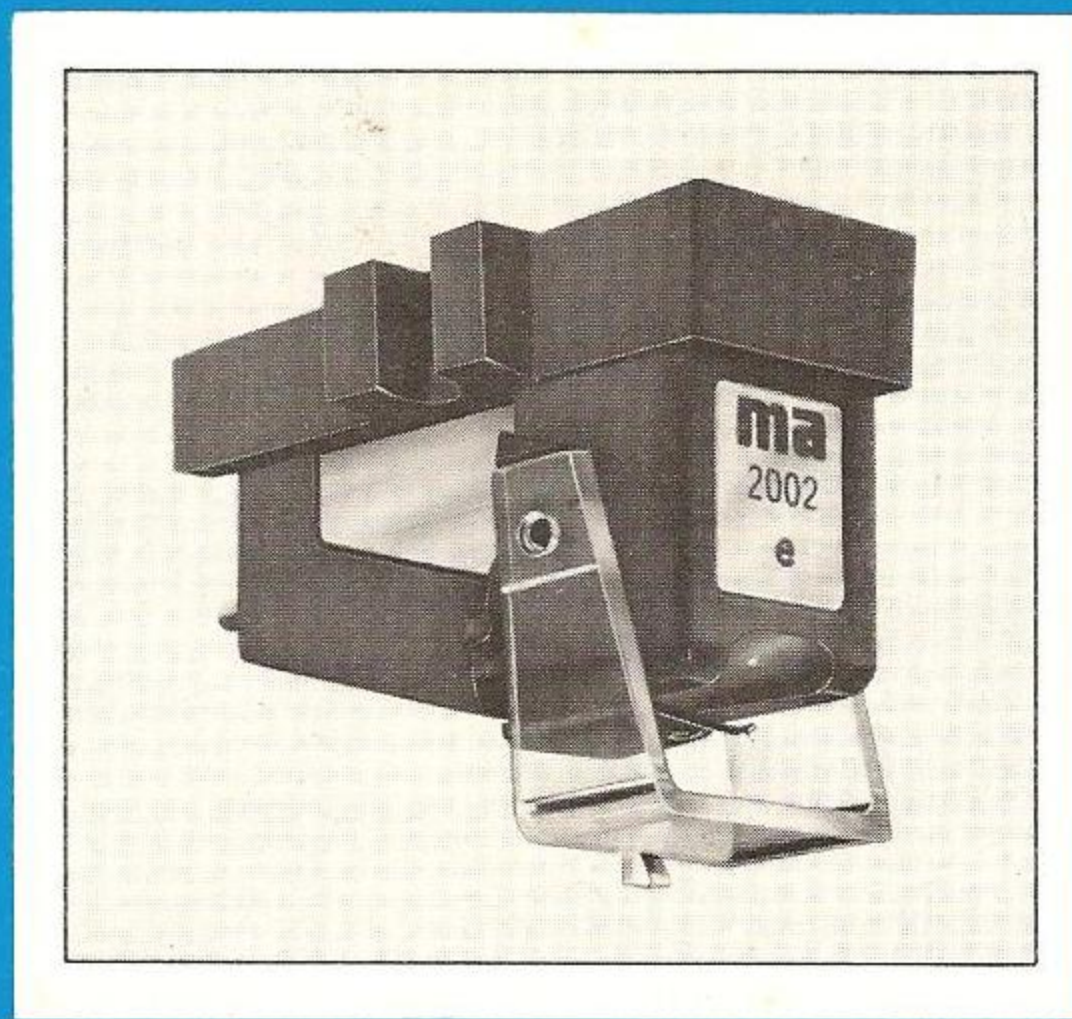


The Micro-Acoustics Model 2002-e

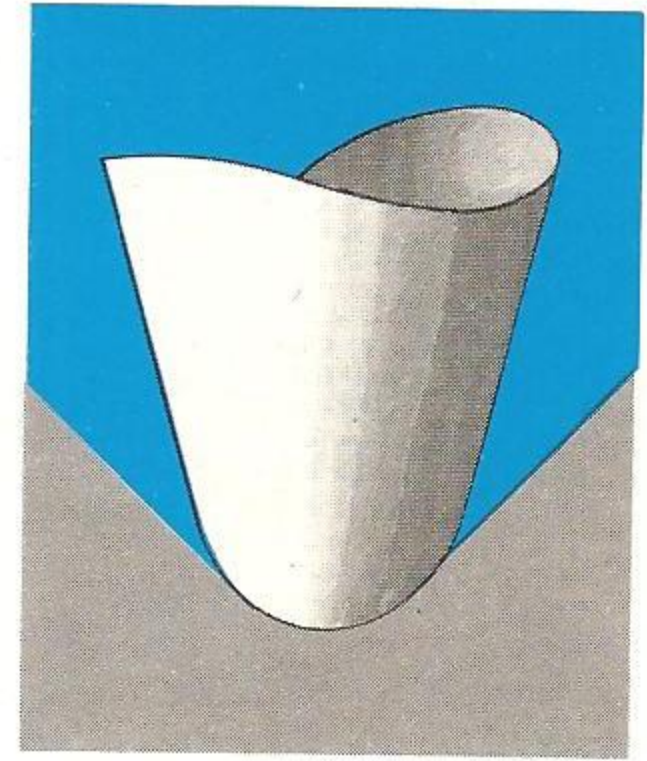


**Because good
tracking isn't enough.**

Everyone agrees that a good phono cartridge should reproduce recorded music clearly and accurately, with an absolute minimum of record and stylus wear. But until now, these goals were largely contradictory.

Tracking ability is just the beginning.

For reproduction without distortion, it's essential that the phono stylus and record groove remain in close contact during even the loudest musical passages... at forces low enough to prevent wear to record or stylus. But this *tracking ability*, discussed at great length in articles and manufacturers' claims, is only part of the picture. *Because tracking ability doesn't tell enough about the ultimate clarity of the sounds a cartridge reproduces.*

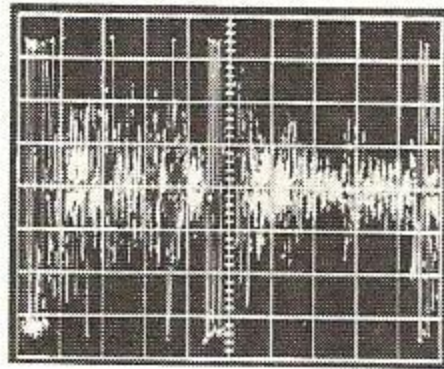


The first step in good reproduction is good contact between stylus and record groove.

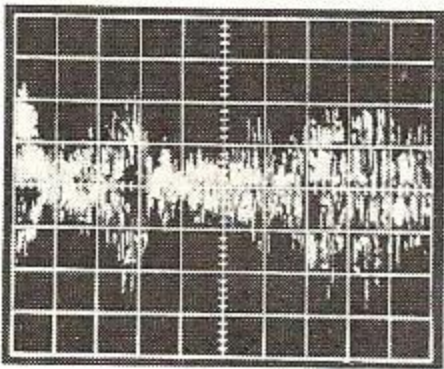
Transient ability is just as important.

Perhaps more than anything else, music is *transients*. Lots of them. Sudden start-and-stop bursts of sound at all frequencies. And the more complex the music, the more complex the transients... as any oscilloscope will tell you.

From the sudden attack of a low organ note to the bite of a plucked string, a good phono cartridge must handle all kinds of transients without distortion. Because transients—the characteristic attack and decay of musical sounds—are essential to



Instantaneous oscillogram of transients present in *Lover's Concerto* Selection from Micro-Acoustics Transient and Tracking Ability Demonstration Record TT2002 (see Page 4).



Instantaneous oscillogram of transients present in *The Typewriter*, selection from Micro-Acoustics' Demo record.

differentiate one instrument from another. Providing what most people call 'clarity.' No less important, accurate transient information locates instruments precisely in space: the very basis of stereo reproduction.

Without good transient ability, truly lifelike reproduction of recorded music is impossible.

Cartridge technology to date: a compromise.

Until now, stereo cartridge technology has offered two distinct approaches to record reproduction.

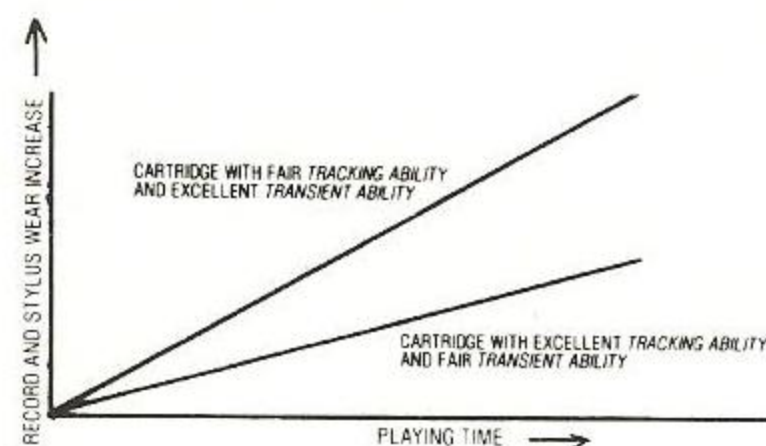
Modern high-compliance cartridges, on the one hand, have concentrated on maximizing tracking. Using minimum damping, they can track extremely high-level recorded passages at stylus pressures as low as 1 gram... providing minimum record and stylus wear, as well. This compromises transient ability, as the under-damped moving assembly tends to stay in motion, blurring transients. Low-compliance cartridges, on the other hand, provide better transient ability. But the over-damping necessary to

control the cartridge's moving assembly reduces tracking ability, increasing record/stylus wear.

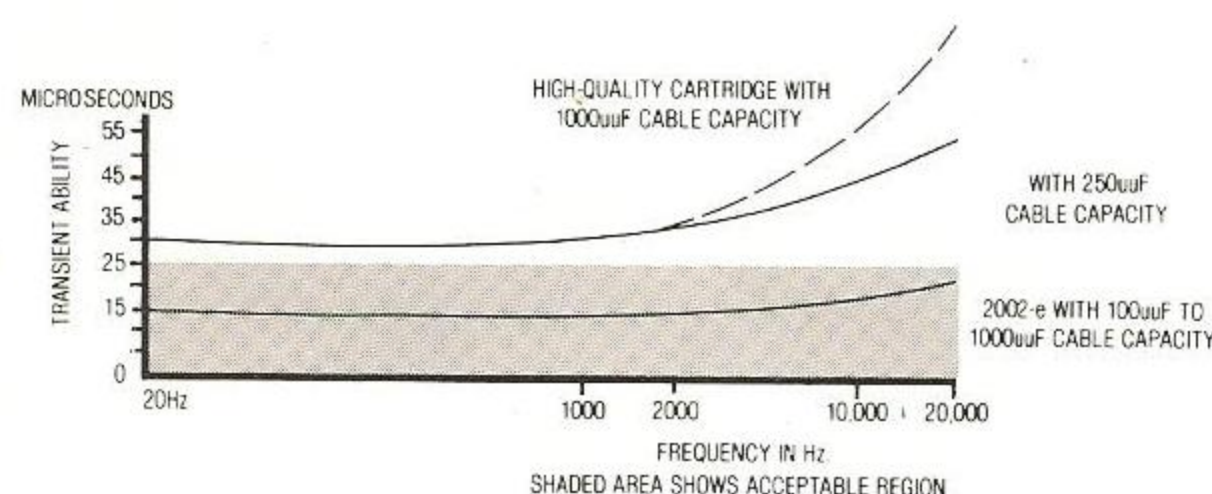
Enter a new technology.

Recognizing the importance of transient *and* tracking ability, Micro-Acoustics has developed a radical new design that optimizes transient and tracking ability for the first time in a single phono cartridge: the 2002-e.*

Compared to a conventional high-quality stereo cartridge (see chart), the 2002-e exhibits noticeably superior transient ability throughout the audio spectrum. Yet, the 2002-e is truly a high-compliance cartridge, which can track the loudest of recorded passages at 1-gram pressure, for minimum record and stylus wear.

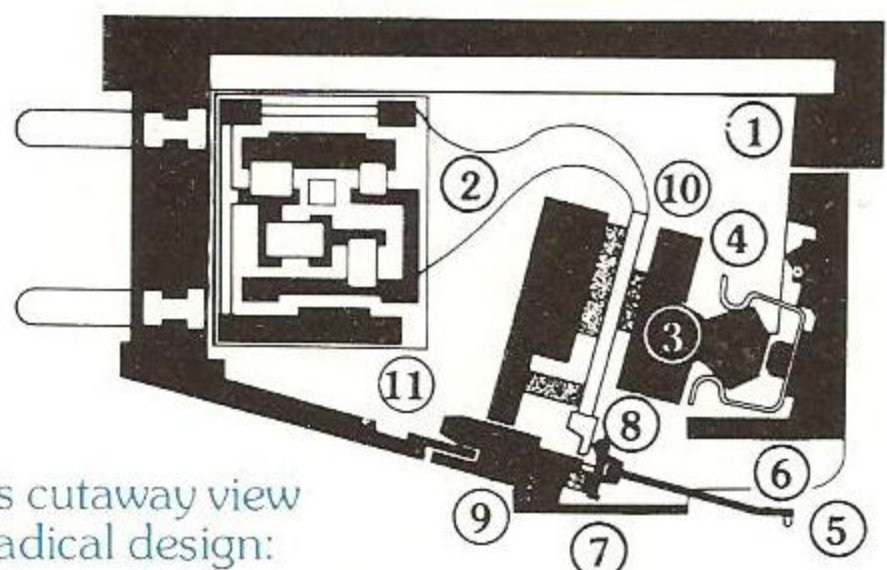


Comparison between high tracking ability and high transient ability cartridges.



Transient ability best defines how fast a cartridge can respond to a musical burst at different frequencies. (Note that the 2002-e's results are independent of cable capacity!)

See for yourself.



The 2002-e's cutaway view reveals its radical design:

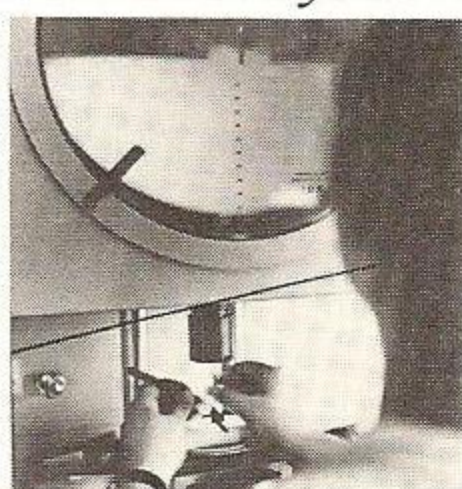
precisely controlled by a configuration of 8 damping blocks (only 3 show in this view). This critical damping system achieves optimum transient response, while allowing the 2002-e to track the heaviest groove modulations at 1 gram or less. **4. Retainer spring** Assures precise, positive positioning when the stylus assembly is inserted into the cartridge body. **5. Elliptical diamond stylus** Our playback stylus is shaped and polished with the same care as our world-famous Micro-Point recording styli. **6. Beryllium stylus bar** Beryllium is the ideal stylus-bar material. It is 35% lighter (lower in mass) than aluminum. By reducing the mass of the moving system, high-frequency transient and tracking ability are significantly improved. **7. Dual bearings and resolver** For optimum tracking ability and precise signal resolution. The resolver separates the complex stylus vibrations into left and right channels. A "perfect" pivot, it is balanced by two elastomeric bearings (only one shown in this view). **8. Direct coupling of stylus bar to electret** Coupling the stylus bar to the electrets at this point directly transmits the undulations of the groove to the transducers. This unique method of lossless coupling provides virtually perfect transient ability. **9. User-replaceable stylus assembly** **10. Electret transducer** A permanently-polarized dielectric device best described as a low-mass electrostatic equivalent of a magnet. It provides superior response because of inherent linearity from 5Hz to 50kHz. **11. Microcircuit** Passive circuit matches the electret transducer's characteristics to preamplifier phono inputs within 1%. Also, makes cartridge output purely resistive,

1. Low mass The low cartridge weight of 4.0 grams is possible because of the lightweight electret transducer. Low mass allows the cartridge-tone arm system to track warped and eccentric records without warp flutter. **2. Pure-gold connecting wires** For reliability and low loss. **3. Mechanical dampers** The cartridge mechanical system is

*U.S. Patent #3952171

eliminating the effect of cable capacitance on frequency response. Resistive output also shunts preamp input, reducing thermal noise.

A technical look. The Micro-Acoustics 2002-e is a low-mass phonograph cartridge, employing electret transducers which are directly coupled to the stylus assembly by means of a unique resolver mechanism. Essentially a perfect pivot, the resolver mechanism transmits stylus-bar vibrations initiated by the record groove to the transducers with virtually no error or loss, and resolves them into two 45/45° signals.



Each cartridge is individually adjusted under a micro-comparator.



Every Micro-Acoustics cartridge is individually tested with CBS Labs STR-100 Test Records

The electret transducer is a near-perfect device for transforming mechanical vibrations into corresponding electrical signals. A permanently-polarized dielectric device, it does not require an external voltage source. When the electret is deflected by the resolver, a voltage develops which is an exact analog of the mechanical vibrations coupled from the groove by the stylus bar and resolver. The electret's resonance is well above the audio range (60kHz), and is critically damped by means of special internal damping blocks.

The outputs of the electrets are fed to the two channels of a passive integrated circuit, which provides a purely resistive 4,000-ohm output at a 3.5 millivolt level. Since the cartridge's impedance is purely resistive, it is virtually unaffected by cable capacitance, eliminating concern over connecting cable type and length. And, as an added benefit, the resistive output acts as a shunt across the preamplifier input, reducing thermal noise significantly.

All critical parts are fabricated by Micro-Acoustics at our own plant. After initial assembly of the cartridge, it is placed in a precision alignment fixture, under a high-power comparator. Here, minute internal adjustments are made so that the mechanical relationships within the cartridge correspond precisely to the ideal design parameters. Every cartridge is tested for frequency response, sensitivity, channel separation, tracking force and distortion. Only then is the cartridge placed into stock for shipment.

Specifications*

Stylus Configuration** (User replaceable)	.0002 x .0007 elliptical diamond, beryllium cantilever
Frequency Response	5Hz to 20kHz ± 1.5dB
Tracking Force Range	0.7 to 1.4 grams
Cartridge Weight	4 grams
Channel Separation	Nominally 30dB at 1kHz 15dB at 10kHz
Output Voltage	3.5 mv each channel at 5cm/sec peak recorded velocity
Load Requirements	10k to 100k (not critical)
Cable Capacity	100pF to 1,500 pF (not critical)
Suggested List Price	\$119.00

*All measurements made with CBS STR-100 Test Record.

**All MA styli are light-beam oriented under a microscope for optimum relationship between stylus and cantilever.

About Micro-Acoustics.

Micro-Acoustics Corporation is an innovative company organized in 1969 to develop and manufacture superior products for the professional and home audio fields. The accomplishments of our engineering staff include:

- Development of the landmark CBS Laboratories Test Record Series, used for test purposes by many manufacturers of high fidelity cartridges, as well as numerous independent reviewers.
- Development and manufacture of the Micro-Point Recording Stylus, an ultra-precision cutting tool and critical component in the disc mastering process, used by virtually all leading recording companies. More than 300 million long-playing stereo records are manufactured each year from masters cut with Micro-Point styli.
- The critically-acclaimed Microstatic™ total coverage high-frequency speaker system, an add-on wide-dispersion tweeter providing improved high-frequency performance for speaker systems.
- FRM-1 and FRM-2 wide-dispersion speaker systems. Universally praised for their combination of wide-range, wide-dispersion sound.
- The QDC-1 stereo cartridge. First cartridge to offer the benefits of direct-coupled electret performance, providing master-tape fidelity from records.



In the future, Micro-Acoustics will continue to develop and manufacture audio products that advance the state of the art. Products like the new 2002-e direct-coupled electret stereo cartridge.

Hear the difference for yourself. We've created a unique demonstration record to help you evaluate and compare tracking and transient ability. For a postpaid copy, send \$3.95 to the factory.



ma
Micro-Acoustics

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