AIPSLETTER

Volume XVI, Number 2: October 15, 1996

A newsletter for users of the NRAO
Astronomical Image Processing System

Written by a cast of *AIPS*

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General developments in *AIPS*

Staff

Ketan Desai has moved from Charlottesville to Socorro, where he will continue working on developments in *AIPS* related to Space VLBI. Eric Greisen has "elected" to concentrate his efforts on developing *AIPS* applications outside of TST; it is the intention that some of these developments will find their way back into standard *AIPS*.

Current release

The 15OCT96 release of Classic *AIPS* is now available. It may be obtained via *anonymous* ftp or by contacting Ernie Allen at the address given in the masthead. *AIPS* is now copyright ©1995, 1996 by Associated Universities, Inc., NRAO's parent corporation, but may be made freely available under the terms of the Free Software Foundation's General Public License (GPL). This means that User Agreements are no longer required, that *AIPS* may be obtained via anonymous ftp without contacting NRAO, and that the software may be redistributed (and/or modified), under certain conditions. The full text of the GPL can be found in the 15JUL95 *AIPSLetter*. Details on how to obtain *AIPS* under the new licensing system appear later in this *AIPSLetter*.

A total of 225 copies of the 15JAN96 release were distributed, of which 104 were in source code form and 121 were distributed as binary executables. The table below shows the breakdown of how these copies were distributed. This includes both source code distributions and binary distributions. The latter method is gaining popularity quickly: 54 % of all distributions include binaries.

ftp	8mm	4mm	QIC	Floppy
186	23	14	1	1

User feedback suggests that the distribution over operating system for installed versions of `15JAN96` was as follows:

Operating System	No.	%
Solaris/SunOS 5	422	50.5
SunOS 4	183	21.9
Dec Alpha	70	8.4
PC Linux	61	7.3
SGI	42	5.0
IBM /AIX	27	3.2
HP-UX	26	3.1
Ultrix	4	0.5
Convex	1	0.1
Total	836	

Solaris/SunOS 5 appears to have made significant gains over SunOS 4 since the last release. These figures are affected by the percentage of *AIPS* users that register with NRAO. We remind serious *AIPS* users that registration is required in order to receive user support.
The next release of *AIPS* will be `15APR97`, and will resume the usual bi-annual release schedule.

System Support

The SunOS 4.1.*x* operating system is now almost phased out at the NRAO in favor of Solaris v 2.4 or v. 2.5. We will keep one or more computers on the old system as long as we can. Although we do not anticipate major problems any time soon, it is inevitable that the quality of our support for the old operating system will diminish with time.

Starting with the current release, we will only ship Linux-elf executables.

Binaries available via ftp are now GNU-zipped for significantly faster download time. A copy of `gunzip` is included in each `$LOAD` area so these files can always be uncompressed.

Improvements for users in 15OCT96

UV data processing

Model-fitting — 1 - SLIME

`SLIME` (Slick Interactive Model Editor) is a new model-fitting program for *AIPS*, and was developed as part of a program to add support for Space VLBI to *AIPS*. It has roughly the same capabilities as `UVFIT` but allows you to mix components of various types and allows you to use any number of components and data points (subject to the amount of memory on your workstation and your degree of patience). `SLIME` differs significantly from `UVFIT` however in terms of the user interface.

`SLIME` is the first *AIPS* task that is a true X Window System program. It presents you with a graphical model editor that displays a scale diagram of your source model. You may also open additional windows that plot the amplitude and phase data for specified baselines together with the visibility function expected from the current model. You can move components or change their sizes by dragging their graphical representations with the mouse in the editing window and the plotted model data will be updated to reflect your changes. This reduces the amount of guess-work or trial-and-error needed to arrive at a good initial model. When you are finally satisfied that you have a model that is in fairly good agreement with the data, you can ask `SLIME` to perform a least-squares fit to optimize the model parameters. `SLIME` models can be stored in *AIPS* CLEAN-component files and used as inputs for other *AIPS* tasks.

Although it is a true *AIPS* task that runs in the *AIPS* environment and uses the *AIPS* libraries, `SLIME` is written in C rather than FORTRAN which is not well suited to developing X Window System programs. C++ was considered as an implementation language but the potential for portability problems arising from the various different dialects of C++ in use was judged to outweigh the advantages of C++. `SLIME` is, however, based on an object-oriented design and is intended to be easily extensible.

Because the *AIPS* compilation procedures do not handle this type of program, `SLIME` is distributed separately from *AIPS*. The source code is available for down-loading through the `SLIME` home page at `http://www.nrao.edu/~cflatter/slime.html` and can be installed into an existing *AIPS* installation by anyone with *AIPS* manager privileges. The existence of Motif is a prerequisite for running `SLIME`. Configuration is automatic for SPARCstations running Solaris 2.4 or later or ALPHA/AXP-based DEC workstations running OSF/1. `SLIME` should also work on other Unix-based systems that have X11R5, Motif 1.2 and the Display PostScript extension to X. The Display PostScript requirement will be removed in the next major release (expected to be available in the first quarter of 1997) which will make it easier to port to additional Unix systems. This release should also have facilities for plotting and fitting closure-phase data.

Problem reports or comments concerning `SLIME` should be sent to Chris Flatters (`cflatter@nrao.edu`) directly rather than using the `GRIPE` system or the designated AIP program.

Model-fitting — 2 - `OMFIT`

`OMFIT` is an advanced model-fitting task that works directly on *UV* data and is far more flexible than `UVFIT`. `OMFIT` can fit to an arbitrary number of model components, with each chosen from a small, but growing, pool of available component types. The available component types include several that model polarized flux and at least a few that allow for multi-spectral fitting. `OMFIT` can, optionally, perform self-calibration of the data, which is offered in two flavors. Simple self-calibration allows a single amplitude and/or phase to be determined per antenna for each solution interval while multiple self-calibration allows a separate amplitude/phase self-calibration solution for each model component. Questions, comments, and suggestions should be sent directly to Ketan Desai (`kdesai@nrao.edu`).

Elevation interpolation

A new task `ELINT` is available in this release. The task `CLCAL` allows the interpolation over time of calibrator antenna gains to target sources. If the elevation difference between the calibrator and target sources is large, (either due to a large physical or time separation), significant errors can result, especially at high frequencies where there is a strong dependence of antenna gain on elevation. The task `ELINT` both solves for the gain dependence on elevation, and interpolates the required corrections into the `SN` table. In addition, `ELINT` solves for the flux densities of the calibrators used, assuming the flux density of the first calibrator is known.

The input data is an `SN` table resulting from a preliminary calibration using a set of selected calibrators. The task fits a given type of fitting function to these data. This functional form is then used to interpolate gain values for the target sources. The fitting is done independently for each antenna, each IF, and each polarization (Stokes).

The simplest mode of operation is to determine the gain dependence using only a single calibrator whose elevation range matches or exceeds that of the target sources. In many situations however, the elevation range covered by a single calibrator is not sufficient, while that of all, or many calibrators, is. In this case, `ELINT` can solve for *both* the elevation gain dependence and the flux density ratios between the calibrators, assuming the first-named calibrator is the flux density reference. It then determines the corrected flux densities of the calibrators.

The result of fitting can be displayed on the TV or recorded in a plot file. The average (for all selected antennas, IFs, and Stokes) found voltage factors, (MEANFACTOR), original flux densities of selected calibrators (FLUXOLD) and corrected flux densities of the calibrators (FLUXNEW) are displayed. The determined correction of the antennas' gain vs. elevation is written in an output `SN` table for all selected target sources.

Two types of fitting function are provided: a third degree polynomial (`OPCODE = 'POLE', 'POLZ', 'VLBI'` and `'VLBN'`) and secant z (`OPCODE = 'SECZ'`). Only amplitude fitting (`OPTYPE = 'AMP '`) has been installed now, but others are planned in the future.

Bandpasses

Bandpass interpolation in time has be reinstated in the calibration system and is available in all tasks that support the DOBAND adverb (e.g. IMAGR, SPLIT). The current options, DOBAND=1 (mean bandpass) and DOBAND=2 (nearest BP in time) remain unchanged but DOBAND=3 (linear interpolation) has been re-activated. A new option DOBAND=4 which uses weighted two-point interpolation is also available. The BP entries are now stored in a cache buffer rather than intermediate scratch files and all interpolation modes treat flagged BP entries correctly. DOBAND interpolation modes 2 through 4 consider BP record flagging on a record by record basis. New experimental BP interpolation modes 5 through 7 mirror the lower numbered options (2-4) but interpolate BP entries and check flagging for each IF and polarization separately.

FILLM and the TY table

Until April 30, 1996, the VLA online system only wrote so-called *Nominal Sensitivities* to the VLA archive tape. FILLM writes these values into the TSYS column of the TY extension file belonging to the *AIPS UV* data set. Starting May 1, 1996, the VLA online system also writes front-end and back-end system temperatures (in degrees Kelvin) to tape. FILLM was modified to read these system temperatures, and to write either the front-end or the back-end temperature to the TANT column of the TY table, which was previously not used for VLA data. Default is back-end T_{sys} for P- and 4-band, and front-end T_{sys} for all other bands. This default can be overridden using CPARM(2) in FILLM.

FXVLA - 1996 leap second at the VLA

This is a special purpose task written to correct a UT1 interpolation error affecting data between 30 December 1995 and 5 January 1996. This error was caused in the on-line system by interpolating over the leap second discontinuity. This task will be retained in the standard *AIPS* distribution in case the affected data are reduced at some point in the future. All users affected by this error have been notified individually. For specific questions regarding FXVLA, users should contact Michael Rupen (mrupen@nrao.edu) or Athol Kemball (akemball@nrao.edu).

Miscellaneous *uv* task improvements

LTESS LTESS had the cutoff for the primary beam hard-coded at 7% but was modified to allow the user to specify the cutoff. It still defaults to 7% however.

APCAL Null characters were stripped from antenna names to increase the robustness of the calls to the KEYIN routines, and handling of source selection of the type "-SOURCE" was improved.

SETJY New polynomial coefficients, derived by Perley & Taylor from VLA flux density monitoring in 1995, were added, and a rounding error introduced in SETJY for the Perley 1990 coefficients was corrected. This error, for 3C286, ranged from 0.5% to 1.9% from P-band to Q-band.

CALIB An error in the way CALIB dealt with dual polarization data was corrected. It sometimes occurred when one polarization was missing throughout a solution interval. In the fit, polarization-independent weights were used, which at times led to very high gains in the missing sense of polarization. This in turn biased the mean gain modulus (MGM), if computed. Errors in the MGM were cumulative over several iterations, and sometimes significant.

UVLSF BCHAN and ECHAN selection were applied to the input when phase shifting and fitting the baseline. Since they only apply to output, the full loop is now done on input.

FILLM FILLM allows for a certain difference in frequency/velocity before it assigns different FQID's. For some extreme cases (sources at opposite ends of the sky) the old limit was not sufficient; it is increased now.

SNCOR Two new features were added to SNCOR: 1) OPCODE='PCOP' allows solutions to be copied from one polarization to another with the copy direction controlled by SNCORPRM(1); 2) OPCODE='PNEG' will flip the sign of the gain phase for all selected solutions. Both features are sometimes required in line polarization calibration. Also added the capability of `SNCOR` to work on single source files.

`POSSM` When `NCOUNT=0`, and the user requested multiple IFs to be plotted together (`APARM(9)=1`), only the first generated plot had the proper range of IFs plotted. This has been fixed now. The functionality of `APARM(8)` was extended: if `APARM(8)=1` the total power is plotted for selected antennas; if `APARM(8)=5` both amplitude and phase are plotted for selected antennas and polarization. This allows cross-polarized autocorrelation data to be examined.

`SPFLG` Added the possibility to load only total-power spectra for a first pass at data flagging. To this end, the interpretation of `DPARM(2)` has been changed as follows: `DPARM(2)=0` gives only cross-power spectra, `DPARM(2)=1` gives cross- and total- power spectra, `DPARM(2)=2` gives *only* total-power spectra. The ability to customize the reasons that `SPFLG` attaches to flagging commands entered into the `FG` table was added. To each flagging command stored in the `FG` table is attached an optionally customized string that will be recorded as the reason for that flagging command.

`VLACALIB` In this procedure the user now can specify the version of the output `SN` table using the `SNVER` adverb.

`CLCOR` The amplitude factor used for the opacity correction for `OPTYPE = 'OPAC'` was corrected. The amplitude factor was the square of what it should have been.

`SMOOTH` Treatment of the adverb `SMOOTH` and the variable `DOSMTH` in many of the tasks supporting was streamlined.

Image analysis and display

Image fitting

Two dimensional Gaussian fits are used in astronomy for accurate measurements of source parameters such as central position, peak flux density and angular size. In many cases the estimation of the errors is as important as the values of the parameters. The main drawback in the error handling in both `JMFIT` and `IMFIT` was that both tasks only used one set of expressions for the errors for all ratios of the sizes of the fitted component and the beam size. Instead, different formulae, depending on the beam size relative to the fitted component size, should have been used. The theory is presented in *AIPS* Memo #92, *Errors in two dimensional Gaussian fits*, by L. Kogan. The ideas discussed in this memo were implemented into `JMFIT`. The old version of `JMFIT` was confusing as it provided two sets of errors based on the rms obtained from the residual map and from the data itself. Only one set of errors based on the rms obtained from the data itself has been retained. A new adverb has been added to allow the user to force a pre-determined rms of samples to be used in the error calculations. These changes make `JMFIT` the task of choice; `IMFIT` is not strongly recommended. There are plans to implement a similar treatment of errors in `SAD`.

Miscellaneous analysis and display improvements

`TVRGB` For `DOOUT 1.5`, fully blanked pixels are converted from black to white (transparent).

`LWPLA` Added 11×17 paper and user-dimension paper to the output options.

`PRTTP` A formatting error, causing the reference pixel number to be multiplied by 10, was corrected.

`SAD` Changed `SAD` to use `GAUSPS` to avoid precision problems in converting VLBI-scale component sizes to angular sizes and to consolidate code with the improvements in `IMFIT/JMFIT`. `SAD` was suffering from the same problems that were fixed in `IMFIT/JMFIT`: milli-arcsecond-scale components tended to be set to zero width.

`STALIN` This verb, useful for erasing parts of a data set's history file, has now been modified to handle much larger `HI` files than before.

VLBI-related developments

Although most AIPS tasks are dual-purpose and many of the developments listed above are applicable to VLBI and VLA data, we list some enhancements here that are more specific to VLBI users.

Data Loading — FITLD

FITLD has been upgraded in this release to deal with new correlator developments and to add new user functionality. This includes the ability: i) to select on IF using new adverbs BIF and EIF; ii) to deal with data from multiple subarrays; and iii) to write data with baseline-dependent integration times.

The VLBA correlator can now process data in multiple subarrays but cannot label the subarrays at correlation time. If FITLD detects a subarray condition the user is informed and the data will be written without an NX or CL table. Further processing of the data is discussed under the paragraph concerning USUBA below. The correlator can now handle baseline-dependent integration times, as part of a recent upgrade in support of Space VLBI. These data will have a sort order of '**' due to the multiple dump rates from the individual baselines. Further software development within AIPS will address this problem in future releases. FITLD also now allows the user to control whether the large VT table, containing tape statistics, will be copied to the output file.

As part of the new support for baseline-dependent integration times, the amplitude scaling of data within FITLD *and the VLBA correlator has changed. VLBA users whose data are correlated after mid-November 1996 will need to obtain the* 15OCT96 *AIPS release, containing the new release of* FITLD, *for full compatibility. If data correlated after this date are loaded with earlier versions of* FITLD *the global scaling of the final maps will need correction.* This will be fully described in a forthcoming AIPS memorandum, but further information may be obtained from Phil Diamond (pdiamond@nrao.edu) or Athol Kemball (akemball@nrao.edu).

Support for VLBA subarrays - USUBA

As discussed above, the VLBA correlator now supports multiple subarrays. Immediately after loading the data using FITLD, subarray identification and labeling needs to be performed using task USUBA. This task has been substantially re-written to support this development in the VLBA correlator and can be operated in three modes: i) automatic subarray identification; in this case an algorithm is used which minimizes the total number of subarrays and maximizes subarray continuity; ii) multiple subarray definition in an external text file under full user control; and iii) selection of an individual subarray through the input adverbs. These options allow flexible subarray assignment under user control. For further information please contact Athol Kemball (akemball@nrao.edu).

Baseline-based fringe-fitting

Several enhancements have been made to baseline-based fringe fitting within AIPS as currently implemented in tasks, BLING and BLAPP. These tasks were primarily developed for Space VLBI but have general VLBI application.

It is now possible in BLING to divide a model into the uv-data before fringe-fitting. In addition, the Cotton-Schwab baseline-stacking algorithm has been implemented to add in data from indirect baselines for greater sensitivity. The handling of off-center windows has been changed to allow greater padding in the FFT's and removes the need for non-linear least square fitting to refine the fringe solutions. The speed-up settings available to the user now restrict the FFT padding in the delay and rate solutions separately.

Interpolation of unevenly spaced data in BLAPP has been improved, and uses the fringe acceleration term, if available. The interpolated solution can be passed back to BLING for use in subsequent fringe-fit iterations. Several enhancements to the robustness of BLING and BLAPP have also been made.

A new task BSPRT allows printing of the baseline-based fringe solution BS tables produced by BLING. For further information on baseline-based fringe-fitting please contact Chris Flatters (cflatter@nrao.edu).

Ground-phasing for Space VLBI fringe-fitting

A new task has been developed to separately phase up the ground radio telescopes in an orbiting VLBI experiment to produce a single synthesized baseline between the ground array and the orbiting antenna. This task, `GPHAS`, allows data selection, calibration and model division and is expected to play an important role in fringe-fitting Space VLBI data. The synthesized baseline can be fringe-fit using conventional tasks such as `FRING` and `BLING`, but this technique is expected to lead to a significant improvement in sensitivity. The baseline is written as a normal *AIPS* uv-file and can be edited and examined using standard *AIPS* tasks. For further details please contact Ketan Desai (`kdesai@nrao.edu`).

Data display - `VPLOT` and `CLPLT`

Several library routines have been developed to compute (u, v, w) coordinates for an orbiting antenna defined by a set of standard Keplerian elements, and to calculate model visibilities accordingly. These routines have been implemented within `VPLOT` and `CLPLT` to plot continuous model information across intervals for which there is no correlated data. These two tasks have also been upgraded to plot combined models from multiple image fields, as is required in gravitational lens imaging and have also been upgraded to improve subarray selection, as required by recent developments in the VLBA correlator.

Pulse calibration - `PCCOR`

The algorithm in `PCCOR` has been enhanced to better resolve the $2\pi n$ ambiguity for IF channels that are non-contiguous in frequency. Support for multiple subarrays has also been added, and a new feature allows the cable delay to be switched off, which is useful in geodesy applications.

Coherence time estimation - `COHER`

A new task `COHER` has been implemented which measures the coherence time of uv-data. The coherence time is estimated for each interval by comparing the ratio of successive vector and scalar averages as a function of increasing integration time. The loss factor or cutoff can be defined by the user. The task allows uv-data selection and provides various output formats for the measured coherence properties. This task is useful in VLBI fringe-fitting in general but was written primarily with Space VLBI data in mind.

Data simulation and software testing

Two new tasks, `DTSIM` and `DTCHK`, have been implemented in this release, but are the subject of on-going development. The task `DTSIM` generates fake uv-data for the dual purpose of testing the correctness of *AIPS* software, and the investigation of the performance of reduction algorithms for data over a range of signal to noise ratios. The task generates pre-fringe-fitting errors in a variety of forms, adds noise under user control and computes (u,v,w) coordinates to allow imaging tests. It is currently used in the testing of Space VLBI reduction software and as part of a complementary test suite for general VLBI tasks commonly used within *AIPS*. For further information please contact A. Kemball (`akemball@nrao.edu`) or K. Desai (`kdesai@nrao.edu`).

Contributed polarization calibration software

The feed calibration task `LPCAL` has been enhanced by Kari Leppänen (JIVE) to allow the use of a linearly-unpolarized feed calibrator. No input model need be specified using `IN2NAME` in this case. The run file `CRSFRING` has also been implemented which determines cross-polarized delay and phase offsets. This procedure uses task `BLAVG` and is thus distinct from `CROSSPOL`, although their overall purpose is the same.

Changes to MK3IN

MK3IN has been updated to include changes in the fractional bit-shift correction (FBS), as supplied by Kari Leppänen (JIVE). Amplitude FBS corrections are required for high dynamic range imaging as revealed by recent imaging tests using the EVN. It was also found that the band center for the existing FBS phase correction was in error by one half of a frequency channel; this has also been corrected. MK3IN will also ignore LO offsets, under user control, but no corrections are currently applied for this effect.

Documentation, on-line help, and user support

Designated AIP program

We reinstated a modified form of the designated AIP program. *AIPS* user support can now be obtained by the following methods:

1. E-mail to aipsmail@nrao.edu. This account is checked several times a day, and messages are forwarded within the AIPS group as appropriate.

2. Submit a gripe. This is usually done from within AIPS. Newer versions of *AIPS* (15JAN96 and later) will automatically send an e-mail message to NRAO. The gripe system should be used for less urgent matters, such as suggestions for improvement.

3. Contact the AIPS group member currently designated to provide user support. This listing is available on the WWW via

http://www.cv.nrao.edu/aips/d_aip.html

The "designated AIP" program now covers general AIPS user support, including VLBI. Users may wish to contact individual members of the AIPS group directly if their question is of a specialized nature, and they know who in the AIPS group is the specialist in that area.

AIPS access to HTML help

The experimental pseudoverb XHELP was added to *AIPS*. XHELP is intended to provide direct access to HTML versions of cookbook-level help. XHELP FOO will look for a file named FOO.html in area AIPSHTML and automatically loads it into a browser (only Netscape is supported at the moment) which will be started if not already running. If FOO.html does not exist then *AIPS* will check for FOO.HLP in HLPFIL and load it into the browser as plain text. If the .HLP file doesn't exist then a default index page (INDEX.html from AIPSHTML) will be loaded.

Improvements Primarily for Programmers in 15JAN96

Changes affecting *AIPS* Managers

Programming considerations

Memory usage

A number of arrays in *AIPS* were still dimensioned as the product of MAXCHA (maximum number of channels) and MAXIF (maximum number of IFs), rather than the maximum product of these parameters as defined by MAXCIF. This was corrected throughout the bandpass system, and in many other tasks. Important common blocks in DSEL.INC have also been affected by these changes, which are part of a general initiative to reduce memory usage. The buffer requirements for TABIO have been reduced by reading long table records directly. Note that this has led to changes in the calling sequences of several subroutines including TABINI, TABSRT, TABMRG, GETCOL and PUTCOL, including others. There have also been changes in the calling sequence to several Z-routines, including ZDCHIN, ZCREAT, ZEXIST, ZCMPRS. Other subroutines affected include UCMPRS, CQMAKE, DSMEAR and MAKTAB, amongst others. Local tasks developed with libraries from earlier releases will be to be updated accordingly.

New Z-routines to allow dynamic memory allocation have been implemented (ZMEMRY and ZMEMR2).

OOP routines and compressed data

The OOP package was modified to write compressed data. If a *UV* file is created by calling OUCREA then that file will be compressed if ISCOMP is true in the corresponding UVDESC object (OUCREA is usually called indirectly through OUVOPN). OUVOPN now detects when a file to be written is compressed and records the location of the WEIGHT and SCALE parameters (in UVWSPT) for use by UVWRIT. OUVCLO will also check on this information and make sure that the header is correct for compressed or uncompressed data to protect against destructive changes to the UVDESC object.

OUVCLN now checks for a virtual DOUVCOMP keyword attached to the input UVDATA object and compresses the output file if this exists and has the value .TRUE.. OUVSCR (in UVDATA.FOR), UV2SCR (UVUTIL.FOR) and CP2SCR (UVUTIL.FOR) now take an extra argument that indicates whether scratch data should be compressed. Calls to the scratch file routines have been updated in QUVUTIL.FOR and tasks MAPBM, FRCAL and SCMAP.

UVDSCP (in UVDESC.FOR) now regards random parameter names as size related and refuses to copy them. Note, however, that UVDCOP copies the input file's compression state to the output file.

A new UVDATA routine, OUVPAK, is responsible for adjusting the descriptive information for uv data to reflect compression (*i.e.*, changing NAXIS(1) and adding or removing the WEIGHT and SCALE parameters). This is principally used internally by UVDATA but may be called by client programs (an obvious use is to patch up descriptive information for a compressed file to reflect uncompressed data: see UV2MS for an example).

Task FIXWT will now write compressed scratch files if DOUVCOMP is true and task UV2MS will now append data to compressed multi-source files and will create new multi-source files in compressed format if DOUVCOMP is true. Tasks MULIF and SPECR will now write compressed data if their input data was compressed: strictly speaking, this is incorrect behavior since it is not conditioned on DOUVCOMP but has not been fixed yet since there are no adverse effects from this.

Tape handling

A problem that was preventing Solaris 2.5/SunOS 5.5 systems from using magnetic tapes (of any kind: exabyte, DAT, or 9-track) was solved. If the tape unit is opened with the non-blocking I/O bit set, the SCSI driver refuses to write EOF marks. Everything seems to work if the open() statements are done without the O_NONBLOCK attribute (though DATs under 5.4 have not been tested; exabytes seem fine with this fix under 5.4 or 5.5, as do DATs and 9-tracks under 5.5).

Exabytes do not yet work under Linux, but a remote Exabyte on another architecture can be used normally. Work to fix this problem is in progress. DAT drives appear to work fine under Linux.

AIPS errors using NFS version 3

Some *AIPS* errors have recently been reported using NFS v.3 on AIPS NFS data servers running SunOS 5.5 (Solaris 2.5). The form of the error is that tables attached to *AIPS* files on NFS-mounted data areas are not always sorted correctly. This affects tasks such as CLCAL and TASRT, although no explicit *AIPS* error is triggered and no error message is reported. In this case CLCAL will produce an incomplete and missorted calibration table which will result in missing data. This problem does not affect locally mounted disks. The problem was investigated in consultation with the site where it occurred and was found to be corrected by installing SunOS 5.5 (Solaris 2.5) patch 103226-07, which fixes several NFS errors. The problem was introduced by an earlier version of the same patch, which explains why sites that did not have the patch installed at all did not see the problem. Users are advised to be aware of this potential problem, and to install the necessary Sun patch if this problem is present on their system. The error is repeatable and can easily be verified by testing CL table sorting using task TASRT. In conducting this test the CL table needs to be located on the NFS-mounted disk and adverb `BADDISK` should be set such that all scratch files are written to the NFS disk also. For further information please contact A. Kemball (NRAO-Socorro) at `akemball@nrao.edu`.

AIPS Publications and the World-Wide Web

The *World-Wide Web* (WWW) is a method for sending and receiving hypertext over the Internet network and has been made easy to use by clients such as *NCSA Mosaic, Netscape, Arena,* and *Lynx*. NRAO is among the many institutions which now offer informative Web pages and networks of additional information. The NRAO "home" page is at the Universal Resource Locator (URL) address

`http://www.nrao.edu/`

The *AIPS* group home page may be found from the NRAO home page or addressed directly at URL

`http://www.cv.nrao.edu/aips/`

This page points at basic information, news items about *AIPS*, the PostScript text of recent *AIPSLetter*s, patch information for all releases after `15JAN91`, the latest *AIPS* benchmark data from various computer systems, copies of `CHANGE.DOC` for every release since `15JAN90`, *all* relevant *AIPS* Memos, *every* chapter of the *CookBook*, and all recent quarterly reports to the NSF. There is even a tool to let you browse the `15OCT96` versions of all help/explain files. We recommend that you check this URL occasionally since it changes when new software patches, revised *CookBook* chapters, and new *AIPS* Memos are released.

There is one new *AIPS* Memo with this release:

Memo	Date	Title and author
92	96/09/30	Errors in two-dimensional Gaussian Fits L. Kogan, NRAO

These memos are available through the WWW pages. Since some Memos are not available electronically and others do not yet have computer readable figures, you may wish to write for a paper copy of these. To do so, use an *AIPS* order form or e-mail your request to `aipsmail@nrao.edu`. If you cannot use the Web, you can still use `ftp` to retrieve the Memos, *CookBook* chapters, etc.:

1. `ftp aips.nrao.edu` (currently on `192.33.115.103`)
2. Login under user name anonymous and use your e-mail address as a password (*yourname*`@` will do; ftp will fill in the machine you are using).
3. `cd pub/aips/TEXT/PUBL`
4. `get AAAREADME` and read it for lots more information.
5. `get AIPSMEMO.LIST` for a full list of *AIPS* Memos.

Patch Distribution

As before, important bug fixes and selected improvements in `15OCT96` can be downloaded via the Web at:

`http://www.cv.nrao.edu/aips/15OCT96/patches.html`

Alternatively one can use *anonymous* `ftp` on the NRAO cpu `aips.nrao.edu` (currently located on `baboon` which is `192.33.115.103`). Documentation about patches to a release is placed in the anonymous-ftp area `pub/aips/`*release-name* and the code is placed in suitable subdirectories below this. Information on patches and how to fetch and apply them is also available through the World-Wide Web pages for *AIPS*. As bugs in `15OCT96` are found, the patches will be placed in the `ftp`/Web area for `15OCT96`. No matter when you receive your `15OCT96` "tape," you must fetch and install these patches if you require them.

Obtaining *AIPS* under the GNU General Public License

We have decided to make *AIPS* available via anonymous ftp under the GNU General Public License, the meaning of which was spelled out in the `15JUL95` *AIPSLetter*. The installation of *AIPS* will now proceed something like the following example:

We assume that you have created an account for *AIPS* with a root directory called `/AIPS`. Then do

```
home_prompt<601> cd /AIPS
home_prompt<602> ftp aips.nrao.edu
Connected to baboon.cv.nrao.edu.
220 baboon FTP server (Version wu-2.4(1) Fri Apr 15 12:08:14 EDT 1994) ready.
Name (aips.nrao.cv:johndoe): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password: johndoe@nrao.edu
230- This is the National Radio Astronomy Observatory ftp server for the
230- AIPS, AIPS++, and FIRST projects.  Your access from primate.cv.nrao.edu
230- has been logged, and all file transfers will be recorded.  If you do not
230- like this, type "quit" now.  Counting you there are 1 (max 20) ftp users.
230-
230- Current time in Charlottesville, Virginia is Mon Jan 18 10:18:46 1996.
230-
230-
230-Please read the file README
230-  it was last modified on Wed Mar  8 14:01:24 1995 - 316 days ago
230 Guest login ok, access restrictions apply.
ftp> cd aips/15OCT96
250 CWD command successful.
ftp> get README
200 PORT command successful.
150 Opening ASCII mode data connection for README (nnnn bytes).
226 Transfer complete.
local: README remote: README
nnnn bytes received in T seconds (5 Kbytes/s)
ftp> get INSTALL.PS
200 PORT command successful.
150 Opening ASCII mode data connection for INSTALL.PS (mmmmm bytes).
226 Transfer complete.
local: INSTALL.PS remote: INSTALL.PS
mmmmm bytes received in TT seconds (5 Kbytes/s)
ftp> binary
200 Type set to I.
ftp> hash
Hash mark printing on (8192 bytes/hash mark).
ftp> get 15OCT96.tar.gz
200 PORT command successful.
150 Opening ASCII mode data connection for 15OCT96.tar.gz ( bytes).
226 Transfer complete.
local: 15OCT96.tar.gz remote: 15OCT96.tar.gz
mmmmm bytes received in TTTTT seconds (5 Kbytes/s)
ftp> quit
221 Goodbye.
```

You should type in your full e-mail address (not `johndoe@nrao.edu`) at the password prompt. The `hash` command is optional and may be inappropriate in some versions of ftp; it does give a useful indication of progress in the long `get` in most versions. If you do not have the GNU file compression code (`gzip`), you should `get 15OCT96.tar`. Out ftp server will uncompress the gzipped file automatically. (It would be around 3 times faster if you had `gzip`.)

At this point you should read the README file to review the latest changes, if any, affecting your installation of *AIPS*. You should print out the INSTALL.PS PostScript document and read at least its overview section. To create the rest of the /AIPS directory tree, and fill it with the *AIPS* source code

```
cd /AIPS
zcat 15OCT96.tar.gz | tar xvf -
```

or

```
tar xvf 15OCT96.tar
```

depending on whether you fetched the source file with compression or without.

If you want to get the binary version(s) of *AIPS*, you should read the README file for further directions. They will tell you about a procedure to run from the INSTEP1 installation procedure and/or at a later time which will initiate a second ftp session to fetch the appropriate contents from the $LOAD, $LIBR, MEMORY, BIN, and DA00 areas. You may run this procedure more than once if you need to fetch binaries for more than one architecture. You may also have to run portions of this procedure "by hand" if you encounter reliability problems with the network.

You will then have to run the INSTEP1 procedure, as usual, to tell your *AIPS* about your computer environment. A new part of INSTEP1 is its offer to assist you in "registering" your copy of *AIPS*. It will help you complete a registration form and will even e-mail it to us if you want. When we get a registration request, we will enter your information in our user data base and reply with instructions and registration numeric "keys" which you may use to complete the registration process (using SETPAR and SETSP). This may seem cumbersome and onerous, but we have two reasons for doing this. The first reason is to provide us with information about the use of *AIPS*. This information is useful to us to justify, to management and funding agencies, our existence and our need for more employees or computers or disk or whatever. The second reason is a concern about excessive demands on our employees' limited time to provide assistance to sites in installing and running the software. If an excessive demand should arise, information from the registration process will allow us to set priorities among the different sites. This registration is entirely optional. We will use transaction logging in ftp and, hence, know which sites have fetched the code. We will assume that sites which do not register are not "serious" in their use of *AIPS* and we will be unable to provide any assistance to unregistered sites (except, of course, to help them register). This means that unregistered sites will receive no assistance in installing *AIPS* and users at those sites will receive no assistance in using *AIPS*, including no printed literature. All serious sites are strongly encouraged to register since registration statistics are used to determine the level of effort that NRAO can provide for the Classic *AIPS* project. The statistics are also used to obtain assistance from computer vendors.

As of the 15JUL95 release, *AIPS* is available under the GNU General Public License. The short statement of this license is in every *AIPS* file, is available on-line via HELP GNU, and was given (once) in the 15JUL95 *AIPSLetter*. You should have received the GNU General Public License from several sources, most notably GNU themselves with their emacs, gcc, and numerous other software products. Since *AIPS* now applies that license to itself — and intends to import and use other GNU-licensed routines — we also include the full license text on-line via EXPLAIN GNU and, once, in the 15JUL95 *AIPSLetter*.

CookBook Update Continues

The previous release of *AIPS* saw an extensive rewrite of the *CookBook*. In the current release, a few further modifications were made, including the addition of a short section on polarization VLBI calibration.

AIPS Order Form for* 15OCT96 *(Unix, "tar" format)

Now licensed under the GNU GPL; not the old user agreement

AIPS is available via anonymous ftp to aips.nrao.edu (192.33.115.103)

1. Name and address of Contact Person: ______________________
☐ Check here if address on back is ok. ______________________
(Include street address for UPS delivery) ______________________

I ☐ want ☐ do not want to receive paper copies of the Aipsletter

2. ☐ New order ☐ ReOrder Do you have an old User Agreement? ☐ Yes ☐ No

Have you registered previously? ☐ Yes ☐ No

(Registration is free to educational/research sites and is required *on every release* if you want support from NRAO)

3. Tape "media" desired: .... ☐ Exabyte (5GB) ☐ Exabyte (2.2G) ☐ 4mm DDS DAT
☐ QIC 150 (150MB) ☐ 9-track 6250 bpi
☐ Floppy disks (15, dos filesystem, unix tar.gz file split)

We reserve the right to institute a media charge at any time

☐ Check here for BINARY TAPE (load and go), exabyte or DAT only, and indicate OS/hardware
☐ Sparc/Solaris 2.5 (SC4) ☐ Sparc/SunOS 4.1.2 (SC2.0.1) ☐ IBM RS6000/AIX 3.2
☐ Linux 2.0 (ELF format) ☐ Silicon Graphics IRIX 5.3
☐ Dec Alpha/OSF-1 3.2 ☐ HP 9000/7xx HP/UX (not yet available)

4. Computer(s) make, model and OS version: ______________________
Include hardware/software/quantity info, e.g. ______________________
Sun 4/SunOS 5.4/3, Intel 486DX2/66 Linux 1.2.8/5, etc. ______________________

5. DDT test package (15JAN94 version): .... ☐ (includes small, medium, and large tests;
(FITS tape) NOTE: Also available via ftp on aips.nrao.edu in **`/pub/aips/DDT/15JAN94/*`**

6. VLA Continuum (VLAC) test tape:............... ☐ VLAL (Line) test tape............................ ☐

7. Printed Documents Requested: .... ☐ AIPS Cookbook (`http://www.cv.nrao.edu/aips/cook.html`)
☐ AIPS Memos: ____________ Going AIPS (15APR90) ☐ Vol 1 ☐ Vol 2
(See separate list at `ftp://aips.nrao.edu/pub/aips/TEXT/PUBL/AIPSMEMO.LIST`)

8. Custom 3-ring binders .... Cookbook ☐
Registration required if you order binders Going AIPS ☐ Vol 1 ☐ Vol 2

Send this order form (or an electronic equivalent) to:

AIPS Group
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, VA 22903-2475
USA

Network Addresses
Internet: aipsmail@nrao.edu
UUCP: ...uunet!nrao.edu!aipsmail
Web: http://www.cv.nrao.edu/aips/
Anonymous ftp: aips.nrao.edu/pub/aips/