Specifications


Temperature range	SPL variation $< \pm 3$ dB and frequency variation $< \pm 2$ Hz over the range -10 to 50° C
Humidity range	SPL variation $< \pm 0.3$ dB and frequency variation $< \pm 2$ Hz over the range 10 to 90 % relative humidity (non-condensing)
Storage temperature	-40° C to 60° C
Storage humidity	0 to 90 % relative humidity (non-condensing)
Effective volume of calibrator and microphone	$> 100 \text{ cm}^3$ (6.1 in. ³)
Dimensions	Length 124 mm (4.9 in.) Diameter 44.5 mm (1.75 in.)
Weight	249 gm. (8.8 oz.)
Battery	9 V NEDA 1604A or IEC 6LR61
	CE-mark indicates compliance with: EMC directive
EMC Emission	EN 50081-1: Generic emission standard. Part 1: Residential, commercial and light industry
EMC Immunity	EN 50082-2: Generic immunity standard. Part 2: Industrial environment.

Table A - 1 Technical Specifications

B

Warranty/Customer Satisfaction

A. Total Customer Satisfaction. Larson Davis, Inc. ("LD") guarantees Total Customer Satisfaction. If, at any time you are not completely satisfied with any LD product, LD will repair, replace or exchange it at no charge, except as otherwise provided in this Limited Warranty. The employees of LD strive to provide superior, unmatched customer service. Should you find yourself dissatisfied with any LD product for any reason, consult a LD Application engineer or local representative/ distributor to discuss your situation.

B. Purchase Price Refund/Limited Warranty. LD warrants to the original purchaser (the "Buyer") that, unless otherwise expressly specified in writing by a LD officer, all LD products shall be free of defects in material and workmanship for a period of two (2) years from date of original purchase. In furtherance of LD's commitment to Total Customer Satisfaction, LD will, for a period of one (1) year from date of original purchase, refund 100% of the customer's purchase price for any LD product with which the buyer is not completely satisfied, subject to the exceptions contained in Paragraph J of this Limited Warranty. The option of a refund may be selected during this one (1) year period in lieu of repair, replacement or exchange of the product.

Extended Labor Warranty. In furtherance of LD's commitment to Total Customer Satisfaction, LD offers an extended labor warranty of one (1) year on all products calibrated or certified by a factory technician at any time or from time-to-time during the first seven years of the product life from date of manufacture. The customer's sole remedy pursuant to this extended warranty is to receive free labor for any repairs required during the period in which the extended warranty is effective. This extended labor warranty is subject to the limitations as outlined in Paragraph J.

Service & Repair Limited Warranty. In addition to the limited warranties set forth above, LD offers a 90-day parts and labor limited warranty for all repair work performed at the factory. This warranty is limited to parts repaired or replaced at the factory by LD. This warranty is also subject to the limitations as outlined in Paragraph J.

C. Shipping Charges. The buyer will return the product freight prepaid by the Buyer to an authorized service center. The product will be returned to the buyer freight prepaid by LD.

D. Products Manufactured by Others. This Limited Warranty does not cover any products manufactured by others. Such products are subject to the warranty, if any, of their respective manufacturers, and to be repaired only by a respective authorized service person for such products. LD shall have no obligation to undertake repairs of products manufactured by others.

E. NO SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES. LD'S SOLE OBLIGATIONS UNDER THIS LIMITED WARRANTY ARE SET FORTH ABOVE IN PARAGRAPHS A, B, C AND D. IN NO EVENT SHALL LD (ITS CONTRACTORS OR SUPPLIERS) BE LIABLE TO THE BUYER FOR ANY LOST PROFITS, DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER BASED ON CONTRACT, IN TORT OR ANY OTHER LEGAL THEORY. SUCH DAMAGES FOR WHICH LD SHALL NOT BE RESPONSIBLE INCLUDE, BUT ARE NOT LIMITED TO, LOST TIME AND CONVENIENCE, LOSS OF USE OF THE PRODUCT, THE COST OF A PRODUCT RENTAL, COSTS OF GASOLINE, TELEPHONE, TRAVEL OR LODGING, THE LOSS OF PERSONAL OR COMMERCIAL PROPERTY, AND THE LOSS OF REVENUE.

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I. Procedure for Warranty Performance. If the product fails to perform to LD's specifications, the Buyer must provide LD with the applicable model and serial numbers, the date of purchase, and the nature of the problem.

J. ADDITIONAL EXCLUSIONS FROM THIS LIMITED WARRANTY. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED IN THIS LIMITED WARRANTY, THIS LIMITED WARRANTY DOES NOT COVER ANY OF THE FOLLOWING:

1.EQUIPMENT THAT HAS BEEN ABUSED, DAMAGED, USED BEYOND RATED CAPACITY, OR REPAIRED BY PERSONS OTHER THAN AUTHORIZED SERVICE PERSONNEL.

2.DAMAGE CAUSED BY ACTS OF GOD THAT INCLUDE, BUT ARE NOT LIMITED TO, HAILSTORMS, WINDSTORMS, HURRICANES, TORNADOES, SANDSTORMS, LIGHTNING, FLOODS AND EARTHQUAKES.

3.DAMAGE UNDER CONDITIONS CAUSED BY FIRE OR ACCIDENT, BY ABUSE OR BY NEGLIGENCE OF THE USER OR ANY OTHER PERSON OTHER THAN LD, BY IMPROPER INSTALLATION, BY MISUSE, BY INCORRECT OPERATION, BY “NORMAL WEAR AND TEAR”, BY IMPROPER ADJUSTMENT OR ALTERATION, BY ALTERATIONS NOT COMPLETED BY AUTHORIZED SERVICE PERSONNEL, OR BY FAILURE OF PRODUCTS PARTS FROM SUCH ALTERATIONS.

4.COSTS OF REPAIRING DAMAGE CAUSED BY POOR OR IMPROPER MAINTENANCE OR UNAUTHORIZED REPAIR.

5.COSTS OF MODIFYING THE PRODUCT IN ANY WAY ONCE DELIVERED TO THE BUYER, EVEN IF SUCH MODIFICATIONS WERE ADDED AS A PRODUCTION CHANGE ON OTHER PRODUCTS MADE AFTER THE BUYER'S PRODUCT WAS BUILT.

Authority to Alter This Limited Warranty. No agent, representative, distributor, or authorized dealer of LD has any authority to alter the terms of this Limited Warranty in any way. This Limited Warranty may be altered only in a writing signed by an authorized officer of LD.

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