

May 7, 1958

Prof. Fred T. Haddock  
University of Michigan  
Department of Astronomy  
Ann Arbor, Michigan

Dear Fred:

For "political" reasons, I think it is prudent that we follow formal steps in reporting on the meeting on the Very Large Antenna, held at HCO, Monday evening, April 21.

Attached is a rough draft of a letter from you to Don Menzel that summarizes my notes at the meeting. I am sending a copy to Frank Drake at Green Bank with the request that he review the draft and send any amendments to you promptly, so that you can have comments from both of us when you put the letter into final form.

When the meeting broke up April 21, several people voiced the suggestion that the group be reconvened to discuss the various exploratory studies with the individuals or groups that would conduct the studies. I am vetoing this suggestion, because I do not believe an ad hoc committee is the best means of instructing the several study groups. NRAO will have to develop problem statements, based on your letter report of the April 21 meeting, that take into account both the total scope of the VLA investigation and the individual interests and capabilities of the investigators, all bounded by the available money. I would hesitate to turn this contracting job over to any committee.

Many thanks for your assistance.

Sincerely,

Richard M. Emberson  
Assistant to the President

Signed in Dr. Emberson's Absence

/lc  
Encl.

cc: F.D. Drake  
D.H. Menzel

Draft of Letter,  
F.T. Haddock to D.H. Menzel

(a)

In accordance with agreements made at the January 18 meeting of the AUI Radio Astronomy Advisory Committee, I convened an ad hoc group to discuss research requirements for a Very Large Antenna. This letter reports the results of a meeting held Monday evening, April 21, at Harvard College Observatory.

Those present for all or part of the discussions were:

R.N. Bracewell  
B.F. Burke  
M.H. Cohen  
A.J. Deutsch  
F.D. Drake  
R.M. Emberson  
H.I. Ewen  
R.M. Gallet  
T. Gold  
F.T. Haddock  
R.S. Lawrence  
A.E. Lilley  
D.H. Menzel  
Olaf Rydbeck  
Geo. Swenson  
H.F. Weaver

(b)

After a brief statement of the interest in a VLA for the NRAO and the need to start now if the VLA were to be constructed within 5-6 years, the group discussed radio astronomy programs that might make use of a VLA. The programs were of three types:

- A. Those that would be dependent on the availability of a VLA and that singly, or as a group, were sufficient to justify the construction of the instrument.
- B. Those that could make use of a VLA but that were not dependent on a VLA.
- C. Those that would appear to require a VLA but that are

cc: Dr. Strove 5/27/59

believed to be otherwise limited and, hence, not a proper justification for the VLA.

Under Type A we may list studies of M31 and M33; the exploration of the nucleus of our own galaxy; determination of the fine structure around some stars of special interest (e.g. B Lyrae); and red shift measurements. *FDD - a study of fine structure of interstellar medium, including cloud structure & such details as the small hydrogen masses, possibly in the act of forming stars.*

Under Type B were such problems as polarization measurements, the "non-noise" characteristics of some radio astronomy signals, flare stars, lunar mapping and radio spectra.

Under Type C were a large host, such as surveys that could be accomplished better with fanned beam arrays; or improvement of the solar parallax, for which there is no pressing astronomical need; or for work at low frequencies (20 mc) where gain is not a limitation but better resolution, as with a Mills Cross, is desired; or for *absorption* studies of the intergalactic medium, which *is* independent of the aperture. *FDD*

(c)

The ad hoc group discussed at great length three parameters for the VLA: the minimum operating wavelength, the effective diameter (assuming a paraboloid or something equivalent thereto), and the sky coverage. The consensus was that 21 cm was an acceptable minimum wavelength but if the cost did not increase greatly, a smaller wavelength should be the goal. On the basis of very provisional estimates presented by Dr. Lilley that a 1000-foot zenith array, fixed paraboloid, and steerable paraboloid might have relative costs of 1:8:30, all agreed that some compromise would be necessary between aperture and sky coverage. Dr. Weaver pointed out that a

1500-foot aperture was about the minimum for a really detailed study of M 31 and M 33, and that the telescope should track through at least  $\pm 30^\circ$  about the median position. Dr. Gold suggested that costs be estimated for three amounts of sky coverage, centered at the zenith or perhaps some other nearby coordinate: a meridian instrument with motion of  $\pm 1^\circ$  in declination; the same with motion of  $\pm 10^\circ$  in declination; and  $\pm 10^\circ$  in both hour angle and declination.

The ad hoc group endorsed studies on rf problems, (e.g. feeds, arrays, special forms and lenses), data handling (e.g. to digitalize the IF information and store on tapes), servo manipulation for sky coverage and for holding the proper reflector shape, and structural problems, including earth moving and flotation schemes.

(d)

The ad hoc group recognized that some of the suggested problems (e.g. lunar mapping, emissions from the planets at long wavelengths and a search for flare stars) required considerably more sky coverage than could probably be realized. There was a considerable body of opinion that the first goal should be an aperture greater than 1500

*FDD* of in some cases, more telescope time than could be justified by the gains expected from the observations.  
feet and with orientation and tracking capability sufficient for the M 31 study. Beyond this, it was felt the range in observable declination should be extended as much as possible. A range of  $\pm 10^\circ$  from the G-B zenith would permit most Type A problems (e.g. M 31 & M 33,  $\beta$  type & other stars of special interest, red shift measurements) to be attacked; a range of  $\pm 20^\circ$  would allow all Type A problems except the galactic nucleus to be attacked.