

VLBA ACQUISITION MEMO #256

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TO: VLBA Data Acquisition Group

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SUBJECT: Tape profile along the headstack

If the ferrite in the headstack wears down below the spacer material a spacing loss will result unless the tape deforms into the slot. In this memo I calculate the amount the tape deforms to accommodate non-uniformities along the headstack. Figure 1 shows the geometry of the tape along the headstack. The amount δ by which a tape will drop into a slot is the result of a number of effects:

- 1] The relief of the compression in the thickness direction for which

$$\delta = Pt/Y_{\epsilon} \sim 0.007\mu m$$

where P = head to tape pressure ~ 7 psi
 t = tape thickness $\sim 16 \mu m$
 Y_{ϵ} = Young's modulus in the thickness direction
 $\sim 8 \times 10^5 / 50$ (see Acquisition Memo #236)

- 2] the bending of the tape under pressure for which

$$\delta = 60P\ell^4 / (384Yt^3) \sim 0.003\mu m$$

where ℓ = width of slot $\sim 40\mu m$
 Y = Young's modulus in tangential direction
 $\sim 8 \times 10^5$ psi

This deflection is reduced by a factor of 5 if the tape is fixed (or clamped) at each end.

These numbers are both very small and show that the tape will not significantly deform into the ferrite area of the headstack if this area is worn down more than the spacer material. A year ago we suspected that the ferrite erosion might be a problem (see Figure 2) but this was not pursued owing to a lack of confirmation from profilometer measurements at Honeywell. With the higher densities of the VLBA (56Kbi) the spacing loss is more significant and this question will be re-examined.

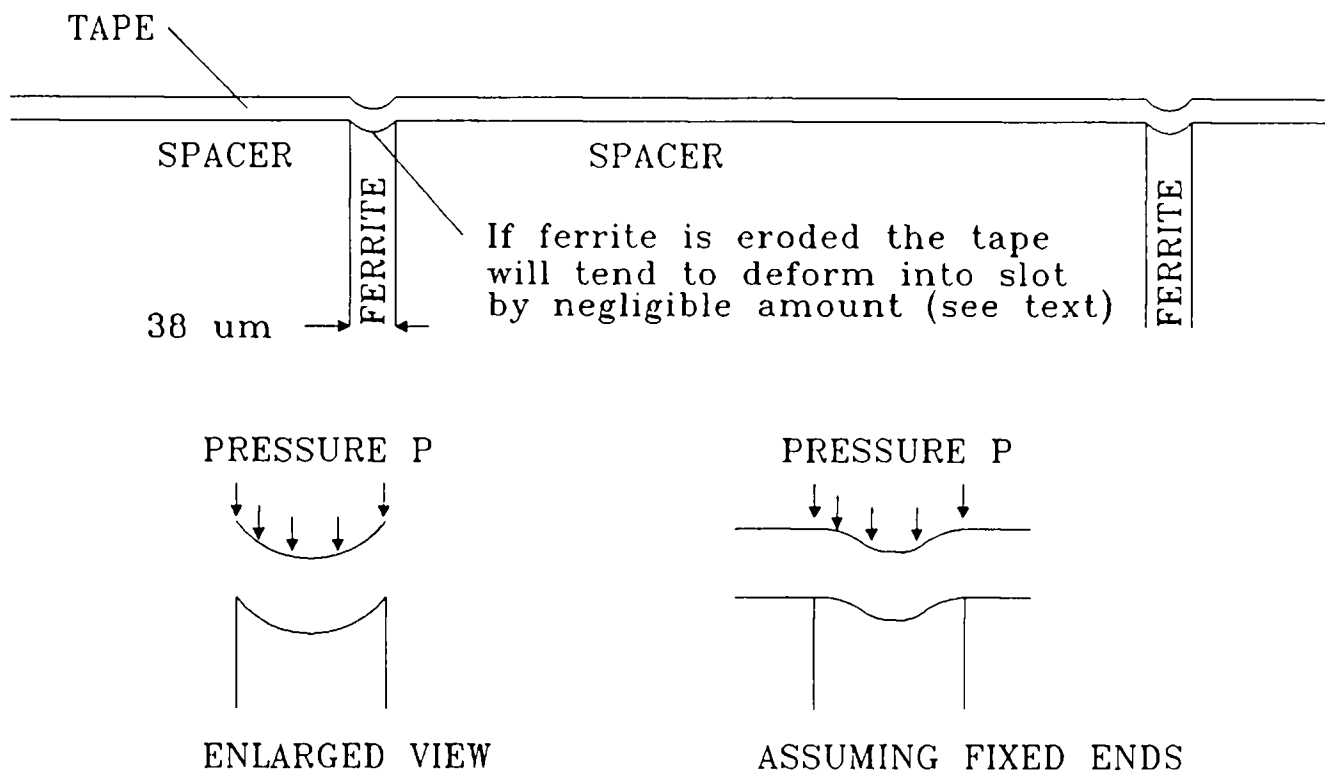
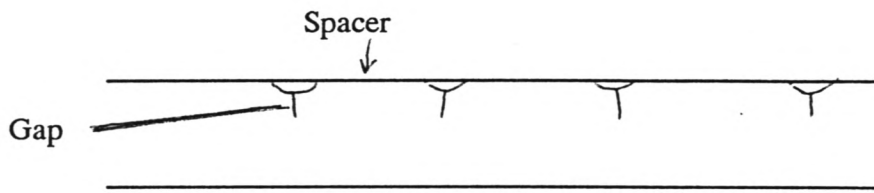
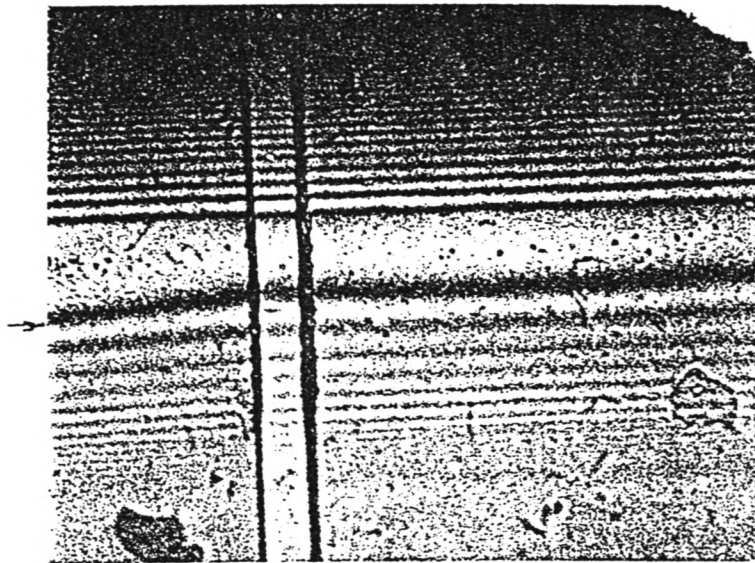


Figure 1. Tape profile along headstack

There is some evidence that the ferrite heads are a little lower ($\sim 0.05 - 0.1 \mu\text{m}$) than the spacers - see Newton's fringes below.



Fringe spacing $\sim 0.25 \mu\text{m}$ -



109 TIP 32 - before shuttle

Figure 2.

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