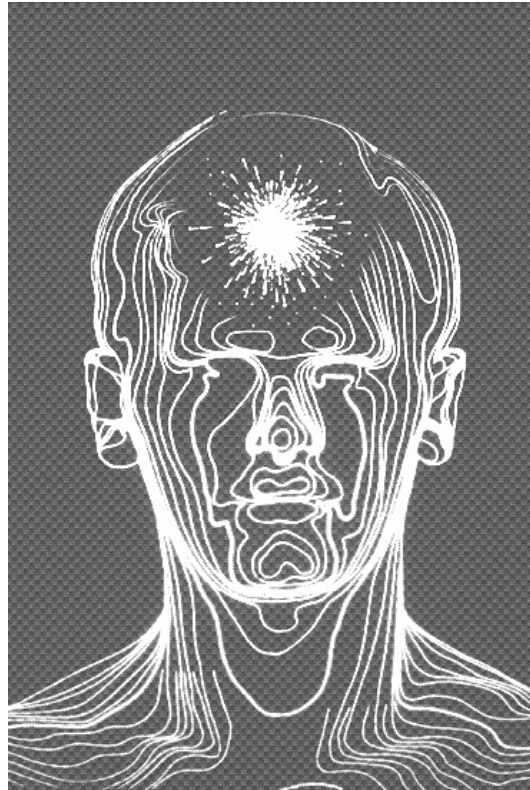


Set up and Basics Guide

May 11, 2000



Vibration Research Corporation
6437 28th Ave.
Hudsonville, Michigan 49426
U.S.A.

Phone: (616) 669-3028
Fax: (616) 669-5337
Email: support@vibrationresearch.com

Table of contents

1.	Introduction	1
1.1	Why is Vibration Control important	1
1.2	The Basics of Vibration View	1
1.2.1	Sine View.....	1
1.2.2	Random View	1
1.2.3	Shock View.....	1
1.2.4	Field Data Replication View.....	1
1.2.5	Sine on Random View	1
1.2.6	Random on Random View	1
1.2.7	All	1
1.2.8	Process Spectrum Monitor.....	2
2.	About Accelerometers	3
3.	Quick Setup Instructions.....	5
4.	Computer Requirements	5
5.	How to install the hardware	5
6.	How to install the software	5
7.	The Shaker.....	5
8.	How to Select Test Types (Sine, Random, etc.)	5
9.	How to Run the System Check Test	5
10.	The Remote Input Option	5
11.	The Process Spectrum Monitor (optional).....	6
11.1	Installing the Hardware.....	6
11.2	Installing the Software	7

1. Introduction

1.1 Why is Vibration Control important

Vibration control is an essential part of the manufacturing process. It is used to effectively test the parts that you produce. You are very interested in the quality of your products and so are we. Thus we have created this highly accurate shaker controller for you to test the limits of your products.

1.2 The Basics of Vibration View

1.2.1 Sine View

Frequency is easily set and Amplitude can easily be changed in acceleration, velocity, and displacement. The test can be programmed to perform a certain number of sweeps, or run for a certain duration of time. The sweep rate can be set on a linear or logarithmic scale. You can temporarily hold the sweep or sweep up or down by Clicking a control button. This test can also be stepped from one frequency to another.

1.2.2 Random View

The levels of any test can be scaled up or down at run time. Random vibration control is achieved by the control of narrow bands of energy called lines. With 800 control lines standard, you have the resolution required for your test at your fingertips. Control channels can be average or Extremal (if you buy the option). You can temporarily hold the test timer by clicking a control button.

1.2.3 Shock View

You can automatically adjust for the pre- and post-pulse levels. The waveforms can be rapidly repeated. The shaker, fixture, or product is automatically equalized before the wave is replicated. You can temporarily hold the test timer by clicking a control button.

1.2.4 Field Data Replication View

You can record the acceleration wave in your specific field to be replicated by the software. The waveform length is limited only by your hard drive (50 Mb of space will hold 1 hour of recording.) The reference waveform can be multiplied by any desired value to get the intensity desired for your product. The sampling frequency is adjustable so you can select whatever sampling rate is appropriate for your test.

1.2.5 Sine on Random View

Up to 9 true sine tones with floating point precision can be specified. These tones will sweep back and forth at a user-defined rate. The amplitude, start frequency and end frequency are also user-defined. You can temporarily hold the test timer by clicking a control button.

1.2.6 Random on Random View

Up to 10 random levels can be specified to sweep back and forth at a user-defined rate. Amplitude, bandwidth, start center frequency, and stop center frequency are also user-programmed. You can temporarily hold the test timer by clicking a control button.

1.2.7 All

All of the above "Views" have the ability to do many other things. Each test can have default graph scales set for the different types of graphs. These scales are adjustable at any time by double-clicking on the axis you wish to modify. Each test has three lines of annotations that you can identify. All the test data can be stored for later retrieval at user-defined intervals or at the click of a button. Limits can also be set by the user to protect the shaker system. The tests can be put into an open loop condition that prevents control updates from changing the drive levels.

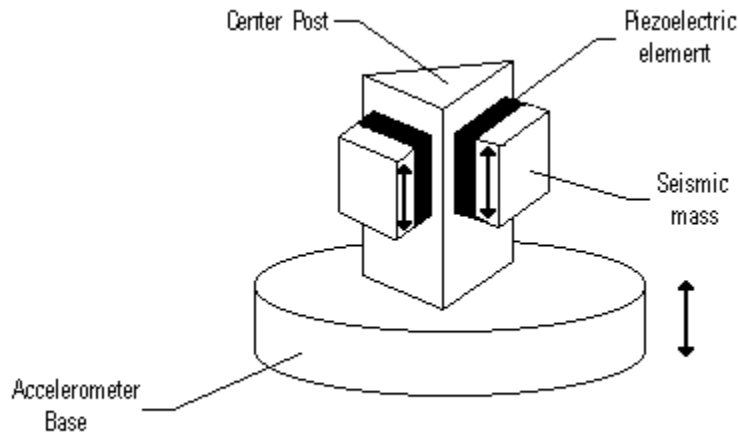
Also, the inputs can be analyzed and compared.

1.2.8 Process Spectrum Monitor

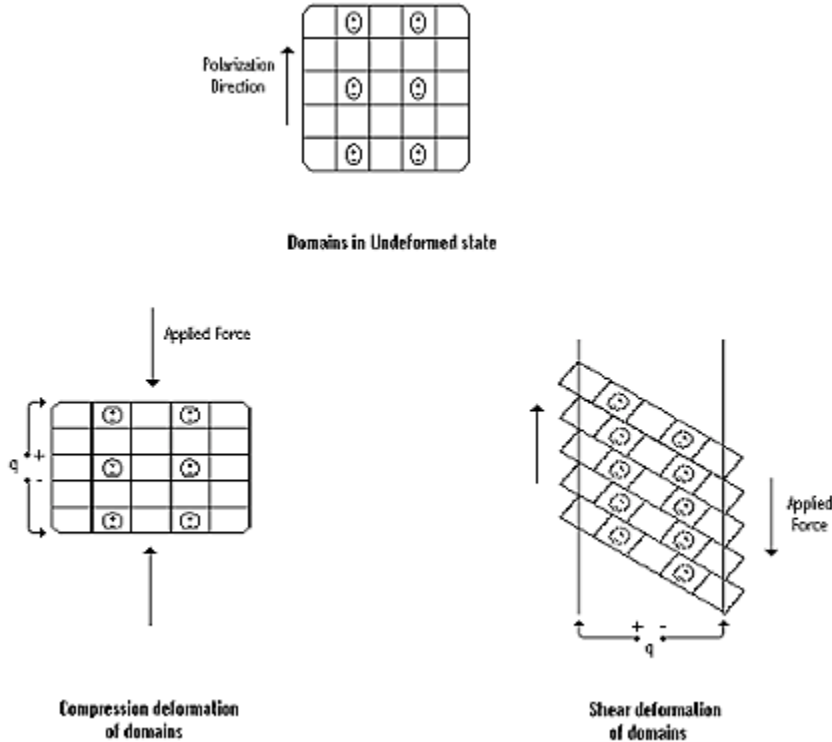
The process spectrum monitor is a separate program that allows you to easily spot a bad spectrum signature. It is easy to use and easy to run. You input a known good spectrum, define your limits, assign spectrum limits, and run the test. To run, input the signals, Click the run button, and watch the go/no-go indicators. Statistics are kept by the program so that you can go back to analyze where errors occurred. You can also set your own spectrum limits or have the program automatically choose intelligent ones.

2. About Accelerometers

The active elements of an accelerometer are the piezoelectric elements. These act as springs that connect seismic masses to the base of the accelerometer. Piezoelectric materials develop an electrical charge when subjected to force.



These materials are polarized so that when a force acts on the material, it causes deformations of the domains and charges so that the material forms polarity on its ends. Thus a connection between the ends produces an electric charge. When the accelerometer is vibrated, the seismic masses produce a torque on the piezoelectric materials that cause them to emit a charge.



This charge is then sent to the conditioner.

There are two basic types of accelerometers, the constant current and the charge accelerometer. The I/O box that you received with your system has ICP conditioning. ICP is the trademark name of PCB, an accelerometer manufacturer. It stands for Integrated Circuit Piezoelectronic. The generic term is "constant current" accelerometer. Basically, a 4 mA DC current is fed into the device. The current is changed to regulate voltage inside the accelerometer, by internal electronics. The AC signal "rides" on top of the DC bias. The DC bias voltage is specified for each accelerometer, but usually is 7 to 15 volts. Thus, a 28 VDC max current drive will supply a constant 4 mA for a healthy signal. Remember, the AC signal rides on top of the bias, so as the accelerometer measures the signal, it is added to and subtracted from the DC bias. Inside the IO box, we have a capacitor, which filters out the DC bias, and looks only at the AC signal.

The other type of accelerometer is a "charge" accelerometer. The quartz material inside this accelerometer changes capacitance proportional to acceleration. This can be measured by an external "charge amplifier", and turned into a mV/g signal. If you want to use a charge accelerometer, we can provide a charge to ICP converter BNC barrel at a cost of about \$150. Note that an ICP accelerometer is nothing but a charge accelerometer with electronics (very small) inside the accelerometer.

The advantage of charge accelerometers is that they are considered to be more stable at extreme frequencies, as the electronics in an ICP accelerometer have a hard time surviving some environments. The advantage of ICP type accelerometers is that they are much less susceptible to noise.

When using an accelerometer you must have the accel conditioner turned on by flipping the switch labeled ACC1 (or whichever channel you have the accelerometer connected to) on the back of the I/O box.

3. Quick Setup Instructions

See Section 2 of the VibrationVIEW Operators Guide.

4. Computer Requirements

See Section 3 of the VibrationVIEW Operators Guide.

5. How to install the hardware

See Section 4 of the VibrationVIEW Operators Guide.

6. How to install the software

See Section 5 of the VibrationVIEW Operators Guide.

7. The Shaker

See Sections 6 and 8 of the VibrationVIEW Operators Guide.

8. How to Select Test Types (Sine, Random, etc.)

See Section 10 in the VibrationVIEW Operators Guide.

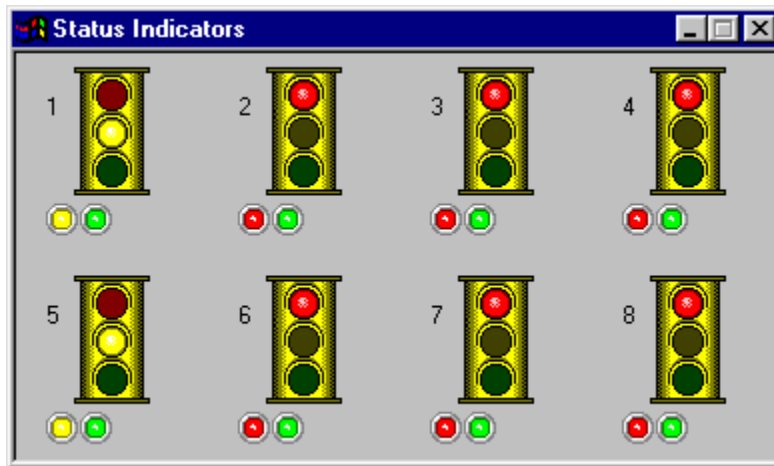
9. How to Run the System Check Test

See Section 8 in the VibrationVIEW Operators Guide.

10. The Remote Input Option

See Section 23.1.1 in the VibrationVIEW Operators Guide.

11. The Process Spectrum Monitor (optional)



11.1 Installing the Hardware

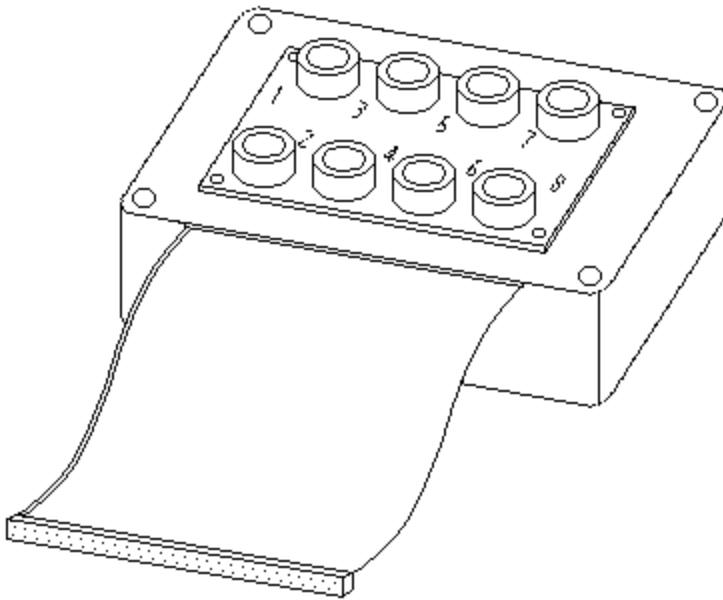
The hardware for the Process Spectrum Monitor consists of a National Instruments DAQ board and a small input box. If you purchased a computer system with your vibration system then the NI-DAQ board is already installed and you need only connect the input box.

The NI-DAQ board fits into a short PCI slot and is electro-sensitive. Thus, common static resistant procedure must be followed for the installation of this board.

1. Open up your computer box.
This can usually be done by taking the screws off the back or "unlocking" the left side and removing that panel.
2. Remove the metal plate of the PCI slot that you want to put your NI-DAQ board in.
3. Open the Static Free Sleeve that the board is in but do not remove it.
4. Place one hand on the outside of your computer box and the other on the sleeve that the board is in to dissipate any static charge on your body.
5. While touching the Static Free Sleeve, reach inside of the sleeve and touch the metal end of the board.
6. Now you can remove the board from the sleeve.
7. Insert the card into the PCI slot that you have selected. Make sure that it is securely in place.
8. Fasten the metal end of the board to the computer box with a screw.
9. Replace the panel on your computer box.

You have successfully installed your NI-DAQ board.

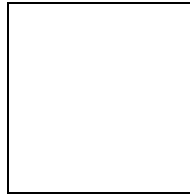
The small input box has a 50-pin adapter connected to it that fits into the port on the NI-DAQ board. Make this connection and your hardware is setup to run the Process Spectrum Monitor.



11.2 Installing the Software

If you purchased a computer system with your vibration system then the Software for Process Spectrum Monitor is already installed on your computer. If not, you must follow these steps to install the software.

1. Insert the VibrationVIEW CD into your drive.
2. Open "R:\Extra\VibrationAnalyzer" where R is the letter assigned to your CD-ROM drive.
3. Run "Setup.exe"
4. Go through the setup dialog boxes, selecting all the defaults.



To run the software click on the "Vibration Analyzer" icon that is on the desktop.