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INSIDER VIEWS ON EVERYTHING VINYL

## ANALOG BY MICHAEL FREMER CORNER

THIS ISSUE: Audio Union's Döhmman Helix 1 turntable and Schröder CB tonearm.

### Extraordinary Analog

**T**urntables, tonearms, and phono cartridges are tuned systems. That each of them can be adjusted to maximize the sound quality—especially the quality called *tunefulness*, which is difficult to quantify—drives vinyl deniers crazy. Today, one of them e-mailed me: “You are the stupidest motherfucker I have ever encountered. Go shove a tone-arm up your ass.” He followed that with this: “You are demented, deluded, and deaf. Records suck, and always have.”

Just ignore them. I do. (Well, I try.)

The ability to fine-tune a vinyl playback system is part of what makes it possible to combine an archaic technology with modern thinking and materials to create musical magic, and take listeners to new heights of ecstatic musical pleasure. It's why so many young people are tuning in to vinyl, and helps explain why just today, as I write this, it was announced in the UK that, for the first time, revenues from sales of vinyl exceeded those from downloads.

You can buy a turntable that's been pre-tuned by the designer—that is, the user can't adjust its combinations of mass, materials, suspensions, etc.—or you can buy one that offers a few things you can adjust to your own taste. Either approach can be valid.

You can also buy a turntable whose designer has decided that high mass and heroic amounts of damping will solve any problems in the system's electromechanical design, and has applied these with an iron fist but without careful, critical listening. You might as well buy a CD player.

I bring this up because both Audio Union's Döhmman Helix 1 turntable and the Schröder Captive Bearing tonearm include instructions outlining how one can tune them—in one case through the use of heavy brass weights,

and in the other by various degrees of screw tightening. These options are spelled out in well-written manuals, not because the designs are unfinished or the designers uncertain, but because

the player's international design team, headed by Mark Döhmman, consists of both scientists and careful, experienced listeners who understand the tuned nature of the system.

#### Audio Union

The last time we heard from Mark Döhmman, he was the chief designer at Continuum Audio Labs—it says so right on his business card. There, he headed a design team that created the no-longer-in-production Caliburn turntable, Cobra tonearm, and Castellon stand. That was more than a decade ago.

I listened, I reviewed, I bought . . . and 11 trouble-free years later I'm still glad I did, though I've since replaced the Cobra with the Swedish Analog



Technologies (SAT) arm (and am glad I did that, too). And I replaced the Castellon's original magnetic-repulsion isolation system with one from MinusK.

Döhmman is now a member of the Audio Union team, based in Sofia, Bulgaria. Rumen Artarski, who holds a degree in electrical engineering from the University of Denmark and who also manufactures the Thrax line of electronics and loudspeakers, is Audio Union's executive director of engineering and marketing. The other Audio Union team members from around the world include names familiar and unfamiliar: world-renowned tonearm designer Frank Schröder; Dave and Tom Kleinbeck, of EnKlein cables (Dave is a telecommunications engineer, Tom a patent-holding mechanical and aeronautical engineer); Bo Christensen, of Bow Technologies (and previously of Primare); and Dr. David Platus, inventor of MinusK's vibration isolation technology. There are also two more Bulgarians: Stanislav Stoyanov, an aeronautical engineer who, among other things, oversees Artarski's state-of-the-art CNC machining facility; and Dr. Plamen Ivanov Valtchev, an expert in the use of advanced software visualization, FEA modeling, and acoustics. You can read more about the team at [www.audio-union.com/Helix.php](http://www.audio-union.com/Helix.php); if you do, you'll think they got together to design a great-sounding guided missile, but no—it's "just" a turntable project.

### Döhmman Helix 1 turntable

Mark Döhmman's goals for the Helix 1 were the same as for his older designs: Isolate the groove-stylus interface from the outside world and from within. Drain away noise and various forms of energy produced by the turntable's bearing, the motor, and the stylus/vinyl interface. And, of course, spin the platter at the correct and unvarying speed. (For details about how he accomplished this in the Continuum Caliburn, see my review in the January 2006 issue.<sup>1</sup>)

The goals this time were the same, but with a desire to bring it in at far lower cost. By the time the Caliburn came to market, its retail price had soared past \$150,000, and it couldn't easily be dismantled for moving.

The Döhmman Helix 1 (\$40,000) looks unlike any other turntable on the market. Its design concept and execution are equally unique, beginning with the integrated MinusK Negative Stiffness isolation platform.<sup>2</sup> Simply put, MinusK is a totally passive leaf-spring design that isolates down to 0.5Hz vertically and 1.5Hz horizontally. Nothing from outside gets in. It wasn't

invented for audio applications, but it sure works well under whatever you want to isolate.

Interesting as that is, it's probably the least intriguing aspect of the Helix 1's design. More fascinating are other design features, each with its initials: Micro Signal Architecture (MSA), Mechanical Crossover Technology (MCT), Tonearm Damping System (TDS), and Resonance Tuned Suspension (RTS). You can read way more about these on Audio Union's website<sup>3</sup> than I have space for here. The language is flowery, but I found it free of another pair of initials: BS.

Basically, the Helix 1's interior consists of various plates that can be thought of as leaves on a tree—or, as described on the website, "the bearing is the center of the 'universe' where 'planets' (motors and arms) sit on an orbital plane (the chassis/plinth). Vibrate the plane (chassis/plinth) by internal or external means and you get vibration patterns and nodes, which become visible to the naked eye using Chladni plate analysis.

"By placing the bearing and motor and arms into 'optimal zones' where vibration was well damped or controlled we provided the best possible place on the chassis for the sub-system to sit with the lowest possible vibration. Helix 1 chassis research created several eureka moments!" Want to know what "Chladni plate analysis" is? Go to the link.

In fact, if you want to see a Helix 1 partially assembled by Rumen Artarski at his factory, see my 25-minute video at [https://youtu.be/5QYU6qRg\\_PA](https://youtu.be/5QYU6qRg_PA). More particulars include a plinth of 4"-thick, CNC-machined aluminum and structural alloys that, fully assembled, weighs 100 lbs. Not visible in the video are the aforementioned series of interlocking plates "fitted closely" to the MinusK platform, to which are attached the motor, the platter bearing, and two suspended, isolated platforms for mounting tonearms.

A "mechanical crossover," produced by the various materials and their thicknesses and placements, creates, the manual claims, continuous, "smooth vibrational pathways that drive higher order vibrations generated through motor noise away from the bearing and platter via a complex coupling to the chassis."

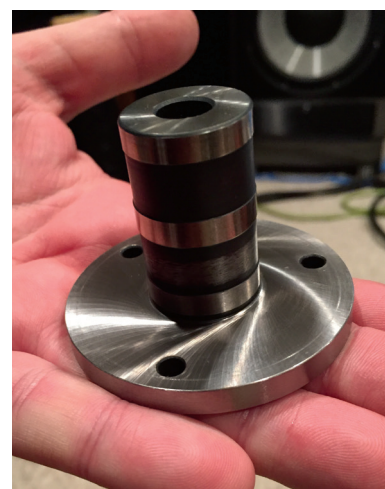
The 30-lb platter is a triple sandwich of layers of an "engineered thermoplastic" and a nonferrous alloy that's balanced and shaped for the lead-in groove and label areas of LPs. This is topped with a thin, permanently installed damping mat. The spindle is of brass.

The platter bearing is similar to

the brilliant design used in the Spiral Groove turntables designed by Allen Perkins, who worked with Döhmman on the Helix 1 prototypes. The Helix 1's bearing—clearly shown in the video, and well worth a look—is manufactured in Europe to precision tolerances. The spindle and housing are of *maraging steel*—an alloy of iron possessing superior strength and toughness. The spindle rides on a single ceramic ball and thrust pad.

A high-torque, low-noise, zero-cogging motor capable of 100W of power drives the platter via two dissimilar O-rings. The belts are purposely machined to have different durometers (degrees of hardness), so that each belt "beats" differently, with the motor-control system doing the final smoothing. Döhmman says that a "springy" belt is good because it addresses motor-bearing noise and motor cogging—but because of inevitable bearing friction, the belt slows (we're talking on a microscopic level of course) and needs retensioning, which produces a "beat." With the addition of a second, less compliant belt—which, when added to the system, won't stretch at the same time or at the same rate—the two belts will then "average out," smoothing the beat—and the motor controller can be programmed to further aid the improved belt performance. Döhmman figures that makers of turntables driven by two or more identical belts will eventually pick up on this.

The Helix 1's custom, software-based motor-control system is housed in a handsome case the size of a preamplifier. This digital, closed-loop



<sup>1</sup> See [www.stereophile.com/turntables/106con/index.html](http://www.stereophile.com/turntables/106con/index.html).

<sup>2</sup> For more about the Negative Stiffness system, see my September 2012 interview with MinusK's David Platus: [www.analogplanet.com/content/minusks-david-platus-takes-stand-behind-his-negative-stiffness-isolation-technology](http://www.analogplanet.com/content/minusks-david-platus-takes-stand-behind-his-negative-stiffness-isolation-technology).

<sup>3</sup> See [www.audio-union.com/Helix.php](http://www.audio-union.com/Helix.php).

servo has greater than 16-bit resolution. The motor-control software was designed by Tom Kleinbeck, Rumen Artarski, and Stanislav Stoyanov. This international collaboration was necessary, Döhm says, partly because of the different electrical needs of various nations, but also because they found ways to “voice” the motor with flexible programming. With each iteration of the software, each of the three independently listened, then shared his opinions with the other two. From the Audio Union website: “Absolute positioning reading occurs over 120,000 discrete positions of the rotor per revolution. The motor spins several hundred times to achieve one revolution of the platter thus increasing the system resolution by an order of magnitude over a direct drive topology.”

The Helix 1’s two speeds,  $33\frac{1}{3}$  and 45rpm (78rpm is available on request), are set at the factory and, according to Audio Union, should not need adjusting. If they ever do, a smartphone/tablet app will do it—or the controller can be connected to the Internet, to allow AU’s service techs to remotely diagnose and adjust, as well as download firmware and/or software updates.

There’s a screw-on record clamp.

**SETUP AND USE:** The Döhm Helix 1 comes in a compact road case and is relatively easy to set up. It sits on adjustable leveling feet, from which the turntable itself is completely decoupled. It’s big: 23.4" wide by 5.2" high by 18.7" deep. The MinusK suspension requires no tuning or tweaking, other than to adjust the vertical “travel” once the arm(s) has been installed: The suspension is very sensitive to weight.

Audio Union supplies a pair of thick, mirror-imaged aluminum armboards that can be machined to accommodate your choice of tonearm. The boards are bolted, from above, to suspended platforms. Once a board is in place, it can be leveled and/or raised to keep it from touching the frame below by adjusting two pairs of screws accessible from the top surface. In the front left corner of the chassis top are two illuminated pushbuttons:  $33\frac{1}{3}$  and 45rpm, and On/Off (the latter glows red for Off, green for On).

The first time you screw down the record clamp, you’ll think you’ve done something wrong. The suspension will bottom out with a bang, and/

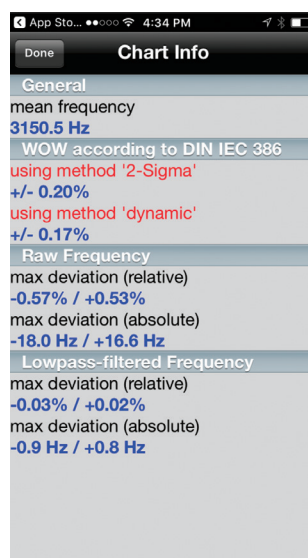
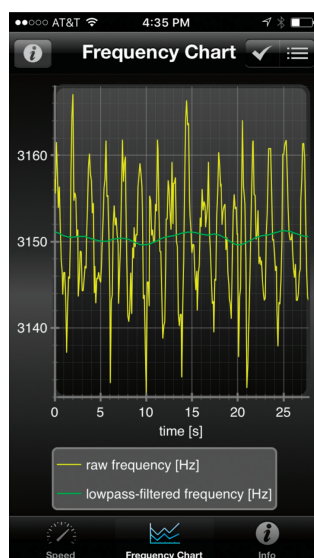
or the chassis will twist horizontally, making you think the whole thing is about to slide off the shelf. It won’t. That’s the MinusK platform behaving normally. You just have to get used to it, and modify your usual screw-down technique. Rubber stoppers or bumpers would prevent the knocking, but I wonder if they’d affect the ‘table’s tuning . . . ?

#### Schröder CB tonearm

Frank Schröder, the well-known German designer of tonearms, created his ingenious Captive Bearing (CB) arm for Audio Union. You can watch part

fumbler, be careful! I won’t go over the setup procedure, which is relatively straightforward but difficult to accomplish accurately, other than to commend the instructions for their clarity, completeness, and usefulness.

More useful is the manual’s advice about vertical tracking force (VTF), especially the note about how the tightening of various screws affects the sound. The bottom half of the CB arm’s two-piece, underslung counterweight can be screwed tightly to the upper half, the degree of tightness affecting the reproduction of the bass.



**Fig.1** (far left) Audio Union Döhm Helix 1, speed stability (raw frequency yellow; low-pass filtered frequency green).  
**Fig.2** (left) Audio Union Döhm Helix 1, speed stability data.

#### Measurements

When he set up the Döhm Helix 1 and Schröder CB in my listening room, Dave Kleinbeck used Dr. Feickert Analogue’s PlatterSpeed app (not really of lab quality, but still useful) and got a mean frequency of 3149.4Hz for the Feickert test record’s 3150Hz.

When, a few months later, I remeasured, I got 3150.5Hz (figs. 1 and 2). In that time the Helix 1’s dynamic wow

had risen slightly, from  $\pm 0.11\%$  to  $\pm 0.17\%$ . The low-pass-filtered relative maximum speed deviation went from  $\pm 0.01\%$  to  $-0.03\%/+0.02\%$ , while the low-pass-filtered absolute maximum deviation went from  $-0.2\text{Hz}/+0.5\text{Hz}$  to  $-0.9\text{Hz}/+0.8\text{Hz}$ . These are exceptionally good, stable numbers.

#### Listening

The audible difference between a well-damped and a well-tuned turntable was apparent from the first record I played after having spent time with Acoustic Signature’s Ascona Mk.2 turntable.<sup>4</sup> Compared to the Döhm Helix 1, the Ascona Mk.2 left the music in the box, sounding somewhat shut down and flat.

For my review of the Ascona I’d made a 24-bit/96kHz file of Ray Brown’s *Soular Energy* (2 45rpm 200gm LPs, Concord Jazz/Analogue Productions APJ 45-268) and other albums, using the SAT arm, Lyra’s Etna SL cartridge, and the Ypsilon VPS-100 Silver phono preamp—the only variable was the turntable.

<sup>4</sup> See my review in the December 2016 “Analog Corner.”



I'm now playing files of that recording made with both turntables, and both sound very good—but the Helix lets the music erupt (as I wrote about the Caliburn 11 years ago), while the Ascona suppresses attacks and blunts sustains. The Helix allows both attacks and sustains to be fully expressed—from both Gene Harris's piano and, especially, Gerryck King's cymbals—while the Ascona Mk.2 blunts the shimmer and ring. This is what I heard directly from these turntables; having these files is really useful for corroboration—and mea culpas!

I could hear from the Ascona the same blunting of individual piano notes, especially notes higher on the keyboard; they were tamped down, instead of having a more generous, natural sustain and decay. The Helix 1's tunefulness—its harmonic and rhythmic correctness from top to bottom—was immediately obvious, as was the absence of any identifiable mechanical artifacts that could give its sound a specific character.

The Helix's smooth, liquid flow reminded me of VPI's similarly priced Direct Drive turntable,<sup>5</sup> which says a great deal about what Audio Union has managed in a belt-driven design in terms of speed stability and, especially, musical drive. I could describe, say, its bottom end as “fast and clean,” etc., but breaking the table's performance down into pieces would give short shrift to its top-to-bottom coherency—and, because of its exceptional image stability and solidity, would detract from the overall sound's easy believability and consequent relaxed listening pleasure.

After a more-than-satisfying month or so of listening to the Schröder CB arm with the Lyra Etna cartridge, through either the Ypsilon VPS-100 phono preamp with MC10L step-up transformer or CH Precision's P1 phono stage with optional power supply, it was time to change one of the variables by swapping the Schröder for the SAT arm—but not before recording more files.

With the SAT on the Döhmman Helix 1, two things became obvious: First was that the Schröder was a strong performer for \$4000, or even more; and second, that the SAT on the Helix 1 put the Helix 1 and the Caliburn on a more level playing field. The SAT's superior bass performance was immediately obvious, but so was the Helix 1's ability to handle the SAT's explosiveness.

Also clear was that the Caliburn, overall, sounded slightly more laid-back



than the Helix 1, which was somewhat more “present” and fast in terms of transient response. With “Exactly Like You,” from *Soular Energy*, the Helix 1 produced sharper, more pleasing piano and bass attacks—but the Caliburn countered with richer textures in instrumental sustain and resulting harmonics.

I also digitized “All Roads to the River,” from the reissue of Janis Ian's superb *Breaking Silence* (LP, Morgan Creek/Analogue Productions APP 027), mastered by the late Doug Sax, and I heard the same differences—which, through the Caliburn, produced a more fully fleshed-out reproduction of Ian's voice.

These are minor obsessive differences in the short term, and somewhat bigger ones long term—but so would be the Caliburn's almost four-times-higher price, were it still available. If I were offered a Helix 1 in exchange for the Caliburn plus cash for the difference in prices, I wouldn't do it—but I'd sure think about it!

### Conclusions

I can't say that Audio Union's Döhmman Helix 1 is the equivalent of the Continuum Audio Caliburn, or that the Schröder CB performs as well as the Swedish Analog Technologies arm. But I'm not surprised that, overall, the two turntables, fitted with the same arm and cartridge, sounded more similar than different. The same chief designer oversaw both, keeping in mind the same carefully chosen goals.

More than a decade of thought and technological progress have allowed Mark Döhmman and another team of experts to find other ways to damp and tune, to house the motor outboard, and to avoid having to use an 86-lb platter of cast magnesium alloy (which is costly and difficult to cast), or any number of other expensive tactics that can now, for the most part, be accomplished far

less expensively.

Had I installed the Helix 1 in the same 2005 system that provided the context for the Continuum, I'd have written about it what I felt about the Caliburn: “no turntable in my experience comes close to its sonic performance and you are guaranteed to hear your favorite demo LPs, indeed all of your LPs, as you've never before heard them—I don't care what table you use or have heard.”

Over the last decade or so, the best turntable designers have definitely upped their game, but I still think that, regardless of price, the Döhmman Helix 1 is at or near the top of the heap in terms of sound quality. What I said in the January 2006 issue about the Caliburn is equally true of the Helix 1: “What I marveled at most throughout the review period was not any particular sonic parameter in which the Caliburn performed well, but the unforced believability of almost everything I played, at whatever volume I played it.” ■

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<sup>5</sup> See my review in the May 2014 “Analog Corner”: [www.stereophile.com/content/vpi-classic-direct-drive-signature-turntable](http://www.stereophile.com/content/vpi-classic-direct-drive-signature-turntable).

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