CATS Sine Control

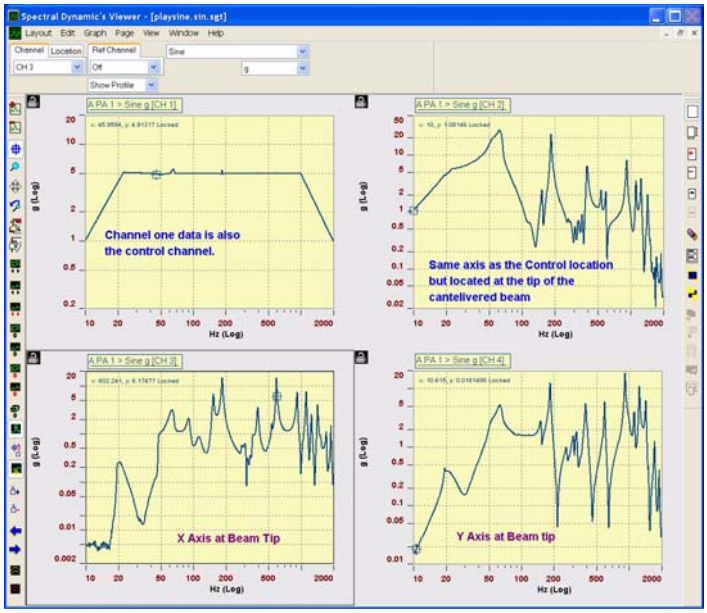

Figure 1

Sine testing can be done two ways:

1. Overall test level control, where we do not care about what frequency causes the response energy.
2. Fundamental Control, which requires Tracking Filters. See Figure 2 below

Nearly all tests presume Tracking Filters are being employed. PUMA provides True analog quality tracking filters created in DSP with the same Sine-Co-Sine Heterodyne method SD patented in 1961, If you must test to MilStd expectations, you must use tracking filters. FFT based processes DO NOT yield the same accuracy that Digital Tracking Filters offer.

Signal Generation hardware matters. PUMA generates harmonic free analog quality Sine signals that permit remarkable resonance control and accuracy.

NOT generating Harmonic content, means the power amplifier WON'T receive high frequency energy which it CANNOT reproduce, thereby removing another worry from the Test Professional's mind.

- Analog quality sine signal generation
- Multi-channel digital tracking filters with variable fixed and proportional bandwidths
- Digital re-sampling provides true proportional bandwidth tracking filters
- Sweep range from 0.1 to 10,000 Hz
- Optional resonance search and phase-tracked dwell
- Frequency Response Function (FRF) measurements for all active channels
- Independent limit profiles for each active measurement channel

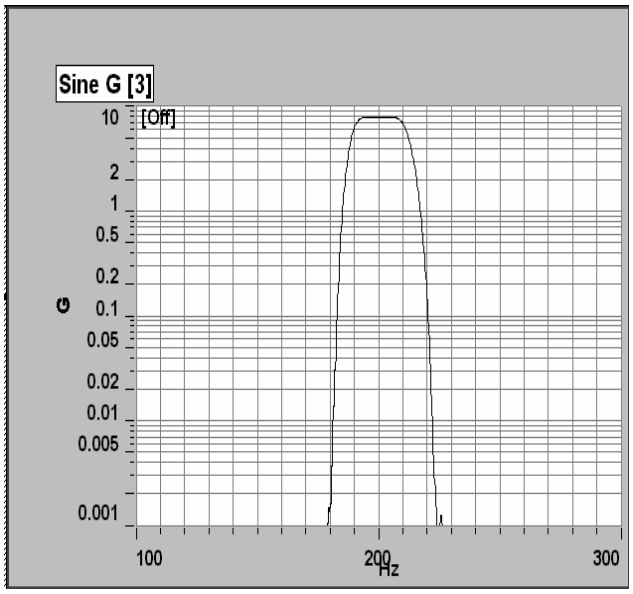

Figure 2

CATS™ Computer Aided Test Suite

Graphics so POWERFUL, the user interface can be simple

SPECTRAL DYNAMICS

Control Methods	
Control loop	True analog-quality sine sweep with a double precision integrated phase algorithm for low distortion
Control Performance	
Dynamic range	Greater than 80 dB with 0.05 dB level step control over the full range
Output signal	Analog-quality digital sine generation, using a double precision integrated phase algorithm for low distortion
Level accuracy	Control to within ± 1 dB at a sweep rate of1 oct/min through a 600 Hz resonance of a linear system with a Q of 70 with an internal 20% proportional tracking filter Sweep frequency resolution±0.5% of the drive frequency
Loop time	Less than 5 msec for single channel control
Compression rate	Up to 3,500 dB/sec with unconditionally stable feedback control loop
Harmonic distortion	< -75 dB at full output
Reference Profile	
Definition	Up to 500 frequency segments
Segment types	Constant displacement, velocity, acceleration, and straight line acceleration (linear or logarithmic)
Crossover frequencies	Automatically calculated to avoid segment boundary discontinuities
Alarm and abort limits	Independent positive and negative alarm and abort margins
Sweep range	User-defined sweep range from 1 to 5000 Hz; and 0.01 to 10000 Hz (Premier) optional
Sweep resolution	User-defined resolution of 450 to 800 points per sweep; 450 to 2400 points per sweep (Premier) optional
Spectrum dynamic limits	Acceleration range, maximum or minimum acceleration, maximum velocity and maximum displacement
Limit Profiles (optional)	
Definition	Up to 500 frequency segments
Segment types	Constant displacement, velocity, acceleration, and straight line acceleration (linear or logarithmic)
Crossover frequencies	Automatically calculated to avoid segment boundary discontinuities
Number	Up to the number of active channels minus one (Premier)
Control Parameters	
Mode of operation	Manual, automatic
Test duration	Maximum 99,999 sweeps or 9999:59:59 (hhhh:mm:ss); unlimited test
Measurement processing	RMS, or tracking filter processing for all channels in parallel; processing type individually selectable for each channel
Tracking filter types	Proportional to drive frequency, 1 to 200% and fixed bandwidth, 1 Hz to 1,000Hz
Transducer types	Control based on acceleration, velocity, displacement (transducer with programmable transition frequency band)
Number of control channels	1 to all available channels, max 16
Multi-channel control strategy	RMS, arithmetic average, min, max
Abort channels	Abort test when user-defined level exceeded
Compression	5% to 100%
Units	m/s^2 - m/s - mm; g – in/sec - in; g - m/s – mm
Box Tolerance Enable	Alarm & Abort width set 0 to 100%
Startup/Shutdown Rate	1 to 99 dB/sec
Sweep Parameters	
Sweep mode	Linear, logarithmic
Sweep duration	User-defined, maximum 999:59:59 (hhh:mm:ss)
Number of sweeps	0.01 to 100,000
Sweep rate-linear	0.00003 to 300 Hz/sec (0.0018 to 18,000Hz/min)
Sweep rate-logarithmic	0.1 to 800 Oct/min
Initial sweep direction	Up, down
Safety Features	
Shaker limits	Pretest verification that spectrum dynamic limits are within shaker operational limits (acceleration, velocity, displacement and voltage)
Loop check max. drive	User-selectable, 0 to 5,000 mV RMS
Control signal loss	Continuous automatic detection
Manual abort	Graphical and keyboard abort buttons
Maximum drive signal	0.0001 to 12 V peak
Startup/shutdown rates	Independently selectable, 1 to 99 dB/sec
Test Automation	
Test scheduling	User-defined sequence of up to 500 independent tests run automatically
Sweep rate table	Up to 50 sweep rate vs. frequency segments
Compression table	Up to 50 compression speed vs. frequency segments
Schedule cycles	1 to 100
Print Automation	Ability to create reports Automatically with Customized displays
Base Engineering Units	Label(EU), Conversion(EU/Transducer Units)
Engineering Units Calculations	Integrated (Label and Scale Factor), Double Integrated(Label and Scale Factor), Differentiated (Label and Scale Factor), Double Differentiated (Label and Scale Factor)
Channel Setup	
Channel type	Control, measurement, reference, limit, abort, inactive
Sensitivity	0.001 to 999,999 mV/g or mV/(m/s^2) mm; EU for Measurement Channels
Channel loop check	Enabled, disabled
Channel label	Up to 20 characters for each channel
Transducer serial number	Up to 10 characters for each channel
Transducer Database	Table Driven Archival Database
On-Line Test Analysis	
Display functions	Control, drive, measurement channel 1 to 32, frequency response function (magnitude/phase or real/imaginary
Cursors	X and Y value readout, peak search, trace tagging, multi-window looked positioning
Scaling of display	Log/linear, auto-scaled/fixed
Real-time/stored data	Simultaneous display and overlay of real-time data and any stored data
Passive Sine Analysis	Same capability as test operations w/o output generation
Resonance Search & Dwell (optional)	
Dwell modes	Fixed frequency, phase tracked(auto/manual), Continuous (w/reset option)
Search parameters	Max no. of resonances, hysteresis, minimum Q value
Q Search	Peak Ratio or –3dB points
Smoothing	Low, Medium, High
Search Channel	Any active channel
Phase Reference Channel	Any active channel
Resonance calculation	Resonance frequency, Q, phase, level
Dwell table parameters	Duration, start frequency, dwell frequency, end frequency, dwell level and phase, alarm limit, abort limit
Dwell level type	Acceleration, velocity, displacement
Data Storage	
Setup options	Sweep Increment, first sweep, last sweep
Playback	Scan through the entire test data file, with adjustable delay and Tagging
Documentation	
Test summary	Fully documented post-test summary, easily printed or incorporated into any document using standard word processing software
Run message log	Text file records all system status messages displayed during test run
Safety Features	
Shaker limits	Pretest verification that spectrum dynamic limits are within shaker operational limits (acceleration, velocity, displacement and voltage)
Loop check max. drive	User-selectable, 0 to 5,000 mV RMS
Control signal loss	Continuous automatic detection
Manual abort	Graphical and keyboard abort buttons
Maximum drive signal	0.0001 to 12 V peak
Startup/shutdown rates	Independently selectable, 1 to 99 dB/sec

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