

Introduction

Welcome to the Larson Davis Model 831. This versatile instrument, with graphic display, performs the functions of several instruments. It puts the combined features of a precision sound level meter and a real-time frequency analyzer in the palm of your hand.

About This Manual

This manual has 27 chapters and 4 appendices covering the following topics:

Chapters

- **Chapter 1 - Introduction:** Orients the user to the contents of this user manual and the Model 831 features, functions and measurement capabilities.
- **Chapter 2 - First Use:** Describes the process of unpacking the Model 831 and preparing for first use.
- **Chapter 3 - Overview:** A brief discussion of the displayed views, the keypad and navigation through the various functions of the Model 831.
- **Chapter 4 - Basic Measurement Setup:** A detailed description of setting up the Model 831 for the measurement of basic sound level parameters. Includes a description of the Setup Manager.
- **Chapter 5 - Basic Data Display:** A detailed look at the various metrics and information presented on these screens during and following a basic sound level measurement.
- **Chapter 6 - Run Control:** The Model 831 provides a number of run modes to control the time duration of a measurement. The most simple are Manual Stop, Timed Stop and Stop when Stable. More advanced are the Continuous, Single Block Time and Daily Timer modes which are available when the optional firmware 831-ELA is enabled. These are all described in detail in this chapter.

- **Chapter 7 - Making a Measurement:** Describes the important steps in making an accurate sound level measurement.
- **Chapter 8 - Voice Recording:** The user is instructed in the process of recording, reviewing and saving voice annotations.
- **Chapter 9 - Industrial Hygiene:** Describes the measurement of noise dose and noise exposure using the optional firmware 831-IH.
- **Chapter 10 - Time History:** Describes the use of the optional firmware 831-LOG for measuring time history data.
- **Chapter 11 - Measurement History:** Describes the use of the optional firmware 831-ELA for performing a sequence of measurements using the same setup, either manually or automatically.
- **Chapter 12 - Noise Exceedance History:** Describes the use of the optional firmware 831-ELA for measuring data associated with threshold exceedance-based noise events.
- **Chapter 13: RT60:** Describes the RT60 instrument mode (831-RT) and making reverberation time measurements.
- **Chapter 14 - FFT:** Describes the FFT instrument mode (831-FFT) and making FFT measurements.
- **Chapter 15 - Sound Recording:** Describes the digital sound recording features associated with the optional firmware 831-SR.
- **Chapter 16 - Data Explorer:** Learn to use the Data Explorer to view stored data files, load settings from a saved data file and other operations.
- **Chapter 17 - System Properties:** A discussion of instrument related functions including date/time, backlight, language, units and using the USB port.
- **Chapter 18 - Non-Acoustical Inputs:** This chapter discusses the use of external transducers and devices to provide non-acoustical data to the Model 831. Included

are the following: 831-INT Interface Unit, Weather (Wind, Temperature and Humidity) and Location using GPS device

- **Chapter 19- Communication:** The Communication Pages are used to setup communications between the Model 831 and a PC using dial-up modems, GSM cellular telephones and RS-232 devices.
- **Chapter 20 - Lock and Unlock The Model 831:** A discussion of the various scenarios to lock or unlock the Model 831 and the interaction with running a measurement.
- **Chapter 21- Calibration:** Describes the process of calibrating the Model 831.
- **Chapter 22 - About:** A look at basic Model 831 system related information.
- **Chapter 23 - System Utilities:** A description of the utilities available within the Model 831.
- **Chapter 24 - Model 831 Hardware:** Describes the Model 831 hardware including functionality of front panel keys, connectors and interfaces.
- **Chapter 25 - Parameters Measured:** An overview of the many parameters measured and recorded by the Model 831.
- **Chapter 26 - Memory Utilization:** Presents formulas to calculate the amount of memory used by the parameters which can be stored to internal memory or USB memory.
- **Chapter 27 - Upgrade Firmware:** Describes the procedure for upgrading firmware versions and adding options to the Model 831.
- **Appendix A - Technical Specifications:** Provides a listing of acoustic, electronic, environmental and physical characteristics of the Model 831.
- **Appendix B - Measuring to IEC61672-1:** Provides specifications and information specifically required to appear in the manual by this standard.
- **Appendix C - Integrated Level Calculations:** provides information on TWA, Leq, SEL, Dose and Projected Dose calculations.

- **Appendix D - Glossary:** Contains technical definitions of key acoustic and vibration terms.

Features

Hardware Features

The Larson Davis Model 831 has the following features:

- **Precision integrating sound level meter**
- **250 MB unformatted standard data memory (2 GB optional)**
- **160 X 240 graphic LCD display with backlight and icon-driven user interface**
- **Quiet Touch elastomeric keypad**
- **Large dynamic range , > 120 dBA**
- **RMS Detectors: Slow, Fast & Impulse**
- **RMS Frequency Weighting: A, C & Z**
- **Peak Frequency Weighting: A, C & Z**
- **Any Level™: Simultaneous measurement and display of Max and Min sound pressure levels (Slow, Fast and Impulse detectors), plus Leq and Peak levels, all with A, C and Z frequency weighting.**
- **Weather Measurements (Wind Speed and Direction, Temperature and Humidity)**
- **Jack for AC/DC output or headset microphone and speaker**
- **Compatible with 61 m (200 ft.) microphone extension cable (full scale to 20 kHz)**
- **4-AA batteries provide greater than 8 hour operating time**
- **Dust tight (IP53) durable plastic case with tripod mount (tripod not included) and lanyard**
- **USB 2.0 full speed host connector for mass storage, cellular and dial-up modems and future devices.**
- **USB 2.0 full speed peripheral connector for control and data download by a PC.**

- **AUX control connector for USB remote power, weather transducers and the 831-INT.**
- **I/O connector for communicating with peripheral devices such as weather transducers.**
- **Multiple language support: English, French, German, Italian, Norwegian, Portuguese (pt and br), Spanish and Swedish.**
- **Field-upgradeable firmware**

Basic Measurements

- **SPL, Leq, Lmax, Lmin, Lpeak, Lpeak(max)**
- **2 RMS event counters and 3 Peak event counters**
- **L_N statistics: computed to 0.01% with 0.1 dB accuracy over the range $L_{0.01}$ through $L_{99.99}$, with display of six on the meter, and Histogram tables.**

Basic Operation

- **Status Bar and About display**
- **Auto-Store with Auto-Reset**
- **Run Timer and Stop-When-Stable Control**
- **Back-erase**
- **Markers to annotate portions of time histories**
- **Real-time clock**
- **Start time, elapsed time and paused time**
- **Time stamping for Lmax, Lmin, Lpeak(max) metrics**
- **Session Log**
- **Lock functions**
- **Calibration with calibration history and list of calibrators**
- **Power management**
- **Status bar and About display**
- **Names Setup files and Setup Manager**
- **Data files and Data Explorer**

- **Automatic data backup to prevent data loss on power failure**
- **Overall measurement**
- **Community Noise Measurement**
- **Voice Annotation**
- **GPS Data**

Available Options

The Model 831 is delivered with all firmware options available at the time of manufacture already installed. However, only those options which have been purchased have been enabled. Any of the other firmware options can be enabled at a later date, following purchase, using a file delivered from Larson Davis via the internet.

Purchase Required Options

- **Real-time 1/1 & 1/3 Octave Frequency Analysis (831-OB3)**
- **Measurement History for the manual or timed storage of statistical data (831-ELA)**
- **Automatic Data Logging with periods from 20 ms to 24 hour (831-LOG).**
- **Fast Spectral Time History Data Logging with intervals of 2.5, 5.0 or 10 ms (831-FST, requires 831-LOG and 831-OB3)**
- **Exceedance-based Logging Analysis with Events (831-ELA). Automatic sound recordings can also be made when the 831-SR option is also enabled.**
- **Industrial Hygiene Measurement (831-IH)**
- **Sound Recording (831-SR)**
- **2 GB Memory (831-MEM2G)**
- **Advanced IP Communication for Cellular connectivity (831-COMM)**
- **RT60 (831-RT): Instrument mode for measuring reverberation time.**
- **FFT (831-FFT): FFT Instrument mode**

No Charge Options

The following options are available at no additional charge:

- **Weather Data: Wind Speed and Direction, Temperature, Humidity (831-WTHR)**
- **Analog Modem or RS-232 Communication (831-MDM)**

Standard Accessories

Some of these options may not be provided with systems designed for specific applications.

The Model 831 is generally delivered with the standard accessories described below.

Microphone Preamplifier

- PRM831 (16 to 140 dB measurement range)

Microphone

- 377B02 1/2" free-field prepolarized microphone, 50 mV/Pa, providing performance conforming to Class 1 sound level meter standards.

or

- 377B20 1/2" random incidence prepolarized microphone, 50 mV/Pa, providing performance conforming to Class 1 sound level meter standards.

Software CD

- SLM Utility-G3 software for setup, control and high speed data download. A CBL138 USB cable is required to utilize the software.

Accessory Kit

Included with purchase of 831-FF or 831-RI; not included when Model 831 is purchased without microphone and preamplifier.

831-ACC including:

- 831-CCS Hard Shell Case
- PSA029 Universal AC Power Adaptor, providing power from PC via USB port
- CBL138 USB to mini-B cable, 1.8 m
- WS001 3 1/2" Windscreen
- 4 Rechargeable AA NiMH batteries

Other

- Lanyard

Optional Accessories

Microphones

- 1/2" free-field prepolarized microphone, 50 mV/Pa
- 1/2" random incidence prepolarized microphone, 50 mV/Pa
- 1/4" free-field prepolarized microphone, 4 mV/Pa, for higher level and/or higher frequency measurements (ADP043 adaptor required).
- 1/4" pressure prepolarized microphone, 1.6 mV/Pa, for higher level and/or higher frequency measurements (ADP043 adaptor required).

Microphone Preamplifiers

- 1/2" ICP Low Noise Microphone Preamplifier (requires adaptor ADP074)
- 426A12 Outdoor Microphone Preamplifier
- 426A12-NPT: Coupler, 1.5"X27"ISO228-1 to NPT thread

Environmental Protection

- EPS2106-2 Environmental Shell, protects microphone and preamplifier from rain and wind. Use with tripod TRP003
- EPS2108-2 Environmental Shell, protects microphone and preamplifier from rain and wind. Use with tripod TRP002
- EPS029-831 Weather-proof enclosure for remote noise monitoring; includes two batteries and microphone mast.
- EPS030-831: Weather-proof enclosure for remote noise monitoring; includes battery.
- EPS031: Pole mount weather proof fiberglass enclosure for AC power and mounting to TRO019-XX and TRP020-XX series tripods; includes enclosure, internal brackets and 9AH backup battery.

- **EPS032:** Pole mount weather proof fiberglass enclosure for solar power and mounting to TRP019-XX and TRP020-XX series tripods; includes enclosure, internal brackets and solar charger.
- **EPS033:** Steel security band for NMS systems.
- **NMS016:** Permanent noise monitoring system with weather proof enclosure and tilt down pole designed for AC power; includes Model 831, EPS031, 831-INT, 17' pole, 426A12, 9AH backup battery and fiberglass enclosure.
- **NMS017:** Permanent noise monitoring system with weather proof enclosure and tilt down pole designed for solar power.; includes Model 831, EPS032, 831-INT, 17' pole, 425A12, solar charger and fiberglass enclosure. Optional solar accessories include the following:
 - PSA012-80 80W SOLAR PANEL
 - PSA012-50 50W SOLAR PANEL
 - BAT012 100AH BATTERY
- **NMS018:** Portable Noise monitoring system with weather proof enclosure and tripod designed for AC power; includes Model 831, EPS031, 831-INT, heavy duty tripod (10', 15' and 20' configurable heights), 426A12, 9AH back up battery and fiberglass enclosure.
- **NMS019:** Permanent noise monitoring system with weather proof enclosure and tripod system designed for solar power; includes Model 831, EPS032, 831-INT, heavy duty tripod (10', 15' and 20' configurable heights), 426A12, solar charger and fiberglass enclosure. Optional solar accessories include the following:
 - PSA012-80 80W Solar Panel
 - PSA012-50 50W Solar Panel
 - BAT012 100AH Battery
 - BAT013 2X21AH batteries

Weather Data Acquisition

- **831-INT: 831 Interface Unit for use with 426A12 Outdoor Microphone Preamplifier and weather sensors.**
- **SEN028: Wind Monitor; Speed and Direction**
- **SEN029: Anemometer; Speed and Direction (Low Cost)**
- **SEN030: Sensor; Temperature and Humidity**
- **SEN031: Sensor; Vaisala Weather Station**

Communication

- **MDMUSB-A: Modem V.90 Dial-up with USB Interface**
- **MDMUSB-E: Modem Edge USB Wireless Quad-Band GSM**
- **DVX008A: USB to RS232, 9 Pin Adaptor**
- **CBL117: Serial Null Modem Cable, Connects DVX008A to PC Serial Port**
- **831-INT-ET: 831-INT with integrated Ethernet capability**

GPS

- **GPS001: GPS Receiver, USB Magnetic Mount**

Equivalent Electrical Impedance Adaptor

An equivalent electrical impedance adaptor can be used in place of the microphone when very high impedance measurements need to be made and the instrument is being tested electrically. The adaptor is simply a series capacitor with the same capacitance as the microphone it is replacing. The following adaptors will be available for sale. If square wave pulse measurement is to be performed, then the adaptor must also be used with a 100 kHz, low pass, T filter.

- **ADP002 6.8pF Adaptor for 1/4 in., 7pF microphone**
- **ADP090 12pF for 1/2 in., 12pF microphone**

Cables

Direct Input Cable or Adaptor

- **Microphone Extension Cable: EXCXXX (shielded), where XXX is the length in feet (XXX = 010, 020, 050, 100 and 200 available).**
- **USB Cable: CBL138**
- **AC/DC Output Cable: CBL139**

Cables for Environmental Monitoring

- **CBL152: Cable; 426A12 to 831 Signal, 20'**
- **CBL153: Cable; 426A12 to 831-INT Control, 20'**
- **CBL154: Cable; 426A12 to Model 831 Control, 20'**
- **CBL144: Cable; PRM2100 to 831 Signal, 20'**
- **CBL145: Cable; PRM2100 to 831 Control, 20'**
- **CBL146: Cable; PRM2100 to 831-INT Control, 20'**

Cable for use with PSA027 Universal Input Power Supply AC Power Adaptor

- **CBL140: Cable; 831 Power, 2.5 mm JACK, 1'**

Power Supply

- **PSA027: Universal 90-240 AC Power Adaptor providing power from electrical outlet, used to power the Model 831 in conjunction with CBL140, CBL145 or CBL154. 1.25 A, 2.5X5.5X14 mm**

Tripods

- **TRP001: Instrument/Camera Tripod with ADP032 1/2 in. microphone clip. Use with EPS2108-2.**
- **TRP002: Microphone Stand with Boom.**
- **TRP003: Support Tripod, heavy duty, can be used with EPS029, EPS030 and EPS2106-2.**
- **ADP034: Mounting adapter to attach EPS2106-2 to TRP003**
- **ADP091: Mounting adapter, 426A12 TO TRP003**
- **TRP019: Permanent 17' tilt down pole. Use with EPS031 AND EPS032.**
- **TRP020-06: Heavy duty 6' tripod. Use with 426A12, EPS030-831 AND EPS029-831. Note: EPS031 AND EPS032 are not for use with this tripod.**
- **TRP020-10: Heavy duty 10' tripod. Use with 426A12, EPS030-831, EPS029-831, EPS031 and EPS032.**
- **TRP020-15: Heavy duty 15' tripod. Use with 426A12, EPS030-831, EPS029-831, EPS031 and EPS032.**
- **TRP020-20: Heavy duty 20' tripod. Use with 426A12, EPS030-831, EPS029-831, EPS031 and EPS032.**

Other Hardware

- **ACC003: Headset with microphone for voice recording/playback.**

Calibrators

- **CAL200: Class 1 Sound Level Calibrator, 94/114 dB @ 1 kHz**
- **CAL250: Class 1 Sound Level Calibrator, 114 dB @ 250 Hz**

Soft Case

- **CCS032: pouch with belt clip**

Software

- **DNA (Data Navigation and Analysis) software provides setup and remote operation of the Model 831, providing real-time data displays on a PC. Powerful graphics routines are provided to create custom data displays ranging from simple time histories and frequency spectra to spectrograms (level vs frequency vs time) and annotated data presentations. A variety of advanced post-processing tools can be used to extend measured data to engineering results such as searching time history data for user-defined events, masking or modifying portions of measured data and recalculating Leq and searching spectra for pure tones. DNA will take you from measured data to a completed project, including report generation.**

Model 831 Components



FIGURE 1-1 The Model 831

The Model 831 is a convenient hand-held sound level meter / real-time analyzer with a simple user interface.

The standard Model 831 shown in FIGURE 1-1 includes the following:

- **1/2 in. diameter condenser microphone**
- **PRM831 microphone preamplifier**
- **Backlit graphic 160 x 240 pixel LCD display**
- **13-key soft rubber backlit keypad**
- **AC/DC output, control, USB, and external power connectors (shown in FIGURE 1-2)**
- **True “hand held” instrument with “sure grip” pads**

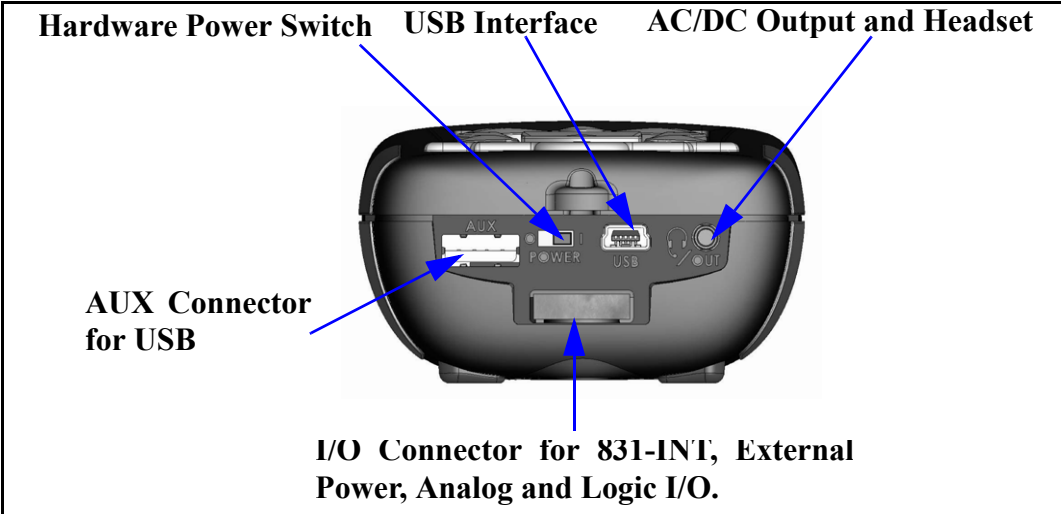


FIGURE 1-2 Model 831 Bottom View

