SGP MEMO NO. 32

ASTRONOMICAL USE OF THE PIPELINE - SUGGESTED PRIORITIES

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We are attempting to use the existing pipeline system to make maps which are of sufficient quality for accurate astronomical use. The pipeline is close to such utilization, however, several improvements are necessary before it can be opened up to users and before it can produce a useful product.

SHORT TERM GOALS (as soon as possible)

1. Fix Mapping Bugs:
   Continued use of the software finds bugs. At the present time the use of EXP*SINC produces negative as well as positive sources. The use of box car convolution produces maps which agree with those in AIPS by about 0.2%. Hardware bugs are present and appear to come and go. The transpose memory may be the major culprit.

   If the mapping were reliable, most spectral line users would use the PIPELINE. Not only because it is faster than AIPS at the present time, but because EXPORT tapes are extremely inconvenient to produce.

2. Keep UV data which has been transported by the DEC-10 into the PIPELINE:
   Saves sending data from the DEC-10 when remaking maps. Use same format as that which was read directly into the PIPELINE?

3. Data Flagging: Until data flagging information at the visibility level (not only at the index level) can be transmitted to the PIPELINE, many users will prefer to make EXPORT tapes and use AIPS for their final map making run. The PIPELINE would then only be used for first-pass maps and not for the best quality maps.

4. Minimal documentation for users:
   Since the system will be changing quickly as new features are implemented and as special procedures are needed, some easily accessed on-line documentation would be useful. At this stage it is probably too cumbersome to include this documentation in the regular DEC-10 packages.

LONGER TERM GOALS

The emphasis is on versatility of the PIPELINE, not on the throughput.

1. Map Arithmetic:
   Add a suitable set of maps to obtain a continuum map. Then subtract continuum map from the line maps. For weak sources

little further processing may be necessary.

2. Use of AIPS self-calibration:
   Requires transferal of continuum visibility data from PIPELINE to AIPS via UVFITS.
   Requires transferal of AIPS self-cal gain table back to DEC-10 or PIPELINE.

3. Cleaning:
   Begin implementing PIPELINE clean using transpose memory. For large maps transpose memory may significantly increase cleaning efficiency. Otherwise AIPS is about as fast.

4. Visibility model subtraction:
   For large field, large frequency range spectral line maps, continuum subtraction must be made in the visibility plane. AP's can be used here and the mapping package can handle this problem.

5. Use PIPELINE visibility directly:
   Observers will probably not use the PIPELINE visibility data directly for mapping it includes visibility data editing and display are available. On-line PIPELINE filler would also help since at the present time it takes just about as long to transfer visibility data from the DEC-10 as it is in reading the Modcomp data type directly into the PIPELINE.

GENERAL REMARKS:

It is not yet clear how much faster the PIPELINE will produce good quality maps as compared with the AIPS system. For continuum data it may not be much faster; for spectral line data it may be significantly faster. However, we feel that the PIPELINE will be used a lot when the short term goals are met, regardless of the of whether it is operating at full efficiency. This is because it is time consuming to get the visibility data into AIPS.

AIPS mapping and cleaning could be sped up considerably by incorporating some PIPELINE concepts: Reading visibility data directly from the Modcomp tapes with the pigeon-hole sort; Use of transpose memory or extended memory in the VAX to speed up large Fourier transforms.