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9 January 1985

To: VLBA  
From: W. D. Cotton, J. D. Romney  
Subject: Data Processing Meeting 8 January 1984

Present: Benson, Burns, Cotton, Crane, Fickling, Kellermann,  
Moore, Molnar, Pearson, Romney, Schwab, Simon, Walker, Wells

The items discussed on the agenda were the following:

1) There will be a meeting in Socorro later this month which be a design review or something. As preparation for this meeting we should discuss the interface to the correlator. As a starting point for discussion the following is assumed:

- Data archived in the form of FITS files. Data will be in IEEE floating point format (or whatever is adopted for FITS) and will contain the information currently in AIPS data files plus whatever is needed for geometric accountability.

- Each data file will have a table containing gain information derived from T sys corrections etc.

- Each data file will have a table containing flagging information.

- Each data file will have an associated log file giving relevant monitor and correlator information. The information to be included needs to be more fully specified.

2) Any other items anyone wants discussed before the Socorro meeting.

- J. Romney described discussions he had with people at JPL about geodetic VLBI and software.

- P. Crane wanted to discuss the question of what RMS to carry with the data.

Item 1) Most of the discussion was about the archive and/or distribution format and medium. J. Romney suggested that the format of the archive files need not be FITS. He also argued that the archive and distribution format did not need to be the same. There was considerable disagreement on this point and D. Wells pointed out the unfortunate history of internal formats becoming external formats. Don also stress the need to avoid machine dependent features in both the archive and distribution formats.

P. Moore pointed out that FITS had little error recovery capability and argued that VMS Backup which has good error recovery codes be used. Since Backup is seriously machine dependent there was little other support for this particular suggestion.

T. Pearson suggested that 32 bit scaled integers would be an adequate form in which to store the data and avoids the problem of the floating data format. He was also uneasy about the ability of FITS to handle multi volume data sets and multiple users data. On the question of the form of the data, P. Crane pointed out that the VLA is moving away from scaled integers to floating point since (16 bit) scaled integers have insufficient dynamic range. There was no consensus on whether or not 32 bit scaled integers was sufficient or whether scaling data to integers or floating point data conversion was more efficient.

There was an extended discussion about the physical medium for archiving data. D. Wells pointed out that, since there are no industry standards for optical disks, this technology does not provide a practical distribution medium for the near future. C. Walker pointed out that since different experiments being processed simultaneously would require different record sizes data from several experiments could not be written into the same FITS file. After some discussion the need for multiple tape drives and/or much disk buffer storage in the archive writer became obvious.

T. Pearson pointed out that that the  $w$  (of  $u, v$  and  $w$ ) is in fact the model delay need for geometric measurements. In the absence of anyone at the meeting intimately familiar with the needs of geodetic/astrometric applications, ignorance prevailed and no decisions were made. (R. Simon reported during the meeting that K. Johnston claims to have actually started writing the long awaited memo on this subject).

Item 2) J. Romney described his discussions at JPL with John Davidson, supervisor of the Geodynamics Systems Group, on a recent visit to Caltech. The main topic was the JPL geodetic VLBI data-reduction software system "Masterfit". This runs on a VAX 11/780, and receives its input VLBI observables via the Crustal Dynamics Data Base format. As are other geodetic software packages, this is a very large body of code representing perhaps 30 - 40 manyears of programming effort. It is supported externally in that initial and update code are distributed for installation elsewhere. One feature of particular interest for possible integration into a VLBA post-processing system is that one of the many outputs provided gives the calculated geodetic model parameters; presumably this could provide a link to a module which would apply the improved model to VLBA data generally.

From a programming point of view this system differs from the GSFC CALC/SOLV package (which has been described in previous post-processing meetings) primarily in the host computer. Since we may use VAXes, at least initially, for VLBA post-processing, it would be possible to import the Masterfit system wholesale as an alternative to translating the HP1000 CALC/SOLV code. Romney pointed out that both of these packages are of a volume approximating that of AIPS, and that

it may be unrealistic to plan to integrate geodetic reductions into AIPS as a subsystem. There followed some (inconclusive) discussion on the necessity of running these reductions in the AIPS environment, and the difficulties of (repeatedly) translating or extracting foreign code.

Romney's discussions with Davidson also touched on the observing requirements for deriving the high-precision geodetic measurements which will be necessary for successful phase-referencing work with the VLBA. Such observations would evidently require at least 12 hours for the continental VLBA stations, and probably more like 24 hours for the Hawaiian (and perhaps the Puerto Rican) site as well as possible European participants. The frequent brief runs we have been planning for clock calibration will be useless for geodetic work. Probably the simplest approach to station-position calibration would be for the VLBA to participate in the major geodetic runs which occur roughly quarterly and last for 4 - 5 days.

P. Crane wanted to discuss weights and flagging. He pointed out that the current practice on the VLA is to have two levels of flagging, on line and user flagging. He argued that the RMS carried along with the data should be an internal scatter in the data going into a given integration since this is very useful in detecting problems. It may be possible to carry along both since the theoretical RMS will be nearly the same number for all correlations in a record whereas the empirical RMS will not.