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Audio Union
(Aurum Sonis)

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Schröder

Captive Bearing Tonearm

Specification and Design Guide

www.audio-union.com

A Note from Audio Union

Audio Union is an organization of respected engineers, research scientists and international manufacturers dedicated to restoring the true meaning of “High Fidelity”. The hallmark of our products is not only the timeless beauty of the exterior; the application of revolutionary engineering concepts, it is also the desire to construct products that express music perfectly.



The Audio Union core team has experience in scientific research, theoretical and applied engineering, and most importantly, musical performance. The project team members are selected for multiple cross-functional abilities, including their core competencies. Gifted individuals who understand collaboration, not compromise, is the key to successful implementation.

The leadership of Audio Union focuses on driving the team to strive for perfection, by increasing efficiency and reducing repetition of errors. Creating this nurturing environment for research and development spanning four continents is a major undertaking for any company and we consider this achievement is paramount to our success!

The project teams focus their precious efforts on every component, experimenting and applying diverse spectrums of knowledge, to determine the finest technical solutions to each discrete problem. Our organizational work flow provides an environment, driven by the communication of knowledge and techniques to provide the right framework to enrich the entire team’s capabilities.

Audio Union continues to innovate and launch industry class leading products to support our vision for excellence in engineering and musical performance. All innovations are based on duplicable engineering principles, not marketing hype. Music is one of the greatest expressions of the human soul, we intend for each product to be capable of faithfully delivering the essence of every performance.

Rumen Artarski

Executive Director of Engineering and Marketing

Systems Architect – Frank Schroeder

Frank Schröder, a craftsman of the finest and innovative tonearms ever made, enjoys being at the forefront of technology. Frank enjoys challenges that are deemed “impossible” to overcome, amazing the audio community with his ingenious ways to create solutions for the “impossible”. Frank was attracted to the unique approach of Audio Union and decided to join the team, generously offering his design skills to develop a new tonearm.

Frank created an entirely new, radical technique to decrease friction in captured bearings. The resultant experimentation generated friction number results lower than anything ever published. This is complemented with a new multilayer carbon fiber wand, establishing a new tonearm design.

Modeling radical new methods and prototyping armwand's led to the study of various materials and the subsequent transmission of kinetic energy. Constrained layer damping and material transitions is used throughout the design to tune and separate sources from absorbers of the impeding mechanical movement in the mechanism. The end result, there is no discernible sonic fingerprint added to your system by the wand.

The CB tonearm features several unique technologies and solutions:

- Magnetically centered and pre-loaded ceramic hybrid bearings eliminating bearing chatter completely, guaranteeing constant rigid structural coupling and silent ultra-low friction movement.
- Unique system for lateral movement damped by eddy current induction.
- Extremely low bearing stiction/friction through the use of magnetically centered and pre-loaded ceramic hybrid ball bearings.
- Symmetrical mass distribution around the central bearing axes prevents external excitation to cause any cantilever deflection
- The geometry and mass balance prevents change in VTF when altering VTA
- Bearing for vertical movement is on the same plane as record, so the arm is immune to warp wow effects
- Wiring harness with extremely low dielectric losses allows mounting of any MM cartridges with proper capacitive load at the phonostage.
- Symmetrical layout of the conductors preventing RF and EMI entering your preamplifier.
- Multi-layer armwand construction using carbon fiber and other composites create extreme torsional and bending stiffness with very high internal damping factors. This prevents any signal reflection back into the cartridge.
- A dual section counterweight is incorporated with an adjustable damping system. This allows tuning of structural vibration absorptions to prevent signal reflection across the armwand.
- Magnetic anti-skating; essentially the forces vary across the record during playback to correctly compensate for the skating forces.

Innovation with Mechanical Crossovers

One of the major influences in the sound reproduction of vinyl play back is mechanical vibration. After all, tone arms are basically mechanical devices. So what if a “mechanical crossover” concept could be extended to create a smooth continuous pathway to channel vibrations away from critical areas on a turntable?

Historically mechanical crossovers have been well documented in loudspeaker design for decades. Experienced designers such as Dr Plamen Ivanov Valtchev in Europe have published numerous papers (AES, patents, etc.) on advanced mechanical speaker structures and designs.

Here is a summary of one successful implementation.

- Coupling the cone of the speaker to a voice coil bobbin through a compliant section and directly attaching a small lightweight whizzer cone allows the compliant section to serve as a compliant filter!
- The main cone is not vibrated at higher frequencies as whizzer cone responds to all frequencies, however due to its smaller size; it limits the output at higher frequencies, thereby implementing a “mechanical crossover function”.

From this method we learn the shape and weight of the components influence the acoustic behaviour under vibration. Therefore, selection of materials and the suspension elements utilized actually determine the crossover frequencies and their effectiveness! This is not necessarily a good approach for a tonearm, even disregarding the complexity of integration needed achieve our high fidelity goal.

Then we had an epiphany; what if the designer could define physical zones within the infrastructure that focuses vibrations away from key areas; such as the platter, bearing, motor, tonearms, and floor modes across a broad frequency spectrum to improve the clarity and detail retrieval?

The CB tonearm is designed to reject vibrations conducted through the mounting plate that originate from other turntable components such as; the motor, plinth, bearing, and airborne playback bending. The premise, integrate a stiff, balanced mass structural coupling to the chassis. This effectively eliminates external excitation by generating equal forces to all sides of the arm, maintaining the dynamic stability of the system and preventing a deflection of the cantilever.

Design team

Frank Schröder – Analog Designer

Frank is one of the most respected analog designers of his generation and one of the industry's true gentlemen. His immense knowledge of audio history of the audio art provides insight into the genesis of ideas and with whom they should be rightly attributed. He has designed several impressive analog systems in his own right and his tonearms are among the most sought after arms in the market. He holds patents for his technologies and is a regular visitor to Audio Union's main European manufacturing hub.

The CB tonearm is generating industry discussions as being one of the finest tracking arms ever made. The bearing system offers lower friction numbers lower than even the venerated Technics EPA-100. Sonically, the CB it is a musical masterpiece.

His contributions to the Helix project include advanced magnetic pre-loading systems and the ingenious arm bearing design. The Helix 1 is evidence of Audio Union's ability to collaborate effectively to attain our lofty goal, restoration of "High Fidelity".

Rumen Artarski – Executive Director of Engineering and Marketing

Rumen is the lead project engineer, coordinating and guiding the engineering team to construct the Carbon fiber composite armwand to meet the Micro Signal Architecture © specification for ultra-low vibration operation. He also drew upon David Kleinbeck's concepts of signal transmission and communications subsystems, to integrate an original design that suppresses EMF and RF to vanishingly low levels, preserving the very low-level cartridge signals.

Rumen is the key integrator of the "mechanical crossover" application and selective damping implementation within the design. His patience, knowledge, effective communication skills and commitment to our customers are the key factor in the successful development of the CB tonearm.

Tonearm Schröder CB Specifications:

Arm wand Type:	Wood (Glossy)	Carbon Fiber
	9 inch Wand	12 inch Wand
Effective Length:	239.3 mm	282.0mm
Pivot To Spindle Distance:	222.0 mm	267.48 mm
Overhang:	17.3 mm	14.52 mm

Effective Mass with supplied cartridge-mounting plate:

- 9 inches armwand
 - 14gr
 - 19gr with optional heavy cartridge mounting plate
- 12 inches armwand
 - 18gr
 - 23gr with optional heavy cartridge mounting plate

Mounting Hole:

- 24-25mm with single M6 tapped hole.

Raised bearing technology:

Ceramic hybrid bearings

- > 2mg vertically
- > 3.5mg horizontally

Type: Neutral balance arm, no change in VTF when altering VTA or record thickness.

- Internal magnetic damping for the horizontal movement.
- Adjustable Parameters:
 - ✓ VTF
 - ✓ VTA
 - ✓ Overhang
 - ✓ Offset angle
 - ✓ Azimuth
 - ✓ Anti-skating
 - ✓ *Frictionless, resonance free magnetic anti-skating up to 2.3gr.

Wiring:

- High purity copper wiring, 1m from arm to RCAs (additional lengths upon request).

Double Counterweight:

- Lower counterweight can be exchanged to an optional lighter or heavier cylinder, allowing for an increase/decrease of total counterweight mass without altering the overall mass distribution of the arm. Adjustment to a fundamental arm cartridge resonance frequency of 8-12Hz yields optimal performance of the system.

Metal color: Black

*VTF higher tracking forces can be compensated for by exchanging the anti-skating screw, upon request

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Audio Union products are manufactured in USA and European Union.