From: OUTBAX::VAX1::AROTS 30-NOV-198[illegible]
To: PVANDENB, MGOSS, GSEIELST
Subj: 300-ft

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re are just some random thoughts on the 300-ft replacement. They neither etend to be profound, nor complete, but may help in the discussion.

As I see it, there are three types of instruments that could replace the 300-ft, but before I get to that I would like to stress the issue of frequency coverage. There is an obvious lack of low-frequency capability in the U.S. The VLA now covers the 327 MHz band, and maybe we'll have 75 MHz some day, but that is a far cry from covering everything between, say, 75 and 1420 MHz. My own interest, of course, is red-shifted HI. The Green Bank site has some unique properties in this respect, and I think we should take full advantage of them and emphasize low-frequency work there. What the maximum frequency should be will depend on the type of instrument we build. For a single dish it should st least be 15 GHz, but for a synthesis instrument we may not want to go any higher than 5 or 8 GHz.

In trying to define the role of the instrument in the whole of the NRAO facilities, I feel very strongly that it should be the "zero spacing" instrument - whether or not its vata are actually combined directly with those of the larger arrays (VLA, VLBA) or not; call it the high-sensitivity/ low-resolution telescope, if you wish.

1. The first type that comes to mind is a high quality large single dish, the most direct replacement of the 300-ft. The surface should be more accurate (Sebastian von Howrner's homology design - finally?) and possibly larger, it should be fully steerable, there should be feed arrays, etc. I don't think I have to elaborate this type of instrument, but it also should be capable of supplementing VLA data with short-spacing information.

The second type is what I would call a single-structure synthesis instrument: either multiple dishes mounted in a single plane, or a large single dish with multiple feeds illuminating different parts of the surface. This would be truly a short baseline synthesis array. Its advantages for measuring low spatial frequencies are obvious and some interesting designs could be envisaged. As far as sensitivity/speed is concerned it would out-perform the single dish design. However, it may be a little cumbersome when used at low frequencies.

3. Finally one could envisage a compact synthesis instrument, with dishes in the 10 to 15 m class. This could give the present single dish users the same capabilities they have now (or, rather, had last month) and more. With a well-designed configuration and flexibility in observing modes (mosaicing, nodding, etc.) it would be excellent for wide-field mapping and for obtaining short baseline information. Its emphasis should be on low frequency spectral line (either "real" spectral line or continuum in line mode), up to 2 (5, 8?) GHz, and almost continuous frequency coverage - say, from 75 to 1700 MHz.

I would obviously favor the third option. In my opinion it would provide the astronomical community with the most versatile and supplementary instrument possible. In addition, it would take some of the pressure off the VLA, because it could replace (or out-perform) the VLA for D-array spectral line work. An obvious problem with this proposal would be the

number of antennae and the associated front-end electronics, this especially in connection with desirable frequency agility.

If the number of antennae would not be greater than 27 (but then tHesize would have to be at least 15 m), one might even consider the following: give it the current VLA correlator - which would be very well suited for the purpose - and build a new one for the VLA. You will realize that this remark is extremely tentative; I know quite well that such a thing would be very sensitive and I'm not even sure it's a good idea. But it ought to be considered and I only mention it here because this is not meant to be a public document.

As I said, there is nothing particularly profound about what I have written here. Others have said very similar things and, I'm sure, many more have had similar thoughts. But I felt that opnions had to be voiced, given the urgency and the fact that I will not be able to attend the Green Bank meeting. If any of you want me to expand on this I'll be happy to.