

National Radio Astronomy Observatory

Socorro, New Mexico

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To: R. D. Ekers and D. S. Retallack

From: W. N. Brouw

Subject: Report on Activities at VLA February 18 to March 9, 1984

During the three weeks at the VLA site I repaired some errors, but luckily I could spend most of the time testing and adding new features to the mapping part of the pipeline system. A (not complete) list of the things accomplished follows:

1. The main problem with the pipeline system in the last year has been the occurrence of indeterminacy in the maps produced. Already for a long time these were believed to be due to timing errors in array processors when doing simultaneous IO and arithmetic, and accordingly, all concurrent IO was stopped a year ago. However they have kept occurring. I was lucky enough this time to catch, on my first day at the VLA, a connection between the use of multiple memory pages in the AP and an asynchronous interrupt as the cause of additional interference. Since the suppression of this interrupt no indeterminacy has been detected in any map, although the system has been used quite heavily.
2. Some minor errors existed in, or had crept into, the code, eg: the asymmetric beam in some cases. All of these were easily fixed; some by simply by recompiling some modules.
3. Averaging across channel boundaries in the Sorter data sets of 8 channels per group was fully implemented and tested.
4. The interpretation of the user interface was reorganized, mainly in view of new requests and for easier debugging.
5. The baseline-time option was upgraded and tested. Some minor errors, but with a high nuisance rating, were found and corrected.
6. A baseline-frequency and a frequency-time option was added.
7. The user interface was reorganized to allow for the automatic combination of users requests, if possible, to increase speed.
8. Mosaicing, i.e. multiple off-center maps in one pass through the data, was added.
9. Clipping of data was added as a flagging option.

- 10 Squaring of observed visibilities was added as an option to enable r.m.s. calculations.
11. The 4-IF system was extensively tested and debugged.
12. Radial UV-limits were tested and incorporated into the user interface.
13. Disk names for input were generalized to make use of the variable Sorter pack designations.
14. More Stokes parameters were defined and implemented in view of the 4-IF system.
15. The system was designed for on-the-fly production of uniform weights and maps. This made it impossible to combine observations of different days, arrays, or frequency bands, correctly if uniform gridding was wanted. I added the possibility to generate the weighting plane in a separate run through the machine (e.g. a box gridded natural cover, although any input cover type file could be used, mask or whatever). This can be read in a subsequent run. This procedure is not slower and, in the case of line maps where one is willing to use one weighting set for all channels, will even be faster. The user still has to specify the two runs but making it an automatic procedure is quite easy. I talked it over with Bob Payne, but he did not want to incorporate it on my last night. This procedure will produce the correct result for uniformly weighted data from any combination of inputs.

Major parts of the system that still need adequate testing:

1. The third dimensional case. Although all the code is there, and in principal should work, no testing was done during this time.
2. The option of outputting channel maps in RA-frequency planes rather than RA-DEC planes is fully implemented (and tested), in the array processor, but needs some more FORTRAN interfacing and testing.
3. The 2-IF line and 4-IF polarization line case exists in the array processors. No FORTRAN interface has been defined as yet, mainly because of the lack of understanding of the actual possibilities envisaged and the lack of test data.

To make the system a really workable system I would like to suggest:

1. Make sure that the maintenance and spare parts, and knowledge of the APs, the Dataram memory, and the North star interface processor, are adequate.
2. Since disk space will be the real bottleneck of the system, with line data, adequate managing of the available disk space by the users and by software is necessary. An automatic delete procedure seems appropriate.

3. Speed improvements are possible by using larger I/O buffers for the disk input/output. In the case of Sorter data sets the structure of the pigeon hole data set makes it impossible to gain anything. The output rate of the maps can be increased however and Bob Payne is working on it already. Big improvements could be possible by integrating the use of the transpose memory and hanging 3 AP's; preferably one feeding on to the bus of another processor.

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