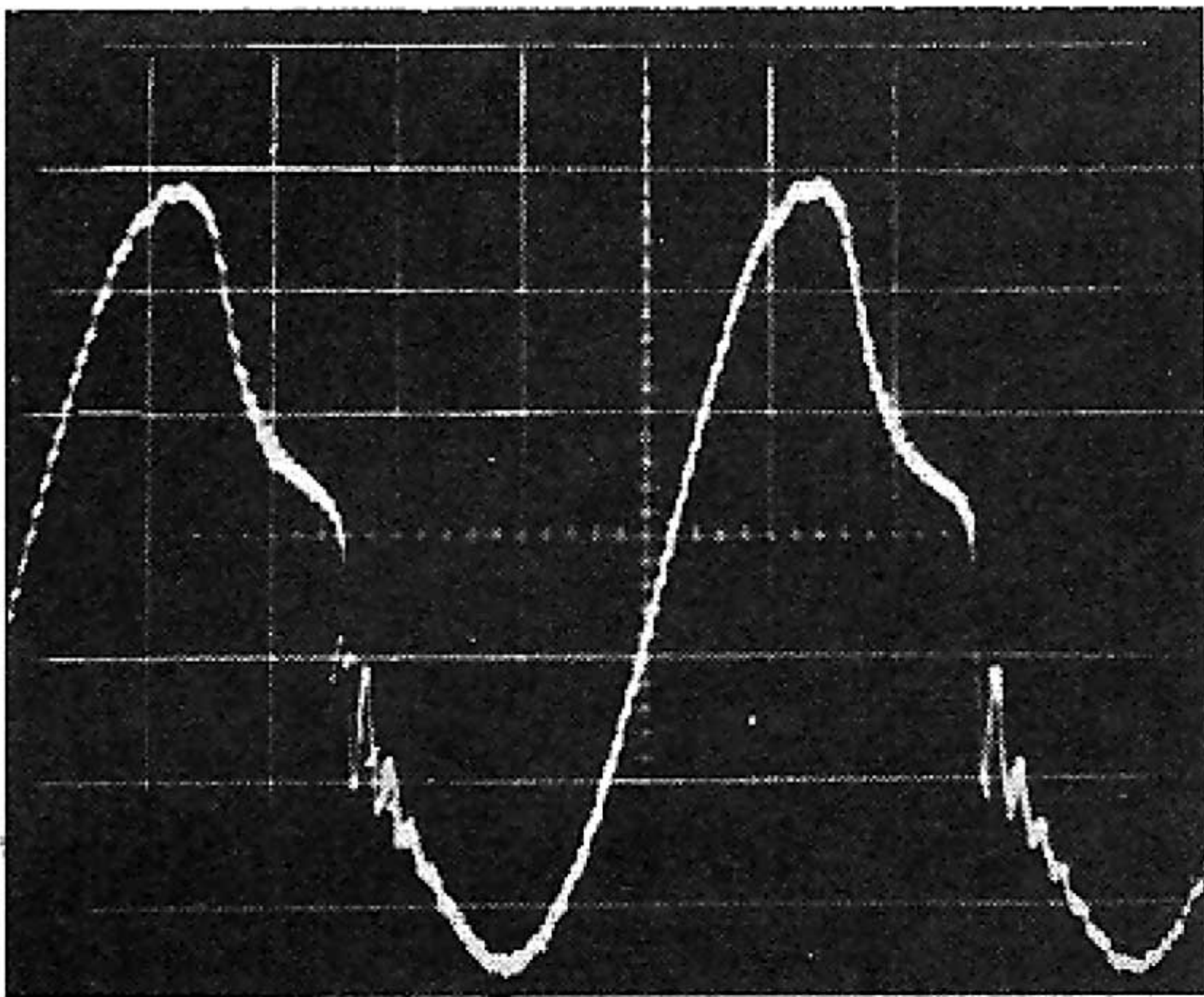




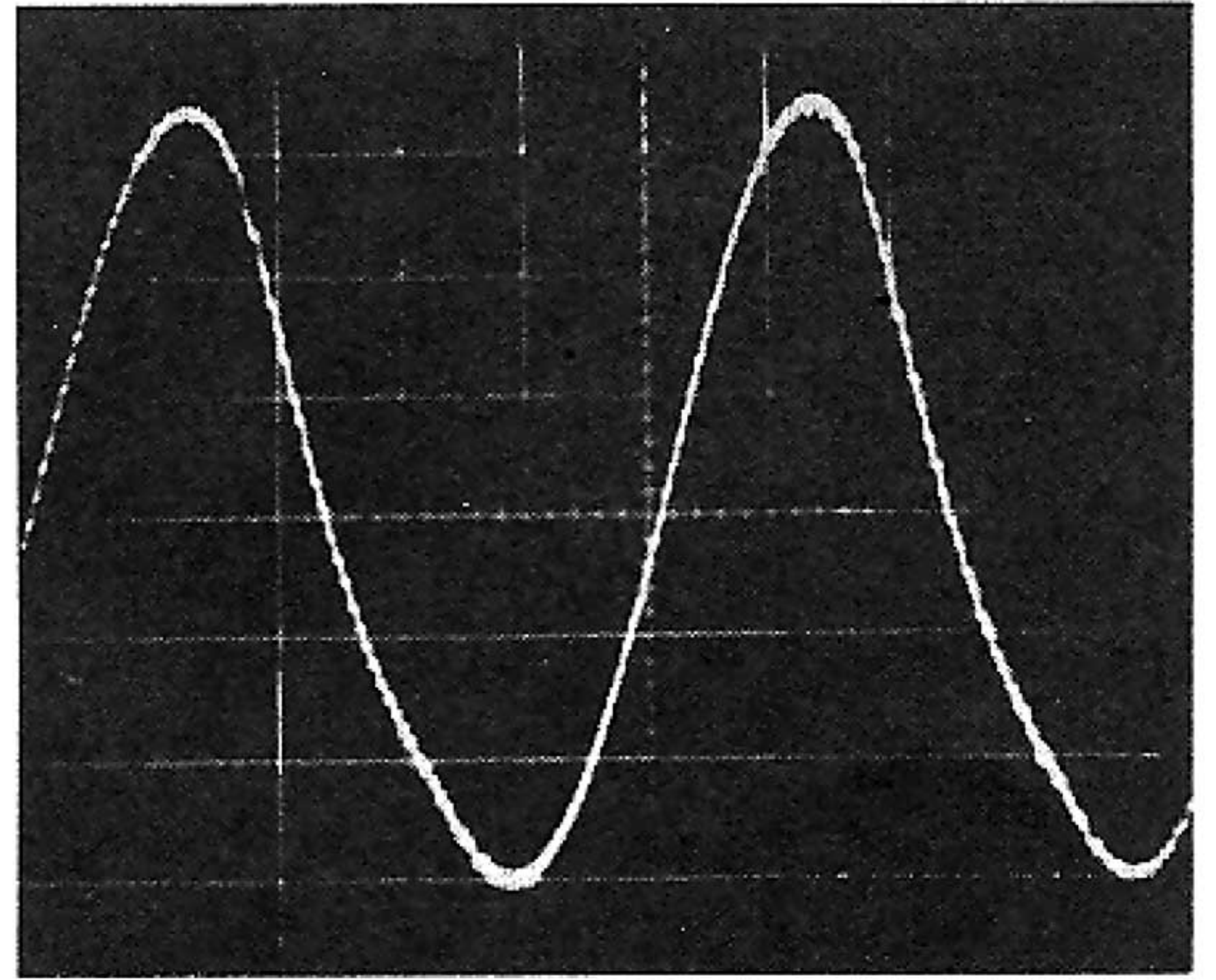
STYLUS FORCE REQUIREMENTS FOR CURRENT CARTRIDGES

This list of stylus force requirements was made on the basis of tests in AR's laboratory, using the AR turntable. The force shown for each cartridge is the minimum value at which no significant improvement in performance could be achieved with higher stylus force, on the following three tests:

1. the low-frequency tracing band of HF/SR Test Record 211



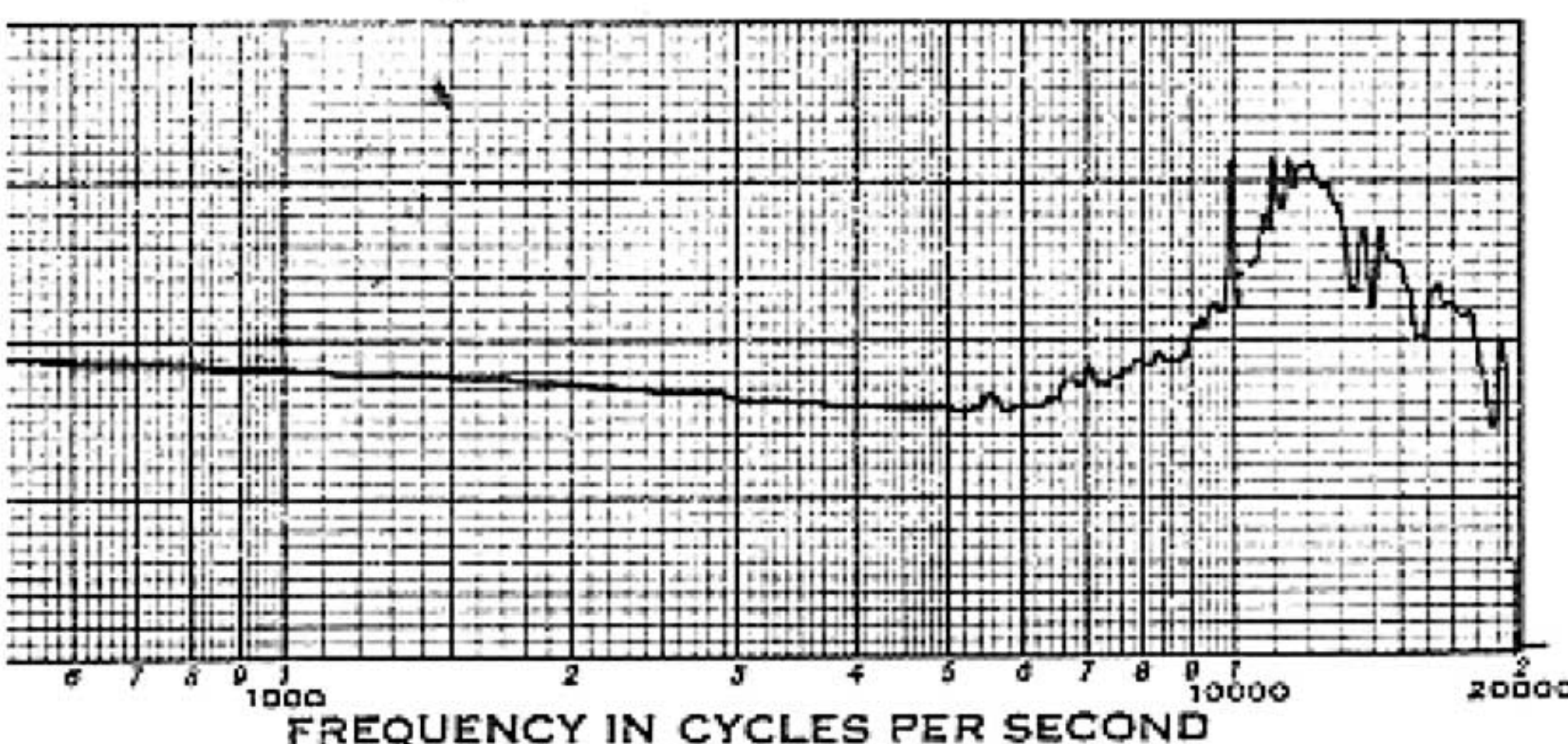
Cartridge output on HF / SR low-frequency tracing test, using too little stylus force.



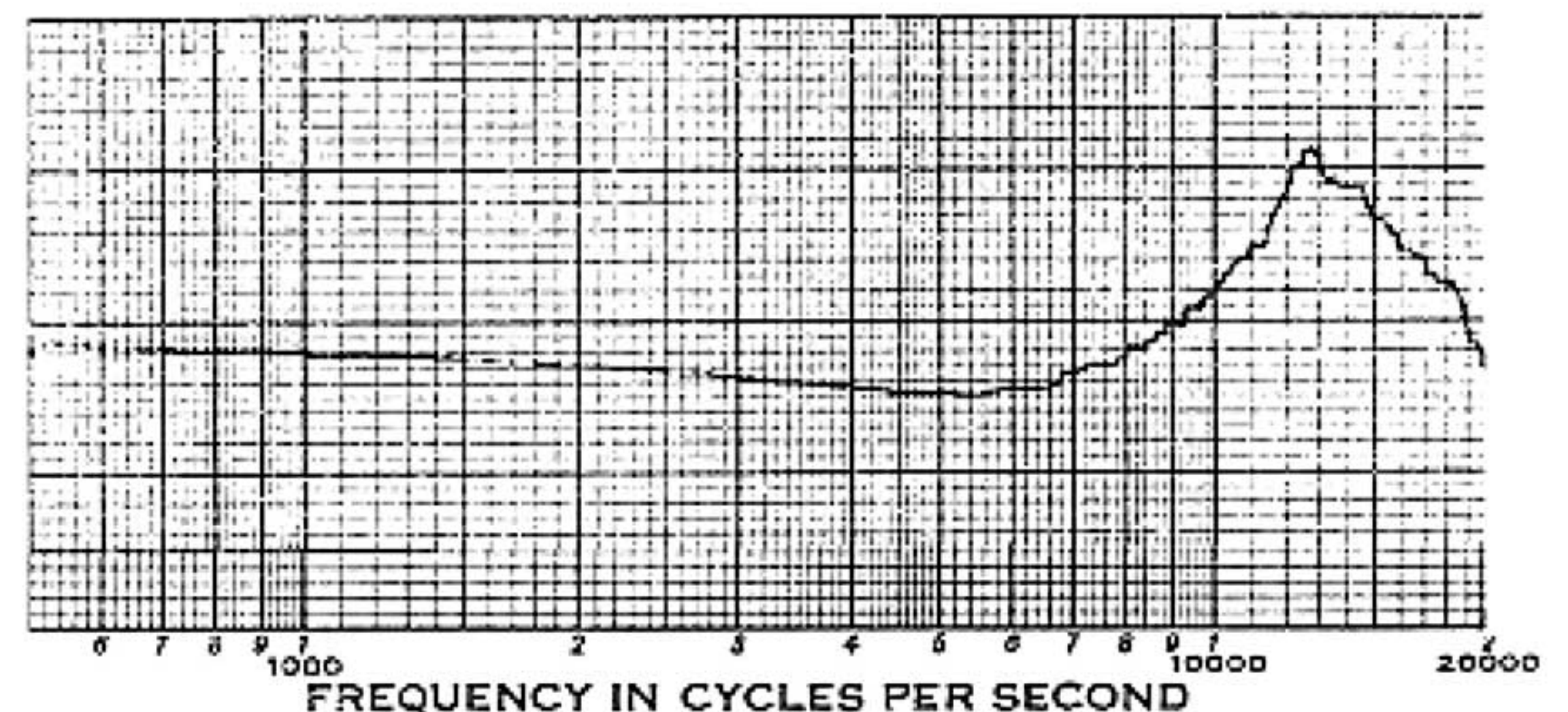
Cartridge output on same test with correct stylus force.

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2. the high-frequency tracing band of the same record
3. the frequency response band of CBS STR-100 test record, output automatically recorded.



Cartridge frequency response on CBS STR-100 test record, at $\frac{1}{4}$ gram too little stylus force. Low-frequency test band of HF/SR 211 was traced satisfactorily at this force.



Frequency response of same cartridge at $\frac{1}{4}$ gram higher stylus force.

(Some of the cartridges would pass *some* of the tests at lower forces. All of the cartridges would play at lower forces on discs that have no heavily recorded passages.)

There are variations in individual samples of cartridges; we tested several unselected samples of the same model, bought in retail stores. Occasionally there will be a manufacturing change in a particular model which increases or decreases the stylus force required.

These values apply only to arms which, like the AR arm, are not a limiting factor on cartridge performance. A good arm must have 1) low inertia (so that it is least affected by warped and off-center records); 2) adjustable needle-to-pivot length (this dimension must be kept constant for cartridges with different mounting centers, to minimize tracking error distortion); and, particularly for changers, 3) neutral balance (which keeps stylus force the same at different heights). Almost all current arms, including those in most changers, have sufficiently low friction.

The stylus force required by a cartridge is not an index of its quality. Using less than the correct stylus force degrades performance and *increases* record wear, since the needle will not stay in proper contact with the groove walls. It is far better to use a little bit too much stylus force than too little. The force should be measured by an accurate stylus force gauge whether or not the arm adjustments are calibrated.

| CARTRIDGE | STYLUS FORCE | CARTRIDGE | STYLUS FORCE |
|---------------------------|--------------|--------------------------|--------------|
| ADC-1, .4E | 1¾ grams | Ortofon S-15/T | 1¼ grams |
| ADC 10/E | 1¼ grams | Ortofon SPU/T, SPE/T | 2¾ grams |
| ADC 660, 660E | 1½ grams | Pickering V-15/AM series | 1½ grams |
| Dyna Stereodyne III | 2½ grams | Shure V-15 | 1¼ grams |
| Elac STS 322 | 2 grams | Shure V-15 type II | 1 gram |
| Empire 880 series | 1½ grams | Shure M44 | 1¾ grams |
| Empire 888 series | 2¼ grams | Shure M55, M75, M75E | 1½ grams |
| Euphonics | 2 grams | Shure M7-N21D | 1¾ grams |
| GE VR-1000-3 | 3 grams | (older models | 2¼ grams) |
| Grado Mark I | 2¼ grams | Stanton 481AA | 1¼ grams |
| Grado type A | 1¾ grams | Stanton 500, 500A | 2 grams |
| Grado BT series | 2¾ grams | Stanton 581 | 2¼ grams |
| (high compliance setting) | | (including brush) | |
| IMF Mark 4 | 2 grams | Weathers LDM | 2 grams |

HINTS ON RECORD CARE

The material below is taken from HIGH FIDELITY SYSTEMS: A USER'S GUIDE, by Roy F. Allison, available at \$1.00 postpaid from Acoustic Research, Inc., 24 Thorndike Street, Cambridge, Massachusetts 02141

Depending entirely on how you treat them, your records may be ruined after two or three playings, or they may be almost like new after you've enjoyed them dozens of times.

Modern pickup cartridges press down on a record with a force that is only a small fraction of an ounce, it is true. Yet because the areas of contact between the needle and record groove walls are so exceedingly small, the pressure developed at these contact points may be thousands of pounds per square inch—enough to deform the record groove surface appreciably. In order to minimize the permanent effects of this deformation (and, accordingly, reduce record wear), your pickup cartridge and arm should be adjusted for the lowest stylus force *at which they will trace heavily-recorded passages well* without buzzes or fuzziness.

Further, you should not play any part of a record repeatedly. Give the groove walls a chance to recover from this deformation before playing the record again. A day's rest should be enough.

Make it a habit to look at the needle occasionally, to see that it hasn't been bent by rough handling, and that it hasn't accumulated a ball of dust which might interfere with its motion. Bent needles must be replaced immediately; dirty ones should be cleaned by gently coaxing away the dirt with a very soft brush. The needle should be replaced after two years of use, even if it doesn't appear to need it.

Records become warped easily. Severe warping, even if it does not make the record unplayable, accelerates record wear by increasing stylus force on the upward slope of the warp and decreasing it on the downward slope. You can keep warping under control by storing records on edge, in rows of only one record size; keeping moderate sidewise pressure on each row, between flat surfaces; keeping the records aligned in each row; and replacing records in the proper row immediately after playing them.

Perhaps the worst record problem, however, is dust and dirt. Records acquire static charges very easily as they are played. Even the act of removing a record from its jacket can generate a charge on it. When so charged, a record attracts dust particles from the air and from the turntable mat. These particles settle down in the grooves, whence they are impossible to remove with a cloth—even a damp cloth. When the needle encounters this dirt it makes those familiar crackling sounds in the loudspeaker and, at the same time, grinds up the dirt and roughens the groove walls permanently.

There are many liquids on the market which are supposed to prevent the build-up of static charges on records. Some are claimed to have "lubricating" properties also. Some, if used as directed, build up sludge deposits which do far more harm than good. There are two with which we have had good results; these are the liquid supplied with the Dust Bug, and with that applied by the Disc-Preener (provided it is applied lightly). The Dust Bug and Disc-Preener are distributed by Elpa Marketing Industries, Inc., New Hyde Park, N.Y.

In addition, it is necessary to remove dirt which settles in the groove even when the record has no significant static charge. This can be done with a brush having bristles shaped specifically for the job, such as the Dust Bug.

Very dirty records can best be cleaned by washing them carefully in a dilute solution of mild dishwashing detergent, rinsing thoroughly, and blotting them dry with a clean turkish towel.

Never touch the groove area with your fingers when handling records. Use only the outer edge and center area. With a little practice you'll find it easy to remove a record from its jacket, play it, and put it back without touching the groove area.

Records should be insulated from the outer packet of heavy cardboard by an inner sleeve of hard, glossy paper, cellophane, or flexible plastic. If you lose or tear the inner sleeve it should be replaced; plastic sleeves for this purpose, and the products listed above, can be bought at many record stores and high-fidelity component dealers.