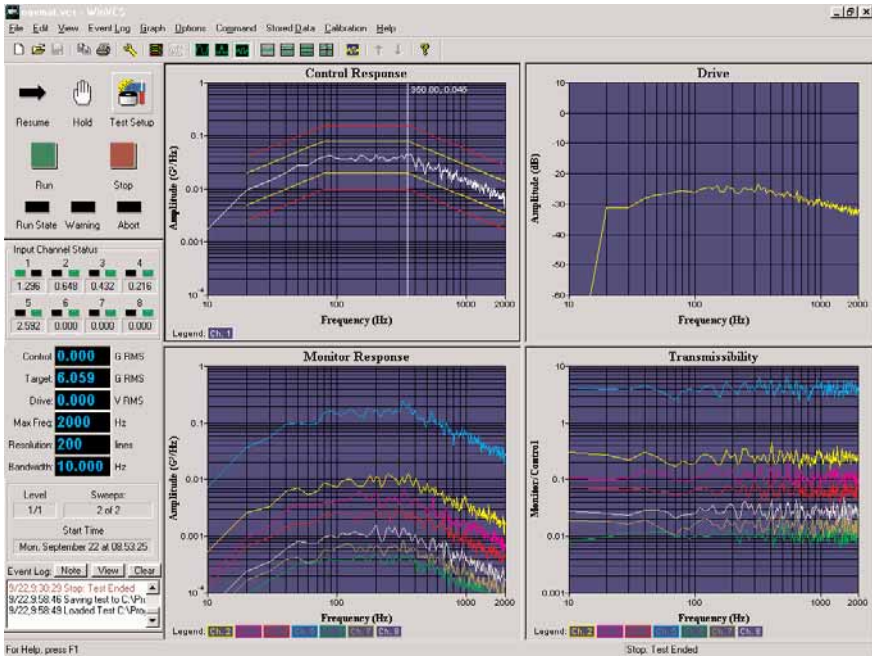
THERMOTRON®

VCS - 3200 VIBRATION CONTROL SYSTEM

- **Ideal for Automotive, Electronic and Military testing requirements**
- **Sine, Random, Shock, Resonant Search and Dwell, Real Data Analysis and Playback (RDAP), Random-on-Random and Sine-on Random capabilities**
- **PC-based for operational versatility**
- **Easy to understand programming instructions**
- **4 high speed multiplexed input channels standard providing virtual parallel processing; 8 channels optional**
- **Wide range of display options allows you to monitor all pertinent test parameters**
- **Library of pre-programmed vibration profiles**
- **Test level scheduling and profile sequencing**
- **Sophisticated program chaining capabilities for long term automatic operations**
- **TCP/IP Communications Compatible**



■ Designed for Compatibility and Versatility

Our Vibration Control system (VCS) is designed to be fully compatible with all Thermotron shakers. The VCS is "Windows™" based for versatility, allowing the user to implement other software programs when the computer is not running the controller.

■ VCS Offers Unsurpassed Simplicity

The Thermotron VCS has a library of preprogrammed vibration profiles that fit many preset test specifications. This feature, coupled with "Windows™" based menu-driven software and color graphics, greatly simplifies set-up and operation.

■ Unparalleled Perfomance Capabilities

With a user selectable frequency range up to 3,000 Hz. and a user selectable resolution up to 3200 lines, the VCS offers an excellent performance value. With an unmatched dynamic range, the VCS also eliminates nuisance aborts during operation. Our system offers the most advanced test level scheduling and profile sequencing to provide the operator with the simplest, most automated operations available.

All features subject to change without notice.

■ Combined Systems Leader

The Thermotron VCS is part of the total systems package from the industry's only Shaker/chamber/instrumentation manufacturer. With the VCS, Thermotron offers its clients a totally integrated testing system that is unrivaled for performance, adaptability, accuracy and ease of use.

■ Responsive After-Sale Support

Our service is complete and on-going. With Service Centers throughout the world, we provide immediate access to service engineers familiar with your system's operation. On-call and on-site troubleshooting is handled by factory trained people who can immediately answer your equipment questions. Most local service centers offer factory direct assistance with an inventory of standard parts and accessories to help keep your system on line.

TECHNICAL SPECIFICATIONS

■ INPUT CHARACTERISTICS

Number of channels	4 standard, 8 optional
Type	Any channel switch selectable for voltage input from externally conditioned accelerometers (ie: charge amplifier or in-line charge converter) or I.C.P. utilizing internal power supply.
Maximum Voltage	10 volts peak
Maximum ICP	1 to 1000 mv/g (4 ma, 28v maximum drive)
Accuracy	0.5dB
A/D Resolution	16 bit

■ OUTPUT CHARACTERISTICS

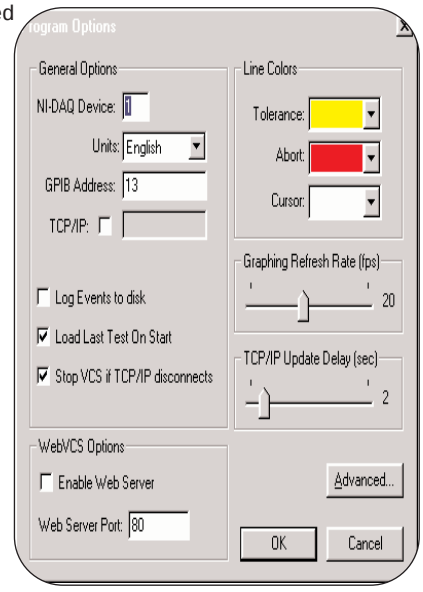
Level	20 volts peak to peak
Impedance	50 typical
Dynamic Range	*Analysis*- typically greater than 80dB *Control*- typically 75dB peak/notch minimum 60dB
D/A Resolution	16 bit

■ PROGRAMMING CHARACTERISTICS

Programming Units	English or Metric
Stored Tests	Number of tests limited only by the size of the hard drive
Level Scheduling	Up to 60 levels programmable in 0 to -100dB, 0 to 100 G (peak/RMS) or 0.001 to 1000% with up to 99 hours, 59 minutes, 59 seconds per level in 1 second intervals.
Test Scheduling	Up to 60 different stored tests can be programmed to be run in a selected sequence. The test schedule can be a mix of random, sine and shock. Up to seven different schedules can be remotely selected.

■ TEST DATA STORAGE

Data Stored	Control response, monitor response and drive are automatically stored upon level change, test completion or test abort. Data can also be stored through manual operation.
Storage Medium	PC hard drive. Data can be transferred to floppy disk for archiving.
Number of Data Records	Only limited by the size of the hard drive.



■ RECOMMENDED PERSONAL COMPUTER SPECIFICATIONS

PC Type	Pentium IV or Equivalent
CPU Speed	2.4 Giga Hz
Motherboard	ATX
Slot	1 PCI
Ports	2 Serial, 1 Parallel and 2 USB
Memory	512 Mbytes of SDRAM
Hard Drive	40 Gigabyte
Disk Drive	3.5" high density floppy
CDROM	50X
Video Card	32 Meg (1024 x 768)
Monitor	17" LCD Color
Mouse/Keyboard	Both Required
Operating System	"Windows XP™" or higher

■ TCP/IP INTERFACE

The TCP/IP interface allows you to operate the VCS computer over any standard TCP/IP network, like the Internet or a local Ethernet network. In addition to using the command set, you can operate the VCS computer from a remote computer that is also running the WinVCS program. The remote WinVCS program operates the interface invisibly and displays the data from the VCS computer on the displays in the WinVCS computer.

■ WEB SERVER

The WinVCS program features a built-in HTTP server that is capable of handling request for HTML documents.

■ DIAGNOSTICS

At power up the PC initiates a self-test procedure to check its control system circuitry.

■ CALIBRATION

Three calibration modes area available. The first method utilizes the built-in oscillator and determines the mv/g sensitivity of the accelerometer(s), based on the defining two of the following: frequency, displacement, velocity or acceleration. The second method utilizes the user entered sensitivity from the accelerometer(s) calibration sheet. The third is a system verification checkout for your cal lab.

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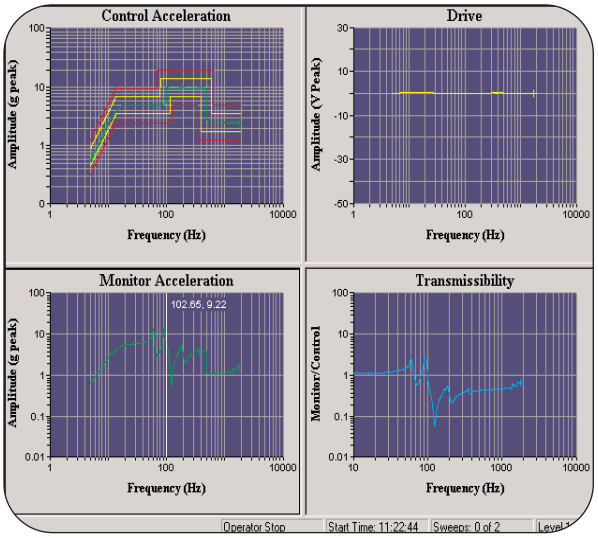
VCS - 3200 SINE CONTROL

■ CONTROL CHARACTERISTICS

Frequency range	1 Hz to 4 kHz
Frequency resolution	Crystal controlled to 0.01%
Acceleration	0.02 g to 100 g peak
Velocity	0.01 to 100 inches per second
Displacement	0.01 to 4 inches peak to peak
Control Response	1 to 4 channels (optional 8 channels) may be used in any combination for single point or average control.
Monitor Response	Any of 1 to 4 or 8 channels may be selected and displayed in real time. Tolerance and abort limits, independent of control limits, may be defined for monitor channels.
Demand	Up to 120 breakpoints in terms of Acceleration, Velocity and Displacement per test.
Tolerance and Abort	Up to 120 segments for tolerance and abort limits
Sweep Direction	Up, down or bi-directional
Sweep Type	Linear or logarithmic or resonant search and dwell
Sweep Rate	Logarithmic 0 to 99 oct./min or 0-99 dec./min Linear 0.01 to 5,000 Hz per minute
Number of sweeps	0 to 9999 sweeps or time test

■ DISPLAY CHARACTERISTICS

Amplitude	Log or linear
Frequency	User selectable log or linear
Displays	Control response in terms of Acceleration, Velocity, or Displacement Monitor response in terms Acceleration, Velocity, or Displacement Drive Transmissibility Stored data (any of the above)



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THERMOTRON®

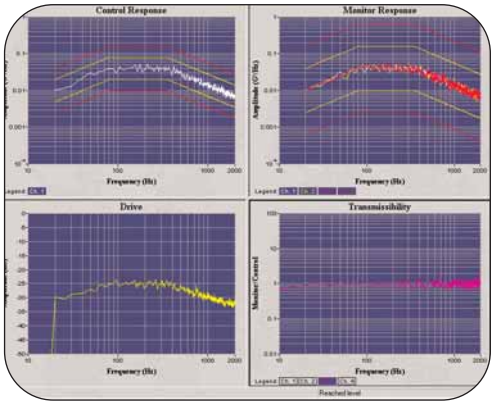
VCS - 3200 RANDOM CONTROL

■ CONTROL CHARACTERISTICS

Frequency range	1 Hz to 3 kHz
Resolution	User selectable 100, 200, 400, 800, 1,600 or 3,200 lines
Signal	True random with Gaussian distribution. User selectable sigma clipping of 2 to 10 in 0.1 increments
Program Range	$1x10^{-10}$ to $1x10^{3}$ g^2/Hz
Averaging	Exponential averaging with variable decay
Control Response	1 to 4 channels (optional 8 channels) may be used in any combination for single point, average, minimum, maximum control.
Monitor Response	Any of 1 to 4 or 8 channels may be selected and displayed simultaneously in real time. Tolerance and abort limits independent of control limits may be defined for monitor channels
Demand Spectrum	Up to 120 breakpoints per profile
Tolerance and Abort	Up to 120 segments for tolerance and abort limits RMS
Abort	Independently programmable over and under Grms
Demand PSD Dynamic Range	45 dB
Drive Type	*Normal*- Equalization in steps with gradual increase in output *Resume*- Equalization utilizing the last successful equalized drive stored on disk *Model*- Equalization utilizing a model for instantaneous full level output
External Input	External Input allows for taking recorded vibration signals from the field and using this data to define a reference profile. This data can be input as raw field data from a DAT Recorder or analyzed data in spread sheet format

■ DISPLAY CHARACTERISTICS

Amplitude	Log
Frequency	User selectable log or linear
Bandwidth	User selectable over any bandwidth
Displays	Demand profile Control response Drive Transmissibility Stored data (any of the above)



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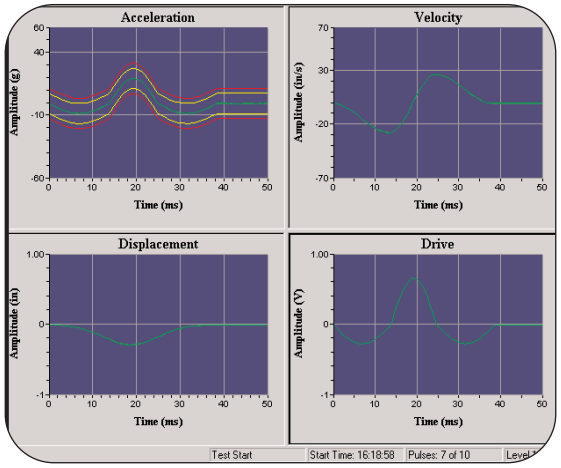
VCS - 3200 SHOCK CONTROL

■ CONTROL CHARACTERISTICS

Pulse Types	Half sine, triangular, terminal-peak sawtooth, initial peak sawtooth and trapezoidal
Pulse Duration	0.1 ms to 2000 ms Pulse Direction Positive or Negative Pulse Repetition Maximum of 1,000 repetitions with up to 1,000 seconds between pulses
Bandwidth	Selected automatically to Suit pulse duration
Protection	User settable independent tolerance and abort limits for control response and maximum output drive.
Drive Type	Normal- equalization in steps with a gradual increase in drive Resume- equalization utilizing the stored drive from a previously successful test. Model- equalization utilizing a model for instantaneous full level output
Tolerance Limits	User selectable
Abort Limits	User selectable

■ DISPLAY CHARACTERISTICS

Amplitude	Linear
Time	Linear
Time Width	User selectable over any time width
Displays	Control response acceleration Control response velocity Control response displacement Drive Stored data (any of the above)



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VCS - 3200 RDAP CONTROL

RDAP - REAL DATA ANALYSIS AND PLAYBACK CONTROL

■ RECORDING CHARACTERISTICS

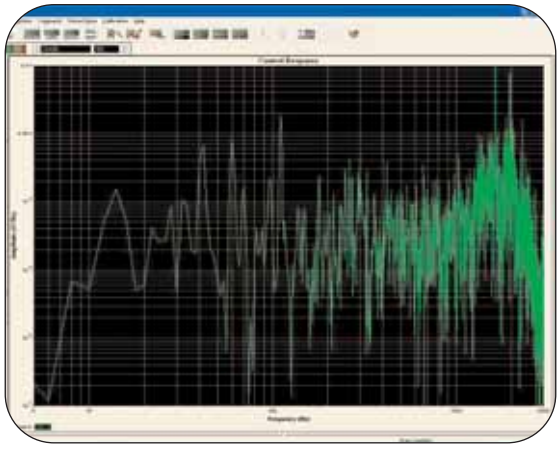
Frequency Range	1 Hz to 5 kHz
Sample Rate	200, 500, 1,000, 2,000, 5,000 or 10,000
Record Length	Only limited by the size of hard drive. Data records are stored in 680 MB blocks for easy transfer to CD-ROM.
Input Channels	Four standard. Eight optional.
Accelerometer Conditioning	ICP. Accelerometer power supply can operate from either an AC or DC power source.

■ CONTROL CHARACTERISTICS

Frequency range	1 Hz to 3 kHz
Signal	Continuous update of Real Time Input
Acceleration Level Protection	User selectable 0.1 to 100 G
Level Scheduling	Up to eight levels programmable in 0.001 to 1,000% with up to 99 hours, 59 minutes, 59 seconds per level in one second intervals. Looping up to 1,000 loops.

■ DISPLAY CHARACTERISTICS

Amplitude	User selectable log or linear
Frequency	User selectable log or linear
Bandwidth	User selectable over any bandwidth
Displays	Control, Real Time Input, Real Time Output, Monitor Response, Drive, Stored Data (any of the above)



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VCS - 3200 SINE-ON-RANDOM CONTROL

Sine-on-Random tests define a wide band background test combined with sine tones which are placed on that wide band test. The sine tone may be harmonically or non-harmonically related. Examples of Sine-on-Random test are reproducing automobile engine vibration and helicopter vibration.

■ RANDOM CHARACTERISTICS

Frequency Range	1 Hz to 3 kHz
Resolution	User selectable 100, 200, 400, 800, 1,600 or 3,200 lines
Signal	True random with Gaussian distribution. User selectable sigma clipping of 2 to 10 in 0.1 increments
Program Range	$1x10^{-10}$ to $1x10^{3}$ g^2/Hz
Averaging	Exponential averaging with variable decay
Demand Spectrum	Up to 120 breakpoints per profile

■ SINE CHARACTERISTICS

Frequency range	1 Hz to 3 kHz
Frequency resolution	Crystal controlled to 0.01%
Number of Tones	Up to sixteen (16). Tones may be Harmonics, Non-harmonics or Swept
Acceleration	0.02 g to 100 g peak
Demand	Up to 32 breakpoints in terms of Acceleration, Velocity and Displacement per tone
Sweep Direction	Up or down
Sweep Type	Linear or logarithmic
Sweep Rate	Logarithmic 0 to 99 oct./min or 0-99 dec./min
Linear	0.01 to 5,000 Hz per minute

■ DISPLAY CHARACTERISTICS

Amplitude	Log or linear
Frequency	User selectable log or linear
Bandwidth	User selectable over any bandwidth
Displays	Demand profile, Control response (background Random with indication of tone(s) Amplitude and Frequency), Monitor Response, Drive, Transmissibility, Stored data (any of the above)

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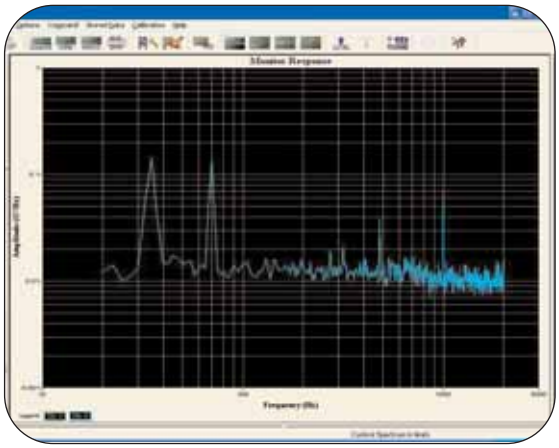

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VCS - 3200 RANDOM-ON-RANDOM CONTROL

Random-on-Random tests define a wide band background test combined with narrow band random steps which are placed on that wide band test. As the wide band background test outputs a standard random demand, the narrow bands typically sweep up and down within the frequency band of the demand. Examples of Random-on-Random test are reproducing tracked vehicle, propeller aircraft and turbine engine vibration.

■ BACKGROUND CHARACTERISTICS

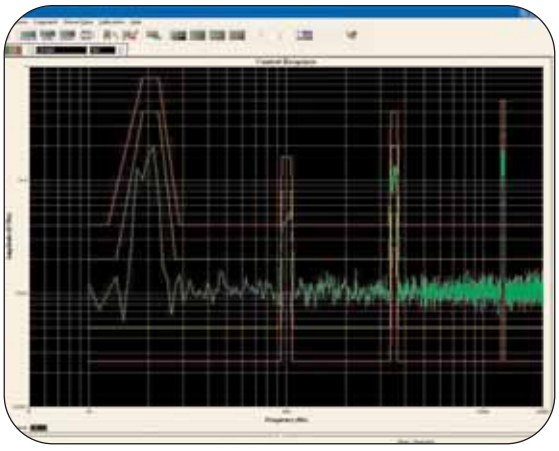
Frequency Range	1 Hz to 3 kHz
Resolution	User selectable 100, 200, 400, 800, 1,600 or 3,200 lines
Signal	True random with Gaussian distribution. User selectable sigma clipping of 2 to 10 in 0.1 increments
Program Range	$1x10^{-10}$ to $1x10^{3}$ g^2/Hz
Averaging	Exponential averaging with variable decay
Demand Spectrum	Up to 120 breakpoints per profile

■ NARROWBAND CHARACTERISTICS

Frequency Range	1 Hz to 3 kHz
Number of Bands	Up to sixteen (16). Bands may be Stationary or Swept
Program Range	$1x10^{-10}$ to $1x10^{3}$ g^2/Hz
Averaging	Exponential averging with variable decay
Sweep Type	Linear
Sweep Rate	0.1 to 1,900 minutes per sweep

■ DISPLAY CHARACTERISTICS

Amplitude	User selectable log or linear
Frequency	User selectable log or linear
Bandwidth	User selectable over any bandwidth
Displays	Demand profile, Control response (background Random with narrow band random steps), Monitor Response, Drive, Transmissibility, Stored data (any of the above)



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