



# CATS Sine On Random

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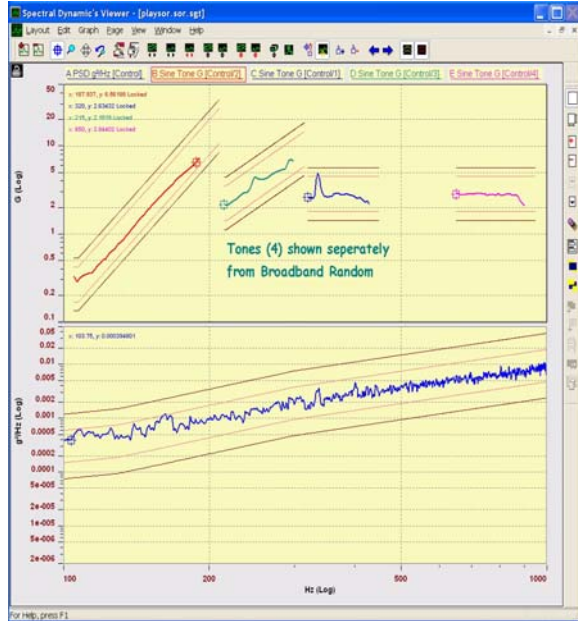


Figure 1

**CATS SOR starts** with the same high quality Random signal generation and control quality that CATS Random employs. Tones are added with the same quality of signal generation and sweep capability that CATS Sine employs.

**The feature that makes CATS SOR unique** is its ability to add or subtract the tones without harming the Random energy. Random is a Frequency Domain product. Sine is a Time Domain product. Simply summing the signals is incorrect methodology resulting in distortion. By employing Spectral Dynamics' unique tone insertion technique there is no distortion and no spectral hole is created to harm the distribution of the random energy. High performance distributed processing makes this technique possible for PUMA.

- Up to 10 independent tones on a broadband random
- Independent sweep profile for each tone (acceleration, velocity, displacement, and straight line segments)
- Independent sweep rate and direction for each tone
- Smooth, phase-continuous sweep (tone frequencies independent of broadband FFT lines)
- Time domain level extraction, independent control for each tone with automatic adjustment for tone sweep
- Independent display and storage of tone sweep amplitude vs. frequency
- Sweeping Tones DO NOT leave a "hole" as they change frequency i.e. the random energy remains correct

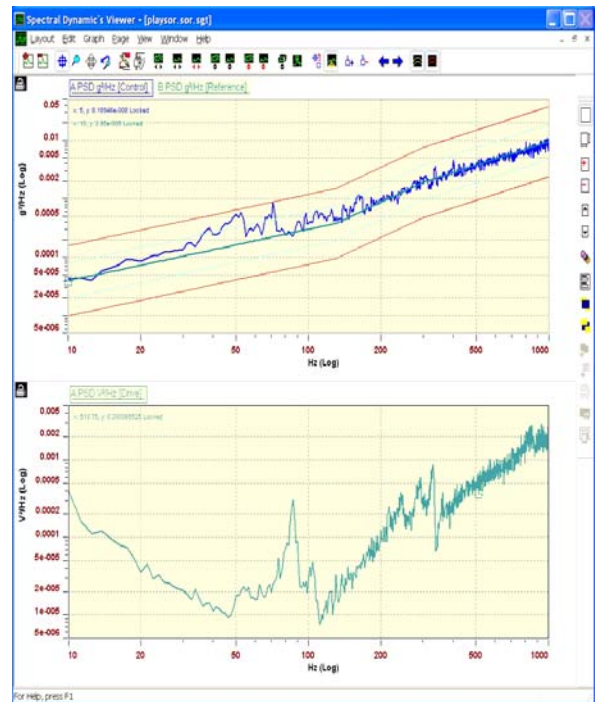


Figure 2

## CATS Sine on Random

## Technical Specifications

<b>Control Methods</b>		<b>Alarm/Abort spectral lines</b>	Number of lines, or percent of lines within user-specified range
Broadband control	Adaptive control algorithm controlling the shape of the drive spectrum and overall RMS level optimizes both control speed and stability	<b>Control signal loss</b>	Standard (programmed abort when control signal drops to within 3 dB of measured noise floor), low, or off
Tone (sine) control	Smooth, phase-continuous sweep (tone frequencies independent of broadband FFT lines); Time domain level extraction, independent control for each tone with automatic adjustment for tone sweep, true continuously swept sine tones (no stepping)	<b>Drive signal clipping</b>	2 to 20 sigma
Drive signal generation	Digital drive signal generation from broadband and tone components, tones added after randomization to assure pure sine waves	<b>Startup/shutdown rates</b>	Independently selectable, 0.1 dB/sec to 999 dB/sec
<b>Input/Output</b>		<b>Channel Setup</b>	
Input channels	4 to 32, dependent on hardware subsystem	Channel type	Control, measurement, inactive
Input/output dynamic range	>92 dB	Sensitivity	0.01 to 9,999 mV/g or mV/(m/s <sup>2</sup> ) EU for Measurement Channels
<b>Reference Spectrum</b>		ICP power	On/off
Broadband definition	Easily defined by up to 500 frequency break points/slopes	Coupling	AC or DC
Frequency range	50,80,100, 200, 400,500,800,1000, 2000, 5000 Hz	Channel loop check	Enabled, disabled
Frequency resolution	(Broadband) 100, 200, 400, 800 lines	Channel label	Up to 8 characters for each channel
Reference import	Import broadband reference profile from PUMA data file (SDD) or Universal File Format (UFF); cut and paste from spreadsheets	Transducer serial number	Up to 10 characters for each channel
Tone definition	Arbitrary frequencies created by high precision sine generation algorithm; user-defined sweep profile, sweep rate, start frequency, direction	Transducer Database	Table Driven Archival Database
Tone sweep profile	Displacement, velocity, acceleration, log-log line, lin-lin line	Control channel weighting	Individuality defined, -20 to 6 dB
Tone points per sweep	Up to 1600	RMS abort	Individually defined, 0 to 999 grms or (m/s <sup>2</sup> )rms
Number	Up to 10 tones, including harmonics	Base Engineering Units	Label(EU), Conversion(EU/Transducer Units)
Sweep	Linear or log; user defined sweep start frequency, sweep end frequency and sweep rate; independent for each tone	Engineering Units	Integrated (Label and Scale Factor), Double Integrated(Label and Scale Factor), Differentiated (Label and Scale Factor), Double Differentiated (Label and Scale Factor)
Initial sweep direction	Up, down, or stationary	Calculations	
Linear sweep rate	0 to 30 Hz/sec	<b>On-Line Status Monitors</b>	
Log sweep rate	0 to 5 oct/min	Test status	Elapsed and remaining test time
Units	g-in/s-in; g-m/s-mm; m/s <sup>2</sup> -m/s-mm	Level status	Schedule level number, elapsed and remaining level time
<b>Control Parameters</b>		Control status	Test dB level, test and drive RMS level
Mode of operation	Manual, automatic, automatic only	Channel status	RMS levels for all active channels
Test duration	User defined, maximum 9999:59:59 (hhh:mm:ss)	Tone status	Tone status for each tone: frequency, sweep direction, sweeps completed
Degrees of freedom	User defined, minimum 8. maximum 30000	Message log	Records all test operations, including operator commands, and reports on alarm or error conditions
Number of control channels	1 to all available channels	<b>On-Line Controls</b>	
Multi-channel control strategy	Average	Start/Abort test	Smoothly initiates or terminates test
Tone Extraction	Control Channel or All Measurement Channels	Resume test	Restart test and complete remaining time
<b>Startup Parameters</b>		Test Mode	Manual or automatic
Initial test level	User-selectable, -99 dB to 0 dB	Drive update	Update of drive spectrum on or off
Time at initial level	Off, 0 to 99 control loops	Broadband level control	Step up or step down (manual mode)
Level increment	1 to 99 dB	Tone control	Operator control of tones during test (in manual mode only), including on/off, sweep direction, sweep rate
Time to full level	0 to 100000 seconds	Pause	Lower drive level to -90 dB, hold until resume
<b>Test Automation Features</b>		<b>On-line Analysis</b>	
Level scheduling	User-defined level, time at level, transition time to reach the level	Real-time displays	Spectra for all available channels may be simultaneously displayed during the test
Pre-schedule time	User-defined time at full level prior to level schedule start	Spectra analyzed	PSD, auto-spectrum, linear-spectrum, frequency response function (magnitude/phase or real/imaginary), coherence,
Test scheduling	User-defined sequence of independent tests can be scheduled to run automatically	Tone displays	Independent display of entire sine sweep with tone tolerances
Remote Communication Interface	Supported, enables integration with environmental chamber controllers	Averaging control	User-defined DOF exponential or linear averaging
Print Automation	Ability to create reports Automatically with Customized displays	Real-time/stored data	Simultaneous display and overlay of spectra or time histories for real-time data and any stored data
<b>Safety Features</b>		<b>Data Storage</b>	
Shaker limits	Pretest verification that broadband spectrum dynamic limits are within shaker operational limits (acceleration, velocity, displacement and voltage)	Setup options	Automatic storage every 1 to 999 seconds, save on level change, save on alarm, save on external command, save every sweep, manual save
Loop check max. drive signal	User-selectable, 1 to 5000 mV RMS	Playback	Automatic play of entire test data file, with adjustable display update delay; manual selection
Alarm/Abort RMS	RMS acceleration, specified in dB or absolute level	Run message log	Text file records all system status messages displayed during test run



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