

NATIONAL RADIO ASTRONOMY OBSERVATORY

Charlottesville, Virginia

1984 Oct 15

To: Coordinating Committee
From: P. Sebring *Paul*
Subject: Notes from Coordinating Meeting, 1984 Oct 12

Addressees are invited to let Paul know about errors in these notes.

Participants

NRAO-CV H. Hvatum, moderator
 L. D'Addario
 M. Balister
 J. Benson
 R. Burns
 B. Cotton
 R. Thompson
 P. Sebring

NRAO-GB K. Kellermann

NRAO-VLA B. Clark
 P. Napier

NRAO-SOC W. Horne

Caltech M. Ewing
 D. Forrest
 A. Readhead

Haystack A. Rogers

1. Action List, 84 Oct 12 update

1.1. Budget Allocation. No time spent on this.

1.2. Note was taken that "Select M/C computer*," "First cooldown 1.5 GHz," "Select communication protocol" and "RFI Los Alamos" are now completed items.

*As a neophyte, I have found myself confused by the terminology variously applied to VLBA computers. If I now understand Barry Clark correctly, this "M/C Computer" is really the "Array Control Computer," for which some version of VAX was reported last week as having been selected.

1.3. RFI Pie Town. Nearly complete. Another two days should do it.

1.4. Larry asked to rediscuss the "completed" communication protocol item. I found I was unable to follow the discussion and I invite Larry to help with a short note I can append to next week's notes.

1.5. Select Antenna Computer. Barry says (in a later conversation) that a better term for this is "Station Controller," or "Station Control Computer," in accord with the Project Book. Another week is needed on this. Two Motorola units are being considered, 68010 and 68020. Will be some time before board level computer based upon 68020 is available, but it's more powerful, has floating point system. Want to use same unit as correlator if possible. (Sounds like more than a week to me!)

1.6. IF Signal Processing. Larry says Oct. 24.

1.7. Monitoring and Control Documentation. Barry says he needs a minimum of two weeks. Larry says pressure mounting to tie this down, because other items depend on it. Barry says problem is his time. Hein said let's call it Nov. 1. Peter asks if a change in this area would impact the servo design. Barry thinks not.

1.8. RFI 345 kV Power Line. May be delayed until about the end of October.

1.9. Specify M/C/Correlator Language & Operating System. Jon Romney and Larry asked about this. Still pending. Last week Barry said another month was needed. Much discussion over possibilities, but I could not digest it!

1.10. Hein reports successful antenna negotiations with both vendors. "Best and final" proposals due on Oct. 18. Both will include options for panels with 0.005 inch rms deviation at manufacture. Both accepted error budgets that ensure a structure sufficiently stable to support 86 GHz operation. Peter anticipates ~ 20% aperture efficiency at this frequency if we try the 0.005 inch option. He says the subreflector is emerging as a problem. It may be expensive to get the needed tolerance because it's not a surface of revolution.

2. Other Items

2.1. Larry states he has a prepared list of needed decisions to review next week.

2.2. Bob Burns raised matter of a leased line, Caltech to Tucson, at \$800/month. Would put Caltech on our internal digital link. Is it worth it? Will we be doing software over it?

2.3. Marty states he's just learned of the projected Nov. 9 teleconferencing/viewgraph review of playback-correlator area. Will talk to Hein by phone. Not happy to take the time for such a review just now.

2.4. Alan Rogers reports recording Polaris/IRIS data at Westford with the 40 micron tracks. Looks good. Haystack is once again issuing VLBI Notes.

PENDING DESIGN DECISIONS

Larry R. D'Addario
841010

This is a list of major design decisions which are presently pending, with a short discussion of each. It has been prepared at the request of Hein Hvatum in order to monitor our progress.

QUANTIZATION: Current plans call for three quantization options: 2-, 3-, and 4-level. However, the discussions leading up to this plan did not consider its impact on the correlator cost. We need to know the full consequences of requiring the correlator to support more than one quantization. Options: 2-lvl only; 3-lvl only; 2 and 3; 2, 3, and 4. (2,4 omitted because cost is same as 2,3,4).

CORRELATOR ACCUMULATION TIMES: One of the major parameters affecting the correlator cost is the minimum accumulation time. Slightly less critical is the maximum accumulation time. Both need to be cast in concrete as soon as possible.

VARIABLE PHASE SAMPLING: This eliminates, or at least drastically reduces, the need for bit shift corrections. It allows slower correlator dump rates with substantial savings. But these savings disappear if we must support foreign stations without this feature.

PHASE SWITCHING: This allows cancelling quantizer offsets, biased errors in data transmission, and some spurious signals. In my opinion, there is no question that this should be done; however, various technical details need work. One consideration is that there will be a minimum integrating time for which phase switching will be effective, and this may have to be 1 sec or more. For shorter times, the phase switch will not help as much, but neither will it hurt.

RF PULSE CALIBRATOR: This is sometimes called "phase calibration" (a misnomer) or "delay calibration." The questions are (a) whether to implement this at all; (b) if implemented, whether to place detectors at the stations or at the correlator; and (c) if implemented, what the parameters of the detectors should be (frequency range, integrating time, degree of multiplexing among channels). These questions are tied up with whether we must support this feature for foreign stations not conforming to the VLBA design.

MONITOR/CONTROL BUS DETAILS: Only a preliminary version of the M/C bus spec has been issued. Some details of the timing and protocols are under discussion and may be changed. It has also been suggested that this scheme be scrapped in favor of the Intel BitBus.

COMPUTER SELECTIONS: The station computer, fringe processor, and playback system controller need to be chosen. So far, each group has suggested a different microcomputer. A strong effort to make these the same (or same family) is needed. The playback controller might be excepted if its code can be considered

frozen (by moving tasks to the correlator computer if programmer intervention is contemplated in the future).

I.F. DYNAMIC RANGE: The receivers must have a large enough dynamic range to handle variations in front end gain and system temperatures, including observations of the Sun. Additional dynamic range helps with interference immunity. The exact requirements need to be specified. Some of the dynamic range will be achieved by ALC loops; how many and where? Any additional required will be achieved by programmable attenuation; how many steps? where? phase requirements? This also affects the gain calibration scheme (switched noise sources); parameters need to be specified.