

VLBA ACQUISITION MEMO #194
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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Area Code 508

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To: VLBA Data Recording Group

From: Alan E.E. Rogers

Subject: Summary of What We Learned in Testing Tape Performance

1] Head to tape contact

We can operate the recorder at speeds up to 270 IPS before there is a significant loss due to separation of the tape from the head by an "air bearing". (See VLBA Acquisition Memo #146.)

2] Relaxation of prepass requirement

The "prepassing" to tapes is most needed on tapes that have undergone a severe cycle in temperature during shipping. However, the prepass can be performed well ahead of the record time and can even be performed on a different recorder. (See VLBA Acquisition Memos #129 and #160.)

3] Head profiles

A mathematical model (see Acquisition Memo #141) can be used to accurately predict the head profile and the initial signal loss in going from a thick to a thin tape. (See VLBA Acquisition Memo #168.)

4] Tape abrasivity/head wear

The abrasivity (head wear rate) can be measured via spacing loss changes in going from thick to thin tape. The method is very sensitive and allows the tape abrasivity to be measured in a few hours. (See VLBA Acquisition Memo #170.) For a given tape the abrasivity increases very rapidly by a factor of about 20 in going from 50 to 100% relative humidity. While we can expect 5000 hours head life using Fuji H621 in an environment with less than 50% humidity, heads will wear out fast in a high humidity environment. D1K and S-VHS tapes are less abrasive than Fuji H621. (See VLBA Acquisition Memo #172.)

5] Operation at 56 Kb/in

Many new formulation tapes were tested at 56 Kb/in (the proposed initial operating density for VLBA recorders) and satisfactory performance was obtained using D1 and S-VHS tapes. (See VLBA Acquisition Memos #157, #169, #172.) In general, S-VHS is a little better than D1 and both are significantly better than Fuji H-621. Our heads will not drive D2 (MPT) tape satisfactorily.

6] Handling of thin tapes

D1 tape is 13 μm thick (compared with H621 with 25 μm thick) and handles well on the Honeywell transport. (See VLBA Acquisition Memos #142 and #156.)

7] Short wavelength response of D1 and MET

Tests have been made to try and understand the short wavelength limits of the combination of present VLBA headstack and new tape formulations. (See VLBA Acquisition Memo #184.) Equivalent spacing loss distances of 0.13 and 0.15 μm have been measured for MET and D1 tape respectively.

8] Tape and Pre-amp noise

While the VLBA pre-amp is far from optimum (See VLBA Acquisition Memos #185 and #186.) the SNR is normally limited by tape noise. (See VLBA Acquisition Memo #187.) S-VHS tape has a lower erasure and modulation noise (See VLBA Acquisition Memo #187.) than D1.