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Issue 196

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Magico

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Redefining A Genre

Magico M5 Loudspeaker

by Jonathan Valin

First, a confession: I generally don't like big dynamic loudspeakers. To me their chief *raison d'être* are loudness and bass. And since I gravitate toward small-scale acoustic music where neither is a necessity, I don't see the point of giving up all that you stand to lose with one of these behemoths for (to my way of thinking) the little that you stand to gain.

Yes, Virginia, you do give up a few items with a big multiway dynamic loudspeaker. First of all, where do you put it? If you live in a penthouse this may not be the issue that it is in my smallish listening room, although the corollary to "Where do you put it?"—to wit, "Where do you put it *without exciting all sorts of room resonances?*"—can remain a problem even in a penthouse. Second, how do you make that menagerie of drivers—all those paper or silk or metal or ribbon tweeters, upper-midrange cones, lower-midrange cones, mid/woofers, and woofers, with different on- and off-axis dispersion patterns, power-handling capabilities, and break-up modes—cohere? It's hard enough to make a two-way sound like a single thing, but a four- or five-way? Third, those giant enclosures aren't just hard to place; they're hard to erase. To me, the first essential duty of any loudspeaker (of any piece of hi-fi gear) is to disappear as a sound source. A "disappearing act" is a lot harder to achieve when you have a cabinet with the surface area of a picnic blanket, every square inch a potential source of diffraction or reflection. Fourth, lots of drivers mean lots of crossovers—those heal-alls that are supposed to compensate for all the other problems I've mentioned (like different dispersion patterns, power-handling capabilities, and break-up modes). Crossovers may be necessary, but lots of them with lots of different parts, slopes, and hinge points aren't necessarily good things. (Just consider how hard it is to get the simple high-pass crossover in a subwoofer to work right.)

So what happens to that Holy Grail "disappearing act" when you house half-a-dozen different drivers, with half-a-dozen different high-pass and low-pass filters, in a gigantic singing box? Don't ask. Not only do you usually hear the box, you sometimes hear the individual drivers, the crossovers, everything. Now I'll grant that materials, technology, and engineering have come a long way in the past decade—and that big speakers are considerably better than they used to be. (The Rockport Hyperion was a high point for me, as were the Kharma Grand Exquisite and the Wilson MAXX Series 3 I heard at CES.) Nonetheless, as a group they still evince many of the driver-coherency and enclosure problems I've mentioned, and in worst cases, can still carry you about as far from the "single-driver" ideal as any kind of loudspeaker can take you. Is it any wonder, then, that I prefer (bass-limited) 'stats, planars, and mini-monitors?

But... what about the fifth string of that five-string Fender Deluxe American Jazz bass guitar, I hear some of you asking? What about rock-concert power handling? How can you listen to the latest Slayer album at "lifelike" (or would that be "death-like," because you're surely killing your ears) levels on a Quad 2905, a MartinLogan CLX, a Maggie 1.6QR, or a Magico Mini II? Well...you can't. There—I've said it. But let me also say something about so-called deep bass in many typical large ported dynamic loudspeakers.

First of all, more often than not the bass isn't really that deep. There is more than one gigantic loudspeaker out there with a steep roll-off below 35–40Hz. What keeps you from noticing this is its greatly elevated midbass and upper bass—a plateau in the 40–125Hz region that can make standard four-string bass guitars or Hammond organs or jazz/rock drumkits

sound astonishingly powerful and “authoritative,” giving the impression of a really deep-reaching low end although none of these instruments really goes that deep (the lowest E of a four-string bass is 41.2Hz). Many audiophiles tend to like speakers that accentuate the mid-to-upper bass in this way. They think the sound is more exciting and visceral—and it is. It can also be annoying.

Second, there is the huge problem of coherence. I don’t know how many times I’ve talked in these pages about the troubles I’ve seen trying to make cone subwoofers blend seamlessly with ’stats or ribbons or mini-monitors. I grant that some people are less sensitive to timbral, dynamic, and textural discontinuities among drivers than I am, but (outside of the MBL 101 X-Treme

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So. Does Magico’s big multiway speaker cure the traditional woes that have turned me off to many big multiway speakers?

subs and a brief flirtation with the Wilson-Benesch Torus) I have never been able to come close to mating a cone sub to a “satellite” speaker of any kind without losing much of what I prized the satellite for in the first place. Not only do I always hear that sub playing faintly up into the midrange (no matter how low I cross it over), overlaying timbres, transients, and textures with its own greasy thumbprint; I also hear the enclosure of the sub singing up there, causing bass-range (and sometimes lower-midrange) instruments to sound more “localized” and “boxy.” Hearing drivers and enclosures as the source of the music—or any register of the music—is the exact opposite of a “disappearing act.”

Now, here’s the kicker. Though I haven’t made this point explicitly before, I generally feel that cone woofers present many of the same issues as cone subwoofers. Yes, they are housed in the same box as the midrange and the tweeter—and given proper time and phase alignment there are well-known advantages to projecting all the sound from the same point or plane (although there are also disadvantages). Nonetheless, to me cone-bass-in-a-ported-box-in-an-average-sized-listening-room almost always sounds like, uh, cone-bass-in-a-ported-box-in-an-average-sized-listening room. Putting aside the inevitable (and often incurable) room modes—those huge, maw-like 60–80Hz peaks that swallow up everything below (and sometimes above) them—cones-in-a-box bass more often than not sounds louder, darker, lumpier, noisier, and less articulate than cone midrange and cone treble. The consequent audible discontinuity in timbre, transient speed, distortion, and resolution between bass-range and midrange and treble-range instruments instantly makes me more aware that I’m listening to a loudspeaker—just as it does with a subwoofer.

Given all that I’ve just said, why then am I reviewing a multiway dynamic loudspeaker in a relatively large enclosure (though, to give the M5 its due, at a mere 18" wide, 53" tall, and 21" deep, it is demure in comparison to most of its competitors)? The answer is that in complaining about the things I think typically get traded away, wholly or in part, in

large multiway dynamic loudspeakers I am also pointing to the challenges that faced Magico’s Alon Wolf and Yair Tammam in designing the M5.

Let’s talk about how they went about tackling them.

First, consider the enclosure problem. How do you keep a box from singing along with the drivers it houses? Well, what is the box doing when it “sings”? It is being excited by the energy of the front and backwaves of the driver, adding its own resonant note to each, and then radiating that resonance back into the room for all the world to hear as the opacity, coloration, dulling, and smearing we call “boxy sound.” How do you prevent this? According to Wolf (see my interview with him on p. 96), to create a relatively resonance-free enclosure you have to balance three different, somewhat conflicting elements: stiffness (to push the enclosure’s resonant frequency as high as possible), mass (to dampen this higher-frequency resonance and reduce its Q), and damping (to further reduce the amplitude of the resonance and kill the sound of the backwave). Finding the right combination of materials to perform this complex bit of resonance-control is a somewhat controversial topic. For Wolf, adding the high stiffness of a 6061-T aircraft-aluminum baffle to the high mass

and high damping of an airtight Baltic Birch box is the right formula (although it isn't the *only* right formula). I can't speak to the physics of Wolf's box, but I can say this: The M5 is the first and only large multiway loudspeaker I've heard whose enclosure disappears into the soundfield like that of a mini-monitor. Indeed, the similarity between it and the Magico Mini II in this regard is striking. For all sonic intents and purposes, the M5s' boxes just aren't there.

However, Wolf had to address a couple of other matters in order to make his heroic enclosure work the way it was intended to. To begin with, he had to ensure that the only moving parts in his speakers were the drivers' cones. If those drivers weren't securely fastened to his inert enclosures, their frames would rattle against the aluminum baffles, inciting resonances and destroying the "seal" of his sealed boxes (more on this in a moment or two). To achieve this resonance-free seal, Wolf uses an ingenious tension-coupling system that clamps the drivers at very high torque against their aluminum baffles and then "pulls" those baffles against the birch-ply boxes via thick stainless-steel tensioning rods that run between knobs at the back of the cabinet and the backs of the baffles (into which the rods are screwed by applying very high torque to the adjustable knobs).

O.K. We've got a box that doesn't sing, a system of attaching drivers to that box that ensures that their cones are the only moving parts in the speaker, now what about the drivers themselves?

Those of you who remember my Magico Mini II review (in Issue 179) will recall how astonished I was at the magnitude of the improvement that a single pair of Magico's proprietary "Nano-Tec" mid/woofers made to a sound that I didn't think could be

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The M5 is the most neutral and coherent, lowest-in-distortion, fullest-range big multiway dynamic speaker I've heard in my home.

further improved. Designed by Wolf's partner Yair Tammam, these Nano-Tec cones combine front-and-back multi-walled carbon skins embedded with carbon-Nano-tubes and an inner core of Rohacell foam to make exceedingly strong, light, stiff drivers. The Nano-Tec cones are then attached to 75mm titanium voice coils and a special neodymium magnetic system that is said to reduce distortion to new lows. (This is not an idle claim, BTW. I have seen independent laboratory measurements of the Nano-Tec drivers that show THD is 60+dB down even at *very* loud levels—results that would've been respectable in a phonostage not too many years ago.)

With the Mini II only one pair of drivers was changed to a Magico in-house design and the improvement was astounding. In the M5, *every* driver (including the MR-1 ring-radiator tweeter) is Magico-designed and all of the midranges and woofers are Nano-Tec cones. Indeed, the M5s are the first speakers Wolf and Tammam have engineered with all-Magico drivers. The results...well, we'll get to that in another moment. First, let's consider one more piece of the multiway-speaker puzzle—the crossover.

In my Mini II review, I attributed the improvement in the sound in large part to the Nano-Tec driver (with its much higher-in-frequency breakup modes and much lower distortion) and in part to Magico's superb CAD-designed crossovers. Wolf is a bit secretive about the slopes and hinge points he uses in all of his speakers, but he's proud as punch of the quality of the parts he uses—gold and gold/silver caps, precision coils, and low-inductance resistors from Raimund Mundorf of Cologne, Germany. Once again, this divine excess isn't just window dressing. To make a crossover work *precisely* the way it is intended to work, you have to use *precisely* the right-value parts, and those values can't change with time or use. That the break-up modes (the frequencies at which any driver stops behaving in a linear fashion and starts to distort) of Magico's 6" Nano-Tec midrange cones have been moved out to nearly two octaves above its passband is a remarkable accomplishment, but it would go for naught if Magico's in-house-designed crossovers didn't ensure that the output of that midrange driver was completely removed from the passband well before those breakup modes start to matter. With the Mini II, I can remember being shocked not just by how much better the new

Nano-Tec mid/woof sounded in its own right but also by how much better it made *the tweeter*—no longer roughed up by the residual break-up-mode distortions of the midrange driver—sound. Once again, this is a testament to both driver and crossover.

Finally, before turning to the sound itself, let's consider the M5's bass—as its, I dare say, unique quality will be the very

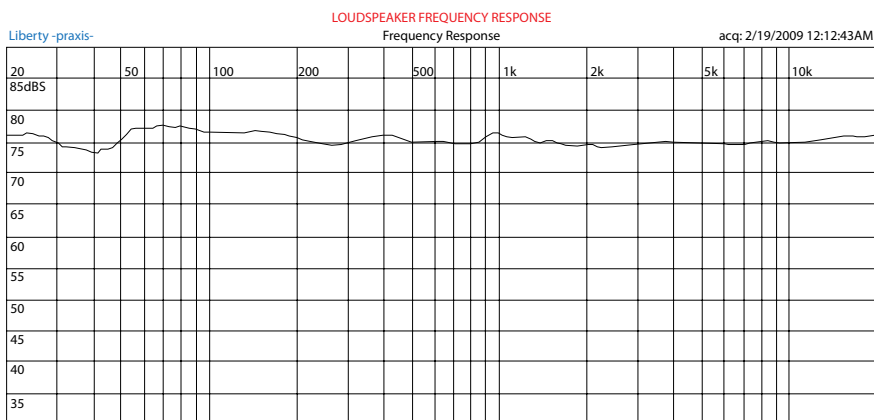
first thing you notice when you listen to M5s, although you will also notice the newfound buttery smoothness of the speaker's treble. How come the low end of the M5 sounds so flat, so seamless, so completely integrated with the other drivers, so *non-big-speaker-like*? True, the bass is still coming from a cone-in-a-box—two 9" cones, in fact—but these are highly linear, very-low-distortion Nano-Tec cones in a superbly engineered box with the highest-precision crossover that the mind of man (or, at least, of a man named Alon Wolf) can design. In addition to this, Wolf's box is sealed—no ported.

Sealed-box (or acoustic-suspension) bass has, and has always had, certain distinct advantages over ported bass (and vice versa). Although a sealed box is *much* harder to make because of the enormous pressures generated inside it by the backwaves of the woofers, it is also inherently more linear, as the air trapped inside the enclosure acts as a spring that returns the woofers' cones to their zero point above and *below* resonance, allowing the cones to remain flatter in response and lower in distortion longer (which is to say, to play deeper into the bass without breaking up or petering off) than the woofer of a ported design. The trade-off in an acoustic-suspension design (other than the greater difficulty of building the sealed enclosure) is sensitivity. It takes more power to drive the woofers in a sealed box than those in a ported box. You also lose that often-*gemütlich* resonant peak in the low-to-mid bass, which can add energy and excitement to the sound.

So. Does Magico's big multiway speaker cure the traditional woes that have turned me off to many big multiway speakers?

If you read my CES report (in Issue 192), you already know that the answer is pretty close to an unqualified “Yes!” The M5 is, quite simply, the finest big multiway cone loudspeaker I’ve heard in my home (or, for that matter, in someone else’s home or at a show), largely because it is the most neutral and coherent and delicately detailed, lowest-in-enclosure-and-driver-coloration, fullest-range multiway cone loudspeaker I’ve heard in my home or someone else’s home or at a show. Indeed, as I said in my CES report, I have never auditioned a multiway dynamic speaker that comes this close to the “single-driver” ideal or disappears this completely as a sound source.

You can get a sense of why the M5 sounds so octave-to-octave seamless—so much like a single-driver transducer—by looking at the following RTA, taken from the listening position in my room.



This is *standard-settingly flat* on-axis response, testifying to the superb integration and linearity of all five of the M5’s drivers, from woofers through midranges to tweeter. But it isn’t just flat frequency response that makes the M5 so special; after all, I’ve tested other very-flat-measuring speakers (the MBL 101 X-Tremes, for instance) that didn’t sound like the M5s. There is something else going on here—a marked overall reduction in driver/enclosure/crossover distortion and coloration—that makes the M5 the first (and thus far only) big cone multiway loudspeaker I’ve heard that has much of the coherence, resolution, and lack of distortion of an electrostat.

This comparison to electrostats has, I’m afraid, been worked to death in the audio press (sometimes by me). But the clarity, freedom from distortion, and octave-to-octave coherence of ’stats remain a benchmark, and each time a speaker comes closer to this ideal we trot out the analogy. Here it applies more appropriately and completely than ever before in my experience. If you can imagine a MartinLogan CLX—the most neutral and transparent electrostat I’ve tested—with greatly increased extension and linearity in the low-to-mid bass, a sweeter, more effortless, more extended treble, *slightly* less low-level resolution and (hence) transparency-to-sources, slightly less sterling dynamic range and scale on *pppp*-to-*mp* passages or at very low listening levels (where the CLXes remain champens), but considerably fuller and more lifelike reproduction of tone color and instrumental “body” at any volume and considerably better dynamic range and scale on *mf*-to-*ffff* passages and at medium-to-loud listening levels, equally great transient response top to bottom, and much wider, deeper, taller soundstaging, then you have an accurate idea of how the M5s sound.

No, cones aren’t quite as high in resolution and low in grain as ’stats; even the Nano-Tec drivers add just the slightest overlay of texture to foregrounds and backgrounds, making the difference between listening to M5s and CLXes rather like the difference between viewing a slide enlarged and projected on a screen by a Leitz projector and viewing the same slide on a light table with a loupe. The CLXes will tell you a bit more about how a record or CD has been recorded and engineered. But its peerless transparency-to-sources comes at a price that you don’t pay with the M5s, which, unlike CLXes, never make lousy recordings sound barely listenable and do anything but roll off the bass.

Let’s talk about the M5’s bass. A friend of mine—Andre Jennings, a first-class listener with a superb ear (and a gifted audio engineer, to boot)—said rightly about the M5s that it is the first big box loudspeaker he’s ever heard in which the enclosure didn’t seem to

be playing along with the music. I myself have never heard anything quite like it from a cone speaker. The bass octaves here are so much flatter, better integrated with the midrange, and lower in distortion and coloration than they usually are with cones-in-a-box that it is rather like listening to the planar bass of a Maggie I-U (which remains, after all these years, my ideal). Bass-range instruments from the deep-reaching plucked doublebasses (faintly doubled by the glistening timbre of plucked harps) in the Passacaglia of Lutoslawski’s great Concerto for Orchestra [EMI]—where the notes of the bass line (which, after all, are what a passacaglia is based on) are clearer and more lifelike than I’ve heard them sound before—to the thrilling entrance of the electric bass on Alison Krauss’ “Forget About It” [MoFi]—which seems to rise straight up from the floor as if lifted on pneumatic tubes, an almost literally solid foundation perfectly in tune, time, and tempo with the rest of the band (rather than a flooded basement of ill-defined pitches, timbres, and rhythms)—are so “freed-up” from the drivers and the enclosure, so quick and finely detailed and naturally imaged (rather than artificially spotlighted), so close to the

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absolute in pitch, color, texture, and dynamic that it is kind of mind-boggling. Cone bass just hasn’t sounded like this in my past experience—ever. Yeah, the M5s will shake the floors with the best of them (just put on the third track of *The Thin Red Line* soundtrack and strap on your seatbelt), but rattling floors, windows, and walls is (thank God) in many ways the least of what these speakers do. (I’ve just never heard a better blend of low, mid, and high from a dynamic multiway. I’ve never heard a smoother presentation of low-, mid-, and upper-bass, either—from anything.)

Speaking of highs, if you’re familiar with the ScanSpeak Revelator that Magico uses in its Mini and Mini II, you’re going to be in for a surprise. I don’t know exactly what Wolf and Co. have done with that in-house ring-radiator tweeter (although I do know Wolf is using a

powerful neodymium magnet of Magico's own design), but whatever it is it makes the treble octaves blend as seamlessly with the midrange as the bass octaves do. There just isn't a note that you can point to and say, "Oh, yeah, *now* I hear the tweeter!" Frankly, this is not something I could have said about the original Mini or even the Mini II, as improved as it was in this regard. The tweet in both iterations of this great mini-monitor did have an audible rising response and a bit of residual roughness. Not here, with Magico's own MR-1 tweeter. Indeed, if you are used to the sound of the Mini, you may at first feel cheated of top end—the treble is that smooth, flat, and low in customary distortions. But put on any record with considerable midrange and treble energy, like the youthful Nadia Salerno-Sonnenberg's fiery rendition of the Prokofiev First Violin Sonata [MusicMasters], and marvel at the lifelike timbre and dynamics of the fleet, eerie, muted runs of scales (which cover almost the entire range of the instrument and which Prokofiev himself said should sound like "wind in a graveyard") at the finish of the first movement *Andante assai*, or at the in-the-room-with-you realism of the whistling harmonics that close the second movement *Allegro brusco*, or at the rhythmic clarity of the tricky cycle of eighth notes (which alternate 5/8, 7/8, 7/8, 8/8) that starts the final movement *Allegroissimo*. (Those folks who claim that there is no way to tell how a piece of music *should* sound on a recording ought to look at a score every now and then.)

As for the midrange...Magico has long had a lock on that. The Mini II was the most lifelike dynamic speaker I'd heard on voice, guitar, sax, trumpet, viola, piano (above the bottommost octaves), you name it. I don't know that the M5 is *better* (save that its mids blend with the bass and treble more seamlessly), but it sure is every bit as good. Just listen to Miloslav Klaus' phenomenal rendition of Britten's *Nocturnal after John Dowland* (on a great-sounding Panton LP)—eight variations for classical guitar so famously difficult that Julian Bream, who was Britten's dedicatee, declared them unplayable. Eventually, Bream mastered the piece, and so, God knows, has Klaus. The Czech virtuoso wrings colors and textures from these toss-and-turn restless, drowsy, dreamlike variations (the Dowland theme was written to accompany a song on sleep and death) that will astound you, especially through the M5s. I've simply never heard a more realistic facsimile of a classical guitar or of a classical guitarist on a hi-fi system. When you hear piece, performer, and performance reproduced this fully—when a speaker lets you understand not just how beautiful music sounds but also how much craft and skill and intelligence it took to compose and to play it—it is an almost irresistible invitation to keep listening. That's what a great loudspeaker and a great stereo system really buy you.

Obviously, the M5 is every bit as marvelous with the human voice as it is with guitar (or anything else). Alison Krauss' soprano, Holly Cole's contralto, Frank Sinatra's baritone, Tom Waits' bass pop up in your room with breathtaking realism. Better still, as with Miloslav Klaus' guitar, you not only hear the timbre and texture of each of these voices with astonishingly high fidelity; you hear precisely the way these vocalists are *using* their voices—the way they're thinking and feeling about the words they sing. As I pointed out in the last issue in my Odyssey Khartago review, great singers are inevitably also great actors, and the M5 gives you their entire performance as if it were reading from their scripts. It sends a literal chill up my spine to hear Frank Sinatra sing and act the lyrics of "What's New" from *Only the Lonely* [MoFi] and, minus a bit of whiskey-colored wear-and-tear on the vocal cords,

bring virtually the same sophisticated mix of lyricism and *weltschmerz*, the same *life experience* to the song played back through the M5s that he did when I heard him sing it live many years ago.

As for soundstaging...that depends on the LP or CD, for the M5 goes as wide or as narrow, as shallow or as deep, as tall or as short as the engineering and mastering allow.

Though I wouldn't say its stage is quite as encompassing or uncannily three-dimensional as that of the MBL 101 X-treme (which, because of their omni design, simply own that aspect of high fidelity), it is *at least* as good as any other kind of speaker I've heard, including the Mini IIs. Better still, like the great MBLs, it utterly disappears into the stage, leaving behind nothing but the panorama of instrumentalists and the music they are making.

The words "the best" have been bandied about quite a bit in this magazine and on our Web site (avguide.com)—and there is legitimate concern that they are being overused. Unfortunately, no other words will do to describe how I feel about the Magico M5. Not only has it redefined an entire genre of speakers for me, it

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Setting Up and Driving the Magico M5s

The M5s are a handful. Although I've had other speakers that weigh a good deal more than these Magicos do, they've broken down into semi-manageable parts. The M5s do not. You are going to be dealing with two four-and-a-half-foot tall, nearly two-foot deep, 360-pound objects, so...get some help.

Happily the speakers arrive with wheels on them, allowing you to roll them out of their crates and freely maneuver them around your listening room. Once you've settled on a spot for the speakers, the wheels must be removed—a process that involves tipping the enclosures fore and aft (Magico supplies an illustrated instruction booklet that shows you how to uncrate the speakers and remove the wheels safely). After the wheels are off, gliders on the bottoms of the baseplates allow you to move the speakers for fine adjustments without marring floors. (You will need a strong friend to help you do this and be sure to avoid touching the drivers as you push the speakers about.) Like most big speakers the M5s thrive on room, so keep them as far from sidewalls and backwalls as is feasible and at least as far apart as the distance between your listening seat and their front baffles.

Unlike the Mini IIs, which liked to be listened to slightly off-axis, the M5s fare best when the centers of their drivers are pointed *directly* at your ears. (Use the nipple of the ring-radiator tweeter as a guide.) In a smaller room, this makes for a "narrower" sweet spot. It's not as if the M5s don't sound great well off-axis; they just don't sound as great as they do when you're sitting directly in their tractor beams.

has carried me substantially closer to the absolute sound. So close, in fact, that, for the first time, I can imagine the possibility of someday achieving a genuine facsimile of the real thing—not merely parts of it, not merely midrange or treble, voices and violins, but the *whole* thing from the lowest notes to the highest, from the least dynamic utterance to the most. *That* is how natural—how complete—the M5 sounds to my ears. It is, in fact, the most complete loudspeaker I’ve ever heard.

Remember that when I say “the best,” I mean “the sound, overall, that comes closest to the real thing to my ears”—with the

kind of music I listen to most often, at the levels I typically choose, and in the room where I listen. What I *don’t* mean, which may be as important as what I do mean, is “the best in every way” or “the best for every listener.” As good as it is, the M5 has sonic competition in several areas: The \$250k MBL 101 X-Treme omni is more immersive, dimensional, and outright exciting; the \$23k MartinLogan CLX electrostat is more transparent-to-sources, more finely detailed, and better scaled dynamically on pianissimos and at lower levels; the \$115k Symposium Acoustics Panorama hybrid ribbon/planar is every bit as realistic in timbre and texture in the midrange and lower treble and better at softer volumes; the \$68k Wilson Audio MAXX 3 has more lifelike wallop in the mid-to-upper bass and much the same beauty of timbre; the \$32k Magico Mini II mini-monitor has just as remarkable a “disappearing act” and a similar midband; even the \$1.7k Magnepan 1.6QR quasi-ribbon planar is as top-to-bottom seamless and “of a piece,” where it plays. On top of this, the M5 is very expensive, sounds its very best played loud (or louder), and may not suit some musical tastes or some rooms or some ancillaries as well as it does mine (although, frankly, I can’t imagine anyone being disappointed with it).

There may be other speakers on the market or on the horizon that outperform the M5s overall—the absolute sound is, after all, a rapidly moving target. If there are such speakers, I simply haven’t heard them yet. If you have, I have no argument with you. For all the observations and evidence I’ve presented in support of my opinion, there is, finally, no arguing taste. I freely concede that there is room out there for more than one nominee as “the best loudspeaker.” You’ve just read about

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Be aware that the M5s are very full-range loudspeakers that will put an *enormous* amount of energy into your room. In a less-than-palatial estate this can be problematical, and you may have to consider adding corner traps and diffusors to reduce room resonances in the midbass. As with any kind of room treatment, be careful not to overdamp.

Although they are rated at 89dB sensitivity, the M5s are actually closer to 86dB sensitive. On top of this they are acoustic-suspension speakers. All of which means you’re going to need some power to drive them. I have tried them with both great solid-state amps (Soulution 700s) and great tube amps (ARC 610Ts), and they sound fabulous with each, though fabulous in different ways. For the most “accurate” sound (particularly in the bottom octaves), I would lean toward transistors—and especially toward the Soulution amps, which are a match made in audio heaven with the M5s. For a more bloomy, three-dimensional sound and higher ultimate SPLs, I would tend toward the 610Ts (also a match made in audio heaven). In any event, if you’re going to spend \$89k on a pair of the world’s best loudspeakers, you would be foolish not to drive them with the best electronics you can afford and harness them up with the best cables and interconnects.

Speaking of cables, the M5s are designed to be bi-wired or bi-amped. Each speaker has two sets of binding posts and both sets must be used. Although Magico supplies two pairs of (very good) MIT jumpers if you choose to single-wire, the speakers sound better bi-wired with two identical sets of cables and best bi-amped (which is something you can do with the Soulution 700 but not the ARC 610T). **JV**

SPECS & PRICING

Type: Five-driver, four-way, floorstanding dynamic loudspeaker
Driver complement: One MR-1 ring-radiator tweeter, two 6" Nano-Tec midrange, two 9" Nano-Tec woofers
Bandwidth: 22Hz-40kHz
Impedance: 4 ohms
Sensitivity: 89dB
Recommended power: 50-1000 watts
Dimensions: 18" x 53" x 21"
Weight: 360 lbs. each
Price: \$89,000

MAGICO
 Berkeley, CA
 (510) 649-9700
magico.net

JV'S REFERENCE SYSTEM
Loudspeakers: Magico M5, MartinLogan CLX
Linestage preamps: Soulution 720, Audio Research Reference 3, Audio Space Reference 2
Phonostage preamps: Audio

Research Reference 2, Audio Tekne TEA-2000, Lamm Industries LP-2 Deluxe
Power amplifiers: Audio Research Reference 610T, Soulution 700, Lamm ML-2
Analog source: Walker Audio Proscenium Black Diamond record player, AAS Gabriel/Da Vinci turntable with DaVinci Grandeeza and Nobile tonearms
Phono cartridges: DaVinci Grandeeza, Air Tight PC-1 Supreme, Clearaudio Goldfinger v2
Digital source: Soulution 740, dCS Scarlatti with U-Clock, ARC Reference CDB
Cable and interconnect: Tara Labs "Zero" Gold interconnect, Tara Labs "Omega" Gold speaker cable, Tara Labs "The One" Cobalt power cords, MIT Oracle MA-X interconnect, MIT Oracle MA speaker cable, Synergistic Research Absolute Reference

speakers cables and interconnects, Audio Tekne Litz cable and interconnect
Accessories: Shakti Holographs (6), A/V Room Services Metu acoustic panels and corner traps, ASC Tube Traps, Symposium Isis equipment stand, Symposium Ultra equipment platforms, Symposium Rollerblocks, Symposium Fat Padz, Walker Prologue Reference equipment stand, Walker Prologue amp stands, Shunyata Research Hydra V-Ray power distributor and Anaconda Helix Alpha/VX power cables, Tara Labs PM 2 AC Power Screens, Shunyata Research Dark Field Cable Elevators, Walker Valid Points and Resonance Control discs, Winds Arm Load meter, Clearaudio Double Matrix record cleaner, HiFi-Tuning silver/gold fuses

JV Interviews Magico's Alon Wolf



Jonathan Valin: The M5 is the first Magico speaker to use all "in-house" drivers. Tell us about the design of these drivers (particularly your new woofer), and how your "Nano-Tec" cones differ from those of your competitors, several of whom also use carbon-fiber-composite cones?

Alon Wolf: We first introduced the Nano-Tec drivers in the Mini II three years ago. Since then we have added three more drivers to the series—a 5", 7", and the new 9" that is in the M5. Designed by our CTO Yair Tammam, the Nano-Tec drivers are the first transducers that use carbon nanotubes in their cone construction. These cones operate as perfect pistons throughout their entire operating range and are extremely well damped due to their sandwich construction. Their outer carbon skins of multi-walled carbon embedded in thermoplastic and carbon nanotubes have a tensile strength of 43GPa. (A similar composite of these cones is used in manufacturing helicopter blades.) In comparison, a carbon fleece skin, commonly used in cone construction, has a tensile strength of approximately 2-to-6GPa.

Nano-Tec cone technology enables our drive unit to have very low distortion and to maintain this low-distortion pattern throughout its passband without any irregularities. A typical 9" woofer in a sealed enclosure can have 300% higher THD at 20Hz than at 80Hz. The distortion level of our 9" Nano-Tec woofer at 20Hz is merely 3% higher at 20Hz than at 80Hz.

The motor systems of our drivers are engineered to maximize the potential of this cone structure. They feature a very large voice coil that has the following

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"Understanding a well-executed, low-distortion speaker will fundamentally change the way you listen to music."

advantages: maximum mechanical stability; maximum heat dissipation; and minimal voice coil inductance. Our magnet system uses a high-excursion underhung motor system with massive copper sleeves for stabilization of the magnetic field, further reducing the voice coil inductance to below 0.08mH for the 7" driver, and less than 0.58mH for the 9" with one-inch excursion. We use neodymium magnets of the highest available grade (N45SH, N48H). We also use the world's best surrounds and spiders—all from European manufacturers.

The cost of our cones alone is twenty times higher than the industry average, in fact more than most complete woofers available to most manufacturers. Add the high cost of our motor system and soft parts and you end up with one of the most expensive transducers ever built.

The M5's cabinets are constructed of Baltic Birch ply and aircraft-grade aluminum. First, why did you choose this combination of materials instead of something else, like the composites many of your competitors use? Second, the M5 is rather foursquare compared to the smoothly sculpted enclosures of certain other loudspeakers. Why didn't you make its enclosure curved, and given the presence of two sets of sharp edges at either side of the aluminum baffle and either side of the birch enclosure how do you avoid diffraction/boundary effects?

A properly designed loudspeaker cabinet is a tricky proposition. The cabinet's basic function is to be the mounting platform of the drivers and contain their rear waves. Ideally, the enclosure would be infinitely stiff so its resonance frequency would be higher than the audible range. But since pushing the resonance frequency completely out of the audible range is not possible in the real world, the issue becomes an exercise in management control of the resonance frequency. If the enclosure is sufficiently stiff, by adding mass and damping the excitation in the high frequencies can be suppressed and the amplitude of the cabinet resonance can be reduced. We believe that the best way to

manage these multiple goals is to use materials with opposing physical characteristics. This is why we use aluminum and birch. The aluminum provides us with a very stiff platform while the birch dampens and adds the necessary mass to the structure.

While it is fairly easy to add mass or damping in a loudspeaker enclosure, it is impossible to change the Young's Modulus (the stiffness) of the material used to build it. This is a very important point, because the relatively low Young's Modulus of MDF or many molded composites does not change with an increase of mass or size. In other words, a 1" MDF baffle will be just as stiff as a 5" MDF baffle. This is why a clean cumulative spectral-decay plot can be misleading. A block of rubber will have an incredibly clean plot, yet its Young's Modulus will be too low to allow it to act as an effective loudspeaker enclosure.

As for the shape of the M5's box, we pay very close attention to diffractions that interfere with the tweeter's operating range. Diffractions are negligible as long as the front baffle width is longer than the wavelength of the lowest frequency the tweeter reproduces. All of our faceplate profiles are machined with smooth 3-D curvatures to avoid diffractions. This machining process is extremely expensive.

What is the "tension-coupling" mechanism that you use to secure your drivers, how does it work, and what are its advantages?

Achieving cone motion *only* in drive units is crucial to loudspeaker functionality. Any vibration of the driver's chassis will add a significant distortion to its output. All of the hard work that goes into building a sensible enclosure would be meaningless if the driver basket was not firmly secured in its place. The amount of torque that can be applied to the bolts holding the drivers in place is crucial. In a sealed enclosure, the pressure generated from a bass driver can exceed 100 psi. A maximum of 3-4 Newton-meters of torque, which is about the most torque you can apply to a wood insert, is simply not enough to hold a driver firmly in place at these pressures. Similar issues are presented in composite-type enclosures. Once you add in the natural movement of most materials due to climate changes, the chances of keeping drivers securely coupled are slim.

Our "tension-coupling" mechanism isolates the driver-coupling system from the main enclosure completely. The drivers are mounted directly onto the aluminum baffle through a clamping system that allows us to apply 11-13 Newton-meters of torque, thus ensuring a perfect coupling forever. To secure the baffle to the cabinet, rods of stainless steel extend through the cabinet from the rear panel, their threaded ends screwing into the back of the front baffle. These are tightened to achieve "tension-coupling" by turning exposed aluminum pucks on the rear panel. There is no hardware between the drivers, their aluminum platform, and the material of the enclosure. The system also allows the end-user to properly maintain the maximum torque needed for the structure to operate properly by tightening the pucks when and if needed without ever stripping any parts of the enclosure.

The M5 is a multi-way system. First, tell us how the technological advantages of your "in-house" drivers played into design of the speaker. Second, you call your crossover designs "elliptically symmetrical." What exactly does that phrase mean? Third, you use very very expensive parts in your crossovers. What does using them buy you that couldn't be had if you used the high-quality but less extraordinarily expensive parts?

The M5 is a five-driver, four-way loudspeaker. In-house design of the drivers enables us to tailor the off-axis and power response of each driver for optimally smooth transitions

between them. We also balance the dynamic behavior of each driver to control linearity at high levels. Smaller drivers have tremendous limitations at high levels. We've developed proprietary tools to control driver behavior in high-excursion situations to match the rest of the system, so dynamic linearity across the entire bandwidth is preserved.

A Magico crossover design uses proprietary topologies which include elliptical filters. Those topologies enable us to reduce the drivers' distortions by an order of magnitude with the use of fewer parts in the signal path. An elliptical filter has an equalized ripple (equi-ripple) effect in both the passband and the stopband. The amount of ripple in each band is independently adjustable, and no other filter of equal order can have a faster transition in gain between the passband and the stopband as a properly implemented elliptical filter. The cone-sandwich geometry of our drivers pushes the first breakup point to at least two octaves above the driver bandpass. Our elliptical crossovers then ensure that these breakups are completely suppressed.

We do use expensive parts in our crossovers and for a good reason. The 10AWG copper-foil coils we use are as close as possible to perfect inductors, with minimum losses and minimum mechanical noise. The resistance of a commonly used 16AWG/4.7mH air coil is 0.95 ohms versus the 0.31 ohms of a 10AWG coil. That means that if a 16AWG/4.7mH air coil is used, there is close to a one-ohm resistance in series with the woofer. How many audiophiles would choose to insert a one- or two-ohm resistor in series between their mega-buck speaker cables and their speaker? Unfortunately, a 10AWG copper-foil coil costs ten times more than a 16AWG/4.7mH air coil.

We also use the best capacitors for their low ESR and low microphonics, and high-grade non-inductive resistors to minimize inductance effects. There is no point in building an ultra-high-bandwidth tweeter and then limiting it with low-grade resistors.

High-quality crossover parts result in higher dynamic range, increased linearity, extended bandwidth, and lower mechanical noise.

Tension-coupling isolates the drivers from the main enclosure.

Why not use a port or side-firing woofers? And why not use a D'Appolito configuration (which is said to help ameliorate room effects) and/or some sort of adjustable head unit to optimize time/phase alignment?

We strive to balance technically-sound designs in all our products. There are hardly any theoretical reasons to use a port or a side-firing woofer. There are plenty of reasons not to. The same can be said about D'Appolito configuration. This configuration may solve one problem under very specific conditions while creating other problems at the same time. Furthermore, most of the so-called "D'Appolito configurations" out there are simply MTM (midrange-tweeter-midrange) alignments that do not subscribe to the very specific conditions a D'Appolito design needs in order to work properly. At all cost, we avoid aesthetic design decisions or "cool concepts" that will compromise sound performance. The precision of our designs is such that a 1mm driver-placement change requires a recalibration of the crossover. This is why we do not have "moving parts."

You design your speakers to achieve certain measurable goals. Other manufacturers make similar claims, particularly about flat frequency response. First, what distinguishes your products from other products that also measure well? Second, which measurements do you think are most important—and why?

There are many aspects to good loudspeaker design. I am not going to review all of them here, but I would like to point out that loudspeaker design is a complex process that can't be reduced to one easy-to-understand factor. Unfortunately, since "flat response" is the easiest quantitative measurement for the layman to understand, it has been exploited shamelessly. A flat on-axis response with poor power response (dispersion pattern) will sound worse than a not-so-flat but-smooth-power-response design. This is not to say that proper frequency response is not important, but not all +/-3dB frequency responses are created equal. A 3dB suckout at a crossover point is not the same thing as a 3dB dip in the bandpass (the driver's operating range). The latter can be acceptable while the former indicates poor crossover execution.

Although some measurements are more telling than other, you really need all four: frequency response, power response, impedance, and distortion to intelligently begin to assess a speaker's performance. The balancing act between on- and off-axis response and the integration of the drivers' power response and dynamic behavior is the most challenging task a designer faces. This challenge can only be met with a complete control over and understanding of the design and manufacture of the loudspeaker.

There seem to be three schools of thought when it comes to high fidelity: a) those who believe that a transducer (or any component) should make the best recorded music sound like "the real thing," what we at TAS call the absolute sound; b) those who believe that a transducer (or any component) should make recorded music sound precisely like the kind of recording it is (i.e., that a transducer should make recorded music sound as good, bad, or indifferent as the engineering and mastering allow it to sound—and that we should clearly hear that engineering and mastering as part of the listening experience); and c) those who think that listeners should be free to choose whatever transducer makes the music they like sound best to their ears, regardless of fidelity to the absolute or fidelity to the mastertape. As a speaker designer (and a listener), where do you fall among these three groups of listeners (allowing that they sometimes overlap)?

In my perfect world, A, B, and C will be the same. Speaker designers (or designers of any component) are neither artists nor gurus with a monopoly on the knowledge of good sound. Their job is not to interpret what is coming into the device they are designing. Their job is to seek signal fidelity. Music is beautiful the way it is. It needs no help or enhancement. It only needs to be heard as closely as possible to the way it was captured.

But how would one know this? There are no standards or guidelines for any of it. On the contrary, such assessment tools would be detrimental to the audio industry as we know it. So you are left to decide on your own what is right and what is not. How would you do that? I am sure that most of us feel that we can easily trust our ears. But I can assure you that our ears are easily fooled. And they have fooled you and me many, many times.

We are not born with the objective ability to know "good sound" on the spot. Our senses did not develop in a linear fashion. We needed to respond to certain cues faster than others so we could survive. That is why our brain is not sensitive to certain things, like even-order harmonic distortion. But it is very sensitive to odd-order distortions. These "built-in" weak spots can lead us to some interesting conclusions about the perception of sound. Our industry, unknowingly, has exploited these weak spots for years. Ninety percent of listeners would prefer, in the first 30 seconds of listening, a speaker with an elevated midrange output. Listeners will perceive it as more "open" and "transparent," even though it is actually non-linear and deviates from neutrality and fidelity. Our ears also have a "comfort zone." Some listeners, when first auditioning a low-distortion

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loudspeaker may feel they are missing something. A sealed-alignment loudspeaker may seem "light-sounding" in comparison to a ported alignment. This is in spite of the fact that a proper sealed-bass alignment will easily go lower than just about all ported loudspeakers available on the market today. The lack of bass that some people may "hear" is a by-product of being used to ported-bass alignments that usually have elevated midbass output. The non-linear, less-extended bass that we all were accustomed to hearing fools us into believing that we hear "less bass" from much more extended, more linear bass transducers.

Over the years I have read and heard many conflicting reports on what people think about the sound of our speakers. I have learned very quickly that one can't argue with what people believe they hear. However, I have noticed time and again that people's perception will change once objective assessments are pointed out to them. It is perfectly fine for someone to prefer a loudspeaker with a dip at a crossover point or elevated midbass output, as long as he *actually knows* that is what he is listening to. But for what is a relatively painless effort, listening to and coming to understand a well-executed, low-distortion, extended tool for music reproduction can and will fundamentally change the way you listen to music. **TAS**

M5



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