

VLBA ACQUISITION MEMO #308

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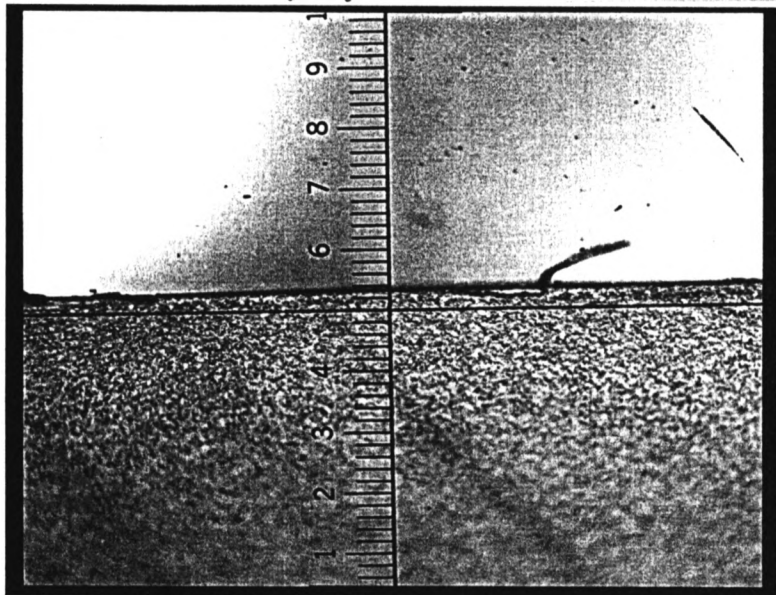
Subject: Tape Edge Abrasion by Contact with Reel Flange Rims

Generally, the contact between tape edge and the reel flange has no measurable effect. Well inside the reel, actual contact is prevented by the presence of a lubricating air layer between the smooth flange and the tape. The danger zone is at the rim of the reel where the tape leaves or enters the reel. Under some conditions (high speed and rough flange edges), the tape might be whacked hard enough by the edge of the reel to produce sporadic damage as shown in the micrograph of Figure 1. The conditions leading to this kind of edge damage are not entirely understood and so far have only been reproduced in a repeatable manner by deliberate reel misalignment. The whacked edge itself may not directly produce a bumpy pack but it does generate debris which, it is feared, may stick to the alumina hard plates well enough to result in a "melt-down" of the edge. Even without deliberate misalignment of the reel, there are conditions when the tape oscillates between one flange and the other making a clearly audible sound. This oscillatory condition is not always easy to reproduce but may occur more often with the larger 15" self-packing glass reel whose rim is only about 1.25" from the I/O roller - see Figure 1. While the sporadic edge damage shown in Figure 1 may have been produced by this oscillatory condition, a rapid build-up of edge debris was not as clear as in the case of a reel misalignment.

While there have been some reports of the audible whacking of the tape against the reel flanges when using the standard 14" self packing glass reels, the oscillations may be infrequent enough to be insignificant or their effect may be benign. At this time, our experience with the larger reels is not sufficient although it seems clear that virtually all problems associated with misalignment or the packing of marginal tapes are aggravated with larger reels. As a result of this added mechanism for edge damage, we will avoid using the larger 15" glass reels on any of the transports involved in the accelerated tests. Further work is needed to be sure that tape edge abrasion is not a significant contributor to failure of thin tapes.

Prolonged (overnight) shuttling at high speed (270 ips) with a reel flange offset by as little as 30 mils into the tape path produced an abnormally large amount of generally loose debris in the vacuum pockets. This is clear evidence of abrasion but not of melt-down or permanently degraded packing characteristics. Pack alignment with the tape path (I/O roller flanges) at the ± 10 mil tolerance level can only be assured with a self-packing glass reel that has not been significantly deformed by shock in shipment. The non-self-packing takeup reel typically results in a 30 mil misalignment at OD and should be replaced by a self-packing reel.

Some loose edge pieces - debris from
osc against reel flange??



VLBA 0065
OUTER BACKCOAT

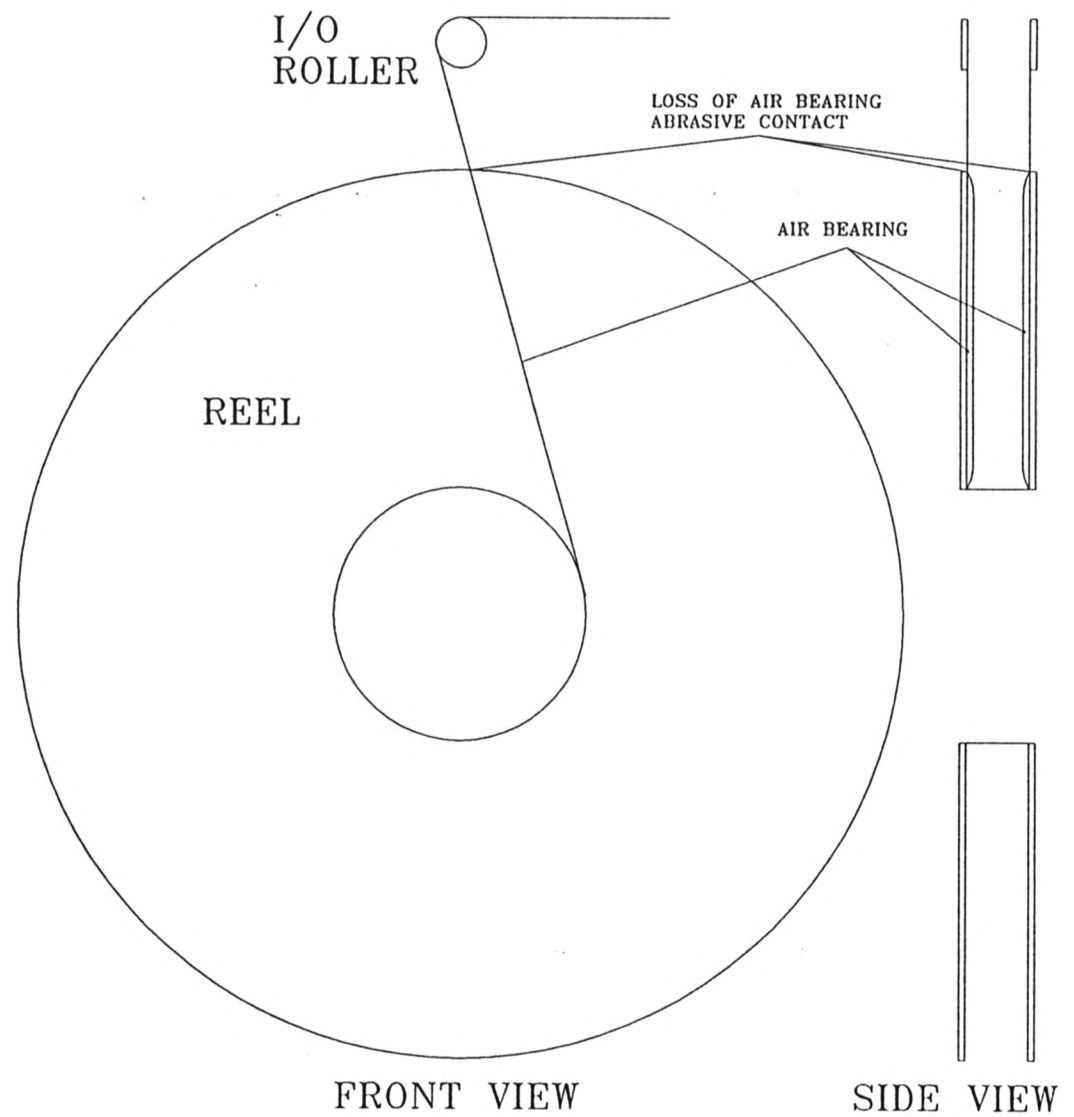
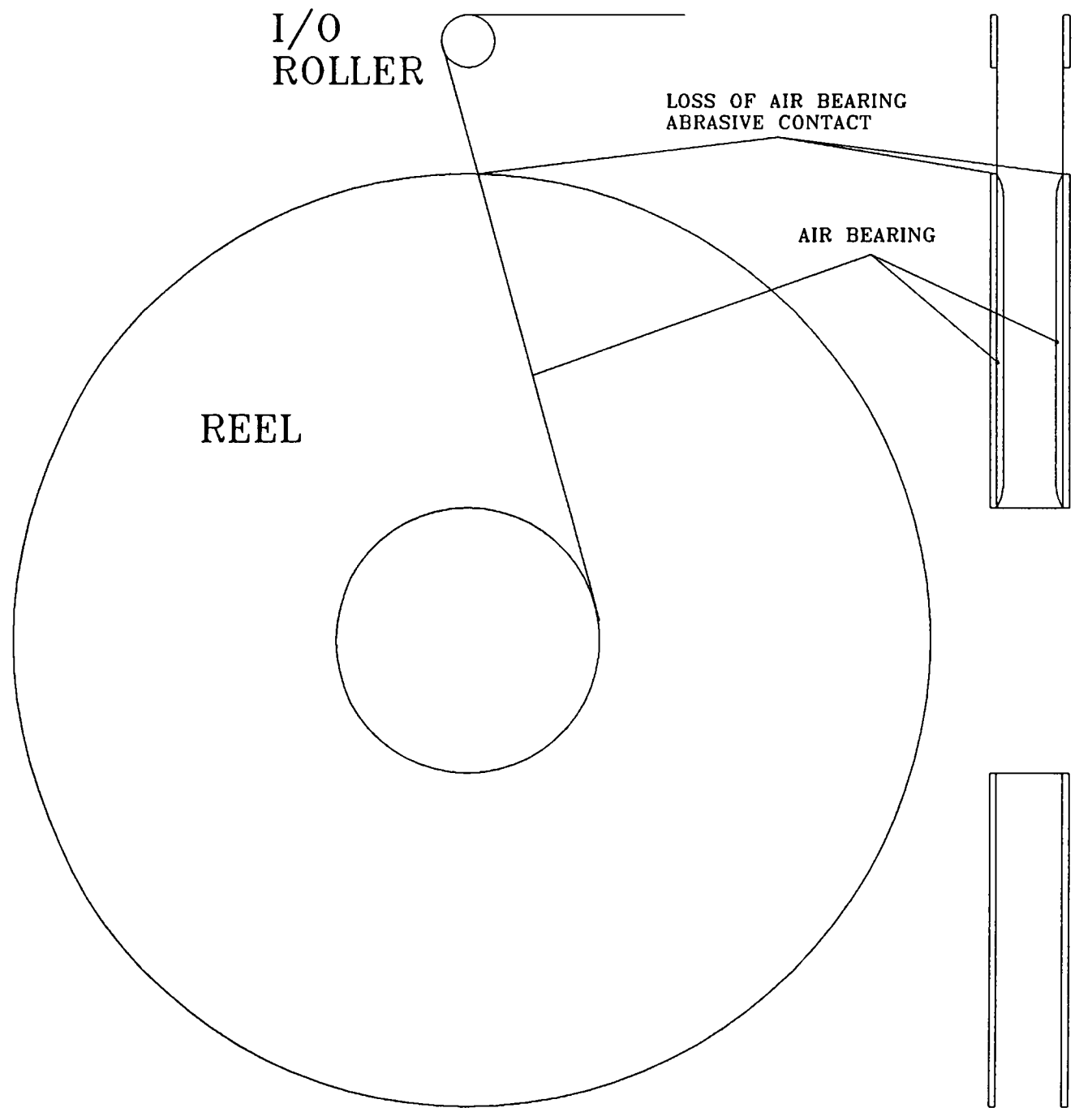


FIGURE 1.



I/O
ROLLER

LOSS OF AIR BEARING
ABRASIVE CONTACT

AIR BEARING

REEL

FRONT VIEW

SIDE VIEW