

SME Model 20/12 turntable & 312S tonearm

By Michael Fremer • Posted: May 15, 2009

Much has happened in the analog world since I reviewed SME's flagship Model 30/2 turntable for the March 2003 Stereophile (footnote 1). Back then, spending \$25,000 on a turntable (without tonearm) was an odd extravagance intended only for those seriously committed to the format, and who already owned large LP collections. Although new LPs were being pressed in growing numbers, the resurgence of vinyl was still spotty, and the long-term prognosis for the old medium remained in question.



Not any more. In 2009, we're in the midst of an explosion of new vinyl capable of vaporizing the bank accounts of all but the very wealthiest audiophiles. Whatever your musical tastes (save for new classical and jazz releases), with a few clicks of a desktop mouse you can go from 0 to 1000 worthwhile new records—and an equal number of unworthy candidates.

Although the Internet is now the world's largest new and used record store, a network of resilient bricks-and-mortar survivors keep alight the flame of the indie record store. Forgive the morbid thought, but the record collections of aging baby boomers will soon be producing yet another unparalleled wave of vinyl-buying opportunities.

So while spending \$25,000 on an SME 30/2 turntable makes more sense today than it did in 2003, that 'table will now set you back \$36,000 without arm, or \$40,000 with the SME V. As I said, much has changed since 2003. To accommodate their new 12" tonearm, the V12, SME has introduced the larger, more massive Model 30/12 turntable—and that combination will set you back \$50,000.

Footnote 1: SME Ltd.'s US importer, Sumiko, advertises on my website, www.musicangle.com

While you catch your breath, consider SME's new 20/12. This somewhat smaller, lighter version of the 30/12, complete with 312S 12" tonearm, will empty your wallet of \$28,000. While that's still a lot of money, and puts the 20/12 beyond the reach of most, a grasp of the engineering rationale and construction highlights of this no-nonsense, exquisitely designed and built turntable is not.

Still built to run O-rings 'round the competition

The Scale Model Equipment Company Limited (SME) was founded in 1946 by Alastair Robertson-Aikman to meticulously build scale-model trains and cars and, later, aircraft instrumentation, among other things. Alastair got into the tonearm business by accident in 1959, when he designed and built one for his own use. He died in 2006, but his son, Cameron, has carried on, and today SME is heavily invested in the medical and automotive fields—and still builds turntables and tonearms.

SME sticks to Robertson-Aikman's original design principles for good reason—their turntables' overall build quality, fit'n'finish, and machining have rarely been equaled, and never been surpassed, by any other turntable manufacturer of my experience. The 20/12 is a tank-like machine built to higher than mil-spec tolerances. If you think of the SME 30/12 as a somewhat larger edition of the 30/2, you can think of the 20/12 as a slightly smaller, somewhat slimmer version of the 30/12.

The quality of the construction and of the engineering thinking are evident, even if the look is more machine-tool industrial than highly stylized or even remotely sexy: There has never been, nor will there probably ever be, a candy-apple, gloss-red SME turntable. As I wrote of the 30/2, "this impressive hunk of black metal is not the turntable to impress your friends with—until you play a record on it."

Sensible setup for a sensible design

SME designs its turntables for easy setup, though more likely than not the purchase price will include setup by the dealer. The Model 20/12 arrives tightly packed inside a heavy-duty cardboard crate, its key components locked down to prevent damage during shipping. The drive platter is secured by four setscrews, and a pair of more substantial bolts seals the platter bearing's silicone-damping reservoir, should you need to transport the 'table. The four-point suspension is also screwed down snugly, and a bolt inserted through the bottom of the lower chassis secures the motor. As I freed the drive platter and gave it a spin, unscrewed the motor-locking bolt that allowed the chassis's four steel points to rest comfortably and securely on an elastomer damping platform set into the lower plinth, then freed each of the four suspension towers to a clearance precisely set with a supplied gauge, I felt the 20/12 spring to life under my hands.

Which left not all that much to do: connect the motor drive controller; stretch the flat, ground belt over the crowned, precision-machined, stainless-steel motor pulley; and fit the oversized, 14.3-lb platter. The rigid, compact, no-nonsense, dense Model 20/12 —it weighs almost 75 lbs—was ready for a spin. Still, I couldn't play a record until I'd mounted the 312S tonearm and leveled the turntable by adjusting the threaded feet, which contact the user's choice of turntable-mounting platform via integrated balls or compliant inserts.

What I wrote in 2003 of the Model 30/2's build quality and fit'n'finish is also true of the 20/12: "The machining quality of the proprietary setup tools and the smoothness and unflinching certainty with which the various locking screws rotate in their threaded sockets—not to mention the feel of the unlocking mechanisms—enhanced my confidence that the buyer's money will be well spent. The 30/2 is an heirloom product meant to be enjoyed and passed down from generation to generation."

No-nonsense engineering

Because playing records is all about turning mechanical into electrical energy, the control and damping of vibrations, as well as efficient energy transfer, are the keys to any successful turntable design. If the machining of the bearing is very precise and the construction of the plinth is rigid, dense, well damped, and effectively isolated, the turntable shouldn't produce appreciable noise of its own.

The SME 20/12's ¾"-diameter spindle, precision-machined from hardened and ground high-chrome steel, rides on a conventional ball/thrust pad that floats in a sealed oil bath. Technically, it's as conventional as it gets; its superb performance relies on precise machining—something SME knows how to do well.

Though measuring only 20.5" wide by 14.8" deep, the 5/8"-thick aluminum-alloy subchassis, suspended by 10 specially designed O-rings for each of the four towers, weighs 17.6 lbs. SME claims the design is stiff enough to avoid low-frequency torsional flexing and sufficiently well damped to avoid high-frequency resonances, and that the suspension effectively isolates low-frequency energy from feeding back into the system.

With the motor located on the lower, fixed subchassis and the platter on the suspended upper chassis, there's the possibility that upper-chassis horizontal deflections caused by tonearm undulations (particularly when playing eccentrically pressed LPs) can vary the distance of the motor pulley from the platter and thus affect speed accuracy. SME addresses this so-called "porch glider" effect with a centrally located fluid damping system, while the outboard power supply's microcomputer-controlled, closed-loop, pseudo-sinewave commutation sequence and proportional-plus-integral (PI) algorithm oversees control of the motor's three speeds (33.33, 45, and 78rpm). The motor itself is a triple-phase, six-pulse, inductance design with an eight-pole neodymium magnet structure and three integrated Hall position sensors. The net result is effective motor isolation and precise control of motor speed.

SME 312S 12" tonearm

Only a few tonearms with which I'm familiar can match the rugged build quality and precise fit'n'finish of an SME arm. It's safe to say that while some others are built as well as the 312S, none is built better. Setting up any SME arm is particularly fast, convenient, and just about foolproof, though the ones with detachable headshells, like the 312S, are even easier.

SME began making 12" tonearms almost from the time it began making record players, with the Model 30/12. Most 12" arms were originally used in radio stations, where their extra length made possible playback of 16" transcription discs pressed at 16.67 or 33.33rpm. The longer arms soon found their way onto audiophile turntables. But before addressing the 9" vs 12" tonearm controversy, let's look at the 312S.

The 312S has a tapered armtube made of pressure die-cast magnesium, 27gm lighter than if it were made of aluminum. Magnesium gives the tube strength, rigidity, and low mass—all keys to getting good performance from a longer tonearm.

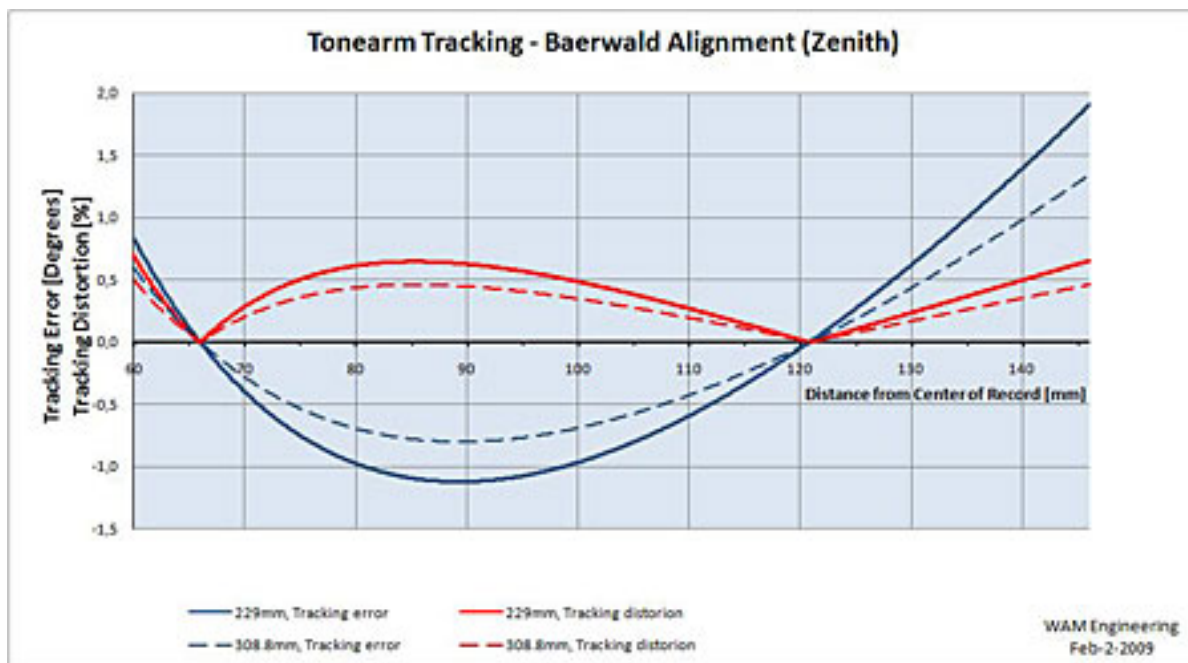
Fitting the tube with a detachable, rigidity-reducing headshell would seem to be counterproductive, but SME has come a long way from its old-fashioned, floppy bayonet mount, to a spring-loaded system that's both mechanically and electrically secure. While this has the advantage of permitting quick changes of cartridge and adjustment of azimuth, it has the disadvantage of adding two more electrical breaks between the cartridge pins and RCA plugs, for a total of three.

SME reprises the familiar, ultraconvenient, and secure sliding-track overhang adjustment mechanism for the arm, the less-than-convenient (for fetishists) spring-loaded VTA post, the underslung counterweight, the high-quality, low-tolerance bearings—and, most important for a 12" arm, the silicone-filled damping trough with adjustable paddle.

Foot-long arms have been extremely popular in Japan for many years, and lately their popularity elsewhere seem to be growing—but is that only the herd mentality at work? Anyone who tells you about the superiority of 12" tonearms without addressing the tradeoffs involved is blowing smoke. Yes, there will be lower horizontal tracking error and therefore less distortion—but how much lower error, how much less distortion? And at what cost?

Looking at the geometry of a pivoted arm, obviously, at the Baerwald null points of 120.9mm and 66mm from the spindle center, the stylus will be tangential to the groove, and there will be no tracking error with a properly set-up arm of any length. Comparing, for instance, SME's nominally 9" 309 arm with the 312S at the 146mm point across the groove surface, the misalignments from tangency are $+1.86^\circ$ and $+1.35^\circ$, respectively (see the diagram). Closer to the end of the side, at 89mm, the respective errors are -1.1° and -0.79° ; even closer, at 60mm, the misalignments are $+0.76^\circ$ and $+0.56^\circ$. So, yes—the longer arm produces less tracking error. But does that translate into lower audible distortion? And what other variables need to be taken into consideration?

Reducing all of the numbers to something easily understandable, and using the Baerwald alignment, the tracking error of a nominal 9" tonearm (229.7mm effective length) produces levels of harmonic distortion that max out at around 0.65% over about 25% of the groove surface, this rising to about 0.8% for the innermost grooves. The tracking error of a nominal 12" arm (effective length 309mm) produces harmonic distortion that maxes out at around 0.46% over the same 25% of the groove surface, and at about 0.5% for the innermost grooves. That's it: 0.65% and 0.8% vs 0.46% and 0.5%, and those percentages hold true with precise alignment. Setup errors with a longer tonearm will be magnified, potentially narrowing the gap even more.



Other big issues to consider are a longer arm's mass, rigidity, and dynamic behavior. In the case of the 312S, SME has managed to keep the mass low and the rigidity high. The difference in mass between the 312S and SME's 9" arms is insignificant in terms of calculating tonearm/cartridge resonant frequencies (9.5 vs 12gm),

which, for a 10gm cartridge of low to medium compliance, translates into 10Hz vs 9.5Hz. However, for 12" tonearms that are much heavier than their 9" counterparts, the difference in mass could be significant, as the effective mass or moment of inertia is calculated by multiplying mass times the distance to the pivot squared; those extra inches add up fast.

Another issue worth considering is the dynamic behavior of a longer, higher-mass tonearm. A longer arm's moment of inertia is greater. It takes the longer arm more time to react to a warp or eccentricity, and more to "settle" again afterward. Applied in moderation, damping, like a car's shock absorbers, can limit excursions and help control arm behavior.

Longer arms require less of an offset angle, which means there's less skating, but there still is some; some means of applying an antiskating force is still required. SME implements it with a tension spring and filament.

To sum up: A 12" tonearm has some minor theoretical advantages, as well as a few disadvantages that, if not properly addressed, will probably outweigh the advantages, in my opinion. SME has adequately addressed these issues, producing, in the form of the 312S, a tonearm that has all of a 12" arm's theoretical advantages and none of its disadvantages. Whether it's worth spending the extra money for those advantages is another issue.

Well-balanced sound

Using the SME 20/12 was about as easy as using a turntable can be. It was trouble-free, it got up to speed within seconds, and its speeds were precisely correct. As with other SME 'tables, the platter surface is made of a softer-than-vinyl material called Isodamp, which is diamond-turned with a fine scroll to produce a fiber-like finish that SME claims provides superior record/platter contact. A reflex clamp (supplied) secures the record tightly to the platter surface.

When you pay as much or more for a turntable and tonearm as you might for an automobile, you should expect from the best recordings: deep bass extension coupled with nimble control and expressive touch, "black" backgrounds, fully realized microdynamic expressiveness, and unlimited macrodynamic explosiveness with equally robust control.

You should also expect tightly focused images, free of grain and edge, that maintain a supple three-dimensionality, clarity, and specificity, no matter their size. You should expect harmonic generosity that fully expresses instrumental colors, and textural resolve that produces both the hardest edges and softest touches with equal finesse—and, when required, simultaneously. Transients should be resolved with the speed and cleanness heard in concert, but without the hardness and brittleness so common in reproduced sound.

Attacks should be fast, sustains prolonged, and decays should be natural, extending into a real-world pitch-blackness that digital enthusiasts don't believe is possible from analog. Noise should inhabit a spatial zone far removed from any musical information. Unwanted impulses, such as pops and clicks, should be heard as brief, well-damped episodes that quickly dissolve.

In other words, when you spend \$28,000, the sound should approach transportive reality with zero mechanical aftertaste. The sounds of the playback mechanism should be neutralized. The wires holding up the flying actors should be invisible. All of this, of course, is made possible only by speed accuracy and control that surpass the limitations of record eccentricity.

The SME 30/2 could manage all of that. So could the Rockport Technologies System III Sirius, though I don't recall it having provided the 30/2's bottom-end heft and weight. Until the Continuum Audio Labs Caliburn entered my life, the 30/2 was the best turntable I'd heard.

Too many intervening system changes prevent any sort of meaningful comparison of the 30/2 and 20/12. Still, I can confidently say that the 20/12, while having excellent bottom-end extension and cleanness of line, lacked the bigger 'table's subterranean weight—which is not to say that that's a deficiency. Some 30/2 detractors with whom I've spoken argue that the bigger 'table is "overdamped" and somewhat "thick" on bottom.

But I didn't hear it that way back in 2003, and based on hearing the 30/2 elsewhere, I still don't. Then again, my system at that time couldn't reproduce the bass weight, cleanness, and authority it now can. It's possible that those who think the 30/2 is too heavy on bottom may find the 20/12's tight, deep, yet nimble bass performance just right. When you spend big bucks on a turntable—or loudspeakers, for that matter—two things you should get are exceptional bass extension and, especially, bass control. The 20/12 delivered both.

For a review of a recent reissue, on 180gm vinyl, of The Band's eponymous second album (Capitol), I spent an entire day comparing various pressings played on the 20/12 with Lyra's Titan i cartridge installed in the 312S arm. That cartridge can carve out all of the bass weight and textural details found in any record, and proved a good match for the SME combo.

The Band was mostly recorded in Los Angeles, in Sammy Davis, Jr.'s pool cabana, which the group had turned into a studio with the help of Capitol engineers. The cabana was thickly padded and damped, and Levon Helm played an antique, wooden-rimmed drum kit keyboardist Garth Hudson had picked up in an L.A. pawnshop. All of this helped give the record a thick, woody sound that, when played back on most late-1960s turntables, turned the production into sonic mud.

Kudos to original mastering engineer Bob Ludwig (look for "RL" in the "deadwax" near the label) for not rolling off the master tape's bottom end. Played back on the best modern turntables, the original edition of The Band conveys the group's sonic and musical intentions, and does so better than does any reissue, vinyl or CD.

The 20/12's rendering of the thumpy kick drum and the thwack of Helm's meaty snare was somewhat drier and less infused with skin than through my far more expensive reference 'table, the Continuum Audio Labs Caliburn with Cobra arm, nor was it as sensationally dynamic—but the day's listening answered the question I asked in the February issue, at the end of my review of VPI's Super Scoutmaster Reference Rim Drive: What, if anything, do you gain by moving from the \$8200 VPI to a turntable costing more than \$25,000, especially given the VPI's impressive bass performance?

With the SME 20/12, at any rate, you get plenty on the bottom, assuming your speakers can deliver bottom-octave density, control, extension, and—especially—textures. I recorded the outputs of both 'tables with my Alesis Masterlink; comparisons of the resultant CD-Rs (to keep the comparison fair), showed that while the SME didn't produce more bass than the VPI, it produced tighter, cleaner, more controlled, and better-proportioned bass. The SME better revealed the room sound behind the players, reproduced producer John Simon's occasional tuba in greater relief and with more detail, and presented Helm's drum kit in explosively clean three dimensions while better separating out Rick Danko's bass-guitar lines.

Nor did the 20/12 produce the Super Scoutmaster's "balance that, on top, leaned slightly toward the warm, enticing side of neutral." Instead, it opened up wide, deep vistas of air and space, producing levels of grit- and grain-free transparency, and especially finely drawn and stable image specificity, that only the top-tier combos of turntable and tonearm can produce.

Classic Records' 200gm reissue of Neil Young's Massey Hall 1971 (Reprise/Classic 43328-1) produced an impressively black backdrop out of which rose a palpable yet subtle sense of hall space behind a stable, tightly focused image of Young and his acoustic guitar and piano. When Young sang and played quietly, the hall was only a sensation. When he brought up the volume a small amount, the sense of space opened up. When he really raised it, the echo of his voice ricocheted well behind him and around the room, producing a far greater indication of the size of the space.

The ability to define and control these low-level dynamic gradations—not to mention reproduce and control the big ones—are among the important performance characteristics that separate the cardboardy, dynamically restricted performance of low-priced turntables from the costlier rigs. Better to limit an inexpensive turntable's deep bass than try to reproduce it at the expense of control and rhythmic drive. This is one reason the less expensive Rega turntables have been so successful: they get the rhythmic drive right while trimming the extension on bottom.

However, the sound of a \$28,000 turntable-tonearm combination should have none of these performance compromises, and the sound of the SME 20/12 with 312S didn't—which is not to say it's the very best-sounding turntable you can buy, or that its sound was entirely without character. It aimed for full bass extension and got almost all the way there without compromising rhythmic control. It maintained tonal neutrality and transparency throughout the midband, and extended into the uppermost octaves without adding grit or grain. The 20/12's sound was nonmechanical, with a very low noise floor and excellent control of unwanted impulses. It maintained unwavering image stability and solidity. In fact, the SME 20/12–312S did everything a \$28,000 turntable-tonearm combination should.

Are there blacker backdrops to be had? Yes. Are greater bottom-end weight and extension possible, along with even wider macrodynamic range and a somewhat sweeter overall sound? Yes—from the SME 30/2 and the Continuum Audio Labs Criterion, if my sonic memory doesn't fail me, and definitely from the five-times-more-expensive Continuum Caliburn. And there are probably some others I haven't yet heard.

Did the 20/12 have an identifiable sonic character? Switching among familiar cartridges indicated that, tonally, the SME was an essentially neutral carrier. If I had to pin a character on it, I'd say it was on the slightly dry, analytical side, more similar to the SME Model 10 (which I reviewed in the April 2000 *Stereophile*) than to the Model 30/2.

Were I buying a 20/12, I'd opt for a richer, less analytical cartridge than the Lyra Titan i; say, a Dynavector XV-1s or the Sumiko Palo Santos Presentation, which was just beginning to break in nicely when I had to pack up the 20/12 and ship it out for the cover photo. No doubt the Presentation was voiced on one SME or another.

Were I spending \$28,000 on a turntable and arm, I'd insist on build quality as high as is obvious in the SME 20/12 and 312S. At or near the price, I'm not sure anything else comes even close.

Conclusion

The SME Model 20/12 is among the best-built turntables in the world, and with the 312S, one of the most neutral cartridge carriers. Together, they'll fully inform you of any cartridge's sonic qualities and groove-tracing abilities. It would be unfair to say that the combo had "subtractive errors," but it wouldn't be unfair to say that greater bottom-end extension and weight can be had from the 20/12's bigger brother, the Model 30/2, and elsewhere, if at far greater cost.

However, you could also spend a great deal more and get not much more for it than a lot of unnecessary engineering hocus-pocus, grandiosity, and showmanship. You could also spend more for homemade brews that can't begin to compete with the SME 20/12's machining excellence.

As for the value of a 12" tonearm: I believe that, because of the tradeoffs involved, the advantages can be more theoretical than actually realized in the real world. The numbers appear to back me up: there's more distortion added by other elements of vinyl playback and by the other components in your system than by the distortions created by the tracking errors of 9" arms. I've come to feel the same about tangential tracking, but I'm always open to be proven wrong. Certainly, in the 312S, SME has produced a tonearm that has all of a 12" arm's theoretical advantages and none of its disadvantages. But whether it's worth spending the extra money for those advantages is another issue.

One thing's for sure: Should you have \$28,000 to invest in a turntable-tonearm combination, you can't go wrong with the SME 20/12.

Specifications

Description: Belt-driven turntable with fluid-damped O-ring suspension and three-phase, eight-pole motor with electronic controller. Speeds: 33.33, 45, 78rpm, all adjustable. Wow & flutter, rumble: not specified. Includes soft dustcover, tools, gauges, strobe disc, other accessories.

Dimensions: Turntable: 20.5" (520mm) W by 6.9" (175mm) H by 14.8" (375mm) D. Weight: 78 lbs (35.5kg). Tonearm: 12" (308.19mm) effective length. Weight: 0.42 oz (12gm).

Serial Number Of Unit Reviewed: 001.

Price: \$28,000 with 312S tonearm. Approximate number of dealers: 20.

Manufacturer: SME Ltd., Steyning, Sussex BN44 3GY, England, UK. Tel: (44) (0)1903-814321. Fax: (44) (0)1903-814269. Web: www.sme.ltd.uk. US distributor: Sumiko, 2431 Fifth Street, Berkeley, CA 94710. Tel: (510) 843-4500. Fax: (510) 843-7120. Web: www.sumikoaudio.net.

Associated Equipment

Analog Sources: Continuum Audio Labs Caliburn, Cobra, & Castellon turntable, tonearm, & stand; VPI Super Scoutmaster Reference turntable, Graham Phantom tonearm; Lyra Titan i, Clearaudio Goldfinger, MySonic Hyper Eminent cartridges.

Digital Sources: Musical Fidelity kW DM 25 transport & DAC, Cary CD 306 Professional Version SACD player, BPT-modified Alesis Masterlink hard-disk recorder, Sooloos music server.

Preamplification: Manley Steelhead, Einstein Turntable's Choice, Audia Flight Phono phono preamplifiers; darTZeel NHB-18NS preamplifier.

Power Amplifiers: Musical Fidelity kW & Titan (both monoblocks).

Loudspeakers: Wilson Audio Specialties MAXX 3.

Cables: Phono: Hovland MG2 Music Groove. Interconnect: TARA Labs Zero & Omega Gold. AC: TARA Labs The One Cobalt, Shunyata Research Anaconda Helix.

Accessories: Finite Elemente Pagode, HRS SXR stands; Symposium Rollerblocks Audiodharma Cable Cooker; Shunyata Research V-Ray Reference, TARA Labs Power Screen power conditioners; Furutech DeMag & deStat LP treatments; Oyaide AC wall box & receptacles; ASC Tube Traps, RPG BAD & Abffusor panels; VPI HW-17F, Loricraft PRC4 Deluxe record-cleaning machines.—Michael Fremer