

# VLB ARRAY MEMO No. 379

National Radio Astronomy Observatory  
Edgemont Road, Charlottesville, VA 22901  
(804) 296-0211, FTS=938-1271

22 August 1984

To: VLBA  
From: W. D. Cotton  
Subject: Data Processing Meeting 14 August 1984

Present: Benson, Burns, Crane, Cotton, Fickling, Hilldrup,  
K. Johnston, L. Molnar, P. Palmer, Romney, van Gorkom,  
Walker

Material sent out to (most) committee members before the meeting is given as an appendix to these notes.

Walker made an appeal to those who have seen it for responses to his draft memo soliciting comments on and suggestions for the proposed joint VLBA-VLA calibration project.

During the discussion of the suggestion and specification it was concluded that the names of the files should be more mnemonic than the current scheme. Wells suggested using subdirectories to separate different categories. Cotton will revise the names before the next meeting.

There was an extended discussion of whether there should be one general task to apply the gain table or several specific tasks. In the calibration and editing phase, raw data will be kept and the gain table will be modified. Then when the bulk of the editing and calibration is done, the gain table will be applied and calibrated, edited, single source files in the current AIPS style will be created. There was a general (but not unanimous) consensus that a single task with switches to turn on or off various corrections was sufficient. It was also clear that there should be a general subroutine to apply calibration, editing and data selection criteria since many data display and calibration tasks will need calibrated data internally.

The spectral line observers present agreed that the function of the DEC 10 PASSUM program was necessary. PASSUM displays the average spectrum of a selected subset of the data. Cotton suggested that this could be done in GRID even if it had to produce a  $l \times l$  (no. freq. chan.) image.

Crane pointed out that some of the function of MORAS (see list below) was done on line on the VLA and that there was no practical way to get autocorrelation data out of the VLA. Palmer expressed a desire to do so.

Crane suggested that the polarization calibration needed to include a frequency dependence because the polarization characteristics of feeds vary across a 50 MHz bandpass. There was also a discussion but no conclusions of the problem of the variation

of the polarization characteristics across the antenna beam.

Romney suggested that a task to apply the VLB phase cal tone information was necessary.

Palmer and Crane explained the need for a non uniform spacing of frequency channels, for example to cover several of the 1660 MHz OH lines. Several pointed out that there is a similar need for bandwidth synthesis data with the VLBA. All agreed that using channel rather than frequency with a lookup table to describe the frequency coverage was probably sufficient.

## Appendix

### Agenda for Meeting

The basic agenda for tomorrows meeting (14 Aug, 1530 EDT ph (203) 797-9065) is a continuation of the discussion of the VLA/VLBA editing and calibration project.

- 1) Specification and suggestion files. Details are appended to the end of this document.
- 2) Data correction tasks, should there be one task to apply corrections or several, one for each kind of correction?
- 3) Spectral line software.
- 4) Priorities for the software.
- 5) Line up, sign up, and write the specifications of the function of your choice.

Also appended to this document is the current list of work to be done for the editing and calibration project. Any relevant items not on this list should be added.

### Check out for Specification and Suggestion Files.

There are two types of files for specifying the various functions and data structures, first the specification files which are to contain the current specifications and should not be casually changed. The second type of file is the suggestion file, which are for the purpose of formally entering suggestions and entries can be made by all interested persons. The current list of tasks and persons working on specifications and/or software is given in the file DP'TASKS.TXT. Each item has an identification number (e.g. ASCAL is 3.3) which is used to generate the names of the files. File names are of the form: Sccnnn.mmm where cc is the category number (e.g. 1 for utility routines), nnn is the number in the category ( e.g. 3 for ASCAL) and mmm is SPC for specification files and SUG for suggestion files. For example, the specification file for ASCAL is S03003.SPC. There is also a suggestion file for general comments named GENERAL.SUG.

An example suggestion file for GRID (number 2.1, file S02001.SUG) follows:

Suggestions for 2.1 (GRID)

Name	Date	Phone	Comments
B. Cotton	9Aug84	(804)296-0319	This program should be able to grid calibration information as well as data, this would help finding data for which there are no fringes to a given antenna.

These files are kept in directory CVAX::UMA3:[VLBA.DATAPROC]. These files may be checked out only by persons logged into VLB (no password) and similarly to check them back in the user must be logged into VLB. Directions for using the checkout system are found in the text file CVAX::UMA3:[VLBA.DATAPROC]CHKOUT.TXT. When checking out a file please put your name as the first part of the reason when asked, this is the only way to tell who has which file checked out.

Calibration and Editing Functions in AIPS

13 August 1984

The following is a working list of functions need in AIPS or modifications to AIPS. Names of tasks in parentheses are provisional.

Function

Utility:

1.1 (CALIB)

Multi-source to single sources file conversion routine. This task should apply gain and editing tables.

1.2 (UVGET)

Subroutine to produce a file containing a selected subset of calibrated data from a raw data file plus a calibration table.

Data Display/Flaging:

2.1 (GRID)

This routine will convert a uv data set into an image which can be displayed on a television. E.g. time on one axis, baseline on another. Output image may be have more than two dimensions.

2.2 (FLAG)

This routine would allow interactive flaging based on the results of GRID.

2.3 (FLAGB)

This routine would display data as a function of time on each baseline and allow interactive flaging.

## 2.4 (LISTR)

This routine will provide a flexible means of obtaining printer listings of data similar to the DEC 10 LISTER program. Optional plotted output is desired.

## 2.5 UVFLG

The current capabilities of UVFLG should be enhanced.

## Calibration:

### 3.1 POLCA

This routine will determine polarization calibration parameters.

### 3.2 (POLCO)

This routine will apply the results of POLCA to a second uv data set.

### 3.3 ASCAL

ASCAL needs to be upgraded to handle the several types of multifrequency data. Could be given the ability to include fringe fitting.

### 3.4 ASCOR

ASCOR applies the results of ASCAL and needs to track ASCAL.

### 3.5 (GNED)

This routine or routines will allow manipulating gain files produced by ASCAL. Included are concatenation, editing and smoothing.

### 3.6 (ATMOS)

This routine would determine and apply atmospheric corrections to a uv data set. Should include both neutral (wet and dry) and ionized components with data from a wide variety of sources.

### 3.7 (MODEL)

This routine would determine and apply and/or correct the geometric model using a high quality model. Must correct both visibility and model data.

### 3.8 (SHAD)

This routine would compute and apply corrections for geometric shadowing and/or flag data if the antennas are shadowed.

### 3.9 MORAS

This routine applies spectral calibration using autocorrelation spectra.

### 3.10 SWAMP

This routine does a fringe fit in the time domain and gives a number of useful displays.

### 3.11 PHREF

This routine references the phases of a spectral data base to a particular channel or to the average of a range of channels or an external calibration table.

### 3.12 DUNE?

This routine makes fringe rate maps.

### 3.13 (VEL)

This routine makes velocity corrections to spectral data bases including

doppler tracking.

### 3.14 (BAND)

This routine will determine and/or remove bandpass functions for both baseline and antenna based solutions. (May be done in fringe processor for VLBA).

### 3.15 (BASE)

This routine will fit and remove baselines from auto and perhaps cross correlation data.

### 3.16 UVAVG

Enhancements to UVAVG should allow averaging over regions of the uv plane; both vector and scalar averaging should be supported.

### Modifications to AIPS:

#### 4.1 Multi-source data files.

This will include geometric observables and an attached but unapplied gain table.

#### 4.2 Modified catalogue header.

There is a need to handle randomly spaced and/or time variable axes.

#### 4.3 Gain table

Table for calibration and editing information.

#### 4.4 Monitor data logs.

Table for monitor and other auxiliary information.

### Needs for Geometric observations:

#### 5.1

The following table lists the person(s) currently responsible for writing the specifications or software and the anticipated date of completion.

Item	Specifications		Software	
	Person	Date	Person	Date
Utility:				
1.1 (CALIB)				
1.2 (UVGET)				
Display/Flagging:				
2.1 (GRID)	Cotton			
2.2 (FLAG)				
2.3 (FLAGB)	Romney		Romney	
2.4 (LISTR)				
2.5 UVFLG				
Calibration:				
3.1 POLCA	Molnar		Molnar	12/84
3.2 POLCO	Molnar		Molnar	12/84
3.3 ASCAL				
3.4 ASCOR				
3.5 (GNED)				
3.6 (ATMOS)				
3.7 (MODEL)				
3.8 (SHAD)				
3.9 MORAS				
3.10 SWAMP				
3.11 PHREF				
3.12 DUNE				
3.13 (VEL)				
3.14 (BAND)				
3.15 (BASE)				
Modifications to AIPS:				
4.1 UV data base	Greisen/Cotton		Greisen/Cotton	
4.2 Mod. cat. header	Greisen/Cotton		Greisen/Cotton	
4.3 Gain table	Cotton		Cotton	
4.4 Monitor log.				
Geometric needs:				