

Michael Fremer

SRA, VTA, & My Sonic Lab Eminent EX MC cartridge

A quick word about the Axpona show held in Jacksonville, Florida, at the beginning of March and sponsored by *Stereophile*: it exceeded everyone's admittedly uneasy expectations. The turnout, particularly on Saturday, was impressive for a first show, and the attendees were enthusiastic folks appreciative of the efforts made to bring an audio show to their locale.

I ran two well-attended seminars on turntable setup, and heard very good sound in many of the rooms, much of it from unfamiliar products. The best record collection I've ever seen at an audio show was in the Lee Island Audio/AAudio Imports room, where Einstein Audio electronics and Acapella horn speakers produced superb sound. See John Atkinson's and Jason Victor Serinus's excellent coverage at <http://blog.stereophile.com/axpona2010>, which closely mirrored my own listening experiences—especially JA's reaction to the Legacy Audio Helix speakers. The big ones were astonishingly flat and remarkably coherent, especially given the pile o' drivers adorning their front baffles. I sat through most of an 80-minute disc transfixed by how much detail they unraveled.

The Atlanta Audiophile Society hosted a pre-show event at Audio Alternative—a great store—where I conducted another turntable-setup seminar for a large, appreciate group. Thanks to Chuck Bruce and everyone involved—but next time, lay off the talking moose, okay?

More on VTA and SRA

A profusion of confusion and mindless pontification continues to be generated on this subject. First of all, the vertical tracking angle (VTA) is the angle between the record surface and the line described by the *contact point* of the stylus in the groove and the cantilever's pivot point. It is *not* a line drawn through the center of the cantilever extending to wherever that line might meet the re-

cord surface well in front of the stylus. That would be a *big* angular difference.

Matching the recording and playback VTAs is desirable because doing so cancels out a frequency-modulation distortion caused by the displacement of the cutting and playback styli forward and backward in the groove, in response to

playback styli will still be different.

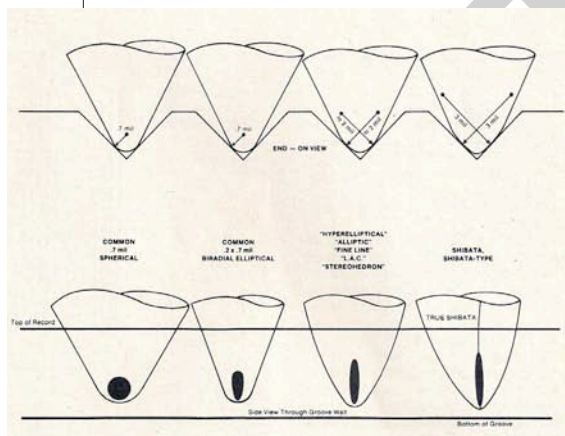
In fact, matching VTA is not nearly as important today as matching SRA. Today's more extreme, smaller-contact stylus radii result in extremely tall, narrow, ridge-like "contact patch" vertical surface profiles on either side of the stylus (see the diagram). The SRA relates to how these tall, thin contact patches interface with the angled vertical modulations. If the angle of the tall, thin contact patch doesn't align with the angle of the vertical modulation inscribed in the LP, the modulation can actually torque or twist the stylus, sending vibrational shocks up the cantilever, which produces audible intermodulation (IM) distortion.

The cutter stylus must be angled beyond 90° in order for the lathe's vacuum system to extract and remove the thread of lacquer cut away by the stylus. That means that in many (though not all) cases, the angle is correctly set when the stylus shank attached to

the cantilever is slightly forward of the actual stylus contact point. The good news is that measurements and listening done in the early 1980s show that an SRA of 92°, *ie*, 2° to the left of a line perpendicular to the record surface, is almost always ideal, or close to ideal. In other words, the stylus will appear to be pitched slightly forward of vertical.

Mismatched cutting and playback VTAs cause a certain amount of FM distortion that's somewhat objectionable, but tests have shown that mismatched SRAs create far more audible distortion, particularly with the more extreme **stylus profiles** common today. Tests done decades ago and reported in *Audio* magazine show that most of the time, when analog fanatics say they can hear a big difference from a tiny change in VTA, what they're really hearing is the change in SRA that results in the reduction of intermodulation distortion.

A change in VTA as small as 1° requires a rather large (4mm) vertical displacement at the pivot point of a



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vertical (out-of-phase) modulations.

Ideally, the disc's vertical modulations would be cut and played back directly vertically, but as the cutting and playback styli are both mounted at the end of a pivoted cantilever, they describe vertical arcs that move the stylus fore and aft instead of directly up and down. That creates frequency-modulation distortion. In the days of conical styli, correct VTA was key to minimizing distortion. A conical stylus's round contact area meant that its stylus rake angle (SRA)—the angle between the record surface and the vertical axis of the stylus's contact area—effectively never changed, and so was irrelevant.

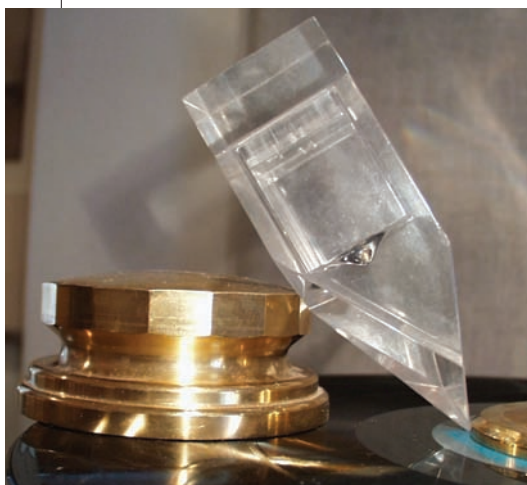
Match the record/playback FM distortions by matching the cutting and playback VTAs, and they cancel out. That's more easily said than done; the VTAs of cutting systems can vary from 16° to 22°, and since matching the lengths of the cutting and playback cantilevers is nearly impossible, the actual arcs described by the cutting and

9" tonearm, which is why one online story, about using the thin shims included with the Ringmat system to “fine-tune” SRA, is sadly misinformed. Use all eight of the supplied shims and the total height change is 1.225mm, which represents a change in SRA/VTA of about 0.29° for a tonearm of 239mm effective length. Sorry, but once you’re properly locked in at 92°, you’re unlikely to be able to hear a difference of 0.3°!

You can change the SRA and VTA far more by increasing or decreasing the vertical tracking force (VTF). Generally speaking, a change in VTF of 1gm produces a 1° change in SRA, which is why, when some reviewers suggest that sonic improvements can be achieved by tracking far in excess of the manufacturer’s recommended VTF, without also compensating for the change in SRA, they’re blowing smoke.

For these reasons—and because of manufacturing variations in how styli are bonded to cantilevers, and because I don’t have the space here to go into it more deeply—setting correct SRA is far more important than setting correct VTA, though the two are related. Ideally, you’d want setting the proper SRA to coincide with having correct or near-correct VTA—and if you’ve spent thousands on a cartridge, you’re entitled to one gives you the correct VTA when you correctly set the SRA!

Even if a manufacturer specifies a cartridge’s optimum VTA (not all do) and you can both see the cantilever and have a way of measuring the angle



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(for instance, you can use a protractor to draw, on pieces of white paper, various angles from 17° to 22°), you’re much better off using a good magnifying loupe to check and adjust the SRA, once you’ve set the VTF and started with the armtube level with the record surface—which, I assume, is where most cartridge makers intend VTA and SRA to be correctly set.

Keep in mind that, once a new cartridge has been broken for 20–40 hours, the settling of its suspension will cause the adjustment you’ve made to be off by anywhere from 1° to almost 2°—the equivalent of moving the arm pivot 4–7mm!

Unfortunately, to properly set SRA you need to know the stylus-profile contact patch of your cartridge. As recently pointed out in this column, the Ortofon **Replicant stylus**, a Geiger variant (see the photo of the large-scale

model), has an extreme-angle contact patch that requires the shank to be pitched far forward in order for the contact area’s SRA to be at 92°.

Ortofon specifies a VTA of 23° for its A90 cartridge, which uses a Replicant stylus to achieve the proper SRA of 92°. Unfortunately, one reader misread what I’d previously written on the subject (November 2009, p.31) and attempted to get the *shank* of his Replicant stylus set to 92°, rather than the contact area! In other words, he’d lowered the back end of his tonearm so far that it was touching the record—and he hadn’t even come close to 92°.

But most manufacturers don’t specify VTA, and even when they do, I’d use such figures as only a rough guide. What we need—what we should *demand* to know from every cartridge manufacturer—is the precise stylus profile and a drawing of the contact patch area, so that we can more accurately achieve the required 92° SRA, which will be good for about 80% of the LPs in anyone’s collection.

One technique worth considering is to set the SRA to 90°—that is, with the shank of a symmetrically configured stylus sitting perpendicular (at a right angle, or 90°) to the record surface. Try using a mirror to achieve a straight line, much as you might to get an approximation of azimuth. Then, if your tonearm’s effective length is, say, 239mm (Rega, etc.) and you move the arm pivot up (a considerable) 8.35mm from perpendicular, you’ve increased the SRA by 2°, to the desired 92°. Mathematically competent readers should be able to calculate how much to move the pivot for any tonearm’s effective length.

Keep in mind that, ultimately, you’ll have to fine-tune by ear. However, if you don’t start close to the correct angle, you’ll *never* get it right—when you’re far off, you can’t possibly hear a difference until you somehow luck in to the correct zone. Only when you’re close to begin with can you hope to find the precise point where everything dramatically locks into place!

If, like me, you want to take this to the extreme and get the *precise* 92° setting, consider buying a digital USB-based microscope like the **Dino-Lite Plus AM 313**, which you can find online for \$249 (I got mine from Cyberguys.com). You’ll have to carefully remove the front plastic shield so you

IN HEAVY ROTATION

- 1) Joanna Newsom, *Have One on Me*, Drag City LPs (3)
- 2) Steve Earle, *Townes*, New West 180gm LPs (2)
- 3) Preservation Hall Jazz Band, *Preservation*, Preservation Hall 180gm LPs (2)
- 4) Top Topham, *Ascension Heights*, Blue Horizon/Pure Pleasure 180gm LP
- 5) Rosanne Cash, *The List*, Manhattan 180gm LP
- 6) John Jenkins, *John Jenkins/Kenny Burrell*, Blue Note/Music Matters 180gm 45rpm LPs (2)
- 7) Rickie Lee Jones, *Pirates*,

- Warner Bros./Mobile Fidelity Sound Lab 180gm LP
- 8) Dan Dyer, *Direct-To-Disc, Volumes 1 & 2*, Analogue Productions 180gm D2D LPs (2)
- 9) The Blues Project, *Projections*, Verve/Folkways/Sundazed mono LP
- 10) John Coltrane and Johnny Hartman, *John Coltrane and Johnny Hartman, Impulse!/ORG* 180gm LPs (2)

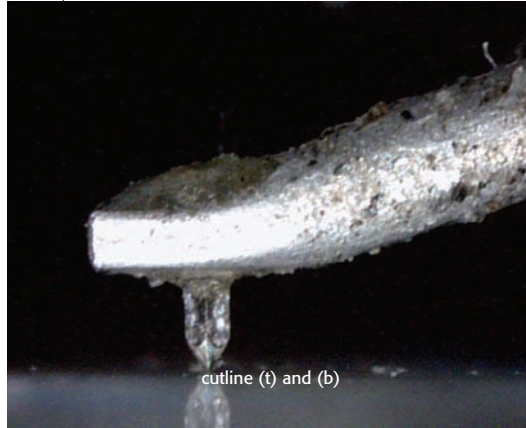
Visit www.musicangle.com for full reviews.

can get the 'scope close enough to the cartridge, and you'll have to cobble together some sort of stand (I use a camera tripod and an aluminum L-beam), but you can see the results in [the accompanying photo](#).

The Dino-Lite's software lets you draw lines that calculate the precise VTA and SRA (not shown in photo). Even without the lines, you can see in the photo that the SRA is, at best, 91° and needs to be raised.

I found the software's learning curve steep; getting good pictures at 150x magnification took about a day. If you've bought a new, expensive cartridge that specifies VTA, but you find that when the VTA is correct the SRA is way off, you should return it for a proper sample—this is the sort of discrepancy that can occur when the stylus is improperly mounted on the cantilever. With the microscope, you can also check the stylus's contact-radius orientation, as well as wear on older styli.

My thanks to WAM Engineering's



Wally Malewicz, who pioneered the work.

My Sonic Lab Eminent EX moving-coil cartridge

Basis Audio now imports the My Sonic Lab cartridges, designed by industry veteran Y. Matsudaira. Though he founded the company in 2003, Matsudaira has been doing this work for more than 40 years, designing cartridges for both Supex and Audiocraft—names that may be familiar to older vinyl fans. An

old friend of Air Tight founder Atasushi Miura, Matsudaira also designed and built the Air Tight PC-1 and PC-1 Supreme cartridges, which have gotten far more press in the US than have his own My Sonic Lab designs.

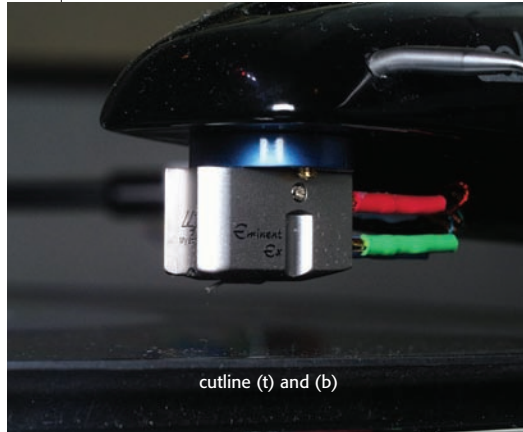
Like the Air Tights, the My Sonic Lab Eminent EX (\$6800) features an ultra-low internal impedance of 1 ohm and a relatively high output of 0.4mV, the latter achieved by the use of a special core material Matsudaira calls SH- μ X. The Eminent EX weighs 9.5gm, has a semi-line-contact stylus (3 by 30 μ m), and is designed to track at a vertical tracking force (VTF) of 1.9–2.2gm. The cantilever is of an unnamed metal. The channel separation measured in excess of 30dB at 1kHz.

The Eminent's manual recommends a load resistance somewhere between 100 and 800 ohms, with 400 ohms suggested as ideal. Sure enough, the Eminent EX sounded best in my system loaded to 400 ohms. Any lower and it closed up, and any higher seemed to di-

minish somewhat the Eminent's superlative power and control in the low frequencies. The cartridge sounded best tracking at 2gm with its stylus rake angle (SRA) set to 92°, which means the armtube will be somewhat above parallel to the record surface.

Immediately obvious was the Eminent EX's deep, solid, powerful, ultra-well-controlled bass performance. However, until I'd used the cartridge for 40 hours or so, the top end sounded somewhat closed-in and lacking in air. Combine that with the powerful bottom end, and for those first few days the EX could sound thick and dull.

But patience rewarded me with the Eminent's iron grip, power, and subterranean extension below rich, fully flowering, velvety mids; and clean, refined high frequencies that, while not exactly sparkling and airy, made bright recordings sound ideal—and ideal recordings, too! I don't know how the EX managed that, but it did. However, if your



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system is on the dull side to begin with, you may have a different experience. If you're looking for more sparkle and air from your rig, the Eminent EX is not the way you should go. In that regard, its top-end performance was similar to that of the stone-bodied Koetsus, which sound ideal in some systems and dull in others.

In a well-balanced system, however, you'll find the EX anything but soft and rolled-off on top. Its transient performance was reasonably fast, clean, and

natural, in many ways reminiscent of the nearly ideal upper-frequency performance of the Miyajima Shilabe, particularly in how it managed the ideal attack and harmonic structure of brass instruments and percussion. Brass had the right amount of bite, and cymbals and other percussion the proper shimmer, both followed by meaty, well-burnished harmonic structures, and none of the thin, bright character some detractors of moving-coil detractors complain of. Violas and cellos rumbled richly with a dark, fiery glow, while unamplified voices sounded rich, round, and appropriately fleshy, without being muffled.

The Eminent EX was generally ideal for classical and acoustic music. But unlike, say, the riper Koetsus and the original Clearaudio Goldfinger, it also produced superior results with rock, capturing particularly well the warmth of overdriven tubed guitar amps while not shortchanging the sparkle of strings. I played a ridiculously bright

track, Nick Lowe's "Labour of Love," and heard it finally tamed by the My Sonic Lab. And when I played any well-balanced recording, it, too, sounded properly dialed in, in term of tonality, dynamics, and space.

If you're into counting rivets in cymbals, other cartridges with more severe stylus shapes—such as the Transfiguration Orpheus L, which I reviewed in my May 2010 column—will retrieve more information, produce greater amounts of air, better resolve reverberant tails, and more intensely define three-dimensional space. But with those you'll give up some of the overwhelming body, weight, and solidity reproduced by the Eminent EX. The Orpheus L would be a better match with a tubed preamplifier or phono preamp, such as Balanced Audio Technology's Rex.

I used the Eminent EX with the Boulder 2008 and 1008, Vitus MP-PT01, Einstein Audio Turntable's Choice, Manley Audio Steelhead, and Abbingdon Music Research PH-77 phono preamps and found it consistently capable of expressing its rich, powerful personality through that wide range of electronics, as long as I paid careful attention to its loading.

If I had to describe the Eminent EX in one word, it would be *power*. Despite its less-than-crystalline top end, there was nothing polite about this cartridge. Its personality was punchy, explosive, and deliberate from top to bottom, and produced great dynamic authority and forward thrust. The EX tracked cleanly, particularly sibilants and percussive transients, and sailed relatively quietly through many noisy records—and not because it was rolling off the top end.

For \$6800, you should expect high performance *and* refinement. The My Sonic Lab Eminent EX delivers both. If it sacrifices some resolution of detail, speed, and "snap" in favor of more groove-friendly real-world performance, I can confidently say, after having spent many months with it, that the Eminent EX presents the demanding listener with a tradeoff that's more than worthwhile. My Sonic Lab's Eminent EX is among the finest, most skillfully balanced cartridges I've heard. ■

CONTACTS

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