



NATIONAL RADIO ASTRONOMY OBSERVATORY

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June 2, 1982

Dr. K. O. Shoemaker
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VLB ARRAY MEMO No. 88

Dear Dr. Shoemaker:

Thank you for sending your interesting report on the Mobile Radio Astronomy System. The recent discussion at the Boulder AAS meeting referred to the proposed 10-element transcontinental VLB Array, as discussed by the Astronomy Survey Committee (see e.g. Physics Today 35, 46, 1982), rather than a single midwest telescope, and it is not clear if the MRAS could satisfactorily serve as elements of the VLBA.

It is difficult to make any detailed comments on the MRAS since in any comparison with more "conventional" elements cost is a primary consideration, and no cost figures are presented in your report. We are considering conventional shaped paraboloids 25 m in diameter equipped with a 10-band radiometer system in the range 7 mm to 90 cm with typical system noise temperatures at short centimeter wavelengths of about 50 K using cooled GASFET and maser amplifiers. The estimated cost of these proposed 25 m VLBA elements complete with radiometers and recording systems (50 to 100 MHz bandwidth), hydrogen maser, instrumentation for monitor and control, and site development is about 3.5 million dollars per element. Your proposed array would have about the same collecting area as one 25 m dish, but 3 to 4 times poorer noise figure. Also, I imagine that it would be very expensive to provide for multi-frequency capability, and in any case it would not be feasible to remotely select the observing frequency appropriate to the scientific program and weather conditions.

For radio astronomical use, the concept of a mobile station is not particularly attractive, since the self-calibration (e.g. Nature 285, 137, 1980) procedures used to obtain high quality images require the simultaneous use of many antennas. However, the JPL geodetic program does use a mobile facility with fixed frequency (S/X band) requirements and I would think that the MRAS could be suitable to their needs and interests.

As currently conceived, the proposed VLB Array is intended primarily for astronomical research, and so fixed multi-frequency capability appears to be more appropriate for the antenna elements. If, however, there is

sufficient interest and support from the geodetic community, then it is conceivable that there could be an additional requirement for a sensitive mobile station, if this could be built and operated at a competitive cost.

Sincerely,

K. I. Kellermann

KIK/bbs