G4 LD Utility
Software Manual

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

Larson Davis

G4 LD Utility
Software
Reference Manual

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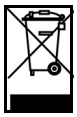

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Table of Contents

Module 1 Introduction

1.1 Overview

TAKE NOTE This manual can be used with the 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 GHz	2 GHz
Computer Memory	4 GB	8 GB
Available Hard Disk Space	2 GB	2 GB

Table 1.1 System Requirements

Screen Resolution	1024 X 768	1280 X 1024
CD Drive	No	Yes
USB Connection	Yes	Yes
Microsoft® Office	None	Excel® 2007[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 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.

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.

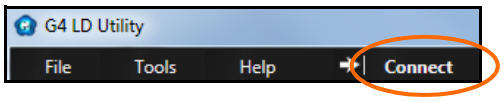
1.6 Working with G4 LD Utility

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**.

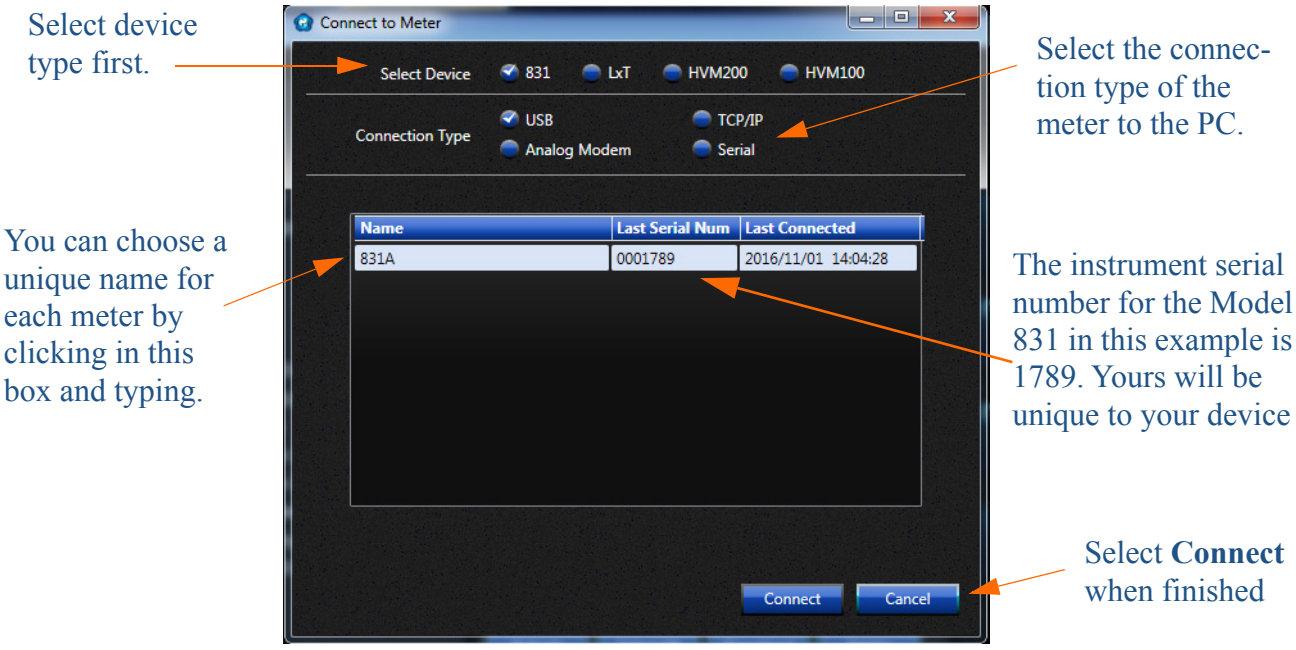
FIGURE 1-1 Connect



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



1.6.2 Upgrade Instrument Firmware

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

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

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:

- 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 831
- HVM200 and HVM100 Human Vibration Meters
- Purchased options for the HVM200

FIGURE 1-3 Upgrade Firmware

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 menus 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 by serial number to work with measurement files, calibration histories, or specific instruments.

Instrument serial number

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

1.7.2 Meter Manager

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

Download Options

- Open downloaded file(s)
  - This option will open a tab next to a meter tab, 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 can be saved 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.

1.7.3 Live View

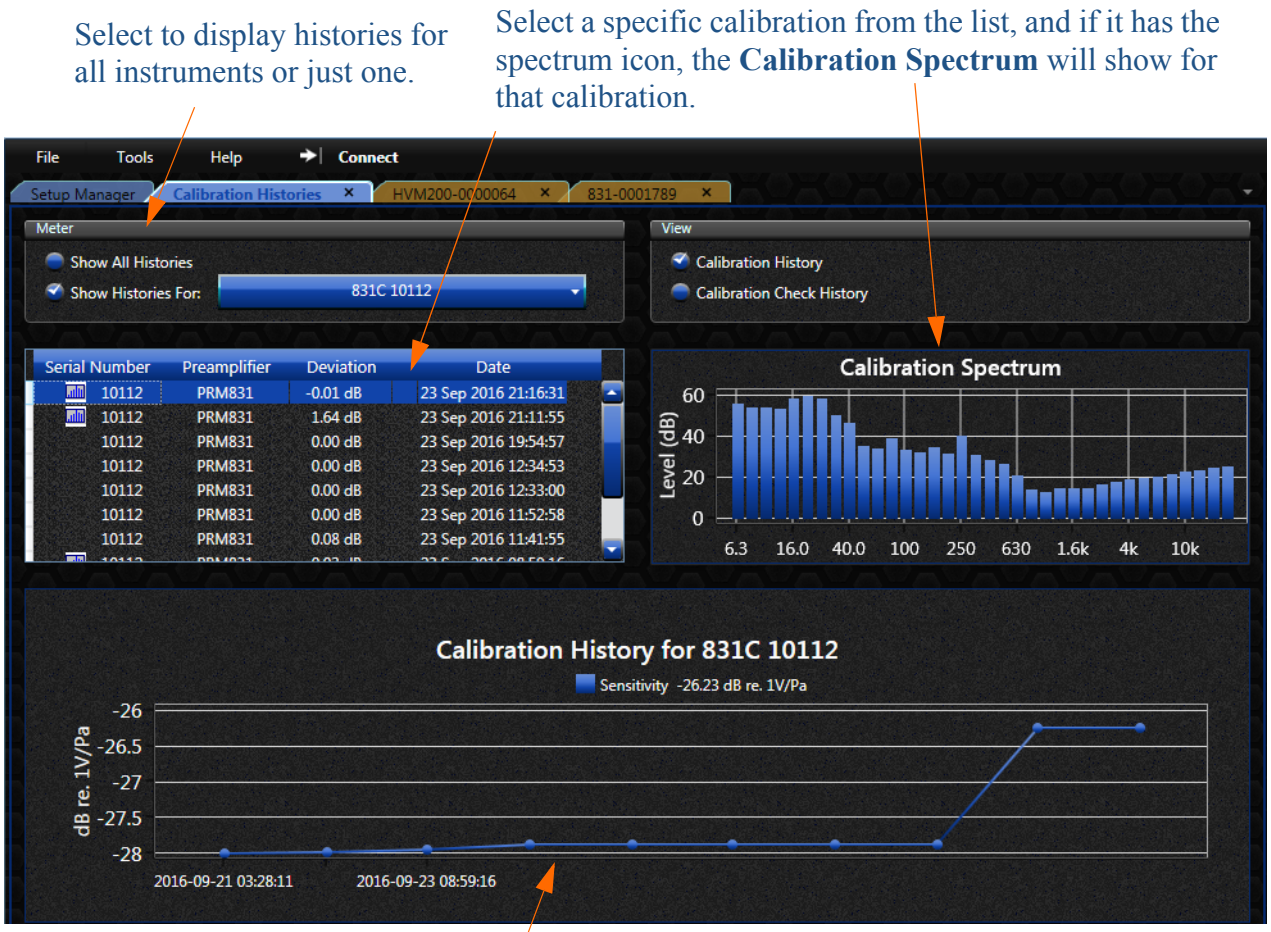
Instrument tabs include a **Live View** display that provides alternative controls for the meter and real-time data display.

FIGURE 1-6 Live View

1.7.4 Calibration Histories Tab

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

FIGURE 1-7 Calibration History

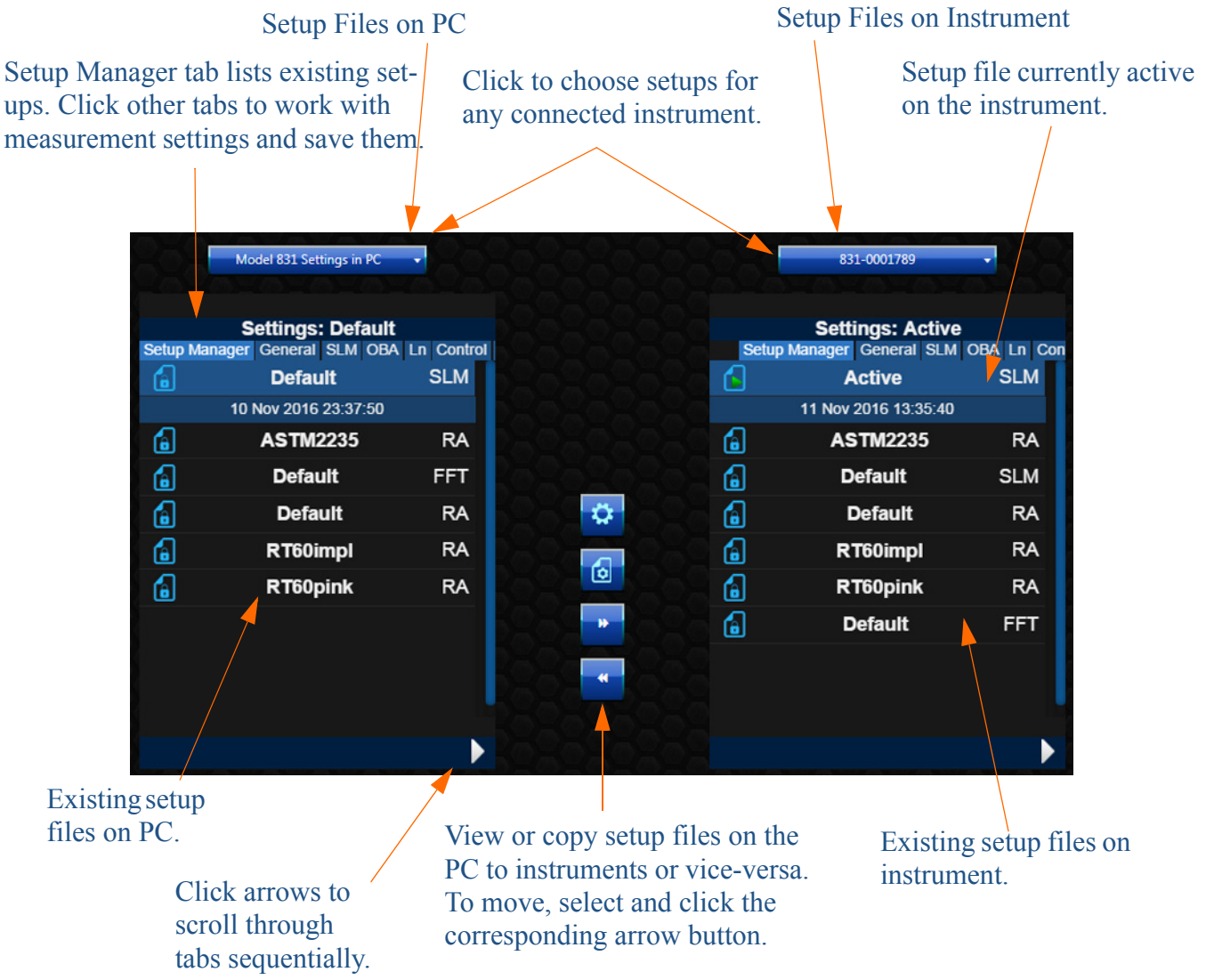


1.7.5 Setup Manager Tab

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 1-8 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.

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.

Module 2 Environmental Noise Measurement Example

2.1 Overview

TAKE NOTE Although this example can also be followed with 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 assumes that the following options are installed on the Model 831:

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

2.2 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.

The following sections describe these steps in more detail.

2.2.1 Calibrate the Instrument

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

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

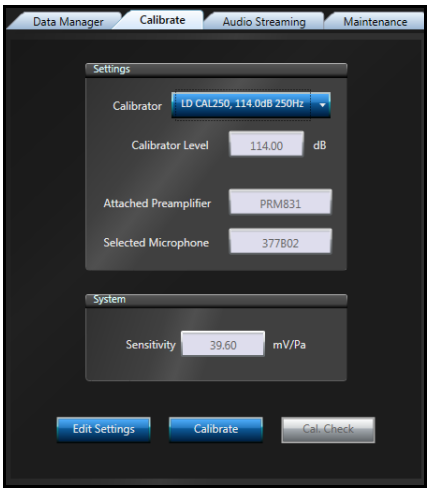
TAKE NOTE You should perform calibration just prior to taking a sound measurement.

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.

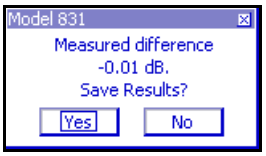
Select the calibrator and click the **Edit Settings** button if the calibrator settings need to be modified. Ensure that the settings correspond to those described in the manual for the selected calibrator. Then click the **Calibrate** button.

FIGURE 2-1 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 2-2 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.

2.3 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 LAeq and Lzpeak.
- Snapshot sound recordings for events.
- Weather data taken with Sen03x weather station.

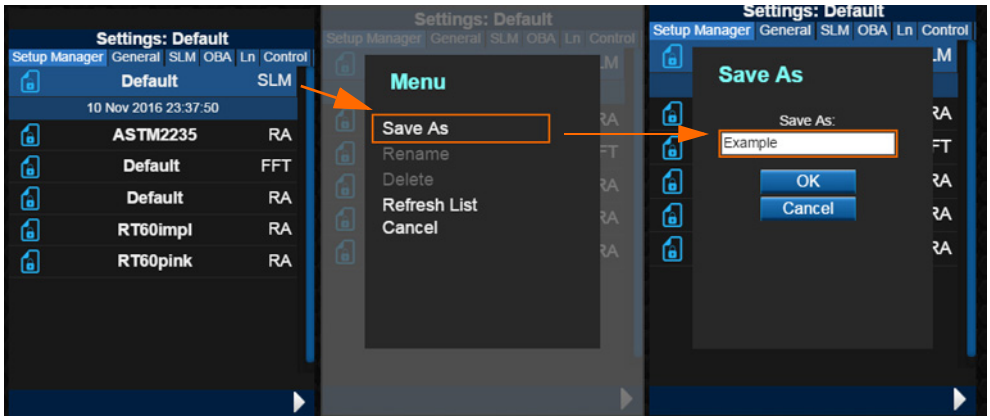
Name the setup

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 2-3 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.

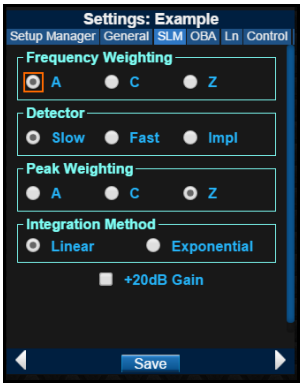
Find and click the **Example** setup button you just created on the Setup Manager.

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

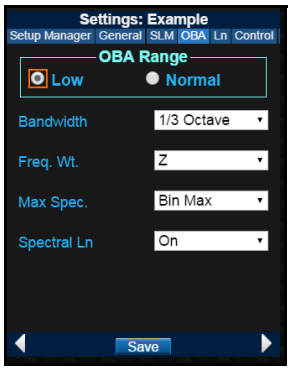
FIGURE 2-4 Weighting, Detection, and Integration Method



Specify Octave Band Analysis Settings

- **Bandwidth**: 1/3 Octave
- **Frequency Weighting**: Z
- **Max Spec.**: Bin Max
- **Spectral Ln**: On

FIGURE 2-5 OBA Settings



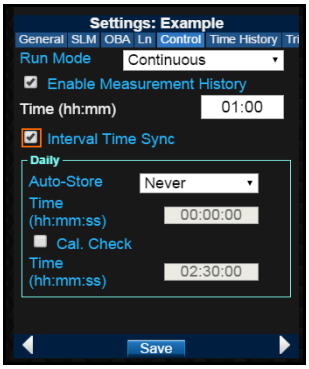
Specify Control Settings

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.

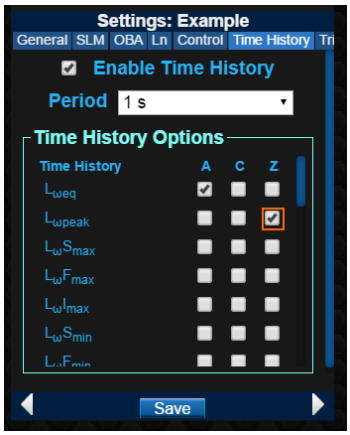
FIGURE 2-6 Measurement Control Mode and Measurement History



Specify Time History Settings

- Check **Enable Time History**
- **Period**: 1 second
- **Lωeq**: A
- **Lωpeak**: Z

FIGURE 2-7 **Time History Tab**

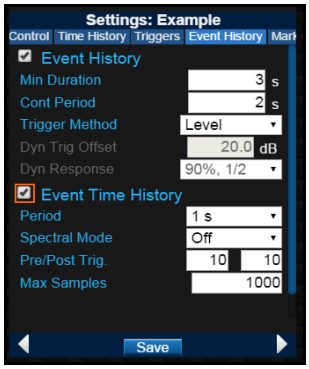


Specify Event History Options

TAKE NOTE We will leave the trigger thresholds on the Triggers tab at their default values.

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

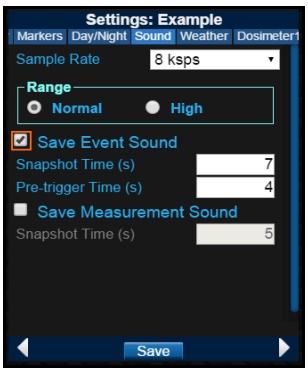
FIGURE 2-8 **Event History Tab**



Record Snapshots for Events

Click the **Sound** tab and select the **Save Event Sound** option. Leave the default values for the snapshot options and click **Save**.

FIGURE 2-9 **Recording Snapshots for Events**

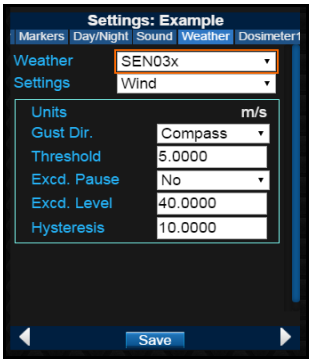


Set Weather Options

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

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

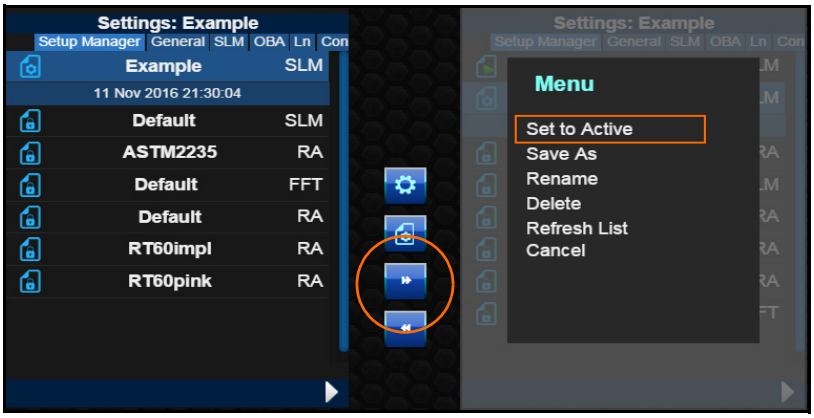
FIGURE 2-10 Weather Tab



Move the Setup to the Instrument and Make it Active

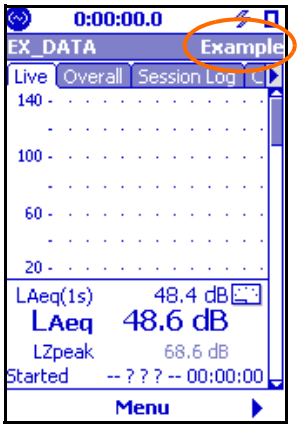
In the Setup Manager, click the Example setup and then click the right double-arrow button to transfer the setup to the instrument. You will be asked to enter a new file name. Double click the setup on your instrument and then click **Set To Active**.

FIGURE 2-11 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 2-12 Active Example Setup



2.4 Making the Measurement

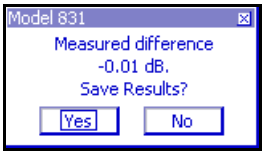
LEARN MORE Before starting the measurement, secure your Model 831 in a location where you want to monitor sound levels. Larson Davis recommends using tripods or environmental protection systems for proper measurements. For more information, see the Model 831 Manual.

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 2-13 Post-Measurement Calibration



2.5 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.

2.6 Download the Measurement File

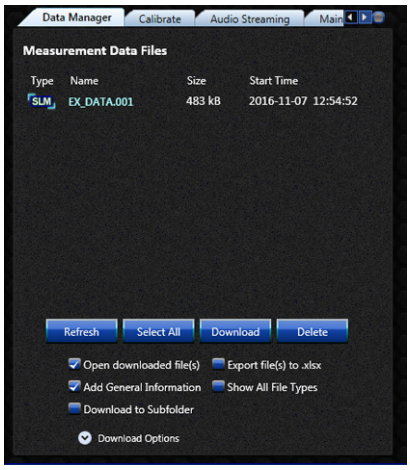
Click the instrument serial number tab and select the data file from your measurement on the **Data Manager** tab.

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.

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, the **Show files for all modes** option can be selected to see all files.

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 2-14 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.

2.7 Use G4 LD Utility File Viewer

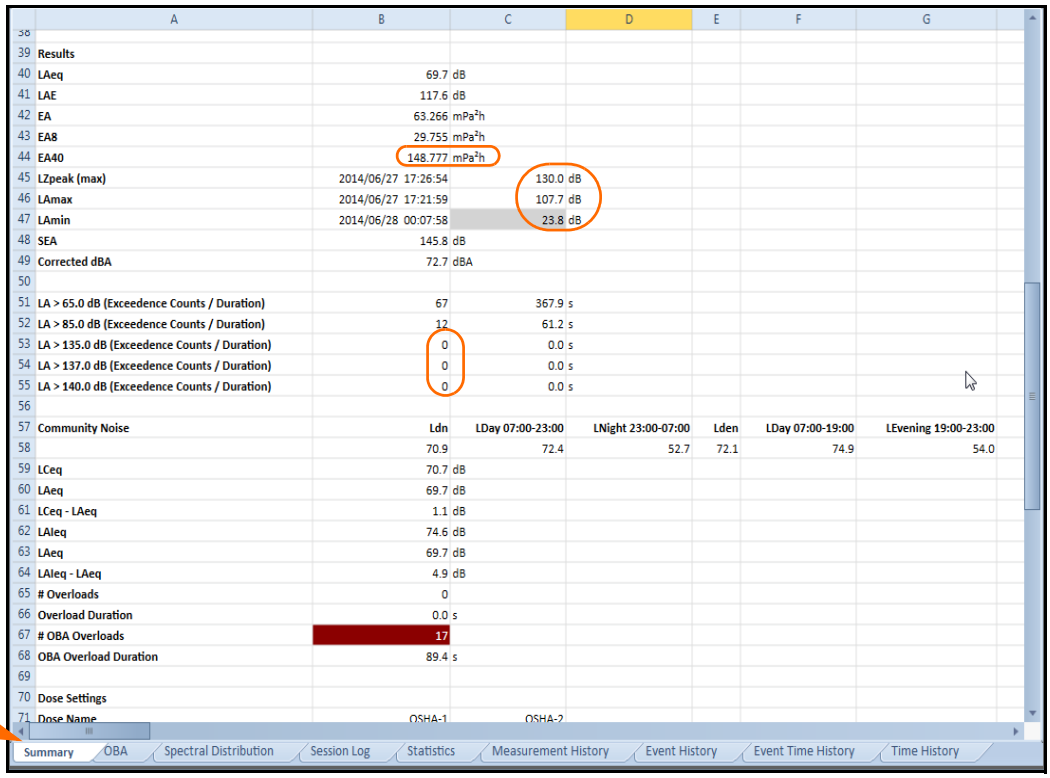
Each G4 worksheet provides sound data according to the settings we specified in our measurement setup.

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 LAeq, LZpeak, LAmax, 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 2-15 shows the sheet.

FIGURE 2-15 Summary Sheet Results



	A	B	C	D	E	F	G
39	Results						
40	LAeq	69.7 dB					
41	LAE	117.6 dB					
42	EA	63.266 mPa²h					
43	EA8	29.755 mPa²h					
44	EA40	148.777 mPa²h					
45	LZpeak (max)	2014/06/27 17:26:54		130.0 dB			
46	LAmax	2014/06/27 17:21:59		107.7 dB			
47	LAmin	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 (Exceedence Counts / Duration)	67		367.9 s			
52	LA > 85.0 dB (Exceedence Counts / Duration)	12		61.2 s			
53	LA > 135.0 dB (Exceedence Counts / Duration)	0		0.0 s			
54	LA > 137.0 dB (Exceedence Counts / Duration)	0		0.0 s			
55	LA > 140.0 dB (Exceedence Counts / Duration)	0		0.0 s			
56							
57	Community Noise	Ldn	LDay 07:00-23:00	LNight 23:00-07:00	Lden	LDay 07:00-19:00	LEvening 19:00-23:00
58		70.9	72.4	52.7	72.1	74.9	54.0
59	LCeq	70.7 dB					
60	LAeq	69.7 dB					
61	LCeq - LAeq	1.1 dB					
62	LAleq	74.6 dB					
63	LAeq	69.7 dB					
64	LAleq - LAeq	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				

Summary | OBA | Spectral Distribution | Session Log | Statistics | Measurement History | Event History | Event Time History | Time History

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 2-16 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 2-17 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
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/in²							
Hail Max Rate	0.00 hits/in²h							
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 2-18 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	6
Overall 1/3 Spectra	61.6	58.1	57.0	57.4	57.5	58.5	58.5	58.4	59.0	60.8	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	6
Min 1/3 Spectra	52.4	48.8	41.8	50.3	50.7	46.0	45.0	42.3	44.2	35.7	3
LZS5.00	67.0	63.4	59.9	60.3	60.5	63.0	63.3	64.0	64.6	66.8	6
LZS10.00	66.1	61.8	59.3	59.7	59.9	62.2	62.7	63.2	64.0	66.3	6
LZS33.30	61.2	57.9	57.5	58.0	58.2	58.0	58.9	58.7	59.0	60.2	6
LZS50.00	59.6	56.4	56.8	57.3	56.8	56.4	55.6	55.0	54.9	56.9	5
LZS66.60	59.1	53.6	55.5	55.8	55.5	55.6	52.3	53.1	51.6	51.8	5
LZS90.00	55.9	50.3	46.7	52.8	51.5	54.4	49.3	48.4	45.3	40.9	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	6
1	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	
3	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	
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	6
Under Range Limit	36.0	33.0	29.0	31.6	30.8	28.8	26.0	22.0	22.0	21.0	2
Noise Floor	12.3	9.6	8.3	8.8	6.9	6.0	5.5	5.4	3.7	1.7	

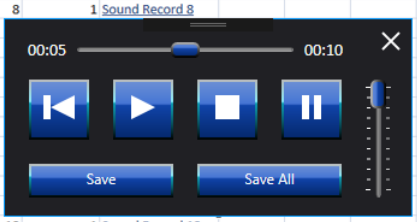
Session Log Sheet

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. Click **Sound Record** and then click Play to hear the snapshot.

FIGURE 2-19 Session Log Sound Snapshot

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

Setup Manager | Calibration Histories

	A	B	C	D	E	F	G	H	I	J	K	
1	Record #	Date	Time	Run Duration	Run Time	Pause	LASeq	LASE	LASmin	LASmin Time	LASmax	LAS
2	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	
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	
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	
5	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	
6	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	
7	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	
8	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	
9	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	
10	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	
11	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	
12	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	
13	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	
14	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	
15	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	
16	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	
17	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	
18	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	
19	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	
20	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 2-21 Event History Sheet

Setup Manager | Calibration Histories | 3074 16081400.BK0

	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	-
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	-
7	1	6	-5.0000	60.9	-17.4	-24.5	-22.0	-17.8	-
8	1	7	-4.0000	63.7	-17.4	-24.5	-22.0	-16.7	-
9	1	8	-3.0000	64.1	-17.4	-24.5	-22.0	-18.7	-
10	1	9	-2.0000	65.6	-17.4	-24.5	-19.6	-19.3	-
11	1	10	-1.0000	65.7	-17.4	-24.5	-21.8	-16.2	-
12	1	11	0.0000	65.1	-17.4	-24.5	-24.6	-15.1	-
13	1	12	1.0000	65.9	-17.4	-24.5	-24.6	-12.4	-
14	1	13	2.0000	66.4	-17.4	-24.5	-25.2	-11.1	-

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 2-22 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

Time History Sheet

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

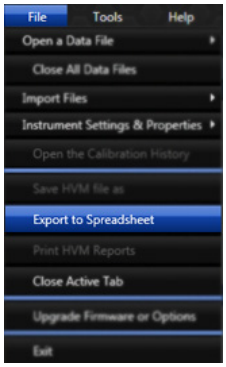
FIGURE 2-23 Time History Sheet

Record #	Record Type	Date	Time	LAeq	LZpeak	Ovrld.	OBA Ovrld.
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

2.7.1 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 2-24 Export To Spreadsheets



Module 3 Room Acoustics Measurement Example

3.1 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

3.2 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.

3.2.1 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)

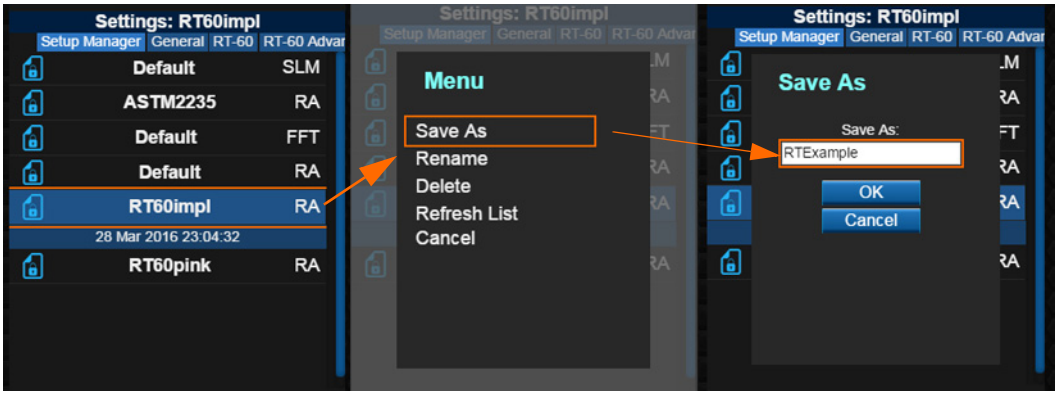
Name the setup

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 **RTExample**.

FIGURE 3-1 **RT-60 Example Setup Name**

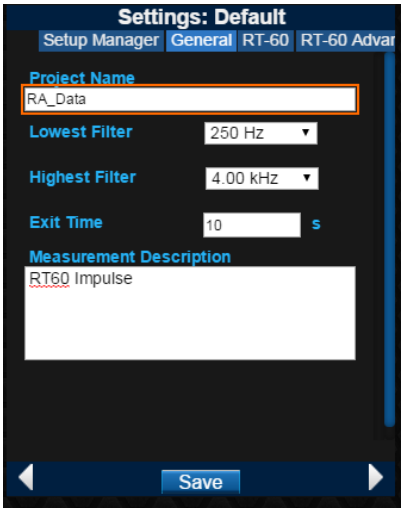


Specify Low Filter, High Filter, and Exit Time

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 **RTExample** button you just created on the Setup Manager. Click the **General** tab and leave the default settings for **Project Name**, **Lowest Filter**, **Highest Filter**, and **Exit Time**. Under **Measurement Description**, enter "RT60 Impulse." Click **Save**. Figure 3-2 shows the settings.

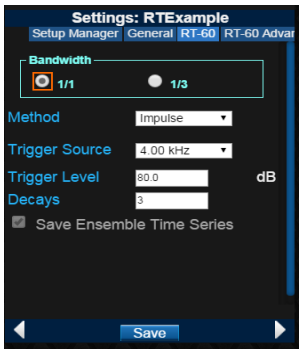
FIGURE 3-2 **RT-60 Filters and Exit Time**



Verify RT-60 Settings

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

FIGURE 3-3 **RT-60 Settings**

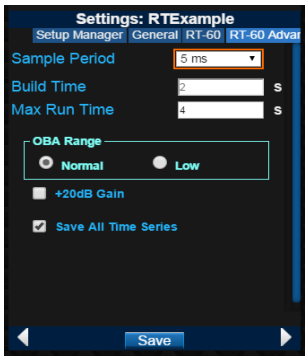


Verify RT-60 Advanced Settings

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.

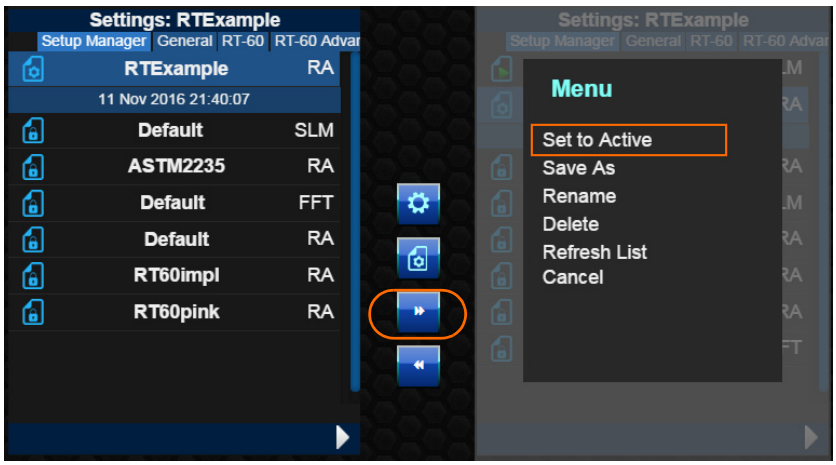
FIGURE 3-4 **RT 60 Advanced Settings**



Move the Setup to the Instrument and Make it Active

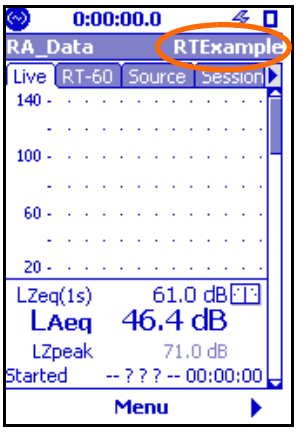
After making all the changes, save the file. In the Setup Manager, click the **RTExample** setup button and then click the right double-arrow button to transfer the setup to the instrument. Double click the setup and then click **Set To Active**.

FIGURE 3-5 **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 3-6 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.

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 3-7 shows the prompt.

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.

FIGURE 3-7 Exit Prompt

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

Table 3.1 Impulse RT-60 Prompts

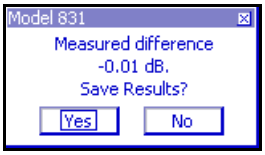
Prompt	Meaning
	The background noise level is measured for 5 seconds and is then used for determining signal-to-noise ratio on successive decays.
	The background noise measurement is complete and the pre-trigger buffer is filling.
	The pre-trigger buffer is full and the source within the room should 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 3-8 Post-Measurement Calibration



3.3 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.

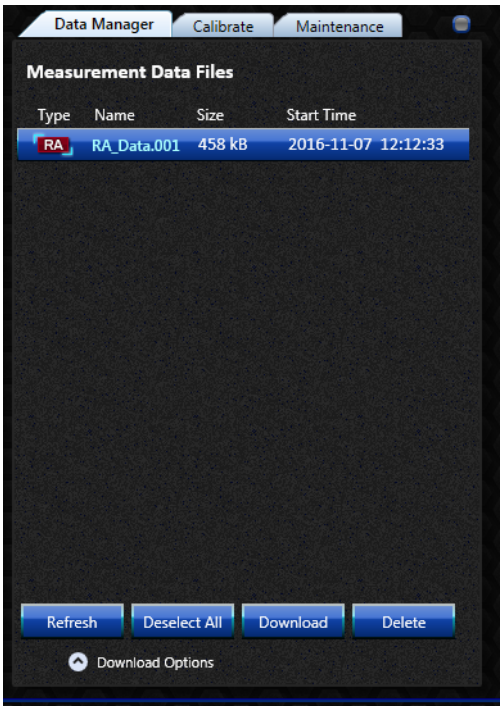
To complete our example, we will download the measurement file to G4 and examine the data with G4 viewing and export tools.

3.3.1 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 3-9 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.

3.3.2 Use G4 LD Utility File Viewer

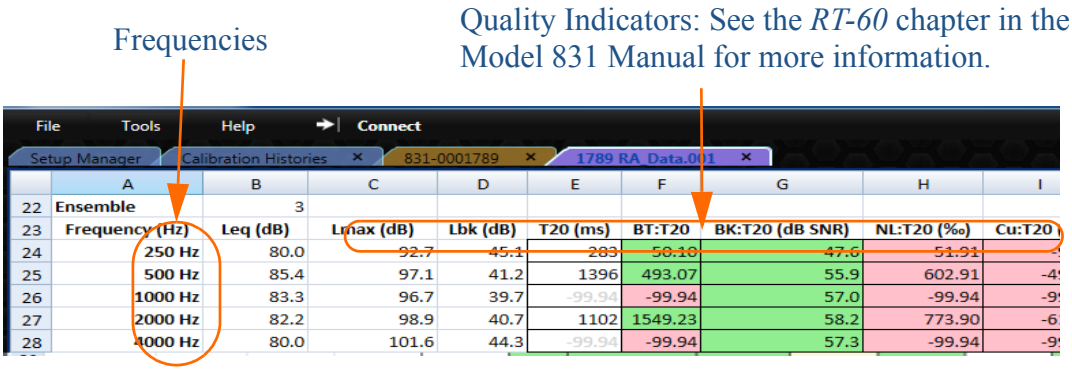
Each G4 worksheet provides sound data according to the settings we specified in our measurement setup.

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 3-10 shows the sheet.

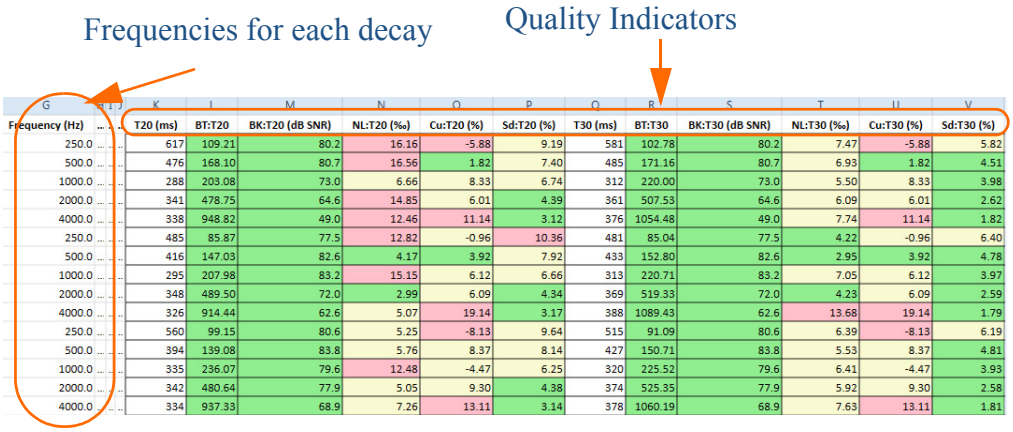
FIGURE 3-10 RT-60 Summary Data Sheet



	A	B	C	D	E	F	G	H	I
22	Ensemble	3							
23	Frequency (Hz)	Leq (dB)	Lmax (dB)	Lbk (dB)	T20 (ms)	BT:T20	BK:T20 (dB SNR)	NL:T20 (‰)	Cu:T20
24	250 Hz	80.0	92.7	45.1	283	50.10	47.6	51.91	
25	500 Hz	85.4	97.1	41.2	1396	493.07	55.9	602.91	-4
26	1000 Hz	83.3	96.7	39.7	-99.94	-99.94	57.0	-99.94	-9
27	2000 Hz	82.2	98.9	40.7	1102	1549.23	58.2	773.90	-6
28	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 3-11 RT-60 Detail Sheet

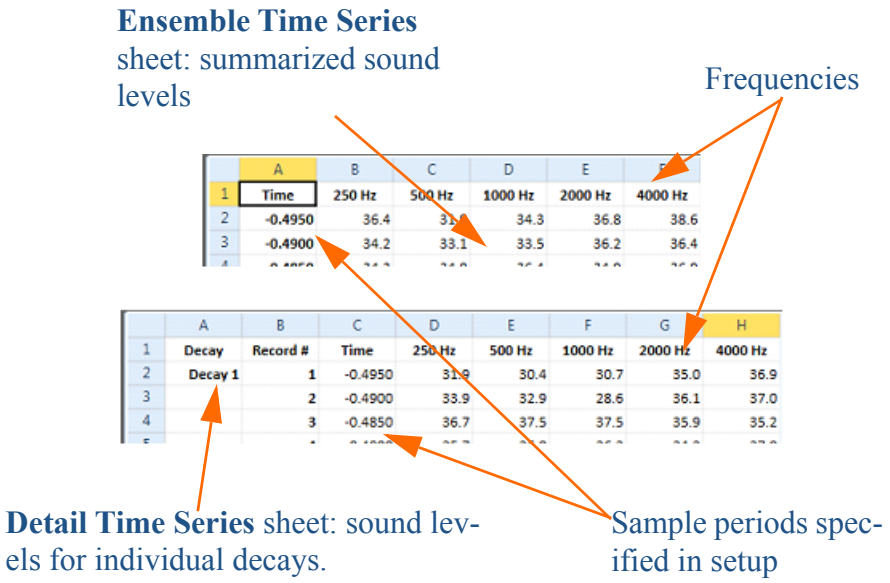


Frequency (Hz)	T20 (ms)	BT:T20	BK:T20 (dB SNR)	NL:T20 (‰)	Cu:T20 (%)	Sd:T20 (%)	T30 (ms)	BT:T30	BK:T30 (dB SNR)	NL:T30 (‰)	Cu:T30 (%)	Sd:T30 (%)
250.0	617	109.21	80.2	16.16	-5.88	9.19	581	102.78	80.2	7.47	-5.88	5.82
500.0	476	168.10	80.7	16.56	1.82	7.40	485	171.16	80.7	6.93	1.82	4.51
1000.0	288	203.08	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 3-12 shows the sheets.

FIGURE 3-12 Time Series Data Sheets



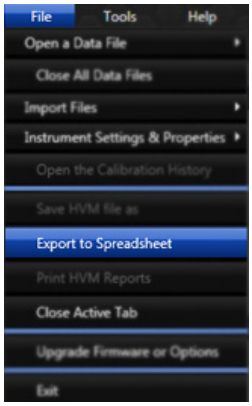
	A	B	C	D	E	F
1	Time	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
2	-0.4950	36.4	31.9	34.3	36.8	38.6
3	-0.4900	34.2	33.1	33.5	36.2	36.4

	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

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 3-13 Export To Spreadsheets



Module 4 FFT & Tonality Example

4.1 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

4.2 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.

4.3 Create a Setup File on the PC

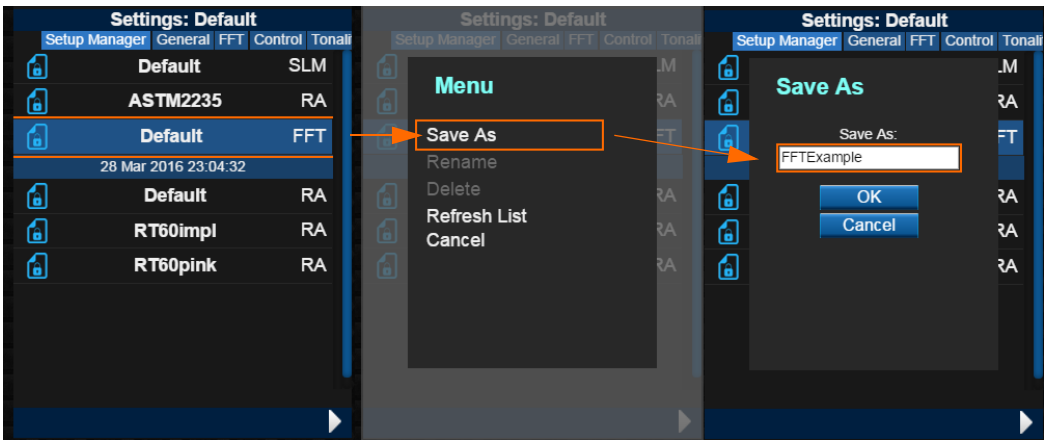
Name the setup

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 4-1 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.

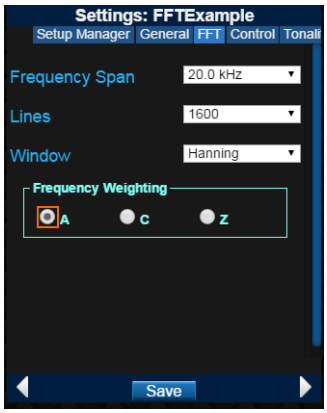
Find and click the **FFTExample** setup you just created on the Setup Manager. Click the **General** tab and leave the default setting for **Default Data File**. Under **Measurement Description** type "FFT and Tonality."

Specify FFT Settings

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

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

FIGURE 4-2 FFT Tab Settings

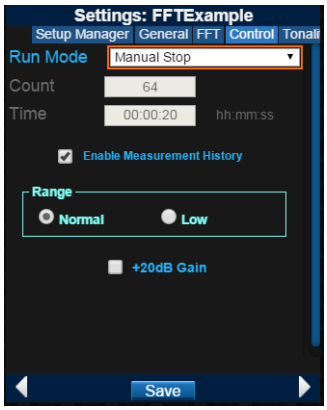


Specify Control Settings

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

- Run Mode: Manual Stop
- Measurement History: Enabled
- Range: Normal

FIGURE 4-3 FFT Control Tab Settings

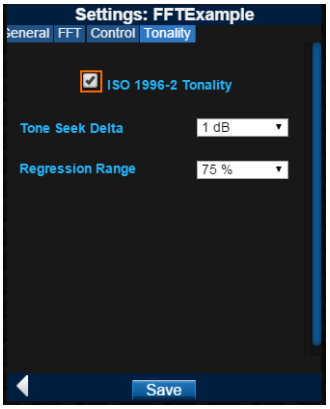


Specify Tonality Settings

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

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

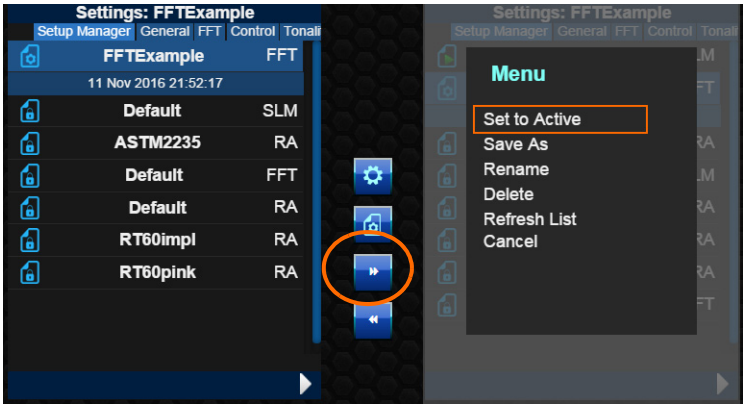
FIGURE 4-4 Tonality Tab Settings



Move the Setup to the Instrument and Make it Active

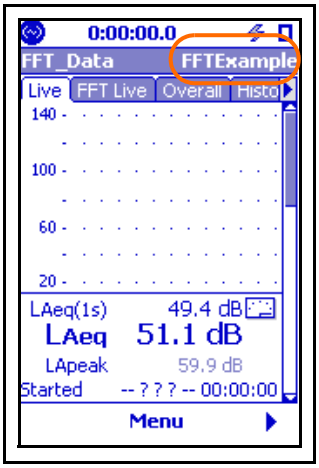
In the Setup Manager, click the **FFTExample** setup button and then click the right double-arrow button to transfer the setup to the instrument. Double click the setup and then click **Set To Active**.

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 FFT Example Setup



4.4 Making the Measurement

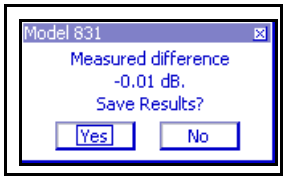
TAKE NOTE Before starting the measurement, secure your Model 831 in a location where you want to monitor sound levels. Larson Davis recommends using tripods or environmental protection systems for proper measurements. For more information, see the Model 831 Manual.

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 4-7 Post-Measurement Calibration



4.5 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.

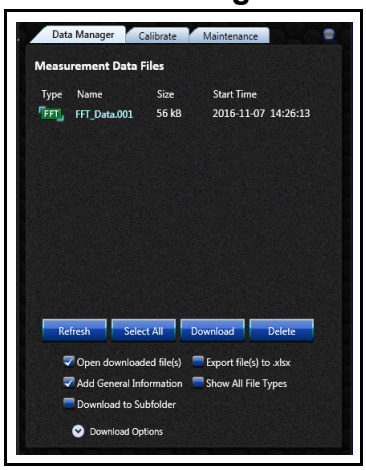
Download the Measurement File

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.

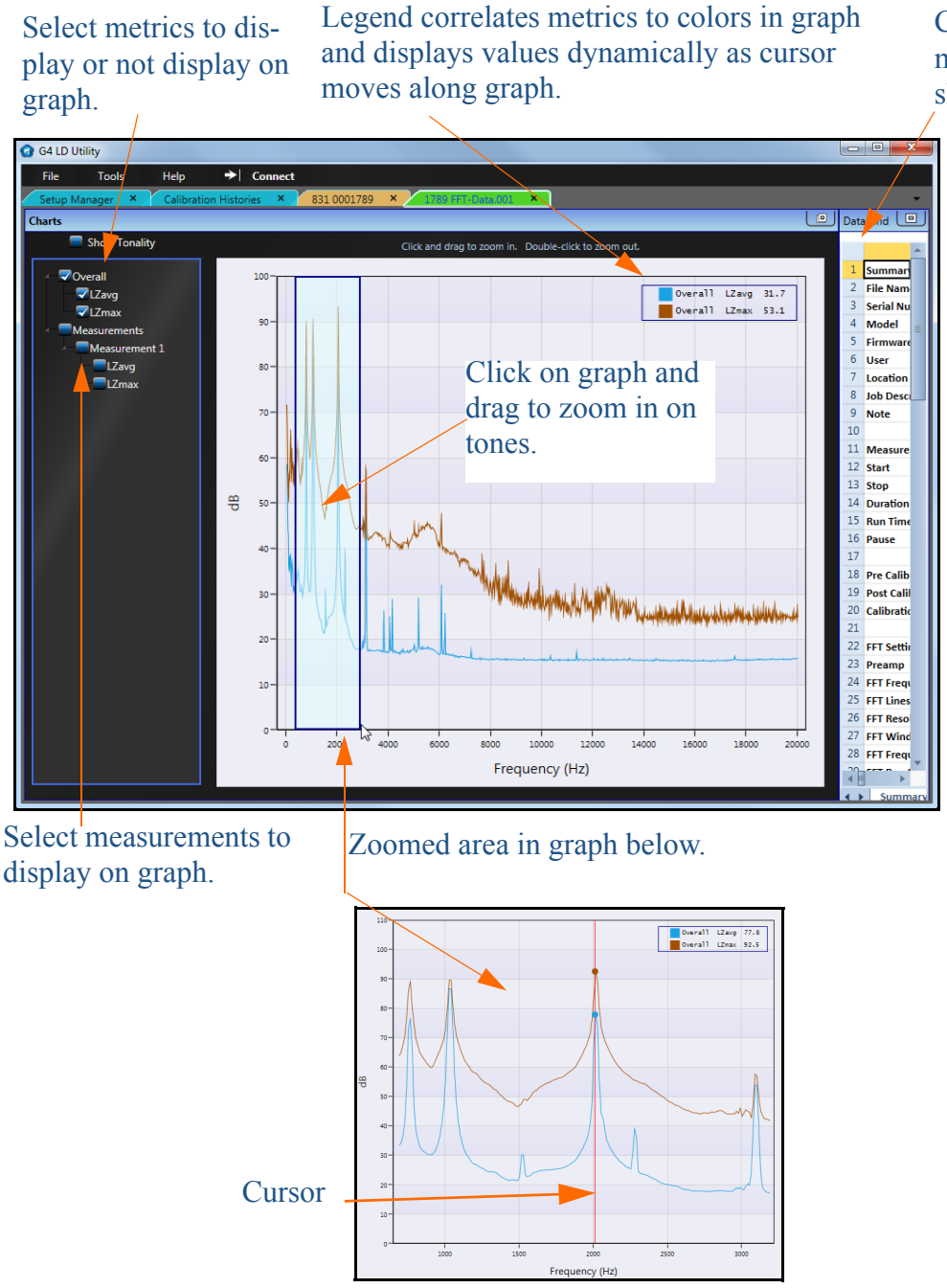
FIGURE 4-8 FFT File in Data Manager



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 4-9 FFT Graphs



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

FIGURE 4-10 Show Tonality Option

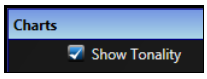
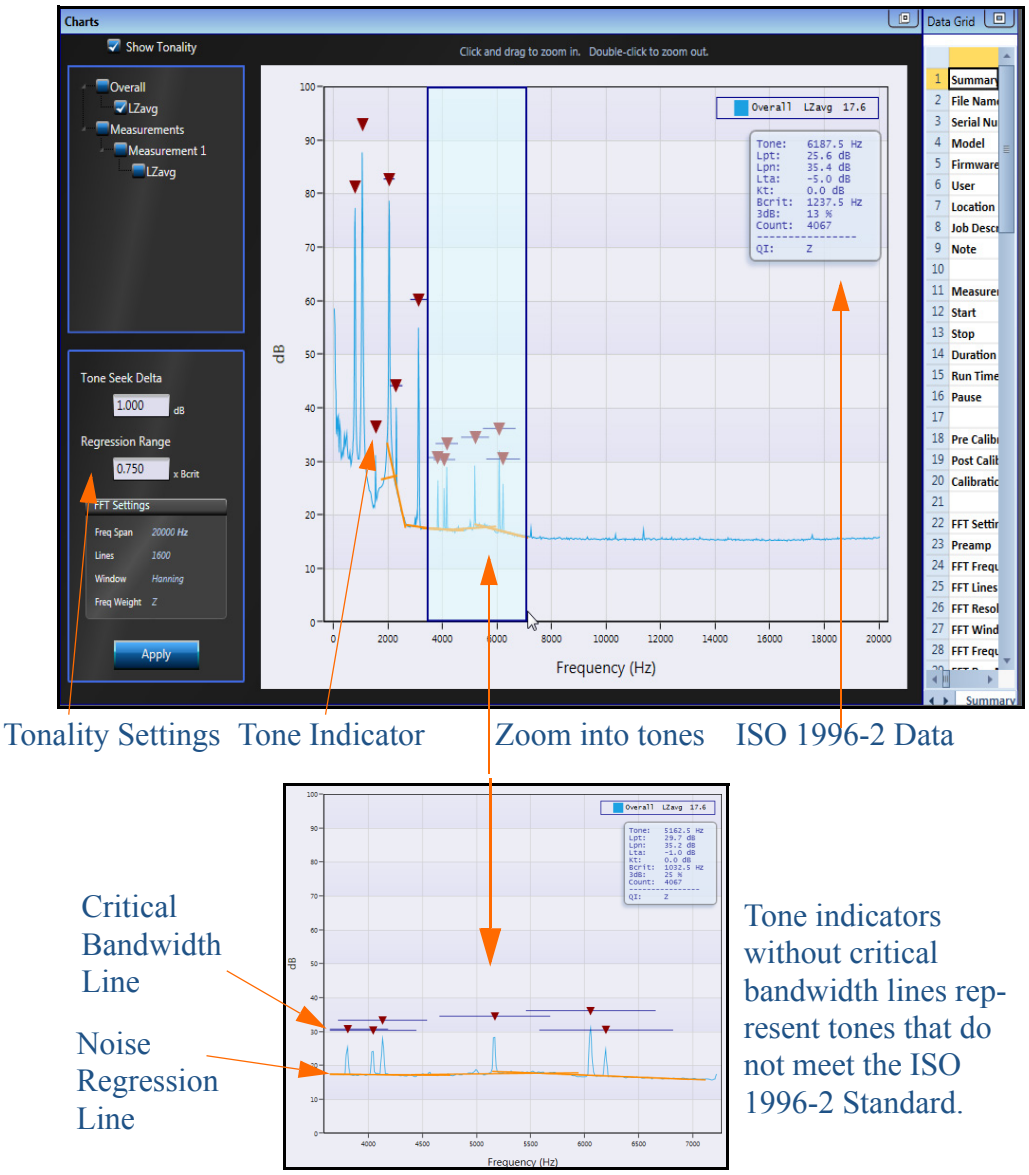
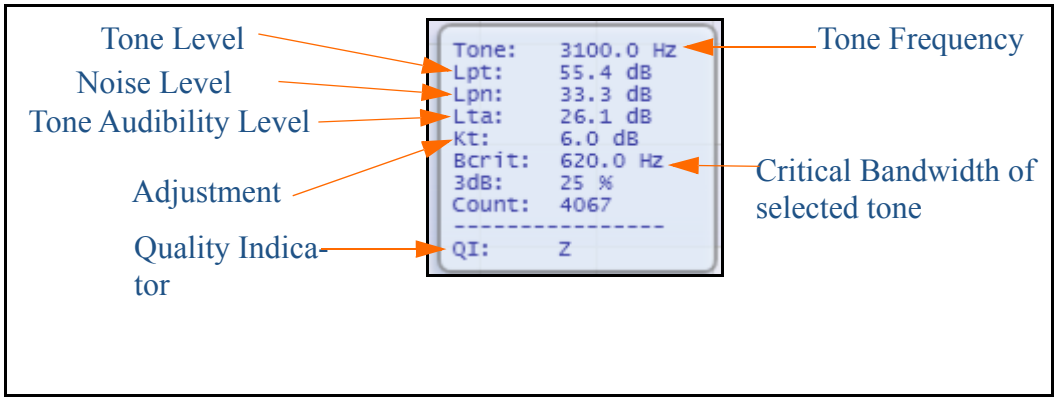


FIGURE 4-11 Tonality Data on FFT Graphs



ISO 1996-2 Annex C Tonality Data

FIGURE 4-12 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 4-13 Quality Indicators Legend

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

Table 4.1 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.

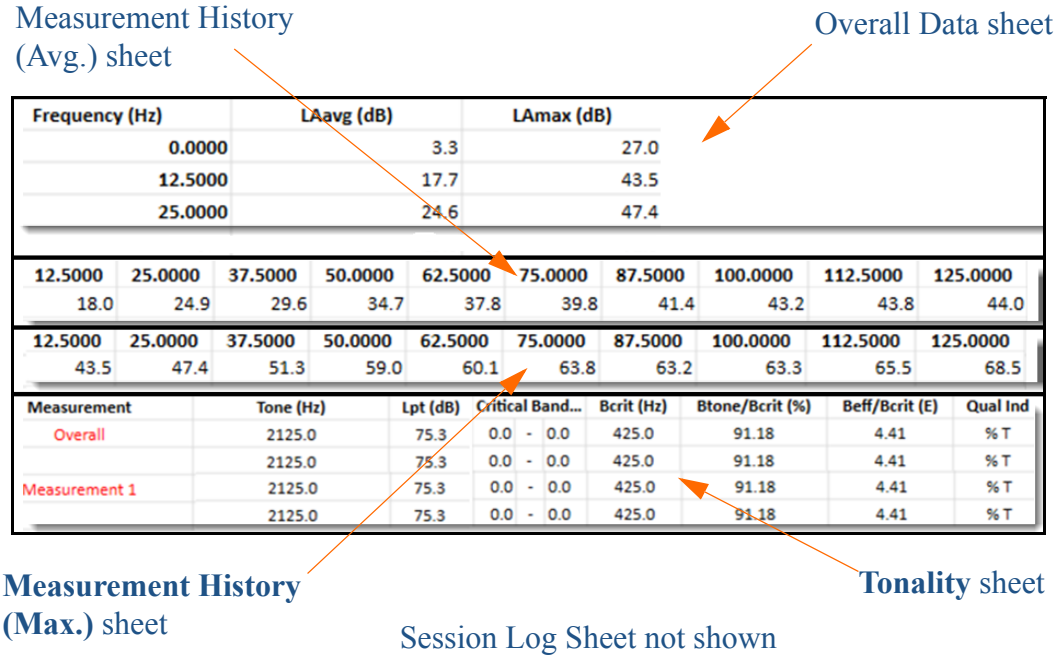
FFT Settings		
Preamp	PRM831	
FFT Frequency Span	20000	Hz
FFT Lines	1600	
FFT Resolution	12.5000	Hz
FFT Window	Hanning	
FFT Frequency Weighting	A Weighting	
FFT Run Mode	Manual Stop	
FFT Count	n/a	
FFT Time	n/a	
FFT Measurement History	On	
FFT Range	Normal	
Gain	0	dB
Overall Broadband Data		
LAeq	79.8	dB
LAmax	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 4-14 FFT Summary Sheet

Additional Sheets

G4 also includes sheets for **FFT Overall** data, **Measurement History (Avg)**, **Measurement History (Max)**, **Tonality**, and **Session Logs**. Figure 4-15 shows sections of these sheets.

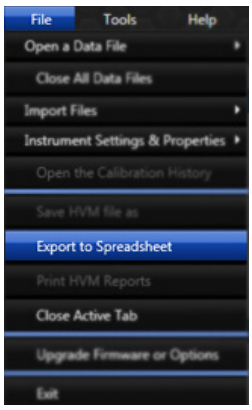
FIGURE 4-15 Additional FFT Data Sheets



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 4-16 Export To Spreadsheets



Module 5 Human Vibration Meter Example

5.1 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.

5.2 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.

5.2.1 Install G4 LD Utility License

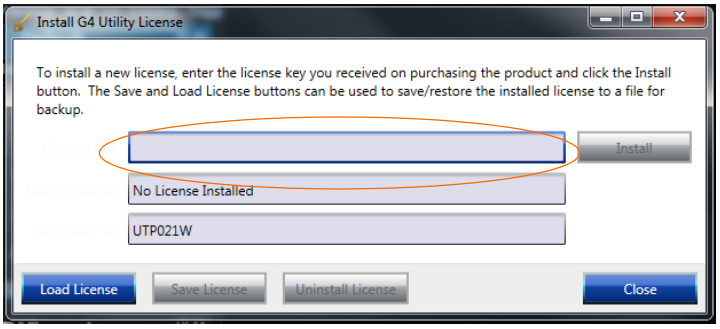
Install for PC with Internet Access

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 5-1 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.

5.3 G4 LD Utility for HVM100

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

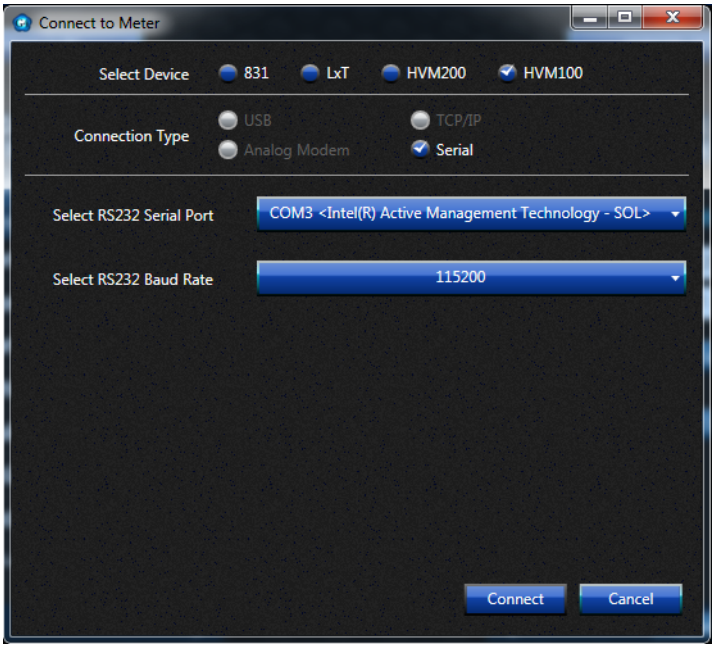
Step 1 Click **Connect** on G4.

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 5-2 HVM100 Connection



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

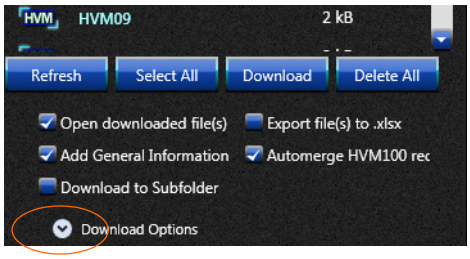
HVM100 setup and measurement can be performed with G4 but not with the HVM200 App. However, the instructions for using G4 for HVM100 are the same as those described for the HVM200 App in the *HVM200 Manual*. Refer to the *HVM200 Manual* for more information.

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 5-3 Download Options

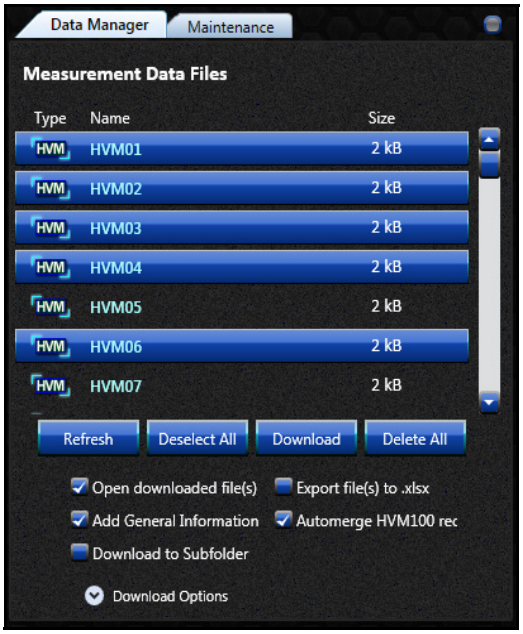


Step 3 Click **Download**.

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.

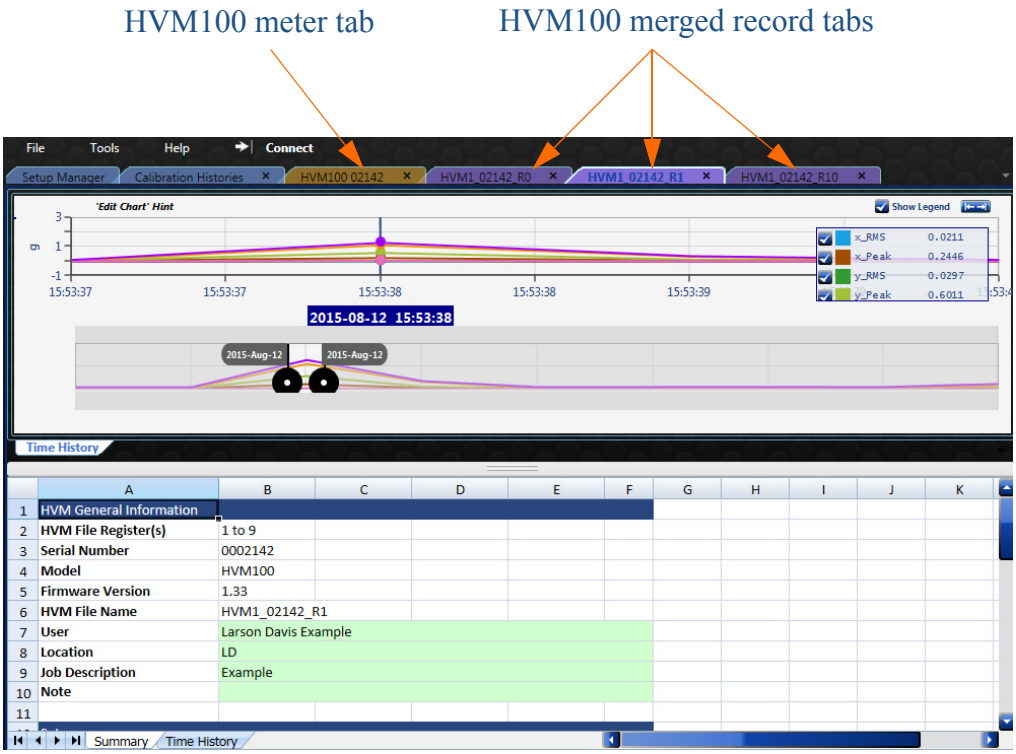
FIGURE 5-4 HVM100 Files Download



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 5-5 HVM100 Graphical Data



5.4 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 and 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 Chapter 6 "Reference" on page 6-1.

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.

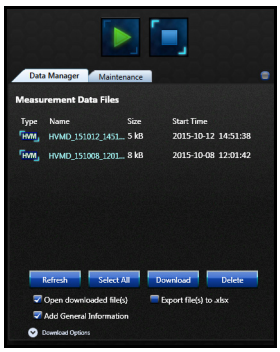
TAKE NOTE **Add General Information** and **Open Downloaded File(s)** are selected by default.

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

Step 3 Click **Download**.

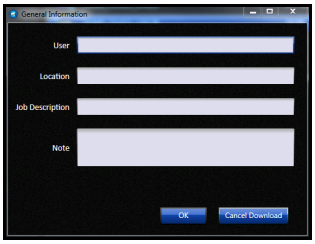
TAKE NOTE By default, files are listed according from most recently-measured at the top to oldest at the bottom.

FIGURE 5-6 Download Files from Meter



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

FIGURE 5-7 General Information



View G4 LD Utility Data Display for HVM200

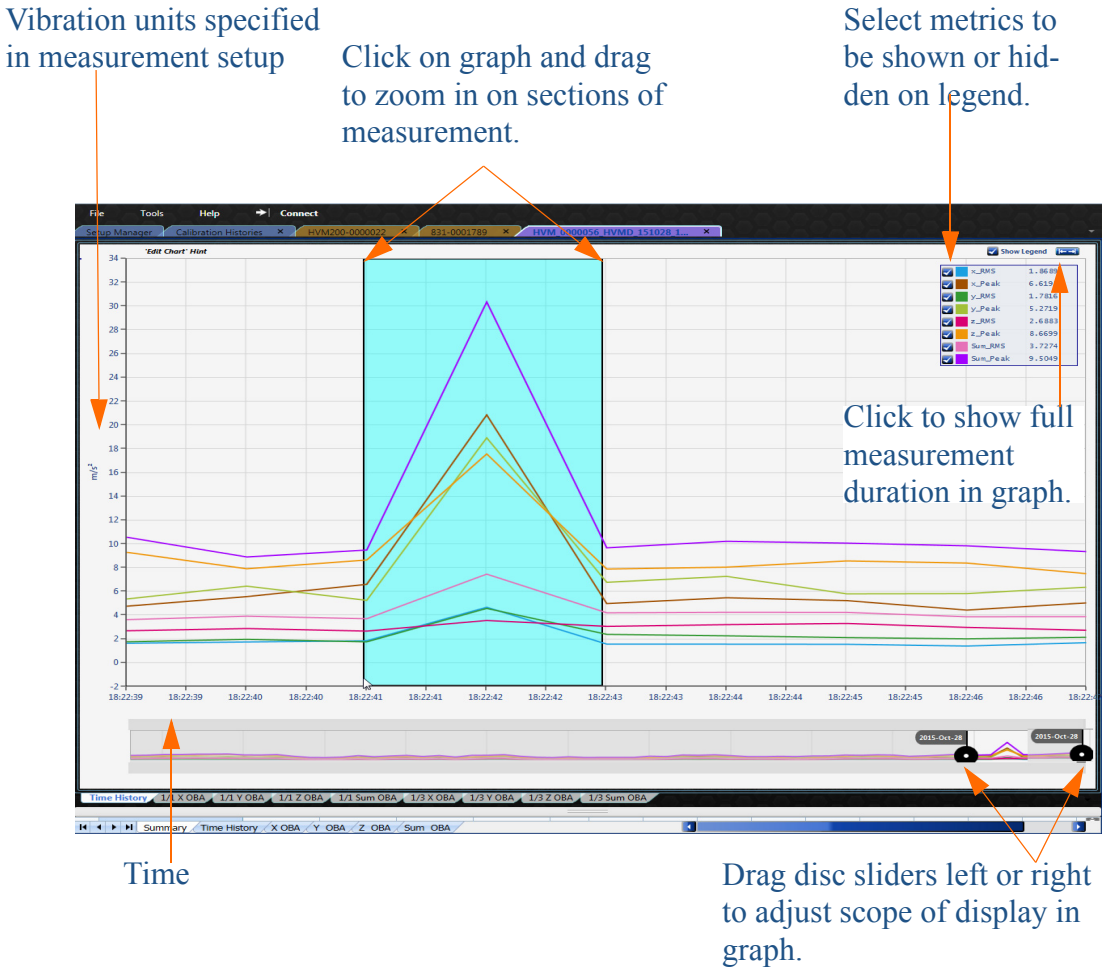
After downloading, HVM200 data files, G4 creates a measurement tab for each file. You can select each measurement tab to view graph and spread-sheet data.

FIGURE 5-8 Measurement Data Display

View Expanded Graph

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

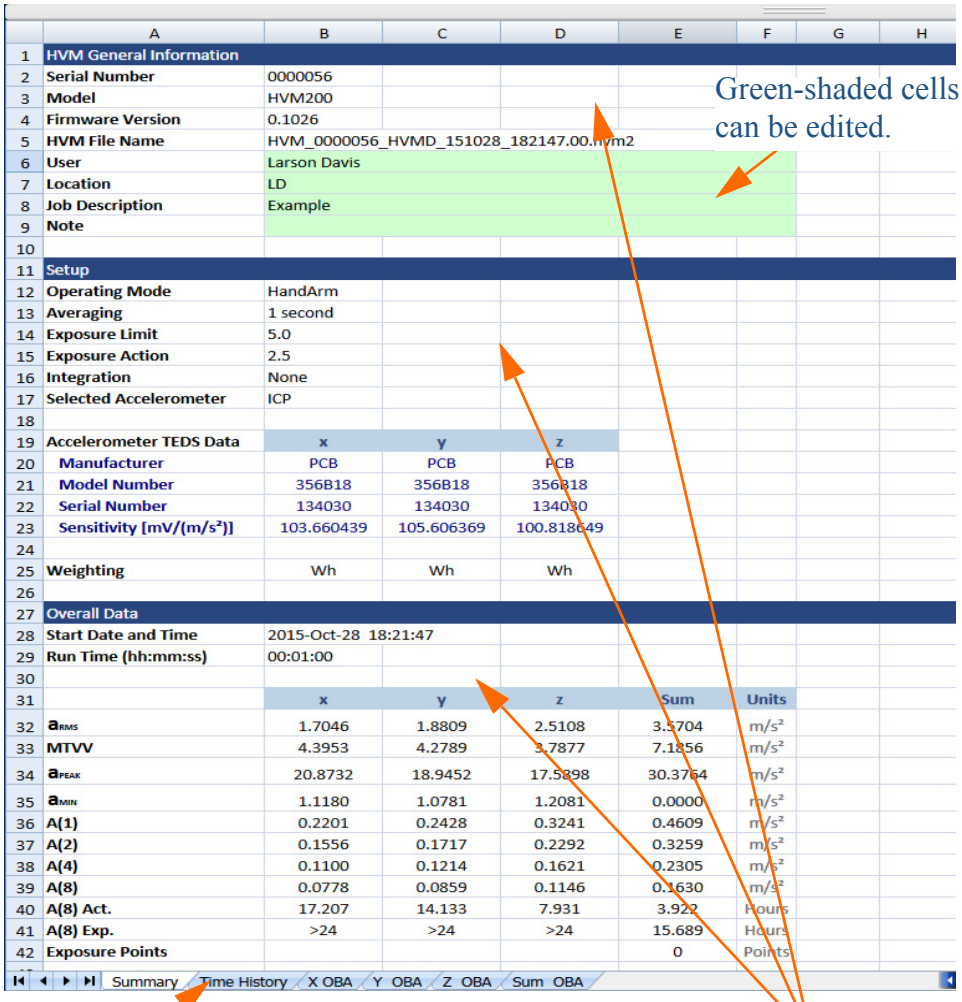
FIGURE 5-9 Expanded Graph Display



View Expanded Spreadsheet

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

FIGURE 5-10 Expanded Spreadsheet Display



	A	B	C	D	E	F
1	HVM General Information					
2	Serial Number	0000056				
3	Model	HVM200				
4	Firmware Version	0.1026				
5	HVM File Name	HVM_0000056_HVMD_151028_182147.00.hvm2				
6	User	Larson Davis				
7	Location	LD				
8	Job Description	Example				
9	Note					
10						
11	Setup					
12	Operating Mode	HandArm				
13	Averaging	1 second				
14	Exposure Limit	5.0				
15	Exposure Action	2.5				
16	Integration	None				
17	Selected Accelerometer	ICP				
18						
19	Accelerometer TEDS Data	x	y	z		
20	Manufacturer	PCB	PCB	PCB		
21	Model Number	356B18	356B18	356B18		
22	Serial Number	134030	134030	134030		
23	Sensitivity [mV/(m/s²)]	103.660439	105.606369	100.818649		
24						
25	Weighting	Wh	Wh	Wh		
26						
27	Overall Data					
28	Start Date and Time	2015-Oct-28 18:21:47				
29	Run Time (hh:mm:ss)	00:01:00				
30						
31		x	y	z	Sum	Units
32	a_{RMS}	1.7046	1.8809	2.5108	3.5704	m/s²
33	MTVV	4.3953	4.2789	3.7877	7.1856	m/s²
34	a_{PEAK}	20.8732	18.9452	17.5898	30.3764	m/s²
35	a_{MIN}	1.1180	1.0781	1.2081	0.0000	m/s²
36	A(1)	0.2201	0.2428	0.3241	0.4609	m/s²
37	A(2)	0.1556	0.1717	0.2292	0.3259	m/s²
38	A(4)	0.1100	0.1214	0.1621	0.2305	m/s²
39	A(8)	0.0778	0.0859	0.1146	0.1630	m/s²
40	A(8) Act.	17.207	14.133	7.931	3.922	Hours
41	A(8) Exp.	>24	>24	>24	15.689	Hours
42	Exposure Points				0	Points

Summary | Time History | X OBA | Y OBA | Z OBA | Sum OBA

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.

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

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

Edit Data

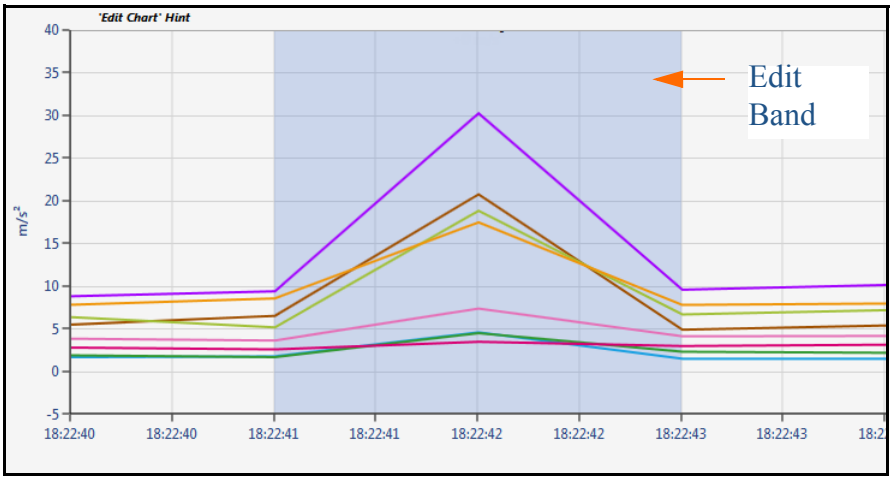
TAKE NOTE When making edits to your data, the original data is not modified. Instead, both the original data and the modified data are displayed in separate sections of the spreadsheet. Also, saving the file preserves any edits made in the appearance of the graph, but not in the original data.

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 5-11 Edit Graph



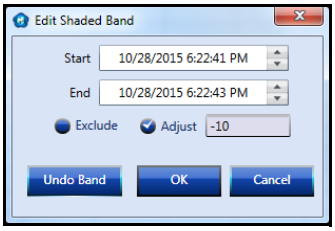
TRY THIS To remove graphical edits, press the **Shift** key, click on the edit band **in the graph, and then click the Undo Band** button on the **Edit Shaded Band** dialog box.

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 option.

Step 3 Click **OK**.

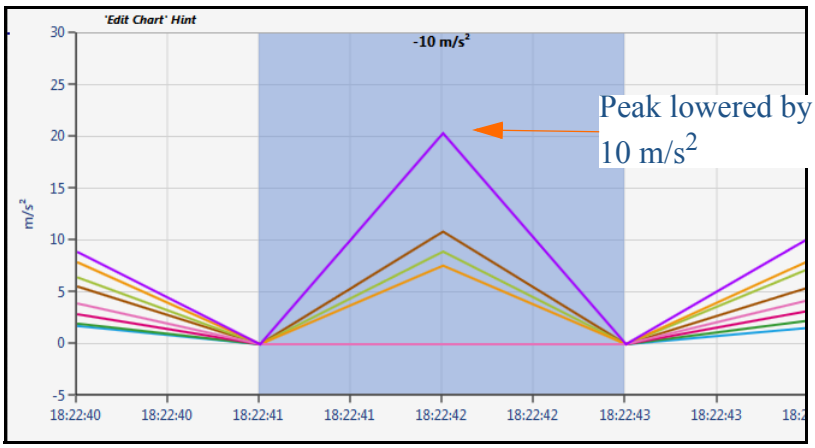
TAKE NOTE Alternatively, you can specify the duration of the edit band by specifying a **Start** and **End** time in the dialog box instead of clicking and dragging on the graph.

FIGURE 5-12 Edit Shaded Band



The graph displays the modified value within the shaded band.

FIGURE 5-13 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 5-14 Edited Data in Summary Spreadsheet

44	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/s²
50	MTVV	4.3953	4.2789	3.7877	7.1856	m/s²
51	a_{PEAK}	10.8732	8.9452	10.0040	20.3764	m/s²
52	a_{MIN}	0.0000	0.0000	0.0000	0.0000	m/s²
53	A(1)	0.2016	0.2250	0.3112	0.4337	m/s²
54	A(2)	0.1426	0.1591	0.2201	0.3067	m/s²
55	A(4)	0.1008	0.1125	0.1556	0.2169	m/s²
56	A(8)	0.0713	0.0795	0.1100	0.1533	m/s²
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

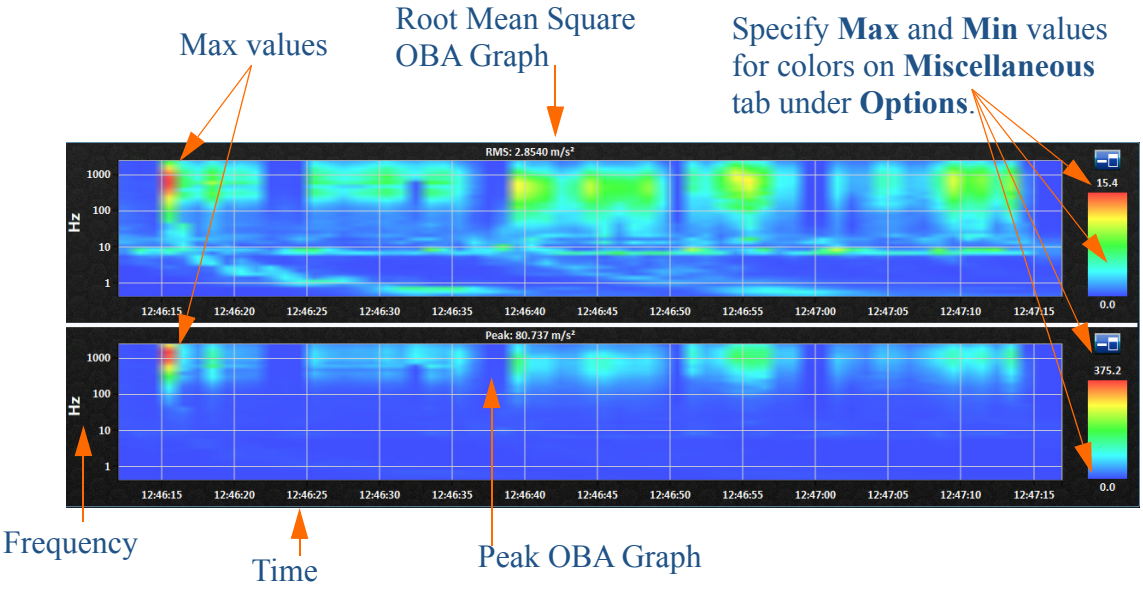
Edited peak value

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 5-15 OBA Graph



Appendix A Additional Features

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 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:

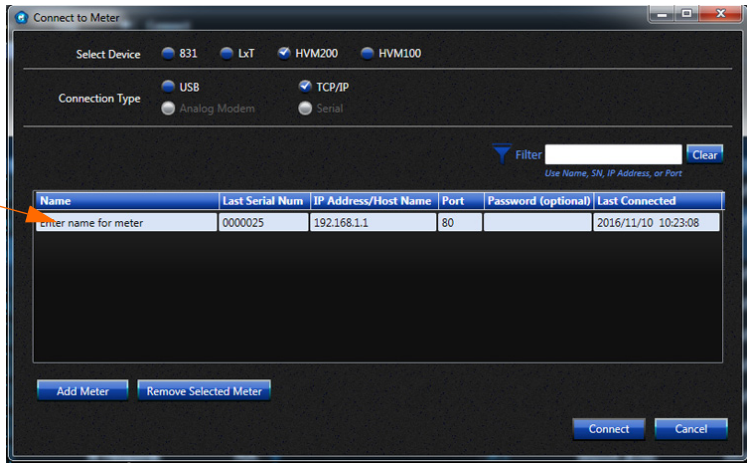
- Name (not required)
- IP Address
- Port number
- Password (if applicable)

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

Step 3 Click **Connect**.

FIGURE A-1 Connect via TCP/IP

You can have multiple meters displayed, and filter through the list if needed.



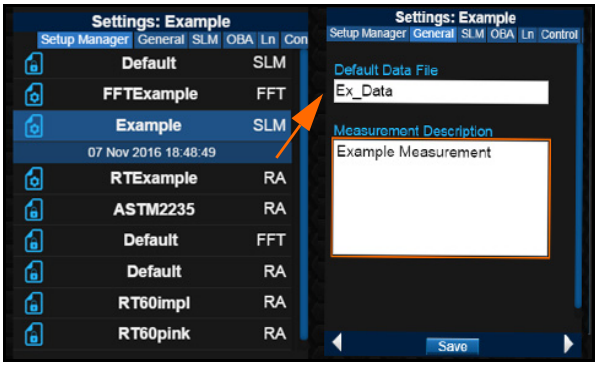
A.3 Naming Measurement Data Files

To name the measurement data file, click the setup file and then click the **General** tab. Specify the filename for your measurement. Click **Save** and then click **Yes** to apply the changes.

TAKE NOTE This feature is supported on Model 831 and LxT.

LEARN MORE To change the name of a measurement on an HVM200, navigate **Settings** ⇢ **Tools,** see the HVM200 Reference Manual for more information.

FIGURE A-2 Measurement Data File Name

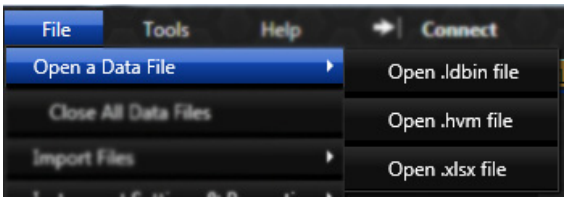


A.4 Open a Data File

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

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

FIGURE A-3 Open Data Files



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

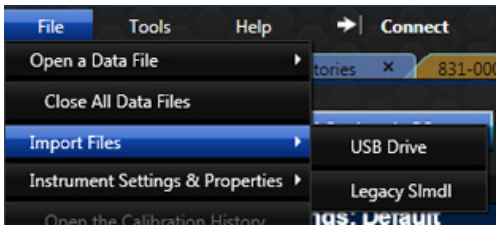
A.5 Importing Existing Data Files

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 A-4 Import Files into G4



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

A.6 Packaging Instrument Settings & Properties

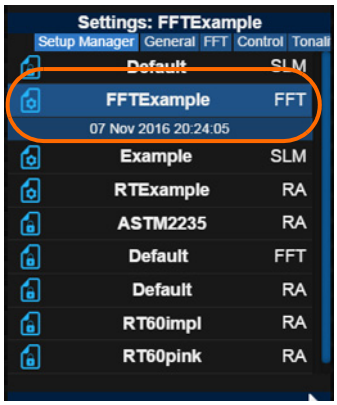
TAKE NOTE This feature is supported on Model 831, LxT, and HVM200 instruments.

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 FTP 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.

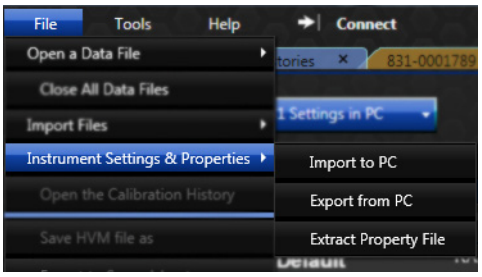
FIGURE A-5 Selected Settings File



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

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

FIGURE A-6 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:

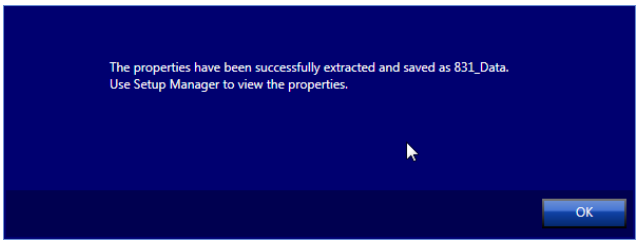
TAKE NOTE Extract Property File only works with SLM Model 831 and LxT.

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

TAKE NOTE The name of the setup file is one of the properties extracted with this option. Setup files receive new names upon extraction--if so specified in the properties.

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

FIGURE A-7 Properties Extracted Message



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

A.7 File Naming Option

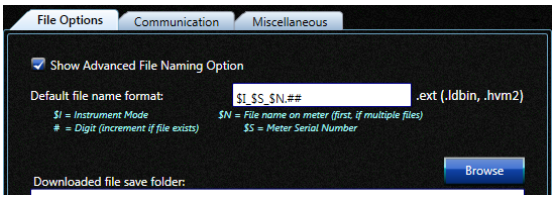
File Name Codes:
$I = Instrument Mode
 # = Digit (increment if file exits)
$N = File Name on Meter (first if multiple files)
$S = Meter Serial Number

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 A-8 File Naming Options

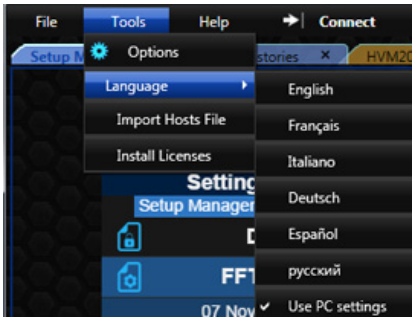


A.8 Accessing Additional Languages

In addition to English, you can use G4 in French, Italian, German, or the language settings currently configured on your PC. To change the language, navigate **Tools** ⇢ **Language** and select the language setting.

TAKE NOTE This feature requires you to close G4 and restart it after selecting a different language.

FIGURE A-9 G4 LD Utility Language Support

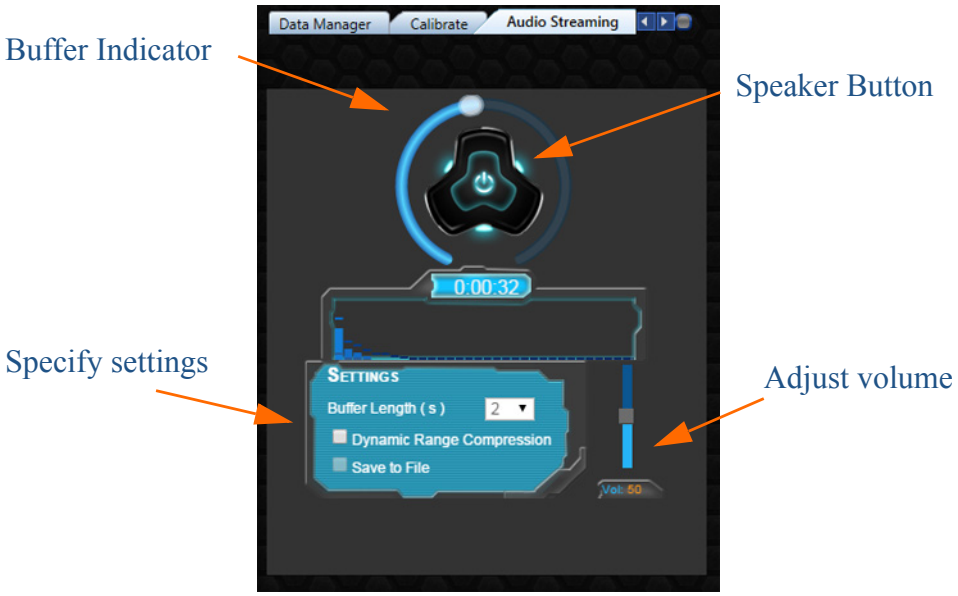


A.9 Listening to Streaming Audio

TAKE NOTE This feature is supported for Model 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.

FIGURE A-10 Streaming Audio



A.10 Specifying Reference Spectra

TAKE NOTE This feature is supported for Model 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.

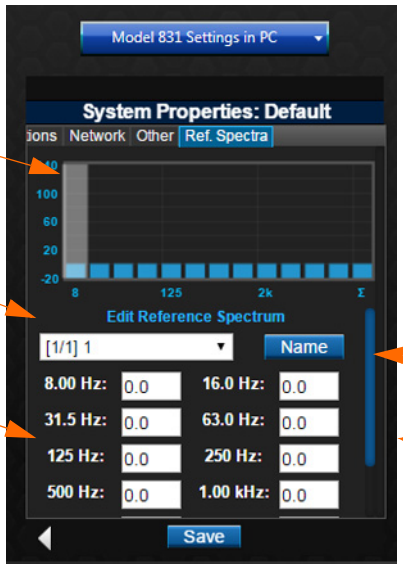
Step 3 After taking a measurement, click **Live View** in G4 and then view the Live tab to see the spectra with specified references.

FIGURE A-11 Reference Spectra Setup

Drag the bar to frequency on chart 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.11 Color Theme

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

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

To change the color theme, follow these steps:

Step 1 Launch G4.

Step 2 Navigate **Tools** ⇢ **Options**.

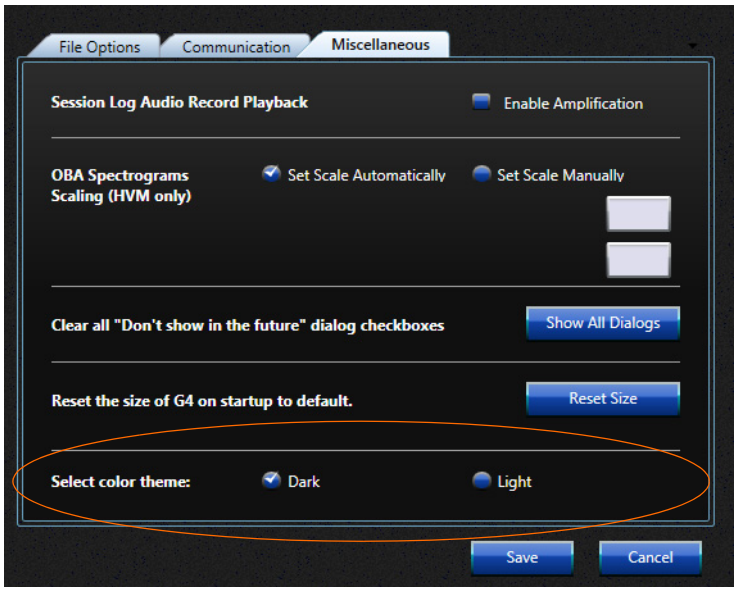
Step 3 Select the **Miscellaneous** tab.

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

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-12



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