

AUDit™ & System 824

Audiometer Calibration and Electro-acoustic Test System

Larson
Davis



A comprehensive line of couplers, systems and software!

Larson Davis audiometer calibration systems combine the speed and power of the System 824 real time analyzer with the sophisticated, yet user-friendly, AUDit™ software. Standard audiometer specification tests can be performed manually or under computer control with greater ease than with any other system.

To interface with the large variety of audiometer transducers, the Larson Davis family of couplers includes NBS 9-A and IEC 318 couplers as well as an extremely practical artificial mastoid.

Finally, there is a rugged, portable solution for in-house or in-field audiometer calibration which sacrifices none of the accuracy and stability of laboratory instrumentation.

1 Verify audiometers quickly and accurately under computer control with exhaustive tests based on the ANSI S3.6-1996 *Specification for Audiometers* limits

Test nearly every type of transducer such as supra-aural, extended range circumaural, bone vibrator, hearing aid, insert earphone, and speaker

Automatically correct RETSPLs, microphone, coupler, and all other response adjustments using AUDit™ software

Perform level and frequency adjustments during audiometer tests

Qualify audiometric booth ambient noise with real time 1/3 octave analysis and fast pass/fail results for ANSI S3.1-1991

Store and recall tests in databases; query databases by audiometer, technician, date, etc.

7 Print custom reports and certificates for your customers or for your own archives

System 824: Electro-acoustic analyzer and precision SLM

Level, frequency, FM, and pulse measurements are only a small portion of the capabilities of the System 824 real time analyzer.

Narrow-band FFT and real time 1/3 octave analysis speed up measurements such as THD or ambient noise measurements.



Research & Development

- Audiometer design and testing
- Earphones and hearing aids
- Electro-acoustic testing



Industrial Hygiene

- Audiometer certification
- Clinics and hospitals
- Hearing protection programs



Since the 824 is a complete, hand-held precision sound level meter, it is also well suited for:

- measuring noise dose exposure
- performing environmental noise studies
- assisting in noise reduction engineering

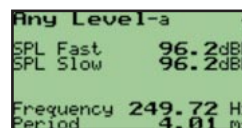
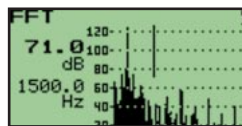
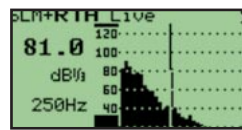
The perfect integration of analyzer, software and couplers for fast, exhaustive testing

The 824-AUD Firmware provides internal audiometer testing functions

Larson Davis audiometer calibration systems owe their power to the precision System 824 sound level meter: its standard real time fractional octave filters are important for audiometer tests. The 824-AUD firmware is also loaded with additional features such as FM and pulse, 400-line FFT for narrow-band analysis and total harmonic distortion, etc.

Real time analysis for HL, frequency & THD

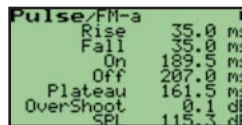
Hearing level measurements are simple with the real time 1/3 octaves of the System 824. The full spectrum is displayed without having to change filters. The 400-line FFT mode displays smaller frequency bands to locate and measure harmonics for THD measurements.



A precision counter accurately samples the period of the tone stimulus and displays it along with frequency.

All pulse measurements on a single screen

When pulsed stimulus capability must be tested, simply present the tone and read all values on a single screen of the System 824. Rise, Fall, ON and OFF times are measured with millisecond accuracy. Plateau duration and overshoot level are also averaged and displayed on the same screen.



Test frequency modulated stimuli

The characteristics of the FM presentation can be assessed just as easily. The System 824 measures minimum and maximum frequencies, calculates the carrier frequency and also measures the modulation rate.



AUDit™ Software offers test management, audiometer database, and reporting

An audiometer calibration involves much mundane but time consuming (and possibly error prone) note-taking and calculation. The AUDit™ software has been designed to simplify those steps and streamline testing.

Complete test information and definition

Measurement system: keeping track of test equipment is easy as the software maintains a database of your calibrators, microphones, couplers and 824 SLM with model, serial number and calibration date information.

Audiometer description: enter a complete description of the tested audiometer, its capabilities (such as type and frequencies), and its transducers. Future tests can recall this configuration.

Level corrections: these are done automatically from entered microphone, coupler and other responses.

Perform exhaustive calibrations

Ambient (booth) noise level test: the ambient noise of an audiometric test must not affect the patient. LD has integrated this standard test in AUDit™. Simply calibrate the microphone, then start the test. Failed frequencies are reported with a large red X.

Speaker tests, visual inspection: these are only two of the many tests that are available. Tests can recall the audiometer configurations and test instrumentation from previous calibrations.

Perform all, or select only desired tests: the main measurement screen displays a selection of tests, as well as their current status. Once a test is selected, simple prompts indicate what stimulus is required. Adjustments can be made immediately in some tests!

Low Freq. Input Levels				High Freq. Input Levels				Left	Right
Frequency	Measured SPL	Hearing Level	Deviation	Target SPL	Frequency	Measured SPL	Hearing Level	Deviation	Target SPL
125	117.2	68.9	-0.3	114.5 to 120.5	4000	78.0	68.3	-1.7	77.5 to 83.5
250	95.4	68.9	-1.1	93.5 to 99.5	6000	69.9	67.4	-2.5	70.5 to 80.5
500	82.0	68.5	-1.5	80.5 to 86.5	8000	71.0	58.0	-12.0	70.0 to 88.0
750	77.4	68.9	-1.1	75.5 to 81.5					
1000	76.5	69.0	-1.0	74.5 to 80.5					
1500	76.6	69.1	-0.9	74.5 to 80.5					
2000	81.1	70.1	0.1	78.0 to 84.0					
3000	79.4	69.9	-0.1	76.5 to 82.5					
4000	78.0	68.3	-1.7	77.5 to 83.5					
6000	69.9	67.4	-2.5	70.5 to 80.5					
8000	71.0	58.0	-12.0	70.0 to 88.0					

Generate results, reports and certificates

Results: each test displays immediate results on screen, with measured data and standard limits. It is possible to retest each failed frequency, level or function.

Custom reports and certificates: any stored calibration may be printed in whole or part. A certificate can also be printed, with your own customized certification text.

Export from database: should you desire even more flexibility, test results can be exported to your own template as .csv files.

AMC493 Artificial Mastoid

Use this innovative transducer for no-fuss bone vibrator testing

The LD AMC493 artificial mastoid is a precision mechanical coupler used to calibrate bone conduction hearing aids and audiometer bone vibrators.



The AMC493 is cost effective and simple to use. Its patented design converts the vibrator velocity output to an acoustic signal measured with the system's sound level meter. It is integrated with the AEC100 artificial ear to perform both ear and bone conduction tests using essentially the same equipment.

The AMC493 has an extremely low thermal mass compared to mastoids that require hours to reach the 23°C calibration temperature recommended in the standard. The AMC493 is ready for use within minutes! Put it in your pocket, instead of hitting your knees carrying a heavy case.

While polymers used in other mastoids are affected by aging and environmental exposure, the AMC493 polymeric parts are completely replaced each year during its inexpensive calibration and certification.

COMPONENTS DESCRIPTION

AMC493:	Artificial mastoid coupler (use with LD AEC100)
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SPECIFICATIONS

Frequency range:	125 Hz - 8 kHz, individually calibrated
Static force:	5.4 N with added mass ring
Materials:	Black anodized, laser etched aluminum disk with polymeric inserts, stainless steel mass
Dimensions:	0.3" H x 1.2" dia. (7mm H x 30mm dia.)
Weight:	0.3 oz. (8.7 g), coupler only

AEC101 IEC318 Coupler

An optional coupler for extended frequency earphone testing

Circumaural earphones are often used in modern audiometers offering stimuli at frequencies higher than 8000 Hz. The LD AEC101 IEC 318 coupler better represents high frequency earphone to ear coupling and is therefore indicated in ANSI and other standards for testing circumaural earphones.

The AEC101 is supplied with accessories to test extended frequencies on earphones such as the Koss HV1/A and Sennheiser HDA200, as well standard frequencies on TDH series earphones. Weights and plates for all supported earphone types are neatly packaged in a light, weather-tight case.



COMPONENTS DESCRIPTION

Microphone:	2559 1/2" random incidence (not included)
Preamplifier:	PRM902 1/2" dia. low noise preamp (not incl.)
AEC101.F:	IEC 60318-1 coupler
MAEC101.06:	Type 1 adaptor plate
MAEC101.07:	Type 2 adaptor plate
MAE100.6:	Earphone retaining ring
Static Force:	4.5 N standard, 9.5 N bag for circumaural earphones
ACC001:	Vibration isolation pillow
CCS002:	Fiberglass reinforced weather-tight case

SPECIFICATIONS

Materials:	Stainless steel base and coupler cavity, Delrin® conical ring, aluminum plates and retainer ring
Pressure leak:	Custom precision orifice
Dimensions:	2.2" H x 3.2" dia. (56mm H x 81mm dia.)
Coupler weight:	3.2 lbs (1.4 kg)

AEC100 NBS 9-A Coupler

A rugged instrument for testing TDH earphones

The AEC100 Coupler is a precision acoustic coupler designed primarily for the calibration and test of supra-aural earphones used in audiometry.

It allows accurate and repeatable measurements within its frequency response (up to 8 kHz). It may also be used for production testing where correlation between the coupler and real ear response is not a requisite.



COMPONENTS DESCRIPTION

Microphone	2575 1" pressure mic (not included)
Preamplifier	PRM902 1/2" dia. low noise preamp (not incl.):
MAE100.1:	NBS 9-A coupler
SP-MAE100.40:	Coupler base
MAE100.3:	Protective cap
MAE100.6:	Earphone retaining ring
Static Force:	4.5 N mass and handle
ACC001:	Vibration isolation pillow

SPECIFICATIONS

Materials:	Stainless steel base, coupler & mass, alum. ring
Diameter:	3.2" (82 mm) max
Height:	2.5" (64 mm)
	4.4" (110 mm with ring)
Weight:	5.5 lbs (2.5 kg)



Ready to use systems or custom configurations

Larson Davis has a solution for your audiometer or electro-acoustic test

The following systems are configured for exhaustive audiometer testing. The SYS008 consists of software, a System 824 precision analyzer, and AEC100 coupler for certification of audiometers with supra-aural earphones. If

you calibrate audiometers with bone vibrators, the SYS009 also includes the AMC493 artificial mastoid. Call Larson Davis to configure your own system – substitutions allowed!

SYS008 Audiometer Calibration System

824	Precision SLM / real time analyzer
AUDit™	Powerful test and reporting software
AEC100	NBS 9-A coupler
CAL250	Acoustic calibrator
2575	1" pressure air condenser microphone
EXA010	10 ft. extension cable
CCS007	Airtight insulated custom fiberglass case
Adaptors	For electrical and ambient noise testing

SYS009 Audiometer Calibration System with AMC493

824	Precision SLM / real time analyzer
AUDit	Powerful test and reporting software
AEC100	NBS 9-A coupler
AMC493	Artificial mastoid for bone vibrator test
CAL250	Acoustic calibrator
2575	1" pressure air condenser microphone
EXA010	10 ft. extension cable
CCS007	Airtight insulated custom fiberglass case
Adaptors	For electrical and ambient noise testing

Features & Specifications

Measurements and Features

Hearing level, linearity:	Test / adjust user selected frequencies and levels with prompts, out-of-tolerance indication
Frequency accuracy:	Precision counter averages readings of audiometric or extended frequencies
Pulse measurements:	Simultaneous test of pulsed stimulus: rise, fall, on and off times, on/off ratio and width
Frequency modulation:	Minimum, maximum frequencies, % modulation and repetition rate at all test frequencies
Total harmonic distortion:	Hands-off test of THD using FFT analysis reports fundamental and harmonic levels, % THD
Narrowband, broadband:	Narrowband stimulus level, % modulation and repetition rate test at all test frequencies
Speech, crosstalk:	Microphone, tape / CD output signal test or speech noise test, as well as crosstalk
Bone vibrators:	Hearing level and other tests for forehead or mastoid placement using AMC493 or B&K mastoid
Earphones:	RET SPLs and couplers for supra-aural (eg TDH 39, 40, 50), circumaural (eg HDA200, HV1/A), software compatibility with transducers such as in-the-ear or insert, IEC 711, HA-1 or HA-2 couplers
Speakers:	Automated tests with binaural or monaural (0, 45 or 90° placement of speakers)
Ambient noise:	Audiometric test / hearing aid fitting area allowed background noise test by 1/3 octaves

System 824 Precision Analyzer

General:	Precision (Type 1) SLM with A,C,Flat weight, >80/105 dynamic range, int/ext power, 2MB, 824-AUD firmware, low-noise 1/2" preamp, NiMH battery, RS232 and printer cables
Frequency analysis:	1/1 octave: 16-16kHz, 1/3 octave: 12.5-20kHz, narrowband FFT: 400 lines 1,2,5,10,20 kHz
2575 microphone:	Precision 1" pressure response condenser compatible with AEC100 coupler
CAL250 calibrator:	114.0 dB (re 20 micropascals), 250 Hz +/- 0.5 Hz, one inch opening, 1/2" adaptor ADP019

Governing Standards

AUDit™ software:	ANSI S3.6-1996 Specification for Audiometers, ANSI S3.7-1995 Methods for Coupler Calibration of Earphones, ANSI S3.1-1991 Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms
System824 SLM/RTA:	ANSI S1.4-1983 –Type 1, ANSI S1.11-1986 – Type 0C, IEC 60651 and 60804 –Type 1, IEC 61260 – Class 1, PTB approved
AEC100 coupler:	ANSI S3.7-1995 Methods For Coupler Calibration Of Earphones, IEC 60318-3
AEC101 coupler:	ANSI S3.7-1995 Methods For Coupler Calibration Of Earphones, IEC 60318-1, IEC 60318-2
AMC493 mastoid:	ANSI S3.13-1993, IEC 60373-1990-01 Mechanical Coupler for Measurement of Bone Vibrators (patented low thermal mass design varies from design features in standard)

Physical

SYS008 weight:	21.5 lbs (9.80 kg) Case dimensions: 20 1/2" x 16 3/4" x 8 1/2" (52 cm x 42.5 cm x 21.6 cm)
SYS009 weight:	21.7 lbs (9.85 kg) Fiberglass reinforced airtight thermoplastic case with pressure relief

AUDit™ software's features and functions apply only to supported Larson Davis products. All specifications are subject to change without notice.



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