

G4 LD Utility

Software Manual



 **LARSON DAVIS**
A PCB PIEZOTRONICS DIV.

Larson Davis

G4 LD Utility

Software

Reference Manual

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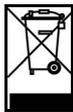
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1.1 Overview

TAKE NOTE This manual can be used with the Model 831C Manual (I831C.01), Model 831 Manual (I831.01), the LxT Manual (I770.01), the HVM100 Manual (IHVM100.01), and the HVM200 Manual (IHVM.01), which provide complete specifications and instructions for the operation of the instruments.

G4 LD Utility (G4) software enhances the features, flexibility, and ease-of-use of Larson Davis instruments by providing setup utilities, instrument calibration, computer-based control of the instrument, data downloading and manipulation, printing, and export of data to third-party software for post processing and analysis.

1.2 System Requirements

Table 1.1 System Requirements

	Minimum	Recommended
Operating System	Windows® 7/Windows 10	Windows 7 Pro 64-bit
Computer Processor	1.5 G Hz	2 G Hz
Computer Memory	4 GB	8 GB

Table 1.1 System Requirements

Available Hard Disk Space	2 GB	2 GB
Screen Resolution	1024 X 768	1280 X 1024
USB Connection	Yes	Yes
Microsoft® Office	None	Excel® 2010 ¹
Broadband Internet	Required for remote Internet connections.	
Analog Modem	Required for remote modem connections.	
¹ Recommended only if exporting data to Excel		

1.3 Software Features

- Provides intuitive and easily-navigated interface for sound and vibration measurement functions
- Connects to multiple meters simultaneously
- Creates and manages instrument setups
- Facilitates convenient firmware upgrades for Larson Davis instruments
- Imports meter data files and translates them for viewing and manipulation in spreadsheets and graphs
- Allows for export of data to a Microsoft Excel® compatible format
- Provides for real-time measurement operation and viewing
- Includes calibration management features
- Provides 64-bit performance on Windows 7 64-bit operating systems

1.4 Supported File Types

G4 supports opening and working with Larson Davis sound level meter files, SLM Utility-G3 software files, HVM100 files, HVM200 files, and .xlsx files.

When working with and saving a Larson Davis HVM200 file (.hvm2) in G4, a .meta file is created to preserve any changes saved to the associated HVM200 data file. Although the HVM200 file does not change, the .meta file associated with it encodes the changes and allows G4 to present the changes with each use.

1.5 Installing G4 LD Utility Software

TAKE NOTE If connected to an instrument via USB, shut down the instrument and disconnect before installing G4 LD Utility.

When you insert the G4 LD Utility software CD, it will start automatically. If it does not, access the CD drive and click LDsetup.exe.

WEB You can access the latest software at <http://www.larsondavis.com/Support/SoftwareProductsSupport/SLMUtilityG4>

The install program prompts for any additional required information. A **PCB Piezotronics** menu item will be created under the Program menu item in the **Start** menu and a shortcut will be placed on the desktop.

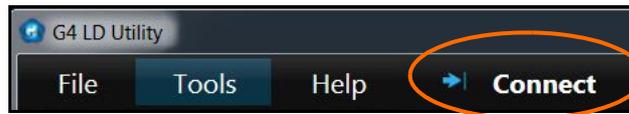
1.6 Working with G4 LD Utility

1.6.1 Connecting to Instruments

TAKE NOTE G4 LD Utility can also be connected to multiple instruments through all connection types.

After installing G4 LD Utility software, make your initial connection via USB cable from your instrument to PC. Then launch the software and click **Connect**.

FIGURE 1-1 Connect



LEARN MORE For more information on connecting to instruments via TCP/IP, see “Connecting via TCP/IP” on page A-1..

In the **Connect to Meter** dialog box, select the device and connection type. Instruments that are detectable via USB connection appear automatically in the list. Click **Connect** when the instruments appear.

FIGURE 1-2 Connect to Meter

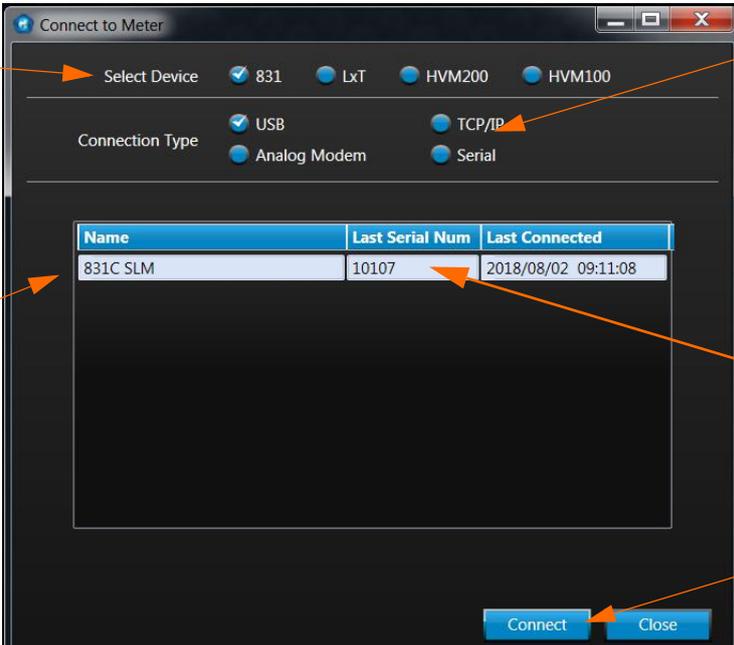
Select device type first.

You can choose a unique name for each meter by clicking in this box and typing.

Select the connection type of the meter to the PC.

The instrument serial number for the Model 831C in this example is 10107. Yours will be unique to your device. You cannot edit this cell.

Select **Connect** when finished



Name	Last Serial Num	Last Connected
831C SLM	10107	2018/08/02 09:11:08

1.6.2 Upgrade Instrument Firmware

TAKE NOTE Begin the firmware upgrade process with the instrument “disconnected” from G4.

To upgrade firmware navigate **File** → **Upgrade Firmware**. Complete the **Connection** box options and then follow the Upgrade Wizard instructions to complete the upgrade.

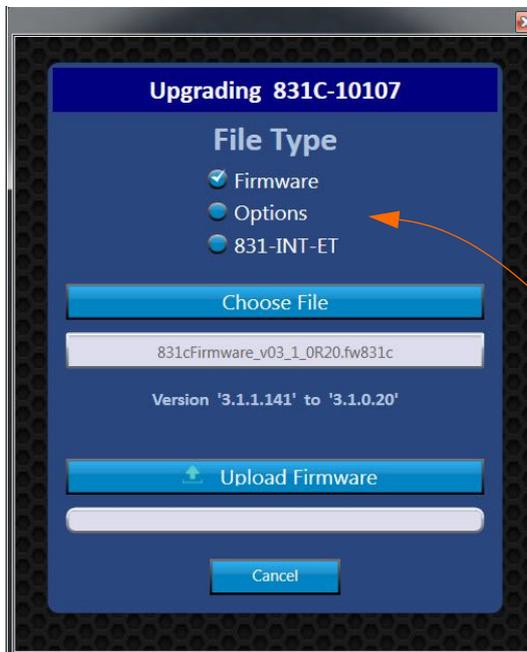
Current instrument firmware is distributed as part of G4 LD Utility installation and can be found by browsing to the following folder:

C:\Program Files (x86)\PCB Piezotronics\G4\Firmware

With G4 you can upgrade firmware for the following:

- SoundAdvisor Model 831C sound level meters
- SoundTrack LxT sound level meters
- SoundExpert LxT sound level meters
- Model 831 sound level meters
- 831-INT-ET Docking Stations
- Purchased options for the Model 831C and 831 meters
- HVM200 and HVM100 Human Vibration Meters
- Purchased options for the HVM200

FIGURE 1-3 Upgrade Firmware



Select the type of upgrade: firmware, options, or if you are upgrading an 831-INT-ET docking station

1.7 G4 LD Utility Displays

1.7.1 G4 Interface

The G4 LD Utility interface is easily navigated for measurement information and tasks, which are organized according to tabs.

FIGURE 1-4 G4 LD Utility Interface

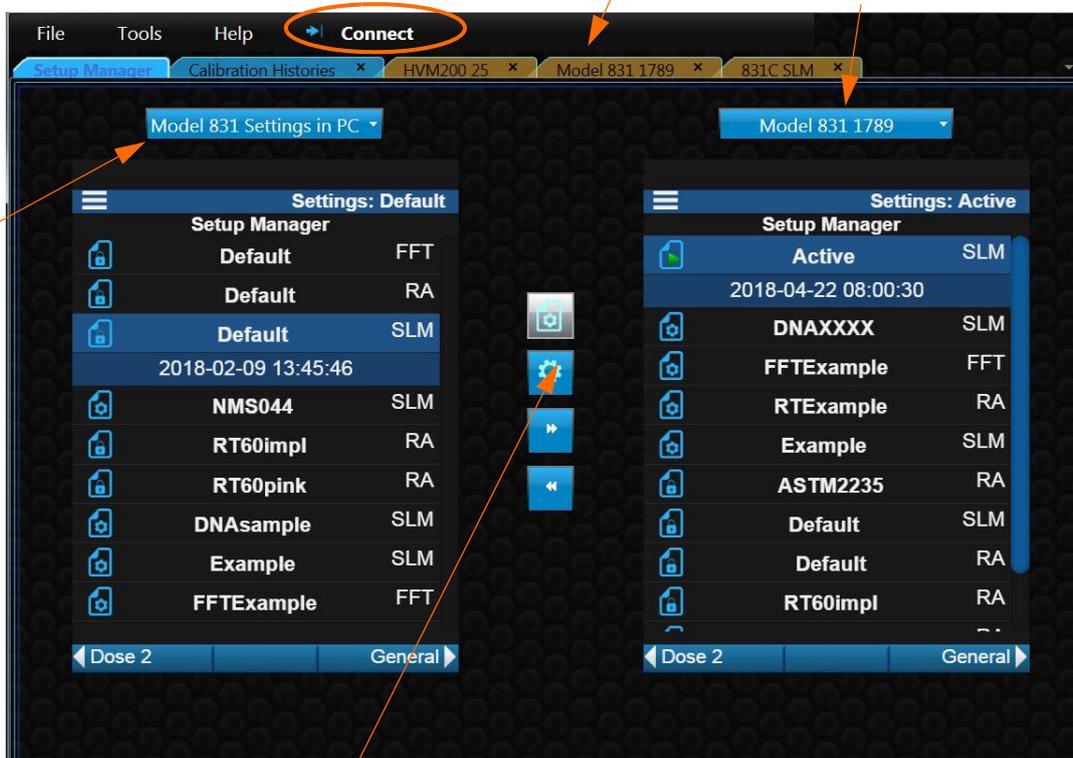
Click menu items to select measurement file commands, specify options, or get help through manuals.

Click **Connect** to connect to instruments and to specify the type of connection.

Click instrument tabs to work with measurement files, calibration histories, or use the Live View.

Instrument name

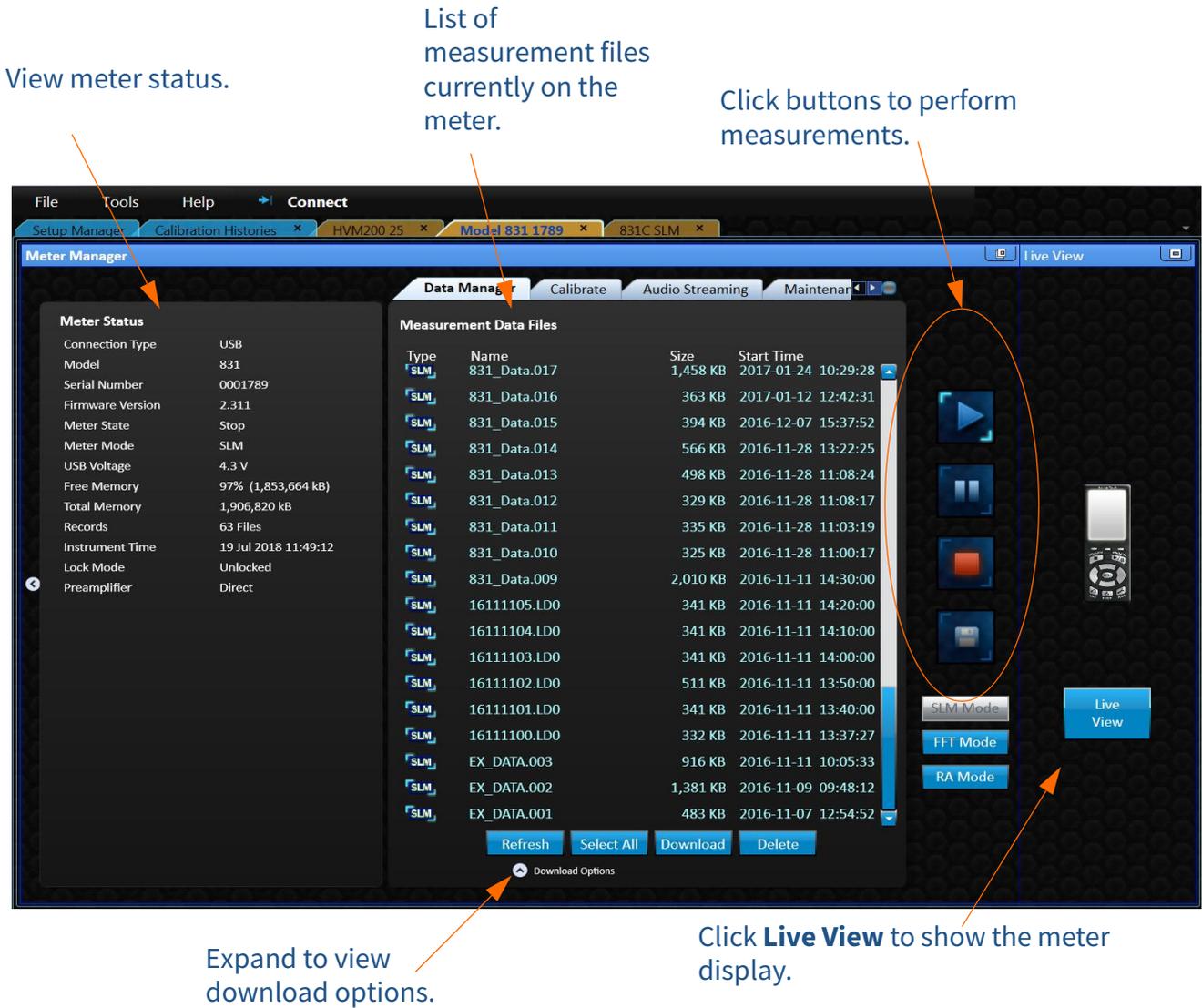
While in a setup file, this menu will display all available setting tabs to quickly jump between them.



For sound level meters, click the **System Properties** button to display instrument settings.

Instrument tabs are labeled by serial number. Clicking these tabs brings up that instrument's Meter Manager. The Meter Manager shows the connected instrument status as well as controls for performing measurement-related tasks.

FIGURE 1-5 Instrument Tab



1.7.3 Live View

Instrument tabs include a **Live View** display that provides alternative controls for the meter and real-time data display.

FIGURE 1-6 Live View Model 831

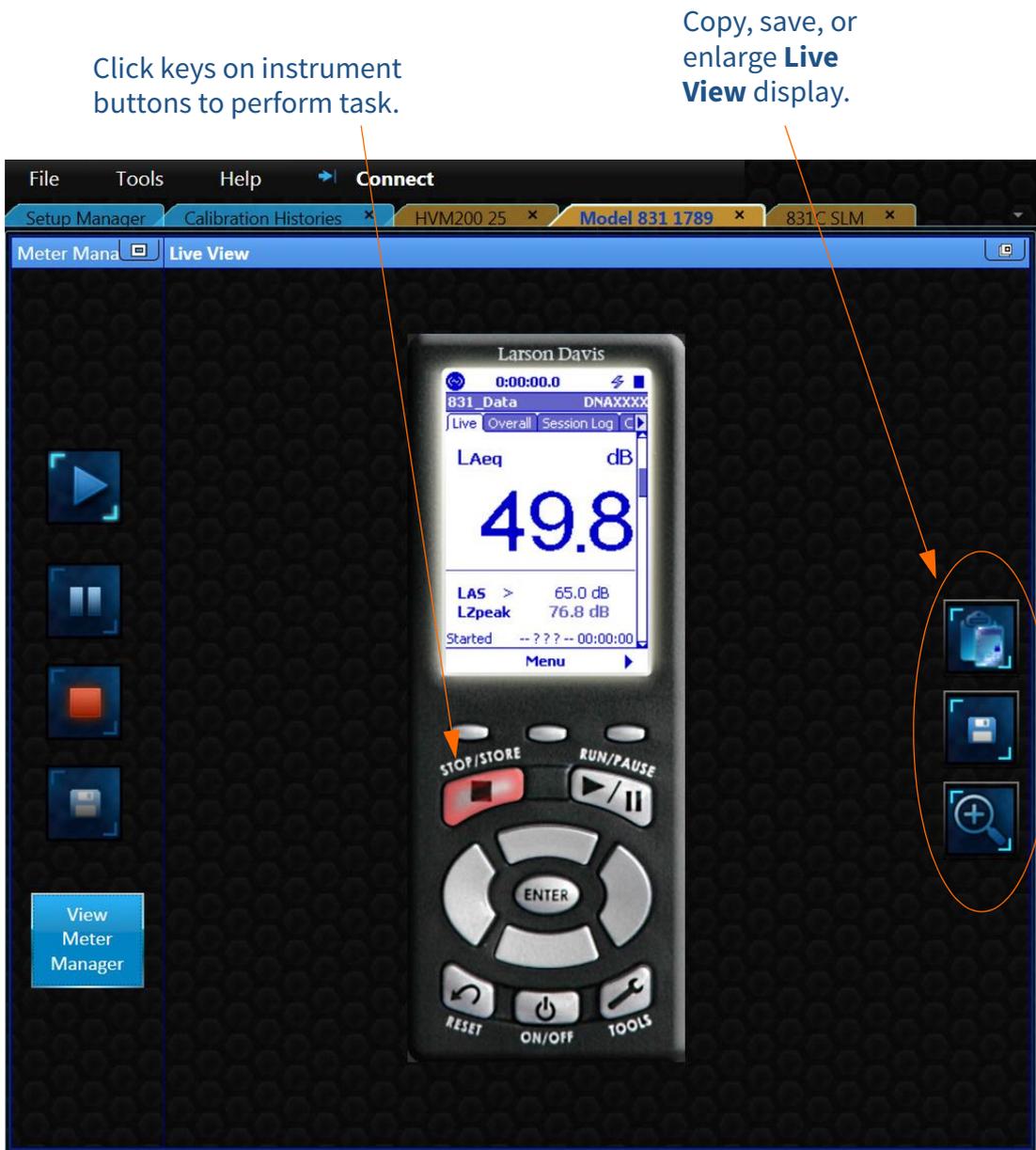
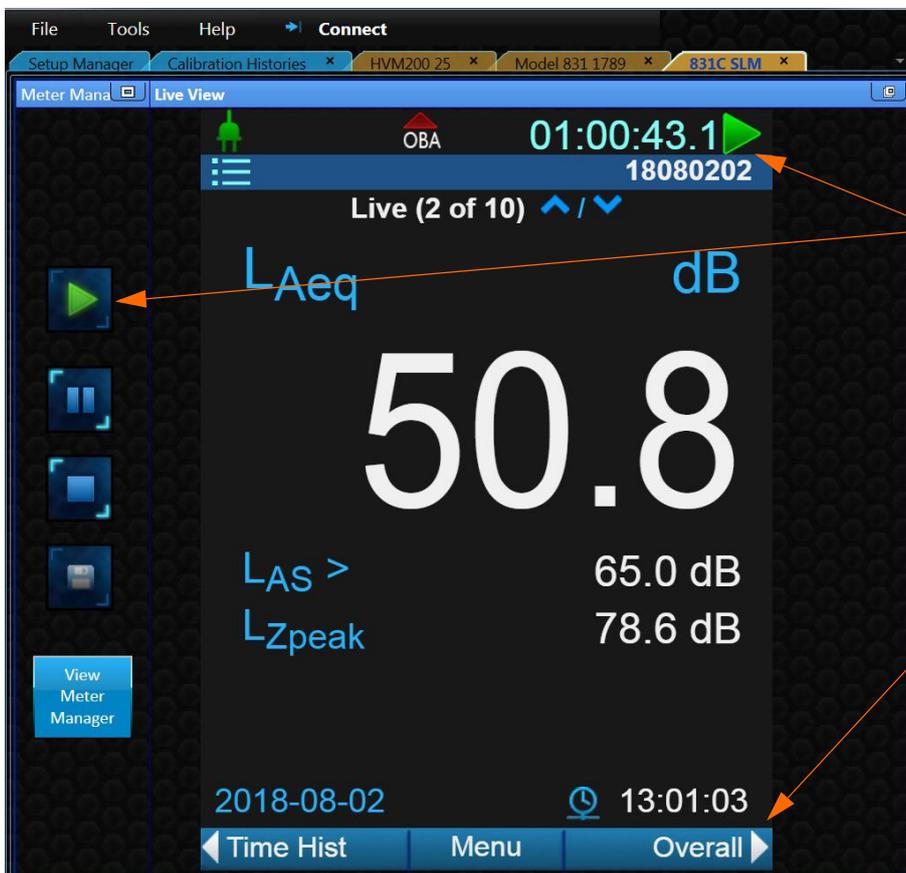


FIGURE 1-7 Live View HVM200



Use your cursor to select the menu, measurement controls, arrows, etc. on the meter.

FIGURE 1-8 Live View SLM 831C



Control the measurement by selecting the measurement status icon, or the buttons.

Control and navigate directly on the display

1.7.4 Calibration Histories Tab

Click the **Calibration Histories** tab to display both acoustic calibration and calibration check information for SLM instruments.

FIGURE 1-9 Calibration History

Select to display histories for all instruments or just one.

Select a specific calibration from the list, and if it has the spectrum icon, the **Calibration Spectrum** will show for that calibration.



Review microphone sensitivity for each calibration over time.

1.7.5 Setup Manager Tab

Use Setup Manager to store measurement setup files on the PC or instrument. You can also use Setup Manager to perform the following tasks:

- Copy or share stored setup files
- Modify setups stored on the instrument
- Modify active meter setups
- Access options for setups (right-click menu)

FIGURE 1-10 Using Setup Manager



View existing Setup files

The **Setup Manager** displays a list of existing setup files for all instrument modes. For example, for sound level meters, the list includes setups for SLM, FFT, and RA (room acoustics) modes. The setups in the left box are stored on the PC and those in the right box are stored on the instrument.

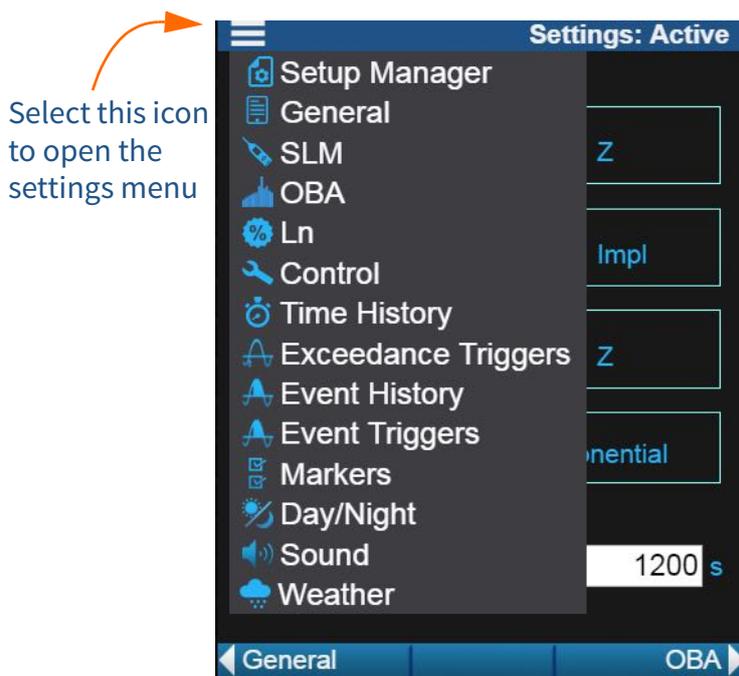
Specify and Store Setup files

Select an existing setup file corresponding to the mode for your measurement. Click on settings tabs to specify options for each metric of your measurement. Name the modified setup and then save it. Move it from the PC to your instrument or vice-versa.

Settings Menu

While viewing a setup, the settings menu can be used to jump to any setting tab you want to view.

FIGURE 1-11 Settings Menu



Activate the Setup file

G4 shows the currently active setup on the instrument by labeling it **Active**. To make any setup active on the instrument, right click the setup file from the list and select **Set to Active**. You can right click setup files to access other options as well.

1.8 AudCal on the 831C

LEARN MORE For more information, see the AudCal Reference Manual (IAUDCAL.01)

AudCal tests the calibration of audiometers and sound booths by using the SoundAdvisor Model 831C sound level meter. Purchasing the 831C-AUD option enables the AudCal functionality on the 831C SLM.

The options for AudCal functionality in G4 can be viewed by navigating to **Tools** → **Options** → **AudCal Options**.

Enable AudCal in G4

If G4 LD Utility does not show actions for AudCal, select this option in the **AudCal Options** tab. Open AudCal through **File** → **Open AudCal**. From here you can create customers, add equipment, and other AudCal actions, then when you connect to a meter, a sync will augment the information with the information on the meter. For example, you can add customer information, with audiometers and transducers, then when you arrive at the location, connect to your meter, perform a sync, and create a test.

FIGURE 1-12 AudCal in G4



Module 2 Measurement Data Files

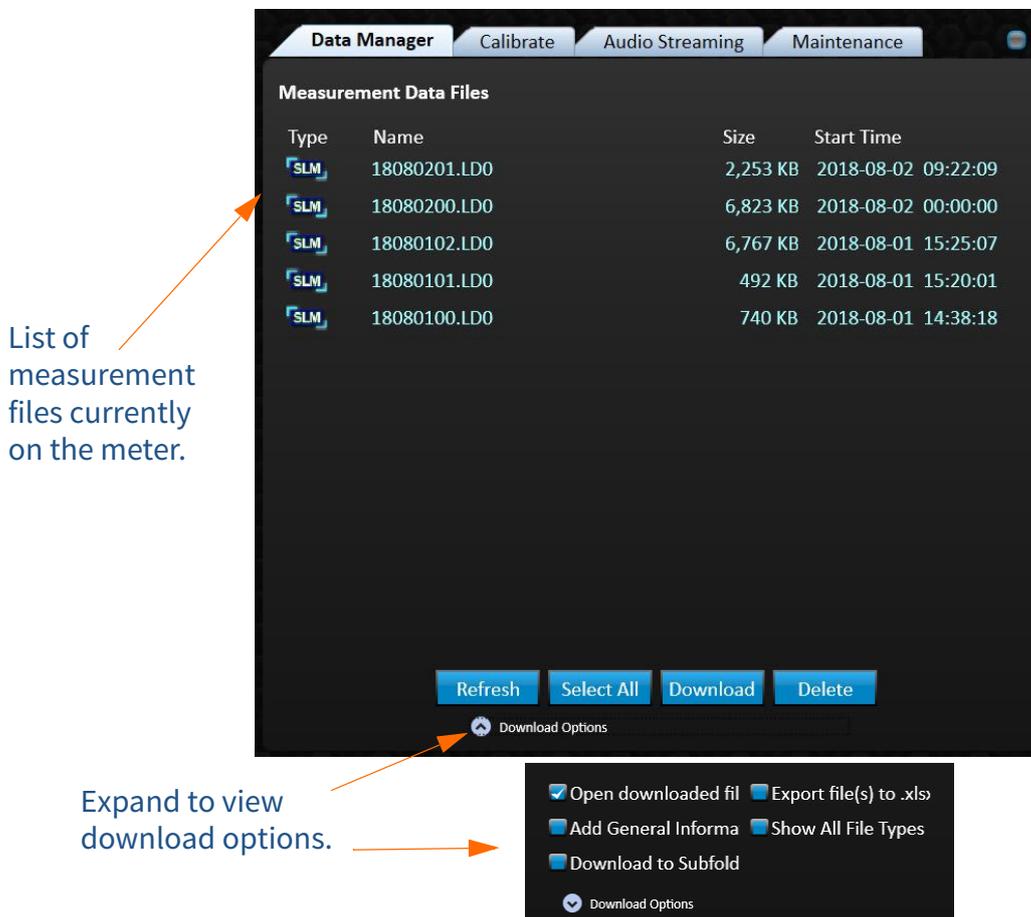
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2.1 Overview

This module describes the G4 LD Utility features for the measurement data files created from Larson Davis products.

2.1.1 Data Manager

FIGURE 2-1 Data Manager



Download a Data File

To download a data file from an instrument, follow these steps:

Step 1 Select the data file in the **Data Manager** tab. Use **shift** + select or **ctrl** + select to select many files at once.

Step 2 Expand the **Download Options** menu, select all the parameters you want for the selected files:

Download Options:

Open downloaded file(s)

- This option will open a tab on the far right, where the data can be viewed.

Add General Information

- Before the download begins, a popup will appear allowing you to enter more specific information about this file.

Export file(s) to .xlsx

- All data files will save in an Excel compatible format.

Download to Subfolder

- The default destination is C:\Documents\PCB Piezotronics\G4\LDbin\, however subfolders can be created here, and G4 will prompt you to specify in which folder you want to save your data file.

Show All File Types

- While not a download option, enabling this feature will allow the **Measurement Data File List** to show SLM, FFT, and RA files available on the meter.

Step 3 Select **Download** button.

2.1.2 Open a Data File

TAKE NOTE This feature is supported on Model 831C, 831, LxT, and HVM200 instruments.

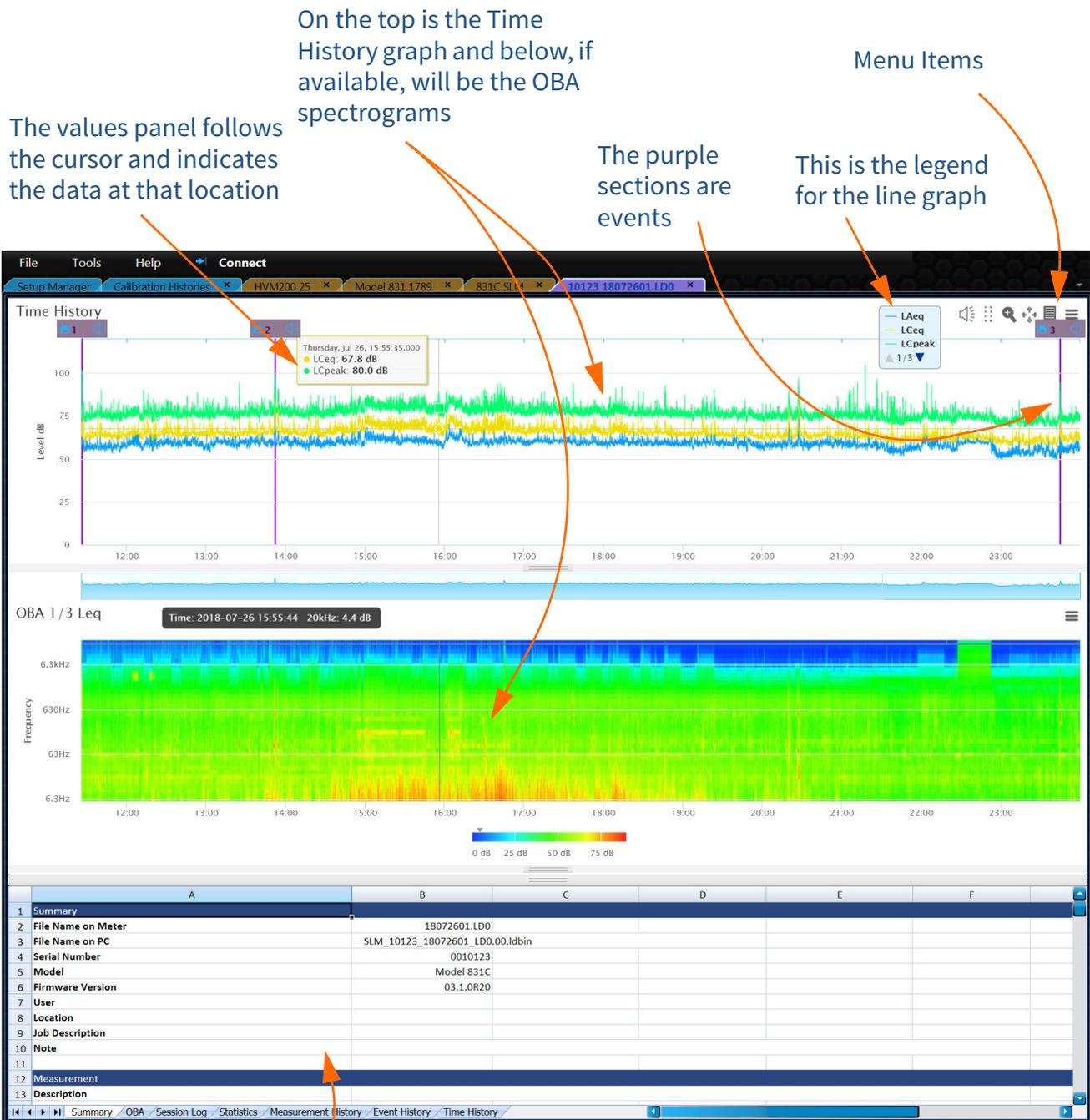
In G4, you can open and view existing measurement files (saved in Larson Davis **.ldbin**, **.hvm1**, or **.hvm2** formats), existing Microsoft Excel® files, as well as **.s** folders (archives). Navigate **File** → **Open Data File** and then select **Open .ldbin file** (sound file), **Open .s folder**, **Open .hvm file** (vibration file) or **Open .xlsx file**.

2.2 SLM Measurement Data Graph

When you open an SLM data file in G4, if the data file was created with Time Histories, graphs will appear above the spreadsheet of data.

TAKE NOTE This feature requires a hardware graphics acceleration Intel integrated graphics card.

FIGURE 2-2 Measurement Data Graphs



Menu Tools for Graphs

Table 2.1 Menu Icons

Icon	Name	Description
	Audio Playback	The icon will go from gray to green when the audio playback is playing.
	Edit Bands	Select and drag the cursor over the graph to create a band, the data in the band can be excluded from the original data or given a decibel offset. The modified data will appear at the bottom of your spreadsheet in a section called Modified Data .
	Zoom	Select and drag the cursor to zoom to that portion of a graph. The view you see will be used in the report. Once zoomed in, a small box on the upper right will appear titled Reset Zoom that can be used to reset to the original view.
	Pan	Move the view of the graph along the X axis
	Legend	Toggle the legend from smaller to larger
	Graph Menu	Other options, and future options will appear here, including Generate Report and Refresh All Graphs .

Data File Too Large

TAKE NOTE Data files of this size should be avoided. Try limiting your Time History records per data file.

If your graph is taking a long time to load, you may have made a data file that is too large. If the file contains more than 400,000 Time History records, this message will appear, “The graphs may take more than a minute to produce. You may continue to wait and browse the Spreadsheet. We can reduce the wait by not including the OBA Spectrograms. Or you may Cancel the rendering and just view the spreadsheet.”

The Pick Start Time dialog will allow you to select a start time for the graphs. This does not affect the spreadsheet or other time history data. Choose a new start time if the file has more than 4,500,000 Time History records with no OBA or 300,000 Time History records with OBA, on a 32-bit G4 LD Utility. On 64 bit, choose a new start time if the file has more than 8,000,000 Time History records with no OBA or 300,000 Time History records with OBA.

2.2.1 Create Edit Bands

The edit band tool allows you to select a period of data and either exclude it from the report or add a decibel offset, either negative or positive.

Adding an edit band will create a section in the spreadsheet and report called **Modified Data** with the edit band information.

FIGURE 2-3 Modified Data Example

Results			
LAeq		40.5 dB	
LAE		85.9 dB	
EA		43.152 $\mu\text{Pa}^2\text{h}$	
LZpeak (max)	2018-08-02 14:45:38		103.5 dB
LASmax	2018-08-02 14:45:38		80.1 dB
LASmin	2018-08-02 23:31:07		35.3 dB
SEA			
LAE			
Modified Results			
LAeq		40.6 dB	
LAE		86.0 dB	
EA		44.615 $\mu\text{Pa}^2\text{h}$	
LZpeak (max)	2018/8/2 14:45:38		103.5 dB
LASmax			-99.9 dB
LASmin			-99.9 dB

Results from the original data

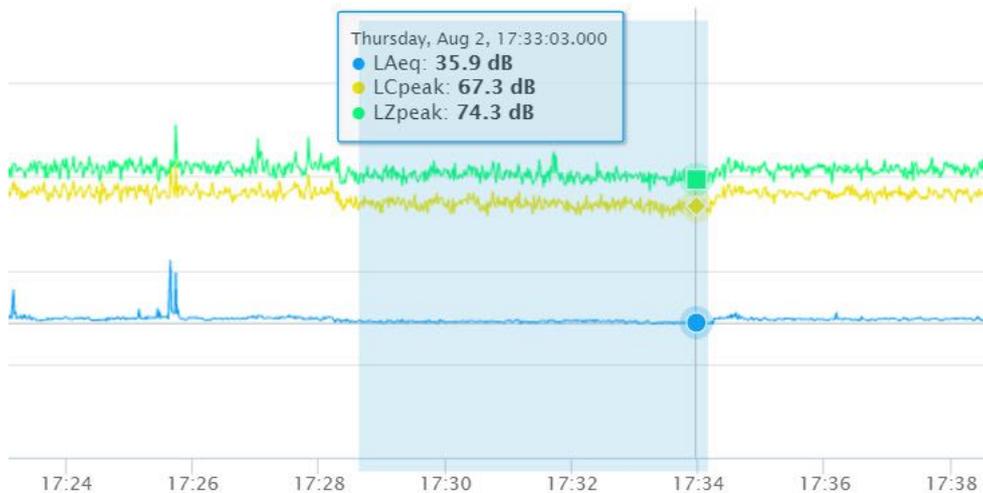
Modified results from the edit band(s)

To use create a band, follow these steps:

Step 1 Select the **Edit Bands** tool in the graph tools.

Step 2 Select, hold, and drag an area for the band on the Time History graph.

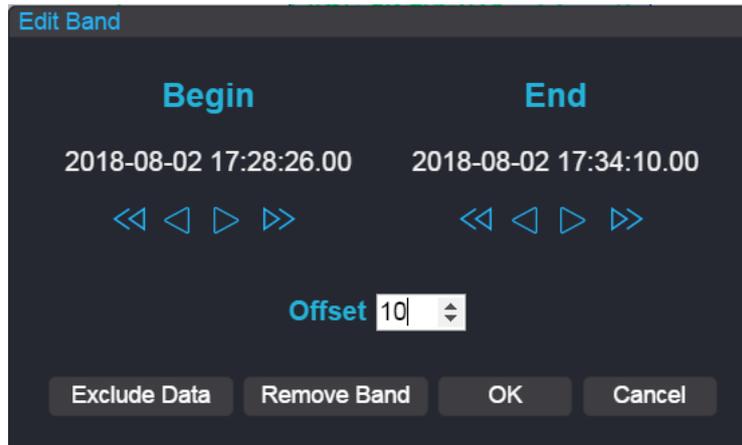
FIGURE 2-4 Edit Bands



Step 3 Once you release the select, a dialogue box will appear. Choose to exclude the data or add an offset, which can be a positive or negative whole number. The start and end edges of a band can be adjusted using the arrows, in small

or large jumps. Select OK after the offset and the bands are correct to set it.

FIGURE 2-5 Edit Bands Controls



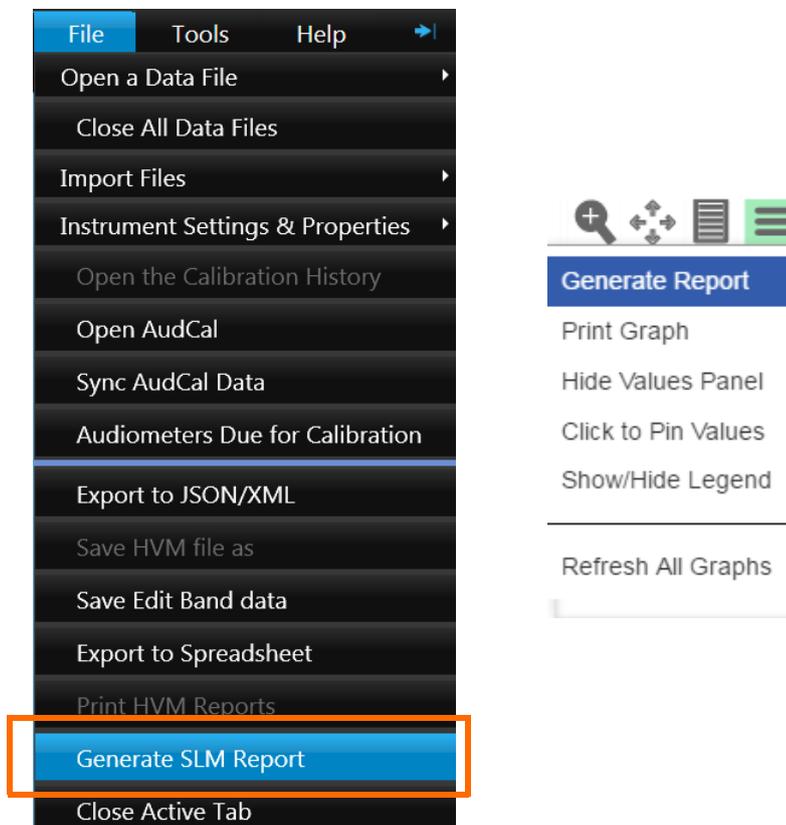
2.2.2 Generate Report

Reports include the graphs, in the view as currently shown, and the spreadsheet data, and modified data.

To generate a report, follow these steps:

- Step 1** There are two locations that can generate a report:
Navigate **File** → **Generate SLM Report**
or navigate graph menu → **Generate Report**

FIGURE 2-6 Generate Report



A report will generate with the SLM data, any modified data, and the graphs that are visible in the display. You can choose to create a PDF to save or share.

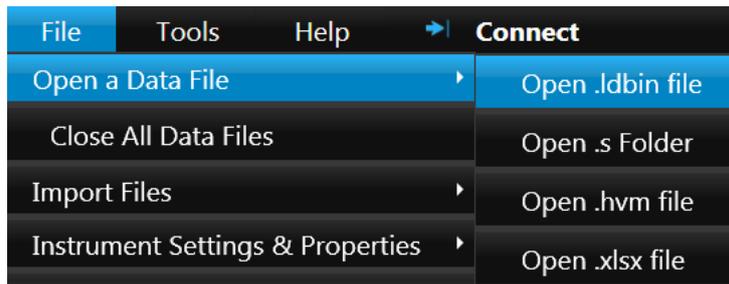
FIGURE 2-7 Generated SLM Report

Print or save PDF using these buttons



2.3 More Data Files Features

FIGURE 2-8 Open Data Files



All selections open a dialog box for navigating to the file/folder and opening it. A .s folder will convert to an ldbin file and save in the location specified in **Tools** → **Options**.

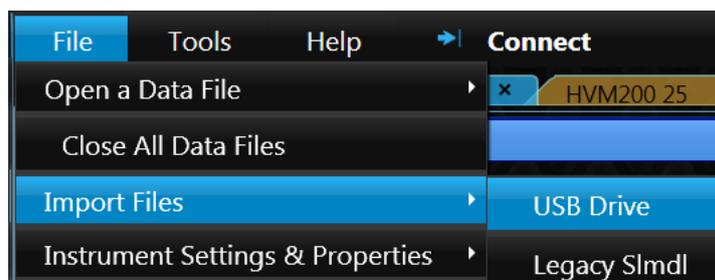
2.3.1 Importing Data Files

USB Drive files are measurement files that have been stored on USB memory from the instrument. Legacy Slmdl files are files created by SLM Utility G3 software.

The folders of the data can be moved to the PC for more long term storage and can still be imported through the **Import Files** → **USB Drive** by navigating to the folders that have been moved from your USB Drive.

To import existing files into G4, navigate **File** → **Import** and then select the type of import: **USB Drive** or **Legacy Slmdl**.

FIGURE 2-9 Import Files into G4



Both selections open a dialog box for navigating to the file and opening it.

2.3.2 File Naming Option

File Name Codes:

$\$I$ = Instrument Mode

$\$N$ = File Name on Meter (first if multiple files)

$\$A$ = IP Address of meter

$\#$ = Digit (increment if file exists)

$\$S$ = Meter Serial Number

$\$C$ = Name in Connection Table

$\$Y$ = Year (YYYY)

$\$M$ = Month (MM)

$\$D$ = Day (DD)

$\$h$ = Hours (hh)

$\$m$ = Minutes (mm)

$\$s$ = Seconds (ss)

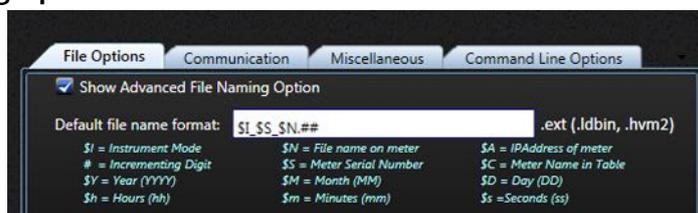
In G4 you can specify the naming convention that the Data Files save as. For example:

SLM_0001025_1460500_LD0.00.ldbin

$\$I_ \$S_ \$N.\#\#$

To edit the default naming convention, navigate **Tools** → **Options** and then check the **Show Advanced File Naming Option**. Use the file name codes (or any text can be entered) to create a custom name. Click **Save**.

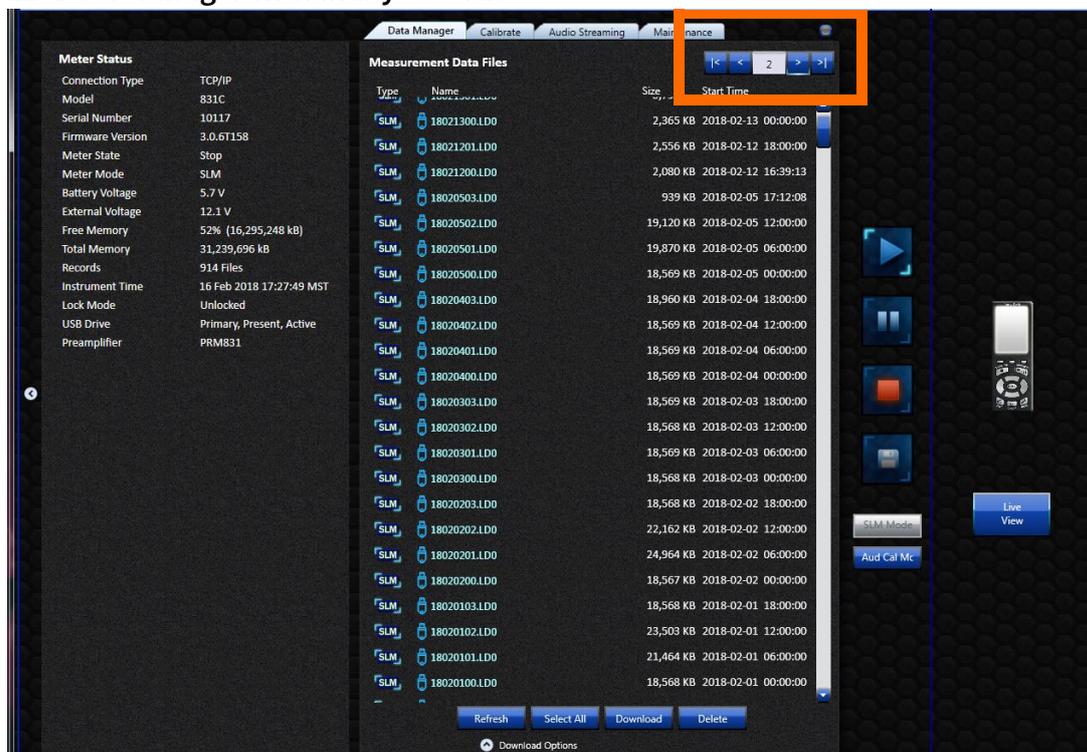
FIGURE 2-10 File Naming Options



2.3.3 Data Manager Pages

In the case that the instrument or USB drive has 500+ records to show in the **Data Manager**, then the files will be shown on multiple pages. You can navigate to a second page using the buttons that will appear on the top right side of the Data Manager.

FIGURE 2-11 Data Manager with many records



Module 3 Environmental Noise Measurement Example

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3.1 Overview

TAKE NOTE Although this example can also be followed with SoundAdvisor Model 831C and SoundTrack LxT instruments, not all features may be available.

The following module provides an example procedure for performing a sound level measurement with G4 in SLM mode and for working with example data.

In this example, we will follow procedures for the Model 831 that demonstrate features for outdoor noise monitoring, including:

- Setting Up the Measurement
- Making the Measurement
- Viewing Measurement Data

This example will cover the following options. They are not required to make a measurement. Ignore the sections that are not available to you, and continue to making the measurement:

- 831-OB3 (Octave Frequency Analysis)
- 831-LOG (Automatic Data Logging)
- 831-WTHR (Weather Data)
- 831-ELA (Measurement History)
- 831-SR (Sound Recording)

3.2 Setting Up the Measurement

This example demonstrates the following steps for setting up the measurement:

- Step 1** Connect the meter via USB.
- Step 2** Calibrate the instrument.
- Step 3** Create a setup file on the PC.
- Step 4** Move the setup file to the instrument and make it active.
- Step 5** Press RUN to start the measurement.

The following sections describe the last four steps in more detail.

3.2.1 Calibrate the Instrument

TAKE NOTE For best results, use Larson Davis Precision Acoustic Calibrators and Larson Davis Microphone-Preamplifiers.

TAKE NOTE You should perform calibration just prior to taking a sound measurement.

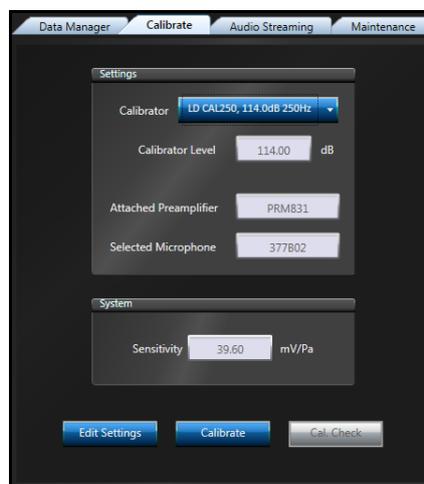
Refer to your calibrator and microphone-preamplifier product manuals for specific requirements in performing the acoustic calibration.

Place the calibrator over the microphone and apply it slowly to avoid sudden large pressure changes to the diaphragm.

Click the instrument tab displaying the serial number of the connected meter and then click the **Calibrate** tab.

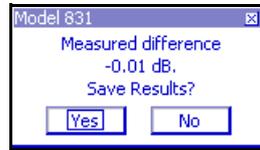
Select the calibrator and click the **Edit Settings** button if the calibrator settings need to be modified. Ensure that the settings correspond to those described in the manual for the selected calibrator. Then click the **Calibrate** button.

FIGURE 3-1 Acoustic Calibration



After a few seconds, a message appears indicating the measured difference and a prompt to save the results. Click **Yes** to save the calibration or **No** to reject it. Slowly remove the calibrator from the microphone.

FIGURE 3-2 Calibration Results



If you are using a preamplifier that supports automatic calibration checks, use the **Live View** in G4 to perform a calibration check.

Click the **Calibration History** tab to view either acoustic calibration or calibration check summaries.

3.3 Create a Setup File on the PC

LEARN MORE For more information on all the following setup options, see the Model 831 Manual.

In this example, we will use the Setup Manager to create an environmental noise measurement with the following settings:

- A-Frequency weighting with Slow Detector and Z-peak weighting.
- 1/3 Octave Band Analysis range set to Low with Spectral Ln Mode on.
- Continuous Run Mode with Measurement History enabled and taken in 1 hour increments with Interval Time Sync enabled.
- Time History enabled and set with 1 second periods and time history options marked for L_{Aeq} and L_{Zpeak} .
- Snapshot sound recordings for events.
- Weather data taken with Sen03x weather station.

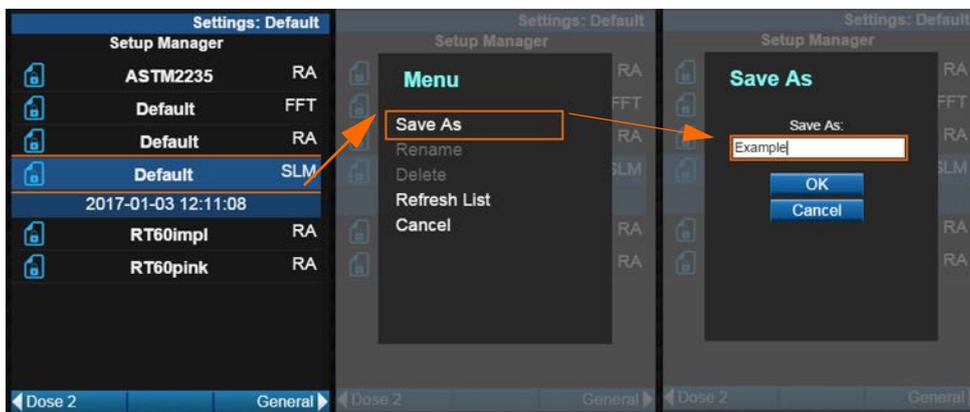
Name the setup

Step 1 To name our setup click on the **Setup Manager** tab in G4.

Step 2 Assign the PC settings as **Model 831 Settings in PC** and assign the Instrument settings to your connected Model 831.

Step 3 Right-click on the **Default** SLM setup file on the **Model 831 Settings in PC** box. Select **Save As** and specify the setup name as “Example”.

FIGURE 3-3 Example Setup Name.



Specify Measurement Weighting, Detection, and Integration Method

TAKE NOTE If you return to the **Setup Manager** tab from a settings tab, you are prompted to save settings. Click **Yes** to apply the changes to the setup.

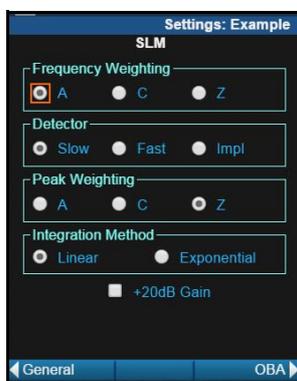
Find and click the **Example** setup button you just created on the Setup Manager.

On the **General** tab, enter **EX_DATA** as the **Default Data File**.

Specify SLM Settings

- **Frequency Weighting:** A
- **Detector:** Slow
- **Peak Weighting:** Z
- **Integration Method:** Linear

FIGURE 3-4 Weighting, Detection, and Integration Method

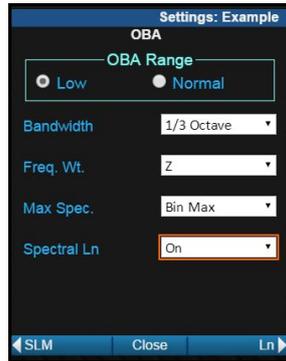


Specify Octave Band Analysis Settings

- **Bandwidth:** 1/3 Octave
- **Frequency Weighting:** Z

- **Max Spec.:** Bin Max
- **Spectral Ln:** On

FIGURE 3-5 OBA Settings



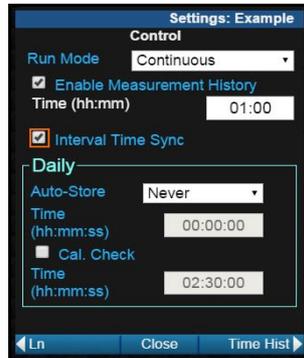
Specify Control Settings

TAKE NOTE Because we are specifying **Continuous** mode, the instrument will continuously take measurements for 1 hour periods, without having to manually start them (the first measurement must be started manually, however).

- **Run Mode:** Continuous
- Check **Enable Measurement History**
- Set **Time:** 01:00 for the duration of each measurement
- Check **Interval Time Sync**

This sets the instrument to stop and begin measurements at a time of day equal to a multiple of 1 hour. For example, if your measurement begins at 00:08:14 (hh:mm:ss format), the first measurement will cut short so that subsequent measurements begin at 09:00, 10:00, 11:00, etc.

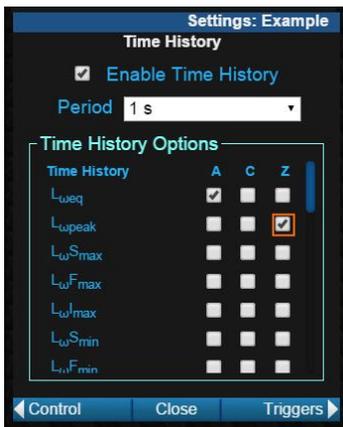
FIGURE 3-6 Measurement Control Mode and Measurement History



Specify Time History Settings

- Check **Enable Time History**
- **Period:** 1 second
- **L_ωeq:** A
- **L_ωpeak:** Z

FIGURE 3-7 Time History Tab

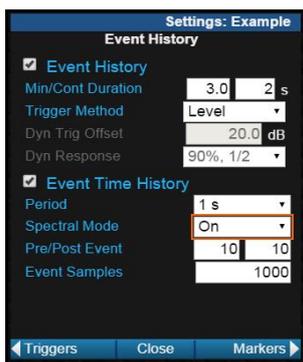


Specify Event History Options

TAKE NOTE Email/Text alerts can only be managed on the instrument, not on the PC. To learn more see SoundAdvisor Model 831C Reference Manual (I831C.01).

Click the **Event History** tab and select the **Event History** option. Leave the default values for **Min/Cont Duration**, and **Trigger Method**. Select the **Event Time History** option and select **On** for **Spectral Mode**.

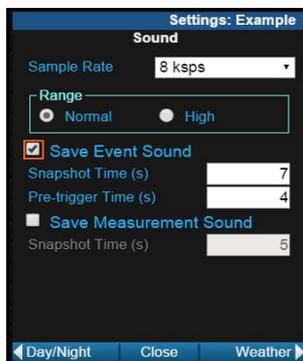
FIGURE 3-8 Event History Tab



Record Snapshots for Events

Navigate to the **Sound** tab and select the **Save Event Sound**. Leave the default values for the snapshot options.

FIGURE 3-9 Recording Snapshots for Events

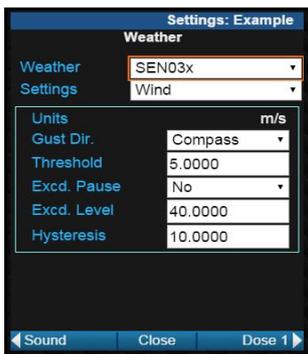


Set Weather Options

TAKE NOTE You will need SEN03x weather station for this option.

Navigate to the **Weather** tab and select **SEN03x** or **Weather-INT** from the Weather drop down menu. **Close** and **Save**.

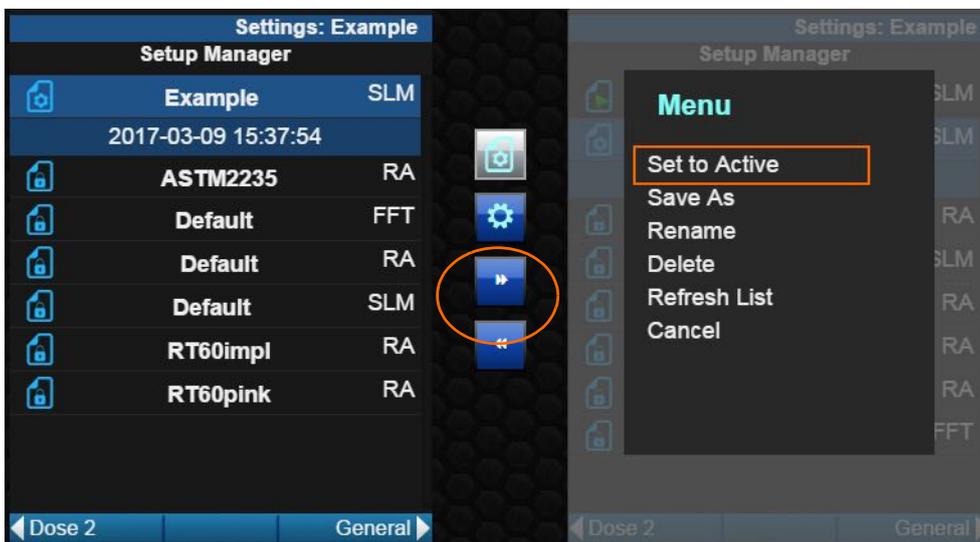
FIGURE 3-10 Weather Tab



Move the Setup to the Instrument and Make it Active

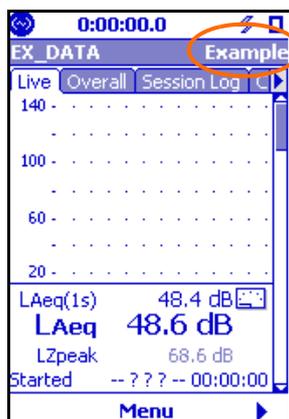
In the Setup Manager, click the Example setup and then click the right double-arrow button to transfer the setup to the instrument. You will be asked to enter a new file name. Double click the setup on your instrument and then click **Set To Active**.

FIGURE 3-11 Transfer Setup and Set to Active



You can verify that the Example setup is active on the instrument by viewing the instrument screen or **Live View**.

FIGURE 3-12 Active Example Setup



3.4 Making the Measurement

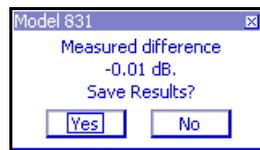
LEARN MORE Before starting the measurement, secure your Model 831 in a location where you want to monitor sound levels. Larson Davis recommends using tripods or environmental protection systems for proper measurements. For more information, see the Model 831 Manual.

For the example in this manual, we will monitor sound levels in one location.

To begin your measurement, press  (RUN/PAUSE) on the meter, or if you are still connected to G4, click the same button on the **Live View** in G4. After an appropriate amount of time, press or click the  (STOP/STORE) button twice to end the measurement and store it.

Perform an acoustic calibration and calibration check as described previously to verify your measurement.

FIGURE 3-13 Post-Measurement Calibration



3.5 Viewing Measurement Data

TAKE NOTE The **Live View** in G4, or the meter itself, displays many tabs and pages of measurement results data. Refer to the Model 831 manual for information on viewing and understanding these pages.

To complete our example, we will download the measurement file to G4 and examine the data with G4 viewing and export tools.

3.6 Download the Measurement File

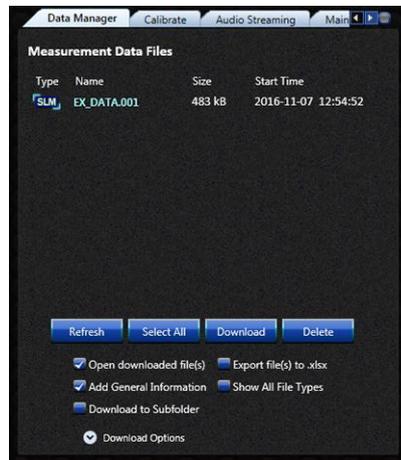
TAKE NOTE When using Continuous run mode, as in our example, data files are stored in the following format: **yymmdd00.LD0**, where **yymmdd** is the date the measurement was started.

Click the instrument serial number tab and select the data file from your measurement on the **Data Manager** tab.

The G4 Data Manager shows data files according to the mode in which the instrument is currently operating. In our example, our measurement was taken in SLM mode; however, in other scenarios with FFT and RA modes, to show all files on the meter the **Show files for all modes** option can be selected in the **Download Options** menu.

TAKE NOTE You can specify the filename format and folder location for saving data files in G4 LD Utility by clicking **Tools** → **Options** and entering the information on the **File Options** tab.

FIGURE 3-14 Data Manager



Click the **Download** button. G4 automatically saves the file in .ldbin format on your PC and opens it in tabbed worksheets in G4.

3.7 Use G4 LD Utility File Viewer

Each G4 worksheet provides sound data according to the settings we specified in our measurement setup.

Summary Sheet Data

TAKE NOTE For more information on the meaning of specific data metrics and values, refer to the Model 831 Manual.

The Summary Sheet provides summarized results, such as L_{Aeq} , L_{Zpeak} , L_{Amax} , and Ln Percentiles, as well as exceedances, overloads, and weather information. The data on this sheet corresponds with the data on the Overall tab on the Model 831. It represents all the data taken since the last measurement reset. Figure 3-15 shows the sheet.

FIGURE 3-15 Summary Sheet Results

	A	B	C	D	E	F	G
39	Results						
40	L _{Aeq}	69.7	dB				
41	L _{AE}	117.6	dB				
42	E _A	63.266	mPa ² h				
43	E _{A8}	29.755	mPa ² h				
44	E _{A40}	148.777	mPa ² h				
45	L _{Zpeak} (max)	2014/06/27 17:26:54		130.0	dB		
46	L _{Amax}	2014/06/27 17:21:59		107.7	dB		
47	L _{Amin}	2014/06/28 00:07:58		23.8	dB		
48	SEA	145.8	dB				
49	Corrected dBA	72.7	dBA				
50							
51	LA > 65.0 dB (Exceedance Counts / Duration)	67	367.9	s			
52	LA > 85.0 dB (Exceedance Counts / Duration)	12	61.2	s			
53	LA > 135.0 dB (Exceedance Counts / Duration)	0	0.0	s			
54	LA > 137.0 dB (Exceedance Counts / Duration)	0	0.0	s			
55	LA > 140.0 dB (Exceedance Counts / Duration)	0	0.0	s			
56							
57	Community Noise	L _{dn}	L _{Day} 07:00-23:00	L _{Night} 23:00-07:00	L _{den}	L _{Day} 07:00-19:00	L _{Evening} 19:00-23:00
58		70.9	72.4	52.7	72.1	74.9	54.0
59	L _{Ceq}	70.7	dB				
60	L _{Aeq}	69.7	dB				
61	L _{Ceq} - L _{Aeq}	1.1	dB				
62	L _{Aleq}	74.6	dB				
63	L _{Aeq}	69.7	dB				
64	L _{Aleq} - L _{Aeq}	4.9	dB				
65	# Overloads	0					
66	Overload Duration	0.0	s				
67	# OBA Overloads	17					
68	OBA Overload Duration	89.4	s				
69							
70	Dose Settings						
71	Dose Name	OSHA-1	OSHA-2				

Click tabs to see data sheets.

TAKE NOTE You can use the right-click menu in G4 worksheets to select various editing tasks: cut, copy, paste, etc.

FIGURE 3-16 Ln Statistics on Summary Sheet

Statistics	
LA5.00	59.6 dB
LA10.00	57.8 dB
LA33.30	53.1 dB
LA50.00	50.1 dB
LA66.60	47.0 dB
LA90.00	39.8 dB

TAKE NOTE You must have a Sen03x Weather Station and include it in your setup in order to get this data.

FIGURE 3-17 Weather Data on Summary Sheet

Weather										
Avg Wind Speed	0.89	mi/h								
Gust Speed	1.12	mi/h								
Min Wind Speed	0.45	mi/h								
Gust Dir (Compass)	E									
Windy Dir	N	NE	E	SE	S	SW	W	NW		
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg Temp	73.58	°F								
Max Temp	73.58	°F								
Min Temp	73.58	°F								
Avg Humidity	30.31	%RH								
Max Humidity	30.40	%RH								
Min Humidity	30.30	%RH								
Barometer Avg	861.20	hPa								
Barometer High	861.20	hPa								
Barometer Low	861.20	hPa								
Rain Accumulation	0.00	in								
Rain Max Rate	0.00	in/hr								
Rain Duration	0.00	s								
Hail Accumulation	0.00	hits/in ²								
Hail Max Rate	0.00	hits/in ² h								
Hail Duration	0.00	s								

OBA Sheet

As specified in our setup, the OBA sheet shows data according to 1/3 Octave bandwidth with Z-weighted Ln percentile data in spectral mode.

FIGURE 3-18 OBA Sheet

Bandwidth →

Percentile

1/3 Octave											
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0
Overall 1/3 Spectra	61.6	58.1	57.0	57.4	57.5	58.5	58.5	58.4	59.0	60.8	61.6
Max 1/3 Spectra	67.3	63.9	60.8	61.1	61.2	63.7	63.7	64.4	65.5	67.4	68.3
Min 1/3 Spectra	52.4	48.8	41.8	50.3	50.7	46.0	45.0	42.3	44.2	35.7	33.0
LZS5.00	67.0	63.4	59.9	60.3	60.5	63.0	63.3	64.0	64.6	66.8	67.6
LZS10.00	66.1	61.8	59.3	59.7	59.9	62.2	62.7	63.2	64.0	66.3	67.1
LZS33.30	61.2	57.9	57.5	58.0	58.2	58.0	58.9	58.7	59.0	60.2	61.0
LZS50.00	59.6	56.4	56.8	57.3	56.8	56.4	55.6	55.0	54.9	56.9	57.7
LZS66.60	59.1	53.6	55.5	55.8	55.5	55.6	52.3	53.1	51.6	51.8	52.6
LZS90.00	55.9	50.3	46.7	52.8	51.5	54.4	49.3	48.4	45.3	40.9	37.4
1/3 OBA Ref. Spectra											
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1/3 OBA Under Range											
Frequency (Hz)	6.3	8.0	10.0	12.5	16.0	20.0	25.0	31.5	40.0	50.0	63.0
Under Range Limit	36.0	33.0	29.0	31.6	30.8	28.8	26.0	22.0	22.0	21.0	20.0
Noise Floor	12.3	9.6	8.3	8.8	6.9	6.0	5.5	5.4	3.7	1.7	1.7

Session Log Sheet

The Session Log sheet displays entries for events if the sound level exceeds the trigger level for the specified minimum duration of time.

This sheet also includes snapshot sound recordings of events. Double click **Sound Record #** and your record will play automatically.

FIGURE 3-19 Session Log Sound Snapshot

Record #	Date	Time	Record Type	Cause	#	TH Record	Sound Record
1	2016-08-14	00:00:00	Run	Timer	1	0	
2	2016-08-14	02:02:47	Stop	IO	1	0	
3	2016-08-14	02:02:58	Run	IO	2	0	
4	2016-08-14	02:30:00	Pause	Timer	2	0	
5	2016-08-14	02:30:15	Calibration Check	Timer	93.9 dB	0	
6	2016-08-14	02:30:15	Resume	Timer	3	0	
7	2016-08-14	05:10:59	Sound	Event	1	1	Sound Record 1
8	2016-08-14	05:31:58	Sound	Event	2	1	Sound Record 2
9	2016-08-14	06:04:16	Sound	Event	3	1	Sound Record 3
10	2016-08-14	07:05:04	Sound	Event	4	1	Sound Record 4
11	2016-08-14	07:56:09	Sound	Event	5	1	Sound Record 5
12	2016-08-14	08:57:21	Sound	Event	6	1	Sound Record 6
13	2016-08-14	09:07:04	Sound	Event	7	1	Sound Record 7
14	2016-08-14	09:22:39	Sound	Event	8	1	Sound Record 8
15	2016-08-14	09:27:59	Sound	Event			
16	2016-08-14	10:03:14	Sound	Event			
17	2016-08-14	10:03:58	Sound	Event			
18	2016-08-14	10:21:42	Sound	Event			
19	2016-08-14	10:25:46	Sound	Event			
20	2016-08-14	10:28:01	Sound	Event			
21	2016-08-14	10:30:13	Sound	Event			
22	2016-08-14	10:32:18	Sound	Event			
23	2016-08-14	10:34:07	Sound	Event			
24	2016-08-14	10:35:04	Sound	Event			



Measurement History Sheet

TAKE NOTE By pushing (RUN/PAUSE) and (STOP/STORE) multiple times, you can create multiple measurements and multiple measurement history records.

The Measurement History sheet shows records for the measurement with setup-specified metrics and values. For our example, Record 1 shows the values specified on the **SLM** tab in the measurement setup.

FIGURE 3-20 Measurement History Sheet

Record #	Date	Time	Run Duration	Run Time	Pause	LASeq	LASE	LASmin	LASmin Time	LASmax
1	2016-08-14	00:00:00	01:00:00.0	01:00:00.0	00:00:00.0	51.5	87.1	47.6	00:05:16	69.3
2	2016-08-14	01:00:00	01:00:00.0	01:00:00.0	00:00:00.0	48.8	84.3	46.1	01:47:01	63.4
3	2016-08-14	02:00:00	00:02:47.4	00:02:47.4	00:00:00.0	47.1	69.4	45.9	02:00:56	49.0
4	2016-08-14	02:02:58	00:56:41.6	00:56:36.6	00:00:05.0	46.9	82.2	44.8	02:32:05	56.4
5	2016-08-14	03:00:00	01:00:00.0	01:00:00.0	00:00:00.0	47.5	83.1	43.1	03:40:26	65.5
6	2016-08-14	04:00:00	01:00:00.0	01:00:00.0	00:00:00.0	47.0	82.6	42.6	04:05:32	59.9
7	2016-08-14	05:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.1	90.7	44.8	05:09:23	72.2
8	2016-08-14	06:00:00	01:00:00.0	01:00:00.0	00:00:00.0	53.5	89.0	43.3	06:34:10	70.4
9	2016-08-14	07:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.0	89.6	42.9	07:31:07	70.2
10	2016-08-14	08:00:00	01:00:00.0	01:00:00.0	00:00:00.0	55.7	91.2	42.9	08:06:36	82.6
11	2016-08-14	09:00:00	01:00:00.0	01:00:00.0	00:00:00.0	57.9	93.4	46.8	09:54:46	73.3
12	2016-08-14	10:00:00	01:00:00.0	01:00:00.0	00:00:00.0	62.5	98.0	46.7	10:57:56	85.2
13	2016-08-14	11:00:00	01:00:00.0	01:00:00.0	00:00:00.0	61.1	96.7	47.3	11:02:45	82.5
14	2016-08-14	12:00:00	01:00:00.0	01:00:00.0	00:00:00.0	58.5	94.0	47.4	12:53:10	73.4
15	2016-08-14	13:00:00	01:00:00.0	01:00:00.0	00:00:00.0	59.0	94.5	46.1	13:22:23	74.5
16	2016-08-14	14:00:00	01:00:00.0	01:00:00.0	00:00:00.0	57.6	93.1	45.6	14:30:19	72.0
17	2016-08-14	15:00:00	01:00:00.0	01:00:00.0	00:00:00.0	58.8	94.3	45.6	15:03:27	74.8
18	2016-08-14	16:00:00	01:00:00.0	01:00:00.0	00:00:00.0	59.9	95.5	46.0	16:29:24	85.8
19	2016-08-14	17:00:00	01:00:00.0	01:00:00.0	00:00:00.0	54.1	89.7	45.9	17:38:29	74.0

Event History Sheet

When triggers are exceeded for a specified minimum duration, the Event History sheet shows enhanced data for these events.

FIGURE 3-21 Event History Sheet

	A	B	C	D	E	F	G	H	I
1	Event	Record #	Time	LASeq	1/3 LASeq 6.3	1/3 LASeq 8.0	1/3 LASeq 10.0	1/3 LASeq 12.5	1/3 LASeq 16
2	Event 1	1	-10.0000	48.0	-17.4	-24.5	-22.5	-18.0	-1
3	1	2	-9.0000	49.0	-17.4	-24.5	-22.5	-17.4	-1
4	1	3	-8.0000	54.0	-17.4	-24.5	-22.5	-16.2	-1
5	1	4	-7.0000	56.4	-17.4	-24.5	-21.9	-13.4	-1
6	1	5	-6.0000	58.8	-17.4	-24.5	-21.5	-14.9	-1
7	1	6	-5.0000	60.9	-17.4	-24.5	-22.0	-17.8	-1
8	1	7	-4.0000	63.7	-17.4	-24.5	-22.0	-16.7	-1
9	1	8	-3.0000	64.1	-17.4	-24.5	-22.0	-18.7	-1
10	1	9	-2.0000	65.6	-17.4	-24.5	-19.6	-19.3	-1
11	1	10	-1.0000	65.7	-17.4	-24.5	-21.8	-16.2	-1
12	1	11	0.0000	65.1	-17.4	-24.5	-24.6	-15.1	-1
13	1	12	1.0000	65.9	-17.4	-24.5	-24.6	-12.4	-1
14	1	13	2.0000	66.4	-17.4	-24.5	-25.2	-11.1	-1

Event Time History Sheet

For the event with the highest Z-peak, Event 6, we can view the Event Time History sheet to see the values for the metrics specified in our measurement setup.

FIGURE 3-22 Event Time History Sheet

Spectral data columns

1 second periods with 10 second pre trigger

Event	Record #	Time	LAeq 1/3...	16.0	31.5	63.0	125	250	500	1000	2000	4000	8000	16000	
Event 6	1	-10.0000	45.1	53.8	52.4	45.1	28.5	34.7	44.1	46.7	36.1	17.6	13.2	12.4	14.2
	2	-9.0000	40.9	52.9	55.0	42.8	28.6	34.3	46.3	39.1	32.2	25.7	17.1	13.9	14.8
	3	-8.0000	46.1	51.0	53.6	39.2	29.3	36.0	49.7	47.0	32.9	25.7	21.2	18.3	15.6
	4	-7.0000	45.8	50.7	54.7	40.9	28.7	32.6	52.6	46.5	30.5	20.4	18.0	16.3	17.1
	5	-6.0000	40.9	51.4	54.1	44.2	30.9	33.8	45.2	40.9	33.3	27.5	24.8	20.4	26.2
	6	-5.0000	36.7	52.9	53.9	42.5	28.8	30.8	40.5	30.2	27.3	28.2	28.7	25.3	22.6
	7	-4.0000	42.9	50.0	51.2	40.0	29.7	32.0	50.8	40.9	25.7	24.7	24.0	21.3	23.4
	8	-3.0000	54.0	56.5	52.3	42.3	34.0	39.0	54.9	54.0	45.1	33.1	29.9	25.2	20.9
	9	-2.0000	60.8	53.5	52.9	44.1	49.6	58.1	60.3	56.5	57.8	52.3	44.7	37.0	22.8
	10	-1.0000	57.5	47.4	53.5	45.1	40.8	52.3	52.7	52.9	54.6	48.0	44.1	38.3	24.8
	11	0.0000	80.9	47.9	52.3	43.8	73.4	83.0	79.6	74.5	69.8	76.1	66.1	57.2	45.7
	12	1.0000	85.0	49.9	60.3	63.1	43.4	77.5	76.2	74.9	77.1	81.6	69.2	61.7	48.8
	13	2.0000	46.6	55.7	60.0	59.9	70.8	67.3	54.8	45.7	37.3	36.4	24.6	19.6	15.6
	14	3.0000	40.5	50.1	54.6	45.1	30.7	32.0	41.3	38.6	32.0	33.3	31.3	23.5	18.9
	15	4.0000	91.9	54.2	51.7	57.2	73.8	81.7	85.9	86.6	81.9	78.0	71.3	66.4	58.0
	16	5.0000	81.4	46.7	64.7	68.9	71.7	76.9	85.9	83.6	84.9	71.4	60.1	57.7	48.5
	17	6.0000	47.6	54.1	68.5	49.2	34.7	32.9	53.9	43.7	35.3	29.2	27.7	26.1	24.5
	18	7.0000	46.8	60.4	53.5	43.8	30.2	31.2	46.7	48.5	34.5	33.7	33.5	30.1	25.9
	19	8.0000	90.9	52.2	53.1	41.2	74.8	84.5	89.6	85.8	80.6	80.7	69.7	64.0	53.8
	20	9.0000	42.6	50.5	69.3	71.5	58.4	42.1	43.1	39.5	34.6	36.7	31.0	20.9	15.7
	21	10.0000	53.8	62.3	52.0	43.8	30.5	41.9	58.1	54.8	43.5	31.5	25.8	21.5	17.1

Gray cells indicate under range values

Time History Sheet

The Time History sheet includes the data for LAeq and LZpeak, as specified in our setup.

FIGURE 3-23 Time History Sheet

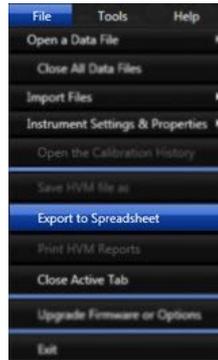
Record #	Record Type	Date	Time	LAeq	LZpeak	Ovrlid.	OBA Ovrlid.
1	Run	2014/06/27	17:12:35				
2		2014/06/27	17:12:35	49.83575	94.414	No	No
3		2014/06/27	17:12:36	48.50575	88.15028	No	No
4		2014/06/27	17:12:37	48.55936	70.11449	No	No

3.7.1 Export to Spreadsheets

To export data files from G4 to Microsoft Excel, make the file the active tab and then click **File** → **Export to Spreadsheet**. G4 prompts you to

save the **.xlsx** file in the default location or the location you specified on the **File Options** tab (**Tools** → **Options**).

FIGURE 3-24 Export To Spreadsheets



Module 4 Room Acoustics

Measurement Example

4.1	Overview	4-1
4.2	Setting Up the Measurement	4-1
4.2.1	Create a Setup File on the PC	4-1
4.3	Viewing Measurement Data	4-6
4.3.1	Download the Measurement File	4-6
4.3.2	Use G4 LD Utility File Viewer	4-7

4.1 Overview

TAKE NOTE This example assumes that the 831-RT option is installed on the Model 831.

This module provides an example procedure for performing an RT-60 measurement in G4 LD Utility and for working with example data.

In this example, we will follow procedures for the Model 831 that demonstrate features for RT-60 sound measurements, including:

- Setting up the Measurement
- Making the Measurement
- Viewing the Measurement Data

4.2 Setting Up the Measurement

TAKE NOTE Before creating setup files on the PC, refer to the sections in the previous chapter to "Connecting to Instruments" and to "Calibrate the Instrument".

This example demonstrates the following steps for setting up the measurement:

Step 1 Create a setup file on the PC.

Step 2 Move the setup file to the instrument and make it active.

The following sections describe these steps in more detail.

4.2.1 Create a Setup File on the PC

TAKE NOTE For more information on all the following setup options, see the RT-60 chapter in the Model 831 Manual.

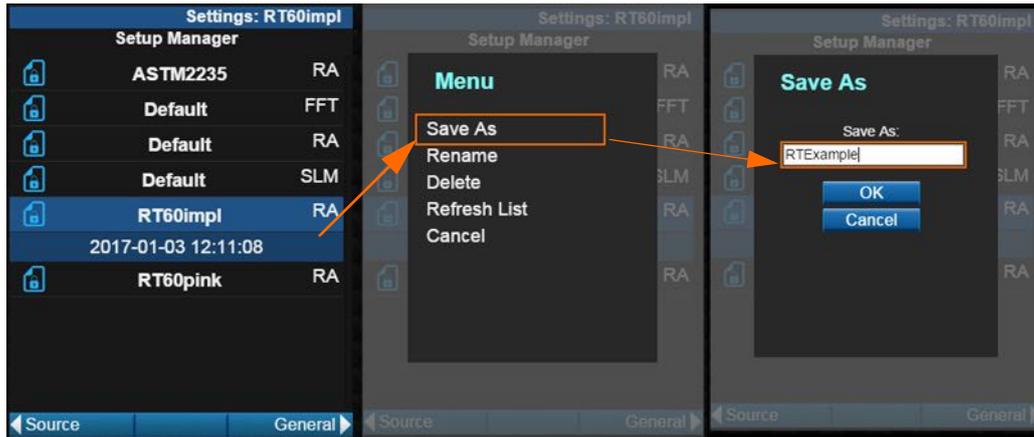
In this example, we will use the Setup Manager to create an RT-60 measurement with the following settings:

- Low Filter at 250.0 Hz and High Filter at 4.00 kHz, with an exit time of 10 seconds (default setting)
- RT-60 Bandwidth of 1/1, Impulse Method, 4.00kHz Trigger Source, 80.0 dB Trigger Level, Decays: 1 (default setting)
- Sample Period of 5 ms, Max Run Time of 4 seconds with Normal OBA Range and all time series saved (default setting)

Name the setup

- Step 1** To name our setup click on the **Setup Manager** tab in G4.
- Step 2** Assign the PC settings as **Model 831 Settings in PC** and assign the Instrument settings to your connected Model 831.
- Step 3** Right-click on the **RT60impl RA** setup button on the **Model 831 Settings in PC** box. Select **Save As** and specify the setup name as **RTEExample**.

FIGURE 4-1 RT-60 Example Setup Name

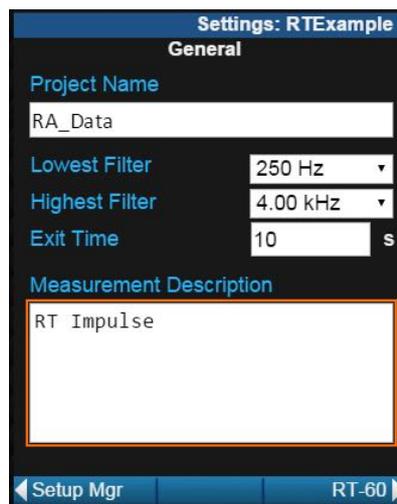


Specify Low Filter, High Filter, and Exit Time

TAKE NOTE If you return to the **Setup Manager** tab from a settings tab, you are prompted to save settings. Click **Yes** to apply the changes to the setup.

Find and click the **RTEExample** button you just created on the Setup Manager. Navigate to **General** (bottom right) and leave the default settings for **Project Name**, **Lowest Filter**, **Highest Filter**, and **Exit Time**. Under **Measurement Description**, enter “RT60 Impulse”. Figure 4-2 shows the settings.

FIGURE 4-2 RT-60 Filters and Exit Time



Verify RT-60 Settings

On the **RT60** tab, keep the default settings, as shown, except for **Decays**; for this value, enter **3**.

FIGURE 4-3 RT-60 Settings

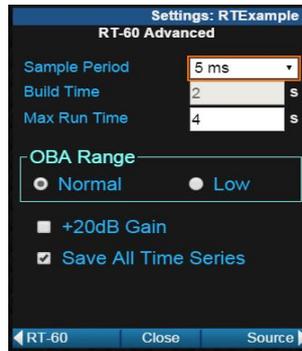


Verify RT-60 Advanced Settings

On the **RT60 Advanced** tab, keep the default settings.

TAKE NOTE The **Build Time** field is disabled as it applies only to the Interrupted Method.

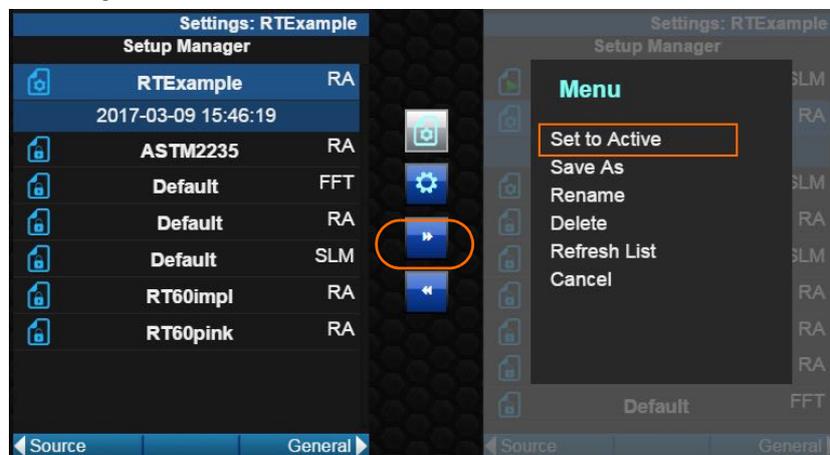
FIGURE 4-4 RT 60 Advanced Settings



Move the Setup to the Instrument and Make it Active

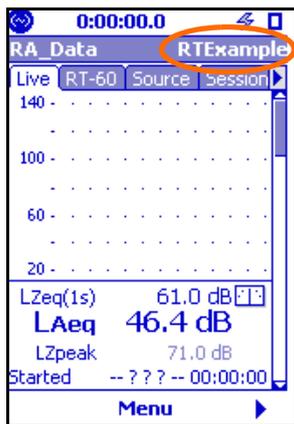
After making all the changes, save the file. In the Setup Manager, click the **RTEExample** setup button and then click the right double-arrow button to transfer the setup to the instrument. Double click the setup and then click **Set To Active**.

FIGURE 4-5 Transfer Setup and Set to Active



You can verify that the Example setup is active on the instrument by viewing the instrument screen or **Live View**.

FIGURE 4-6 Active Example Setup



Making the Measurement

TAKE NOTE Before starting the measurement, secure your Model 831 or microphone in a location where you want to monitor sound levels. Larson Davis recommends using tripods and standard impulse sources for proper RT-60 impulse measurements. For more information, see “Sound Sources” on our website at <http://www.larsondavis.com/Products/SoundSources.aspx>.

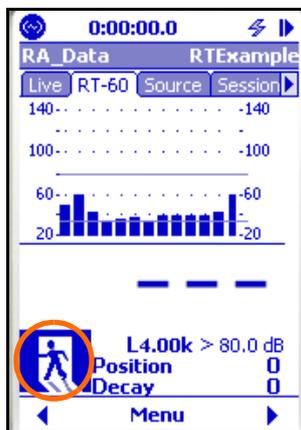
LEARN MORE For complete information on performing an RT-60 measurement with the Model 831, see the RT-60 chapter in the Model 831 Manual.

For the example in this manual, we measure RT-60 levels in only one location, though typically RT-60 measurements are made from multiple locations within one room.

To begin your measurement, press the  (RUN/PAUSE) button on the meter, or if you are still connected to G4, click the same button on the **Live View** in G4.

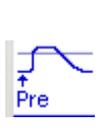
In the lower left corner of **Live View**, G4 provides indications for each step in the measurement process. The first icon shows an exit prompt for the duration of the specified Exit Time, indicating that you should step away from the microphone location. Figure 4-7 shows the prompt.

FIGURE 4-7 Exit Prompt



Live View also displays the following prompts for Impulse RT-60 measurements:

Table 4.1 Impulse RT-60 Prompts

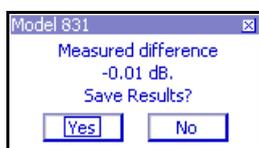
Prompt	Meaning
	The background noise level is measured for 5 seconds and is then used for determining signal-to-noise ratio on successive decays.
	The background noise measurement is complete and the pre-trigger buffer is filling.
	The pre-trigger buffer is full and the source within the room should be activated. If using the internal noise source, it will start automatically.
	The measurement has been triggered.

For our example measurement, you should activate the impulse source each time the **Ready** icon appears on **Live View**. If the **Trig** icon appears after each source activation, your measurement will be ready to stop after three activations. If the **Trig** icon does not appear after an activation, you will need to repeat it until the **Trig** icon appears.

Press or click the  (STOP/STORE) button twice to end the measurement and store it.

Perform an acoustic calibration and calibration check as described previously to verify your measurement.

FIGURE 4-8 Post-Measurement Calibration



4.3 Viewing Measurement Data

TAKE NOTE The **Live View** in G4, or the meter itself, displays many pages of results data on its RT-60 tab. Refer to the Model 831 manual for information on viewing and understanding these pages.

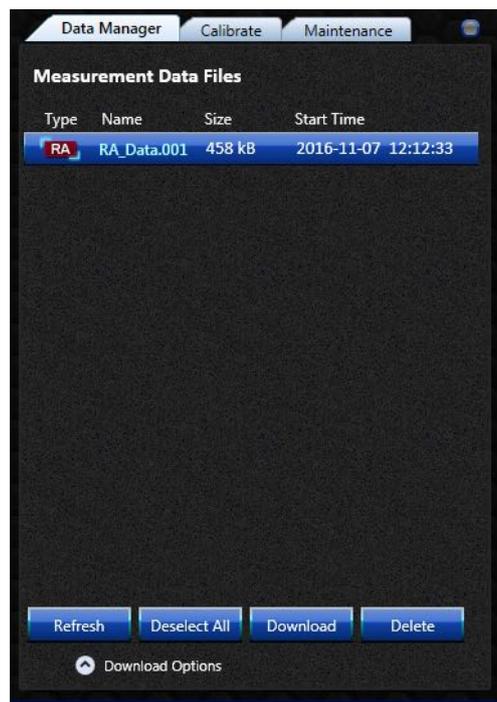
To complete our example, we will download the measurement file to G4 and examine the data with G4 viewing and export tools.

4.3.1 Download the Measurement File

Click the instrument serial number tab, viewing the **Meter Manager**, and select the data file from your measurement on the **Data Manager** tab.

The G4 Data Manager shows data files according to the mode in which the instrument is currently operating. In our example, our measurement was taken in RA mode. In other scenarios with SLM and FFT modes, those option can be selected on the right hand side of this list.

FIGURE 4-9 RT-60 File in Data Manager



TAKE NOTE You can specify the filename format and folder location for saving data files in G4 by navigating **Tools** → **Options** and entering the information on the **File Options** tab.

Check the **Download Options** list and insure that all desired options are selected. Click the file, then select the **Download** button. G4 automatically saves the file in .ldbin format and opens it in tabbed worksheets.

4.3.2 Use G4 LD Utility File Viewer

Each G4 worksheet provides sound data according to the settings we specified in our measurement setup.

Summary Sheet Data

LEARN MORE For more information on the meaning of specific data metrics, quality indicators, and values, refer to the RT-60 chapter of the Model 831 Manual.

The **Summary** sheet provides overall results from all three decays, according to frequency, including quality indicator values for the measurement. The quality indicator values are shaded green, yellow, or pink according to whether they are within limits, marginally within limits, or outside the limits, respectively. Figure 4-10 shows the sheet.

FIGURE 4-10 RT-60 Summary Data Sheet

Frequencies

Quality Indicators: See the RT-60 chapter in the Model 831 Manual for more information.

Frequency (Hz)	Leq (dB)	Lmax (dB)	Lbk (dB)	T20 (ms)	BT:T20	BK:T20 (dB SNR)	NL:T20 (%)	Cu:T20
250 Hz	80.0	92.7	45.1	283	56.10	47.6	51.91	-4
500 Hz	85.4	97.1	41.2	1396	493.07	55.9	602.91	-4
1000 Hz	83.3	96.7	39.7	-99.94	-99.94	57.0	-99.94	-9
2000 Hz	82.2	98.9	40.7	1102	1549.23	58.2	773.90	-6
4000 Hz	80.0	101.6	44.3	-99.94	-99.94	57.3	-99.94	-9

The **RT-60 Detail** sheet provides results for each decay, according to frequency, in detail. The quality indicators are also shown in detail for the three decays individually.

FIGURE 4-11 RT-60 Detail Sheet

Frequencies for each decay

Quality Indicators

Frequency (Hz)	T20 (ms)	BT:T20	BK:T20 (dB SNR)	NL:T20 (%)	Cu:T20 (%)	Sd:T20 (%)	T30 (ms)	BT:T30	BK:T30 (dB SNR)	NL:T30 (%)	Cu:T30 (%)	Sd:T30 (%)
250.0	617	109.21	80.2	16.16	-5.88	9.19	581	102.78	80.2	7.47	-5.88	5.82
500.0	476	168.10	80.7	16.56	1.82	7.40	485	171.16	80.7	6.93	1.82	4.51
1000.0	288	203.08	73.0	6.66	8.33	6.74	312	220.00	73.0	5.50	8.33	3.98
2000.0	341	478.75	64.6	14.85	6.01	4.39	361	507.53	64.6	6.09	6.01	2.62
4000.0	338	948.82	49.0	12.46	11.14	3.12	376	1054.48	49.0	7.74	11.14	1.82
250.0	485	85.87	77.5	12.82	-0.96	10.36	481	85.04	77.5	4.22	-0.96	6.40
500.0	416	147.03	82.6	4.17	3.92	7.92	433	152.80	82.6	2.95	3.92	4.78
1000.0	295	207.98	83.2	15.15	6.12	6.66	313	220.71	83.2	7.05	6.12	3.97
2000.0	348	489.50	72.0	2.99	6.09	4.34	369	519.33	72.0	4.23	6.09	2.59
4000.0	326	914.44	62.6	5.07	19.14	3.17	388	1089.43	62.6	13.68	19.14	1.79
250.0	560	99.15	80.6	5.25	-8.13	9.64	515	91.09	80.6	6.39	-8.13	6.19
500.0	394	139.08	83.8	5.76	8.37	8.14	427	150.71	83.8	5.53	8.37	4.81
1000.0	335	236.07	79.6	12.48	-4.47	6.25	320	225.52	79.6	6.41	-4.47	3.93
2000.0	342	480.64	77.9	5.05	9.30	4.38	374	525.35	77.9	5.92	9.30	2.58
4000.0	334	937.33	68.9	7.26	13.11	3.14	378	1060.19	68.9	7.63	13.11	1.81

The **Ensemble RT60 Time Series** sheet provides a spectra of sound levels by time table (each sample period) before and after the impulse sound activation. Excluded decays are not represented on this sheet.

The **RT60 Detail Time Series** sheet provides individual sound levels for all sample periods for all three decays, whether the decay was excluded or not from the ensemble series. Figure 4-12 shows the sheets.

FIGURE 4-12 Time Series Data Sheets

Ensemble Time Series sheet:
summarized sound levels

Frequencies

	A	B	C	D	E	
1	Time	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
2	-0.4950	36.4	33.1	34.3	36.8	38.6
3	-0.4900	34.2	33.1	33.5	36.2	36.4
4	-0.4850	36.7	37.5	37.5	35.9	35.2

	A	B	C	D	E	F	G	H
1	Decay	Record #	Time	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
2	Decay 1	1	-0.4950	31.9	30.4	30.7	35.0	36.9
3		2	-0.4900	33.9	32.9	28.6	36.1	37.0
4		3	-0.4850	36.7	37.5	37.5	35.9	35.2
5								

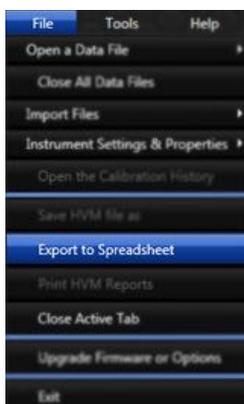
Detail Time Series sheet: sound levels for individual decays.

Sample periods specified in setup

Export to Spreadsheets

To export data files from G4 LD Utility to Microsoft Excel, make the file the active tab and then click **File** → **Export to Spreadsheet**. G4 prompts you to save the **.xlsx** file in the default location or the location you specified on the **File Options** tab (**Tools** → **Options**).

FIGURE 4-13 Export To Spreadsheets



Module 5 FFT & Tonality Example

5.1	Overview	5-1
5.2	Setting Up the Measurement	5-1
5.3	Create a Setup File on the PC	5-1
5.4	Making the Measurement	5-4
5.5	Viewing Measurement Data	5-5

5.1 Overview

TAKE NOTE FFT and Tonality functionality is only available on instruments with DSP Rev 0.5 or higher.

This module provides an example procedure for performing an FFT and Tonality measurement in G4 LD Utility and for working with example data. It is assumed that the 831-FFT option is installed on the Model 831.

This module will demonstrate features for FFT and Tonality sound measurements, including:

- Setting up the Measurement
- Making the Measurement
- Viewing the Measurement Data

5.2 Setting Up the Measurement

TAKE NOTE Before creating setup files on the PC, refer to the previous sections "Connecting to Instruments" and to "Calibrate the Instrument".

This example demonstrates the following steps for setting up the measurement:

- Step 1** Create a setup file on the PC.
- Step 2** Move the setup file to the instrument and make it active.

5.3 Create a Setup File on the PC

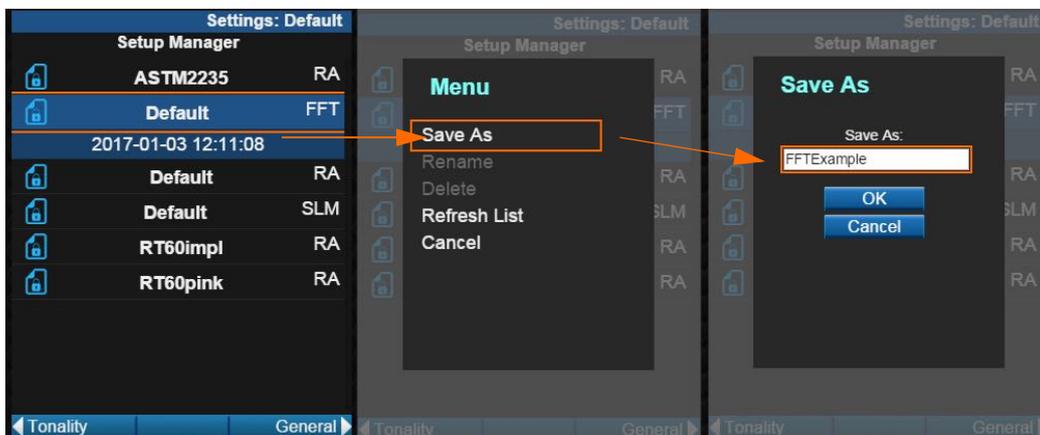
Name the setup

- Step 1** To name our setup click on the **Setup Manager** tab in G4.

Step 2 Assign the PC settings as **Model 831 Settings in PC** and assign the Instrument settings to your connected Model 831.

Step 3 Right-click on the **Default FFT** setup button on the **Model 831 Settings in PC** box. Select **Save As** and specify the setup name as **FFTExample**.

FIGURE 5-1 FFT Example Setup Name



LEARN MORE For more information on all the following setup options, see the FFT and Tonality chapter in the Model 831 Manual.

Find and click the **FFTExample** setup you just created on the Setup Manager. Click the **General** tab and leave the default setting for **Default Data File**. Under **Measurement Description** type “FFT and Tonality.”

Specify FFT Settings

On the **FFT** tab, specify the following:

- Frequency span: 20.0 kHz
- Lines: 1600
- Window: Hanning
- Frequency Weighting: A

FIGURE 5-2 FFT Tab Settings



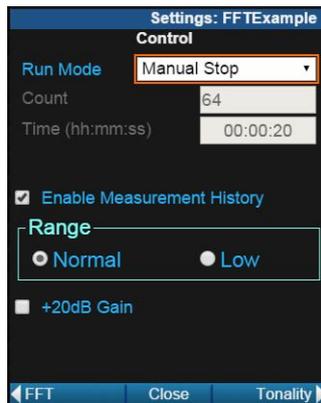
Specify Control Settings

On the **Control** tab, specify the following:

- Run Mode: Manual Stop

- Measurement History: Enabled
- Range: Normal

FIGURE 5-3 FFT Control Tab Settings

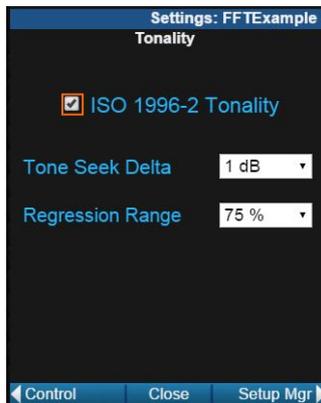


Specify Tonality Settings

On the **Tonality** tab, specify the following:

- ISO 1996-2 Tonality: Turned on
- Tone Seek Delta: 1 dB
- Regression Range: 75%

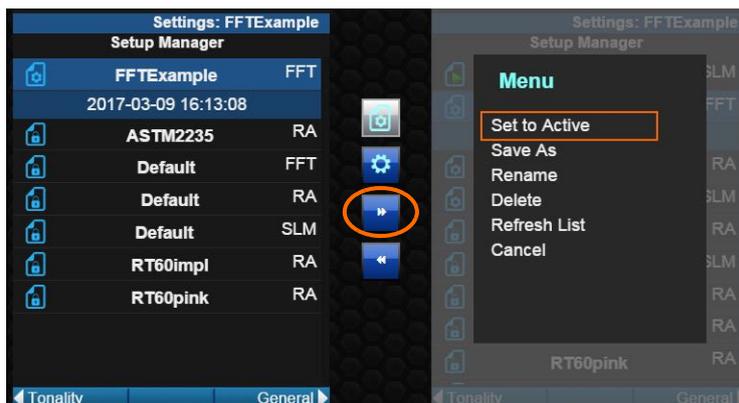
FIGURE 5-4 Tonality Tab Settings



Move the Setup to the Instrument and Make it Active

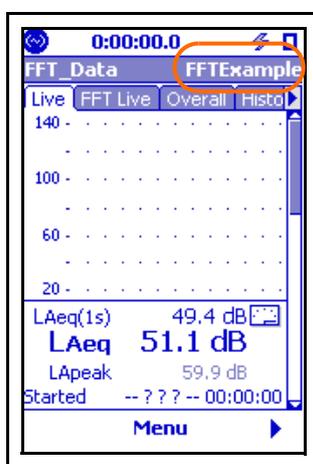
In the Setup Manager, click the **FFTEExample** setup button and then click the right double-arrow button to transfer the setup to the instrument. Double click the setup and then click **Set To Active**.

FIGURE 5-5 Transfer Setup and Set to Active



You can verify that the Example setup is active on the instrument by viewing the instrument screen or **Live View**.

FIGURE 5-6 Active FFT Example Setup



5.4 Making the Measurement

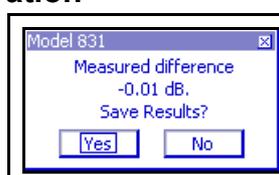
TAKE NOTE Before starting the measurement, secure your Model 831 in a location where you want to monitor sound levels. Larson Davis recommends using tripods or environmental protection systems for proper measurements. For more information, see the Model 831 Manual.

For the example in this manual, we will monitor sound levels in one location.

To begin your measurement, press (RUN/PAUSE) on the meter, or if you are still connected to G4, click the same button on **Live View**. After an appropriate amount of time, press or click the (STOP/STORE) button twice to end the measurement and store it.

Perform an acoustic calibration and calibration check as described previously to verify your measurement.

FIGURE 5-7 Post-Measurement Calibration



5.5 Viewing Measurement Data

TAKE NOTE The **Live View** in G4 LD Utility, or the meter itself, displays many tabs and pages of measurement results data. Refer to the FFT and Tonality chapter of the Model 831 Manual for information on viewing and understanding these pages.

To complete our example, we will download the measurement file to G4 and examine the data with G4 viewing and export tools.

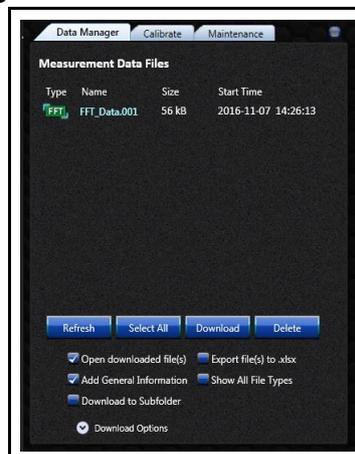
Download the Measurement File

Click the instrument serial number tab and select the data file from your measurement on the **Data Manager** tab.

The G4 Data Manager shows data files according to the mode in which the instrument is currently operating. In our example, our measurement was taken in FFT mode; however, in other scenarios with SLM and RA modes, the **Show files for all modes** option can be selected to see all files.

TRY THIS You can specify the filename format and folder location for saving data files in G4 by navigating Tools Options and entering the information on the File Options tab.

FIGURE 5-8 FFT File in Data Manager



Click the **Download** button. G4 automatically saves the file in .ldbin format and opens it in tabbed worksheets.

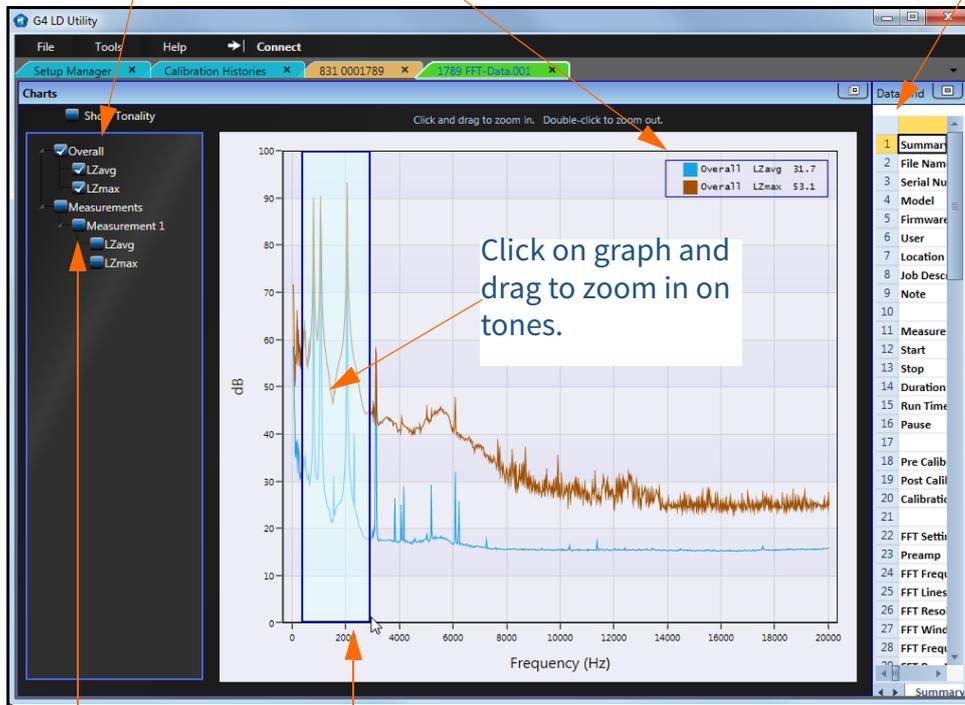
Work With FFT and Tonality Graphs

FIGURE 5-9 FFT Graphs

Select metrics to display or not display on graph.

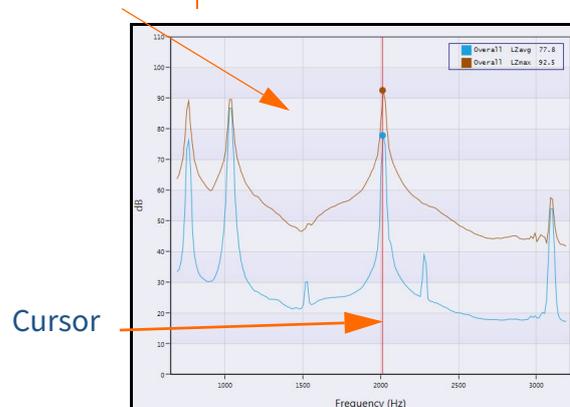
Legend correlates metrics to colors in graph and displays values dynamically as cursor moves along graph.

Click to maximize G4 worksheets.



Select measurements to display on graph.

Zoomed area in graph below.



Cursor

To display tonality data, select the **Show Tonality** option in the upper left corner of the display.

FIGURE 5-10 Show Tonality Option

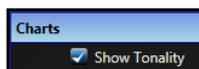
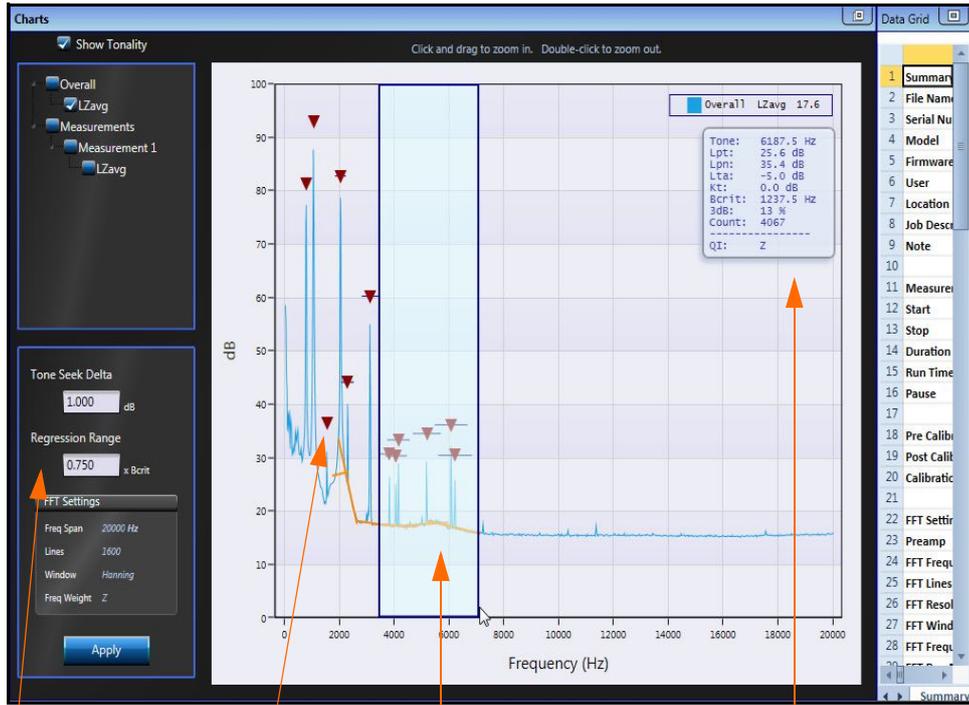
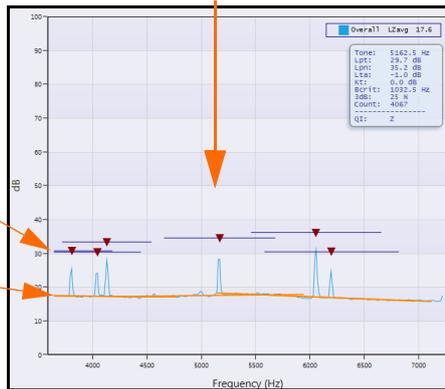


FIGURE 5-11 Tonality Data on FFT Graphs



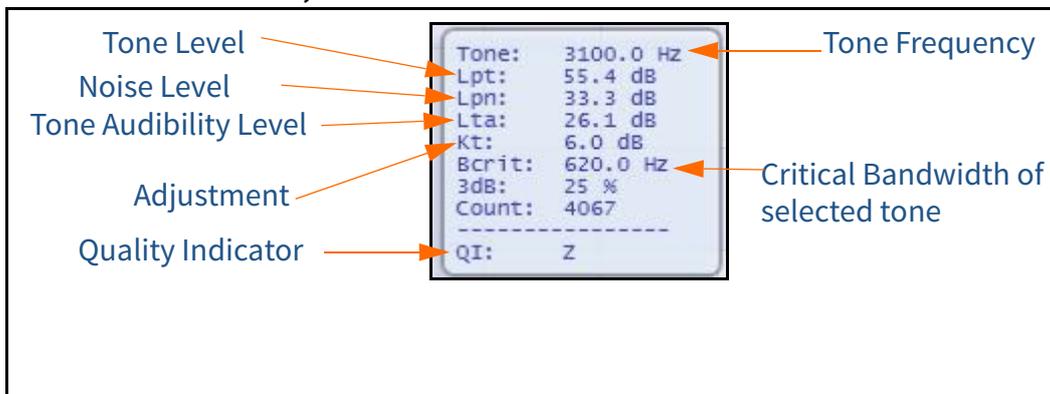
Tonality Settings Tone Indicator Zoom into tones ISO 1996-2 Data

Critical Bandwidth Line
Noise Regression Line



Tone indicators without critical bandwidth lines represent tones that do not meet the ISO 1996-2 Standard.

ISO 1996-2 Annex C Tonality Data
FIGURE 5-12 ISO 1996-2 Standard, Annex C Data



LEARN MORE For more information on Lpt, Lpn, Lta, Kt, and Bcrit, see the ISO 1996-2 Tonality Standard, Annex C.

The data box under the legend shows values of tones where the cursor is placed. Quality indicators are displayed when deficiencies, in relation to the ISO 1996-2 Standard, are detected in measurements. Hover the mouse pointer over the data box to see the Quality Indicators Legend.

FIGURE 5-13 Quality Indicators Legend

Quality Indicators (QI) Legend	
%	= Tone Bandwidth > 10% of Critical Bandwidth (red alert)
E	= Effective Bandwidth > 5% of Critical Bandwidth (red alert)
R	= Insufficient Regression Data (red alert)
C	= Using C Weighting (recommend A)
Z	= Using Z Weighting (recommend A)
W	= Window not Hanning
T	= Run Time < 60 secs (yellow alert)

The following table describes each quality indicator, the corresponding deficiency for each indicator, and the remedy for each deficiency.

Table 5.1 Quality Deficiency and Remedy

Quality Indicator Icon	Deficiency	Remedy
	The measurement has not been averaged for at least one minute (see ISO 1996-2 section C.2.2)	Run the measurement for at least one minute.
	The weighting is set to C (see ISO 1996-2 section C.2.2).	Change the setting to A weighting to perform a standard measurement.
	The weighting is set to Z (see ISO 1996-2 section C.2.2).	Change the setting to A weighting to perform a standard measurement.
	The window type is not Hanning (see ISO 1996-2 Note 1).	Change the setting to Hanning window to perform a standard measurement.
	The tone bandwidth is not less than 10% of the critical bandwidth (see ISO 1996-2 section C.2.2).	Increase the resolution of the measurement by increasing the number of Lines , or by decreasing the Frequency Span in the FFT settings. The appearance of the icon even after the Hanning window is selected indicates that the bands of noise do not qualify as tones as specified in the ISO 1996-2 standard.
	The effective bandwidth is not less than 5% of the critical bandwidth.	Change the window type.
	The sound measurement does not contain sufficient regression data and therefore cannot display a standard linear regression line.	Increase the Regression Range on the Tonality tab.

Use G4 LD Utility File Viewer

Each G4 worksheet provides sound data according to the settings we specified in our measurement setup.

Summary Sheet Data

The **Summary** Sheet provides summarized results of the FFT measurement, including FFT overloads, if any.

FFT Settings	
Preamp	PRM831
FFT Frequency Span	20000 Hz
FFT Lines	1600
FFT Resolution	12.5000 Hz
FFT Window	Hanning
FFT Frequency Weighting	A Weighting
FFT Run Mode	Manual Stop
FFT Count	n/a
FFT Time	n/a
FFT Measurement History	On
FFT Range	Normal
Gain	0 dB
Overall Broadband Data	
LAeq	79.8 dB
LAmx	88.9 dB
LAmin	48.4 dB
LApeak (max)	124.3 dB
Overload	143.4 dB
# Overloads	0
Overload Duration	0.0 s
FFT Overload	143.4 dB
# FFT Overloads	0
FFT Overload Duration	0.0 s

FIGURE 5-14 FFT Summary Sheet

Additional Sheets

G4 also includes sheets for **FFT Overall** data, **Measurement History (Avg)**, **Measurement History (Max)**, **Tonality**, and **Session Logs**. Figure 5-15 shows sections of these sheets.

FIGURE 5-15 Additional FFT Data Sheets

Measurement History
(Avg.) sheet

Overall Data sheet

Frequency (Hz)	LAavg (dB)		LAmax (dB)	
0.0000	3.3		27.0	
12.5000	17.7		43.5	
25.0000	24.6		47.4	

12.5000	25.0000	37.5000	50.0000	62.5000	75.0000	87.5000	100.0000	112.5000	125.0000
18.0	24.9	29.6	34.7	37.8	39.8	41.4	43.2	43.8	44.0

12.5000	25.0000	37.5000	50.0000	62.5000	75.0000	87.5000	100.0000	112.5000	125.0000
43.5	47.4	51.3	59.0	60.1	63.8	63.2	63.3	65.5	68.5

Measurement	Tone (Hz)	Lpt (dB)	Critical Band...	Bcrit (Hz)	Btone/Bcrit (%)	Beff/Bcrit (E)	Qual Ind
Overall	2125.0	75.3	0.0 - 0.0	425.0	91.18	4.41	% T
	2125.0	75.3	0.0 - 0.0	425.0	91.18	4.41	% T
Measurement 1	2125.0	75.3	0.0 - 0.0	425.0	91.18	4.41	% T
	2125.0	75.3	0.0 - 0.0	425.0	91.18	4.41	% T

Measurement History
(Max.) sheet

Tonality sheet

Session Log Sheet not shown

Export to Spreadsheets

To export data files from G4 to Microsoft Excel, make the file the active tab and then click **File** → **Export to Spreadsheet**. G4 prompts you to save the **.xlsx** file in the default location or the location you specified on the **File Options** tab (**Tools** → **Options**).

FIGURE 5-16 Export To Spreadsheets



Module 6 Human Vibration Meter Example

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6.2	G4 LD Utility License for HVM Functionality	6-1
6.2.1	Install G4 LD Utility License	6-1
6.3	G4 LD Utility for HVM100	6-3
6.4	G4 LD Utility for HVM200	6-5

6.1 Overview

This module describes the G4 LD Utility features for the Larson Davis HVM100 and HVM200 instruments.

G4 LD Utility (G4) provides enhanced data-viewing features for both the HVM100 and HVM200 instruments. The following sections present instruction for using these features.

6.2 G4 LD Utility License for HVM Functionality

To control an HVM with G4, a license must be purchased through Larson Davis. Once the license is purchased, an email will be sent with a license key. This key can be used on up to five PCs at a time. The licenses can be uninstalled if a PC no longer needs it, and then reused again on a different PC.

6.2.1 Install G4 LD Utility License

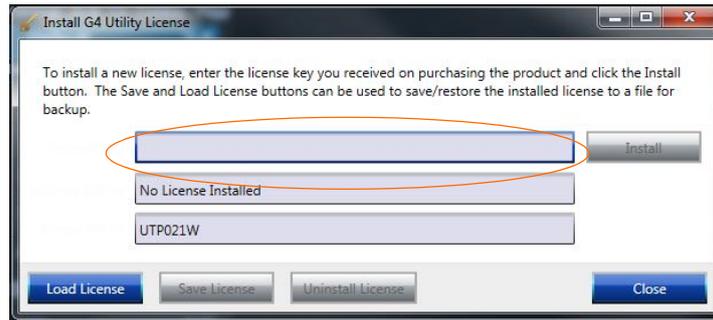
Install for PC with Internet Access

If an Internet connection is available, follow these steps:

- Step 1** Click **Connect** on G4 LD Utility and select an HVM meter. A licensing dialog will appear.

Step 2 Click **Install License** and paste the key into the top text box.

FIGURE 6-1 Install G4 LD Utility License



Step 3 Click **Install**.

Step 4 The software will access the Internet and authenticate the key.

Step 5 When authentication is successfully completed, the second text box will show **Licensed**.

Install for PC without Internet Access

If an Internet connection is not available, follow these steps:

Step 1 Click **Connect** on G4 and select an HVM meter. A licensing dialog will appear.

Step 2 Click **Install License**.

Step 3 Click **Save License**. Save the license file to a known location, where you will be able to find it.

Step 4 Email the license file to Larson Davis ldsupport@pcb.com. Include your Order # in the email.

Step 5 When you receive an email back with the authenticated license file, save the file and repeat Steps 1 & 2.

Step 6 Click on **Load License**. Find the file you downloaded from your email, and load it by clicking on the **Open** button.

Step 7 When the file is successfully loaded, the middle text box will show **License Installed**.

Uninstall a License

TAKE NOTE An Internet connection will be required to uninstall a license.

To uninstall license from your PC, from G4 navigate **Tools** → **Install Licenses**. Click **Yes**. Then choose **Uninstall License**. This will free up one of the five machines allowed to have the same license, if needed.

6.3 G4 LD Utility for HVM100

With G4, you can download, open, and view HVM100 files. To connect G4 to the HVM100, follow these steps:

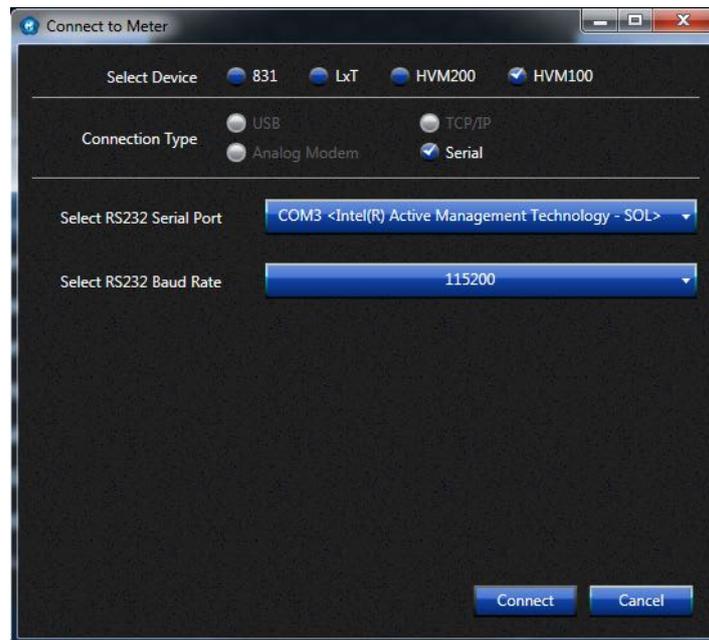
Step 1 Click **Connect** on G4.

Step 2 On the **Connect to Meter** dialog box, select **HVM100** as the **Device** and **Serial** as the **Connection Type**.

Step 3 Specify the **Port** and **Baud Rate**.

Step 4 Click **Connect**.

FIGURE 6-2 HVM100 Connection



TAKE NOTE Select the **Tools 2** tab when configuring the HVM100 for setup.

HVM100 setup and measurement can be performed with G4 but not with the HVM200 App. However, the instructions for using G4 for HVM100 are the same as those described for the HVM200 App in the *HVM200 Manual*. Refer to the *HVM200 Manual* for more information.

To download HVM100 files, follow these steps:

Step 1 Select files to download from the data files list. To select multiple files press the **Ctrl** key while selecting. Using the **Shift** key while selecting files will select a large number of files at once.

Step 2 Select **Download Options** and choose the options available for the files.

FIGURE 6-3 Download Options

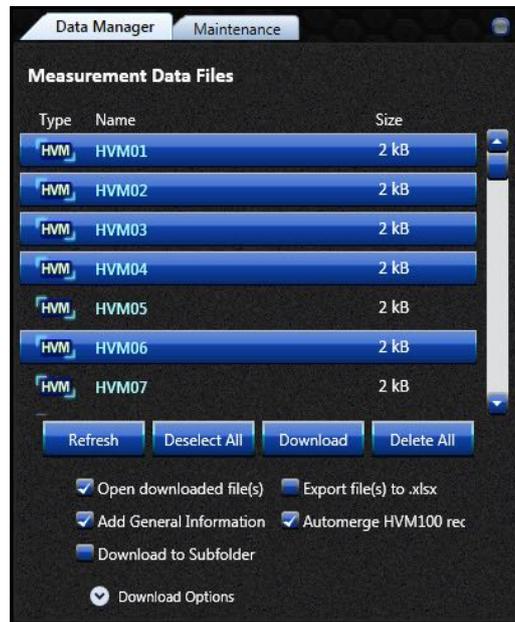


Step 3 Click **Download**.

Step 4 Specify details for the **General Information** dialog box, if needed, and click **OK**.

TAKE NOTE The **Automerge HVM100 Records** option combines contiguous files into records. Each record is displayed as a tab when viewing the data files in G4 LD Utility.

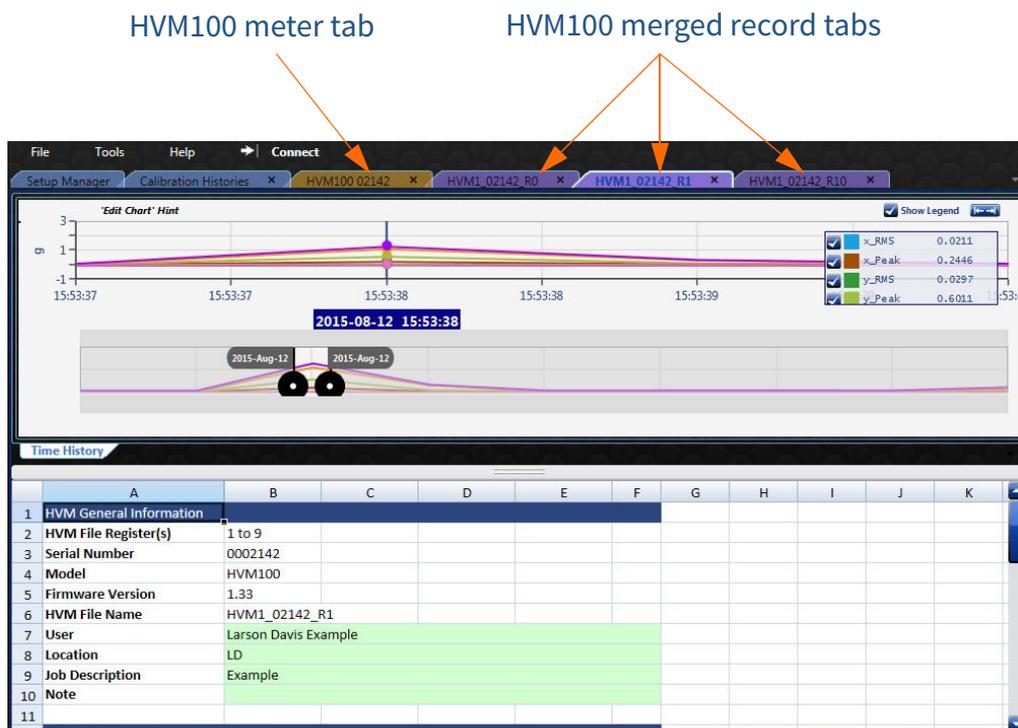
FIGURE 6-4 HVM100 Files Download



To view HVM100 file data, click the tab of the record number created for merged files. Each tab contains a record for only contiguous files.

You can view and manipulate HVM100 graphical data in the same way as HVM200 graphical data, as described in the section "View G4 LD Utility Data Display for HVM200".

FIGURE 6-5 HVM100 Graphical Data



6.4 G4 LD Utility for HVM200

TRY THIS To work with the HVM200 in G4, select the tab with the HVM serial number.

This section presents the features and procedures for using G4 with the HVM200.

Setup the Measurement

LEARN MORE To connect G4 to HVM200 meters by USB, refer to the Introduction in this manual. To connect G4 via TCP/IP to HVM200 meters, refer to the “Connecting via TCP/IP” on page A-1..

HVM200 setup and measurement with G4 is the same as described for the HVM200 App. Refer to the HVM200 Manual for the specific steps to connect, setup and make a measurement with the HVM200.

Download the Measurement File

To download measurement files from the HVM200, follow these steps:

- Step 1** In the Meter Manager view, select the HVM files you want to download. To select multiple files press the **Ctrl** key while selecting.

TAKE NOTE Add **General Information** and **Open Downloaded File(s)** are selected by default.

TAKE NOTE By default, files are listed according from most recently-measured at the top to oldest at the bottom.

FIGURE 6-6 Download Files from Meter

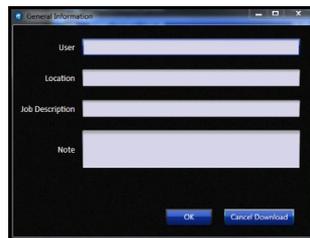


Step 2 Expand the Download Options arrow and select download options.

Step 3 Click **Download**.

Step 4 If applicable, add information to the **General Information** dialog box.

FIGURE 6-7 General Information



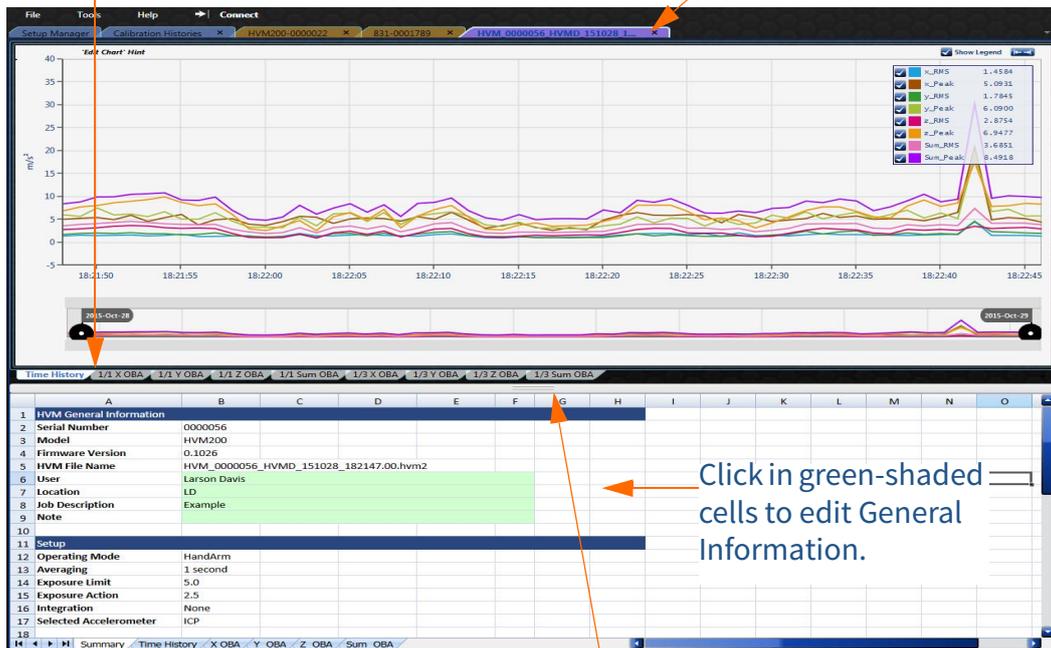
View G4 LD Utility Data Display for HVM200

After downloading HVM200 data files, G4 creates a measurement tab for each file. You can select each measurement tab to view graph and spreadsheet data.

FIGURE 6-8 Measurement Data Display

Click graph tabs to display Time History or OBA graphs.

Click measurement tab to display data for each file.



Click sheet tabs to see measurement data in tables.

Drag bar up or down to expand spreadsheet view or graphical view.

View Expanded Graph

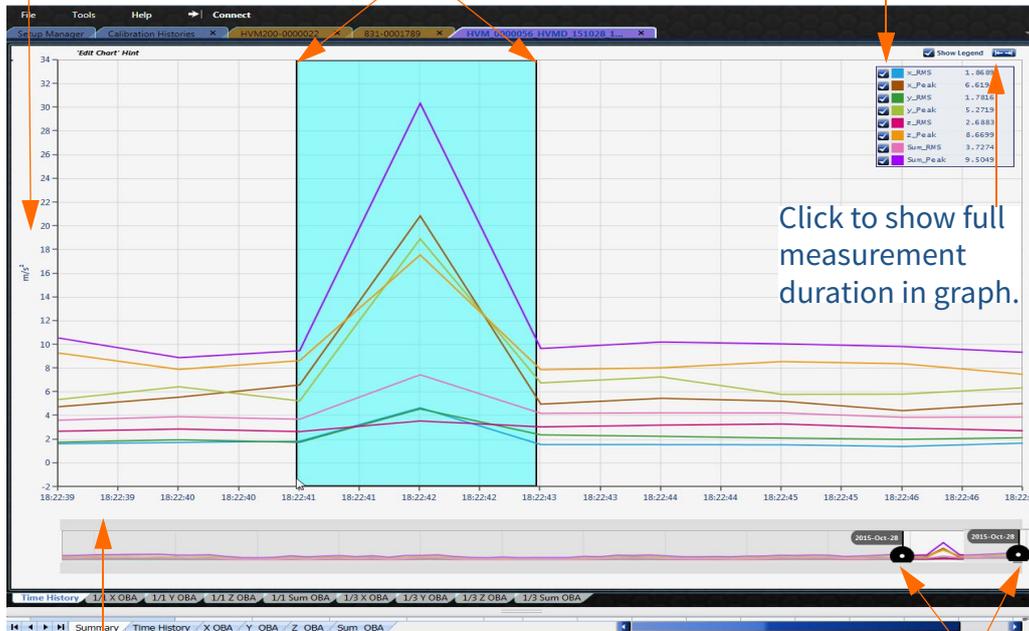
Expanding the graphical view provides a fuller display and easier access to specific data characteristics.

FIGURE 6-9 Expanded Graph Display

Vibration units specified in measurement setup

Click on graph and drag to zoom in on sections of measurement.

Select metrics to be shown or hidden on legend.



Click to show full measurement duration in graph.

Time

Drag disc sliders left or right to adjust scope of display in graph.

View Expanded Spreadsheet

Expanding the spreadsheet view provides more detailed values and metrics for the measurement.

FIGURE 6-10 Expanded Spreadsheet Display

HVM General Information					
Serial Number	0000056				
Model	HVM200				
Firmware Version	0.1026				
HVM File Name	HVM_0000056_HVMD_151028_182147.00.hvm2				
User	Larson Davis				
Location	LD				
Job Description	Example				
Note					
Setup					
Operating Mode	HandArm				
Averaging	1 second				
Exposure Limit	5.0				
Exposure Action	2.5				
Integration	None				
Selected Accelerometer	ICP				
Accelerometer TEDS Data					
	x	y	z		
Manufacturer	PCB	PCB	PCB		
Model Number	356B18	356B18	356B18		
Serial Number	134030	134030	134030		
Sensitivity [mV/(m/s ²)]	103.660439	105.606369	100.818649		
Weighting	Wh	Wh	Wh		
Overall Data					
Start Date and Time	2015-Oct-28 18:21:47				
Run Time (hh:mm:ss)	00:01:00				
	x	y	z	Sum	Units
a _{RMS}	1.7046	1.8809	2.5108	3.5704	m/s ²
MTVV	4.3953	4.2789	3.7877	7.1856	m/s ²
a _{PEAK}	20.8732	18.9452	17.5898	30.3764	m/s ²
a _{MIN}	1.1180	1.0781	1.2081	0.0000	m/s ²
A(1)	0.2201	0.2428	0.3241	0.4609	m/s ²
A(2)	0.1556	0.1717	0.2292	0.3259	m/s ²
A(4)	0.1100	0.1214	0.1621	0.2305	m/s ²
A(8)	0.0778	0.0859	0.1146	0.1630	m/s ²
A(8) Act.	17.207	14.133	7.931	3.922	Hours
A(8) Exp.	>24	>24	>24	15.689	Hours
Exposure Points	0				

Green-shaded cells can be edited.

Click spreadsheet tabs to view **Time History** or **OBA** metrics and values for specified time increments.

Summary sheet provides **General** info, **Setup** info, and **Overall Data** of measurement.

Additional information on spreadsheets:

- Accelerometer overload values are displayed in red cells. If an overload occurs, an additional column in the spreadsheet displays the axis where the overload occurs.
- Accelerometer under-range values occur when noise floor levels are at or near the measured values. These values are displayed in gray cells. An additional column in the spreadsheet displays the axis where the under-range measurement occurs.
- If both an overload and an under-range measurement occur at the same interval on the same axis, the value is displayed in a red cell. This usually indicates a sensor error and if it occurs for more than eight seconds, it may be an indication that the sensor is disconnected.

TRY THIS Navigate the menu icon on the Live View and then select About to view the sensor connection status.

- Calibration check information is displayed on the **Summary** tab, if previously performed.

Edit Data

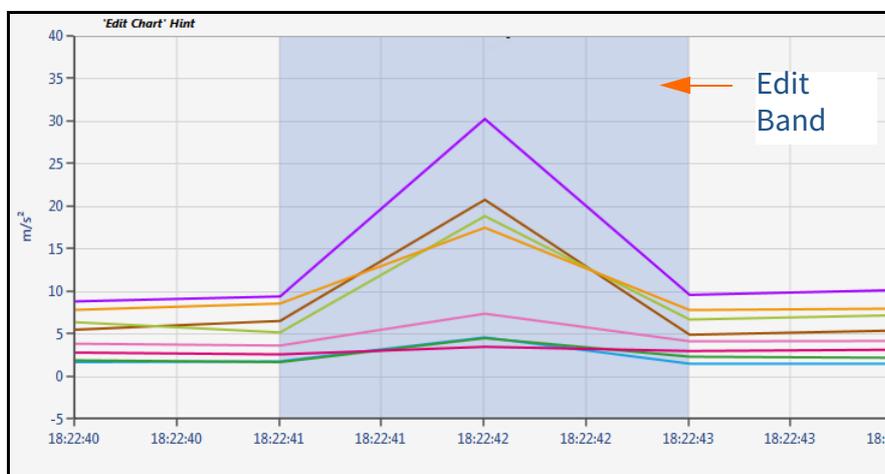
TAKE NOTE When making edits to your data, the original data is not modified. Instead, both the original data and the modified data are displayed in separate sections of the spreadsheet. Also, saving the file preserves any edits made in the appearance of the graph, but not in the original data.

In the G4 Measurement Data Display, you can edit data in the graph to view alternatives and produce a modified file that includes your edits.

To modify data in the graph, follow these steps:

- Step 1** Press the **Shift** key, click on graph, and drag mouse to highlight section to be modified.

FIGURE 6-11 Edit Graph



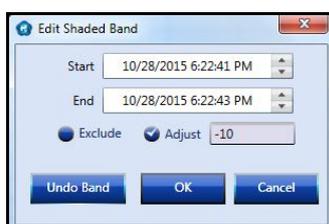
TRY THIS To remove graphical edits, press the Shift key, click on the edit band in the graph, and then click the Undo Band button on the Edit Shaded Band dialog box.

TAKE NOTE Alternatively, you can specify the duration of the edit band by specifying a **Start** and **End** time in the dialog box instead of clicking and dragging on the graph.

- Step 2** In the **Edit Shaded Band** dialog box, select the **Adjust** option and specify a value to add or subtract from the actual measured value. You can specify a positive or negative value.

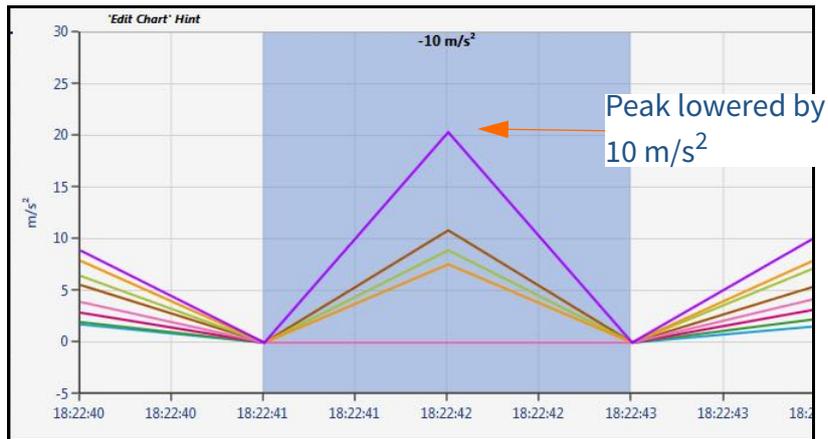
- Step 3** Click **OK**.

FIGURE 6-12 Edit Shaded Band



The graph displays the modified plots within the shaded band.

FIGURE 6-13 Edited Data Graph



The edits also appear in the **Summary** spreadsheet under the heading of **Modified Overall Data**. In the **Time History** spreadsheet, edits appear with a blue background.

FIGURE 6-14 Edited Data in Summary Spreadsheet

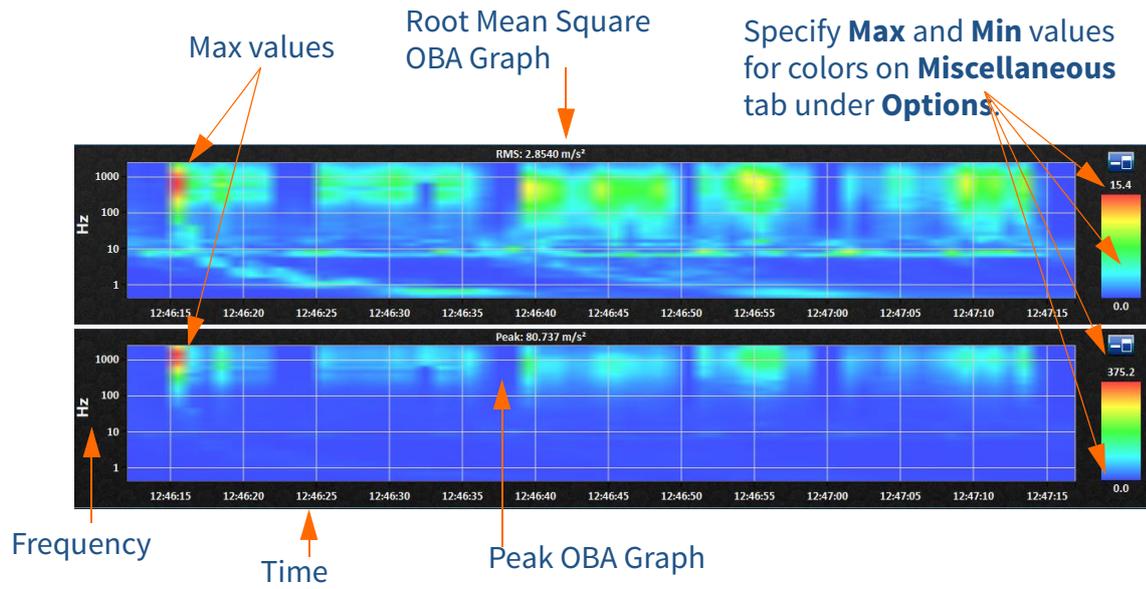
Modified Overall Data					
45	Start Date and Time	2015-Oct-28 18:21:47			
46	Run Time (hh:mm:ss)	00:01:00			
47					
48		x	y	z	Sum Units
49	a _{RMS}	1.5616	1.7425	2.4108	3.3596 m/s ²
50	MTVV	4.3953	4.2789	3.7877	7.1856 m/s ²
51	a _{PEAK}	10.8732	8.9452	10.0040	20.3764 m/s ²
52	a _{MIN}	0.0000	0.0000	0.0000	0.0000 m/s ²
53	A(1)	0.2016	0.2250	0.3112	0.4337 m/s ²
54	A(2)	0.1426	0.1591	0.2201	0.3067 m/s ²
55	A(4)	0.1008	0.1125	0.1556	0.2169 m/s ²
56	A(8)	0.0713	0.0795	0.1100	0.1533 m/s ²
57	A(8) Act.	20.503	16.467	8.603	4.430 Hours
58	A(8) Exp.	>24 Hours	>24 Hours	>24 Hours	17.720 Hours
59	Exposure Points				0 Points

G4 keeps the original values under the heading of **Overall Data**.

View OBA Data

The OBA graphs show the data with respect to both frequency and time using a heat map where the color indicates the amplitude of the vibration.

FIGURE 6-15 OBA Graph



Appendix A Additional Features

A.1	Overview	A-1
A.2	Connecting via TCP/IP	A-1
A.3	Settings and Properties	A-2
A.3.1	Packaging Instrument Settings & Properties	A-2
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A.4	Audio Files and Streaming	A-5
A.4.1	Listening to Streaming Audio	A-5
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A.4.3	Command Line Extraction of Audio Files	A-7

A.1 Overview

This module provides additional features information for G4 LD Utility.

A.2 Connecting via TCP/IP

TAKE NOTE This feature is supported on Model 831C, 831, LxT, and HVM200 instruments.

To connect via TCP/IP with G4 LD Utility, follow these steps:

Step 1 Click **Connect** and select the **Device** and the **TCP/IP** connection type option on the **Connect to Meter** dialog box.

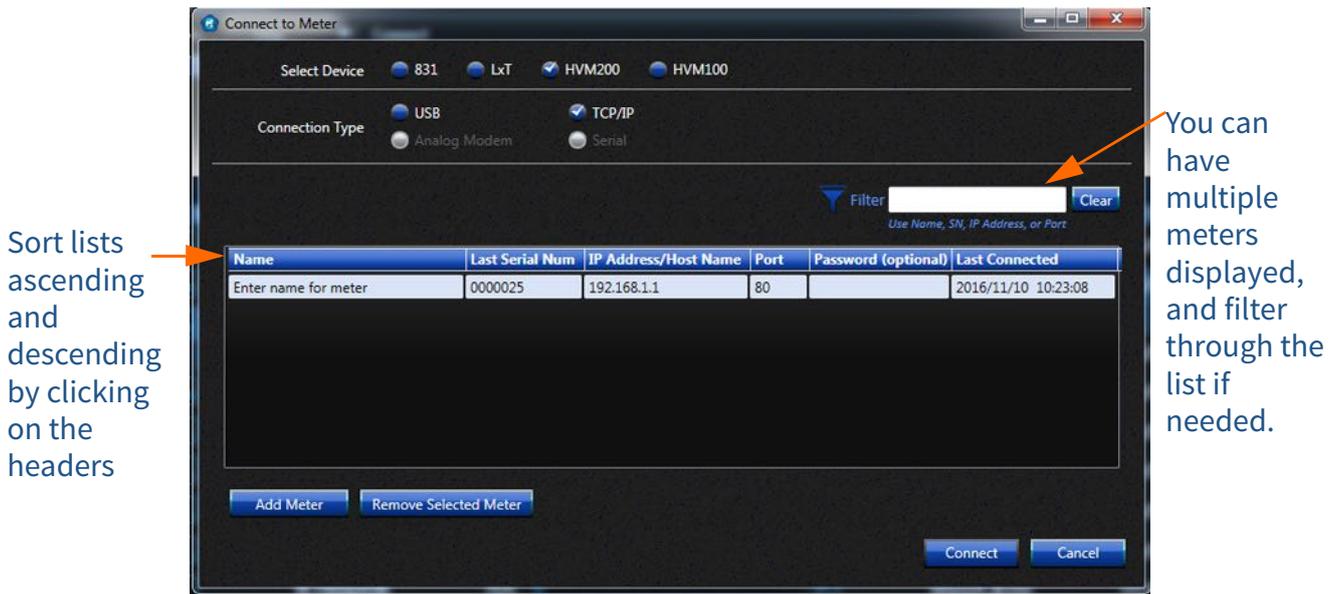
Step 2 Select the meter if it appears in the **Meter** list. Alternatively, click the **Add Meter** button and enter the following information into the list:

TAKE NOTE Specify port numbers **80** or **2001**. If using Secure Sockets Layer (SSL) security, enter port number **443**, which requires a password.

- Name (not required)
- IP Address
- Port number
- Password (if applicable)

Step 3 Click Connect.

FIGURE A-1 Connect via TCP/IP



A.3 Settings and Properties

A.3.1 Packaging Instrument Settings & Properties

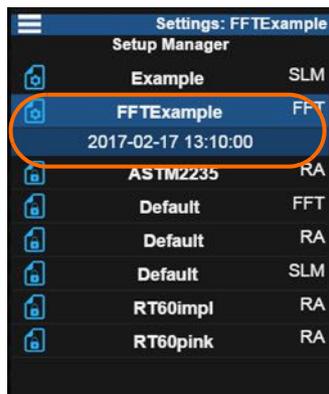
TAKE NOTE This feature is supported on Model 831C, 831, LxT, and HVM200 instruments.

With G4, you can export, import, or extract settings files or property files. Files can be sent via email or uploaded to be accessed through SFTP or cloud storage.

To Export Instrument Settings or Properties, follow these steps:

Step 1 In the Setup Manager, select the settings or properties file to be exported.

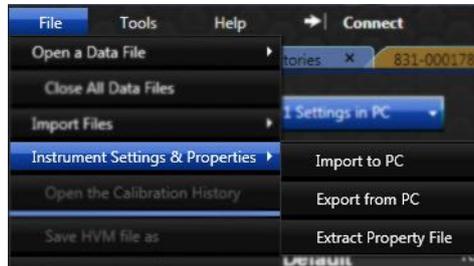
FIGURE A-2 Selected Settings File



Step 2 Navigate **File** → **Instrument Settings & Properties** → **Export from PC**.

Step 3 Name and save the file in the desired location.

FIGURE A-3 Instrument Settings & Properties



To Import Instrument Settings or Properties, follow these steps:

Step 1 Navigate **File** → **Instrument Settings & Properties** → **Import to PC**.

Step 2 Locate the file that is to be imported and select it. Click **Open** on the **Import** dialog box.

To Extract Property Files, follow these steps:

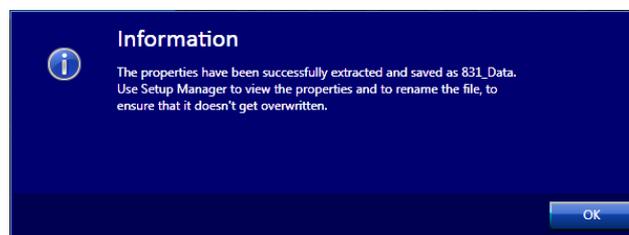
Step 1 Navigate **File** → **Instrument Settings & Properties** → **Extract Property File**.

Step 2 Locate the file containing the properties to be extracted and select it. Click **Open** on the **Import** dialog box.

TAKE NOTE Extract Property File only works with SLM 831C, 831 and LxT.

TAKE NOTE The name of the setup file is one of the properties extracted with this option. Setup files receive new names upon extraction. Rename file to a unique name after extraction in the case the file name is too generic or similar to other data files.

FIGURE A-4 Properties Extracted Message



Step 3 After the properties have been successfully extracted, rename the setup file.

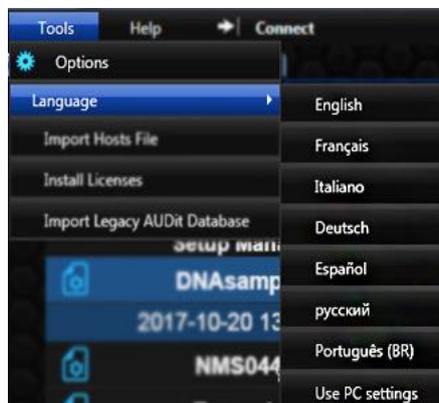
A.3.2 Changing Language

In addition to English, you can use G4 in French, Italian, German, Spanish, Russian, Portuguese, or the language settings currently

configured on your PC. To change the language, navigate **Tools** → **Language** and select the language.

After selecting a new language, close G4 and relaunch in order for the changes to go into effect.

FIGURE A-5 G4 LD Utility Language Support



A.3.3 Color Theme

TAKE NOTE The color themes cannot be changed without restarting G4.

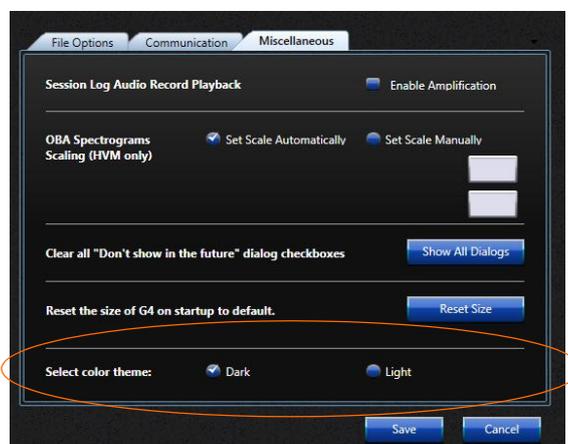
TAKE NOTE The light color theme will make the **Live View** of the HVM200, SLM Model 831C, and 831 appear in a light theme while using G4.

G4 has two choices for color theme: light and dark. The dark color scheme is the standard, but this can be changed anytime.

To change the color theme, follow these steps:

- Step 1** Launch G4.
- Step 2** Navigate **Tools** → **Options**.
- Step 3** Select the **Miscellaneous** tab.
- Step 4** Choose the radio button for the scheme you prefer: **Light** or **Dark**.
- Step 5** **Save** and close G4, then relaunch G4 to enable changes.

FIGURE A-6 Color Themes



A.3.4 Specifying Reference Spectra

TAKE NOTE This feature is supported for Model 831C, 831, and LxT instruments only.

To include reference spectra in setups and measurements, follow these steps:

Step 1 Click the **Setup Manager** tab and then click the **View System Properties** button.



Step 2 Click the Reference Spectra tab for the System Properties on your instrument (right-side of G4) and specify the settings. Alternatively, you can specify Reference Spectra for Settings in PC, but you will need to remember to move the setup file to your instrument before seeing them.

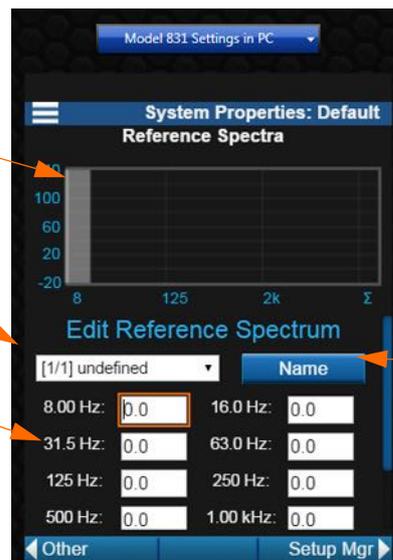
Step 3 After taking a measurement, click **Live View** in G4 and then view the Live tab to see the spectra with specified references.

FIGURE A-7 Reference Spectra Setup

Drag the bar to frequency on graph and use the up or down arrows on your keyboard to raise or lower decibel values.

Assign a number 1-4 for each 1/1 OBA or 1/3 OBA setting.

Specify decibel values as references for listed frequencies.



Click to enter a name for the setting.

Scroll down to see more frequencies to specify.

A.4 Audio Files and Streaming

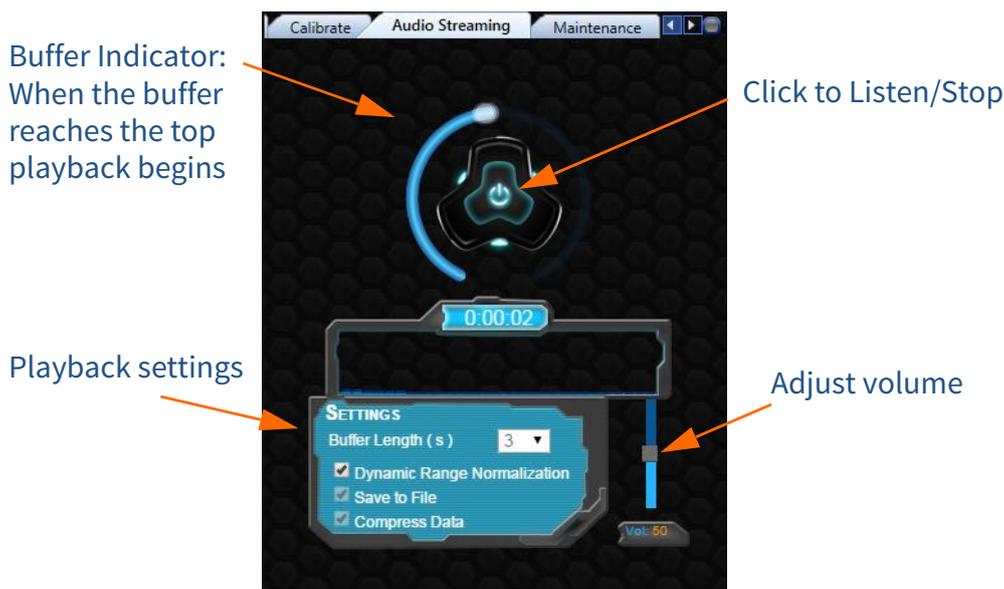
A.4.1 Listening to Streaming Audio

TAKE NOTE This feature is supported for Model 831C, 831, and LxT instruments only. If you are using an 831-INT-ET, you can make a TCP/IP connection and listen to streaming audio over a network or the Internet.

To listen to streaming audio, turn on your instrument and click the **Audio Streaming** tab on the Meter Manager in G4 LD Utility, then click the speaker button. It is not necessary to take a measurement while listening to streaming audio.

During audio streaming the meter will be locked for optimal performance. If a second PC is connected to the same meter, only one can stream audio at the same time. A dialogue box will prompt the second user to end one stream to begin another.

FIGURE A-8 Streaming Audio



Dynamic Range Normalization

Playback is exponentially more sensitive and dynamic. Even a whisper nearby will be picked up and audible.

Save to File

When you check this setting, you will be prompted to name the file that your streaming will be saved to. During the streaming, the file will be updated as it records. Files will be saved as .wav unless you indicate compression, then a .ogg file will need to be named.

Compress Data

A compressed audio file will save as a .ogg file and will be ~1/10th that of an uncompressed .wav file of the same data.

TAKE NOTE Compressed data is only available on the SoundAdvisor Model 831C SLM.

A.4.2 Audio Playback

TAKE NOTE Audio playback on G4 is only available .ldbin files. If you upload an .xlsx file, audio playback will not be available.

Sound recordings created on an 831C are either .wav or .ogg format. Both files can be played back using the player in G4. After you download the files onto your machine, the following programs can be used for playback:

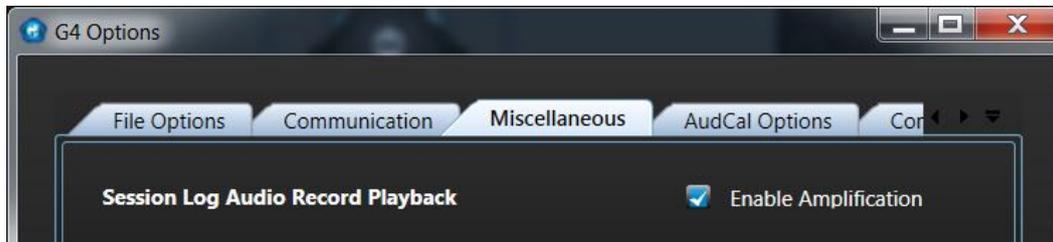
Table A.1 Sound Recording Compatibility

.wav	.ogg
Windows Media Player Most PC/mobile players	VLC Google Chrome Browser Extension for Windows Media Player

Playback from Session Log

Playing a sound recording from the session log in G4 can sometimes result in a quiet, maybe inaudible sound. The recording can be amplified by navigating to **Tools** → **Options** then go to the **Miscellaneous** tab. Check the box for **Enable Amplification**. You only need to do this is one time. All session log playback of audio recordings will be amplified through G4.

FIGURE A-9 Session Log Playback Amplification



A.4.3 Command Line Extraction of Audio Files

For the purpose of extracting audio files from an ldbin file, a command line system is in place. After downloading an ldbin file to your PC, you can extract event, measurement, and voice audio files and save with a user defined naming convention.

To extract audio files from an ldbin file, follow these steps:

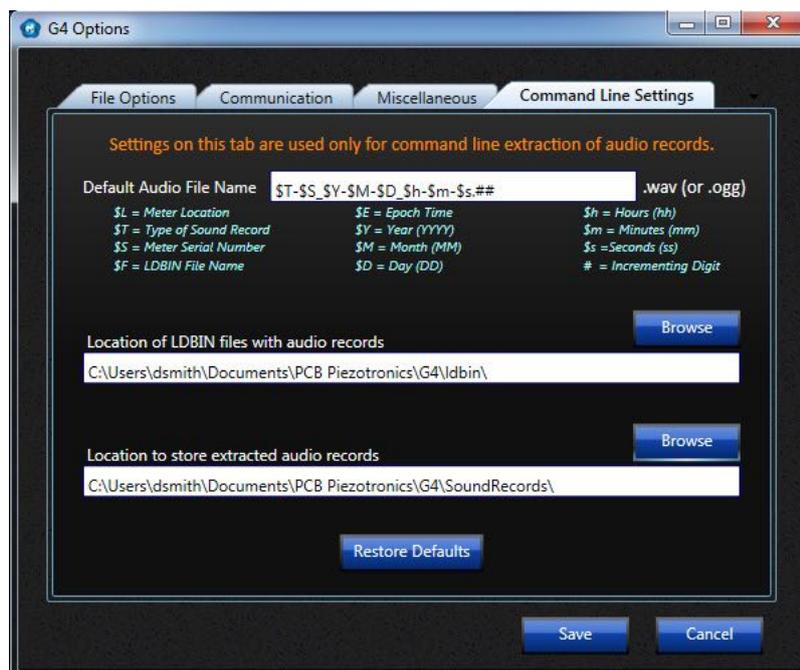
Download Files

- Step 1** Connect your instrument and download the ldbin file. See “Meter Manager” on page 1-6.

Setup Naming Convention and File Paths

- Step 2** Navigate **Tools** → **Options** → **Command Line Settings**.

FIGURE A-10 Command Line Settings



Step 3 Using the file name codes, construct a file naming system for the extracted audio files.

Example: \$L_\$E_\$T.## will result in audio files with names like 03_1497891141_Measurement-11.00.wav

Where the location number is first (this number is from the first two digits followed by an underscore in the file name, if present), followed by the epoch time of the time stamp of the sound recording, then the type of sound recording along with the cause #, and last will be an incremental number, which is recommended to use in cases where a name might be repeated for an audio file and want to prevent the files from getting overwritten. You can also add text that will appear in the name.

Step 4 Define the location of the ldbin file and location to store extracted audio files. **Save.**

The following steps can be done without an instrument connected, and even while G4 is closed. The only requirements are that the PC has G4 and the ldbin file is downloaded on the PC.

TAKE NOTE While the file path locations can be specified in the command line itself, defining it here will omit the need to define it in the command line.

Extract Audio Files

Step 5 Open **Command Prompt**.

Step 6 Navigate C:\Program Files\PCB Piezotronics\G4 or the directory where G4 LD Utility is present.

Step 7 Use the command line:

- Short form:
G4 -ea all -if {[file name]}
- Long form:
G4 -exportAudio {all|m|v|e} -inputFile {[path and] file-name} -destFolder {output directory}

LEARN MORE More information on this and other SDK features can be found in the provided SDK documentation.

The following commands can be used for audio file extraction in G4:
Table A.2 Command Line Extraction

Command	Parameter (optional)
"-exportAudio" or "-ea"	"all" or any combination of "v", "m", "e" (Voice, Measurement, Event)
"-inputFile" or "-if"	file name, include complete path or no path (Partial path not allowed)
"-destFolder" or "-df" (optional)	path for destination folder (Will be created if does not already exist)

Examples:

- G4 -exportAudio all -inputFile "C:\Users\dsmith\Documents\PCB Piezotronics\G4\LDbin\03_SLM_10107_17061900_LD0.00.ldbin" -destFolder "C:\Temp\PCB Piezotronics\G4\SoundRecords\"
- G4 -ea all -if "03_SLM_10107_17061900_LD0.00.ldbin"

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