Fourth generation Scan-Tech cartridge design ~

The Lyra Helikon is the first cartridge of Scan-Tech's fourth-generation design architecture. (The first three generations were the Tsurugi (1985), the Lyra Clavis (1991), and the Lyra Clavis D.C. (1994). Even though there are other Lyra models with different features, the above listed models represent the major progress in Scan-Tech/Lyra cartridge design heritage).

The Helikon's most notable advance is in the elimination of as much conductive material as possible from the vicinity of the generator and gap. Due to the effects of Lenz's Law, even if an advanced, pole piece-less magnetic system is employed, the presence of conductive materials in proximity to the generator and gap will still result in various problems.

True one-piece “mono-block” construction fabricated from aircraft grade alloy ~
The Lyra Helikon has practically zero non-functional material in the vicinity of the generator coils. It consequently has a rather naked appearance, with no permanent surrounding body. Despite this, there is a slide-on/off, see-through full-body stylus guard for complete protection when the Helikon is not in use. The lack of obscuring sides or other body parts also makes it easier to observe the cantilever and stylus during installation and operation, effectively improving visual confirmation and therefore reducing the danger of damaging the delicate cantilever assembly. The material chosen for the main structure is one of the hardest aircraft grade alloys available. This ensures maximum rigidity and machining precision. The surface has been painted and lacquered with a clear finish for lasting appearance.

Internal cantilever-to-body direct mounting system ~
The cantilever assembly of the Helikon (& Parnassus) is mechanically connected directly to the main one-piece structure of the cartridge. In other words, the rear section of the cantilever assembly is extended deep into the body/mechanical grounding structure itself (rather than the center or rear pole piece, per conventional practice), and securely anchored in place by a bolt-mechanism, thereby eliminating as many joints as possible. This arrangement improves the transfer of energy between the cantilever assembly and the main structure of the cartridge, and prevents depleted vibrational energy from being reflected back into the coils, cantilever and stylus, where it can cause modulation distortions which are time-delayed and therefore inharmonic.

Balanced symmetrical field magnetic system ~
The Lyra Helikon uses a pole piece-less magnetic system. The signal coils operate in a magnetic field created directly by two powerful, precisely shaped disc magnets of nearly equal size, mounted fore and aft of the coil gap - in the simplest and purest manner possible. Unlike conventional cartridges, there is no big offset magnet to warp and distort the magnetic field within the gap or affect tracking ability, no pole pieces to affect the transfer of energy from magnet to coils, compress dynamics, or add unwanted distortions and sonic colorations. There is simply less there to cause problems. Unlike other pole piece-less "ring-magnet" designs, the disc design creates a more even distribution of

magnetic flux across the entire gap, and allows the magnet diameter to be reduced and the cantilever length kept short. The lack of conductive material around the generator and gap also helps insure that no unwanted magnetic fields will be created via inductive effects, allowing the primary magnetic field and generator coils to perform their task of converting mechanical groove energy into electrical musical signal, without interference.

Non-conductive front-magnet carrier ~
The white front-piece of the Lyra Helikon visibly signals a break with every other cartridge, including those from Lyra so far. It uses a totally non-conductive synthetic material for this function. The superior mechanical properties of this material have been augmented through intelligent design of the actual structure and its interface with the main body, creating a structurally stiff and rigid front-magnet carrier that is superior in a magnetic, electrical, and mechanical sense.

Chemically pure iron core, high-purity copper coils and solid boron cantilever ~
The Lyra Helikon uses a 0.3mm diameter solid boron circular rod cantilever, and dual-layer coils made of 6Nhigh-purity copper and wound onto a square chemically-purified iron former. This was to obtain a medium output voltage which would be useable with many of today's preamps, as well as a higher level of perceived energy than the Clavis DC which the Helikon replaces. The internal impedance of the Helikon remains a low5.5 ohms, but produces an output voltage of 0.35 mV at 3.54 cm/sec, zero to peak, 45 degrees(Scan-Tech/Lyra normal measurement scale), or 0.5 mV at 5cm/sec, zero to peak, 45 degrees (which is an alternative measurement scale that is also commonly used). However, thanks to the chemically pure iron core, the balanced symmetrical field magnetic circuit and the lack of extraneous material in the vicinity of the magnetic gap and coils, the sonic purity remains on par, if not better than equivalent Lyra models of the past.

Dual elastomer dampers with internal uni-pivot spring suspension ~
The dampers and suspension of an MC cartridge are very critical parts for performance and also longevity of the cartridge. Only years of experience and lots of know-how about the elastomer damper and wire spring materials will make it possible for a cartridge manufacturer to make the choices that provide a combination of good sound, good tracking, and good mechanical stability. The Helikon's spring-damper combination is not only capable at resisting the various forces that impinge on the cantilever, it also creates a clearly defined pivot point and reference for the cantilever and coils to move around, making accurate groove transduction possible.

Low-mass, micro line-contact diamond ~
While there are several types of stylus profiles, all Lyra cartridges use Ogura PA line-contact styli, because it is our conviction that these provide the best tracking and detail resolution at all frequencies. If set up properly, such styli also cause less groove wear. Which brings us to the discussion of tracking force versus wear, although what we see and the tone-arm sees is tracking force, this is not necessarily what the groove sees. Barring mis-tracking, which can cause rapid damage, what really affects the grooves, is the pressure per unit of surface area. Even if the tracking force is light, if the stylus

contact area is small, the tracking force will be concentrated on a smaller area of LP groove, resulting in higher localized pressures and accelerated groove wear. Conversely, due to its sizeable groove contact area, a line-contact stylus does a good job at distributing tracking forces over the entire groove wall, reducing localized tracking pressures and minimizing groove wear.

Apart from the aspects already discussed, the PA has other advantages that are particularly useful when playing used or damaged LPs. Because of its superior profile, the stylus will not only use more of the groove wall, which makes it less likely to be disturbed by localized groove damage, but it will also play deeper in the groove, at depth not normally reached - or damaged - by other styli the LP may have been played with previously. This will result in less surface noise, and also better fidelity imparted by better tracking of the groove walls.

The other aspect of the cartridge stylus that matters is the size of the total stylus shank, not just the part that tracks the LP groove. This ends up affecting tip mass, and consequently, the frequency response and tracking capabilities of the cartridge. The higher the frequency and the greater the stylus tip acceleration forces involved (which are a direct result of the LP cutting velocity and the physical condition of the groove),the more important it is to have small stylus and low tip mass. Dropping the size and mass of the styli and cantilever also confers audible benefits above and beyond its measurable ones, as this can minimize overshoot and improve the settling time. Doing so reduces the time window occupied by ticks and pops, making them less noticeable to the ear.

Rhodium plated output pins ~
The output pins provide the electrical interface between the tone-arm connectors and the cartridge itself. Normally these are gold-plated brass or copper pins. In case of the Lyra Helikon we decided to go for the hardest and most sturdy plating process available, namely Rhodium. This makes a very tough, scratch-proof surface for many years of trouble-free performance.

Sonically transparent coil-protection sheet ~
Most phono cartridges have enclosed bodies, and some of them also have a vinyl cover to protect the delicate damper and coil area from contamination by dirt and dust particles. Unfortunately both of these methods badly affects the sound because it either creates resonance or close in the coil area so the coils are acoustically prevented from "breathing". Lyra cartridges have adopted Japanese "washi" paper that breathes, and while it is very effective protecting the coils and dampers from dirt and dust, it still allows the necessary free flow of air and acoustic impulses that are necessary for an open, free, and natural sound.

Medium output, medium compliance, medium mass ~
We wanted to make the Lyra Helikon a superb performer that would match well with as large a number of interfacing components like tone-arms, turntables, as phono stages as possible. However, in spite of the desire for a wide number of matching possibilities, we didn't want to compromise the design and its peak potential.

The internal impedance of the Lyra Helikon is 5.5 ohms, somewhat higher than previous Lyra designs, but still low enough to classify as a low-impedance cartridge design. In synergy with the improved balanced symmetrical field magnetic circuit, it produces a medium (for an MC design) output of 0.35mV at 3.54cm/sec,zero to peak, 45 degrees (Scan-Tech/Lyra normal measurement scale), or 0.5mV at 5cm/sec, zero to peak,45 degrees (which is an alternative measurement scale that is also commonly used). The medium output of the Lyra Helikon means that it can be used comfortably by most MC capable phono stages or MC capable phono inputs on preamplifiers, including those with tube amplification, without encountering problems like poor signal-to-noise or lack of energy commonly associated with low-sensitivity phono inputs.

The cantilever compliance has been tuned to 12cu which is a comfortable level for most tone-arms (typically medium mass) available on the market today. Compliance is a measure of the cartridge suspension's stiffness. A stiffer suspension requires a higher mass tone-arm, while a looser suspension (high compliance) require a low-mass tone-arm. The Lyra Helikon can be used in any high-performance, rigid bearing, resonance-free, medium mass radial or linear-tracking type tone-arm with integrated head-shell and adjustable anti-skating force.

In spite of the fact that the whole mechanical structure of the Lyra Helikon has been milled out of a solid block of aircraft grade alloy, the naked and open "skeleton" design and the removable see-through, full-body stylus guard, has allowed us to create a rigid and strong structure with a medium mass of just 8.0g. This in effect means that it will match just about any tone-arm on the market, and also that the total mass of tone-arm and cartridge always will remain within commonly accepted constraints and design limits. This also concerns the ideal system compliance which has been discussed above.
In spite of being "medium" in the respects discussed above, the Lyra Helikon is by no means a medium performer. On the contrary, we feel that it should be possible to extract optimum performance from the Lyra Helikon in a far greater variety of systems than most MC cartridges available on the market.