# CATS Random on Random

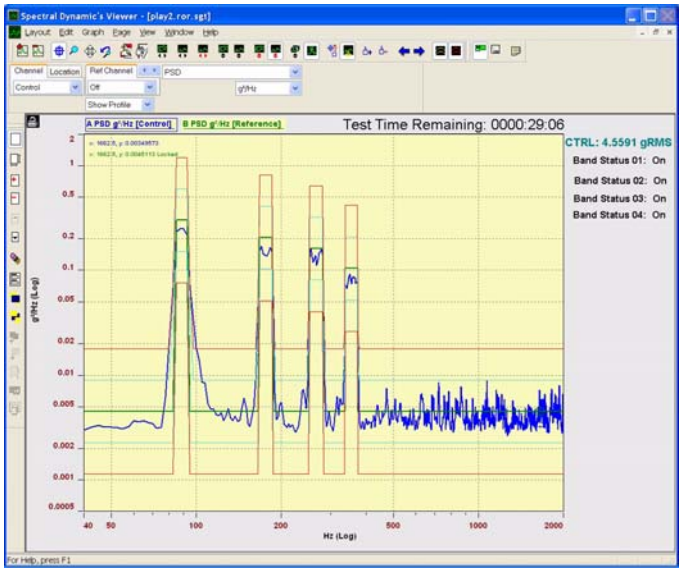


Figure 1

**CATS Random on Random** simulates complex narrowband random on broadband random vibration environments. Narrow-bands may be swept or stationary. This vibration environment is typically seen in reciprocating equipment, repetitive impacts from tracked vehicles, and aircraft gunfire vibration.

**CATS Random** is the seed for CATS ROR. Your test is assured of true random control with patented Adaptive Control capability, which is enhanced, with the addition of narrowband generation.

The ability to switch the NB on/off as well as sweep in the frequency range, WITHOUT causing "holes" in the broadband, is vital to test accuracy.

- Up to 10 independent Narrow-bands on a broadband random
- Independent sweep profile for each narrowband (acceleration $g^2$/Hz vs. frequency breakpoints)
- Independent sweep rate and direction (up, down, stationary) for each narrowband
- Manual mode control of narrowband components (on/off, sweep rate, sweep direction)
- Test and level scheduling
- Powerful Adaptive Control permits the PUMA to adjust to non-linear conditions dynamically

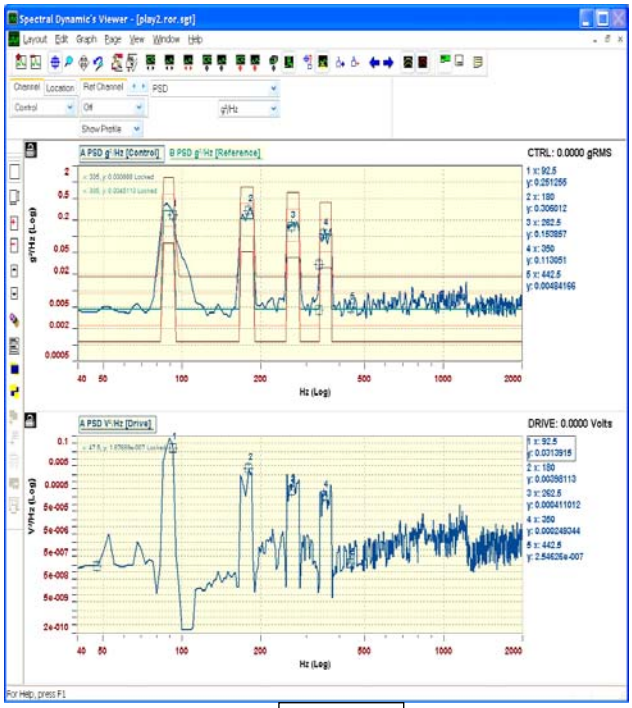


Figure 2

CATS™ Computer Aided Test Suite

**Graphics so POWERFUL, the user interface can be simple**

SPECTRAL DYNAMICS

| | |
|---|---|
| **Control Methods** | |
| Broadband control | Adaptive control algorithm controlling the shape of the drive spectrum and overall RMS level optimizes both control speed and stability |
| Narrowband control | Frequency domain level extraction, independent control for each narrowband with automatic adjustment for narrowband sweep and resolution |
| Drive signal generation | Digital drive signal generation from broadband and tone components, patented randomization algorithm for broadband and narrowband components |
| **Input/Output** | |
| Input channels | 4 to 32, dependent on hardware subsystem |
| Input/output dynamic range | >92 dB |
| **Reference Spectrum** | |
| Broadband definition | Easily defined by up to 500 frequency break points/slopes |
| Frequency range | 50, 80, 100, 200, 400, 500, 800,1000, 2000, 4000, 5000 Hz |
| Frequency resolution | (Broadband) 100, 200, 400, 800 lines |
| Reference import | Import broadband reference profile from PUMA data file (SDD) or Universal File Format (UFF); cut and paste from spreadsheets |
| Narrowband definition | User-defined bandwidth, sweep profile, composition, sweep rate |
| Number | Up to 10 narrowbands |
| Sweep | Linear or log; user defined sweep start frequency, sweep end frequency and sweep rate; independent for each narrowband |
| Initial sweep direction | Up, down, or stationary |
| Linear sweep rate | 0 to 30 Hz/sec |
| Log sweep rate | 0 to 5 oct/min |
| Units | g-in/s-in; g-m/s-mm; $m/s^2$-m/s-mm |
| **Control Parameters** | |
| Mode of operation | Manual, automatic, automatic only |
| Test duration | User defined, maximum 9999:59:59 (hhh:mm:ss) |
| Degrees of freedom | User defined, minimum 8. maximum 30000 |
| Number of control channels | 1 to all available channels |
| Multi-channel control strategy | Average |
| **Startup Parameters** | |
| Initial test level | User-selectable, -99 dB to 0 dB |
| Time at initial level | Off, 0 to 99 control loops |
| Level increment | 1 to 99 dB |
| Time to full level | 0 to 100000 seconds |
| **Test Automation Features** | |
| Level scheduling | User-defined level, time at level, transition time to reach the level |
| Pre-schedule time | User-defined time at full level prior to level schedule start |
| Test scheduling | User-defined sequence of independent tests can be scheduled to run automatically |
| Remote Communication Interface | Supported, enables integration with environmental chamber controllers |
| Print Automation | Ability to create reports automatically with customizable displays |
| **Safety Features** | |
| Shaker limits | Pretest verification that broadband spectrum dynamic limits are within shaker operational limits (acceleration, velocity, displacement and voltage) |
| Loop check max. drive signal | User-selectable, 1 to 5000 mV RMS |
| Alarm/Abort RMS | RMS acceleration, specified in dB or absolute level |
| Alarm/Abort spectral lines | Number of lines, or percent of lines within user-specified range |
| Control signal loss | Standard (programmed abort when control signal drops to within 3 dB of measured noise floor), low, or off |
| Drive signal clipping | 2 to 20 sigma |
| Startup/shutdown rates | Independently selectable, 0.1 dB/sec to 999 dB/sec |
| **Channel Setup** | |
| Channel type | Control, measurement, inactive |
| Sensitivity | 0.01 to 9,999 mV/g or mV/($m/s^2$) (EU for measurement channels) |
| ICP power | On/off |
| Coupling | AC or DC |
| Channel loop check | Enabled, disabled |
| Channel label | Up to 8 characters for each channel |
| Transducer serial number | Up to 10 characters for each channel |
| Transducer Database | Table Driven Archival Database |
| Control channel weighting | Individuality defined, -20 to 6 dB |
| RMS abort | Individually defined, 0 to 999 grms or ($m/s^2$)rms |
| 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) |
| **On-Line Status Monitors** | |
| Test status | Elapsed and remaining test time |
| Level status | Schedule level number, elapsed and remaining level time |
| Control status | Test dB level, test and drive RMS level |
| Channel status | RMS levels for all active channels |
| Component status | Status for each narrowband: center frequency, sweep direction, sweeps completed |
| Message log | Records all test operations, including operator commands, and reports on alarm or error conditions |
| **On-Line Controls** | |
| Start/Abort test | Smoothly initiates or terminates test |
| Resume test | Restart test and complete remaining time |
| Test Mode | Manual or automatic |
| Drive update | Update of drive spectrum on or off |
| Broadband level control | Step up or step down (manual mode) |
| Narrowband control | Operator control of narrowbands during test (in manual mode only), including on/off, sweep direction, sweep rate |
| Pause | Lower drive level to -90 dB, hold until resume |
| **On-line Analysis** | |
| Real-time displays | Spectra for all available channels may be simultaneously displayed during the test |
| Spectra analyzed | PSD, auto-spectrum, linear-spectrum, frequency response function (magnitude/phase or real/imaginary), coherence, |
| Averaging control | User-defined 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 999 seconds, save on level change, save on alarm, save on external command, save every sweep, 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 |

S P E C T R A L
D Y N A M I C S

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