VLBA ACQUISITION MEMO #378

NATIONAL RADIO ASTRONOMY OBSERVATORY
Socorro, New Mexico

7 February 1994

To: VLBA Data Acquisition group

From: Durga Bagri

Subject: Tolerences for VLBA Sampling levels

Project book specifications on the digitizer level accuracy of 50 microvolts seems very difficult to achieve in practice.
Alan Rogers has suggested a 5 millivolt tolerence without trimming and 1 millivolt with trimming (see message dated 28Jan94 from Alan Rogers to Steve Parsely--copy enclosed).
As pointed out by Alan the DC offset and symmetry of the thresholds are more important than the accuracy of the threshold levels. Therefore considering practical problems and above aspects I suggest following.
Without trimming: DC offset < 1 millivolt, symmetry of thresholds < 2 millivolts, and threshold level accuracy of 5 millivolts.
With trimming: we should aim at 1 millivolt accuracy as suggested by Alan. At present we donot use trimming. I suspect that finally we may have to go for it and also may have to add a voltage reference/voltage regulator inside the sampler module to achieve this accuracy. Therefore we should keep a provision for this.
However before we go for this type of tight (1mV) tolerence, I think we need to understand
(1) effects of errors in sampling thresholds, and
(2) variations in BBC output levels.
Threshold level tolerence tighter than 1 millivolt seems hard to achieve without feedback type arrangements, which are complicated, and donot seem justified in view of the discrete nature of the ALC attenuator to control the BBC outputs.

FAX MESSAGE

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28 January 1994

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FROM: Alan E.E. Rogers
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COPY TO: Dr. Peter Napier, NRAO, Socorro
Larry Beno, " "
Jack Campbell, " "
Dr. Durga Bagri, " "
Dr. Dick Thompson, NRAO, Charlottesville

Dear Steve,

The sampling level accuracy (after trimming) of <50 microvolts is indeed (in my opinion) unreasonably stringent. I don't believe that any of the existing samplers have been "trimmed" - although this is certainly possible as a future option. I would think that a spec. of 5 millivolts before trimming, and 1 millivolt after trimming[+], would be more reasonable - but any official change of specifications should come from Dr. Durga Bagri or Dr. Peter Napier of NRAO. I think that the pc boards should have provision for trimming resistors and the customer should specify whether or not the trimming operation is required.

Best regards,

Alan E.E. Rogers

[+]The D.C. offset and symmetry are most critical while the accuracy of the threshold is less critical.

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