

# VLBA ACQUISITION MEMO #312

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

HAYSTACK OBSERVATORY

WESTFORD, MASSACHUSETTS 01886

10 July 1992

Telephone: 508-692-4764

Fax: 617-981-0590

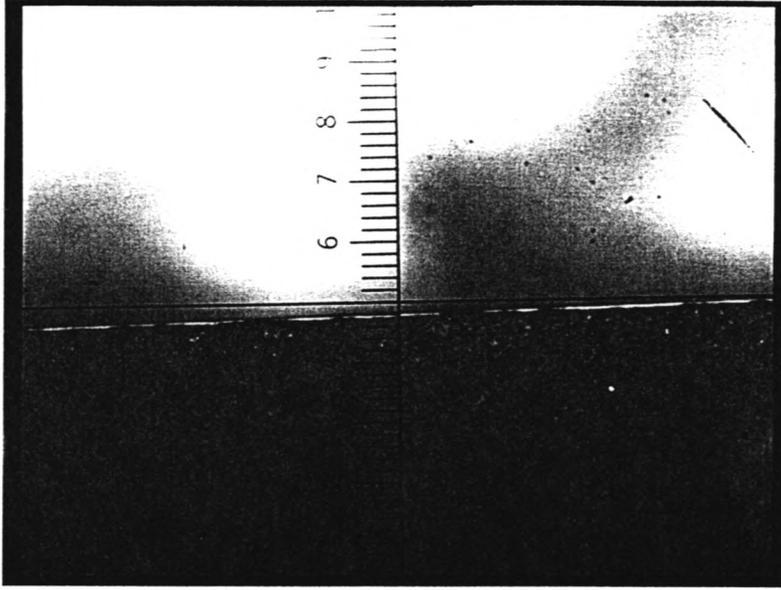
To: VLBA Data Acquisition Group  
From: Alan E.E. Rogers  
Hans F. Hinteregger  
Subject: Tape canister drop tests

It has been noted that a four foot drop is enough to distort the tape pack and make the tape pack bumpy. Once the pack distortion has relaxed, after shuttling the tape onto the take-up reel and back onto the supply reel, the bumpiness is removed. While most of the tape deformation is only temporary, there is evidence for some permanent damage. An already slightly damaged tape (VLBA0019) was found to pass the wind test at 67.5 IPS and 10". After being subjected to repeated drops from six feet on the flat face (worst case for large deceleration) the wind test margin was reduced until after four drops the margin was reduced to 270 IPS, 7". In addition, micrographs (see Figure) of the tape edge show damage that looks a little like edge melt but is much less uniform and is largely a chipping away of the backcoat with a little edge thickening.

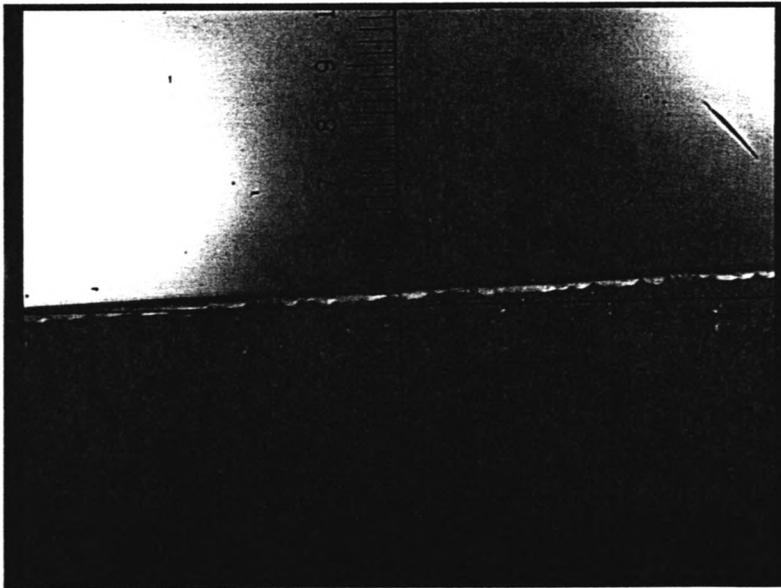
When tapes are subject to the high deceleration of a drop, they develop spokes on the side which experiences the large forces (side nearest impact). These impact-induced spokes look different from the spokes of a bumpy pack. They look more like creases and often fade towards the outer edge of the pack in contrast to the spokes of a bumpy pack which increase strongly with radius. These spokes are routinely seen in drops of 4' or greater.

Tests made with a canister designed for 2" tape with 1/2" of foam (approximately 20 psi modulus in thickness direction) on each side of the reel makes a substantial improvement in the ability of the package to withstand being dropped. With this canister it takes a drop on its edge from 8' to produce enough deformation to observe the spokes, and, flat drops from 4' produce no noticeable pack distortion as judged by the lack of flange separation, wobble or bumpiness when

first run on the transport. The improvement is due to the greatly reduced decelerations (estimated to be only  $\leq 300 g$  for 4' drop - see VLBA Acquisition Memo #313) and the use of a new reel band which clamps the flanges tight against the edges of the tape pack. In addition, we have conducted drop tests on another tape (NASA0011) with margin of 67.5 IPS and 10" and found no change in this margin following 10 drops from 10' with various impacts from flat to edge and even on the handle (which produced minor cracking of the handle). With these repeated drops there is some damage to a few isolated scattered turns (even the self-packing reels don't prevent some scatter - although it is generally quite small) but the damage was far less extensive than that of VLBA0019 for which the repeated drops were all made in the canister designed for 1" tape which has very little shock absorber (see VLBA Acquisition Memo #313).



VLBA0019 - Appearance of edge after dropping.



VLBA0019 - After further drops - 6'