

VLBA ACQUISITION MEMO #163

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

HAYSTACK OBSERVATORY

WESTFORD, MASSACHUSETTS 01886

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Area Code 508

692-4764

To: VLBA Data Acquisition Group
From: Alan E.E. Rogers
Subject: Plan for more complete testing of 13 μ m D-1 tape

Some preliminary testing of 13 micron D-1 tape has already been undertaken (see Acquisition Memos 150, 157). We have decided to get quotations for an initial purchase of D-1 tape (in telecon held 24 August 1989). More tests are needed. Some testing can be started with the limited supply of sample D-1 while complete operational testing will have to await delivery of more tapes.

The following tests are needed using the proposed VLBA longitudinal density of 56,250 flux transitions per inch (9 Mb/s at 160 IPS), and the VLBA track density of 509.1 tracks per inch (14 tracks written per head pitch):

- a) PER, sync loss, dropout and head clogging statistics on all tracks.
- b) Measurements of guard band variations due to tracking signatures.
- c) SNR margins.
- d) Tests of track peaking using total power (as is done now) and using PER.
- e) Environmental range (temperature and humidity) over which performance can be maintained.
- f) Range of mechanical misalignment over which machine interchange signatures are small enough to ensure adequate margins.

In addition, some general tests of 13 μ m tape need to be made as follows:

- g) Head wear rate as a function of vacuum pressure, operating humidity, tape humidity and the presence of pollutants like SO₂.
- h) Range of temperature, humidity, vacuum pressure and machine misalignment over which a satisfactory reel pack can be maintained.
- i) Environment range over which tape can be cycled (during shipment) without damage or significant change in tracking signatures and error rates.

Most of these tests can start almost immediately (some minor items may be required - like 56K equalizers). Many of the tests like b,e,f,i will require machine interchange so that at least one recorder in addition to REC 3 should be involved.

More complete experience can be obtained when there are enough 13 μ m tapes (at least 20) to start using them for observations. When there are enough tapes, Haystack will prepare one playback transport on the MKIII/MKIIIA correlator for 13 μ m tape use. The operational testing will give more information, especially on unexpected difficulties which might not show in controlled "lab" tests.

Test methods

All of the tests can be conducted with the VLBA recorders - although a significant amount of additional software will be needed to facilitate many of the tests. Without a DAR at Haystack measurements of PER and sync loss will have to be made with MKIII electronics so that it will be easier to start these tests at NRAO. Later (when NRAO loans Haystack a DAR for checkout of the data buffer) it will be possible to include Haystack. Head wear rate testing can be accelerated by measuring the spacing loss recovery rate (see Acquisition Memo #141) on a headstack which is first contoured with 1 mil tape and then used with 1/2 mil tape. With this method it should be possible to obtain a wear rate in a day and hence possible to explore the wear rate dependence on environmental conditions in a reasonable time. Later this method (which depends heavily on theory and computer model calculations) can be compared with wear rates measured by removing the headstack and measuring the remaining depth of gap.

Time schedule and test plan (with suggested division between Haystack and NRAO)

Dates

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|----------------------|---|
| 1 Sep 89 - 1 Oct 89 | Haystack will perform initial tests of a,b,c, including design of 56 Kbits/inch equalizers. |
| 1 Sep 89 - 1 Oct 89 | NRAO to start interchange testing (using MKIIIA format until transports are upgraded with idlers and 56K equalizers). |
| 1 Oct 89 - 1 Nov 89 | Haystack will start tests d, e, f, g, h. |
| 1 Oct 89 - 1 Nov 89 | NRAO will perform interchange tests with VLBA format and perform test i. |
| 1 Nov 89 - 31 Dec 89 | Haystack will complete tests d, c, f, g, h. |
| 1 Nov 89 - 31 Dec 89 | NRAO will continue interchange tests - including interchange with haystack. |
| 1 Jun 89 | Goal for start of operational tests with astronomy data recorded on 1/2 mil tape |

The actual division of work between NRAO and Haystack will probably evolve somewhat with time and experience.