SOUND&VISION

from “Seismic Subwoofers” in the September 2004 ***S&V***.

In the Lab

I measured the direct-field frequency response of each subwoofer in the optimal corner of my 7,500-cubic-foot room with its level control turned fully up and its crossover set for maximum bandwidth. The results are given under the sound-pressure level (SPL) graphs on the facing page. In a smaller room, you can expect better extension by 2 to 3 Hz and 2 to 3 dB higher SPL.

Next I measured the peak SPL each sub could produce without its distortion going past 10%, using a ramped 6.5-cycle tone burst at ⅓-octave frequencies over the sub’s bandwidth. The main microphone was placed at an optimal listening seat 2 meters away, and a distortion-sensing microphone was placed close to the speaker. The SPL scores were then averaged over the range of 25 to 62 Hz, where most of the bass in movie soundtracks resides (32 to 62 Hz for the Earthquake sub because it couldn’t play down to 25 Hz).

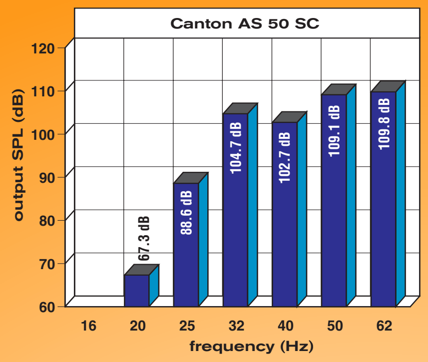
I also recorded the maximum SPL attainable at the lowest frequency the subwoofer can produce with low distortion. Better subs go lower in frequency, play louder with low distortion, and have a smoother power bandwidth — that is, they play any frequency in their range at the same volume. Otherwise, a sub could have an unfair advantage. For example, its average output measurement could be skewed by an unusually high output at, say, 50 Hz, even though its response falls off rapidly at lower frequencies. That’s why we include a number for *bandwidth uniformity* (given below the graph), which tells how smooth the sub’s output is in the 25- to 62-Hz range (higher numbers are better). It’s calculated by dividing the sub’s average SPL over the range by its maximum SPL.

For example, a sub with 100 dB average SPL that produces 104 dB at all frequencies from 32 to 62 Hz has a bandwidth uniformity of 96%, while one with the same average that peaks at 116 dB SPL at 62 Hz and quickly falls off below that has an 86% bandwidth uniformity. The latter sub will tend to overemphasize higher frequencies, causing the sound to seem uneven or boomy. This can make it more difficult to integrate the sub into your system.

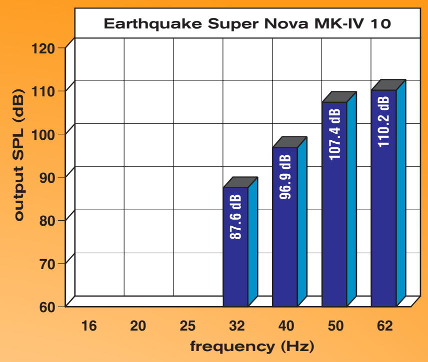
Remember, you want a subwoofer that can go low, can play loud enough to reproduce recorded music and movie soundtracks accurately, and has a smooth response over its operating range. Differences in subwoofer sound quality are directly related to these three factors, especially the latter two.

I also checked the actual crossover points and slopes at the marked settings of the crossover-frequency controls — or at full, half, and minimum dial rotations when there were no interim markings. All ten subwoofers had crossover slopes that met specification. However, in several cases the crossover range I measured was more restricted than the manufacturer’s markings or rating would suggest. I also found with some subs that output level changed as the crossover frequency was lowered. Whenever you adjust crossover frequency or level, you should adjust *both* controls for best results.

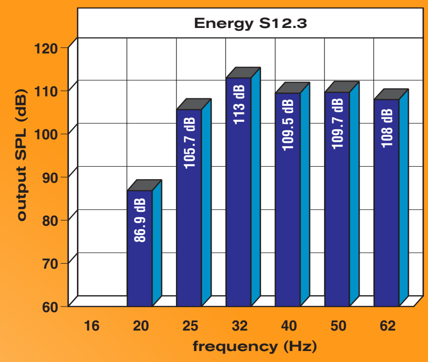
None of the subwoofers in this test showed any signs of damage during SPL testing, even when driven well into audible overload. I suspect that all of them will prove to be reliable in normal use. — *T.N.*



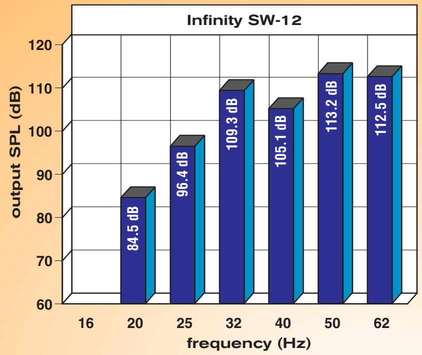
Frequency response . . . . .40 to 113 Hz ±2.1 dB
Bandwidth uniformity 94%



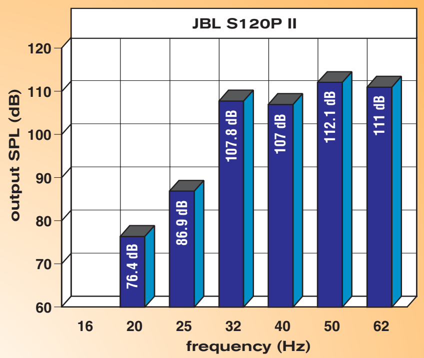
Frequency response . . . . . . .41 to 92 Hz ±2.2 dB
Bandwidth uniformity 91%



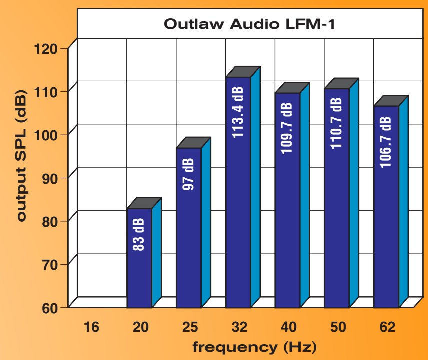
Frequency response . . . . . .29 to 113 Hz ±2.2 dB
Bandwidth uniformity 97%



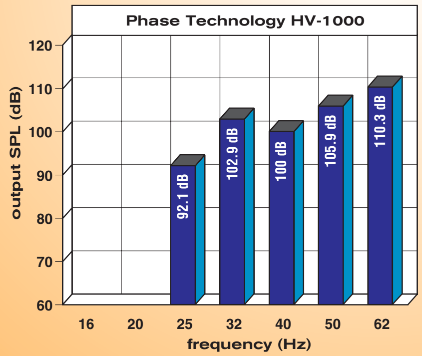
Frequency response . . . . . . .35 to 78 Hz±2.3 dB
Bandwidth uniformity 95%



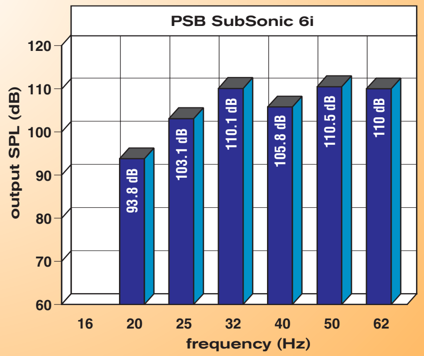
Frequency response . . . . . . .37 to 80 Hz ±2.2 dB
Bandwidth uniformity 94%



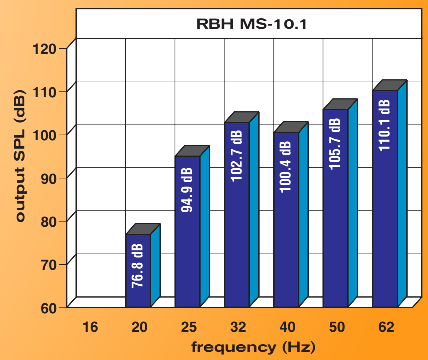
Frequency response . . . . . . .30 to 73 Hz ±2.0 dB
Bandwidth uniformity 95%



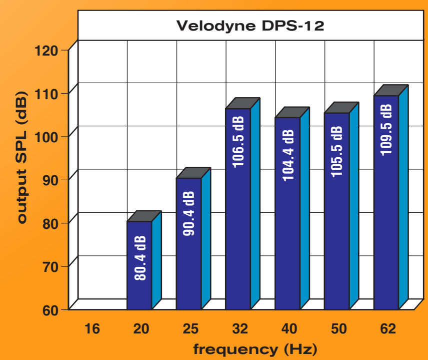
Frequency response . . . . . .35 to 104 Hz ±2.5 dB
Bandwidth uniformity 93%



Frequency response . . . . . .30 to 118 Hz ±2.5 dB
Bandwidth uniformity 98%



Frequency response . . . . . .46 to 172 Hz ±2.4 dB
Bandwidth uniformity 93%



Frequency response . . . . . .36 to 108 Hz ±2.2 dB
Bandwidth uniformity 94%