SGP MEMO NO. 34

SUMMARY OF PIPELINE SOFTWARE MEETING OF JUNE 08, 1983

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The following is a summary of the PIPELINE meeting held at the VLA, with a telephone hookup to Charlottesville, on June 8, 1983. The purpose was to examine and decide on a priority list of PIPELINE tasks which best fit the needs of observers trying to reduce and analyze spectral line data at the present time and in the near future. This meeting was meant to be a general user discussion associated with SGP memo #33.

HIGHEST PRIORITY

There are three pieces of software which most of the attendees agreed had the highest priority; flagging of data in the PIPELINE, UVFITS on the PIPELINE, and implementation of the PIPELINE clean. Continued hardware work on the transpose memory and further debugging of the mapping software should also have high priority.

1. DEBUG MAPPING SOFTWARE:

Transpose memory must work reliably. Maps made on the PIPELINE agree with those made on AIPS to an accuracy of 0.2%. It is not clear if this difference is caused by the slightly different algorithm used in each system or represents an inaccuracy of the PIPELINE mapping procedure at this level. It is believed that the AIPS mapping software is accurate to 0.01%.

Conclusion: Process model data through the PIPELINE and determine real dynamic range limit of PIPELINE mapping system.

2. FLAGGING OF DATA IN PIPELINE:

Now is the time to figure out how to implement the flagging of u-v data resident on the PIPELINE. Until implemented users will prefer to display and edit the source data using the DEC-10. There was some disagreement about what level flagging is needed. Scan level, antenna-IF based flagging is not sufficient. Individual point, antenna-IF based flagging is probably sufficient for most applications.

Conclusion: Devise efficient flagging organization for PIPELINE. Several schemes are available. Interface with PIPELINE display system is important. Lean to most general type of flagging (as with DEC-10 FLAGER) unless very expensive in PIPELINE throughput. Be able to accept flagging information from DEC-10 and from AIPS. Automatic flagging programs should be developed.

3. UVFITS on PIPELINE:

UVFITS has been agreed upon as the format for the transport of u-v data out of the PIPELINE. One important use is to carry u-v data from a subset of the spectral line data base to AIPS for self-calibration. UVFITS on the PIPELINE would be also useful as an alternate route from the DEC-10 to AIPS to avoid the EXPORT tape. Further discussions after the meeting clarified that DEC-10 data sent to PIPELINE could be put in same format as originating PIPELINE data.

Conclusion: Finish UVFITS on PIPELINE. Should be able to write data which originated from the DEC-10. Sort order not important. Data cubes might be useful. See point 8.

4. CLEANING:

The transpose memory will speed-up cleaning significantly as compared with AIPS for maps 1024 and probably 2048 on a side. Since cleaning appears to be one of the most demanding task on AIPS and possibly on VLA resources, VLA processing throughput may not be improved sufficiently unless PIPELINE clean works as advertised. With reliable flagging, mapping and cleaning, the PIPELINE can completely reduce most of the simple spectral line programs to the stage where less cpu intensive image processing can be carried out in AIPS.

Conclusion: Continue to implement and debug full PIPELINE clean capability.

OTHER SOFTWARE NOT AT THE HIGHEST PRIORITY

5. MAPPING SIZES:

The PIPELINE was designed to make 2048x2048 maps efficiently. Maps 4096 and 8192 on a side can be made but are painful. Larger maps are impossible to make. While there are some applications which need maps larger than 2048, the PIPELINE should not be optimized for these large maps. Alternative approaches should be investigated. Two other possibilities--3-D trasnform to handle w-term and summation of snap-shot maps--should also be investigated.

Conclusion: Mozaicing (making many small maps in selected areas of the field of view, instead of one large map) will probably be the most likely alternative. However, several iterations of mapping, cleaning, source subtraction in the u-v plane will be needed in order to reach the desired sensitivity. This coordination of several tasks must be automated to a large extent and the PIPELINE system design must be able to accomodate this iterative type of batch-like reduction.

6. CONTINUUM SUBTRACTION:

In many spectral line programs, a continuum channel (formed in a variety of ways) must be subtracted from the line channels. There are two methods to do this; 1) subtraction of the continuum map directly from the line channel maps and 2) subtraction of a model of the continuum map (probably in a list of up to several thousand clean components) from the line channel u-v data. Both methods are needed.

Conclusion: PIPELINE display system should be able to handle map arithmetic. The present mapping software can handle component subtraction of u-v data. It should be debugged. Are there limitiations to the number of components which can be subtracted?

7. AIPS-PIPELINE INTERFACE:

UVFITS and FITS will transport u-v data and maps between PIPELINE and AIPS. Other data sets also have to be transported: Clean components from

AIPS to PIPELINE and PIPELINE to AIPS; Antenna-time Gain files for self-cal results from AIPS to PIPELINE; additional flagging of u-v data during self cal process from AIPS to PIPELINE; and some sort of history files.

Conclusion: General agreement between AIPS and PIPELINE on format of files. FITS rules on Table data (now under discussion) may be the way to go.

8. DATA CUBES:

Mixed feelings about the utility of data cubes. Makes sense for u-v data on UVFITS tapes because of a saving of substantial space on tape and since the spectral line database in the PIPELINE and DEC-10 are already in a cube format. For maps, the gain is less attractive because of scaling problems. Map cubes are needed for transposition of coordinates but the cubes could be generated in AIPS after they are read separately. Most of the impretus for map cubes has come from the difficulties in the past of keeping track of the individual maps in a spectral line set. With better header information associated with each map and the use of wildcard characters in the mapnames, this problem should be alleviated.

Some discussion about using real format for FITS and UVFITS data. There is some indication that an ANSII standard floating point convention may soon be adopted but it will be several years before it will be widespread.

Conclusion: FITS works and is accepted widely. Going to floating point is not recommended until a universal ANSI convention is adopted and commonly used. The use of cubes for writing on UVFITS and FITs tapes is not strongly recommended. Cubes, as needed, could be made with the data already on disk or as it is read on or off the disk. For UV data, however, a substantial saving of tape could be accomodated by using cubes.

Bob Duquet

Comments on Pipeline Review Document (SGP memo #33)

DBR 6/6/83

p. 3 figure KL10 tape drives 800/1600 bpi (6250 too??)

p. 9 last para. ⇒ no SELFCAL but p. 15 says SELFCAL will be implemented.

p. 12 "unique values of ...." ???

p. 12 2nd para. from end should probably read

"from the ModComp system to SORTER but the calibrator data may be ignored."

p. 13 1st para. "This program will not be able to do data.

p. 13 Section 3.5
This is the first place the words "Pigeon Hole" are encountered. An explanation (brief) would be in order.

p. 15 sect. 3.7.2. contradicts p. 9 !

p. 21 Do you really need the space in R PIPELN (xxxx) ??

Seems inconvenient to me.

p. 29 Display functions: will it also be possible to load a sub-map? This is very important. How about a sequence of maps?

p. 29 The image storage system will allow storage of images

not maps; i.e. 8-bit IIS images are not the same as maps on disk. Check w/ Don Wells but I think the distinction between images vs. maps should be made in the Pipeline Review document if only images will be saved. Otherwise, users might think they will be able to store maps (+ headers, clean components etc.) on video cassette without losing anything.

p. 31 last para. "A program called PIGEON ..." Do you mean MC PIGEON ??

p. 32 sect. 7.3, last sentence

"into 8 channel groups".