



Model CAL150 Sound Level Calibrator



The Larson•Davis Model CAL150 is a precise microphone calibrator intended for the Larson•Davis 3/8" diameter microphones typically used on the Model 700, 710, 712, and 720 SLM/Dosimeters and the Model 705 Noise Badge™. The CAL150 provides a choice of calibration sound pressure levels, 94.0 and 114.0 dB (switch selectable) at a frequency of 1 kHz. The optional adaptor AD110 is available to permit reference measurements of the CAL150 to be made using the Larson•Davis Models 2520 and 2530 1/4" condenser microphones.

Using the Calibrator

1. Select the desired calibration sound pressure level using the switch mounted on the side of the calibrator. When the atmospheric pressure differs from 1013 millibars, add the pressure correction listed on the CAL150 back label to the nominal sound pressure level of 94 or 114 dB to determine the actual level.
2. Insert the 3/8" microphone fully into the microphone opening at the top of the calibrator.

3. With the microphone connected to the instrument being calibrated, press the CAL150's ON button. With a fresh battery, the calibrator will emit an accurate tone for more than 60 seconds before automatically shutting off.
4. Make a reading. If the reading is not within tolerance, refer to the instrument's manual for instructions on how to adjust the instrument.

Note 1: 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 measurements, calibration should be checked again. The inaccuracy of the measurements will be at least the difference between the beginning and ending calibration values.

5. Keep a calibration history of all adjustments.

Calibration history keeping can be minimized if adjustments to the instrument are made only when the tolerance is exceeded. This is a user decision, but reasonable values might be ± 0.5 , ± 1.0 or ± 1.5 dB for Type 2 measurements.

Calibration History

Larson•Davis strongly recommends that a history report 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. But systematic drifts are possible, and these should be recorded for corrective action.

The Larson•Davis Models 712, 720, and 705 automatically keep a calibration history that can be printed out before an overall reset. The Models 700 and 710 provide in the printout offset values that directly relate to the gain in decibels needed to keep these instruments in calibration, and these offsets can serve as a calibration history.

Battery Replacement

At the 114 dB calibration level, the battery will last for approximately 42 hours, which corresponds to about 1,700 calibrations. When using the 94 dB calibration level, the battery will last for approximately 63 hours, corresponding to about 2,500 calibrations. As the battery becomes weaker, the calibration accuracy will not degrade in accuracy, but the operating time will decrease until the time is too short to accomplish an adequate calibration. At this time, the battery should be replaced.

Environmental Precautions

While the CAL150 will perform normally under a variety of gradually changing environmental conditions, some precautions should be taken when sudden changes occur:

1. The temperature of the CAL150 should be stable. If the temperature changes suddenly, such as moving outdoor to indoor, 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. Similarly, if the temperatures of the calibrator and the microphone of the sound level meter are different, they should be permitted to equalize before performing the calibration.
2. While humidity will not affect the CAL150, avoid condensing moisture. Also avoid environments over 90% relative humidity which may adversely affect the microphone. If this is not possible, calibration should be rechecked in better conditions.
3. The CAL150 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, transformers, or other sources of electromagnetic fields.

Calibrator Certification

The American National Standards Institute (ANSI) says, "An acoustical calibrator should be recalibrated at least annually by the instrument manufacturer or an acoustical test laboratory qualified to perform calibration.". Specification 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:

1. For one calibrator and one instrument, the CAL150 should be certified at least yearly, and even more often would not be unreasonable for critical applications.

If a systematic drift of several dB occurs, there is no reliable way to verify which instrument is at fault, although it is more likely to be the instrument. We recommend that the CAL150 be checked against another calibrator at this time.

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

If the CAL150 is being used to calibrate several instruments, then the history of calibration adjustments can usually pinpoint which instrument is drifting. If all the measurements are drifting the same direction by an amount you consider significant, then the CAL150 should be recertified.

3. For several calibrators and several instruments, one certification per year is recommended.

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.

Specifications

Calibration Sound Pressure Level	94.0 and 114.0 dB re: 20 mPa (± 0.5 dB) @ 1013 millibars and 20° C
Frequency	1 kHz $\pm 1\%$
Harmonic Distortion	<3%
Stabilizing Time	± 0.2 dB after 2 seconds
Barometric Pressure Range	650 to 1080 mbar Corrected SPL will be within ± 0.5 dB. Barometric pressure may have $\pm 10\%$ uncertainty
Temperature Range	SPL variation ± 0.4 dB (typically 0.005 dB/° C) Frequency variation $\pm 2\%$ over the range -10 to 50° C
Humidity Range	SPL variation ± 0.3 dB Frequency variation $\pm 2\%$ over the range 10 to 95% relative humidity
Storage Temperature	-40 to 60.0° C
Storage Humidity	0 to 99% relative humidity (non-condensing)
Effective Volume of Calibrator & Microphone	2.64 cm ³ (0.16 in ³)
Battery	9 V NEDA 1604A or IEC 6LR61 With sufficient battery voltage, calibrator will run (after releasing ON button) for 1 to 1.5 minutes before automatic shutdown. With insufficient battery voltage, calibrator will not remain ON after release of button.
Traceability	Utilize the Larson•Davis AD110 1/4" microphone adaptor and a Larson•Davis Model 2520 or 2530 precision condenser microphone in conjunction with other traceable measuring instruments to establish traceability of the output level and frequency of the Model CAL150.
Standards Met	ANSI S1.40-1984 – Specifications for Acoustic Calibrators IEC 942-1988 Class 2 – Sound Calibrators