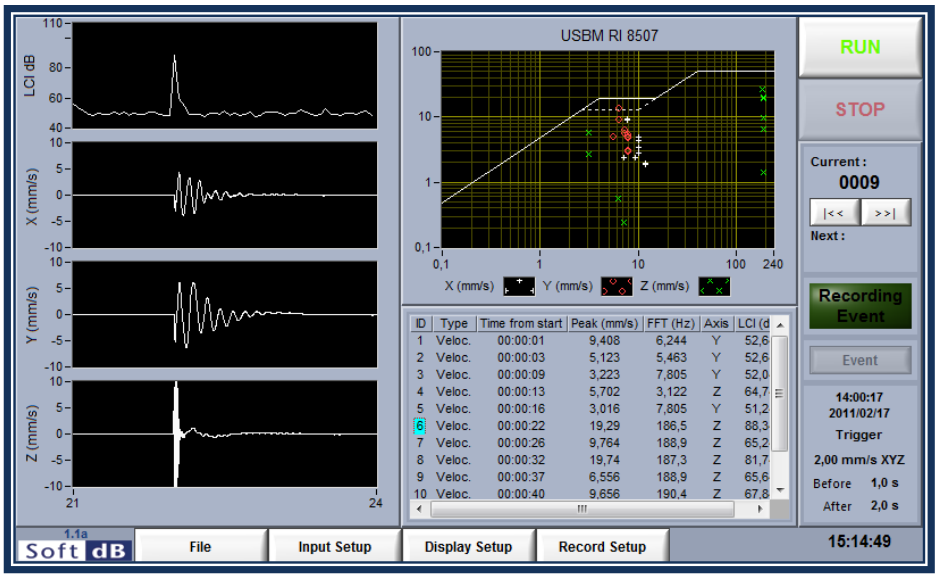
Opus Suite

Building Vib Module

User Guide – V1.2
January 21, 2014



Compatible Hardware:

Alto

Concerto

Conductor

Soft dB Inc.
1040, Belvedere Avenue, Suite 215
Quebec (Quebec) Canada G1S 3G3
Toll free: 1-866-686-0993 (USA and Canada)
E-mail: info@softdb.com

Soft dB
WWW.SOFTDB.COM

CONTENTS

1 Introduction

Congratulations on your purchase of the ***Opus Suite Building Vib Module***.

The ***Opus Software Suite*** is a sound and vibration software that contains several measurement modules:

- SLM 4-ch module : 4-channels, Class 1 (IEC 61672 and ANSI S1.43)
- SLM & 3Vib module : 1 SLM channel (same as SLM 4-ch module) and 3 vibration channels (ISO 8041 and ISO 2631)
- Data Logger module
- Building Acoustics Suite
  - Sound Transmission (ASTM E 336/ISO 140-4)
  - Impact Insulation (ASTM E 1007/ISO 140-7)
  - Room noise (ANSI/ASA S12.2-2008)
  - Reverberation Time (ISO 3382)
  - Speech Privacy (ASTM E 2638 and ASTM E 1130)
- **Building Vibration module (DIN 45669-1 and ANSI S2.46)**
- Intensity module (IEC 1043)
- Hammer Impact module
- Power Transformer Suite

The ***Opus Suite*** is intended to run on a ***Concerto.*** The software can also be installed on a Conductor unit or on any PC if using an Alto unit. Moreover, some post-processing functions are available on a PC even if no compatible unit is detected.

General Specifications – Building Vib Module

Records	• Event recording on triggered vibration value • Vibration time signals recording • Acoustic time signal and SPL Time History recording • User defined event recording length • Continuous monitoring
Vibration	• 3 channels (X, Y and Z) – (triaxial accelerometer) • 240 Hz Bandwidth • Acceleration, Velocity and Displacement • USBM RI 8507 and DIN 4150
Acoustic	• 1 channel • Slow, Fast and Impulse SPL global levels • A, C and Z SPL frequency weighting • 50 ms to 0.5 s SPL sampling rate • Wave recordings for monitoring

2 Compatible Hardware

Every hardware option has an embedded state of the art Soft dB SR-MK3 DSP board allowing real-time and precise measurement with very low energy consumption.

Concerto

Handy, lightweight, fully rugged military tablet
All in one instrument
WLAN communication allows using the Concerto as a monitoring station with remote access.
http://www.softdb.com/en/acoustic/products/concerto.php

Alto

6 or 4 24-Bit asynchronous inputs and 2 outputs
Compact, low-consumption, and flexible
Needs to be connected to a PC.
Competitive price.
http://www.softdb.com/en/acoustic/products/alto.php

Conductor

Rugged platform for acoustics and vibration measurements.
Mainly used for the I-Track sound intensity mapping system.
http://www.softdb.com/en/acoustic/products/conductor.php

3 Opus Environment

The ***Concerto*** unit comes equipped with the **Opus** Environment. This environment acts as a main interface that gives access to the different modules and tools.

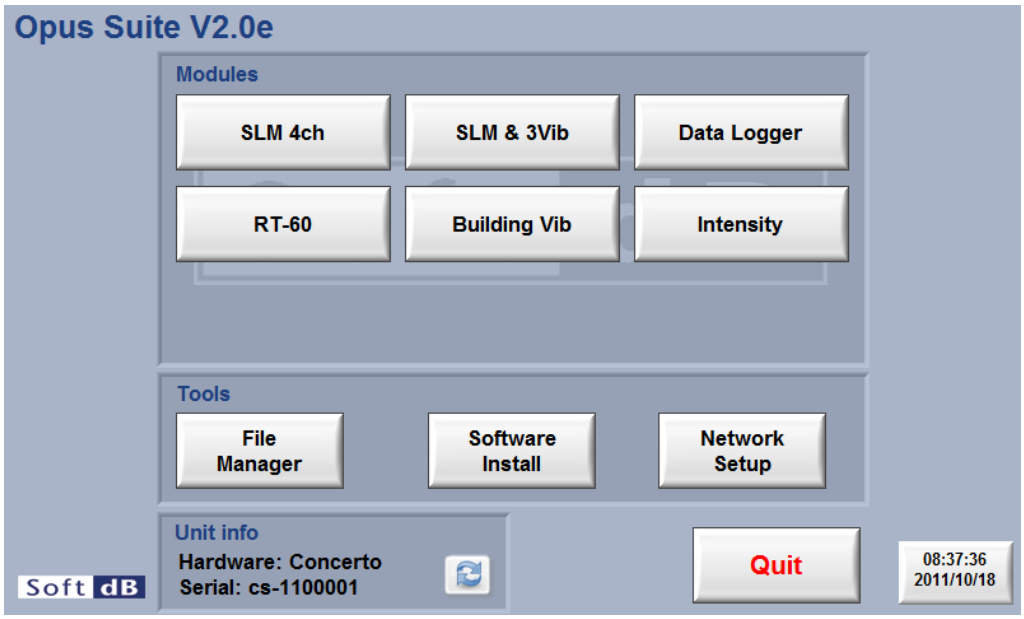


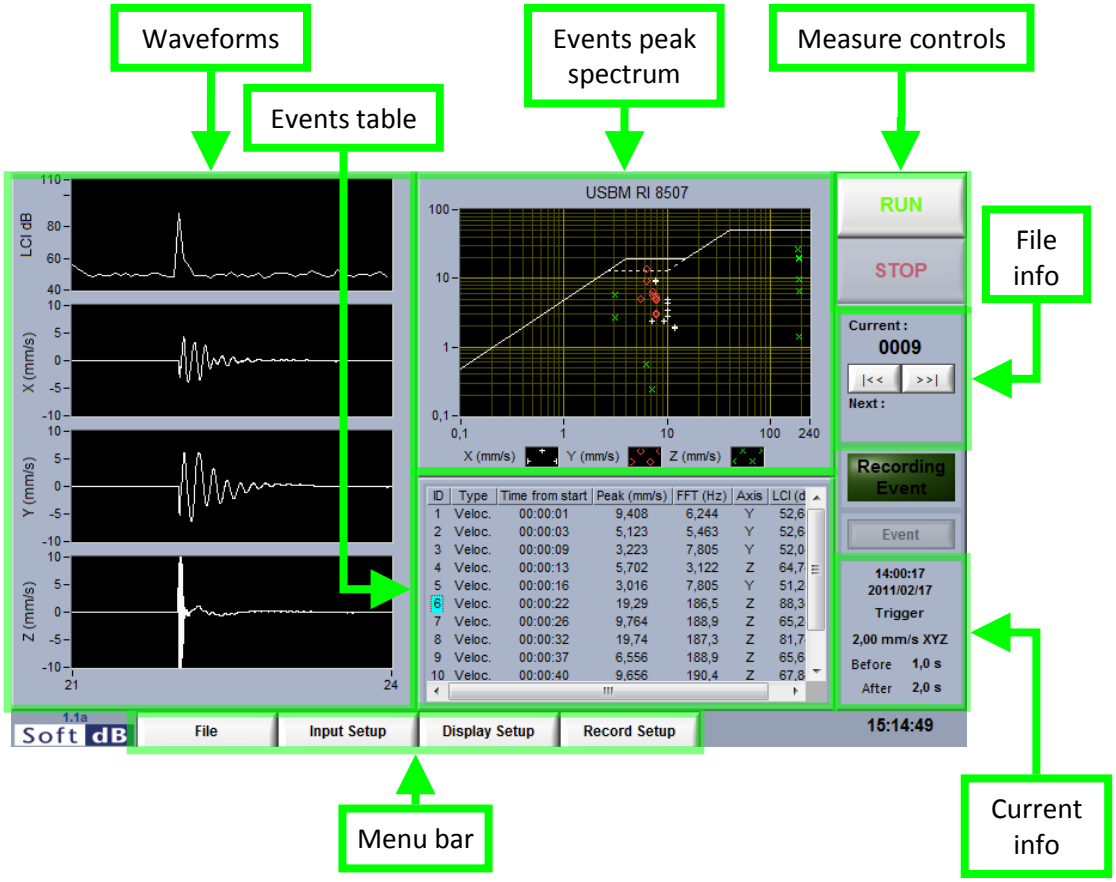
Figure 1 : Opus Suite Interface

Modules	The modules buttons will launch the associated module. When a module is opened, a license verification check is done. If no license is found for that module, a message will indicate the limitations.
File Manager	The **File Manger** button will launch the File Manager Utility (see section 10, p.23)
Software Install	The **Software Install** button will launch a browser from which an Opus software installer can be launched.
Network Setup	The **Network Setup** button will close the Opus software and access Windows. Then, the network can be set through Windows.
Unit info Hardware: Concerto Serial: cs-1100001	The **Unit info** gives the information about the hardware type (Concerto, Alto or Conductor) and the serial number of the unit. The refresh button allows resetting the connection with the acquisition board (useful with an Alto unit).
08:37:36 2011/10/18	The **Clock** indicator displays the time and date on the unit. To change time, simply click on the indicator to display a dialog window.

	The **Quit** button will quit the application differently according to the hardware used. Concerto hardware: - Hold 5 sec to shutdown the unit. - Press and release to enter standby mode. Alto or Conductor hardware: - Press and release to close the application and return to Windows.

4 Main InterfaceThe main interface is divided into five sections:

1) Measure controls (see section 6.1, p. 13)
2) File info (see section 6.2, p. 13)
3) Measure info (see section 0, p. 13)
4) Menu bar (see section 6.3, p. 14)
5) Waveforms (see section6.4, p. 15)
6) Events peak spectrum (see section6.5, p. 16)
7) Events table (see section 6.6, p. 16)



The following operations can be performed using the main interface:

- Perform a measurement,
- Modify the **Input Setup**, the **Display Setup** and the **Record Setup** using associated menus,
- **Save**, **Export** and **Open** data using the File menu

5 Quick Start

The Opus Building Vib Module monitors the vibration time signal from a triaxial accelerometer. When a specified vibration threshold is measured, an event record is triggered. Then, the event record is analysed to identify the peak for each axis and associated parameters.

Each event record contains the simultaneous acceleration, velocity and displacement waveforms for each axis and the acoustic waveforms (Time Signal and Sound Pressure Levels (SPL)).

Step 1 Connections and Setup

Connect the microphone to input 1 and the three accelerometers X, Y and Z axis to inputs 2, 3 and 4 respectively.

For purposes of example, fasten the accelerometer to a table top.

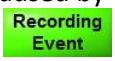
Step 2 Run the Measurement

Click on the 

button to start the measurement. At this point, you should see the running waveform on the waveforms graphs at the left of the interface.

Step 3 Generate Events

With the accelerometer fastened to a table top, gently hit the table top with you fist to generate a vibration event.

If the vibration signals caused by the vibration event were above the trigger level, an event recording has been triggered. The 

indicator is light on during the event recording.

When one event has been recorded, it is analysed to identify the peak information. It is then added and displayed on the event table and on the spectrum.

If another vibration event occurs, it will trigger another event recording.

Step 4 Stop the Measurement

Once the measurement process is completed, click on the 

button to stop the measurement.

Step 5 Save the Measurement

Click on the 

button to save the measurement. The measurement file will be saved as a .snv file in the file save directory. Its name will appear as a four digit number displayed in the File info section of the main interface.

Step 6 Visualize the Measurement

To visualize each event individually, click on the event table to select the desired event to display. When doing so, the event waveforms will be displayed on the waveform graphs at the left of the interface.

6 Main interface controls and indicators

6.1 Measure Controls

RUN

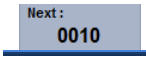
	When the user clicks this button, the measurement process is launched.

STOP/SAVE

	When the user clicks this button, the measurement stops. The **STOP** button then becomes the **SAVE** button.
	When the user clicks this button, the active measurement is saved. The **SAVE** button is then disabled until another measurement is complete.

6.2 File Info

File Save

	This indicator displays the current measurement file.
	Theses two buttons are used to open the next and previous files (respectively) in the measurement save directory.
	This indicator displays the next file to be saved.

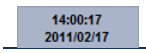
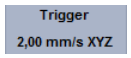
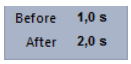
Event Recording

	This indicator light on when an event is being recorded.

Waveform Type

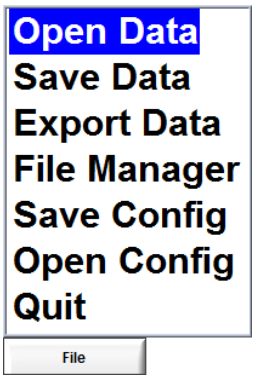
	This control allows the user to display the live signal or the event waveform on the waveform graphs. When the measurement is stopped, only event waveforms can be displayed as there is only a live signal when the measurement is running.

Measure Info

	This indicator displays the start time of the current measurement file.
	This indicator displays the trigger setting of the current measurement file. The trigger value and the monitored axis are displayed. The signal type (acceleration, velocity or displacement) monitored by the trigger is implied in the trigger units.
	This indicator displays the event record length used for the current file. It displays both the record time before and after the trigger occurrence.

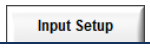
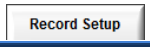
6.3 Menu Bar

File Menu



Open Data:	This item allows the user to open a measurement file (.snv).
Save Data:	This item allows the user to save a measurement file (.snv). When the user saves a measurement, its file number is automatically generated and saved in the measurement save directory.
Export Data:	This item allows the user to export the data in a tab delimited file (.txt .xls).
File Manager:	This item launches the File manager (See section 1, p.23)
Save Config:	This item allows the user to save the software interface configuration in a .cfg file.
Open Config:	This item allows the user to open a .cfg file to restore the saved interface configuration.
Quit:	This item allows the user to quit the Building Vib module and return to the Opus Suite interface.

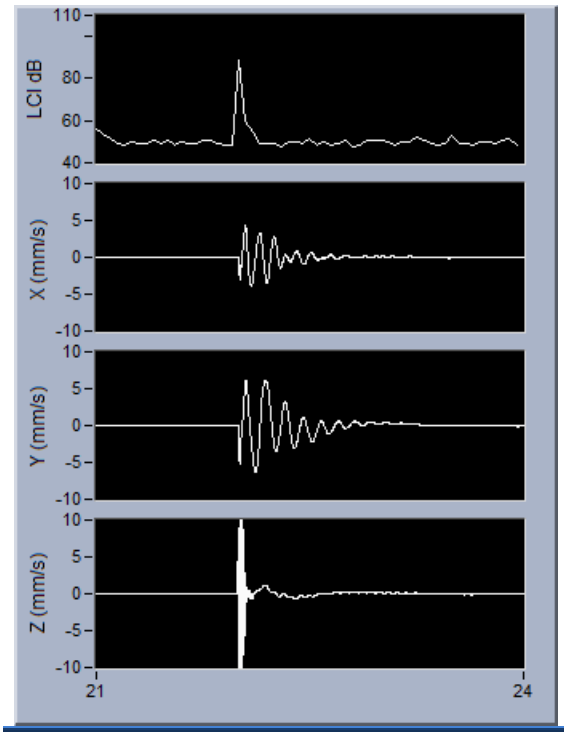
Setup

	This button launches the Input Setup Interface (See section 1, p. 17)
	This button launches the Display Setup Interface (See section 1, p. 20)
	This button launches the Record Setup Interface (See section 1, p. 21)

6.4 Waveforms

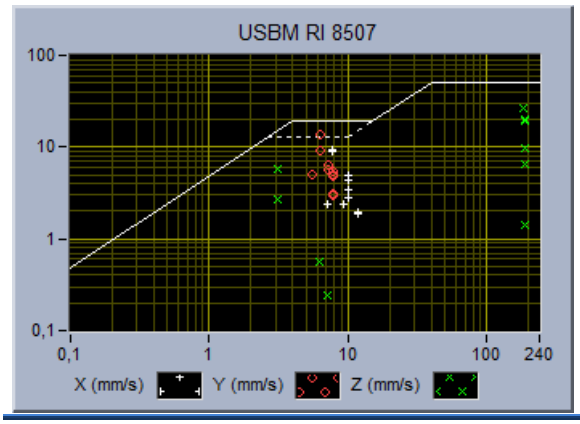
When a measurement is running these waveforms can display either the live signal or the selected event in the event table. This display mode is selected using the 

button at the right side of the main interface.

<table>
<tr><td rowspan="4"> 
</td><td>Acoustic Channel</td><td>This indicator displays either the Time Signal (RTA) or the SPL levels.</td></tr>
<tr><td>Vibration X Axis</td><td rowspan="3">These indicators display the vibration time signal.</td></tr>
<tr><td>Vibration Y Axis</td></tr>
<tr><td>Vibration Z Axis</td></tr>
</table>

To change the displayed event, click on the Event table on the desired event.

6.5 Events Peak Spectrum

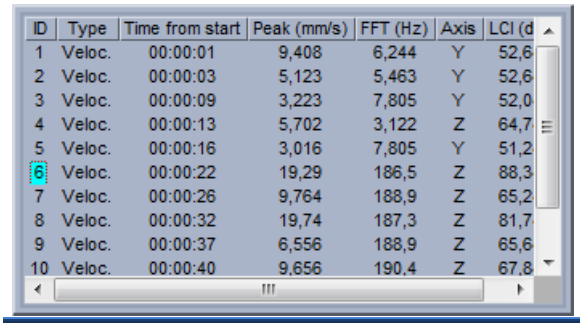


This indicator displays each event X, Y and Z axis peaks and associated frequency. The frequency can be either FFT (DIN 4150) or Zero Crossing.

A reference curve can be displayed on this spectrum. This reference curve can be DIN 4150 or USBM RI 8507.

Use the Display Setup to change the settings of this indicator.

6.6 Events Table

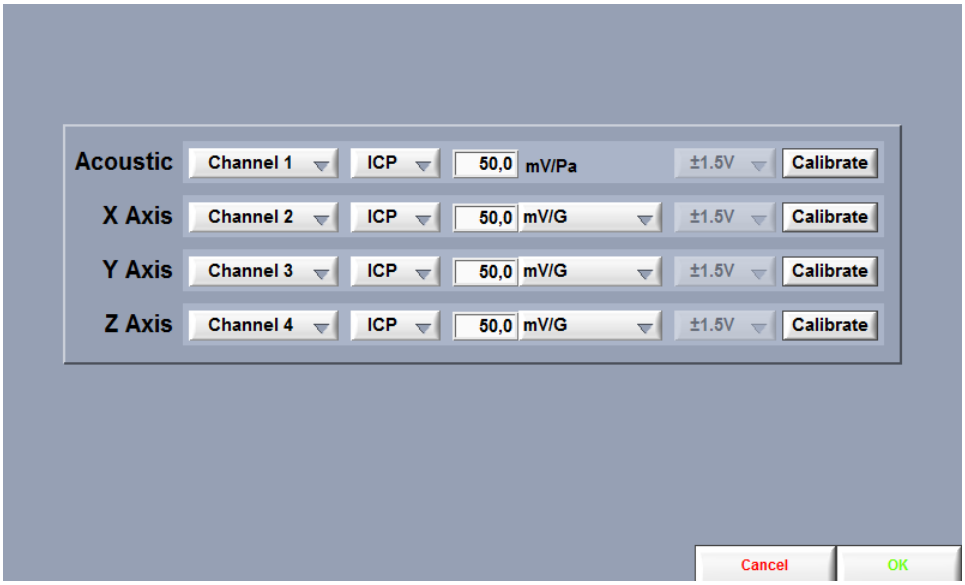


ID	Type	Time from start	Peak (mm/s)	FFT (Hz)	Axis	LCI (d
1	Veloc.	00:00:01	9,408	6,244	Y	52,6
2	Veloc.	00:00:03	5,123	5,463	Y	52,6
3	Veloc.	00:00:09	3,223	7,805	Y	52,0
4	Veloc.	00:00:13	5,702	3,122	Z	64,7
5	Veloc.	00:00:16	3,016	7,805	Y	51,2
6	Veloc.	00:00:22	19,29	186,5	Z	88,3
7	Veloc.	00:00:26	9,764	188,9	Z	65,2
8	Veloc.	00:00:32	19,74	187,3	Z	81,7
9	Veloc.	00:00:37	6,556	188,9	Z	65,6
10	Veloc.	00:00:40	9,656	190,4	Z	67,8

This indicator displays relevant information about each event. The columns of this list box can be selected from a variety of choice in the Display Setup.
Click on the list to select an event to display on the waveforms.

7 Input Setup

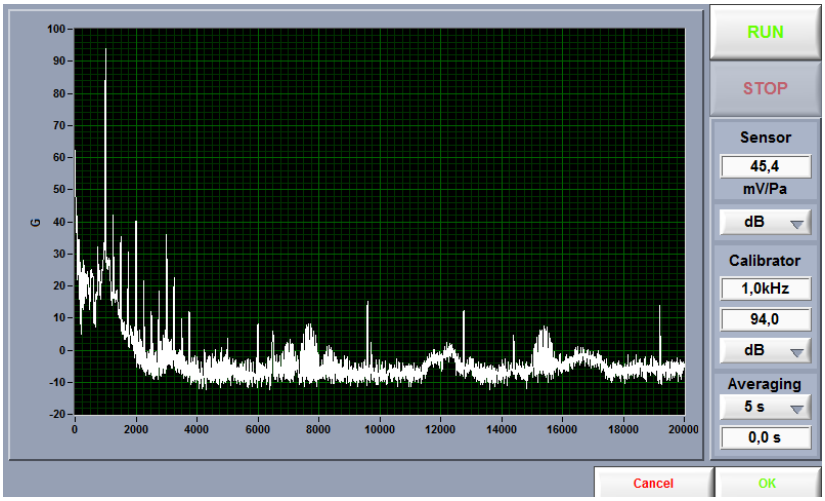
Click on the Input Setup button to go to the **Input Setup** interface.



This interface allows the user to:

- Select the input channel,
- Select the input type (default is ICP for standard accelerometers and microphones),
- Manually modify the microphone sensitivity or automatically using the microphone calibration function,
- Manually modify the accelerometer sensitivity or automatically using the accelerometer calibration function.

7.1 Microphone Calibration



Step 1 Adjust the calibration parameters

The defaults values are:

- Averaging time: 5 s
- Frequency: 1 kHz
- Calibrator Level: 94 dB

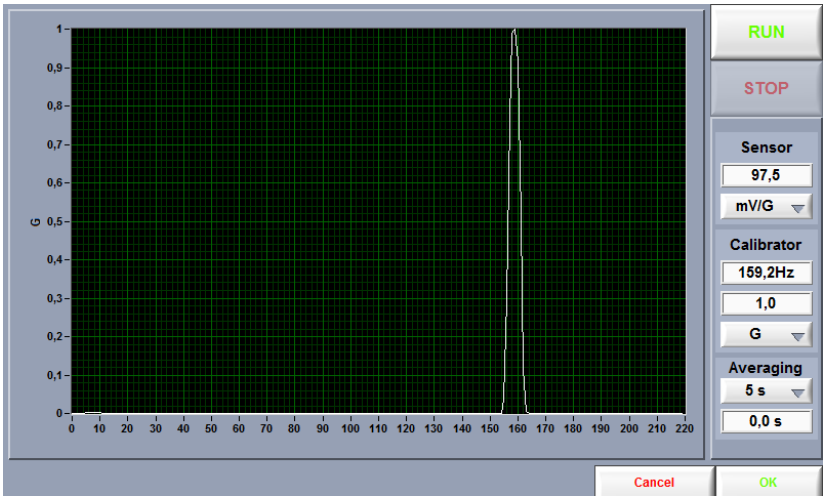
Step 2 Install the calibrator device on the microphone

Step 3 Click START

After the average time is elapsed, the sensitivity value will update.

Step 4 Click OK to accept the sensitivity value

7.2 Accelerometer Calibration



Step 1 ***Adjust the calibration parameters***

The defaults values are:

- Averaging time: 5 s
- Frequency: 159,2 Hz
- Calibrator Level: 1 G

Step 2 ***Fasten the accelerometer on the calibrator***

Step 3 ***Click START***

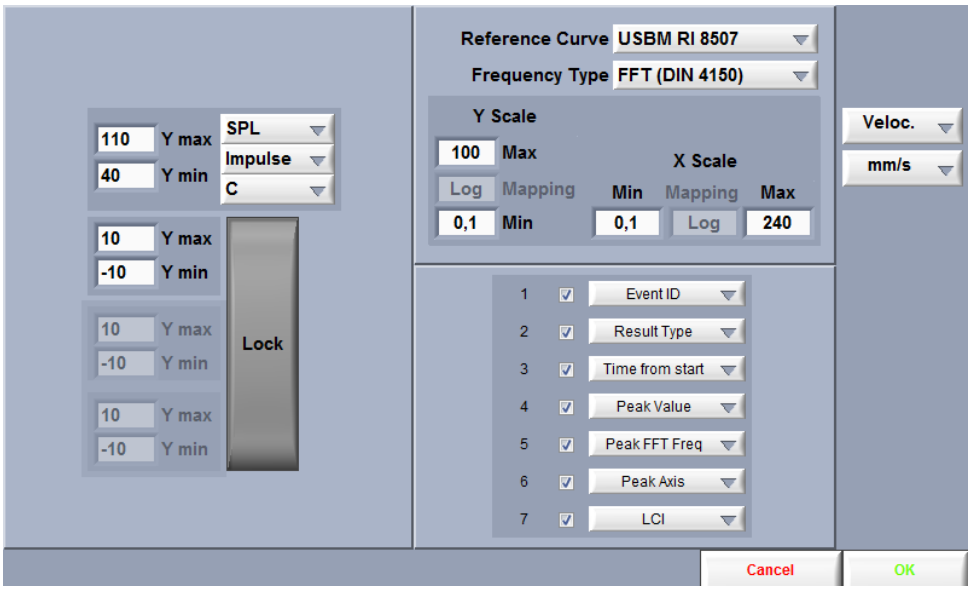
After the average time is elapsed, the sensitivity value will update.

Step 4 ***Click OK to accept the sensitivity value***

8 Display Setup

Click on the 

button to go to the **Input Setup** interface.



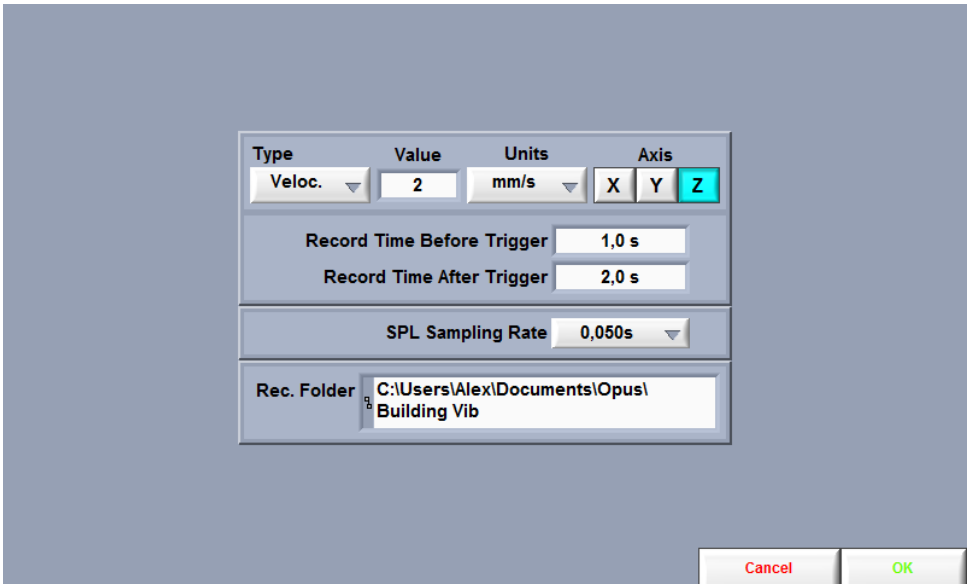
This interface allows the user to:

- Modify the result type to display (from Acceleration, Velocity or Displacement),
- Modify the units to display (from a variety of choice according to the result type),
- Modify the acoustic time history data to display (RTA or SPL),
- Modify the acoustic time history Y axis range,
- Modify the vibration time history Y axis range,
- Modify the event peak spectrum axis range and mapping mode,
- Modify the event peak spectrum frequency type from FFT or Zero Crossing,
- Select a Reference curve (DIN 4150 or USBM RI 8507),
- Select the columns to display on the Event Table.

9 Record Setup

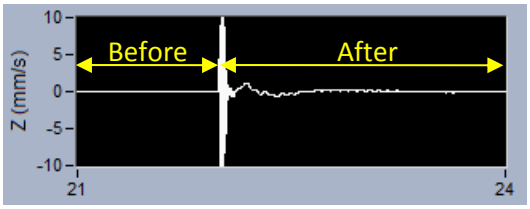
Click on the 

button to go to the **Record Setup** interface.



The events are recorded when a specified trigger value is encountered on one or a combination of axis on the accelerometer. The trigger signal type, trigger value and units and the axis to monitor are set using the controls at the top of the interface.

Two record times are to be set. The first one is the **record length before trigger** and the second one is the **record time after trigger**. The total record time for one event will be the sum of these two durations. *It is recommended to use a record time before trigger of at least 1 s to record the transient occurring at a vibration event. The record time after event is usually longer and can range from 2 s for short events up to 20 s for longer events.*



The SPL (Sound Pressure Level) sampling rate is set from a variety of choices. The default rate is 0.05 s and is appropriate for all time weighting (Slow, Fast and Impulse).

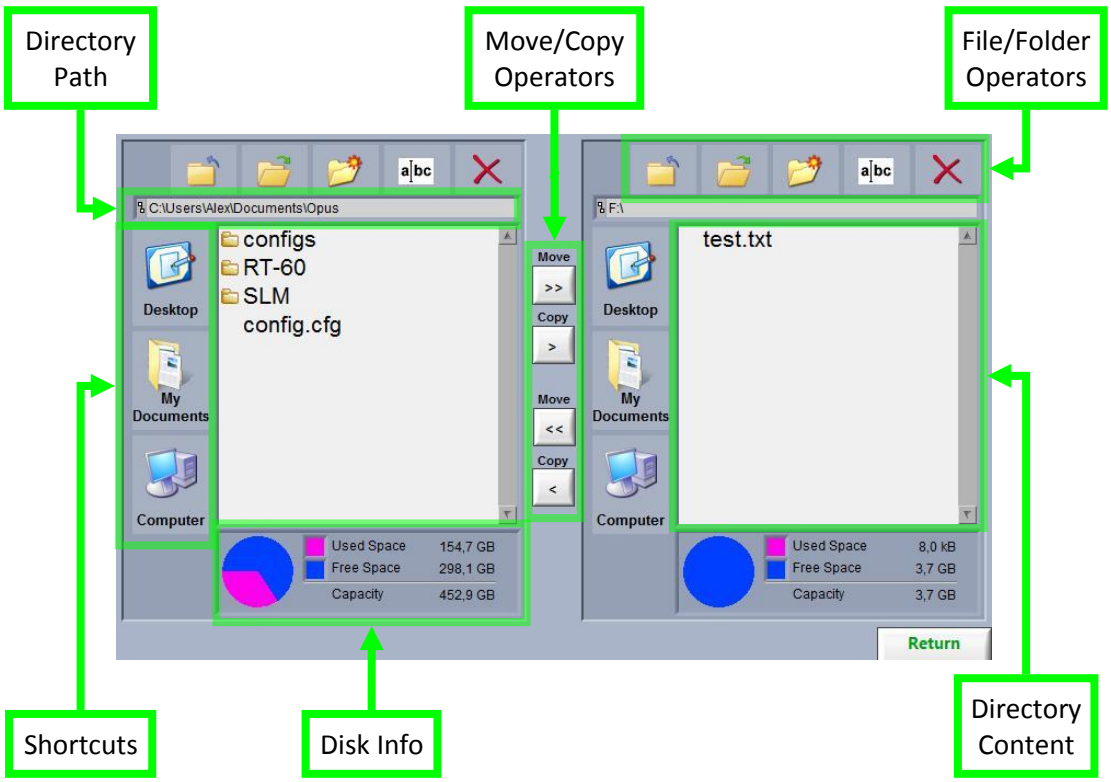
The record folder is the directory in which the files will be stored. To change or create a new folder, click on the field to display an explorer dialog allowing the change.

10 File Manager

The File manager is used to perform most file operations:

- Navigate the directory structure
- Create folders
- Rename files and folders
- Move or copy files and folders from one place to another
- Delete a file or a folder

Although not very useful on a stand alone computer, this manager is necessary on the *Concerto,* on which Windows explorer is unavailable. Its primary function is to allow the user to manage the *Concerto* directory structure and to export files and folders to a USB memory stick.



Directory Path	Displays the path of the active directory.
Shortcuts	Allows easy access to common directories. When the **File Manager** is used on a stand alone computer, these shortcuts are linked to: • Desktop • My Documents • Computer When the **File Manager** is used on a ***Concerto***, the shortcuts are linked to: • Opus Root • USB Device.
Move/Copy Operators	Copies or moves a file or folder from a source to its destination.
File/Folder Operators	Allows user to: • Go to parent directory • Open directory • Create new folder • Rename folder or file • Delete folder or file
Directory Content	Displays the content of a directory and responds to common actions from the user: • Single clicking on an element will select it • Double clicking on a directory will open it • Dragging an element from one side to the other will copy it.
Disk Info	Displays the disk information of the associated hardware.

Appendix 1: Concerto Hardware

Connections

Power on/off

Turn On	Press the trigger button located at the back of the unit This key has two (2) functions: 1. To turn the unit ON. 2. Start a measurement once the SLM Module is loaded After a few seconds, the **Opus Environment Interface** will appear.
Stand-by	The **stand-by** mode allows fast load time. • To put the unit on **stand-by**, click the **Turn Off** button. Note: The unit can be in stand-by for more than three days without recharging, provided batteries are fully charged prior to storage.
Shutdown	To **Shut down** the unit, click and **hold** the **Turn Off** button for five seconds.

Power Reset

If the Concerto happens to crash and it is not possible to take back the control, a power reset might be necessary. To complete the power reset, the three buttons on the front of the Concerto must be used.

Here is the procedure:

Step 1 ***Press and hold the Function, Enter and Down Arrow button for 5 seconds until the Concerto shuts down***

Step 2 ***Wait 5 seconds and press the power button***

Step 3 ***Wait 5 seconds and press the power button a second time to restart the Concerto from a power reset.***

Step 1

Press and hold to trigger the power reset

Step 2 and 3

Power-on

Press 2 times to restart from power reset

Concerto Hardware Specifications

DSP board: Signal-Ranger™ SR3 by Soft dB	
Processor	TI TMS320C6424, 96 kHz/24-bit
Real time bandwidth	DC to 24 kHz @ 4 channels
Dynamic Range	94 dB per range (105 dB total)
Noise floor (@ 50mV/Pa)	25 dBA 30 dBC 30 dBZ
THD + noise	> 90 dB@ 1/4 dynamic range
Cross talk	> 115 dB @ 1kHz
Random noise	< 14 µV(A), < 17 µV(Z) @ 0.1 Hz
Decimation rates	2, 4, 8, 10 (for .wav recording)
Anti-aliasing filter	yes
Input filter (DC, AC)	Adjustable: 0,5 to 16 Hz
Overload detection	yes
Max Input voltage	12 Vp-p
Output voltage	12 Vp-p
Safe Max. input	2,5 Vp-p
Sensor Power Supply:	ICP 4 mA

Physical (DAP Tech 9000 Tablet PC)

Operating system	Intel Atom E660T 1.3 GHz
Storage	16 GB SSD
Data Transfer	USB
Display	180 mm (7 inches) WVGA (800 x 480)
Dimensions	230 x 185 x 60mm (9.0 x 7.3 x 2.4 inches)
Weight	1350 g (2.96 lb)
Battery	2 x Li-ion battery, 7.4 V, 3100 mAh, (1 internal + 1 hot-swappable)
Power	10-20 VDC, 2A
Protection rating	IEC 68-2-32 method 1 (Multiple 1m drops on concrete) IP67 (Rain, Humidity, 1 meter immersion) MIL-STD-810F method 506.4 procedure I (windblown rain) Humidity: 95% non-condensing Temperature: MIL-STD-810-F (-20 °C ... +50 °C); Vibration: MIL-STD 810E 514.5