



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL OCEAN SERVICE  
CHARTING AND GEODETIC SERVICES  
Rockville, Md. 20852

July 18, 1983

TO: Ken Kellermann

FROM: Bill Carter *WLC*

**VLB ARRAY MEMO No. 259**

SUBJECT: VLBA Instrumentation

I have slowly been going through the large stack of VLBA memoranda which I have recently received. Being new to the system, I am not sure of the correct procedure, but would like to comment on memoranda 218 and 242, which were written by the IF/LO/MASER and recorder subgroups, respectively.

During a recent discussion with Al Bates, Applied Physics Laboratory, he expressed some doubts about the Oscilloquartz hydrogen maser, particularly with regards to the magnetic shielding and temperature sensitivity. Since most astronomical applications of VLBI have less stringent timing requirements than geodetic VLBI, I am concerned that there may be a tendency to trade off performance for lower cost in selecting the VLBA masers. The Wettzell, FRG, geodetic VLBI observatory has an Oscilloquartz maser. We will begin joint observations with them later this year and should soon learn how well that maser performs. The point is, if the Oscilloquartz maser does not prove capable of a few parts in  $10^{15}$  over a period of 24 hours, I hope that better units will be purchased for the VLBA.

Concerning the recorder, memo 242 states that "Hein reported that the cassette recording system has been chosen for the VLBA. If further development and tests show this to be a poor choice, then this decision could be reversed in favor of the longitudinal recording system." Since we already have an operational longitudinal system which is growing in numbers very quickly, it seems to me that it ought to be the first choice, to be displaced only if a clearly superior system is developed. Why start out with the intent to introduce a new system, when it may not prove necessary?





# NATIONAL RADIO ASTRONOMY OBSERVATORY

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August 25, 1983

TO: W. Carter  
FROM: K. I. Kellermann

Thanks for your note of July 18. It is good to know that someone is actually reading all this stuff and I appreciate your interest. I am sorry to be so long in replying but I have only recently returned from the summer's travels.

It seems like maser manufacturers are like car dealers. They can all tell you why their product is better. In the end, of course, we will have to choose on the basis of competitive bids against a set of specs which we all agree on. We share your concern about the Oscilloquartz maser, and NRAO has already bought one maser from Oscilloquartz partly to evaluate it, and partly to use at the VLA for VLBI. Unfortunately, there is no dual frequency capability at the VLA, so geodetic observations are limited, and it may not be possible to properly evaluate the long term stability. Italy and Holland will also be on the air soon with Oscilloquartz masers; but the same restrictions may apply there at least at present, so it will be important to get feedback from the Wettzell experience. We did have our Oscilloquartz maser at APL for a short time to compare with other masers, and the results appeared satisfactory. Perhaps we can also arrange for further tests at JPL if this seems useful.

The decision on the use of VCR's was based in part on considerations of operating cost, and the need to be compatible with the proposed Canadian Long Baseline Array. We also recognize the rapidly changing technology in this area; the MKIII technology will be 15 years old when the VLBA is complete, and it is likely that whatever recording system we use initially for the VLBA, it too will be replaced by the mid 1990's. But we require a system that runs unattended at the sites for 24 hours, and with a minimum of tape handling at the 10-19 station correlator!

It may well be that the reduced operating costs of the VLBA system will make it attractive to use at geodetic stations as well. An entire VLBA record rack should cost less than a set of MKIII heads, and maintenance and repair will be very straightforward. Of course, as you know, we intend for the VLBA system to be MKIII compatible, so at a very minimum joint MKIII-VLBA observations will always be possible, provided someone can pay for the tapes and shipping.

As you know, we are working closely with Alan Rogers and the Haystack group to ensure that both the astronomical and the geodetic communities have the best system which we can make available within the overall cost constraints.

I think that further discussion of the maser question can wait until we are closer to making a decision, since everyone agrees on the importance of a reliable maser with state-of-the-art performance. If you want to discuss the recorder question at this time, I suggest you contact Alan Rogers and arrange to participate in the next meeting of that group.

If you have anything else you want to bring up at the meeting of the Scientific Group on September 9, please let me know.

KIK/bbs

xc: H. Hvatum  
A. Rogers