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Meridian DSP7000 Digital Loudspeaker

Robert Harley



It's easy to fall into the trap of believing that our familiar audio-system architecture is the only possible configuration. We think of a hi-fi system as comprising source components, a preamp to control the system, power amplifiers on the floor, and a pair of loudspeakers—all connected by cables. This architecture is so engrained in our thinking that it's hard to imagine any other topology.

Meridian Audio of England *has* imagined an alternate architecture, and it's radically different from the one we're used to. Consider an entire audio system made up of just one com-

ponent plus a pair of loudspeakers, connected with two thin cables—neither of them analog—and a user interface *in the loudspeakers*.

That system comprises Meridian's 800 CD/DVD player as the source component and the new DSP7000 as the loudspeakers. The 800, which has been previously reviewed in these pages, outputs high-resolution digital audio (up to 96kHz, 24-bit) to the loudspeakers, which operate entirely in the digital domain until less than a foot from the loudspeaker drivers. The system is controlled by a single remote, offers a suite of unprecedented features, and fits nicely in your home. Moreover, the 800's open architecture allows hardware and software upgrades, and this two-channel system can easily be expanded to multichannel with no compromise in the two-channel musical performance.

My first impression of the DSP7000 was one of great ease and utterly natural rendering of timbre. By ease I mean that the sound was unforced, flowing the way live music flows, without the mechanical character that can make reproduced music sound stultified. There was an organic wholeness to the presentation that conveyed a sense of life and reality. Even when I listened from another room with the system playing background music, this sense of directness and realism was readily apparent, particularly salient on live recordings, which had an energy and vibrancy that gave me the feeling of being present as the music was being created. Listen to the new double-disc live recording of John Mayall and the Bluesbreakers at their concert in honor of Mayall's 70th birthday (!) through this system and you'll hear what I mean. Or the 1999 James Brown concert at House of Blues, which I happened to catch on satellite in high-definition video, with audio engineering by the great Alan Sides.

This is a reviewer's cliché, but I heard things on familiar recordings I didn't know were there. I absolutely love Mike Garson's piano playing on *The Oxnard Sessions* [Reference Recordings] and am familiar with his habit of singing quietly

in the background as he plays. Nonetheless, when listening to this recording through the DSP7000s, I heard him singing in more passages, and more clearly, than I've heard from any other audio system. The DSP7000 seemed to uncover low-level detail and present that detail as individual sounds rather than as homogenized into the rest of the presentation. This quality made the DSP7000 extremely adept at unraveling dense and complex music, allowing musical meaning to become more easily accessible and gratifying.

I was struck by how cleanly the DSP7000 reproduced transient detail, particularly the leading edge of piano notes. The glassy hardness that often accompanies upper-register piano notes was gone, which fostered an ability to relax into the music. Similarly, the DSP7000 had a wonderfully warm and rich rendering of timbre, giving instrumental textures a con-

vincing palpability.

The 800/DSP7000 system had the lowest level of background noise I've heard from any audio system. With no signal present, or during very quiet passages, there was absolutely no low-frequency noise or background hiss from the electronics. At a high volume setting and no signal, I could hear a bit of electronic "rush" only with my ear up to the tweeter. I appreciated this quality when listening to extremely well-recorded DVD-A discs (the Chesky DVD-A *Sampler and Set-up Disc*, for example), where the format's potential for a dead-quiet background and resolution of extremely fine detail wasn't compromised by the playback system. In fact, every aspect of the 800/DSP7000 system showed off what the DVD-Audio format is capable of.

The system's dynamic capabilities and ability to play loudly were astonishing. Knowing that the maximum volume is

Digital Loudspeaker Technology

ROBERT HARLEY

The new DSP7000 is the latest in the "digital loudspeaker" family created by Meridian Audio. The company virtually invented the category back in 1991 with the enormously popular and long-lasting DSP6000. It's astonishing that 13 years later, Meridian is the only company (to my knowledge) employing this approach.

Let's look at how Meridian's system departs from traditional design.

A conventional loudspeaker takes in a high-level analog signal from a power amplifier, splits up the frequency spectrum with a crossover made from capacitors and inductors, and then feeds those band-limited signals to the loudspeaker's individual drive units. A digital loudspeaker, by contrast, takes in digital-audio data, splits up the frequency spectrum in the digital domain by performing mathematical computations on the audio data with digital signal processing (DSP) chips, converts the multiple digital-audio streams into analog with independent digital-to-analog converters, and then amplifies those signals with multiple dedicated power amplifiers. All these processes are performed within the loudspeaker cabinet. This architecture confers a whole host of technical advantages, not the least of which is the elimination of the crossover between a power amplifier and the loudspeaker's drive units.

Connecting a dedicated power

amplifier directly to each loudspeaker driver means that the system is inherently multi-amped (in the DSP7000's case, quad-amped). This makes for a much more efficient design and greater potential for wide dynamics. In a single-amplifier system, large power demands by the woofer can cause the tweeter to be starved for power. (This limitation is often overcome simply by using a very powerful amplifier.) Another advantage of integral power amplifiers is that the amplifier designer knows exactly the load the amplifier will be driving.

The biggest advantage of digital loudspeakers is, however, the elimination of the passive crossover between the amplifier and the loudspeaker's drive units. Crossovers in conventional loudspeakers employ capacitors, inductors, and resistors to filter certain frequency bands from the respective drive units. There's no question that these parts in the signal path greatly degrade the audio signal. Inductors and capacitors are bad news when operating on line-level signals; they're even more detrimental when handling a power amplifier's high current. In addition, crossover parts tend to isolate the power amplifier from the drive units, reducing the amplifier's ability to control spurious cone movements. For example, the large series inductor in the woofer crossover circuit acts as a kind of sponge that reduces the effective damping factor.

As compelling as these advantages are, there's an even greater argument for digital crossovers: the designer can choose crossover slopes not possible with analog crossovers—and maintain phase accuracy. Want a filter with 60dB per octave roll-off and perfect time-domain behavior? Write a few lines of DSP code. Similarly, the designer can compensate in DSP for driver anomalies, such as notching out the frequency at which a driver breaks up, equalizing a less-than-flat driver, and using delays to achieve perfect time-domain performance. And as I pointed out in the listening impressions, the loudspeaker's bass extension is no longer determined by the cabinet volume; it can be equalized within the limits of the woofer's excursion, power handling, and amplifier output.

Because the DSP knows the acoustic output level, variable loudness compensation can be introduced that boosts bass and treble to perfectly counteract the ear's reduced sensitivity to bass and treble at low volume. There's no guesswork in how much compensation to apply.

The downside of digital loudspeakers is the requirement that analog signals be converted to digital. Many of us are understandably reluctant to digitize the output from our turntables; it defeats the purpose of playing vinyl. But with high-resolution digital audio becoming more prevalent, Meridian's approach seems like the logical next step.

achieved when the loudspeaker's display reads "99," I was able to exactly gauge the system's limitations. With discs recorded at full signal level, settings above 90 were too loud. Pushing the system to maximum volume, I heard no distortion, congealing of the soundstage, or softening of the bass. The system is engineered to be well behaved at any possible user-setting. In addition, there's no chance of damaging the system because the DSP knows how hard the amplifiers and drivers are being pushed, and sets limits on them. The owner's manual mentions a clipping indicator on the loudspeakers, but I never saw it come on. If the system overheats, it turns itself off until cool (something I never experienced). Despite listening at levels I consider excessive (and I like some music quite loud), the DSP7000 was well behaved. I did, however, hear some port chuffing on organ music, but only when the music had little or no midrange energy that would mask the chuffing.

The DSP7000's bass extension, weight, and power were staggering—far greater than I would have thought possible from a moderately-sized cabinet and two 8" woofers. The secret, of course, is that the system can be equalized in the DSP to have extension as low as the designer wants, within the limits imposed by woofer excursion and power handling, and amplifier power. On some recordings with extremely deep bass, it sounded as though the DSP7000s were augmented by a massive powered subwoofer. The DSP7000 even reproduced organ pedal tones with authority; listen to the magnificent organ on Rutter's *Requiem* [Reference Recordings]. The organ is the underpinning of the piece, and to hear it reproduced with full extension from a moderately-sized loudspeaker was remarkable. Even the 16Hz tones pressurized the room and provided the physical feeling of pressure on my body. Such deep bass extension makes the soundstage larger and more expansive because many spatial cues are provided by the lowermost octave, particularly in very large acoustic spaces. Hearing this piece on the DSP7000s reminded me of how the organ sounded as reproduced by the massive Genesis II system, with its separate powered servo-woofer towers, or by the Wilson WATT/Puppy 7 and Wilson's WATCH Dog subwoofer. Surprisingly, the DSP7000's -3dB point is specified at 28Hz; it sounded as though it went much lower.

Despite the brute force bottom-end power, the DSP7000 was remarkably articulate in the midbass and upper bass. Nuances of pitch and dynamic expression were clearly resolved, and acoustic bass had a nimbleness that communicated the player's expression.

I thought, however, that the sound was a bit bass-heavy overall. I tried the "Boundary" and "Corner" settings that equalize the bottom-end to compensate for close placement to rear and side walls, and also the bass tone control, but didn't quite find a combination that delivered warmth and extension without a bit of turgidity. There seemed to be a peak of excessive output (at about 50–60Hz), audible on some recordings more than others, that made me want to turn down the bass, but doing so reduced the extension and weight through the rest of the spectrum that I so enjoyed. It is possible that the DSP7000 is simply stimulating a powerful room-resonance

mode with its prodigious bass-output capabilities. In the DSP7000's defense, I have a smaller room (14.5' x 21' x 9') than this loudspeaker is likely to be used in. Small rooms have a hard time with deep extension and powerful bass, partly because the room resonance modes are more widely spaced than in a large

Less is More? Or is More More?

ROBERT HARLEY

One could argue that Meridian's audio-system architecture is the antithesis of the audiophile's goal of the simplest possible signal path. Alternately, one could make the case that, for digital sources, no simpler signal path could possibly exist. But is a simple signal path still the holy grail of high-end audio in an increasingly digital world?

On one hand, the audio signal in a Meridian system undergoes a significant amount of manipulation. From the upsampling circuitry in the 800, to the DSP7000's digital crossovers, extensive tonal balance adjustments, digital-domain corrections for driver behavior, equalization of the bass to extend the frequency response, and other tricks, the Meridian system is far from a simple signal path.

Conversely, Meridian's approach removes from the traditional signal path a preamp, two runs of interconnects, jacks, the entire analog crossover, and amplifier and speaker binding posts—not to mention reducing loudspeaker cables to just a few inches.

Which brings us to the question of whether extensive signal processing is a good thing or not. There's no question that analog signals are extremely susceptible to degradation by *any* processing—even by putting the signal down a piece of wire. The audiophile's aversion to equalization, filtering, and manipulation of any kind is well founded. That's why we like recordings made in a natural acoustic, with as few microphones as possible, no recording console, and no post-processing, and why we listen on playback systems with as simple a signal path as possible.

But a digital source is different. Once the analog signal has been digitized, the damage has been done. You pay a penalty at the gateway to enter the digital domain, but once inside, additional processing exacts no further toll on the signal's fidelity. In fact, digital-domain processing provides the opportunity to *improve* the signal in ways unthinkable in the analog world. As outlined in the DSP7000's technical description, a digital crossover can have slopes impossible to realize in the analog domain—and with perfect phase accuracy.

With more and more recordings originating in the digital domain—that is, the microphone signals are digitized at the recording session—digital signal processing becomes increasingly compelling.

You'll have to decide for yourself if Meridian's digital wonderworld is worth investigating. I found it a fascinating place to visit—but I'm still not ready to give up playing vinyl records with an all-tube signal path. Not now, and maybe not ever.

room, making them more audible. On the other hand, my room has good dimensional ratios for room-mode distribution, has been extensively treated acoustically, and the DSP7000s were

SPECIFICATIONS

Loudspeaker with integral DSP D/A converters, and power amplifiers

Driver complement: Two 8" woofers, one 6" midrange, one 1" aluminum-dome tweeter

Frequency response: 28Hz–20kHz, +/-3dB

Loading: Reflex bass enclosure, sealed and isolated midrange enclosure

Crossovers: 200Hz, 2.6kHz, linear-phase, realized in the digital domain

Integral amplifier power: 75W (x2), bass; 75W, midrange, 75W, tweeter

Signal processing: Two Motorola 56303 DSP chips at 80MHz

D/A conversion: Four delta-sigma DACs with 128-x oversampling

Inputs: S/PDIF and Meridian High Resolution (MHR) with auto-detect

Input sampling frequencies: 32kHz–192kHz (176.4kHz and 192kHz supported by future software upgrades)

Control: Meridian Comms (x2), RS232 for PC control

Cabinet: Interlaminated panels finished in high-gloss lacquer

Dimensions: 13.6" x 39.8" x 17.7"

Weight: 110 lbs. each

positioned where computer modeling and experience suggest the smoothest bass response will be achieved.

I must reiterate that I was able, through the DSP7000's adjustments, to completely eliminate this excess of bass. Doing so, however, lightened up the tonal balance and kept the system from achieving its full measure of bottom-end solidity and power. The DSP7000 still sounded like a full-range loudspeaker with the

MANUFACTURER INFORMATION

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