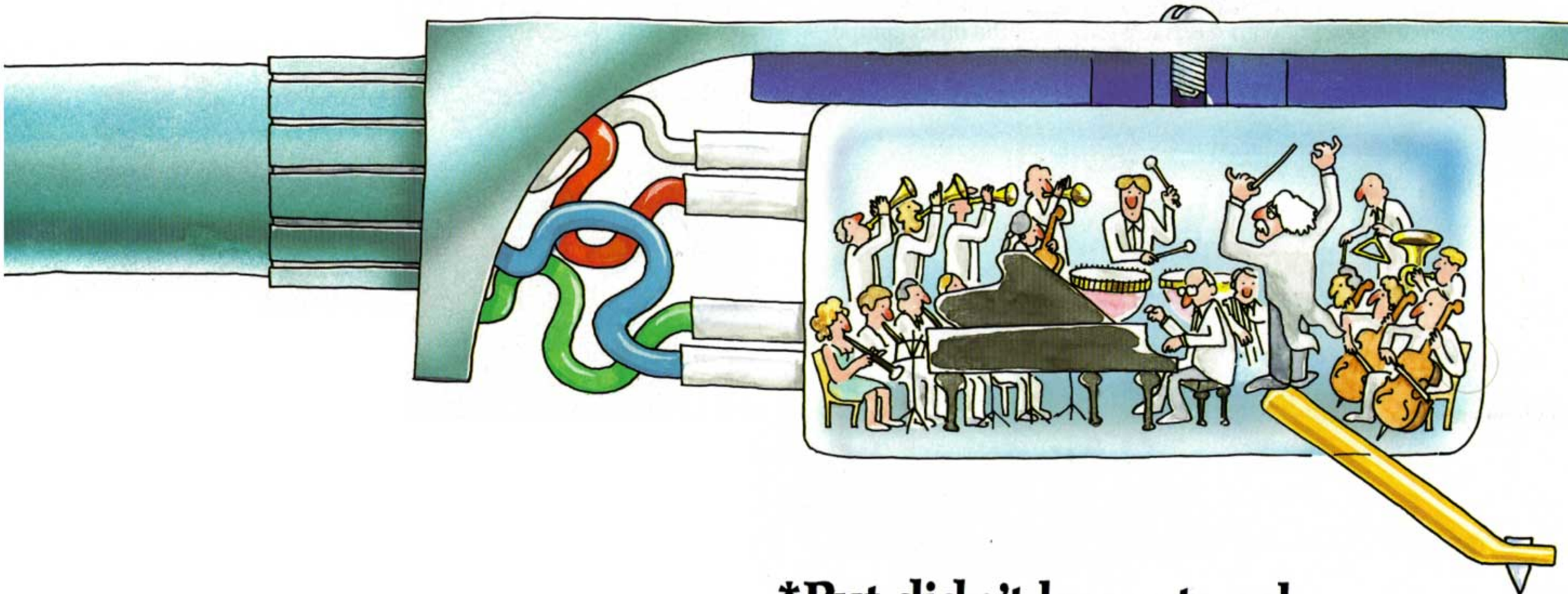
Everything you always should have known about pick-up cartridges*



*But didn't know to ask

Think about this: if you play records and you have a marvellous turntable, a magnificent amplifier, great loudspeakers and a poor cartridge, the sound will be as good as... the cartridge. Yet a cartridge is often chosen with much less care than the other components of a music system.

Music enthusiasts and high fidelity cognoscenti agree: the cartridge, positioned in the tonearm of the turntable, is the key factor in the reproduction of music from records. After all, it makes the first and only contact with the record. Thus, cartridge quality determines sonic performance even before sound is amplified and played through your loudspeakers. We know that two things would happen if music lovers knew more about cartridges in general. First, their music systems and their enjoyment of music would be significantly enhanced. Second, Ortofon cartridges would be part of even more music systems around the world. To understand how important the cartridge is to any music system we must know a little more about records.

First, Making the Tape

Just how *does* music get on a record? Well, first there is the musical performance which is put onto tape. Often, each instrument and/or singer is given a separate microphone and a separate channel. Professional tape recorders may have as many as 32 channels. Thus, the sound of each instrument can be individually balanced, adjusted, and enhanced. Different channels can even be recorded at different times. Now all of the channels recorded in the studio have to be "mixed down" into one stereo channel before a record is cut. At this mixing stage, record producers make many

of the decisions that determine the sound quality of a performance. The 2-channel master tape with the balanced, adjusted and enhanced sound of all 32 channels is then used to make the master disc from which all other records are made.

Making the Record

When the tape is played, its magnetic patterns are converted into electrical signals and sent to a cutterhead (on a lathe). The cutterhead converts these signals into mechanical motion causing a cutting stylus to move as dictated by the signals on the tape. Thus, an incredibly complex groove is inscribed into a master disc. Molds are then made from which the records in your home are stamped.

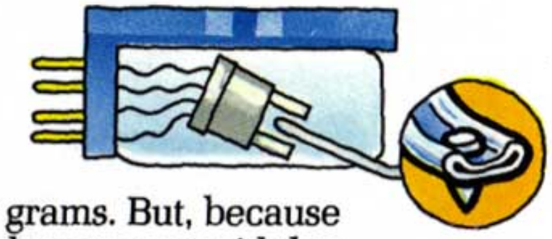
How to Get the Music Out

You might imagine many different ways to extract the music from the record groove. But, in fact, the only way is with a pick-up cartridge. A cartridge consists of three basic elements.

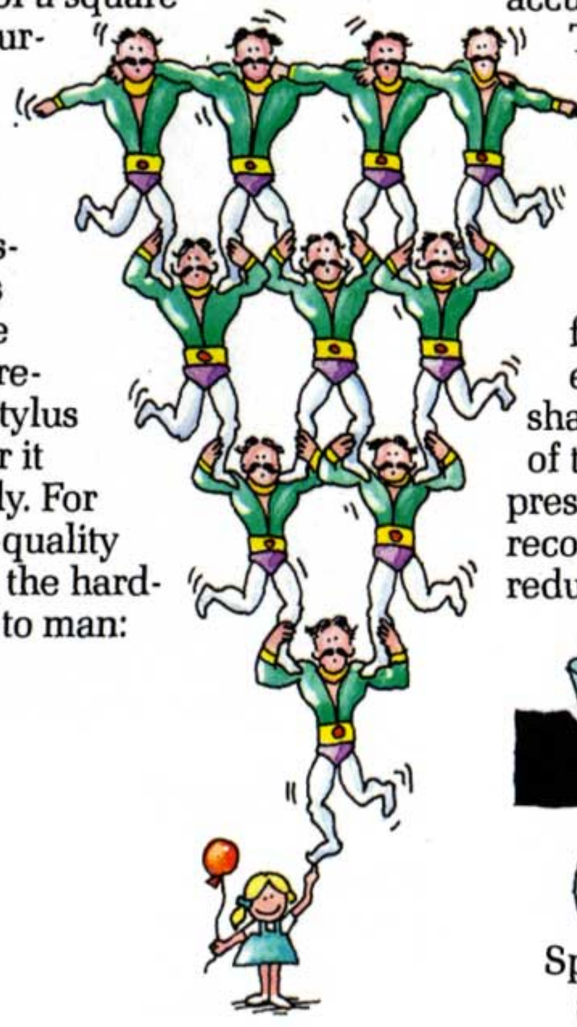
One of these is the stylus (needle) that traces the record groove. Another is the cantilever, the part on which the stylus is mounted. The third is the generating system that converts the motion of the stylus and cantilever to electrical replicas of the sound and sends it on for amplification.

The Stylus

The stylus is the only part to make contact with the record. A force must be exerted by the tonearm to keep the stylus in the groove when the record is spinning.



This tracking force is usually low, between one and two grams. But, because the stylus makes contact with less than one millionth of a square inch of the record surface, it exerts a tremendous pressure: 6000 pounds per square inch! At such enormous pressure, any roughness or irregularity in the stylus would cause record damage. The stylus must also be hard or it will wear out quickly. For these reasons, high-quality styli are made from the hardest material known to man: pure diamond.



The Shape of Things Right Now

There are three commonly-used shapes for styli. The *spherical* (also called *conical*) shape is the least expensive to manufacture, and is commonly used in low cost cartridges. Unfortunately the spherical stylus cannot trace the highest musical tones accurately.

The more expensive *elliptical* stylus, has a narrow profile enabling it to follow the petite undulations of the groove with greater precision. It is used in the majority of high quality cartridges.

A third stylus shape, which Ortofon calls the Fine-Line, provides more faithful tracking of the groove. It has an even narrower profile than the elliptical shape. It makes contact with a wider area of the groove, reducing the tremendous pressure the stylus exerts on the delicate record surface. Thus, the Fine-Line shape reduces record wear.