

VLBA ACQUISITION MEMO #229

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To: VLBA Data Recording Group
From: A.E.E.Rogers, H.F.Hinteregger, D.L.Smythe, P.G.Bolis
Subject: Update on the AMPEX/MAXELL tape packing problem

Many tests have now been performed and an understanding of the problem may be emerging.

Observed packing symptoms (an update/revision on memo #225)

The tapes often pack loosely (with a bumpy pack) and show "cinching" and "windowing". The defects appear more often with:

- 1] Increased vacuum
- 2] Increased radius on reel
- 3] Use of self packing reels
- 4] Continued shuttling of the tape (more use of the tape)

Contrary to the statement in memo #225 the problem improves with high tape speed. Most tapes will shuttle without problems at 270 IPS but will show a problem when the speed is dropped to 135 IPS.

Sony tape continues to be entirely free of the problem and most (?) Maxell tapes have shown no problems to date. Most Ampex tapes have a problem but a few may be OK.

Measurements of elastic constants (show no large differences)

<u>Tape</u>	<u>Modulus along Tape psi</u>	<u>Yield Point %</u>
Sony	790,000	1.7
Ampex	760,000	2.2
Maxell	820,000	1.7

Measurement of the radial modulus (in thickness direction) was attempted but we have no reliable results (using the method given in Memo #133).

Backcoat roughness

All three types of tape have a backcoat which looks very similar without obvious differences as judged by the angle of incidence at which optical reflections go from diffuse to specular. The Sony tape however, will wet, while water beads off the backcoat of the other tapes. Only the Sony backcoat is soluble in isopropyl alcohol. The static coefficient of friction, measured by the angle at which a weight slides on the backcoat, are about the same for all three types.

Observed pancake profiles

If the tape is wound onto a reel without flanges at a very slow speed (<10 IPS) a solid "pancake" of tape is formed which can be examined for uniformity. The problem tapes show obvious defects:

- 1] One or both edges curl up (away from the hub). For a bad tape an angle of 5-10 degrees and scale length of 0.04" is already seen only 1" from the hub.
- 2] At distances more than an inch from the hub the pancake shows the cinching observed in the regular flanged reel pack.

Photographs of the tape edge

In order to examine the root cause of the edge curl seen in the tape pancakes we have photographed the tape edges with linear magnification of about 500. At this magnification the tape edge starts to look like the edge of a piece of plywood. The differences are fairly obvious and can be summarized by saying that the problem tape types have a rough edge (like rough-cut plywood) in which the saw cut pattern and some frayed edges are often visible - see attached figure.

Mechanism for packing problem

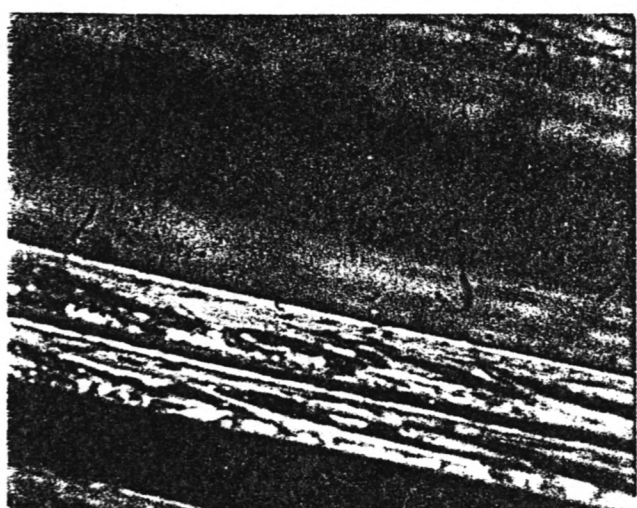
Memo #228 gives a theoretical discussion of possible mechanism for the tape packing problem.

Discussion with Ampex

We have discussed the problem with AMPEX and have returned three tapes (1 unopened, 1 good, 1 bad) to their Opelika Plant for study and evaluation.

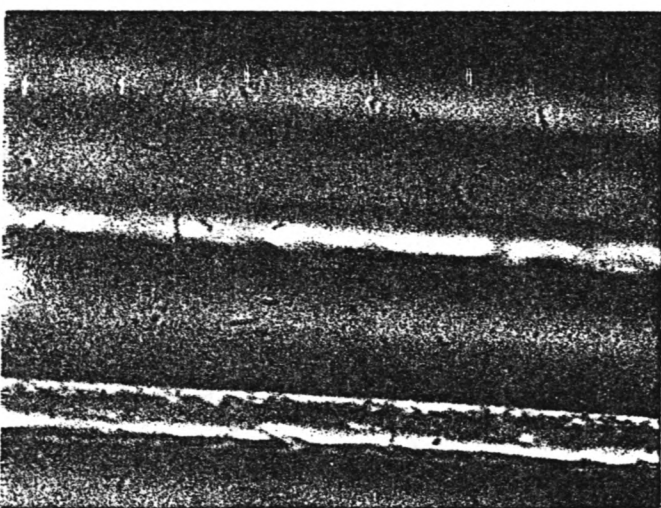


BAD MAXELL FRONT
BAD MAXELL Front

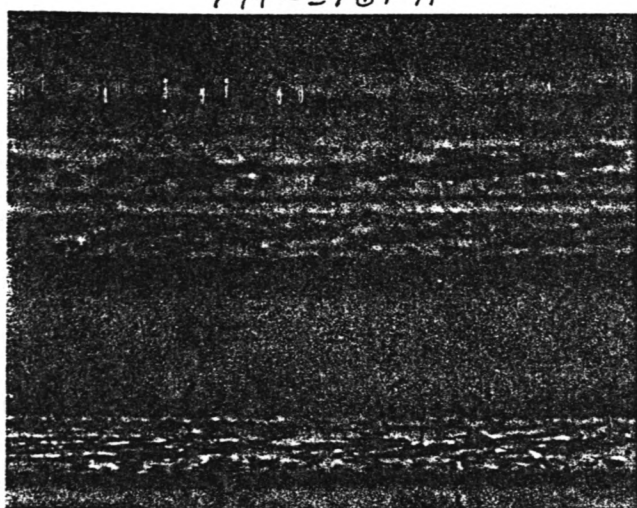


NEW MAXELL
NEW MAXELL

741-596F11



SONY Early D1K
SONY Early D1K



AMPEX 657900310104
AMPEX 657900310104

Figure Tape Edges Magnification ≈ 500

Figure - Tape edges - Magnification ≈ 500
Tape width is $16 \mu\text{m}$ (nominal)