LETTERS TO THE EDITOR

COMMENTS ON "DETERMINATION OF SLIDING FRICTION BETWEEN STYLUS AND RECORD GROOVE"

The author of the above Engineering Report[1] has developed a simple method of measuring the mean frictional drag over a number of record grooves without the need for special equipment. In contrast, Rangabe and Snell[2] used a modified floating arm to measure instantaneous values of drag. Two points are worth noting. First, the frictional drag may vary by as much as 3:1 in an irregular manner over a given record (Table 1). Second, on modulated grooves, the drag depends on the cartridge used (Fig. 1). This is mainly due to the mechanical damping in the pickup suspension.

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[1] R. P. Pardee, *J. Audio Eng. Soc.*, vol. 29, pp. 890–894 (1981 Dec.).
[2] A. R. Rangabe and R. S. Snell, *Hi-Fi News*, vol. 13, pp. 221–225 (1970 Feb.).

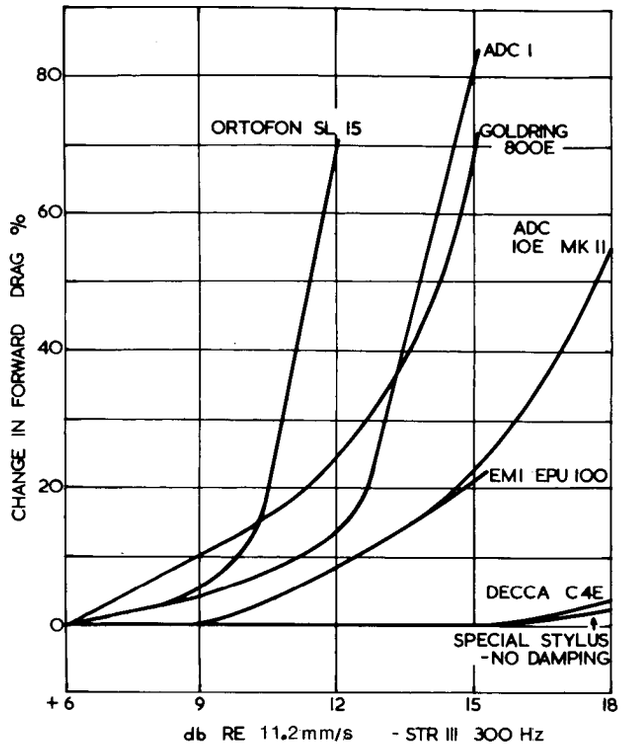

Fig. 1. Change in drag versus modulation velocity.

Table 1

Record	Effective Drag Coefficient* Minimum	Maximum	Estimated Average
Decca SXL 2193	0.35	0.75	0.40
Decca SXL 2261	0.35	0.60	0.40
Decca SXL 2154	0.30	0.42	0.35
Decca SXL 6202	0.45	0.55	0.45
Decca SXL 6379	0.40	0.50	0.42
Decca SET 323	0.35	0.50	0.35
Decca SXL 6215	0.35	0.90	0.40
Decca SET 311	0.35	0.50	0.45
DGG SLPM 138025	0.27	0.45	0.30
DGG LPM 18857	0.35	0.45	0.40
DGG SLPM 138645	0.35	0.45	0.35
EMI ASDF 217	0.30	0.32	0.30
SUPRAPHON PLP (s) 132	0.30	0.90	0.35
SUPRAPHON SUAST 50486	0.23	0.275	0.27
SUPRAPHON SUAST 50519	0.30	0.40	0.35
Record Society RS32	0.35	0.65	0.40
SAGA STXID 5248	0.27	0.35	0.30
SAGA STXID 5079	0.35	0.55	0.40
AMADEO AVRS 5034	0.30	0.55	0.35
URANIA US5702	0.33	0.40	0.35
EVEREST SDBR	0.43	0.65	0.47
PHILIPS 835-507AY	0.43	0.90	0.50

* Forward drag/playing weight. Special stylus without damping.

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AUTHOR'S REPLY

I am indebted to Dr. Barlow for bringing to my attention the work of Rangabe and Snell concerning the measurement of instantaneous stylus/groove frictional drag on a variety of phonograph records and the evaluation of mechanical damping properties of several cartridges.

All of the stylus/groove friction data presented in my paper were obtained with the use of a Bang & Olufsen model MMC 5000 cartridge having an integral Shibata stylus. Its mechanical damping properties were not evaluated. However, comparison of the friction data in my Tables 1 and 2 (after converting to the drag coefficient by the factor $\sin^{-1} 45°$) with the friction data quoted in Dr. Barlow's Table 1 permits a qualitative estimation. The two friction data sets compare as follows:

	Drag Coefficient	
	Rangabe and Snell	Pardee
Range of average values	0.27–0.50	0.31–0.61
Overall average	0.38	0.43

Assuming that the surface conditions and modulation velocities of the two groups of records are roughly equivalent, observed differences in frictional drag must be ascribed to differences in the damping properties of the two cartridges used in the tests. On this basis, the Bang and Olufsen cartridge appears to have some degree of mechanical damping since it yields average drag coefficients about 13% higher than those obtained by a cartridge exhibiting essentially zero mechanical damping, when each is subjected to a wide spectrum of modulation velocities.

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