



COOK

FREQUENCY AND INTERMODULATION

TEST RECORD — SERIES 10

Technical Bulletin

The Cook Series 10 record is a wide range low distortion test disc, produced under exacting standards of production control on clear vinyl. It may be used for precision frequency and distortion measurements as well as determination of arm resonance, tracking and translation loss effects.

Recorded with the Cook 3-B FEEDBACK CUTTER, the recognized quality standard of the industry, it satisfies the need for a calibration record to measure those newer pickup cartridges and transcription arms which are in themselves high quality devices.

RECORDING and PLAYBACK STYLUS



The Capps Anti-noise Modulation (ANM) V-groove recording stylus produces a groove capable of playback with any reproducing stylus regardless of size. The

ANM feature of this type of stylus means that high frequencies are reproduced without the accompanying hiss or rise of "surface" so familiar as modulation noise in recording equipment. Sharpness of cutting surfaces permits the recording of high frequencies at high velocities, which would be impossible with the customary heavily "dubbed" stylus.

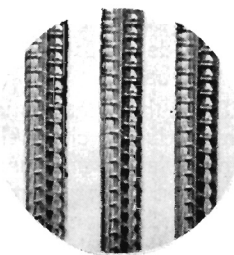
The accompanying illustration shows a wax impression of the one-mil (LP type) in the V-groove, the empty groove cross-section, and a standard 2.5 mil playback radius. The groove in the pressing is actually just as sharp as the illustration.

20,000 CYCLES — PRACTICAL, OR JUST THEORY

Twenty thousand cycles is flat on this record because of four factors:

- (1) The original cutter and amplifier are capable of this frequency,
- (2) The ANM stylus permits them to translate it to the record,
- (3) Processing is by a new and enlightened method involving **no polishing**, and—
- (4) Calibrated playback confirms the reflection response on production pressings.

The advantage of recording music flat to 20,000 cycles may be open to argument, but the practical value of test signals for reproducers at this frequency is considerable. Many reproducer manufacturers claim response at 20 kc, presumably checked by rotating a 10 kc band at double RPM. In any piece of audio equipment it is extremely informative to know what happens in the frequency range immediately above the working range, or pass band.



20,000 cycle groove

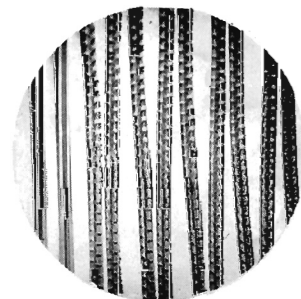
INTERMODULATION — 2% ON THE RECORD

The intermodulation cuts on the Series 10 record are well within specifications and thus will usually be well under the intermodulation found in most reproducing systems.

Two fairly high volume levels 4 db apart were chosen in order to provide a means of measurement of the **slope** of the distortion vs. amplitude curve of the reproducing channel. If the two levels were to be too nearly equal, small errors of playback measurement would cause important errors in the slope computation.

Failure to confirm the specified percentages on the record points to at least one of the below listed factors as deficient.

- (1) The transducer must be fundamentally capable of low intermodulation.
- (2) The reproducing stylus must be free of "flats" worn on the sides of the radius by groove abrasion.
- (3) There must be sufficient vertical pressure to produce complete tracking.
- (4) There must be only a small tangential tracking error.
- (5) Equalizing and amplifying circuits following the transducer must be linear and not introduce distortion themselves.



Intermodulation Cut

EFFECT OF WEAR ON SPECIFICATIONS

The series 10 record is produced in high grade clear vinyl resin because this material withstands abuse and playback wear better than other available materials.

The playing of the high frequency bands on side A repeatedly either with a stylus which has developed serious flats on the sides of the tip, or with a reproducer having a large moving mass or inertia will result in a gradual erasure of the highest frequencies. The same procedure will also cause an increase of intermodulation in the bands of side B. If intermodulation content of this band were higher, I. E., 10%, this effect would be less noticeable, but due to the high degree of perfection of this band, a minor wear or abrasion by improper playback will cause a perceptible percentage increase over the stated figure.

COOK SERIES 10

SPECIFICATIONS AND OPERATING DATA

FREQUENCY CALIBRATION

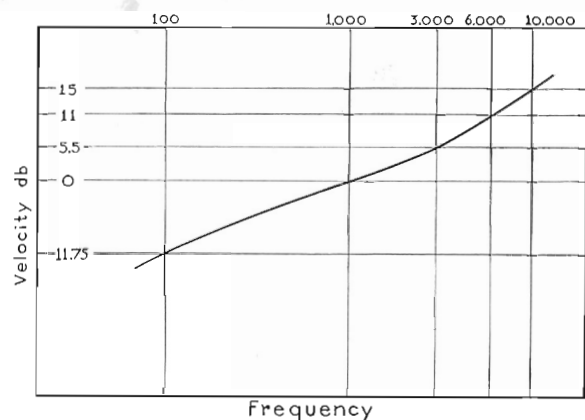
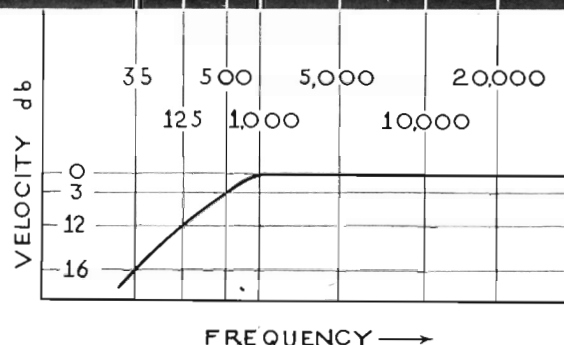
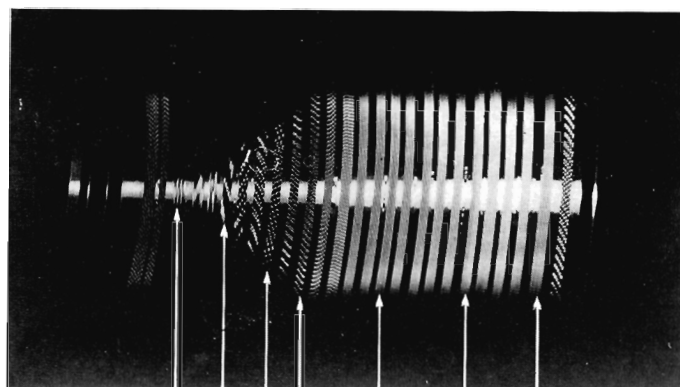
SIDE "A"

An actual photograph of the reflection pattern is shown at the right, with the corresponding response curve drawn below. Velocity from 1,000 to 20,000 cps is 9.0 cm/sec.

Frequency tolerance: 1 db
Crossover: 500 cps
db down at crossover: 3

NOTES: If a pickup under test will not measure up to manufacturer's specifications, inspection of the point for wear is indicated.

Depending upon the particular design used in the pickup, a one-mil tip may display a peculiar falling off above 12,000 cycles, while a normal radius tip in the same type of pickup holds more closely to calibration. This is probably due to the higher unit modulation pressure at the point of contact for a one-mil tip.



FREQUENCY CALIBRATION for LP SYSTEMS

(or translation loss measurement)—Band I, side "B"

Recorded frequencies (starting outside): 100 - 1,000 - 3,000 - 6,000 - 10,000

Volume level: 1.2 cm/sec at 1,000 cps

Level tolerance: 1 db

Characteristic: Published LP curve (see cut)

NOTES: If a properly equalized LP type pickup does not yield substantially flat output for the five check points, a worn or poorly shaped stylus is indicated.

Translation loss of any pickup—LP or standard—may be made by comparing the high frequencies of side "B" with those of side "A" bearing in mind the difference in reference levels. For a nominal radius of .0025 inches with tip in good condition translation loss at 10,000 cycles would be expected to be about 10-12 db.

TEST FOR ARM RESONANCE, TRACKING ABILITY, and 350 CYCLE CROSSOVER

Remainder of side "B"

Recorded frequencies: Sweep from 1,000 - 35 cps
Identifying breaks: 500 - 350 (spiral) - 100 - 50 cps.
Frequency tolerance: 1 db referred to RMA 350 cycle crossover curve

Db down at crossover: 3

NOTES: Because of the high recorded amplitude in the sweep frequency bands, the point at which arm resonance or tracking deficiency occurs can be quickly determined.

INTERMODULATION DISTORTION MEASUREMENTS

Bands 2 & 3—side "B"

Discreet frequencies: 100 cps, 7,000 cps.

Amplitudes, peak-to-peak: .0045" outer band
.0028" inner band

Intermodulation distortion: under 4% outer band
under 2% inner band

Relative volume level: 7,000 cps 12 db under 100 cps
based on flat (not de-emphasized) playback

NOTES: The measurement of low I. M. D. on these test bands is dependent on several factors in the reproducing channel.

Actual measurements of intermodulation are made on each stamper at the beginning and end of production runs. Specially designed "zero" intermodulation reproducers are used to hold tolerance within specifications.