VLBA Acquisition Memo # 81

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25 February 1987

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To: VLBA Data Acquisition Group

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Subject: Tape for the VLBA

Tests on early samples of the new standard "digital video" tape indicate that it is suitable for the VLBA. We have written a test tape using a Mark IIIA recorder and satisfied VLBA specifications for recording rate, duration, and error statistics.

The tape most extensively tested is SONY D1K; a small sample from 3M appears equally good. The parameters of the SONY tape are:

Thickness	14.4 microns	= 0.57 mil
Coercivity	850 oersted	

This tape is on a slightly thicker base than the standard 13 microns which will be used in production. This means that we were able to get a working length of only 24,000 feet on a 16-inch reel instead of 27,000 feet. The resolution of this tape is higher than that of the standard video tape, such that the SNR at 50,000 flux transitions per inch is the same as for standard video tape at 33,000 flux transitions per inch. This makes it possible to satisfy VLBA specifications using the standard 38-micron-wide heads presently used in Mark IIIA but leaves the door open for future track width reduction.

A test tape was written using the available Mark IIIA hardware: Mark III format, 28 tracks and 4 Mbit/sec/track for 112 Mbit/sec data rate. With a track pitch of 45 microns (7 micron guard band), 14 passes were written at a tape speed of 90 ips. Each pass lasted 53 minutes, for a total of 12.4 hours of continuous recording. The tape holds 5 Terabits of data.

With the 13-micron production tape, each pass will last 1 hour. Thus, with 14 passes available, 12 hours of data may be recorded with a 2-hour reserve.

This thin tape has been shuttled repeatedly at various speeds and is handled well by the transport if it is on a glass reel. However, the plastic-lined metal reels are unsatisfactory; they produce tension perturbations which cause the tape to stretch and pack irregularly. Special "narrow" glass reels will be required for the VLBA. These will be 16-inch versions of the special glass reel developed for Mark III, manufactured by Corning.

In December 1986, we were visited by the assistant general manager of the SONY factory which will produce this tape. We will be able to obtain several pre-production reels of D1K by August 1987. The factory will probably be ready

for a production order in January 1988. We are also exploring 3M as an alternate supplier, and anticipate their production schedules will be comparable to SONY's.

For interim operation at the first VLBA sites, we recommend using standard FUJI video tape. This may be packaged as 9000 feet on 14-inch reels giving 15 minutes per pass, or 12000 feet on 16-inch reels giving 20 minutes per pass with all tracks recording. In support of VLBI Network experiments, the worst case is 28-track Mode A operation with a 53% duty cycle. With one recorder per station, a VLBA tape change will be required every 6.6 to 10.1 hours, depending on packaging and whether 14 or the maximum possible 16 passes are used. The 16-pass mode with 4-micron guard bands appears to work in short tests but has not been tried in operational simulation.

There is one other tape candidate to be considered for the VLBA: metal-particle tape. This has a nominal coercivity of 1300 to 1500 oersted, which means it probably cannot be fully saturated by our ferrite head tips. However, it offers much higher SNR and resolution than even the digital video tape. We are attempting to obtain samples for evaluation. The probable production schedule is likely to be about the same as for the digital video tape.