JOHN ATKINSON

Magico M2

LOUDSPEAKER

On a snowy day in March 2019, the first room I visited at the Montreal Audio Fest, hosted by retailer Audio by Mark Jones, featured the world premiere of the Magico M2 loudspeaker.[1] The soundstaging produced by these elegant towers was palpable, the full-range tonal balance superbly uncolored. Both aspects reminded me of my experience of Magico's S5 Mk.II loudspeaker, which I reviewed enthusiastically in *Stereophile*'s February 2017 issue.[2] Accordingly, I made a note that the M2 was going on my "must review" list. Seven months later, Magico's Alon Wolf and Peter Mackay visited to set up a pair of M2s in my listening room.

The M2 . . .

. . . costs $56,000/pair plus $7600/pair for the MPod three-point outrigger bases. Like the S5 Mk.II, the M2 is a three-way, floorstanding design using two woofers in a sealed enclosure (see later). But whereas the S5 Mk.II's enclosure used aluminum panels mounted on an aluminum space frame, the slightly smaller M2 features gracefully curved, 3⁄8"-thick side panels formed from multiple layers of carbon-fiber composite. Magico says that this construction increases the structural strength-to-weight ratio by a factor of 60 compared to machined or extruded aluminum parts, while reducing the overall weight by 50%. The M2's curved front baffle still comprises two hefty pieces of aluminum attached to an internal skeleton, and three tension rods run from it to a vertical aluminum spine at the speaker's rear.

The M2's drive-units are all new. The tweeter is the third version of the 28mm unit that Magico originally developed for their "M Project" loudspeaker. Like the 26mm tweeter that was used on the S5, the M2 tweeter's beryllium diaphragm has a layer of diamond vapor-deposited on it to allow it to operate pistonically to well above the audioband, without compromising the moving mass. The dome has a steep profile, which confers wide dispersion despite its larger-than-normal diameter.

The internal midrange enclosure is similar to the one used in the S5. Formed from a proprietary polymer, it isolates the midrange driver from the woofers' back wave. The cones of the M2's 6" midrange driver and 7" woofers use multiple layers of woven carbon-fiber, incorporating graphene, a form of carbon in which the atoms are assembled in a sheet just a few atoms thick that is said to be 100 times stronger than steel. The resulting cone is both light and stiff, pushing breakup modes well above each unit's operating passband. The midrange driver features a titanium voice-coil and an underhung motor system—a short coil operating in a long magnet gap—to maximize linearity. According to Wolf, all of the M2's drive-units were designed by Magico. Some are sourced from OEM manufacturers; others are made in-house.

The M2's crossover features Magico's Elliptical Symmetry Crossover topology. Wolf told me when he visited, "We have been using an elliptical crossover from Day One, which basically allows us to create a 24dB/octave slope with only two legs. So you have less parts in the crossover, less losses.... The tricky part with elliptical crossovers is that you need to have precise values; . . . these are not off-the-shelf values, so we have to have custom-made capacitors. But the results are quite desirable. You get the cleanness of the [24dB/octave crossover], yet you get some of the lush, free sound that you get with lower-slope [filters]."

Infinite baffles

Like all of Magico's models, the M2 uses a sealed enclosure to load its woofers and, as Art Dudley wrote in his November 2019 Listening column,[3] such loudspeakers "are now as rare as tooth fairy sightings in West Virginia." I asked Wolf why he was one of the few manufacturers to use exclusively

1 See stereophile.com/content/jas-saturday-morning-montreal.
2 See stereophile.com/content/magico-s5-mkii-loudspeaker.
3 See stereophile.com/content/listening-203.

SPECIFICATIONS

Description Three-way, sealed-box, floorstanding loudspeaker. Drive-units: 1.1" (28mm) diamond-coated beryllium-dome tweeter, 6" (153mm) XG Nanographene-cone midrange unit, two 7" (178mm) XG Nanographene-cone woofers. Crossover frequencies: not specified. Frequency range: 26Hz–50kHz. Nominal impedance: 4 ohms. Sensitivity: 88dB/W/m. Minimum recommended power: 50W.
Dimensions 45" (1143mm) H × 18" (457mm) W × 17.5" (445mm) D (all with MPod three-point stand). Weight: 165lb (75kg) each (with MPod stand).
Finish Matte black aluminum baffle, top, and base, with gloss-finished carbon-fiber sidewalls.
Serial number of review samples 00156/00157, made in the US.
Price $56,000/pair; MPod three-point stands cost $7600/pair. Approximate number of dealers: 35. Warranty: 5 years from date of purchase.
Manufacturer Magico, LLC, 3170 Corporate Place, Hayward, CA 94545. Tel: (510) 649-9700. Web: magico.net.

ERIC SWANSON

sealed enclosures.

He responded that while he had experimented with ported enclosures—known as "bass reflex"—early in his career, he quickly realized that it just wasn't possible to make ported designs work. "Don't get me wrong," Wolf explained, "I like some of the aspects of [reflex designs], that big, full, *charging* bass, which is more difficult to get with a sealed design. But unfortunately, the cost you have to pay for that is too great. What you gain from the sealed alignment is, first of all, your group delay goes down to almost nothing. Everything becomes much clearer, not just in the bass but across the midrange as well. Not having that noise that a port generates, being able to have a linear bass where no note is sticking out, and you start hearing things that you didn't quite hear before. Once you hear that, it is difficult to go back to a ported design. If you look at the way we hear the world and how we respond—the Fletcher-Munson [equal-loudness] curves—you can see why [ported speakers] have a problem. While the sound might seem more natural [at low levels] if you have more bass at low frequencies, because in effect you've EQ'd the speakers, as you increase the volume the bass continues to rise as well. It messes up the midrange because the level of the bass is now too high.

PHOTO: ALON WOLF, MAGICO

"And there's also what people are accustomed to," Wolf continued. "People are used to ported sound. I cannot tell you how many times when people hear our speakers their first reaction is 'where is the bass?' when, in fact, we have more extension in the bottom end than a typical ported design would have. So, even though measurement-wise the sealed enclosure goes lower, it doesn't necessarily sound like it, because you don't have that extra oomph at 60Hz or so that ported designs will give you."

I asked Alon if one reason ported loudspeakers are ubiquitous was that most of the low-frequency drive-units available from OEM suppliers are optimized for reflex designs.

"Yes, exactly," he agreed. "You don't really see many off-the-shelf drivers designed for [sealed enclosures]. It requires a lot more of a robust design for a woofer to be able to work in a sealed environment. Because you are actually 12dB up at 20Hz [compared with a ported design], it puts a lot of stress on the drivers. Of course the drivers will still work, but your distortion will skyrocket. So unless they actually design and manufacture their own drivers, the go-to [woofers] used by most companies work better in a ported design."

MPods

The M2's MPod three-point stand is said to act as a low-pass filter, coupling low-frequency energy to the floor while dissipating higher-frequency energy as heat. Wolf explained that the objective is always to couple the speaker well to a floor, "especially since with sealed designs, there's a tremendous amount of pressure inside of the box. You don't want the box to be moving while that pressure is being generated. Spikes . . . create a very good coupling mechanism. However, a spike is also a tremendous channel for noise. So though spikes prevent speakers from moving, . . . any other noise in the speaker, anything above 300–400Hz, reflects right back into the speaker because there's no way for that energy to be dissipated.

"You do not want to put the speaker directly on softer-material dampers because they will allow it to move. So how do you couple it below a certain frequency, yet let it float above a certain frequency? That's how we came up with the MPods. We use constrained-layer damping to very effectively dissipate high-frequency vibration as heat. Below 300Hz, the speaker sees just a direct contact, there's no dissipation of any energy. But above that frequency, the constrained-layer damping dissipates the noise."

Setup

After making sure the M2s' tension rods were correctly torqued, Wolf and Mackay started with the speakers in exactly the same positions in my room where the S5 Mk.IIs had worked best. Then, listening to familiar recordings, they moved the M2s in small increments side to side and forward and back until the low bass was well-integrated with the mid and upper bass and the stereo imaging was well-focused and stable. Measured with a Bosch laser tool, the speakers' front baffles were 75" from the wall behind them and 122" from my listening position; the left speaker was 53" from the closest sidewall, the right 49" from its sidewall.

The big surprise came when, after the optimal speaker positioning had been determined, Mackay installed the three MPods for each speaker and removed the pins that had locked their suspensions. The tightly focused imaging became more palpable, the soundstage floating free of the loudspeaker locations. While the MPod outrigger bases are not inexpensive, I feel that their use is essential with the M2s.

Listening

As with all my loudspeaker reviews, I started my critical listening to the M2s using the test tracks I created for my *Editor's Choice* CD (Stereophile STPH016-2), using Lamm M1.2 monoblock amplifiers. The M2s reproduced the $\frac{1}{3}$-octave warble tones with full weight and minimal distortion down to the 50Hz band, with a slight reduction in level for the 40Hz band. The 32Hz tone was boosted by the lowest-frequency mode in my room, the 25Hz warble was just audible, but I couldn't hear the 20Hz tone at my normal listening level. The half-step–spaced low-frequency tone-bursts on this CD spoke very cleanly down to 32Hz, with no emphasis of any of the tones and without any of the aliasing-like pre-echo I sometime hear with other speakers. When I listened to the cabinet walls of both speakers with a stethoscope while these tones played, I could hear some liveliness between 600Hz and 800Hz.

The dual-mono pink noise track on *Editor's Choice* sounded hollow if I stood up but evenly balanced, uncolored, and smooth when I sat with my ears level with the M2s' tweeters, which are 38.5" from the floor. The pink noise sounded mellower than it had with the Q Acoustics Concept 300s that I reviewed in the January 2020 issue, but the central image of the noise signal was appropriately narrow and stable.

Stable, accurate stereo imaging was a consistent feature during my auditioning of the M2s. I have been a fan of pianist Mitsuko Uchida since *Stereophile*'s then-publisher Larry Archibald and I saw her perform-ing at London's Royal Festival Hall the February 1986 night we sealed the deal on my replacing J. Gordon Holt as the magazine's editor. A recent purchase was Ms. Uchida's live 2010 Beethoven Piano Con-certo cycle with Simon Rattle conducting the Berlin Philhar-monic (24/48 FLAC files, Berliner Philharmoniker BPHR 180241). I have many performances of the "Emperor" concerto in my library, but this powerful performance has taken pride of place. The M2s presented an upfront image of the piano—I suspect that that is how it was recorded—with the orchestra set farther back in the soundstage within a somewhat reticent dome of ambience. Each piano note at the hushed start of the concerto's second movement was precisely and unambiguously positioned in space.

What was unusual about the M2's imaging was that it was preserved even when I was sitting at my desk to the left of my listening seat. Yes, Uchida's piano moved to the left, but

MEASUREMENTS

I used DRA Labs' MLSSA system and a calibrated DPA 4006 mi-crophone to measure the Magico M2's frequency response in the farfield, and an Earthworks QTC-40 mike for the nearfield and in-room responses. The 165lb loudspeaker was too bulky to move outside for testing or to lift onto my computer-controlled turntable. I therefore had to do the quasi-anechoic measurements in my listening room, where the proximity of room boundaries led to more aggres-sive windowing of the time-domain data than usual, which in turn reduced the graphs' resolution in the midrange.

Although Magico specifies the M2's sensitivity as 88dB/W/m, my estimate was slightly lower, at 86dB(B)/2.83V/m. The M2's impedance is specified as 4 ohms. My measurements indicated that the impedance magnitude (fig.1, solid trace) was close to 4 ohms in the midrange but drops to 2.3 ohms between 74Hz and 88Hz. The electrical phase angle (dashed trace) reaches –71° at 50Hz. Although the magnitude at this frequency is 6.5 ohms, this phase angle significantly increases the current needed from the amplifier. This, and the combination of 3.2 ohms and –54.5° at 60Hz, means the M2 will be a demanding load. The single impedance peak at 40Hz indicates that this is the tuning frequency of the M2's woofers. The reduction in impedance above the audioband, in combination with an increasingly negative phase angle, is unusual. Loudspeakers typically have a rising magnitude in this region coupled with an increasingly positive phase angle, these both due to the tweeter's voice-coil inductance.

The traces in fig.1 are free from the small discontinuities that would imply resonances. When I investigated the enclosure's vibrational behavior with a plastic-tape accelerometer, with the speaker sitting on its MPod stands, I found that there was a low-level mode at 797Hz on the sidewalls.[1] The rela-tively high frequency and Q (Quality Factor) make it unlikely that this mode will have any audible consequences.

The blue trace in fig.3 shows the woofers' summed nearfield response. (Both woofers behaved identically.)

1 This graph was not taken with MLSSA, so the Y-axis level is not calibrated. It cannot be compared with cabinet vibrational cumulative spectral-decay plots in other *Stereophile* loudspeaker reviews.

Stereophile Magico M2 Impedance (ohms) & Phase (deg) vs Frequency (Hz)

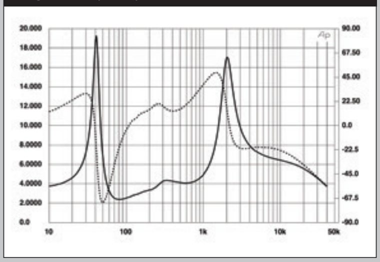

Fig.1 Magico M2, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

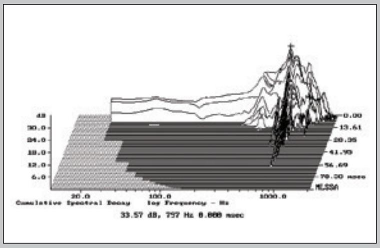

Fig.2 Magico M2, cumulative spectral-decay plot calculated from output of accelerometer fastened to center of sidewall level with midrange unit (MLS driving voltage to speaker, 4V; measurement bandwidth, 2kHz).

PHOTO: ALON WOLF, MAGICO

I could still perceive sufficient stereo spread of the Berlin orchestra when sitting off-axis. I have only experienced this phenomenon before with some minimonitors. That a tower like the Magico can do this is a tribute to its dispersion and even tonal balance.

The M2 may feature sealed-box woofers, but the low frequencies were weighty when appropriate. The orchestral basses in the Uchida "Emperor" sounded suitably rich but without sacrificing articulation. The solo double bass on "Come Together" from Musica Nuda's *Live à Fip* (16/44.1 Tidal FLAC stream, BHM Productions) was reproduced with excellent weight, as was my Fender bass guitar on the channel ID and phasing tracks on *Editor's Choice*. Both instruments also benefited from the M2's superb low-frequency clarity.

Staying with Simon Rattle, I was streaming his Sibelius Symphony No.5 with the Berliners (16/44.1 Tidal FLAC stream, Berliner Philharmoniker) when I realized just how transparent the M2's low-frequency reproduction was. At 4:30 in the third and final movement, to echo the ambiguous tonality of the symphony, Sibelius has the double basses, normally used by composers to provide a solid foundation to the harmony taking place above, playing *divisi* two notes that "fight," G-flat and F natural. At 6:20, the composer does the same thing, but now the contrarian notes are E-flat and F. With many speakers, especially those with an underdamped reflex alignment, while I would be aware that there was something sour with the apparently muddy bass writing, it took a look at the orchestral score to comprehend what I was hearing. With the Magicos, the score is unnecessary. You hear the discord as Sibelius intended: two low notes very close in frequency but far enough apart in pitch to be distinguished. This double-bass discord is something I hear in real life but not often as clearly with recordings as it was reproduced by the Magicos.

Toward the end of the five weeks I had the M2s in my system, I had to prepare the CD master for the Portland State Chamber Choir's second album of works by contemporary Latvian composer Ēriks Ešenvalds, *Translation*, which is scheduled to be released by Naxos in March. Doug Tourtelot and I had recorded the original sessions at 24/96. I therefore needed to audition the various noise-shaping options and sample-rate conversion filters offered by my dCS 972 processor, in order to preserve as much as possible of the hi-rez album's resolution. The Magico M2's transparency and its lack of coloration were a boon when it came to this task. They allowed me to make a clear choice which processing options worked best.

This transparency was maximized by the MPod stands, which made me suspect that Wolf was correct when he said

measurements, continued

The slight peak in the bass is almost entirely due to the nearfield measurement technique, which assumes that the drive-unit is firing into half-space rather than in all directions. The woofers cross over to the midrange unit (red trace) just below 300Hz, with a fast rolloff that is peak-free. The Magico's farfield response, averaged across a 30° horizontal window centered on the tweeter axis, is shown as the green trace above 300Hz in fig.3. The balance is superbly flat and even, though with a slight excess of energy in the upper midrange. Unusually, the M2's output in the top audio octave slopes gently down before starting to rise again above 20kHz. I repeated this measurement with the Dayton OmniMic system as well as with FuzzMeasure using the Earthworks QTC-40 microphone. While the OmniMic system is limited to 20kHz, the Earthworks has a 40kHz bandwidth. The FuzzMeasure measurement with the QTC-40 confirmed that the M2's response rises again above 20kHz, with a small peak present at 22.5kHz and a higher-level peak close to 35kHz. I understand that with a tweeter using a pistonic hard dome with a high-Q, high-amplitude, ultrasonic resonance, there will be a lack of energy in the region below that resonance.

Fig.4 shows the Magico's horizontal dispersion, referenced to the response on the tweeter axis, which thus appears as a straight line. The contour lines in this graph are evenly spaced throughout the midrange and treble, implying stable stereo imaging, and, commendably, the M2's on-axis balance in the treble is maintained to >30° to the sides. In the vertical plane (fig.5), a suckout starts to develop in the crossover region 15° above the tweeter axis. Even so, the M2 maintains its tweeter-axis balance over a wide ±10° vertical window.

The red trace in fig.6 shows the M2s' spatially averaged response in my room. This is generated by averaging 20 $^1/_6$-octave-smoothed spectra, taken for the left and right speakers

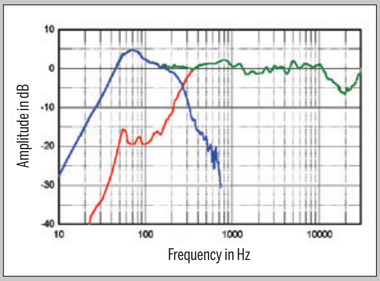

Fig.3 Magico M2, anechoic response on tweeter axis at 50", averaged across 30° horizontal window and corrected for microphone response (green), with the nearfield responses of the midrange unit (red) and woofers (blue) respectively plotted below 350Hz and 700Hz.

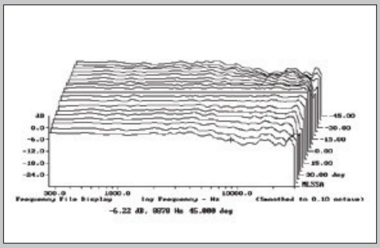

Fig.4 Magico M2, lateral response family at 50", normalized to response on tweeter axis, from back to front: differences in response 45–5° off axis, reference response, differences in response 5–45° off axis.

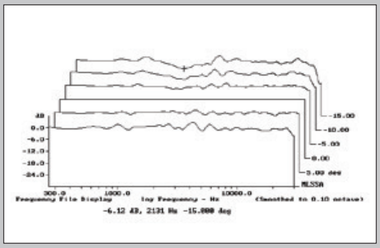

Fig.5 Magico M2, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 15–5° above axis, reference response, differences in response 5–10° below axis.

that these dissipate noise, which will reduce noise modulation. When there's no music, there is no noise, of course. But when there *is* music, the noise rides on top of it. This noise might be at a low level, but listeners are more sensitive to it than the level would suggest because it's correlated with the music.

Conclusion

It has been said about loudspeakers that "A good big'un always beats a good little'un!" While the speakers I have purchased and used for much of my critical listening over the past 40 years have been good little'uns—Rogers LS3/5a's, Celestion SL600s, Bowers & Wilkins Silver Signatures, KEF LS50s—there are still good big'uns that catch my ears and that I would be happy to live with. Magico's M2 joins that exclusive club—if I could afford them. Yes, this is an expensive loudspeaker, even without the mandatory MPod bases. However, this level of quality, not just of sound but also of construction, has never been cheap, as you will appreciate watching the 2018 video "How To Build A Magico Loudspeaker in 10 Easy Steps."[4] The M2 is a loudspeaker designed and manufactured by craftsmen, to be appreciated by well-heeled music lovers. ■

4 See youtube.com/watch?v=r5OMquMru3Y.

ASSOCIATED EQUIPMENT

Analog source Linn Sondek LP12 turntable with Lingo power supply, Linn Ekos tonearm, Linn Arkiv B cartridge, Channel D Seta L phono preamplifier.
Digital sources Roon Nucleus+ file server; Ayre Acoustics C-5xe^{MP} universal player; PS Audio PerfectWave DirectStream and Chord DAVE D/A processors, Chord Hugo M Scaler upsampler, Ayre QA-9 A/D converter.
Power amplifiers Lamm Industries M1.2 Reference monoblocks.
Integrated amplifier NAD M10.
Cables Digital: AudioQuest Vodka (Ethernet), AudioQuest Coffee (USB), DH Labs (1m, AES/EBU). Interconnect: AudioQuest Wild Blue (balanced) with Lamms, AudioQuest Fire (single-ended, with NAD). Speaker: AudioQuest K2. AC: AudioQuest Dragon Source & High Current, manufacturers' own.
Accessories Target TT-5 equipment racks; Ayre Acoustics Myrtle Blocks; ASC Tube Traps, RPG Abffusor panels; AudioQuest Niagara 5000 Low-Z Power/Noise-Dissipation System. AC power comes from two dedicated 20A circuits, each just 6' from breaker box.—**John Atkinson**

measurements, continued

individually using a 96kHz sample rate, in a vertical rectangular grid 36" wide by 18" high and centered on the positions of my ears. For reference, the blue trace shows the spatially averaged response of the Magico S5 Mk.II that I reviewed in February 2017,[2] while the green trace is the spatially averaged response of the Q Acoustics Concept 300 I reviewed in the January 2020 issue. (Because the Q Acoustics' response was taken with the NAD M10 amplifier, which digitizes its analog inputs at 44.kHz, the green trace drops like a stone above 20kHz.)

While performing these measurements, I noticed that the responses at the listening position of the two M2s matched very closely above 900Hz. The in-room response of the two Magico designs is very similar in the bass and midrange, though the M2 and the Concept 300 have slightly greater output between 600Hz and 1kHz than the S5 Mk.II has. The M2 has less energy between 1kHz and 2kHz than the other two speakers have, though all three behave similarly in the low to mid-treble. The slightly sloped-down output above 7kHz of both Magico speakers is due to the increased absorptivity of the room's furnishings at higher frequency, though the M2 produces less energy above 13kHz in-room than the S5 Mk.II. By contrast, the Q Acoustics speaker has significantly more top-octave output than the two pairs of Magicos have.

In the time domain, the M2's step response (fig.7) indicates that all four drive-units are connected in positive acoustic polarity. The decay of the tweeter's step, which arrives first at the microphone, smoothly blends with the start of the midrange unit's step, the decay of which blends smoothly with the start of the woofers' step. This time-coherent behavior suggests optimal crossover implementation. The Magico M2's cumulative spectral-decay plot (fig.8) is superbly clean overall, though with some low-level delayed energy apparent at the top of the midrange unit's passband.

As with the other Magico loudspeakers *Stereophile* has reviewed, the M2 offers excellent measured performance.—**John Atkinson**

2 See stereophile.com/content/magico-s5-mkii-loudspeaker-measurements.

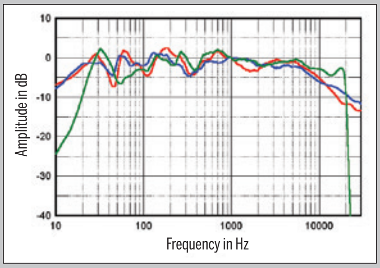

Fig.6 Magico M2, spatially averaged, ⅙-octave response in JA's listening room (red), of the Magico S5 Mk.II (blue), and of the Q Acoustics Concept 300 (green).

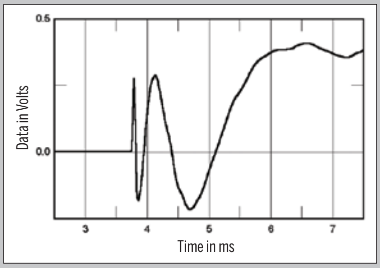

Fig.7 Magico M2, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

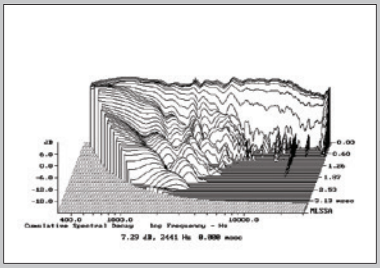

Fig.8 Magico M2, cumulative spectral-decay plot on tweeter axis at 50" (0.15ms risetime).