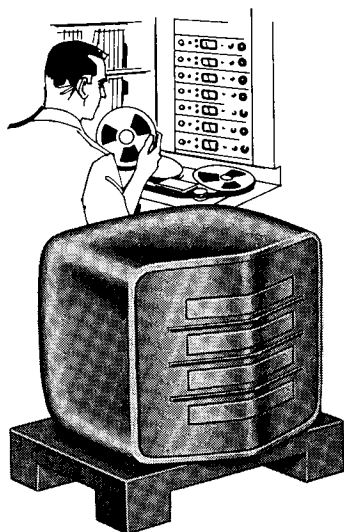




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erased, and during the reverse recording the erase head was shunted out of circuit; this expedient resulted in a noise level 8 dB below the normal noise level for that particular machine.) During playback to air I ran both tapes in synchronism and switched, at random times noted by me, from "A" tape to "B" (reverse re-recorded) tape. Listeners, who included the show's director, were alerted to note the time segments when the broadcast sound appeared most natural. Subsequent reports showed that in all cases the reverse re-recorded tape was the most natural sounding. Note that, to educated ears, the most noticeable improvement was in voice. This experiment (completely unauthorized, by the way!) seemed to indicate to us that reverse-re-recording eliminated the phase shift effects not only of the original tape recording but of the recording chain also. Resultant sound was closest to actual sound heard in the studio itself.

### COMMENTS ON THE STYLUS/ GROOVE RELATIONSHIP IN PHONOGRAPH PLAYBACK SYSTEMS

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THE paper by C. R. Bastiaans entitled "Factors Affecting the Stylus/Groove Relationship in Phonograph Playback Systems" (*J.A.E.S.* **15**, 389, Oct. 1967) may be supplemented by the following comments.

Some years ago, Hunt<sup>1</sup> noted from the Hertz equations that for a pick-up stylus on vinyl, the yield condition is reached at loads of only a few milligrams. Beyond this, these equations cannot be used, as by definition they apply only to the fully elastic range. The test results given by Mr. Bastiaans in his Fig. 2 are not below any "theoretical limit", as there is as yet no theory that applies beyond the fully elastic range. The writer has described elsewhere<sup>2</sup> the behavior of a material under an indenter. The slope of the log impression diameter vs log load curve is 1/3 in the fully elastic region, increasing to about 1/2

in the fully plastic range. The scatter of the results is such that lines of this slope could equally well be drawn through the points. Thus there is nothing unusual about the *slope* of the test results and this is not connected with the elastic springback of Hunt's indentations.

Nevertheless, the points should lie above the line extrapolated from the elastic range, and the two styli should give similar track widths for a given load in this range. An incorrect value may have been taken for the modulus and/or the material may show a skin effect. Mr. Bastiaans states that the results varied around the record. Walkling<sup>3</sup> also found this and showed that it was due to varying residual stresses in the record, due doubtless to rapid irregular cooling from molding. Rapid cooling gives residual compression in the surface layers and residual tension in the interior of the material. The effect of residual compression would be to increase the apparent hardness, which would vary with the depth of the impression. If consistent results are to be obtained, slow-cooled stress-free material must be used. Where a suitable controlled stress system can be produced in a material, improved properties may result; toughened glass is an example of this. A consistent residual stress system appears to be difficult to obtain in modern records, judging by the amount of warping.

### REFERENCES

1. F. V. Hunt, *J. Audio Eng. Soc.* **3**, 1 (1955).
2. D. A. Barlow, *Wireless World* **70**, 4 (1964).
3. R. A. Walkling, *O.N.R. Tech. Memo No. 49* (1963).

### ERRATA

*Our apologies to Arthur W. Schneider for transposing captions for figures 7 and 9 in his article, Sound Systems at The Two New York World's Fairs, in the April issue. Also, apologies to G. M. Sessler for the transposition of two lines in the heading of his Letter to The Editor in the same issue.*