

# Reference 3A MM de Capo i loudspeaker

As names go, "Reference 3A" is awful. It sounds less like a company than it does a model number, as in the Dudco Reference 3A (on sale now wherever Fourier speakers used to be sold); I find it hard not to expect a Reference 3B with each new year. Add to that a cumbersome and somewhat meaningless model designation, "MM de Capo i"—what do the *M*s stand for? what does the *i* stand for? haven't there been other de Capos in audio recently?—and my poor brain becomes utterly confused. And the older I get, the less I can tolerate being confused. Forgive me if, during the course of this review, I get lazy and fall back on the lazy and admittedly somewhat Clintonesque *this speaker*.

In every other meaningful way, the Reference 3A MM de Capo i is as unforgettable as your favorite song, and some people will consider it just as lovable. Difficult though it is for me to wrap my tired mind around its name, it's also hard for me to think of another \$2500/pair speaker that combines this one's superb musical flow and feel with such a very fine sense of scale, acceptably low coloration, and much greater than average electrical sensitivity. This is one hell of a nice thing.

I've just finished listening to Glenn Gould's performance of Brahms' Intermezzo in A, Op.118 No.2, from the new collection *...and Serenity* (Sony Classical SK 90538), a beautifully conceived sequel to last year's *A State of Wonder*, and *this speaker* was satisfying in virtually every way important to me. Pitch certainty was superb. Timbre was fine. When Gould eased back on his arpeggios and the tempo became almost march-like for eight bars or so (beginning at about 2:45), this speaker signaled the change in flow and feel so effectively that the hairs on my arms stood up. And on the same disc, the de Capo even did a stunning job of reproducing the low B that comes 50 seconds into the *Largo* of the Sibelius Sonatine in E—and did so without making it sound small or pinched. Good grief—my



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physically much larger Lowther Medallions can't do *that*.

What accounts for that sort of performance?

### The MM de Capo i

At first glance, this speaker looks like a thousand other stand-mounted two-ways on the market: stubby if nicely made things with sloped front baffles for physical time alignment, as well as chamfered edges, presumably to mitigate the nasty effects of treble splash.

The MM de Capo i, which was designed by company founder Daniel Dehay, is built around a proprietary mid-range/bass driver common to all

Reference 3A loudspeakers: a 7" cone of woven carbon fiber, executed here with an unusually flexible rubber surround and a blunt, molded phase plug. A multilayered wooden disc called a Vibra-Puck (as distinguished from VibraPod, VibroLux, or WonderPuck®), intended to control unmusical resonances, is cemented to the back side of the motor, and in a move reminiscent of the one-piece baffle-frame assembly of the Epos ES11 woofer (and other designs like it), the Vibra-Puck is sturdily bolted to a wooden brace inside the cabinet.

Said cabinet is, in fact, well-braced throughout, and nicely assembled from ¾" MDF. The rear baffle incorporates a reflex port, which measures 2.5" in diameter and bends 90° toward the bottom of the box. My review pair was finished in an attractive

maple veneer that contrasted prettily with the black fabric grilles, and which is one of two standard finishes (the other is the same wood stained red). A little more money can buy a pair of these speakers in black lacquer.

Reference 3A calls their woofer a "hyperexponential" cone, and the company takes obvious pride in its design and manufacture: because it's made to such exacting tolerances, and because its response is tailored so specifically to their own loudspeaker designs, they say, this handmade driver can be run flat-out, driven directly by the user's amplifier, with no filter components of any sort between it and the input terminals. The

**Description:** Two-way reflex-loaded loudspeaker for use with stands 26–28" high (not included). Drive-units: 1" impregnated fabric-dome tweeter, 7" woven carbon-fiber cone woofer. Impedance: 8 ohms. Sensitivity: 92dB/W/m. Frequency response: 44Hz–20kHz, ±3dB. Crossover frequency: 3kHz.

**Dimensions:** 15" H by 11" W by 13" D. Weight: 27 lbs.

**Finishes:** Maple veneer, cherry red-

stained maple veneer; "piano-grade" black lacquer, add \$250/pair.

**Serial numbers of units reviewed:** D2636L & R.

**Price:** \$2500/pair. Approximate number of dealers: 32.

**Manufacturer:** Divergent Technologies Inc., 342 Frederick Street, Kitchener, Ontario N2H 4L8, Canada. Tel: (519) 749-1565. Fax: (519) 749-2863. Web: [www.reference3A.com](http://www.reference3A.com).

tweeter, for its part—a 1" fabric dome that the company says is made to their specifications—is saddled with only a single capacitor as a high-pass filter.

That, as much as anything else, is responsible for this speaker's higher-than-average electrical sensitivity. Combine that with an amplifier-friendly impedance curve—8 ohms for the most part, with no unpleasant bending—and you have a distinctly *efficient* speaker. Consequently, like other Reference 3A designs past and present, the de Capo has garnered lots of attention from en-

thusiasts of single-ended triode (SET) tube amps.

All the materials used in making the MM de Capo i are first-class. The above-mentioned filter component is a chunky, old-style oil cap, and similarly retro-looking wool felt appears here and there for sound absorption. The connecting wire is halogen-free van den Hul, and the double sets of speaker connectors (for biwiring) are from Cardas, as are the oddly shaped solid-copper links, which resemble the things people throw at each other in the film *Zardoz*

(or was it *Planet of the Apes?*).

Construction quality is superb—all Reference 3A manufacturing is now done in Canada, having moved there from Switzerland—and it would be a shame not to mention the robust carton and packing materials used to ship these speakers, including individual cotton sacks that I found helpful for keeping the speakers dustless when not playing music.

**Set-up**

Using ancient metal stands and adjustable spikes, I raised the de Capos about

**Measurements**

The MM de Capo i's voltage sensitivity was above average, at an estimated 91dB(B)/2.83V/m, which is slightly but inconsequentially less than specified. Its impedance (fig.1) was reasonably benign, dropping below 6 ohms only in the lower mid-range and the high treble. (The speaker is thus both sensitive *and* efficient.) The minimum value was 5.1 ohms at 10kHz, and the electrical phase angle was generally mild. Note that the shape of the impedance curve means that using this speaker with a tube amplifier having a high source

impedance will pull down its mid-range level compared with solid-state drive. The significance of this will become apparent.

There are three significant glitches in the impedance traces, between 400Hz and 900Hz, which indicate the presence of cabinet resonances. Examining the panel's vibrational behavior with a plastic-tape accelerometer reveals some major resonances to be present, particularly on the rear panel (fig.2). However, it is fair to note that Art Dudley didn't comment on any coloration that could be traced to this behavior.

The saddle at 46Hz in the impedance-magnitude trace indicates the tuning frequency of the 2.5"-diameter port on the rear panel, which was confirmed by nearfield measurement of the woofer's output. Its response curve (fig.3) is marked by a sharp null at the same frequency, due to the port resonance applying sufficient back pressure at this frequency to hold

the woofer cone motionless. As can also be seen from fig.3, all the speaker's acoustic output then comes from the port. The port's response is basically smooth within its passband, but is marred by three midrange peaks. Not coincidentally, these lie at the frequencies of the glitches in the impedance traces.

The woofer is driven without any low-pass crossover filter intervening, so the upper-frequency rolloff seen in fig.3 is its natural behavior. With the tweeter filtered by a single series capacitor, the two drive-units cross over between 4kHz and 5kHz, the tweeter having a little too much on-axis energy in its top two octaves. As AD found, this will be ameliorated by aiming the speakers straight ahead rather than toeing them in to the listening seat.

AD remarked on the speaker's mid-range "bump." This can be clearly seen in fig.3 as an excess of energy in the octave between 500Hz and 1kHz. I would have expected this to add a distinctly nasal coloration, and AD did comment that the speaker made "violins sound a little thicker than they

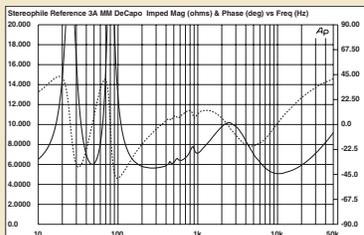


Fig.1 Reference 3A MM de Capo i, electrical impedance (solid) and phase (dashed). (2 ohms/vertical div.)

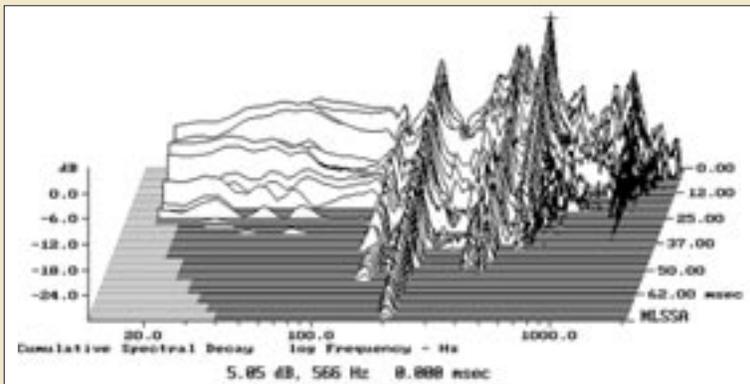


Fig.2 Reference 3A MM de Capo i, cumulative spectral-decay plot calculated from the output of an accelerometer fastened to the cabinet's rear panel. (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz.)

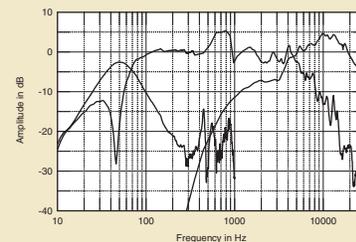


Fig.3 Reference 3A MM de Capo i, acoustic crossover on tweeter axis at 50", corrected for microphone response, with the nearfield responses of the woofer and port plotted below 300Hz and 1kHz, respectively.

29" off the carpeted floor, with little dabs of Blu-Tack between the stands and the bottoms of the cabinets. Coming so soon after my experiences with the Ayre AX-7 amplifier (*Stereophile*, October 2003), I'd rather not blow a thousand words on another setup saga; suffice it to say, these speakers confounded my early efforts at placement, and it took a lot of waltzing around to get them sounding spacious and unfussy.

Interestingly, although the de Capos are "handed" in the usual way—the tweeter is closer to one edge of the baf-

fle than the other—the manufacturer recommends an unusual approach to room placement, with the tweeters on the outermost rather than the innermost edges. The manual also recommends aiming the speakers straight ahead; thoroughness and an immature desire to be contrary led me to try toeing them in anyway, but the sound that resulted was spatially fussy and tonally relentless. For once, I agree: Straight ahead is the way to go.

Two more placement notes: First, the manual recommends that people

with smaller rooms try placing the de Capos along the long wall, firing across the room's short dimension. An earlier experience with one of this speaker's floorstanding predecessors (*Listener*, Vol.6 No.5) bore that out, but when I tried it with the de Capos in my 228-square-foot, medium-small listening room, I wasn't similarly rewarded. Then again, with a brand-new pair of \$2500 speakers and the rest of your life ahead of you, you'd be crazy not to try everything.

Second: Irrespective of how nice that

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are." However, it is also possible that this response shaping adds an articulate character to the speaker's presentation.

Fig.4 shows the Reference 3A's responses averaged across a  $\pm 15^\circ$  horizontal window on the tweeter axis. The midrange bump can again be seen, as can the excess energy at the top of the tweeter's passband, but the curve is otherwise reasonably even. The MM de Capo's bass looks flat in this graph, but as the nearfield measurement technique should boost the upper bass by 3dB, the speaker's low-frequency tuning is actually a little on the overdamped side. The measured -6dB point was a respectable 42Hz, or about the lowest note of the four-string bass guitar.

Fig.5 shows how the speaker's balance changes to the sides of the tweeter axis, with those on the tweeter side of the baffle shown to the front of the graph. On this side, the radiation pattern is marred by a major suckout between 3kHz and 6kHz, which I assume is why Reference 3A recommends setting up the speakers with their tweeters on the outside edges. Conventional wisdom holds that

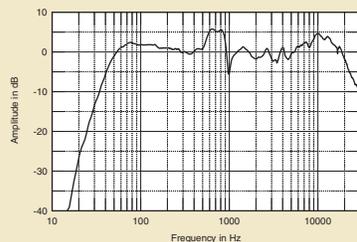


Fig.4 Reference 3A MM de Capo i, anechoic response on tweeter axis at  $50^\circ$ , averaged across  $30^\circ$  horizontal window and corrected for microphone response, with the complex sum of the nearfield woofer and port responses plotted below 300Hz.

using a drive-unit as large as the de Capo's woofer will result in severe beaming at the top of its passband. To my surprise, while the midrange peak and subsequent suckout persist off-axis, the de Capo's dispersion is quite broad between 1kHz and 3kHz, especially on the side opposite the tweeter. This graph also shows that the tweeter's output rolls off quite quickly to

the sides above 10kHz, which is why the MM de Capo's top-octave balance can be adjusted by experimenting with toe-in or the lack thereof.

In the vertical plane, the use of a minimal crossover results in rather a messy-looking radiation pattern (fig.6), though it does look as if the low-treble balance smooths out a little if you sit just below the tweeter

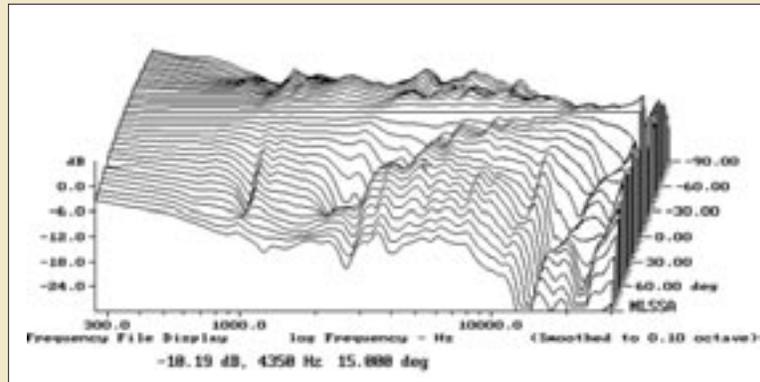


Fig.5 Reference 3A MM de Capo i, lateral response family at  $50^\circ$ , normalized to response on tweeter axis, from back to front: differences in response  $90^\circ$ – $5^\circ$  off-axis on side opposite tweeter, reference response, differences in response  $5^\circ$ – $90^\circ$  off-axis on tweeter side of baffle.

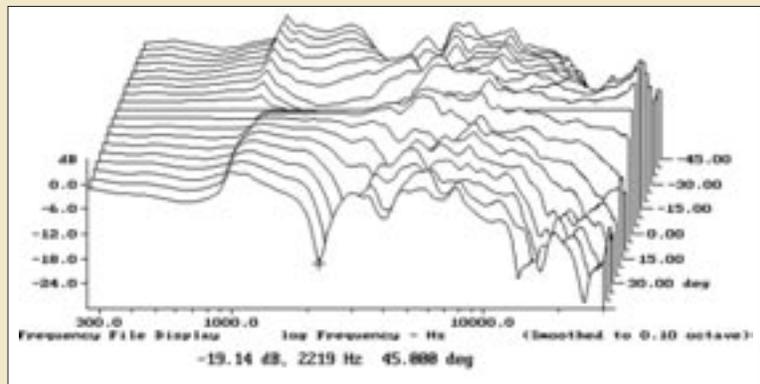


Fig.6 Reference 3A MM de Capo i, vertical response family at  $50^\circ$ , normalized to response on tweeter axis, from back to front: differences in response  $45^\circ$ – $5^\circ$  above axis, reference response, differences in response  $5^\circ$ – $45^\circ$  below axis.

black cloth looks against the pale maple veneer, the best thing you can do with the grilles is to lose them: Having them in place changed the de Capos' sound for the worse. As I hinted a moment ago, those cotton sacks will give you all the protection you need when you're not actually using your hi-fi.

### Sound

Of course if you demand the same sorts of things from a hi-fi system as I do, a pair of MM de Capo i's won't see a lot of down time in your house. But be aware that these did take a while to run in. At first they sounded grainy—very grainy, in fact—as well as hooty and a bit shut in. Over time, presumably as that tweeter loosened up, these speakers sounded considerably more open and airy.

This speaker never lost every iota of that hooty coloration, though, leaving me to think of its response as very slightly lumpier than the ideal, with a midrange boost here that made violins sound a little thicker than they are, and a notch there that robbed voices of a bit of texture—that which gives keening voices their keen. Likewise, Peter Wispelwey's cello in Saint-Saëns' Concerto 1 (Channel Classics CCS SA 16501) always sounded a small shade thicker than I think it should. These

worries were slight: You'll hear them if you compare the Reference 3As with something more unambiguously flat, like classic Spendors, but I doubt you'll be troubled.

And whatever the flaws, they were dwarfed by this speaker's tremendous *expressiveness*. It was impossible to hear Bill Monroe's "Lonesome Moonlight Waltz" (from MCA's fine four-CD retrospective, MCAD4 11048) without

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picturing those big, old gnarly hands of his coaxing—sometimes inelegantly—from his mandolin that beautiful combination of wood tone and barnyard cluck of which only he seemed capable. All the subtleties of Melora Creager's cello playing, as well as her well-used singing vibrato, were brought to the front on Rasputina's *Thanks for the Ether* (Sony

CK 67504), an album that's held up brilliantly well over the eight years since its release. Likewise the one-handed rolls that punctuate so many of drummer B.J. Wilson's lines on Procol Harum's debut LP, recently reissued by Classic Records (LRZ 1001).

More so than most speakers its size, the de Capo i had a wide enough frequency range to sound convincing on orchestral music. The Bernstein recording of the Barber *Adagio* (from the recently released *The Essential Bernstein* set, Sony Classical SK 90581) mesmerized me from beginning to end, thanks not only to the speaker's tight grip on sustained pitches but its good orchestral weight and presence as well. And while the de Capo's bass response was not as deep as that of, say, my Quad ESL-989s, it left no doubt when the deeper instruments were played near the bottoms of their ranges. It's not that I simply *heard* them, or anything so coarse as saying I *felt* them—but I simply became aware of their importance the way I do in real life. That's part of what I regard as musically natural or organic presentation, and that's what the de Capo had in spades.

But more than anything, I kept coming back to piano music with these speakers. For one thing, the de Capo

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axis. This is confirmed by the MM de Capo i's step response (fig.7), which suggests that the tweeter is not stepped back quite enough for absolute time coherence on its axis. Sitting a little lower than the tweeter will push back the sharp up/down spike in this graph to coincide exactly with the woofer's step response. I am not convinced that such time coherence is worth achieving if it is at the expense of other, more directly audible factors, such as good dispersion

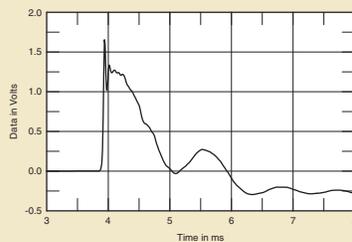


Fig.7 Reference 3A MM de Capo i, step response on tweeter axis at 50° (5ms time window, 30kHz bandwidth).

and flat perceived response. But it is fair to note that AD was impressed by much of what this speaker did.

Note the ringing in the step response, which appears from its period to be associated with the midrange bump in the frequency response. This is confirmed by the speaker's farfield cumulative spectral-decay, or water-

fall, plot (fig.8). Even without a low-pass crossover filter on the woofer feed, the decay in the treble is superbly clean. But oh, look at the enormous ridges of resonant energy between 600Hz and 1kHz. I am surprised that AD wasn't bothered more by this behavior.

—John Atkinson

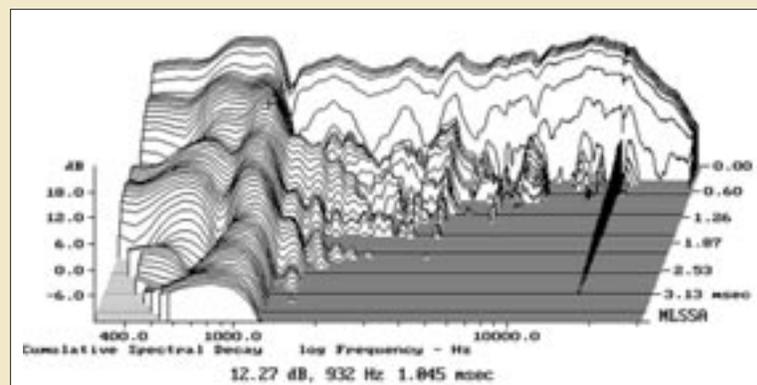


Fig.8 Reference 3A MM de Capo i, cumulative spectral-decay plot at 50° (0.15ms risetime).

was free of the *gross* colorations that can make piano music fatiguing to listen to in more than small doses: Even my Lowthers, God bless their presence and immediacy, are too bumpy in the upper mids to prevent certain notes from standing out or ringing, and that, too, makes my brain tired after a while. (Of course, my Quad ESL-989s, which I also love, are free from such nastiness, and for that reason as well as their own successful-if-different way with *scale*, they too have increased my enjoyment of piano music at home — albeit at close to four times the de Capos' price, and requiring several times as much amplifier power.) The two-disc edition of Josef Hoffman's Casimir Hall recital — Vol.6 in Marston Records' complete and irreplaceable Hoffman series (Marston 52014-2) — drove the Reference 3As to great emotional peaks several evenings in a row at my house. While the Canadian speakers were ruthless in exposing the flaws in the original 1938 recording (hiss, weird resonances, etc.), they more than made up for it by telegraphing Hoffman's wild and sometimes outrageous performances of the standard repertoire — especially Beethoven's "Waldstein" Sonata, which hadn't sounded this exciting to me since I'd last heard the great Jerome Rose play it in concert (quite differently, of course).

Spatially, these speakers pulled off the very neat trick of combining precise image placement — the woodwinds on the Pierre Monteux recording of Brahms' Symphony 2 (LP, Philips 835 167 AY) were *right there* — with the ability to convey both the size of an orchestra and the distance between the listener and such things as the horns in the back row. Usually, when describing small speakers that sound big, reviewers talk about space and air and other things that don't really have anything to do with music (except maybe Cage's). What the Reference 3As did was not that sort of phasey, reverberant bigness; rather, they made the music itself big and substantial when called for. Incidentally, these speakers sounded best when heard at close range, I thought. Suits me.

Of the three amps I own, my favorite with the de Capos was the Audio Note Kit One, which uses a single 300B tube per side for a Schwarzeneggerish 7W or so. My second favorite was the Fi 2A3 Stereo, a 3Wpc amp that actually *controlled* the bass better — but only at volume levels much lower than the realistic. My 35Wpc Naim NAP110 drove the de Capos all right, but the presentation was somewhat poorer than

with the two aforementioned tube amps, with less of a sense of flow and a more mechanical and less organic presentation overall. Is that a large enough sampling to suggest that these speakers preferred tube amps to transistors? I don't know.

Perhaps neatest of all, when I tried to push the de Capos beyond their apparent dynamic limits, they didn't sound strained: The very loudest bits just didn't get louder. So while it's fair to say these speakers compressed the music when pushed too far, I think I'd rather have that than egregious distortion: mushiness, fuzziness, other "uh" words.

You might be interested to know how the de Capo fared when measured in my listening room with the AudioControl spectrum analyzer: From their best overall positions, which were well away from the wall behind them, they were flat down to 80Hz and approximately 4dB down at 63Hz, with useful if attenuated output all the way down to 31.5Hz. (I say "approximately" because bass performance below 80Hz was affected by small shifts in microphone/listener position relative to the wall behind it — a normal effect in a room of this size, and one that could probably be made slightly less severe by devoting even more time and work to placement.)

The spectrum analyzer also confirmed that toeing-in the de Capos was a bad idea. Aimed straight ahead — *ie*, with the tweeters heard somewhat off-axis — the performance was flat, apart from a 4dB bump at 630Hz that I could never get rid of. With the speakers toed-in and the tweeters heard on-axis, although the top-end response was now only 2dB down at 20kHz, there was also a nasty 4dB bump at 12.5kHz, the likes of which would tend to exaggerate

hiss on older recordings and other musical artifacts.

### Conclusion

The capsule review: A nice-looking small speaker with much higher sensitivity than average for the breed. Goes loud and big easily, and has decent if not earth-shattering bass. Some superfluous darkness in the mids, but everything's balanced nicely overall, and it communicates sonic textures brilliantly. Rhythmically fine, with good pitch definition and an utterly superb sense of flow and human feel. Can be driven by some SETs in a small to moderate room, although very-low-power amps (2A3s, 45s, etc.) are doubtful. Decent value, high recommendation.

**The Reference 3A MM de Capo i is a nice-looking small speaker with much higher sensitivity than average for the breed.**

Nothing — *nothing* — about the Reference 3A MM de Capo i could prepare you for how good it is: not its name, or its appearance, or any description of what's gone into it. I wish this review could do the job, but that may fail as well, leaving you no choice but to hear it. Do it: This speaker is utterly worth whatever time you spend with it, and every penny of the asking price. ☒

### Associated Equipment

**Analog sources:** Linn LP12 turntable, Naim Armageddon power supply, Naim Aro tonearm; Rega Planar 3 turntable, Rega RB-300 tonearm; ZYX Airy S, Lyra Helikon Mono, Dynavector DV10x5 cartridges; Tamura L2-D, Audio Note AN-S2 step-up transformers.

**Digital source:** Sony SCD-777ES SACD player.

**Preamplifiers:** Audio Note M3, Naim NAC32-5, Fi Preamplifier.

**Power amplifiers:** Audio Note Kit One (300B), Fi 2A3 Stereo, Naim NAP110.

**Loudspeakers:** Quad ESL-989,

Lowther PM2A in modified Medallion horns.

**Cables:** Interconnect: Nordost Valhalla & Valkyrja, Naim SNAIC (various), homemades. Speaker: Nordost Valhalla & Valkyrja, Audio Note AN-SPX, Naim NACA-5. AC: JPS Labs Digital (on Sony SACD player; all other AC cords stock).

**Accessories:** Mana stands under Linn turntable, Naim power supply, Sony SACD player, Audio Note preamp; Audiotech stand under Naim amp, preamp; Rega wall shelf under Rega turntable; Loricraft PRC3 record cleaner.

— Art Dudley