VLB ARRAY MEMO No. 89

6/7/82

To: Friends of the VLBA Configuration

From: R. C. Walker

Subject: What next?

The VLBA proposal has been sent to the NSF and it is time to begin planning for the possibility that it will be funded. So far in the configuration study, we have looked at what can be done with various arrays but we have avoided selecting a final array. A final array, or at least a list of a few possibilities from which a final array will be chosen, will be needed early in the construction project so that the sites can be prepared. Therefore, I suggest that we begin a serious search for the final configuration.

The first steps in this search probably should be to identify a finite number of candidate arrays from which a final selection can be made and to choose a quality measure with which everyone is comfortable. The first task is hampered by ambiguities remaining in the basic constraints on the configuration such as whether to restrict the array to U.S. territory and whether to place some sites at existing observatories or some distance away so that short spacings can be obtained. The number of sets of constraints can be made small so it is reasonable to search for arrays under each set. In that way, we will be prepared when the political decisions involved are made. My suggestions for the sets of constraints are attached. The second task is a matter of selecting from among the various proposed measurement schemes (dynamic range, Mutel's scheme, sidelobe level etc.).

Since the configuration studies are occuring at several institutions and day to day communication is difficult, perhaps the best way to attack the above problems is for each group to write up its favorite quality measure (dynamic ranges and Mutel's scheme are written up) and to independently search for good arrays under a few commonly agreed upon sets of constraints. We could then meet to choose a quality measure and (probably later) a final list of configurations.

I propose that those interested in participating in the configuration study meet after the regular VLBA meeting which will occur at 1:30 pm EDT on June 14 to discuss the above ideas and, if they seem reasonable, to select the sets of constraints under which configurations will be chosen. Please let me know if there are problems with this time.

ARRAY CONSTRAINTS SUMMARY

I. Constraints common to all configurations.
   - A. Ten stations.
   - B. Most sites on U.S. territory.
   - C. Maximum spacing greater than 7500 km.
   - D. Minimum spacing less than 200 km.
   - E. Two dimensional for low declination coverage.
   - F. Short spacings near the VLA.
   - G. Sites should be as far south as possible for good low declination coverage.
   - H. Inner third provides good coverage.
   - I. Sites are near good transportation.
   - J. As many high-dry sites as possible.
   - K. Sites are near existing technical facilities.
   - L. Array interacts well with other observatories.
     1. Europe.
     2. Japan.
     3. Canada.
     4. Possible southern stations to be added later.

II. Variable constraint on use of existing observatories.
   - A. Sites at existing observatories where possible.
   - B. Sites near but separated from existing observatories (ones that will survive) for short spacings.

III. Variable geographic constraint.
   - A. All sites on U.S. territory.
   - B. One site near Mexico City.
   - C. Two or three sites in Canada.
   - D. B + C.
   - E. No geographic constraint on a few sites.

The variable constraints give 10 separate sets of constraints. It should be possible to adjust the sites near/at existing observatories without major perturbations on the array so there are only 5 really different sets of constraints. The most serious effort should focus on all U.S. arrays.