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Results of Acoustic Tests on the Team CUBE

Description of the Test Set-Up

An insulated, 5-sided, plywood box approximately 60 inches on each side was suspended over the top of the Team CUBE Model 3-LS. The bottom side of the box was open to permit the top surface of the CUBE to be enclosed. No effort was made to seal around the moving portion of the CUBE.

Inside the box, a Simpson Model 884-2 Sound Level Meter was positioned at an approximate height of 33 inches above the top surface of the CUBE. The sound level meter was connected to a Dactron SpectraBook spectrum analyzer. The sound level meter calibration was verified using a Simpson Model 890-2 Sound Level Calibrator.

Four measurements were taken:

1. Ambient noise with all noise sources switched off.
2. SPL with CUBE energized (hydraulics on, CUBE in operating position, no vibratory motion).
3. SPL with time history controlled vibration in the vertical direction limited to a 50 Hz bandwidth.
4. SPL with time history controlled vibration in the vertical direction up to 250 Hz.

Test Results

The following charts illustrate the measured spectra and over-all SPL (OASPL) of the noise at the microphone location inside the insulated box.

Figure 1: Spectrum of noise measured with all noise sources switched off. OASPL = 40 dBA.

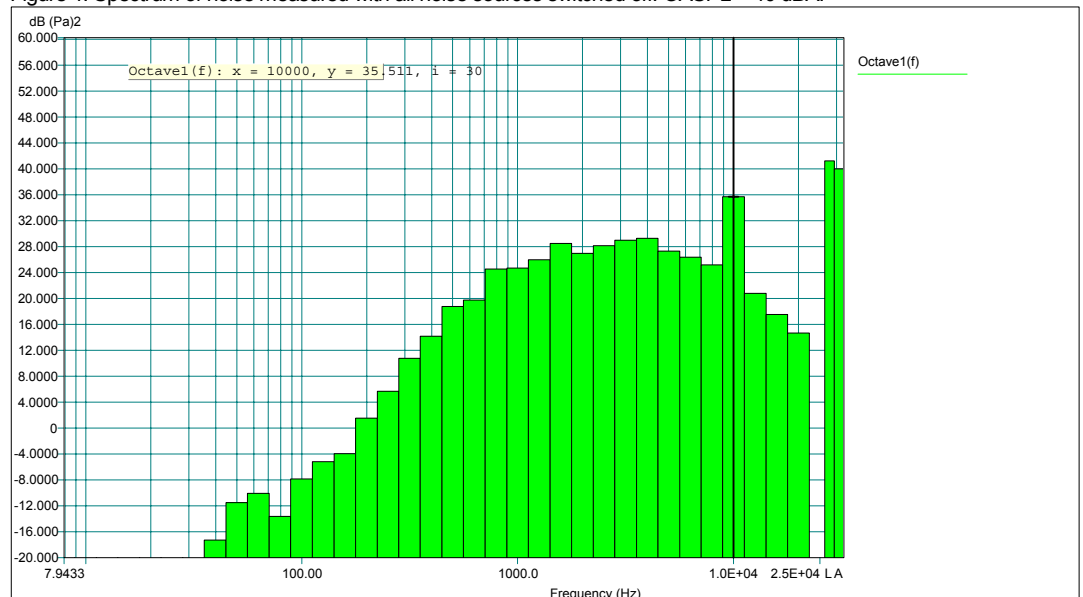


Figure 2: Spectrum of noise measured with CUBE energized and no vibratory motion. OASPL = 41 dBA.

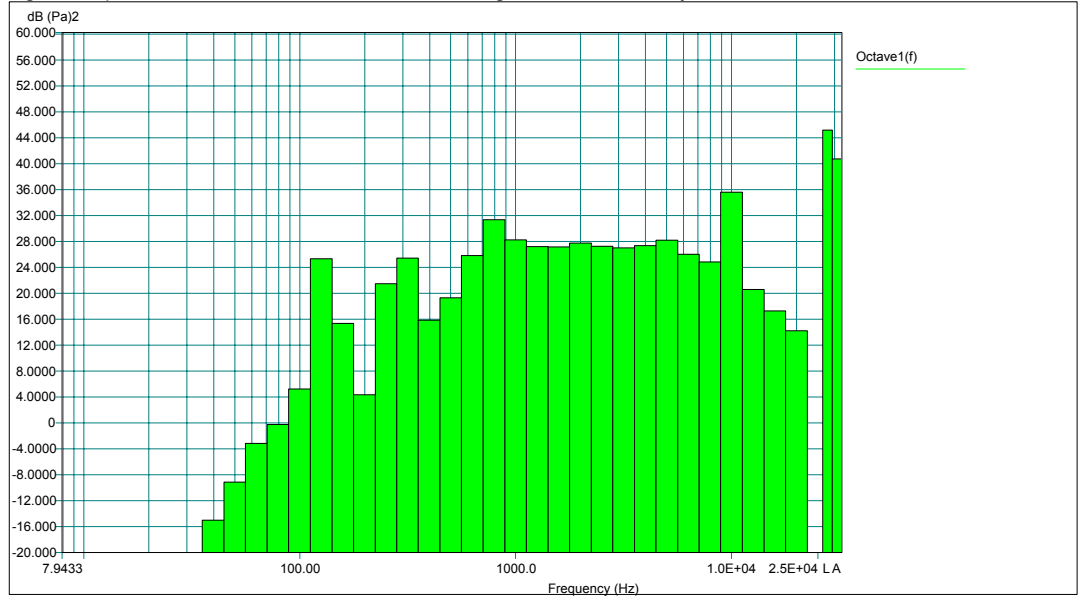


Figure 3: Spectrum of noise measured with CUBE energized and vibration band limited to 50 Hz and below. OASPL = 43 dBA.

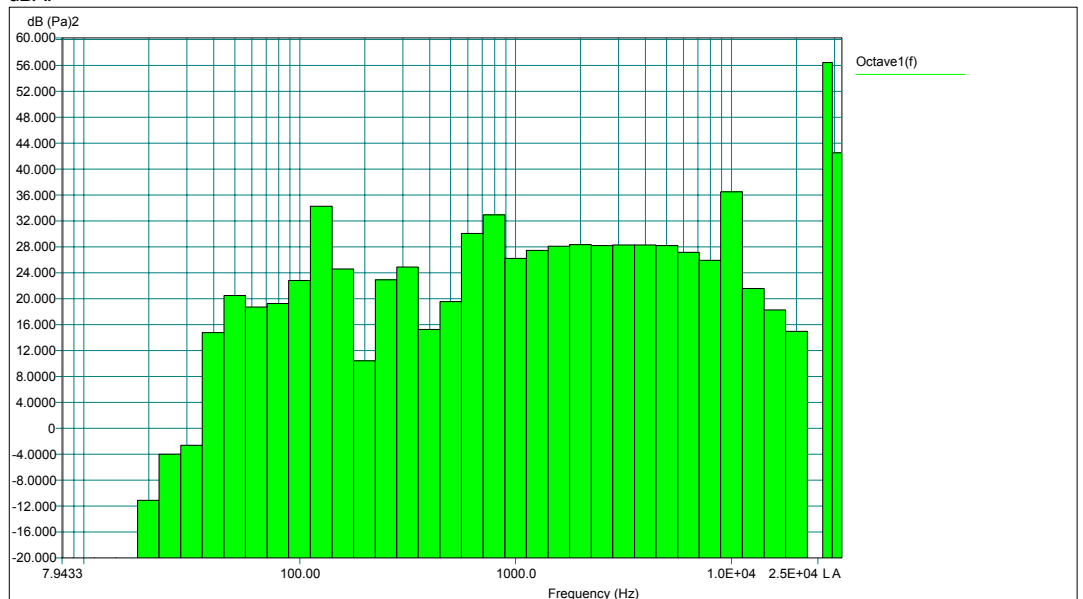
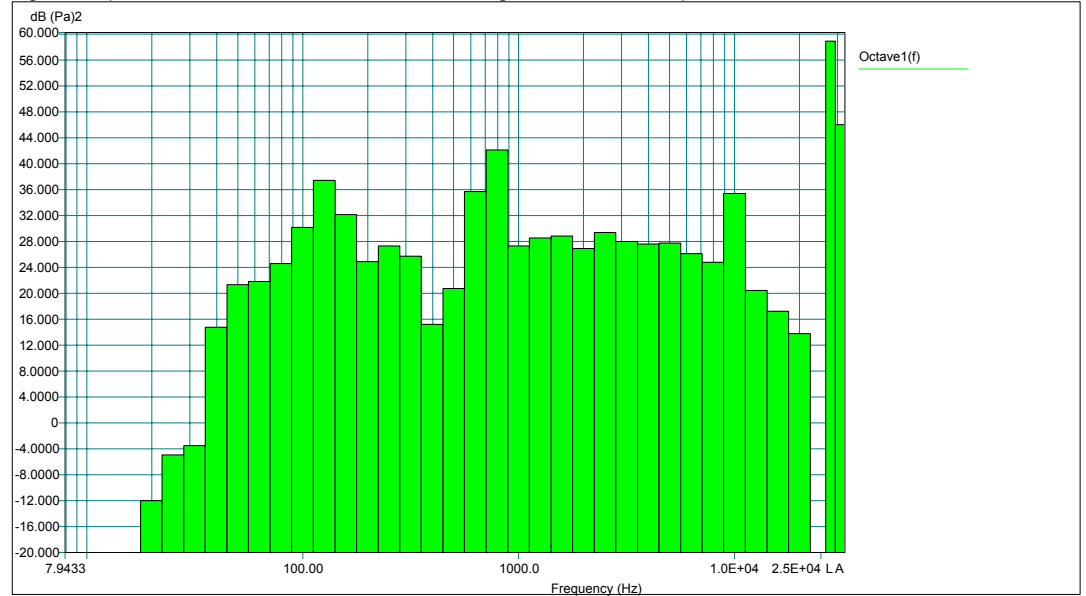


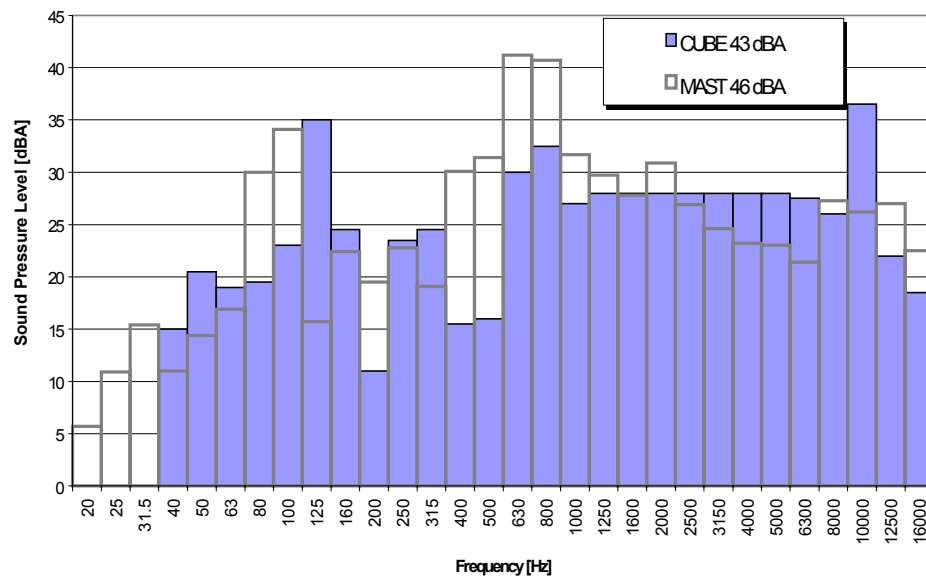
Figure 4: Spectrum of noise measured with CUBE energized and vibration up to 250 Hz. OASPL = 46 dBA.



Comparison to MAST

Overlaying measurements from a MAST rig on top of the results from Figure 3 results in Figure 5 below. Figure 3 for the CUBE was used to match as closely as possible the frequency bandwidth of the CUBE and MAST systems. Note, however, that the OASPL from Figure 4, wherein the CUBE was operating over a 250 Hz bandwidth, is not significantly different from that of Figure 3. So, there is no acoustic penalty for additional bandwidth.

Figure 4: Spectrum of noise measured with CUBE energized and vibration up to 250 Hz. OASPL = 46 dBA.



Observations on the Test Results

- All measurements were taken by non-experts using available (and relatively simple) instrumentation.
- The 35dBA noise at 10 kHz is unexplained. It appears at the same level on all of the sound spectra. It may be an artifact of the noise measurement device. Nonetheless, the reported value is used in the calculation of the OASPL.
- There is little change in the OASPL with the CUBE energized versus not energized. This indicates that the approximately 5-dBA increase in OASPL with vibration active is due primarily to the vibratory motion.
- The vibration was limited to the vertical axis.
- The test results are intended for comparative purposes and do not represent any guarantee of performance.