



CATS Random Control

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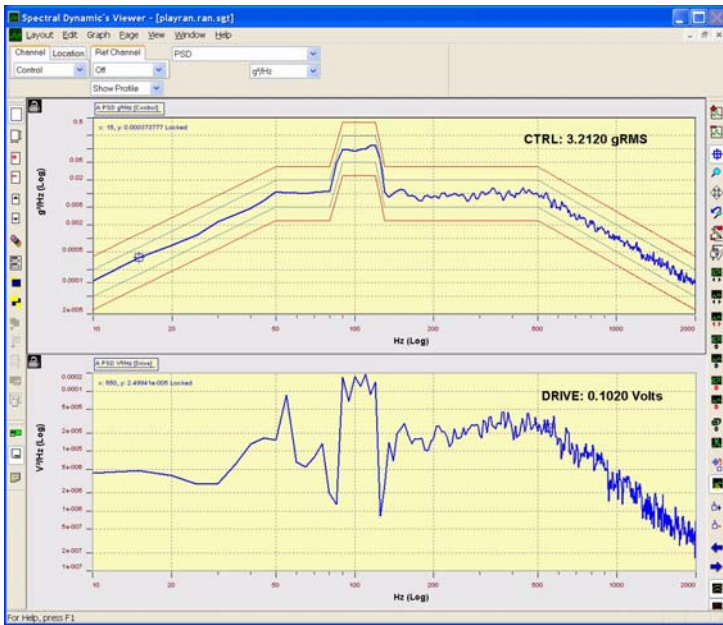


Figure 1

The single most important issue in Random testing after accuracy is correct random energy. This means the excitation energy must be, not only random in frequency, amplitude, and phase but constantly changing as well. Incorrect random energy causes the test to fail to conform to industry test standards. With PUMA you are guaranteed your excitation is the best Random available today. The accepted specification for amplitude variability is described as: 120 Degrees of Freedom (DOF) for control and WILL vary at least +/- 1dB. It does not say it MAY. The statistical standard for Random says it WILL vary +/- 1dB, at least.

ADAPTIVE CONTROL (standard on PUMA) – is a tool that permits PUMA to “see the future” and adjust the control speed in real time to the next measure of error that is about to happen. This ‘look ahead’ feature allows the PUMA to control problems lesser systems don’t even understand.

- Continuous Control to a PSD rather than “Once per Test” control to the system ID
- One Click Data Reporting
- Choose independent limit profiles for each active measurement channel
- Determine Frequency Response Function (FRF) measurements for selected channels
- Easy integration with chambers and other test instrumentation
- Exceptionally rapid correction for resonant frequencies – provides excellent protection against over test

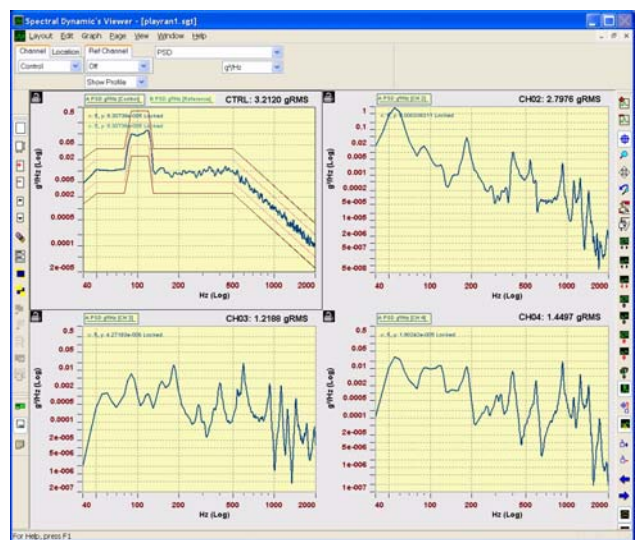


Figure 2

Control Methods		Safety Features	
Control method	Patented adaptive control algorithm with separate controls loops dedicated to controlling the shape of the drive spectrum and overall RMS level optimizes both control speed and stability	Shaker limits	Pretest verification that spectrum dynamic limits are within shaker operational limits (acceleration, velocity displacement and voltage) User-selectable, 0 to 5000 mV RMS
Input/Output		Loop check max. drive signal	RMS acceleration limit in dB or Absolute units
Input channels	4 to 32; all simultaneously sampled	Alarm/Abort RMS	Number of lines, or percent of lines within user-specified range
Input dynamic range	>94dB with auto-ranging	Alarm/Abort spectral lines	User-defined profile for any non-control channel with up to 500 breakpoints each with + and - dB abort tolerances
Output dynamics range	>90dB	Channel abort profile	Aborts test if any channel RMS threshold exceeded
Control Performance		Channel RMS abort	Automatic detection with smooth drive shutdown
Dynamic range	> 90 dB	Control signal loss	Graphical and keyboard abort buttons
Output	True Gaussian noise	Manual abort	Rack or desktop mountable external abort circuit with programmed shutdown (option)
Equalization accuracy	Control to within ± 1 dB for a flat reference spectrum with 120 DOF 90% statistical confidence	External kill-switch	2 to 20 sigma
Loop time	With 4 control channels, 4 new data frames per loop, 2000 Hz, 200 lines 120 DOF, less than 0.5 seconds	Drive signal clipping	Independently selectable 1 to 50 dB/sec
Re-equalization rate	For an instantaneous change of 6 dB in all control spectrum lines, the spectrum RMS is re-equalized to within ± 1 dB within 8 control loops, for a flat reference with 4 control channels, 120 DOF	Startup/shutdown rates	
Reference Spectrum		Channel Setup	
Definition	Easily defined by a combination of up to 500 amplitude/frequency breakpoints, (PSD value/frequency value) and slopes (dB/octave values)	Channel type	Control, measurement, limit, abort, inactive
Spectral alarm/abort limits	Independent positive and negative alarm and abort tolerances for each breakpoint	Sensitivity	0.001 to 9,999 mV/g or mV/(m/s ²)
Frequency range (DC to)	50, 80, 100, 200, 400, 500, 800, 1000, 2000, 4000, 5000 Hz; 10000 Hz and 20000 Hz (Premier) optional	ICP power	On/off
Frequency resolution	100, 200, 400 and 800 lines; 1600 and 3200 lines (Premier) optional	Coupling	AC or DC
Units	g-in/s-in; g-m/s-mm; m/s ² -m/s-mm EU for Measurement Channels)	Channel loop check	Enabled, disabled
Import reference	Copy & paste from spreadsheet program; optional: import from Universal File Format (Intermediate)	Channel label	Up to 20 characters for each channel
Limit Profiles (optional)		Transducer serial number	Up to 10 characters for each channel
Definition	Easily defined by a combination of up to 500 amplitude/frequency breakpoints, (PSD value/frequency value) and slopes (dB/octave values)	Transducer Database	Table Driven Archival Database
Number	Up to the number of active channels minus 1 (Premier)	Control channel weighting	Individuality defined, 20 to 6 dB
Control Parameters		RMS abort	Individuality defined, 0 to 999 grms or (m/s ²)rms
Number of control channels	1 to all available channels	Base Engineering Units	Label(EU), Conversion (EU/Transducer Unit)
Multi-channel control strategy	Average, maximum, minimum; user-defined weighting for each control channel	Engineering Units	Integrated(Label and Scale), Double Integrated(Label and Scale), Differentiated(Label and Scale), Double Differentiated (Label and Scale)
Mode of operation	Manual, automatic, automatic only	Calculations	
Test duration	User-defined, maximum 9999:59:59 (hhhh:mm:ss)	On-Line Status Monitors	
Degrees of freedom	User-defined, minimum 8, maximum 30000	Test status	Elapsed and remaining test time
Output level control	Automatic, manual	Level status	Schedule level number, elapsed and remaining level time
Overlap Processing	None, 25%, 50%	Control status	Test dB level, drive RMS level, Control Level GRMS
Startup Parameters		Channel status	RMS levels for all active channels
Initial test level	User-selectable; -80 to 0 dB	Message log	Records all test operations, including operator commands, and reports on alarm or error conditions
Time at initial level	User-defined number of loops	On-Line Controls	
Level increment	1 to 20 dB	Start/Abort test	Smoothly initiates or terminates test
Pre-stored drive startup	User-selectable (No/Yes/Yes with verify before start)	Resume test	Restart test and complete remaining time
Test Automation Features		Test Mode	Manual or automatic
Level scheduling	Up to 500 test levels; each level with programmable time at level, time between levels, abort/ignore action	Drive update	Update of drive spectrum on or off
Test scheduling	Up to 500 tests run automatically; each test with programmable number of cycles, external start (requires Remote Control Interface), and delay time before starting next test (option)	Level	Step up or step down
Print Automation	Ability to create reports automatically with customizable displays	Pause	Lower drive level to -90 dB, hold until resume
		On-line Analysis	
		Real-time displays	Spectra or time histories for all available channels may be simultaneously displayed during the test
		Spectra analyzed	PSD, auto-spectrum, linear-spectrum, transmissibility, frequency response function (magnitude/phase or real/imaginary), coherence,
		Averaging control	User-selectable; DOF exponential or linear averaging
		Real-time/stored data	Simultaneous display and overlay of spectra or time histories for real-time data and any stored data
		Data Storage	
		Setup options	Automatic storage every 1 to 10,000 seconds, save on level change, save on alarm, save on external command, manual save
		Playback	Automatic play of entire test data file, with adjustable display update delay; manual selection
		Run message log	Text file records all system status messages displayed during test run



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D Y N A M I C S

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