+===+
| VLBA CORRELATOR MEMORANDUM NO. VC 014 |
+===+

CALIFORNIA INSTITUTE OF TECHNOLOGY
MS 105-24, Pasadena, CA 91125
Telephone 818-356-4970
Telex 675425 CALTECH PSD, Telecopier 818-796-8751

To: VLBA Correlator Group Date: Jan. 25, 1984

From: Martin S. Ewing

Subject: Minutes of Correlator Working Group, Jan. 25, 1984

D'Addario introduced (reintroduced?) the idea of placing the VLBA fringe rotation at the antenna, or failing that, placing it just following playback. This would save a factor of 2 in correlator accumulators for a given frequency resolution, since "complex" correlation is not required. He went on to suggest that overall there might be a factor of up to 3 savings in correlator chip-count and/or cost. Ewing estimated maybe 1.5 or so.

The cost for the pre-recording compensation is that the Array phase center is fixed at observing time; the data can never be reprocessed to look at some other place in the sky. Also, LO/clock offsets have to be known precisely at observing time. (Delay could also be adjusted during the observation; if done ahead of the sampler, the fractional bit shift correction is avoided.) Another minus is the need to place more complex hardware at the antennas, where maintenance is a problem.

Post-recording, but station-wise lobe rotation can be performed using a Hilbert transform technique. D'Addario will write this up, we hope. In this case (post-sampling) there will probably be extra losses due to resampling. The losses might not be as bad as you'd think.

We need scientific guidance to know if pre-recording, pre-sampling correction is permissable. Readhead has serious doubts. Phase referencing, for example, becomes problematic.

Ewing pointed out that a hybrid scheme might be useful: intelligent delay and LO control at the telescope <u>plus</u> lobe rotation, delay, and complex correlation at the correlator site. The range of instantaneous offsets in fringe rate and delay can be reduced to the equivalent of one primary beam width; there would be some cost savings, but not a lot. There would only be a payoff if the correlator were reconfigurable from N-channel complex to 2N-channel real; this is not permitted in the current VLSI design. A redesign is possible, but would not be popular.

Ewing called for questions on the C2S design in preparation for next week's review in CV. Responses dealt with how many channels per baseline were achievable on a single baseband channel, how 3- or 4-level sampling was handled, whether parity or data-valid bits were requested.

There was also discussion of the perennial playback system correlator interface. Are 16 subchannels enough? (Mark III mode A compatibility is available in two passes.) Who should be responsible for data deskewing? Should the playback system allow (in principle) different delay corrections for each subchannel? Is there a two-level formatting protocol? Etc.

Hein asked for a list of issues that NRAO management will have to decide. Channelization, especially whether 64 Mb/s channels are needed, seemed to be an example.

The Block II review meeting, scheduled for Feb., will be postponed until perhaps March.