

VLBA ACQUISITION MEMO #143
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To: VLBA Data Recording Group
From: Alan E.E. Rogers
Subject: Summary of what we have learned during recorder mechanical study

Mechanical Alignment Sensitivities

- 1] The tracking is very sensitive to capstan tilt and taper.
-See Acquisition Memo #121 and #122
- 2] Grooving of the precision plate in critical areas is a problem and hard points will be needed.
-See Acquisition Memo #137
- 3] Capstan taper also produces non-uniform tape tension.
-See Acquisition Memo #122

Theory of Tape Path

- 1] The tape is edge-guided by tape contact with the precision plate. Contact with the front door is required - but not for edge guiding.
-See Acquisition Memo #124
- 2] The vacuum column biases the tape so that with perfect capstan and alignments, the tape exits the vacuum column at a small angle.
-See Acquisition Memo #124
- 3] The profile of the heads worn by the tape depends on the "characteristic bending length" of the tape.
-See Acquisition Memo #141

Idle vs Fixed Post

- 1] The Honeywell configuration using an idler roller is less sensitive (by a factor of 3 or more) to tape defects and capstan taper than the present configuration using a fixed post.
-See Acquisition Memo #132

2] Old idler rollers with high bearing friction and inadequate air flow grooves may have been responsible for some non-repeatable tracking in 1985.

-See Acquisition Memo #138 and #140

Tape Dependent Tracking - Prepass Phenomenon

1] A tape related dependence on the forward-reverse offset can be explained by elastic anisotropy.

-See Acquisition Memo #132

2] The tracking shift of the first pass can be explained by the relaxation of tape strain acquired in the pack during environmental changes. The relaxation time of about 5 seconds being too slow to allow relaxation before reaching the headstack on the first pass - hence the need for a "prepass". Tracking shifts with idler configuration are much smaller and a prepass is probably not required.

-See Acquisition Memo #132

Recommendations

1] Return to Honeywell configuration with idler roller.

2] Ensure that new idlers have better bearings and adequate grooves.

3] If possible, obtain idlers with larger diameter to preserve wrap angle with symmetric headblock assembly.