

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
HAYSTACK OBSERVATORY

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TO : VLBA Acquisition Group
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SUBJECT : How Head SNR Affects Reproduce Performance

In order to verify the 24-dB specification for the SNR of a VLBA reproduce head, we measured the SNR of head stack B01 after two of its heads were worn out on Haystack Correlator Drive 2. Then the parity error rates (PER) reported by the correlator were compared to the measured SNR in Fig. 1. This graph shows a large increase in error rates for SNR below 23.7 dB, and confirms the need for a minimum SNR specification of 24 dB.

We have further confirmation of this specification for recent production heads. Two head stacks, one good and one reject, were put on the correlator to evaluate their relative reproduce performance; and the results are shown in Fig. 2, where the SNR data was provided by Metrum. Again, the threshold for good performance is around 24 dB. The factor of ten scale difference between these two graph is the result of improvements made in the reproduce electronics during the two years between the two sets of measurements.

The large amount of scatter in this data demonstrates that both SNR and PER measurements are not very repeatable, and depend on many factors that are difficult to control, such as the quality of the recording head used to prepare the test tape, electrical interference, preamplifier noise, and equalizer response. Our SNR measurements on stack D97 resulted in SNR values as much as 3 dB higher than those reported by Metrum on some heads, as shown in Fig. 3, where Metrum used their own test tape, and Haystack used two different test tapes. The head numbers are Mark IIIA, and can be converted to VLBA head numbers by subtracting the Mark IIIA numbers from 32 (1 -> 31, and 27 -> 5).

HEAD STACK B01

(worn out Feb-89)

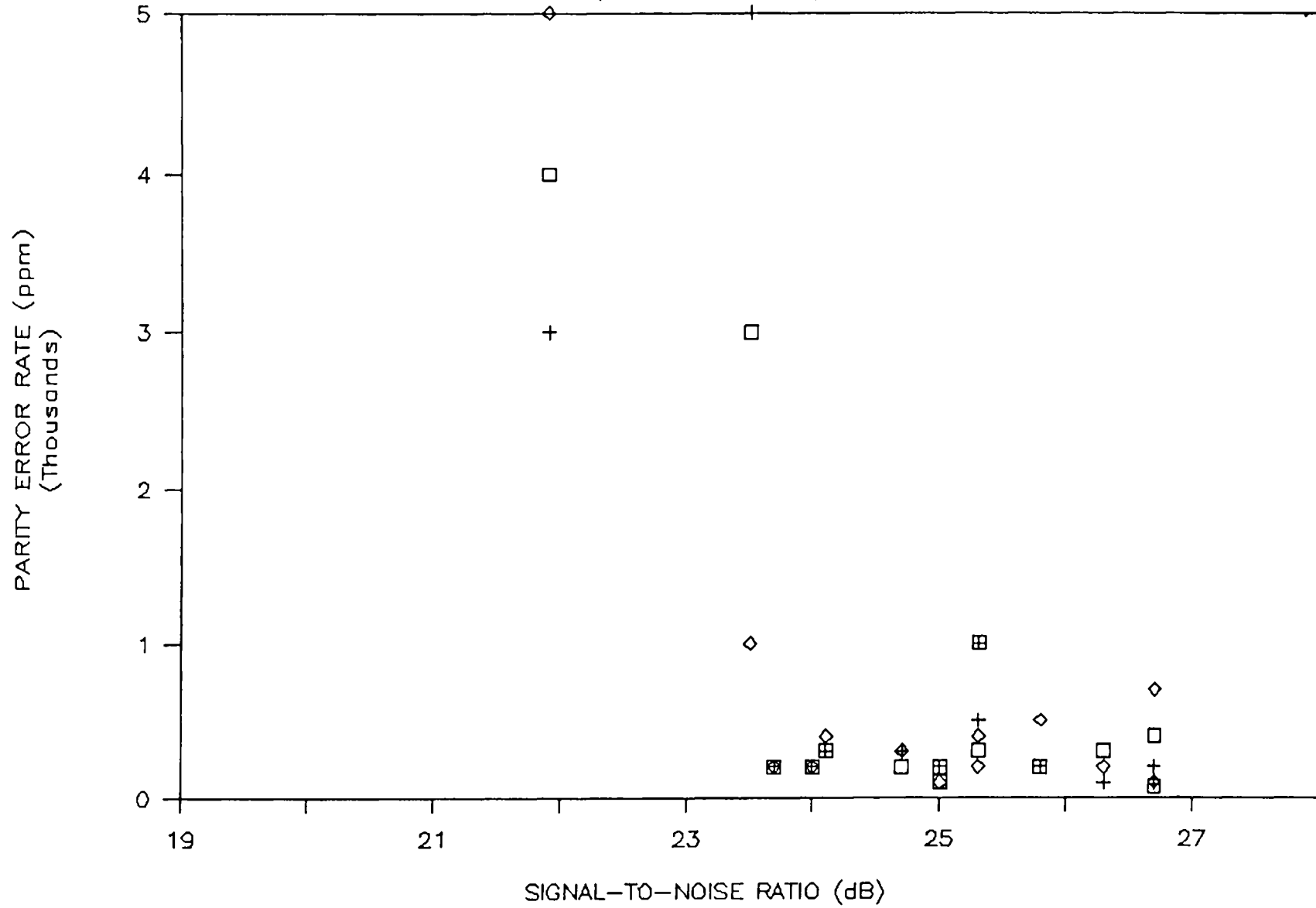


Figure 1.

SHORT GAP HEAD STACKS (new)

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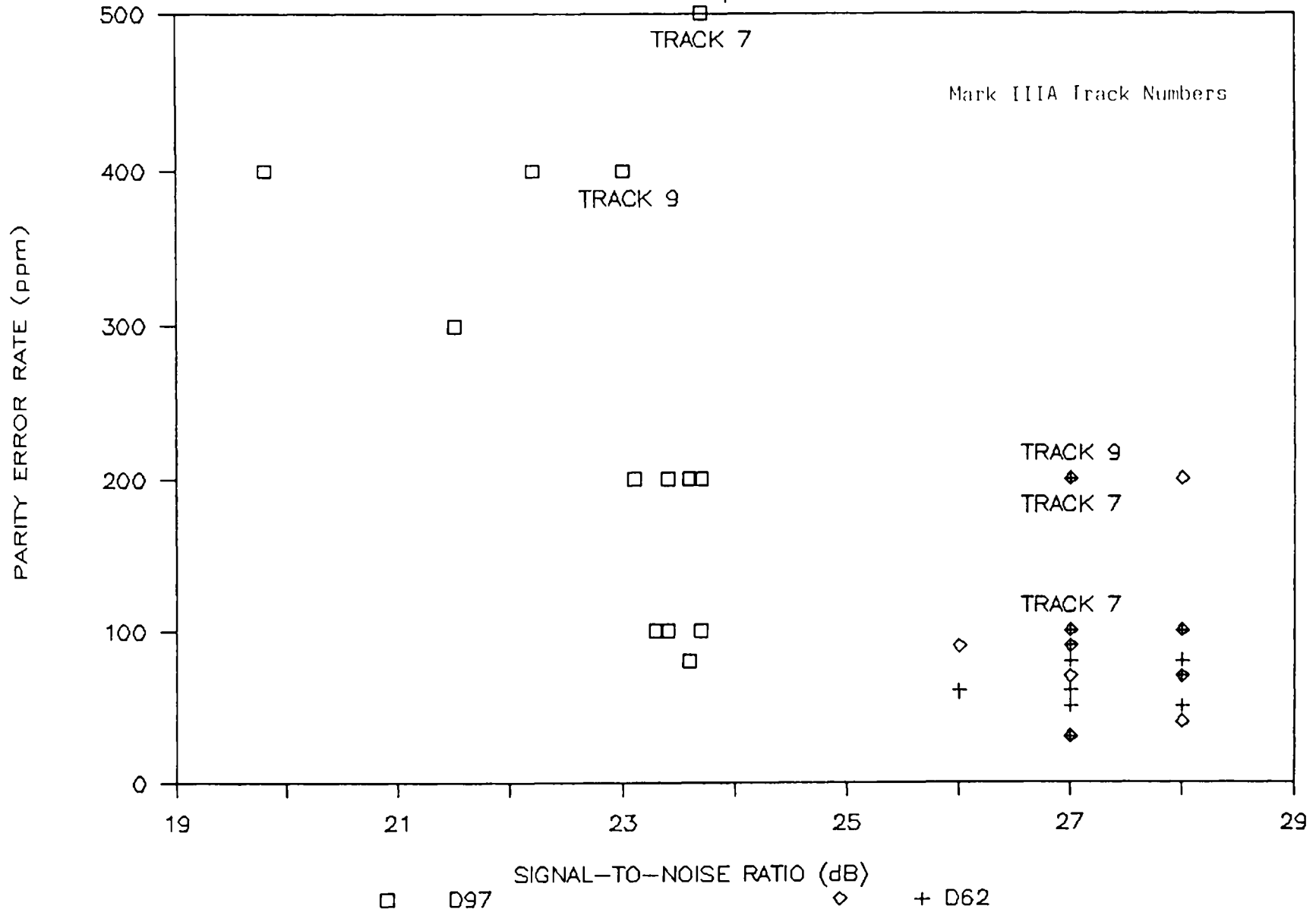


Figure 2.

HEAD STACK D97

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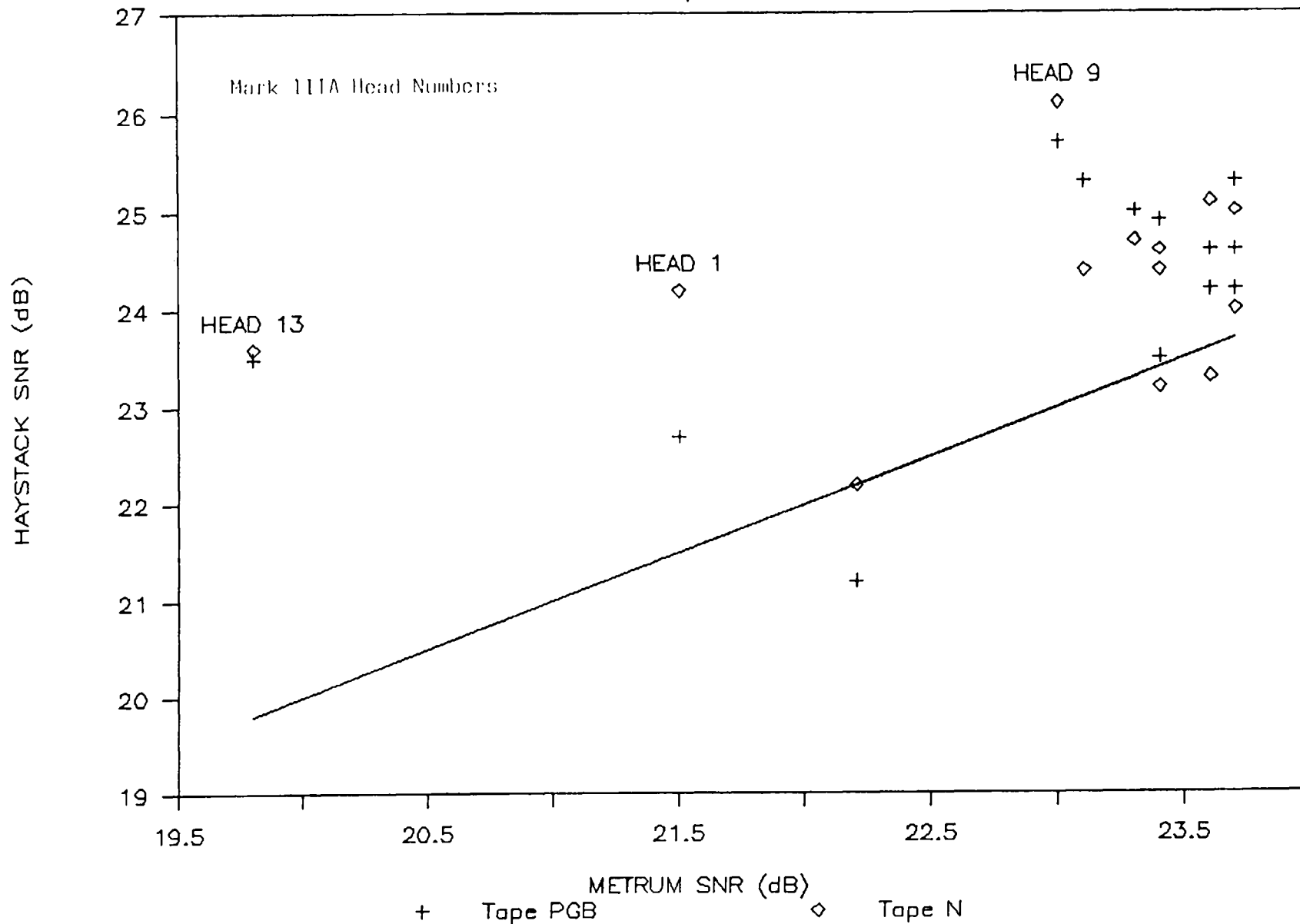


Figure 3.