James Loudspeaker EMB-1000

Energy-Multiplied, High-Output Subwoofer
A Brute-Force, High-Performance, Compact Subwoofer

James Loudspeaker is a relatively new company. But the founder, Jeffrey James Coombs, is a 30-plus-year veteran in speaker design and custom installation, having crafted and developed speaker and custom home audio systems. The company's initial line of products, introduced in 2000 featured a distinctive glossy finish, round-edged cabinetry, and metallic brass accents. (Refer to the review of James' first loudspeaker system in Issue 48, May 2001). Coombs also is known for designing his, own crossover networks, with the aim of tailoring the audio response of the speaker to the acoustical character of the listening environment. The result of his efforts has been the Automatic Frequency Distribution Circuit, a patented application that allows the custom installer or end user to tailor the spectral output of the speaker as necessary to obtain perceptually balanced sound.

In 2001, the company relocated from its initial home in Lake Havasu, Arizona, to its new headquarters in Vacaville, California near the famous Northern California wine country. The company's final manufacturing,
Inventory, and research and development all are in-house.

At the 2002 CES, James Loudspeaker made quite a stir with the unveiling of their EMB-1000 subwoofer. This is a novel design, incorporating a number of advanced, unique engineering advancements to result in what is claimed to be very low distortion, high output, and particularly deep extension capability, all within a remarkably compact cabinet. The EMB-1000 was the result of an extensive design collaboration effort between the James Loudspeaker team and a renowned speaker designer. Having always been impressed by the sound of James Loudspeaker products at trade shows, and especially the EMB-1000, I was eager to find out how this sub (actually, two of them) would perform in my listening environment. My experiences with this subwoofer have all but confirmed to me that the EMB-1000 represents a novel, breakthrough design for subwoofers.

EMB-1000 Design And Features

The James Loudspeaker EMB-1000 is available in black as either Piano Gloss or Granite. The front face of the subwoofer is dark brushed aluminum, with 24k gold appointments. The cabinet Is constructed of 1-inch-thick MDF(medium-sensity fiber-board), a material very commonly used in loudspeakers because of its strength and homogeneity. Because there are three internal compartments, as well as reinforcement between the front baffle and one of the compartment walls, the EMB-1000 intrinsically is extensively braced inside its enclosure. The dimensions of the EMB-1000 are rather modest, with a footprint of 12 x 14 inches and height of 12 inches. Rubber footing is included as standard, and I would recommend spikes in order to help minimize floor vibrations.

The rear panel reveals the essential controls and features for any powered subwoofer. Of particular importance to me is the ability to bypass the internal low-pass crossover filter, in favor of either your receiver or surround processor's bass management, or full-bandwidth LFE if you're running your entire system full-range. The phase control allows you to switch between 0 and 180 degrees. The low-pass filter, with a 24 dB/octave roll-off, can be set to anywhere between 40 and 150 Hz.

Line-level and speaker-level inputs and outputs can be accommodated via gold-plated connectors. For both, a 12 dB/octave high-pass filter at 80 Hz is applied to the output, and for the speaker input, there's a 12 dB/octave low-pass filter. Finally there's a rocker power switch (the EMB-1000 has auto-sensing power on/off), and an IEC socket with ample room with to accommodate various high-end power cable connec-tors, such as the popular Marinco-type.

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The EMB-1000 is rated to deliver 1000 watts RMS, and deep bass down to 20 Hz within a rated tolerance of ±2 dB, (It should be noted that James' white paper on the EMB-1000 states a much lower tolerance value.) The total harmonic distortion is claimed to be less than 0.5% throughout the operating range, a figure that is very impressive for a subwoofer.

Energy Multiplied Bandpass

The driver complement and arrangement for the EMB-1000, as well as the cabinet interior design are collectively part of the Energy Multiplied Bandpass design. The cabinet is sealed, and with three airtight enclosures. The rear compartment is for the electronics. The second houses a 10-inch driver. The third enclosure has the driver in the back and a 10-inch passive radiator in front, which also faces into the room. The active driver features a laminated paper diaphragm and large rubber surround. The passive driver features a spun aluminum cone, and a large rubber surround as well. The use of aluminum was for aesthetic reasons, and also to increase the mass of the diaphragm, which in turn allowed for the tuning of the passive radiator's resonance frequency (a central design aspect of the EMB-1000).

The passive radiator is pneumatically coupled to the active driver. This means that when the diaphragm for the driver is in motion, the passive radiator moves simultaneously. This is due to the meticulous design of the drivers, their chambers, and the elementary constant volume, constant pressure concept (Boyle's Law). Therefore, the active driver and passive radiator are phase-coupled to each other.

The EMS-1000 was designed essentially to address a basic problem of subwoofers - distortion at low frequencies. The inherent challenge of any driver in reproducing sound is to generate the requisite diaphragm excursions linearly and accurately. At very low frequencies, such excursions are substantially greater than at higher frequencies, so the probability for error increases dramatically. The end result is usually some harmonic distortion, for which multiples (or harmonics) of the intended (or fundamental) frequency are produced in small amounts (relative to the fundamental).

One way to address this is to use two active drivers, which share a common enclosure. By wiring them out of phase, and orienting them appropriately, the harmonic distortion is dramatically reduced through internal cancellation. James Loudspeaker has one such product that uses this principle, the 10S. But products that feature this design approach tend to be rather expensive, since two active drivers are required.

The EMB-1000 employs a unique approach to address harmonic distortion. The passive radiator has been tuned such that its resonance frequency is at around 35 Hz. The active driver has been tuned at a different resonance frequency, and also has been strategically equalized. The key is to engineer the frequency response of the active driver, such that when combined with the passive radiator, the resultant output is linear and flat in frequency response.

Theoretically, lower distortion and more accurate performance of the active driver is achieved, simply by producing smaller cone excursions, and the passive radiator generating the bulk of the acoustical output. Because the radiator has been tuned with its acoustical peak in the region of frequencies where bass energy in music and movie soundtracks tend to be greatest, the active driver can operate at the frequencies within its linear range cone excursion range, and rely on the passive radiator to simply "amplify" its output.

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There are two other beneficial consequences of the EMB-1000's design. The first is that a relatively small-sized cabinet is possible, or equivalently, a subwoofer can be designed with a more compact size, to produce the same output as a more conventional, considerably larger subwoofer. The second is that greater efficiency in terms of required amplifier power can be realized. The EMB-1000 has a 1000-watt RMS amplifier, but the company has said that the output capability from the amplifier substantially exceeds the requirement to drive the system.

Setup

For this review, I requested two of the EMB-1000 subwoofers, in order to enable greater flexibility in terms of achieving a ballanced combination of output and tonal smoothness. Though the company did oblige, I was assured that just a single sub should more than suffice in generating abundant low-frequency output for my room, which has a volume of about 2,450 cubic feet. I used the two strategic subwoofer placements in my listening room that I have previously found to yield the most desirable in-room response. The signal to the two
EMB-1000s were fed from a Y-connection originating from the preamp/processor's RCA subwoofer output, via custom Kimber Kable PBJ interconnects.

I evaluated the EMB-1000s with the JMlab Electra series speaker system reviewed in Issue 70, March 2003, replacing the SW900 subwoofers. In order to help ensure a more even bass response from all channels, and to take into account the fact that some of the speakers were placed significantly away from wall boundaries, I engaged bass management. The tests used a variety of SACD and DVD-Video software as well as the Gold Line/PMI 5.1 Audio Toolkit DVD.

Performance

The James Loudspeaker EMB-1000 was far and away one of the most powerful and dynamic subwoofers I have encountered, and at the same time, one of the most musical-sounding. With music, especially from SACOs, various jazz and classical recordings simply sounded splendid and delightful. The distinguishing factor here was that very deep bass to mid-bass musical notes were rendered with an unusual, uncanny sense of precision and accurate timing, resulting in low frequencies that sounded abundantly taut and rhythmic. For example, the bass notes in the recording of Diana Krall's *The Look Of Love* (Verve) had considerably more of a distinctive character to them when played through the EMB-1000s, and also sounded quite a bit more tamed than several other subwoofers I have experienced. An associated consequence of this was that the often dreaded mid_bass emphasis, common with many subwoofers seemed substantially subdued in the case, of the EMB-1000, enabling a clearer, more definite impression of the upper-mid-bass to midrange frequencies in the recordings.

Another SACD that I have come to enjoy very much features the 1974 quadraphonic recording of Beethoven's Symphony No.5; conducted by Sir Colin Davis, and issued on the PentaTone label. With the EMB-1000s, the opening notes had a definite, full-bodied character, the result of the simultaneous sweeps of the cellos and double basses, and was unmistakably rich and, articulate in musical character. What was really remarkable was the lack of excessive mid-bass emphasis. This sonic attribute was also evident with a variety of pop music recordings. And of course, the deep bass produced was convincingly tight and well controlled. A great example was the pulsating beats in the opening track, "Breathe," on the new Pink Floyd Dark Side Of The Moon SACD (Capitol).

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With movie soundtracks, what I discovered with the EMB-1000 was an often incredible unleashing of deep bass energy. This subwoofer was so well-tamed with low frequencies of gentle to moderate nature, yet when called upon to produce, the result, was undeniably powerful, riveting, full of impact, and downright room-shaking. A recent DVD-Video title with some really prodigious low-end output is Daredevil. At times, the low frequencies felt were seemingly to the point of testing my room's structural integrity! Another movie soundtrack with very liberal low-end prowess was that for Star Wars: Episode II-Attack Of The Clones. Particularly in one of the final sequences, during the revelation of the Imperial Clones, the rumbling of the engines of the Star Destroyers caused a simultaneous rattling of the remote controls on my table!

But once again, it is important to note that the EMB-1000 only seemed to produce such intense levels of deep bass when called upon to do so by the source signal. The scene immediately following was the wedding of Anakin and Amidala on Naboo. The low-end associated with John Williams' sweeping musical score had a tight, full bodied, musical character, in stark contrast to the cavalcades of low-frequency energy from the prior scene on Courisant This was an excellent example of a subwoofer responding appropriately to various output demands as conveyed by the signal input.

The EMB-1000's sheer output capability was indeed incredible, but I also encountered an unfortunate consequence of this. According to the company, the multiplicative effect of the EMB system can result in out put that is as much as 16 times that produced by the active driver! This means that while the active driver is within its linear operation, the passive radiator can undergo substantial excursions, and the lower the frequency, the greater the excursions. With really intense movie soundtracks, you could see the enormous motions of the passive radiator. (Actually, I think a more appropriate description would be "violent")

However, under realistic conditions, there would be a point at which the passive would reach its excursion limit and bottom out. And this is something I encountered frequently with certain movie soundtracks played at or near reference level. Therefore, I found it necessary to engage peak subwoofer output limiting, a feature common to many receivers and surround processors. While I don't normally like to use this feature,I found that it was simply necessary with the EMB-1000 for intense movie soundtracks. But even with the limiter engaged, deep bass output was still downright intense, sometimes unbelievably so.

With the test segment on the "Goldline/PMI The 5: 1 Audio Toolkit DVD known as A Whole Lotta Bass, which seriously puts a subwoofer through its paces, with high-energy LFE material, I was able to measure SPL peaks well exceeding 100 dB at the listening position. And that was with the master volume at several dB below reference level, and the sub output limiter engaged! Various test tones and sweeps on the test DVD revealed remarkable, tactile output from 20 to 25 Hz, a very noticeable, energetic presence from 25 to 35 Hz, and even more so to 40 Hz and beyond. Essentially, to my ears, the output of the EMB-1000 was very impressively flat at the lowest frequencies, often of which are too difficult to reproduce at usable SPLs by other subwoofers.

Conclusion

The James Loudspeaker EMB-1000 may well have redefined the subwoofer category with its truly outstanding performance, both with movies and music. At $1,499, the subwoofer also offers superlative bang for the buck, and offered to me absolute joy in experiencing its sound. In my opinion, the EMB-1000 poses a formidable challenge to subwoofers of much greater size and price. The only aspect of the performance that I feel should warrant addressing for future generation products is the occasional tendency for the EMB-1000 to reach its output limits. Still, I would aptly describe this subwoofer as one that is "tame like a bird," but also really "stings like a bee,"