



# Stereo Scene

By Ralph Hodges

## FOR THE RECORD—II

EVERY couple of years the engineering department at Shure Brothers mounts a day-long technical seminar for interested members of the audio press. Invariably these seminars are *events*, not only because they generally herald the unveiling of an important new product, but especially because they bring to light research conducted by the company over the intervening period.

A word about the nature of this research is in order before we go any further. There now exists a considerable body of literature on the subject of record playing, attempting to deal with such matters as tracing distortion, record and stylus wear, mass-compliance considerations in negotiating modulations scribed on a vinyl surface, etc. As a result, the mechanics of record playing have become well enough understood to make it obvious that they are not very well understood at all. Probably what is most lacking is the solid underpinnings of empirical data to support the theoretical conclusions that have been offered. Records differ, one from another, in a surprising number of crucial ways; so do phono cartridges, given the inevitable vagaries of assembling a tiny and complex electromechanical device that can be sold at an affordable price. This raises the problem of accumulating enough experimental evidence to be statistically significant—a problem that Shure has been attacking for some years. The company does not claim to be even close to the ultimate answers, but what it has discovered from playing a great number of records a great number of times with a variety of pickups adds up to a unique body of data.

At the latest seminar, Shure engineers told a somewhat bemused audience of audio writers that: (1) electrostatic charges on record surfaces can have pernicious effects on record-player performance, not the least of them being alterations of tracking force of up to 3/8 gram; (2) that mechanical damping, properly applied, is of benefit when play-

ing the (warped) records available in the real world; that cartridge vertical tracking angle is still a matter of serious concern, although the effects of minor errors (a degree or so) continue to defy objective and subjective analysis; (4) that time-domain distortions such as warp wow are gaining further recognition as major faults in record-player performance; and (5) that record and stylus wear, subjects of profound mysteriousness, can be tied down to a few more generalizations.

**Getting Static.** Shure finds that your typical phonograph record can accumulate a static charge (negative) of up to 30,000 volts. Above that point the breakdown potential of the surrounding air is reached and static charges are carried off. Surprisingly, the actual business of playing the record does not seem to contribute significantly to the charge. Removing the record from its protective sleeve appears to be the major culprit.

Because vinyl is an effective insulator, these static charges tend to be local, cropping up in distinct patches where (presumably) the record surface has been in intimate sliding contact with the interior of the sleeve. Therefore, although the record will exhibit a measurable and fairly constant "macrofield" from some distance away, the pickup will pass through a series of "microfields" as it negotiates each revolution of the record. The magnetic attraction these fields exert will pull the cartridge to the record, compressing the stylus assembly and giving rise to—of all things—a warp-wow effect. Shure's Roger Anderson demonstrated this by first playing a discharged record with steady test tones (fine) and then after scrubbing a small section of the record with a popular record-cleaning appliance (not so fine). A distinct warble in pitch was heard with every rotation.

The conclusion to be drawn is that the patchy occurrences of static charge on the record can have enough influence on the tonearm/cartridge combination to

significantly alter (or wobble) the tracking force. Evidently the effect is quite significant when the tracking force is as low as 1 gram. In fact, Shure's measurements of the variations are in large part based on differences in tracking ability of the cartridge when the static charge (and hence the mutual attraction of disc and pickup) is increased.

No indictment of record-cleaning devices was intended by this demonstration. In fact, Shure generally approves of them. However, discharging or neutralizing the record before it is played is obviously advisable. Its close proximity to the turntable platter (if metallic) will obviously help somewhat, as will the use of anti-static "pistols" available from a number of manufacturers. But a better way is probably afforded by the disc-tracking record cleaners with conductive (and grounded) bristles.

**Getting Damped.** The application of mechanical damping to the typical record-playing system is likely to be beneficial, Shure has decided, as long as the damping is applied at the proper place and in the proper amount. The proper place is said to be as near the stylus as possible, and the proper amount will of course depend on the characteristics of the cartridge and the effective mass of the tonearm structure, assuming negligible bearing friction. The effects of properly applied damping (with the Shure/SME 3009 tonearm) can be seen in Fig. 1. The damping mechanism being used is an integral part of a new Shure cartridge model (of which more a bit later), and its contribution is said to be a hefty reduction of output at the infrasonic tonearm/cartridge resonance.

What does this reduction mean in a practical sense? There are several interdependent ways of looking at it. According to Shure spokesmen: (1) There is much less infrasonic energy reaching the amplifier and loudspeakers, which

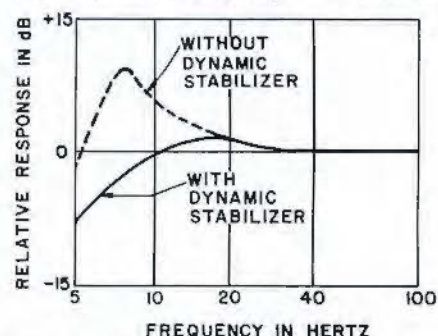


Fig. 1. Curve shows effects of use of dynamic stabilizer, as measured by Shure.

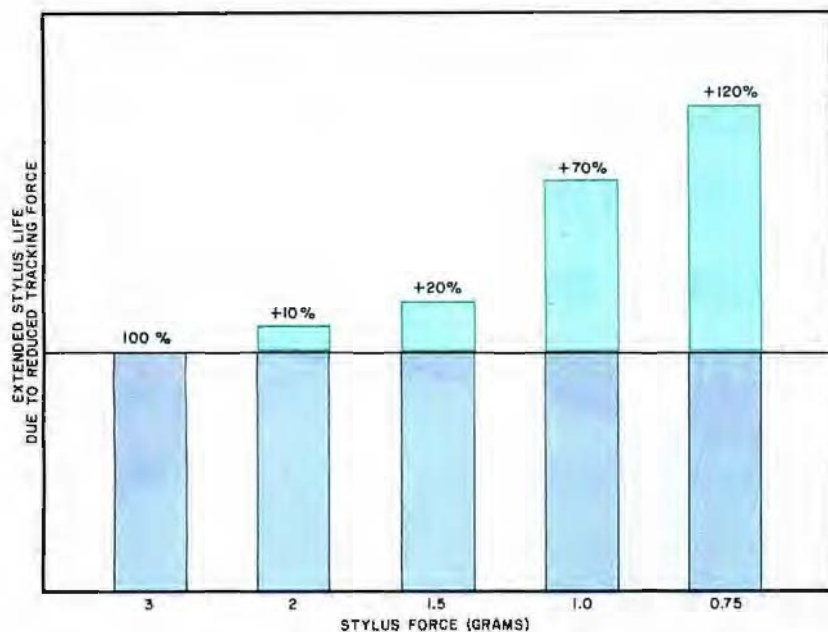


Fig. 2. Shure's studies suggest that stylus forces of 1.5 grams are best for reduced stylus wear.

means much less effort on their part in attempting to reproduce something that is musically inconsequential. (2) There is, by inference, much less stylus motion at these infrasonic frequencies, which means that the musical information on the record won't be frequency-modulated by warps and ripples in the record surface to as great a degree as heretofore. (3) There is an improvement in tracking ability at infrasonic frequencies. According to Shure, tracking ability is directly related to stylus force, and is therefore a commodity that can be used up cumulatively (just as your telephone bill reduces the resources you have to pay your gas and electric bill). Thus an improvement in tracking ability at infrasonic frequencies (present on most records, which are inevitably far from perfectly flat) means more tracking ability left over for the musical information on the disc.

**Getting Worn.** The perennial questions of consumers as to how long their styli or their records can be expected to last remain unanswered. However, there are some general conclusions that can be drawn at this time. (1) According to Shure, stylus wear is closely related to tracking force, no matter what the configuration of the stylus (conical, elliptical, Shibata, etc.). The bar graph in Fig. 2 illustrates this, and shows why Shure recommends a maximum of 1.5 grams on tracking force. (2) Playing the same record over and over for a given number of hours is likely to result in more stylus

wear than playing different records for a comparable length of time. The reason for this seems to be a build-up of abrasive agents in the record groove—in particular, diamond dust from the stylus which has become embedded in the groove during previous plays. (3) A certain amount of wear is inevitable on present-day records when played with present-day cartridges. Even after the first play, sophisticated instruments can detect a shallow trough gouged by the stylus upon the groove walls. To a certain extent this is beneficial; the smoothing of the groove-wall surface improves the signal-to-noise ratio. But after this burnishing of the groove has taken place, any further alteration of its shape is likely to be detrimental.

An interesting sidelight: Shure's experimental results indicate that, on records with simple sine-wave test tones, the wearing process can actually reduce the level of harmonic-distortion products by as much as 66 percent.

**Getting a New Cartridge.** The new top-of-line Shure phono pickup, the V15 Type IV, is of course an attempt to cope with all the newly documented phenomena discussed above. Like its predecessors it has a flip-down stylus guard that remains as functional as ever. But the stylus guard has grown a little beard of conductive carbon-fiber bristles that draw off static charges from the record surface. It is also supported by a pair of viscous-damped pivots that make it an effective damping mechanism for the arm-

cartridge resonance. And finally, the little beard is an effective record cleaner, although that is a secondary function and no substitute for a thorough cleaning of the record before any attempt to play it. (See Hirsch-Houck's test report on the new V15, this issue.)

All in all, the conclusions drawn by Shure's research are highly provocative.

**On Another Front.** Stanton's remarkable stylus for playing record stampers (Fig. 3) has been fairly well publicized in recent months. It solves—or at least comes as close as possible to solving—a weighty problem on the mind of every record manufacturer: How can I tell whether the molding parts (the stampers) for my record are any good before going to the expense of having them clamped into a press to produce a few test pressings? Because it is a mold, the nickel stamper has ridges instead of grooves, and anything intended to play these ridges must straddle a peak instead of plumbing a depression. The illustration explains much better than words could how the Stanton special-application stylus accomplishes its task, but there's another side to the story as well.

According to Stanton, the stamper-playing stylus has turned out to be a remarkably good tip for the reproduction of 78-rpm records. No explanation has yet been given for this, other than the fact that the stylus's outer dimensions are appropriate for the wider grooves on 78-rpm records (as are, indeed, the dimensions of tips sold especially for 78-rpm reproduction). Pending a thorough examination of exactly what is going on, Stanton may decide to offer the stylus to consumers (it fits the cartridge bodies for the 681 and 680 model series). A consumer price schedule has not yet been created, however. ◇

Fig. 3. Special Stanton stylus plays ridges on metal stampers with a two-point configuration.

