

# VLBA ACQUISITION MEMO #277 MARK IV MEMO #053

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TO : VLBA Data Acquisition Group

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SUBJECT : Modifying the VLBA Head Interface for Recording at 18 Mb/s

If a standard VLBA read-write interface is used to record at 18 Mb/s, an asymmetry results in the recorded signal. This asymmetry is caused by the emitter-base junction breakdown voltage of the emitter follower transistor limiting the head voltage to 4-6 volts in the forward direction, as shown in the oscillograph. Since the head current is the integral of the head voltage, this voltage limit dominates the rise time of the head current.

This asymmetry can be eliminated by putting a diode in series with the output of the emitter follower, with the resulting voltage waveform also shown in the oscillograph. (The negative voltage limit is set by forward conduction of the collector-base junction, and depends on the negative supply voltage, which was -10 volts for this experiment.) Using a 1N4148 switching diode, the gain and noise figure of the preamplifier are unaffected, as measured on a spectrum analyzer. This diode is easily added in series with the wire connecting the interface board to the preamplifier board. A diode at the input of the emitter follower might also work, but would require a new printed circuit board for the interface.

A read-write interface modified in this way has been used to write at 18 Mb/s and reproduce at 80 IPS (4.5 Mb/s) with good symmetric eye patterns and an average parity error rate of  $2.4E-5$  over 89 Mbytes on 11 tracks.

A search of low-noise *pn*p transistors reveals that the 2N3906, which we are using, has a emitter-base voltage rating higher than any of the others, and not much can be gained by going to an *n*pn transistor.

