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To: VLBA Data Acquisition Group
From: George Peck
Subject: NARROW GUARDBAND TEST OF VLBA TAPE RECORDER

I ran a test on the VLBA tape recorder at Pietown using a 5 micron guardband between tracks on the tape.

The tape recorder was set up in the following manner. The commanded headstack index positions for indexes 7, 8, and 9 were programmed to be -67 microns, -24 microns, and 19 microns respectively. Assuming a track width of 38 microns, this setup allows a 5 micron guardband. The required procedure of cleaning the heads, prepassing the tape, and cleaning the heads again was followed. Then, the tape was rewound to the beginning of the reel for the test.

To run the test, I recorded track 10 in the forward direction 3 times; first using headstack index position 7, followed by positions 8 and 9. The test was run using a data rate of 4 MBS at a tape speed of 135 ips. The record voltage was 9 volts. After each track was recorded, a check was made to insure that error rates were low.

The results were obtained by playing back the track which was recorded at index position 8, since it was the middle track. A prepass was done before reading back the tape. I used the quality analyzer in the formatter to take parity error readings every 500 feet of tape. A 1 second integration time was used. On the first playback, I peaked up the head in between reads of parity errors. (On a peak up, the head moves to the position where the total power from the track is the greatest.) Following are the results.

feet	parity	headstack position	total power
1500	.000053	-21.2	40.7
2000	.000052	-22.2	40.5
2500	.000060	-20.9	41.6
3000	.000036	-22.2	40.9
3500	.000052	-22.9	41.6
4000	.000044	-21.7	42.3
4500	.000088	-22.9	42.4
5000	.000072	-21.7	43.7
5500	.000056	-22.9	43.3
6000	.000044	-23.7	42.8
6500	.000052	-24.4	42.9
7000	.000048	-23.2	44.6
7500	.000056	-22.4	43.5
8000	.000040	-22.4	45.1

A second playback of the same track was done, leaving the headstack in the commanded position of -24 microns. On both playbacks, the time was decoded from the tape to verify that the track which was recorded in index 8 was being read. Following are the results of the second playback.

feet	parity	headstack total power
1500	.000052	39.8
2000	.000076	40.8
2500	.000068	41.2
3000	.000052	40.5
3500	.000064	40.2
4000	.000024	41.5
4500	.000056	42.2
5000	.000036	42.0
5500	.000056	42.6
6000	.000032	41.8
6500	.000044	42.7
7000	.000040	42.5
7500	.000068	42.9
8000	.000064	43.0

The narrow guardband worked well in this case. Even when the headstack was not peaked up during playback, the parity error rates were well within the VLBA specification of .000300. As the results show, the position of the track at playback was in some cases several microns away from the position it was recorded in. More tests are needed, but this initial test shows that a narrow guardband might be possible.