

LYRA ETNA

MC PHONO CARTRIDGE

Introduction

It is always a challenge to design a worthy heir to a successful product. For the Lyra Etna, however, that challenge was twice as difficult as normal. On one hand its primary goal was to replace the popular Titan. On the other hand, the Etna design project had a second goal, which was to achieve as high levels of performance as possible. If this meant that Etna would give stern competition to the flagship Atlas, so be it.

As a model intended to retail for significantly less than Atlas, but having similar aspirations to the pinnacles of performance, Etna was designed with a strong emphasis on engineering efficiency, so that its performance would be as far beyond the sum of its parts as possible. For this reason, although it shares some of its design philosophy with the Atlas, the concepts are executed rather differently.

Far greater than the sum of its parts

Etna employs a solid titanium core structure machined with non-parallel surfaces to inhibit internal reflections wherever possible, but unlike Atlas (and Titan i before it), this is mated to a slightly undersized, asymmetric duralumin outer body that is designed to lock over the core like a very tightly-fitting jigsaw puzzle. The core and body are augmented with bronze and stainless-

steel resonance control rods, then everything is pressure-fit together into a pre-stressed, solid, void-free structure which is comprised of multiple materials and complex internal shapes. The constrained-layer nature of this construction dramatically reduces the resonant signature of each material and creates a far more neutral-sounding body structure than otherwise possible, while the high body stiffness benefits transients, dynamics and resolution.

Linear transducers such as loudspeakers and phono cartridges are inherently inefficient devices - on the order of 5 to 10%. In other words, of the vibrational energy that enters a cartridge from the LP groove, only 5 to 10% will be converted into electrical signal. The cartridge's internal damping system will dissipate some of the remaining 90 to 95%, but much of the excess vibrational energy will reflect inside the cartridge, creating internal echoes, smearing, and a general diminishing of fidelity. It is easy to demonstrate this with many cartridges - play a highly modulated LP with the power amp turned off, and bring your ear close to the cartridge. The "needle-talk" that you hear is excess vibrational energy which isn't being controlled properly.

To help conduct this excess vibrational energy into the headshell, where it can be safely dissipated within the greater mass of the tonearm and turntable plinth, Lyra has traditionally mounted the cantilever directly into the cartridge body, resulting in a rigid, seamless connection between the cantilever assembly and tonearm headshell (as it happens, Lyra remain the only manufacturer to do so).

In the process of designing Atlas, Lyra discovered that in addition to coupling the cantilever to headshell with a rigid, unbroken path, further sonic gains could be



realized by removing all objects and voids from the path. Atlas' asymmetric shape was conceived partly for this purpose, to move the front magnet carrier, mounting screw and screw hole out of the way of the mechanical path connecting cantilever to headshell.

Etna utilizes the same asymmetrical concept, but whereas Atlas offsets the screw and screw hole to one side, Etna moves the screw / screw hole all the way to the front of the cartridge - and interposes an additional bronze damping barrier between the screw / screw hole and the mechanical path linking cantilever to headshell.

Taking a more in-depth look

By displacing the front magnet carrier and other components so that no objects or voids are in line with the cantilever assembly, a truly direct path is established between the cantilever assembly and headshell. Control over spurious resonances is further assisted by the use of a narrowed mounting area, which couples Etna more tightly to the headshell and facilitates the transfer of vibrational energy into the tonearm. Vibrations are quickly drained away once converted to electrical signals, effectively suppressing induced resonances and internal reflections that would otherwise manifest themselves as sonic colorations and overhang.

Etna uses a yokeless dual magnet system, diamond-coated boron rod cantilever and Lyra-designed variable-radius line-contact stylus (major radius 70 micrometers, minor radius 3 micrometers, block dimensions 0.08 x 0.12 x 0.5mm, mounted within a slot machined into the front of the cantilever), and builds the cantilever assembly directly into the titanium body structure.

Both the cantilever and the insides of the titanium body core are shaped so that joining the two components to each other creates a double-knife-edge mounting system, which focuses as much pressure as possible on the joint area and achieves a type of cold weld. More rigid than the cantilever mounting system employed in the Titan, this design facilitates the transfer of mechanical energy away from the stylus and signal coil area and minimizes reflected mechanical energy, thereby significantly reducing distortion and resonances.

Another design strength is Etna's high-efficiency X-shaped signal coils, which it shares with the flagship Atlas. Compared to traditional square coil formers the X-shape allows each channel to operate with greater independence from one another, giving better tracking, tighter channel matching, improved separation, and lower crosstalk-induced distortion.

Although there are and have been other X-coil cartridges; their benefits have been accompanied by poor efficiency (in converting mechanical work into electrical output), either requiring high internal impedance (the larger coils add considerable moving mass and increase noise), and/or having low output voltage (which stresses the phono stage).

To overcome this weakness, Lyra conducted a careful investigation of X-core coils, using a combination of mathematical analysis and hands-on experimentation. The outcome of the analysis program was a very specific X-core shape that not only had higher efficiency than any previous X-core cartridge, but also surpassed the efficiency of our earlier square-coil cartridge designs.

Rather than using all of the extra efficiency to single-mindedly increase the output voltage, Lyra chose to allocate part of the extra efficiency to increase the output voltage (12% higher than Titan i), and use the remainder of the extra efficiency to reduce the amount of wire in the coils (22% less than Titan i). The lowered mass further improves tracking performance, while the higher output and lower internal impedance allow phono stages to perform better.

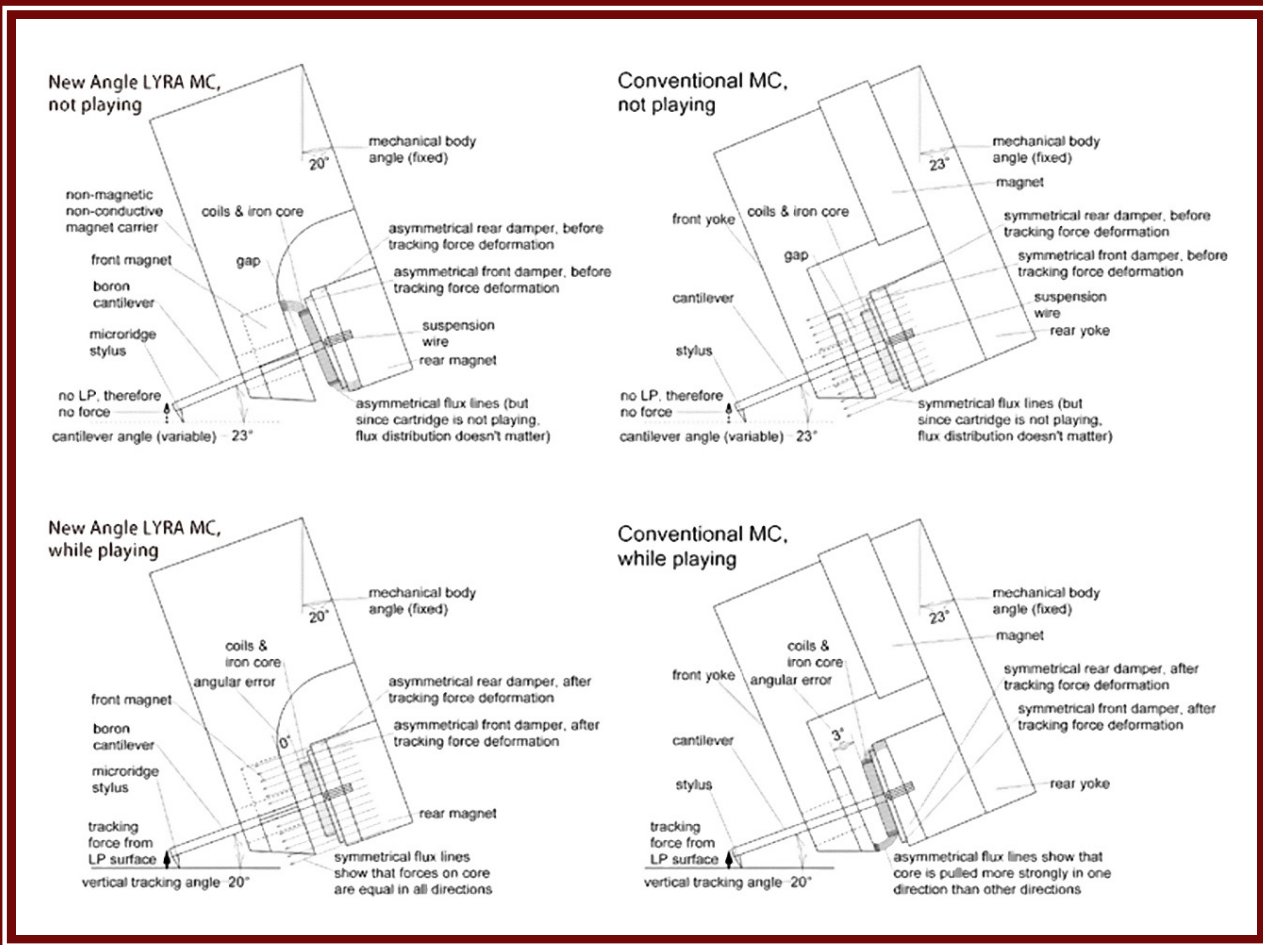
Etna uses Lyra's "New Angle" technology, which mechanically pre-biases the signal coils so that the vertical tracking force brings them into perfect alignment with the front and rear magnets when LP playback takes place. This system also equalizes out discrepancies in vertical and horizontal compliances, and enables Etna's coils to move with equal ease in all directions for wider dynamics, higher resolution, and improved tracking.

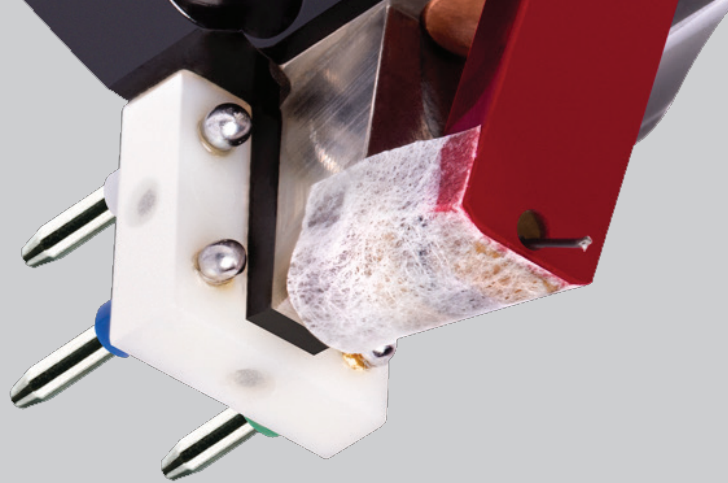


Setting a new benchmark in performance

Lyra offers a truly unique combination of advanced cartridge design by Jonathan Carr and expert construction by master cartridge builders Lyra's Yoshinori Mishima and his assistant Akiko Ishiyama*. This is an elite group of individuals that are capable of crafting the highest level MC transducers on the planet. *only involved in the preliminary build of each Delos & Kleos cartridge

In every possible way, Lyra have done their utmost to enable Etna to reach the very highest levels of performance. While Etna is second from the top in Lyra's line, one listen will demonstrate that its performance would define the very top of any other cartridge line.





MODEL

Lyra Etna

DESIGNER

Jonathan Carr

BUILDER

Yoshinori Mishima

TYPE

Medium weight, medium compliance, low-impedance moving coil cartridge

STYLUS

Lyra-designed long-footprint variable-radius line-contact nude diamond (3um?70um profile, block dimensions 0.08 x 0.12 x 0.5mm), slot-mounted

CANTILEVER SYSTEM

Diamond-coated solid boron rod with short one-point wire suspension, directly mounted into cartridge body via high-pressure knife-edge system

COILS

2-layer deep, 6 N high-purity copper, chemically-purified high purity iron X-shaped former, 4.2 ohm self impedance, 11uH inductance

OUTPUT VOLTAGE

0.56 mV@5 cm/sec., zero to peak, 45 degrees (CBS test record, other test records may alter results)

FREQUENCY RANGE

10 Hz-50 kHz

CHANNEL SEPARATION

35 dB or better at 1 kHz

COMPLIANCE

Approx. 12 X10 cm/dyne at 100 Hz

VERTICAL TRACKING ANGLE

20 degrees

CARTRIDGE BODY

Multi-material (titanium, duralumin, bronze, stainless steel) self-clamping construction with reduced-surface higher-pressure headshell contact area, predominately non-parallel shaping, phase-interference resonance-controlling mechanisms, body threaded for mounting screws

CARTRIDGE MOUNTING SCREWS

2.6 mm 0.45 pitch JIS standard

CARTRIDGE WEIGHT (WITHOUT STYLUS COVER)

9.2g

DISTANCE FROM MOUNTING HOLES TO STYLUS TIP

9.52mm

RECOMMENDED TRACKING FORCE

1.68-1.78g (1.72 g recommended)

RECOMMENDED LOAD DIRECTLY INTO MC PHONO INPUT

104 ohm-887ohm (determine by listening, or follow detailed guidelines in owner's manual)

RECOMMENDED LOAD VIA STEP-UP TRANSFORMER

5-15 ohm (connect step-up transformer's output to 10kohm-47kohm MM-level RIAA input, preferably via short, low-capacitance cable)

RECOMMENDED TONEARM

High-quality pivoted or linear (tangential) tonearm with rigid bearing(s), adjustable anti-skating force, preferably VTA adjustment





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