The Magnepan LRS

Back to the Future

For those of you familiar with Magnepan, its Little Ribbon Speaker (LRS) is a full-range quasi-ribbon speaker that was created to whet your audio appetite. Intentionally designed to extract the most from high-end amplifiers and electronics, Magnepan says its LRS is "an easy introduction to their brand and house sound." Oliver Masciarotte provides his opinion of the speakers while Kent Peterson measures its performance.

Photo 1: Magnepan's Little Ribbon Speaker (LRS) is a slim and stylish alternative to entry-level MDF boxes.

By
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(United States)

Most audiophiles know of Magnepan and its iconic Magneplanar planar magnetic loudspeakers. Unfortunately, fewer people have actually heard these usually room-divider–sized panel transducers. If they did, they'd appreciate how much fidelity one can buy for so few shekels. Take, for example, the new LRS model (see **Photo 1**).

Like their progenitors, these two–ways are thin—a mere inch in thickness. Somewhat novel, at least by Maggie standards, is their size. They're diminutive little panels, with solid-wood trim available in three finishes and three choices of fabric covering. At 4′ tall by 14″ inches wide, they'd fit into pretty much any space and virtually disappear when viewed from the side. They are also "handed," supplied as a left/right pair. In my space, I ended up configuring them with tweeters on the outside. Because they're dipoles, you can't hang them on the wall. Magnepan makes the MMG for that. The LRS, or Little Ribbon Speaker, requires a good bit of breathing room. My pair ended up 42″ from the rear wall, and some 7′ from my listening position.

The Setup

They arrive in a single 45 lbs. carton, with their bent iron, L–shaped feet detached (see **Photo 2**). Eight stainless screws later, two for each foot, and Bob's your uncle. Well, almost...I had recently swapped out my old Level 3 ANTICABLES for a significantly improved set of 9-gauge Level 3.1s. At the time I ordered them, I thought I was so clever to specify bananas at the amp end and large spades at the speaker ends. Upon eyeing the terminals provided by Magnepan, I was a bit disgusted to find neither three ways nor flat screws, but a strange and unholy something else altogether—a sort of small receptacle with angled set screw, made of iron no less. Since the LRS are two–way speakers, they even come with an iron jumper (!) to a second set of sockets for bi–amping. These terminals appear to be a throwback—way, way back, to a time when one would typically grab a length of zip cord, strip the ends, and carefully stuff them into the socket. Torqueing down on the set screw with a supplied Allen key would keep the wire in place. I was not about to chop off the spades on my newly minted cables, so I inserted one blade of the spade into the socket and carefully held it in place. To prevent shorts of the "free" spade blades against the painted metal plate on which the sockets are mounted, I cut a piece of paperboard to act as insulators (see **Photo 3**). Not ideal by any stretch of the imagination, and kludgy at best.

Next up was the signal chain: Mytek Brooklyn's USB DAC balanced outs directly into the Cambridge Audio Edge W (see Resources). I didn't even try my low-power AMPX solid-state Class A since the Magnepan website recommends "…direct-coupled, Class A/B designs with high current capability… (particularly) Class A/B amplifier designs that come close to doubling power at 4 ohms." How about 200 W of Class XA as delivered by the Edge W into the LRS' 4 Ω load? In a word: excellent. Plenty of grunt and clarity to match the quasi–ribbons, which are known for their transparency. Out of the box, they sounded noticeably harsh, but very quickly broke in. Within a half hour, they were well behaved and, after a single overnight brown noise workout, they were ready to charm.

Photo 2: The legs are a simple affair, with an iron loop to provide a slight forward tilt adjustment. The loop was prone to slipping on my wood floor.

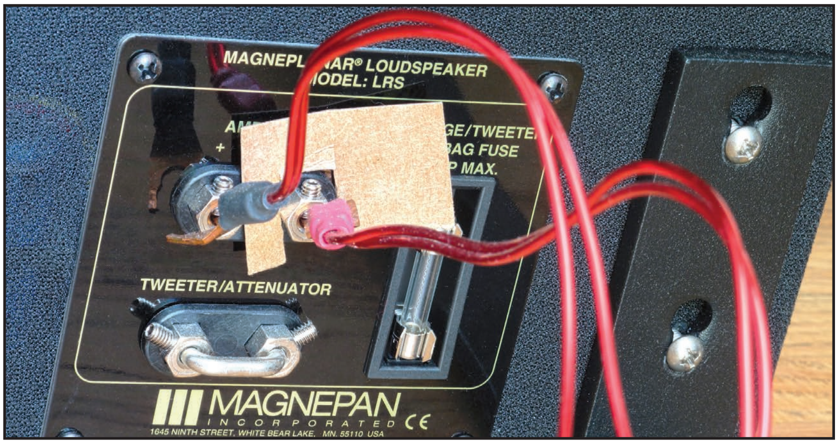

Photo 3: The input terminals are closely spaced bare metal, hence the cut paperboard. In this picture, the "tweeter attenuator" terminals and the factory iron jumper are clearly visible along with the fuse protection.

I know what you're thinking…"A $4,000 amp feeding a budget speaker? Harrumph!" Okay, it is a bit of a price mismatch, but I wanted to really hear what the speakers are capable of. For budding audiophiles, or for a second system, a modern Class D would nicely fit the bill. NuPrime's $745 STA-9 is a less than $1,000 example, and Parasound's $1,195 NewClassic 200 Integrated brings a whole lot of extra functionality to the party. Both are rated into a 4 Ω load. So, for less than $2,000, you'd only need a source component or two for a complete and highly capable system.

If you want to get all hi–fi highfalutin on me, you might want to go with one of several Purifi–based Class D monoblocks from Nord Acoustics or Apollon Audio. I had none of these on hand during this test, but I did have my inexpensive custom $300 50 W into 4 Ω Class D gathering dust, so I swapped the balanced ins and speaker leads and, guess what? Though the soundstage narrowed and clarity went by the wayside, the essence of the music was still there along with plenty of playback volume. Moral of the story? When in doubt, drive the LRS with modern pulse width modulation (PWM) technology unless you already have a quite hefty Class A/B amp lying around.

Ribbon Speakers

Let's rewind a bit and talk about true ribbons versus quasi–ribbons…First off, Maggies are passive planar magnetics, with corrugated aluminum ribbons glued to a single-layer polyester film carrier. The film is stretched taut between dual magnetic fields created by arrays of flexible permanent ferrite magnets closely related to those rubberized magnets you may have on your fridge. The magnets are affixed to perforated sheet steel, improving the rigidity and field strength. So, the metal foil stands in for a voice coil, and the film acts as a firm mechanical support in the same way as the former, spider, and surround do in a conventional driver.

In a true ribbon, the metal foil is unattached, vibrating freely in the magnetic flux. Planar magnetics from other manufacturers, typically seen these days in headphone designs, are fabricated with printed labyrinthine copper "voice coils" on a film carrier. When I first moved to the Twin Cities, I wrote an illustrated piece on Magnepan speakers detailing their construction. Suffice it to say that Magneplanar loudspeakers, regardless of the model, were the first planar magnetics of their kind and are still manufactured by hand with the aid of a few jigs. Inside the LRS is a low mid/woofer set of ribbons, and a set of narrower mid/tweeter ribbons, side by side on the Mylar. They are fed by a commodity first-order crossover.

Initial Impressions

The input terminals aren't the only aspect of the LRS' construction that I find vexing. In the packing box, you will find a set of tweeter fuses, spares for the ones already installed on the back. Remember those? Horrid little things, not conducive to full fidelity. But these a delicate speaker, in that a careless move on someone's part could damage the ribbon or, more likely, weaken the glue from overheating. But wait, there's more! The LRS also comes with two sets of power resistors. The 1 Ω and 2 Ω, 5% wire wounds are for padding down the tweeter. Let me state that there is nothing bright about these speakers. In fact, they start rolling at 400 Hz and just keep dropping at about 10 dB per octave. So, by the time you get 20 kHz, they are down by 30 dB! I know, that makes them seem as though they have no top end but, subjectively, that ain't the case. They are dark but certainly one doesn't need to drop the high end further.

So why the pads? Take a look at Kent Peterson's plots. The LRS exhibits a mid-range and a high-frequency beaminess, a prominent vertical poke in the eardrum that's all too apparent if you place them incorrectly. Hence, the tweeter pads (see **Photo 4**). Do yourself a favor—forego the questionable pads and position the speakers such that your head is below the beam. With that, you'll find the overall timbre to be subjectively neutral, if decidedly midrange–forward. Those L–shaped feet I mentioned earlier have rectangular loops of metal at their end that allow you to easily choose one of two settings for the speaker's tilt. I ended up using the tilted setting, finding it to be correct for my placement and listening position.

Overall Impressions

Being the size they are, an LRS will embrace you with a whole lot of love, but not a ton of bottom octave—50 Hz is about all you can expect. They are as bass-shy as a typical set of large bookshelves but, with or without a bit of EQ, they offer more than enough bass for everyone save the booty-obsessed. Their super-light drive elements make for an exceptionally smooth sounding and cohesive delivery. Being open-baffle dipoles, their low end couples naturally to the room, presenting an open, diffuse soundstage with solid imaging, and a top–to–bottom cohesiveness seldom heard with budget box two-ways. In my living/listening room, I routinely heard phantom images well outside the physical location of the speakers. This has not been the case with other speakers, even my open baffle Trio15 references. By the way, if you really need

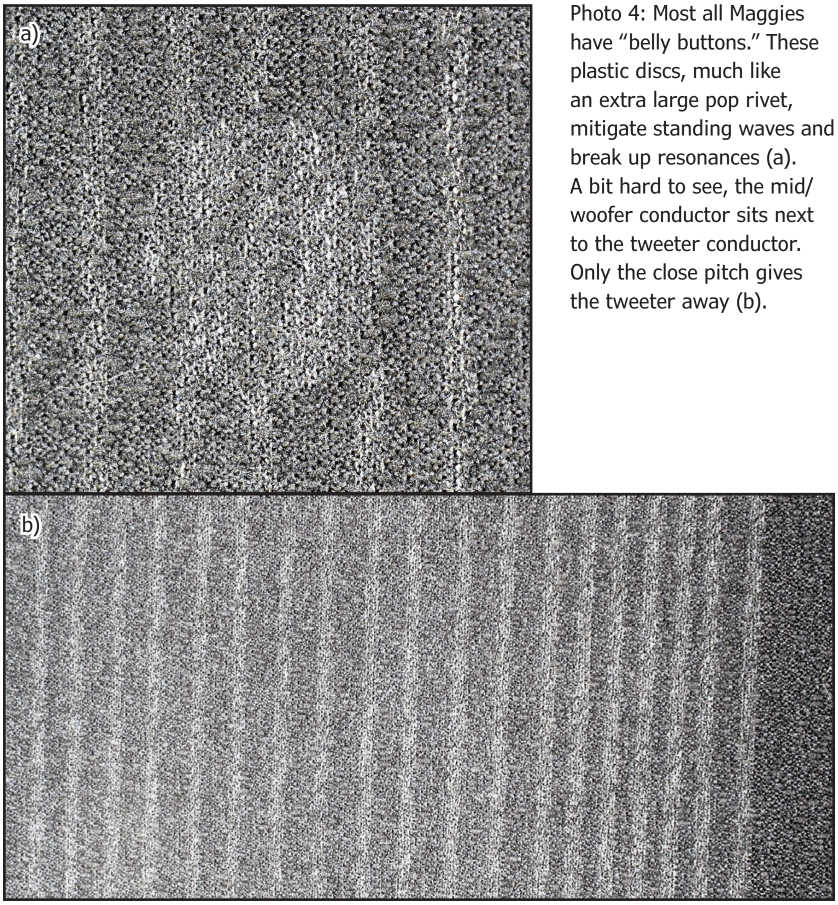

Photo 4: Most all Maggies have "belly buttons." These plastic discs, much like an extra large pop rivet, mitigate standing waves and break up resonances (a). A bit hard to see, the mid/woofer conductor sits next to the tweeter conductor. Only the close pitch gives the tweeter away (b).

About the Authors

O. A. Masciarotte has spent more than 30 years immersed in the tech space, working on facilitation, optimization, marketing, and product development for clients worldwide. As an author and speaker, he enjoys informing folks about technological best practices. More information is available at seneschal.net and othermunday.com.

Kent Peterson is sneaking up on 30 years in the Pro Audio and Acoustics field. Having designed hundreds of audio systems for professional install and approximately 100 miles of highway noise walls, Peterson now manages Warkwyn (www.warkwyn.com), where they help companies design better audio systems, represent Klippel and Microflown, while he simultaneously spreads sawdust on employee "accidents."

Resources

O. Masciarotte, "Cambridge Audio Edge W Power Amplifier: Amplification to Live With," *audioXpress*, January 2020.

O. Masciarotte, "Magnepan Incorporated—A Tiny Giant," HIFIZINE, September 2013, www.hifizine.com/2013/09/magnepan-inc-a-tiny-giant.

more bottom, employ a dipole woofer/subwoofer. It will integrate best with the open-baffle LRS.

Budget? So far, I haven't mentioned the cost of these little wonders. Would you believe $650? These are truly entry level in price but, performance-wise, there are only a handful of worthy alternatives. ELAC's Uni-fi line and MartinLogan's Motion line are front of mind, and those little boxes are lovely for the money but very different beasts. Like every other product I review, I first heard the LRS, then decided to write them up. Frankly, the Little Ribbon doesn't measure well, as Kent Peterson's companion metrics attest. If all you go by are specs, then these little droids aren't the ones you're looking for. If, however, you are careful about placement, adjusting their vertical angle relative to your listening position, you'll be rewarded with musical reproduction far in excess of expectations.

One advantage of all Magnepan products that's not intuitively obvious is their amenability to upgrades. Whether it's their crossovers, hardware, or their internal wiring and fuses, swapping out factory components addresses that tweaker need to experiment. Despite its faults of omission, no deep bass and darkish top end, Magnepan's LRS is a crazy good loudspeaker for the price. It really begs for a much more costly amplifier than you would typically pair with something this inexpensive. These little guys really do well when driven with confidence by a powerful amp. By saving a little on your speakers, you have more leeway to purchase a better quality amp and still land on a satisfying, low-cost system. Another advantage of any Maggie is the DIY upgrade community that surrounds the brand. You can drastically improve performance with a bit of pocket change and some very low-impact sweat equity.

Wendell Diller, Mister Sales at Magnepan, characterizes the LRS as an "appetizer," and low-cost entry into the world of Maggies. "The beauty is in the simplicity," he says, which is one of the reasons why all Magnepan products pack a huge amount of value into a cost-effective package. Maybe you're in the market for a second system. Possibly you're just starting out in this hobby or you know someone who is. If any of those scenarios apply, then you owe it to yourself to evaluate a pair and that's easy to do.

In the sidebar to this article, Kent Peterson shares the measurements he obtained for the LRS speaker using the Klippel Near-Field Scanning system.

EQ Is Your Friend

I listened to the LRS with and without EQ. Although a beefy amp is essential, equalization is highly recommended. I've mentioned it in the past and would like to stress that the audiophile aversion to equalization is a holdover from the "Golden Age of High Fidelity," when resonant frequencies and group delay were baked into "tone controls" and, with few exceptions, there was nothing hi–fi about the associated analog circuitry.

I hate to break the news, but times have changed. My two favorite cross–platform player apps, Amarra and Audirvana, both have EQ capabilities—one built in and the other hosting third-party products. For this review, I first pressed Amarra's in-built, minimum phase EQ into service to good effect. A tasteful low-end shelf, and a touch of high-frequency shelf to illuminate the LRS' darkness and mucho más divertida, kids!

As with the amplifier choices, I wanted to test the limits of equalization. For that, I switched over to Audirvana, which hosts my favorite surgical EQ. The $589 linear phase thEQorange is made by my company, MAAT, and is arguably the most transparent software EQ available (see **Photo 1**). So, I simply had to try it. The result, in short, was wonderful. With careful equalization, the LRS achieves a whole new level of performance, easily competing with loudspeakers costing three or more times their price. You don't need to go to such extremes but I do recommend, if you have a file-based playback chain capable of hosting better quality equalization (DMG Audio, FabFilter, MAAT, PSPaudioware, and Sonic Studio) that you give EQ a try. You just might change your mind about tone controls.

My fellow engineer and old friend Jayson Tomlin was over for a listen, and was quite surprised by the cleanliness and non-fatiguing definition offered by the equalized LRS. Listening to a hi-res audio (HRA) guitar track on Qobuz, he commented, "I can about tell where the knob is on the chorus pedal for that acoustic." In other words, subtle detail without etched harshness.

Photo 1: This EQ combines an upward low-frequency tilt with a midband scoop and a steep low-frequncy roll-off to limit excursion. Band #12 provides a 3 dB lift at higher frequencies to correct for the dark aspect I mentioned.

The Measurements By Kent Peterson

I measured Magnepan's LRS at Warkwyn's facility using the Klippel Near-Field Scanning (NFS) system (see **Photo 1**). The NFS delivers a 360° acoustical radiation balloon allowing for an examination of the radiation pattern, on/off-axis frequency response at any angle or distance, and any directionally important information that might help when determining where to place this dipole into your listening environment.

Unfortunately and right at the time of measurement, COVID-19 restrictions and work-from-home mandates were put into place, which cut short our complete evaluation of the LRS. Sadly, that meant I couldn't visit Oliver Masciarotte's cozy home for a listening session. Nevertheless, we were able to make substantial acoustical measurements on the LRS.

For the measurements of the LRS, we used 3.5 Vrms, a calibrated ACO Pacific free-field microphone with the 4048 pre-amp and a 7052E capsule was used and all on-axis data is referenced at 1 m/2.82v for sensitivity, and 3 m for some evaluations in the listening field. Measurement points around the speaker totaled 2500 and were processed with a resolution of 18 points per octave and from 20 Hz to 20 kHz. The length of the stimulus was 0.40 seconds with an averaging of 4.

As with the previously reviewed Pure Audio Project Trio15 Heil (*audioXpress*, September 2019), before examining the frequency response curves, we remind readers that the LRS is a dipole speaker configuration. With that come some pretty jagged response curves as a result of the cabinet-less design. Another factor contributing to the complex interference and summation across many frequencies is the acoustic "shortcut" or diffraction around the cabinet.

Dipolar loudspeakers function well when paired with reflective surfaces in your listening environment and sometimes cold, scientific anechoic measurements do not tell the entire story. To address that in this analysis, we have added CEA-2034 listening window curves, which better define what a user might experience in a typical listening environment. More on that later, let's dive into the raw data as it is measured anechoically.

Horizontal On/Off Axis Frequency Measurements

Examining the frequency curve on-axis shown in **Figure 1**, the LRS exhibits two prominent peaks at 55 Hz and 90 Hz, a pronounced low-mid bump between 300 Hz and 500 Hz, and a gradual roll-off to 8 kHz where the high frequency rolls off by 10 dB and into the noise floor at about 16 kHz. Summation and interference are presented as jagged peaks and valleys throughout the spectrum and are to be expected due to the dipole nature of the cabinet. Of interest are the high-frequency peaks between 10 kHz and 16 kHz in both the 15° and 30° off-axis measurements, the 8 dB increase between 1.5 and 6 kHz at 60° off-axis, and the deep notches present between 650 Hz to 1.8 kHz, 15° and 30° off-axis.

However, examining only positive degree measurements do not tell the entire story as the LRS has an asymmetrically positioned ribbon tweeter. In our measurement condition, the tweeter was positioned on the right side of the cabinet- or in the positive phi angle plane. Giving fair due, an examination of the negative phi off-axis measurement is shown in **Figure 2**.

A trip around the left side of the cabinet and at 0° theta completely fills in the holes in the mid-band present on the right side and between 500 Hz and 1.5 kHz. Even further off-axis the mid-band is accentuated. Interestingly there is a boost in the high frequency off-axis and at -60° albeit slight.

Photo 1: Magnepan's LRS is shown in its default angle for measurement using the Klippel Near-Field Scanning (NFS) system at Warkwyn's facility.

Horizontal and Vertical Contour Maps

Examining these single-frequency response curves can be a good indication of where to place this entry-level dipole, but I prefer to look at an unwrapped radiation balloon to understand the completeness of acoustical radiation at all frequencies. However, before we look at those plots, it is worthwhile to understand where the near-field of these speakers' transition into the far-field. Given

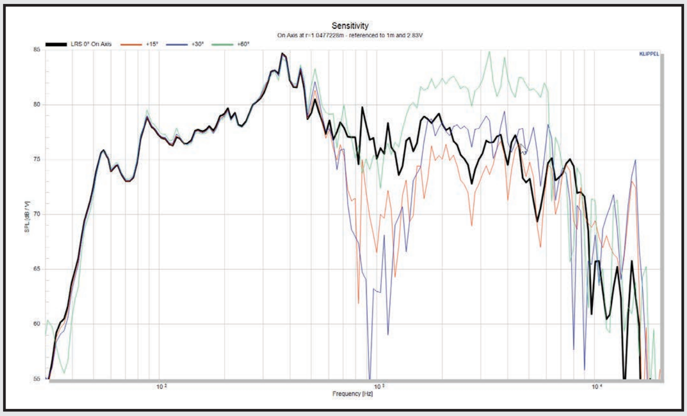

Figure 1: Horizontal sensitivity on-axis, 15°, 30° and 60° (no smoothing) in the positive axis direction

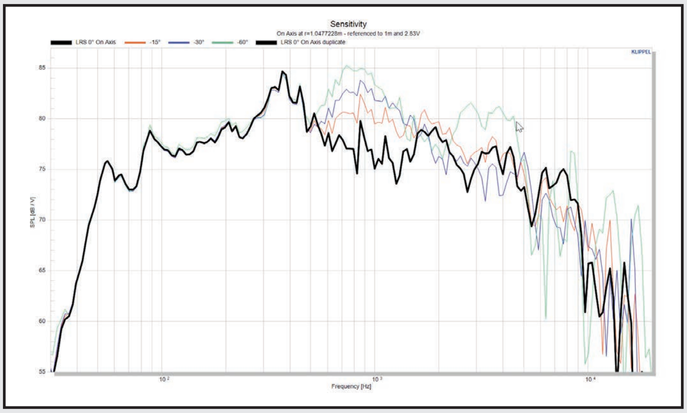

Figure 2: Horizontal sensitivity on-axis, -15°, -30° and -60° (no smoothing) in the other, negative direction

the size of the LRS (122 cm tall, 37 cm wide) and their complex radiation pattern, we wouldn't want to sit too close. Thankfully, the Klippel NFS helps us with an estimation of where the far-field should begin. I have provided an examination of that transition distance.

Figure 3 details sound power (Y) over distance (X, in meters) as the spherical harmonics increase (N) in ascending order. The near-field is characterized by a high amount of reactive power represented by high order Hankel functions. As seen in the graph, the near-field effects decrease over distance as it transitions into the far-field. After the transition, apparent sound power begins to be consistent as velocity and sound pressure become in phase with each other. This point of consistency is where the far-field begins.

For this speaker, that distance is approximately 1.5 m. Note that the use of Hankel functions in the computation could be controversial in this instance as Hankel functions describe the in/out cylindrical expansion of the radiation balloon and are attributable to more standard point source systems. If we are to take the LRS as a true plane wave or line source generator, then the far-field could be construed to be further away due to the $1/r^2$ law being gamed. That being said, and to avoid controversy, let's double the distance to the far-field to a 3 m distance.

All that setup allows us to present the unwrapped horizontal and vertical contour mapping in the far-field with a high degree of confidence at 3 m. The horizontal contour map is shown in **Figure 4**.

In conversations with Masciarotte, he suggested that I might be able to help the reader better understand these contours during this write up. I stare at these tie-died results on a daily basis, but they may be foreign to some. In the horizontal map, I have added the top of a human head. This is a simple representation of the listening position in relation to the mapping. The entire plot is an equidistant measurement, with the vertical axis (Y) representing horizontal degrees relative to the speaker's central axis. At 0° (black center line through the mapping), the listener is right on center of the speaker, with the corresponding frequency response along the black line. The plot's horizontal axis (X) represents frequency, traditionally plotted with low values at left and higher toward the right and from 20 Hz to 20 kHz. The amplitude is represented as a heat map, with a decibel scale shown to the right of the head symbol.

Remember that the unit under test was one half of a mirrored pair, with each speaker having an asymmetrically placed tweeter side-by-side in a horizontal arrangement. Notice the left–right asymmetry caused by that speaker's offset ribbon tweeter (tweeter on right side of cabinet) and illustrated here by the mismatch between the plot above the 0° axis with that below the axis.

By moving the virtual head up to +20° in the plot, you are essentially moving the virtual listener around the right of the cabinet while maintaining an equal elevation and distance from the speaker. Move the head into the negative, below the 0° axis, and you would be moving around the left side of the cabinet. At the extreme top and the bottom of the map, you are effectively looking at the rear of the cabinet (180°), and of course at 90° you are looking at the side of the cabinet. Those horizontal, dark blue areas at ±90° represent the telltale total drop out of pressure below 2 kHz, indicative of a figure-8 dipole pattern.

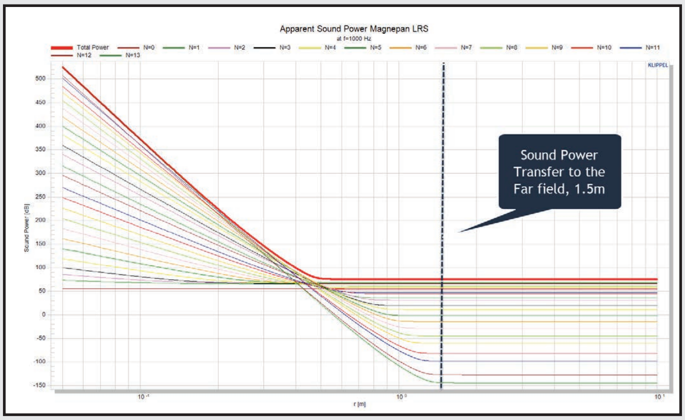

Figure 3: Apparent sound power transitioning from near- to far-field

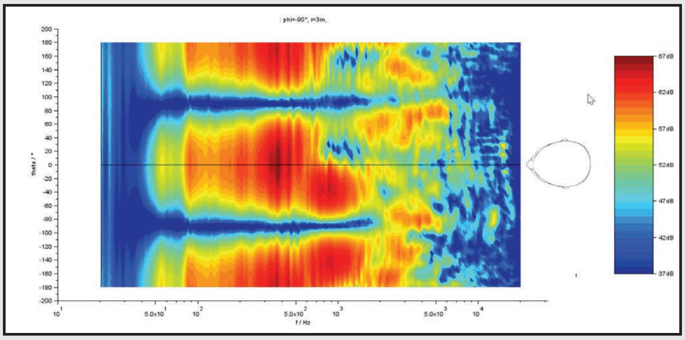

Figure 4: Unwrapped horizontal contour balloon, 3 m

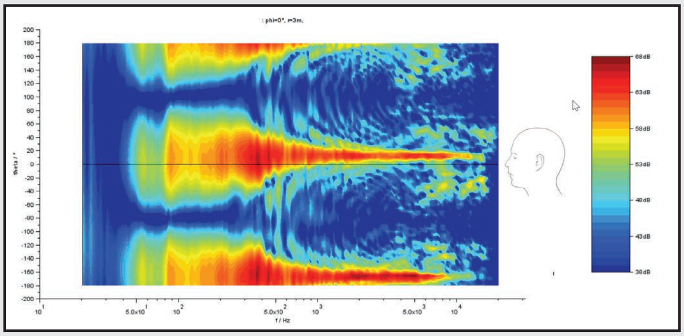

Figure 5: Unwrapped vertical contour balloon, 3 m

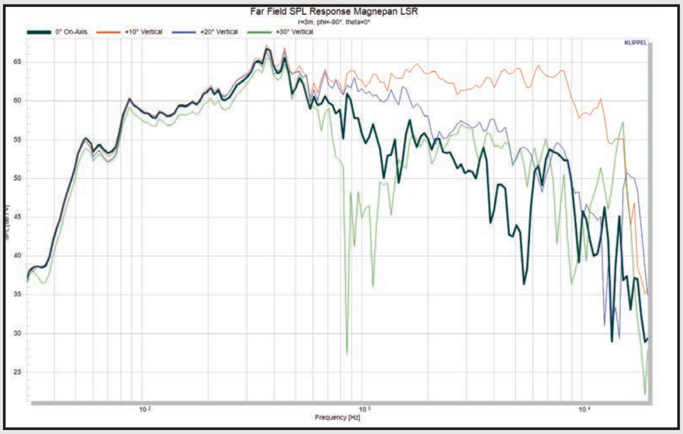

Figure 6: Vertical frequency response at 10°, 20° and 30°, 3 m

Close examination of the horizontal contour map reinforces single-curve measurements on/off axis and at ±15°, 30°, and 60°. From 0° to 30° in the + direction (up" in the map), there is a complete loss of amplitude from 600 Hz through to about 3 kHz. Interestingly, we can see that there is a recovery in pressure level from about 1.5 kHz to 7 kHz at 40° through 80°, this showed up in our 60° curve measurement in Figure 1, and is indicative of the ribbon location.

The usefulness of the unwrapped horizontal contour map shows us this increase in pressure level is good through about 80°, even approaching 90° higher in frequency.

However moving around the left side of the cabinet, negative degrees in the plot, offers a different set of challenges, namely low amplitude from 1.6 kHz and up through 40°. This had me repeatedly going back and looking at the curves in Figure 1 and Figure 2 for verification and yes—there is generally a smoother roll off of the high frequency to the left as opposed to the right though the upper ranges are down up to 10 dB from the right side of the cabinet. The hole encountered at +20° centered at 1 kHz is now present at -20°. And interestingly, the LRS seems to emit more sound in the mid and high frequencies at 90° and at almost 140° behind the cabinet. Contour maps can be your friend, especially when placement of your speaker near reflecting surfaces is so important with dipole systems.

Examination of the vertical contour map offers a good look at your vertical listening window (see **Figure 5**). As in the horizontal contour map, in the vertical contour map I've placed a human head at 0°; he's deep listening. As he "moves up," away from 0°, he's going up and around the cabinet. Moving in the negative direction (down), he is going toward the bottom of the cabinet. At ±90°, he's either listening to the top of the cabinet or the bottom. I wouldn't recommend flying these in a PA installation, but I've seen weirder.

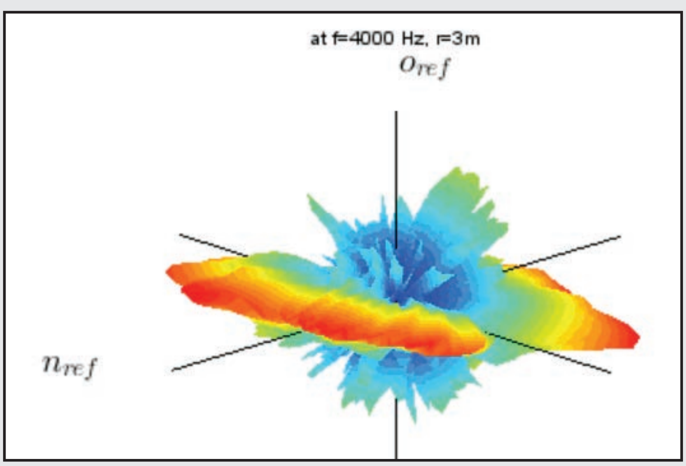

Figure 7: Isometric radiation balloon at 4 kHz, Nref = 0°

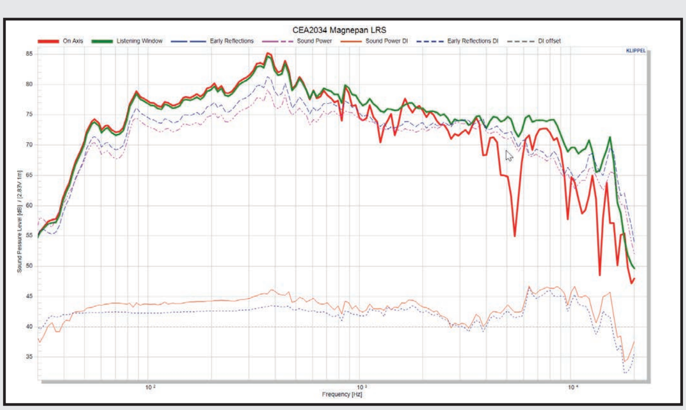

Figure 8: ANSI/CEA2034 graph with indicated listening window

Evident in the contour map is the beaming nature of a planar/electrostatic speaker. Contrary to the horizontal mapping, frequency response looks good albeit in a very tight listening window and angled about 10° up. This, in itself, tells you that analyzing frequency response in the horizontal plane at 0° theta alone might not provide you with all of the information you might need in assessing speakers. It also infers how the speakers are positioned in the default factory stand and tilted relative to the listener's head and floor.

Going back to the measurement platform, we can look at the frequency response at +10°, 20°, and 30° in the vertical plane (see **Figure 6**). Now we're getting somewhere! A +10° shift in the vertical produces a very respectable frequency response curve albeit as tight as can be and already rolling off around 20°. Could this be the difference between sitting and standing at 3 m? **Figure 7** shows the 10° beaming in a 3D radiation balloon.

Of note, there is equal and opposite angular lobing in the rear and at -10°. It is a dipole. Consider though, how the rear reflection possibilities might support the high frequency. Sort of a precedence effect/reverse Haas kicker/reflection board could be placed behind the cabinet on the floor and within a 10 ms reflection window? OK, maybe I'm stretching.

The moral of the story? Don't just rely on the 0° theta horizontal axis measurements to understand a speaker's capabilities, especially when the mid-band or high-frequency components are aimed in a particular vertical orientation.

ANSI/CEA 2034 Analysis and Comments

As mentioned in the introduction, the Magnepan LRS speakers were just between measurements and listening when the world caught a serious virus. Most of us were sent to work from home and that put a stop to a total assessment (including impedance measurements). However, CEA 2034 offers a way to examine the frequency response while the device is in a typical listening space. It does this by integrating and averaging a number of frequency response curves, taking into account near-field reflections. It also provides a listening window, which is a spatial average of the 9 magnitude responses in the ±10° and ±30° angular ranges (see **Figure 8**).

So, when all of the critical, cold and objective analysis is done, at the end of the day and in a "typical" listening environment, the frequency response of the entry-level Magnepan LRS isn't all that bad. Sure, it looks mid-frequency dominant, and begins to roll the high frequency off around 500 Hz, but a little high-shelf equalization can correct for this. Is there a ton of low end? No, but that's typical of electrostatics, and you're probably going to hide a sub in the corner and put a doily on it.

My inclination would be to make the speakers stand perpendicular to the floor so that the high-frequency beaming aimed 10° up would be parallel to the floor and right at my comfortably seated ears. Overall, I think the LRSs are pretty sexy for their very low price point. After these last two reviews of dipoles, my curiosity is heightened, if not just for the uniqueness of the packages.