AIPSLETTER

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A newsletter for users of the NRAO
Astronomical Image Processing System

Written by a cast of *AIPS*

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This is Your Last *AIPSLetter* Unless ...

The publication of the *AIPSLetter* in paper form has become quite expensive due to the steady growth in the mailing list. The last edition was mailed to 103 people in NRAO, 455 others in the United States, and 286 in foreign countries, a total of 844. The cost of printing and mailing is well justified if the recipients actually read it, but is a waste of trees otherwise. Therefore, if you wish to to receive a paper copy of the next (and later) *AIPSLetter*s, you must notify us of this desire. Use e-mail or snail mail to the addresses in the masthead; the order form at the end of this *AIPSLetter* also has a place to indicate your wish to remain on the mailing list. Note that the *AIPSLetter* is made available via the World-Wide Web before it appears in paper form.

The Good News ...

Ketan Desai has accepted a position in the Classic *AIPS* group. He will soon move to Charlottesville and will concentrate on applying *AIPS* to Space VLBI.

The next release of *AIPS* will be `15OCT96`, a shift in the schedule to make releases more convenient for us.

The `15JAN96` release is the second release under a new system designed to protect NRAO's intellectual property rights, while making *AIPS* more readily available to both the astronomy and non-astronomy communities. All files are now copyrighted by Associated Universities, Inc., NRAO's parent corporation, but are made freely available under the GNU General Public License (GPL). This means that User Agreements are no longer required, that you may obtain copies via anonymous ftp without contacting Ernie Allen, and that you may redistribute (and/or modify) the software, under certain restrictions, if you so choose. You may *not* sell this software; it remains free to everyone. Details on this new way to get *AIPS* appear later in this *AIPSLetter*.

The `15JAN96` release of Classic *AIPS* is now available. It may be obtained via *anonymous* ftp or by contacting Ernie Allen at any of the addresses given in the masthead. 281 copies of the `15JUL95` release were given out electronically (156 source only and 74 binary over 8 operating systems) or on magnetic tape (25 8mm, 25 4mm, 1 QIC, and *no* 9-track). 122 of the 258 were of the full binary release. Of the 206 non-NRAO sites, 75 have registered with NRAO to help us and to receive assistance with `15JUL95` if needed. They (and some unregistered sites that used order forms) have indicated their plans to run *AIPS* on 174 SUN OS 4, 168 SUN Solaris, 48 PC Linux, 39 DEC Alpha, 27 HP-UX, 21 SGI Irix, 13 IBM AIX, 4 DEC Ultrix, 2 PC LinuxElf, 2 SUN OS 3, and 1 Convex computers. A total of 499, which would have been larger if all sites actually using *AIPS* had registered.

... and the Bad

The use of Sun OS 4.1.*x* is being phased out at the NRAO in favor of the Solaris operating system, currently at Solaris 2.4 (also called SunOS 5.4). This means that the `15JUL95` version was the last to be tested extensively under the old Sun Berkeley-based operating system. We will keep one or more computers on the old system as long as we can and we do not anticipate major problems anytime soon, but it is inevitable that the quality of our support for the old OS will diminish with time.

Improvements for Users in 15JAN96

Using *AIPS*

GNU readline

One of the benefits of using the GNU General Public License on *AIPS* is that we are free to include and use other GNU-licensed packages. The first of these is the GNU `readline` library which provides the user-input interface for `AIPS` under Unix beginning with the `15JAN96` release. The GNU readline library will be shipped and built with *AIPS*. It gives the user the ability to use the cursor-arrow keys, as well as various "control" and "escape" key sequences, to recall previously-entered commands, to edit the current command line (without having to back-space and re-type the entire line), to search the command history for previously-executed commands, to define customized key bindings for executing commands and macros, and much more. The full information may be obtained with the command `man readline` from the system command line (not inside `AIPS`). (`$SYSUNIX` must be in your `$MANPATH` for this to work.) There is even "tab completion" based on the list of *AIPS* help files and on context. At any point, when typing a symbol, you may hit the `TAB` key. The symbol name will be completed if it is unique or the screen will flash (or the bell sound) if it is not. A second hit on the `TAB` key will produce a list of the possible completions. Since a task name cannot be the first symbol on a line, tasks are included in the possible completions only after some other symbol appears on the line.

The default key bindings should be very familiar to users of `emacs` and/or the bash shell; many of them should also be recognizable to users of the Korn and tcsh shells. Hard-core `vi` users can put `AIPS` into "`vi`-mode" and use `vi`-like key bindings instead. (The basic `emacs`-like key bindings are outlined in Chapter 2 of the *CookBook*.) Your command-line history is automatically saved between sessions, unique to both the user number and the "*AIPS* number" of the session, and then recovered at the next `AIPS` startup.

Guest image catalogs

One of the more powerful aspects of *AIPS* is the ability to compute on one or more compute servers, but still get one's displays (messages, graphics, TV) on the X-Windows display of the computer at which the user is sitting. Previously, this capability was available only to users within a local area network and only between computers of a similar architecture, *i.e.*, only if the computers are at the same *AIPS* "site." (In Charlottesville, for example, we have two such sites, one for big-endian (newtwork byte order) machines like Suns and IBMs and the other for little-endian machines like PCs and DEC Alphas.) For `15JAN96` we have added the capability of assigning "guest" image catalogs on compute servers to *AIPS* computers not at the same site. The assignment is only for the duration of the `AIPS` session and can be a bit confusing. When all computers which display on the user's workstation are within the same "site," there is a single image catalog file for that workstation and all computers are aware of the state of the display. A guest image catalog is a different file on the server which means that the local machine and the server will have different ideas about the state of the display. So long as only one computer at a time uses the display, everything will behave as usual. This slight complexity is more than justified by the ability to do your normal displays from a compute server of another architecture or a remote site. Previously, a remote user had to run `XAS` and friends on the server with the `DISPLAY` set to his/her remote machine. This prevented anyone else, including the person at the console, from using *AIPS*' displays on the server.

Remote gripes

The *AIPS* Gripe System has fallen into disuse in part because the mechanism of harvesting the gripes and forwarding them to the programmers collapsed. In an attempt to improve matters and to allow non-NRAO sites to participate in the Gripe System, the `GRIPE` and `GRDROP` verbs were changed to e-mail copies of the gripe to a number of system and individual addresses. We hope that this will allow serious problems to be addressed immediately and to restore some responsiveness to the whole System. Non-NRAO sites never forwarded the `GRIPE` entries to us and our gripe harvesting only included NRAO computers. With e-mail, our non-NRAO users may also complain.

Other *POPS* enhancements

The `COMPRESS` pseudoverb has (finally) been written for the *AIPS* version of *POPS*. It saves all user procedures and adverb values, loads in an up-to-date "virgin" *POPS* vocabulary, and then recompiles all of the saved procedures and adverb values. It is surprisingly fast and removes the need for the `NEWPARMS RUN` file. To assist in converting user numbers between decimal and the extended hexadecimal (base 36) used in *AIPS*, two new verbs `EHEX` and `REHEX` were written. They do the same things as the command-line procedures of the same names. Finally, the first batch queue is now allowed to run any task.

CookBook

The *AIPS CookBook* was revised for this release. The most important change was the development of an Index capability which has been applied to all present chapters and which will be kept current as chapters are revised. A new chapter was written on processing single-dish data in *AIPS*. The old chapters on analysis, exiting, problem solving, advanced topics (*POPS*, remote use, programming) and file sizes were all revised and modernized. See the separate article in this *AIPSLetter* for details.

UV data processing

Polynomial bandpasses

A new task called `CPASS` has been written to fit polynomials to the bandpass calibration data. This takes advantage of the correlation between nearby channels in their calibration to produce solutions with better signal-to-noise ratios than are possible when each channel is treated separately (as in the task `BPASS`). Both `CPASS` and `BPASS` write their solutions into `BP` tables which are applied to the data by numerous tasks under control of the `DOBAND` and `BPVER` adverbs. The application software determines the type of bandpass from a keyword in the `BP` table header and does the right form of correction without intervention by the user. In addition to improvements in the signal-to-noise, the new form of bandpass solution is easier to correct for frequency shifts arising from antenna-based fringe rotation in the VLBA correlator. This is important for high-frequency VLBA data where such shifts may be more noticeable. This is the first release of `CPASS` and further improvements will be made as more experience is gained with this method of bandpass removal. This task complements `BPASS` and does not replace it.

Other new tasks

`FIXWT` is a new task that makes a copy of a data set with weights derived from estimates of the standard deviation of amplitudes in the data. The resulting weights should be a better approximation of the inverse variance weights than those given by most input sources.

`SNEDT` is a new task to do interactive editing of `SN` and `CL` tables in a style similar to that used by `IBLED`. Up to 5 antennas may be displayed at a time with the central one being edited. Data may be deleted or replaced with interpolated values by a variety of methods.

`OMFIT` is a new task submitted by Ketan Desai. It is similar to `UVFIT` with the following advantages: (1) it self-calibrates the *uv* data as it fits models; (2) it uses singular-value-decomposition to determine parameters better; (3) it employs Levenberg-Marquardt non-linear convergence methods; and (4) it will be able to solve for multiple self-calibration models (one for each model component). For further information contact Ketan at `kdesai@nrao.edu`.

Miscellaneous *uv* task improvements

VPLOT Enhanced to perform flagging on data outside of a user-specified range around the local mean, to plot this range, to do scalar as well as vector averaging, to plot real and imaginary parts of the visibilities after averaging, and to run significantly faster.

SPLIT Corrected "feature" which caused `SPLIT` to write multi-source output files when the source table had multiple qualifiers for the source.

UVCOP Changed the limit on the number of sources from 500 to 16384, added a test on overflow of that limit, and removed a low limit on the product of the number of channels and IFs. Changed to apply selection criteria while copying `PC` tables.

FQ selection Changed data selection so that an `FQ` table with only one entry is always selected. Previously, that single entry had to have `FQ` number one.

UVFIT Improved the estimate of parameters needed by the fitting routines. Previously, it sometimes did not converge or explore an adequate region of parameter space.

FILLM Increased the range allowed for Q band. Corrected the reading of time for data originally recorded before 1988, and to avoid writing multiple entries in the `CL` and `TY` tables for the same time.

MK3IN Raised buffer sizes to handle large problems and modified to allow AC lag functions starting at lag one rather than lag zero.

IBLED Improved to avoid plotting the data and moving the TV cursor unnecessarily.

Other VLBI-related programs

Data Loading — `FITLD`

Several enhancements have been made to `FITLD` in this release, including: (i) the ability to select data by frequency and/or bandwidth; (ii) the implementation of a correction for floating point saturation in the VLBA correlator; and (iii) improvements in the removal of total power FFT artifacts. Fine tuning of the FFT factors at the correlator has significantly reduced the artifacts and `FITLD` applies this correction only when necessary. Floating-point saturation has been shown to occur during autocorrelation accumulation at the correlator, affecting the overall scaling of self-spectra. The factor depends on the polarization mode at the correlator and `FITLD` now scales the autocorrelation spectra to remove this effect. The existing cross-correlation scale factor within `FITLD` has been adjusted by as it was previously based on autocorrelation data which had not been corrected for floating-point saturation.

Data editing —- `UVFLG`, `VPLOT`

Two enhancements have been made in this release to improve automated editing of uv-data within *AIPS*. The task `VPLOT` now allows clipping about a running mean in amplitude and writes the editing information to a flag table. `UVFLG` has also been upgraded to flag VLBI data below a specified elevation limit. This editing information is either appended to a flag table or applied to single source data files directly.

Polarization calibration — `POLSN`, `SPCAL`

New features have been added for VLBI polarization calibration. These include: (i) an upgrade of `POLSN` to allow multiple solutions for the R-L residual delay and phase offsets; and (ii) an upgrade of the spectral-line polarization calibration task `SPCAL` to allow for linearly-polarized spectral-line calibrators. The `POLSN` changes complete the new polarization calibration software contributed by Kari Lepannen and discussed in the previous *AIPSLetter*.

Miscellaneous imaging task improvements

IMAGR Corrected to make only a few scratch files, to apply taper when doing natural weight, to load the current spectral channel to the TV rather than channel 1, to read in circular windows correctly, and to use the maximum u baseline over all sub-arrays.

Clean Corrected errors related to Cleaning with the first field empty of components.

FRMAP Changed to work for the VLA system of coordinates as well as VLBI. Fringe-rate imaging has been found to be useful for VLA observations of methanol masers observed in the A configuration.

IM2UV Added options to shift the phase center, control the peak amplitude, set the central weight, and taper the weights.

CONVL Added an option to do a brute-force deconvolution of a Gaussian from an image.

FFT Corrected to do the FFT on all planes of the input. Previously it made an output cube, but filled only the first plane.

MCUBE Corrected error causing it to fail when it created a `SEQ.NUM` axis under Fortran 77.

UTESS Corrected errors causing it to fail under Solaris, to abort when `NOISE = 0`, to leave read status set, and to leave a history file empty.

Image analysis and display

Image fitting

`IMFIT` and `JMFIT` were changed to use the actual noise in the image together with theory from Condon to estimate the uncertainties in the fit parameters. The previous estimates are also given and are surprisingly similar despite their previous bad reputation. The computation of the actual noise, *i.e.*, the finding of the width of the histogram of intensities around the background level, can fail if the histogram used is too fine, too coarse, or centered around the wrong intensities. To allow the user to set the noise estimate, a new verb called `ACTNOISE` was created to place the noise estimate as a keyword in the image header. If that keyword is present (and positive), `IMFIT`, `JMFIT`, and `SAD` will use it rather than fitting for it.

Fitting tasks do the Gaussian fits in pixels and then must convert the results to appropriate celestial angles. `IMFIT` and `JMFIT` did not do this correctly before the current release and `SAD` got the deconvolved sizes and position angles wrong although it did a better job before deconvolution. Now full non-linear coordinate routines are used throughout to account for rotation, non-square pixels, and non-linearities in the projections of the sky.

Miscellaneous analysis and display improvements

PATGN Added option to make an image of a single-dish beam pattern with the VLA beam of `PBCOR` as the default.

IMMOD Corrected the units and scaling of brightness which were confusing at best.

PCNTR Corrected the display of polarization vectors and the Clean beam. Coordinate rotation, non-square pixels, and non-linear coordinate projections were not considered previously!

KNTR Improved the drawing of dashed contours, corrected the beam position angle, and changed the labeling to represent the third axis correctly even if it is not velocity.

TVRGB Added the option to write out a full color (24-bit) PostScript representation of the final display using a new adverb `RGBGAMMA` (set by the `GAMMASET` verb or by the user) to control the gamma correction.

TVCPS Added the option to make the background and blanked pixels white (transparent) rather than black (in non-inverted color displays).

COPIES Added the `COPIES` adverb to `LWPLA`, `TVCPS`, and `TVRGB` for direct printing on PostScript printers.

LWPLA Changed the representation of grey levels to a full 255 levels to provide better intensity resolution and to avoid bugs in some PostScript programs.

SL2PL Changed the setting of plot ranges to provide better control for the user, as is provided by other tasks.

XAS Corrected a bug which caused it to display nothing when it should have displayed graphics channels with no image channel.

Single-dish data in *AIPS*

With the writing of a new chapter for the *CookBook*, the area of single-dish data in *AIPS* received a considerable boost. The only new task for this release is called `SDMOD`. It adds Gaussian source components (spatially and, optionally, spectrally) to single-dish "*uv*" data sets with random noise while retaining or ignoring the actual observed data. The single-dish imaging task `SDGRD` was enhanced with the addition of circular convolving functions to the rectangular functions normally used in interferometry. The task `OTFUV`, which translates 12m on-the-fly spectral-line data into *AIPS*, was corrected to determine the number of data samples from the actual record size rather than its contents (which had a round-off problem) and to allow more scans in a single run. It was revised to run on little-endian (byte-swapped) computers (such as DEC Alphas and PCs) and to create and fill an `AN` (antenna) table.

Tasks which might be of use with single-dish data were tested systematically during the writing of the *CookBook* chapter. Most were found to need at least minor modifications. In particular, `INDXR` was changed to function without a source table, to write `CS` rather than `CL` tables for single-dish data, to use the `SCAN` random parameter if it is present in the data, and to allow the user to provide needed information when there is no `AN` table. `INDXR` had a significant bug which caused it to perform improperly if used with multiple sub-arrays. `CSCOR` was changed to allow the user to provide the antenna longitude and latitude when the `AN` file is missing. `POSSM` was changed to recognize single-dish data, calling it appropriate things, and to use an `AN` file if present. The format of `POSSM`'s output text file was improved and errors in the computation of the velocities and frequencies in that table were corrected. `DBCON` was altered to stop it from claiming to change single-dish phases; `UVPLT` was changed to call single-dish and autocorrelator data more sensible things; and `IBLED` was revised to average single-dish and autocorrelator data properly and to compute "decorrelations" for them.

Improvements Primarily for Programmers in 15JAN96

Changes affecting *AIPS* Managers

AIPS Managers are provided with a few more tools (read responsibilities) in the `15JAN96` version. The Manager file `$NETO/DADEVS.LIST` indicates which disks are attached to which host, providing a list of disk resources which may be attached to any `AIPS` session. Managers may now separate groups of computers on the local area net into different *AIPS* "sites," maintaining separate `DADEVS.LIST.$SITE` files. You may have to do this because the machines differ in architecture (*i.e.*, big- versus little-endian) or you may choose to do this for local management reasons. To allow computers in a particular "site" to be used as compute servers for other *AIPS* computers not in that site, you may create extra `ID` and `IC` (TV device and catalog) files for use by such "guests." The number of extra files you create determines the maximum number of simultaneous guests a site can entertain. A guest computer runs the display servers (`XAS`, `TEKSRV`, `MSGSRV`) itself rather than hogging the single copies of the servers which are allowed to run on the compute server. Without this guest capability, remote users of compute servers are forced either to do without interactive displays or to lock local users out of the displays.

A new Manager file `$NET0/TPHOSTS` has been created. It lists those computers allowed to connect to the `TPMON` tape (and pseudo-tape disk) servers. All others will be rejected. This closes a very serious breach of computer security. Computers may be listed individually in this file or with domain-level wildcarding (*e.g.*, `*.cv.nrao.edu` and `192.33.115.*`).

The `15JUL94` *AIPSLetter* contained a discussion of the current swap-space requirements for *AIPS*. These requirements are excessive due to coding practises which we expect to improve (see below). However, at present, the use of shared libraries raises the swap-space requirements of many tasks by 10 or 20 Mbytes over their requirements when statically linked. Therefore, the ability to use shared *AIPS* libraries has been removed.

Programming considerations

Object-based programming and TV menus

The *AIPS* object-based programming package received several improvements and the beginnings of a new class for this release. The new class is an edit class intended to provide interactive editing capabilities for tables and *uv* data. The table editing, for `SN` and `CL` tables anyway, was developed in the `QEDIUTIL` library and released in the task called `SNEDT`. Remaining developments were suspended. The table class was given a new public subroutine, `TABEXI`, to test for the existence of a table. The inputs class was given a new public subroutine, `AV2INT`, to start up interactive tasks. The TV device class was given new capabilities to (1) return visible-corner pixel numbers, (2) interact with TV cursor in the usual way with the calling routine to handle results, and (3) read and change (write) zoom parameters.

Bugs corrected in the OOP package included finding and using the frequency reference pixel in the *uv* utility library and saving the actual restoring beam parameters and Cleaned fluxes with each Clean image.

The handling of interactive menus on the TV was generalized. The basic menu manager (`TVMENU`) has a new call sequence, taking in a list of logicals to say whether the menu is left on after each choice and returning the selection as a string rather than as column and row numbers. `TVMENU` now also handles the real-time help in a string-based manner. The new `HLP*.HLP` format is a `C--------` line separating each section, with the case-sensitive string naming the section left justified in the next line. These changes make it much easier to change menus either for new options or even at run time depending on the user's data and specifications.

Common errors

GTPARM The number of adverb values for a task must be correct in the call to `GTPARM`. Too small a number causes some adverbs not to be set, while too large a number causes Solaris systems (at least) to unset fundamental disk I/O parameters.

Reals The format of single-precision floats (`REAL`s) and double-precision floats (`DOUBLE PRECISION`s) is not the same, even in the first 32 bits. In IEEE, used by most modern computers, the exponents have different numbers of bits. If a call to a subroutine uses the wrong kind of float, the best thing that can happen is an abort. On most machines, wrong answers are produced instead.

Scratch files *AIPS* can keep track of only a finite number of scratch files in any one task. `SCREAT` and the `DFIL.INC` include file were modified to know the limits and prevent overflows. Programmers should check for the pre-existence of a needed scratch file rather than blindly calling `SCREAT` on every iteration.

MAXCIF *AIPS* provides two basic parameters, `MAXCHA` and `MAXIF` to specify the maximum number of spectral channels and IFs supported. These are currently 4100 and 28, respectively. *AIPS* also provides a much-overlooked parameter, `MAXCIF`, to specify the maximum supported product of the numbers of channels and of IFs. The current value of this parameter is 8192, one-fourteenth the product of `MAXCHA` and `MAXIF`. This lower limit represents the limits in correlators which can have either a lot of IFs or a lot of channels, but not both. Many programmers have opted for code clarity and simplicity and used arrays dimensioned `(MAXCHA , MAXIF)`. Since this causes significant increases in the swap-space requirements and page-fault rates for many *AIPS* tasks, we will have to change the code to use a more complex, but enormously more parsimonious, addressing scheme.

Tables Programmers of generalized table routines should be aware that properly constructed tables may well have `MAXCIF` values in a row or even in a single column of a row. A number of table routines had to have their buffers increased to account for recent bandpass tables.

Miscellaneous matters

SYSTYP This four-character parameter in `DDCH.INC` has been changed to differentiate between computers rather than just between `UNIX` and `VMS`. The value is set in `ZDCHI2.FOR` of which there are 17 non-generic versions in *AIPS*. Values like `SUN`, `IBM`, `DEC`, `ULTR`, and `SOL` may now be tested in generic Z routines (only please) to avoid having multiple versions of nearly identical Z routines.

ZDIE This new Z routine is called by `DIETSK` and the abort handlers to delete the `/tmp/`*TASKn.pid* files created at task startup and used to test for task activity. Occasionally, a left-over one of these files caused problems when the *pid* matched some current process. `ZDIE` also deletes the guest image catalog lock file, if any, for programs named `AIPS`.

ZWHOMI This `AIPS` startup routine was changed to find the right number to assign to remote graphics rather than depending on the `SP` file to be right. It was also changed to assign guest image catalogs if needed and available.

ZPRMPT This prompted, interactive read routine was changed to enable all of the capabilities of GNU `readline`. New Z routines `ZGRLHI` and `ZGRLTC` were written to perform the operations. The chief difficulty was in masking and re-enabling different interrupts on different systems.

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 *AIPSLetters*, 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 are two new *AIPS* Memos with this release:

Memo	Date	Title and author
90	95/08/15	Delay decorrelation corrections for VLBA data within *AIPS* A. J. Kemball, NRAO
91	95/12/12	*AIPS* Benchmarks on the Sparc Ultra 1 and 2 Patrick P. Murphy, 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

Since *AIPS* is now released only semi-annually, we make selected, important bug fixes and improvements available via *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. (The patches and their documentation are also available on-line via the World-Wide Web.) Reports of significant bugs in `15JUL95` *AIPS* were not numerous, so some of the patches were actually for new or improved code rather than bug fixes. The documentation file `pub/aips/15JUL95/README.15JUL95` mentions the following items:

PCNTR Corrected the plotting of polarization lines and Clean beams to account for rotation, non-square pixels, and coordinate non-linearity. Also affected Clean beam plots in `KNTR`.

TVRGB Added a new option to write out the final display as a 24-bit color PostScript file.

OTFUV Corrected the computation of the number of data records to match that done on-line. Under some circumstances, the count could be off by one with nasty consequences. Also corrected the code to work on byte-swapped computers (*e.g.*, DEC Alphas, PCs).

SDGRD Corrected the gridding routines used for rather large images to support the new circular convolving functions.

TPMON Added code to require authentication before accepting a connection from some remote computer. Previously, any computer could use `TPMON`, a gross security hole.

XAS Corrected the `Makefile` for an error affecting Solaris systems only.

SYSETUP Corrected an error causing it not to copy a new `IC` (image catalog) file from the `TEMPLATE` area during system installation.

TEKSRV Removed an `ioctl` call which failed under OSF/1 on DEC Alpha AXP computers only.

Note that we do not revise the original release tapes or `tar` files for patches. No matter when you received your `15JUL95` "tape," you must fetch and install these patches if you require them. Information on patches and how to fetch and apply them is also available through the World-Wide Web pages for *AIPS*. As bugs in `15JAN96` are found, the patches will be placed in the `ftp`/Web area for `15JAN96`. No matter when you receive your `15JAN96` "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:egreisen): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password: egreisen@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/15JAN96
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 15JAN96.tar.gz
200 PORT command successful.
150 Opening ASCII mode data connection for 15JAN96.tar.gz ( bytes).
226 Transfer complete.
local: 15JAN96.tar.gz remote: 15JAN96.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 egreisen@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 15JAN96.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 15JAN96.tar.gz | tar xvf -
```
or
```
tar xvf 15JAN96.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

With the exception of the Glossary, the *AIPS CookBook* has been completely updated. We have done this one chapter at a time and have made each chapter available via the World-Wide Web as soon as it was ready. After the major rewrites, chapters have been revised in less major ways to account for other changes in the *CookBook* or in the latest *AIPS* releases. The WWW page on the *CookBook* contains a revision history for the chapters and, within the *CookBook*, the latest revision date for each chapter is given at the top of each page. This revision information is provided to encourage users to fetch and/or order only those chapters which they need and which have had significant revisions. For details of the Web, see the publications article in this *AIPSLetter*. The chapters are

- 1 — *Introduction* — Added new sections giving a project summary and a diagram of the structure of *AIPS*.
- 2 — *Starting Up AIPS* — Changed to describe workstation use, *AIPS* in networked environments, and managing the TV server XAS.
- 3 — *Basic AIPS Utilities* — Updated information about history files and disk allocation, added ABOUT and APROPOS to the help section, moved and updated tape mounting, and added a discussion on external disk files (FITS, text, ...).
- 4 — *Calibrating Interferometer Data* — With much help from Rick Perley and Alan Bridle, rearranged and corrected everything, adding a substantial discussion of when and how to edit and bringing the description of TVFLG up to date including a picture.
- 5 — *Making Images from Interferometer Data* — Rewrote old chapters 5 and 6 to describe the new IMAGR task rather than several old imaging tasks, to modernize the self-calibration description, and to replace the discussion of IBLED with one describing the current program.
- 6 — *Displaying Your Data* — Rewrote old chapters 7 and 8 to make a coherent, current, and complete description of printing, plotting, TV, and graphical data displays.
- 7 — *Analyzing Images* — Revised old chapter to mention new image fitting, filtering, and other image-modifying tasks.
- 8 — *Spectral-Line Software* — Rewrote old chapter 10, replacing old outline format with a more coherent (and wordy) description of line analysis, emphasizing continuum subtraction and other more modern imaging techniques.
- 9 — *Reducing VLBI Data in AIPS* — Rewrote the old chapter to describe the nearly completely new software now available for the VLBA. This chapter will remain under active development for some time.
- 10 — *Single-dish Data in AIPS* — Wrote a new chapter to describe the reading, editing, calibrating, imaging, and analyzing of single-dish data in *AIPS*.
- 11 — *Exiting from, and Solving Problems in, AIPS* — Combined two old chapters to describe Gripes, exiting with backups and deletions, and solutions for problems found on modern computer systems (rather than Vaxes and Convexes).
- 12 — *AIPS for the More Sophisticated User* — Modernized the chapter, reorganizing the description of *POPS*, including the list of *POPS* symbols (no longer in Chapter 13), and broadening the description of "remote" use of *AIPS*.
- 13 — *Current AIPS Software* — Replaced old lists with new ones produced for the ABOUT verb. Now current to the 15JAN96 version.
- A — *Summary of AIPS Continuum UV-data Calibration* — Inserted a new appendix giving an updated version of Glen Langston's outline of continuum calibration.
- B — *A Step-by-Step Guide to Spectral-Line Data Analysis in AIPS* — Inserted a new appendix by Andrea Cox and Daniel Puche giving *their* outline view of spectral-line data reduction in *AIPS*.
- Y — *File Sizes* — Modernized the discussion of file sizes and disk and magnetic-tape capacities.
- Z — *System-Dependent AIPS Tips* — Replaced with whole new discussions including color printers, screen copying, film recorders, workstation environments. A method for people to have NRAO make slides for them is described.
- I — *Index* — Created a new index chapter which is kept up to date with all other chapters.

AIPS Order Form for **15JAN96** ***(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 2.4 (SC3.0.1)	☐ Sparc/SunOS 4.1.2 (SC2.0.1)	☐ Silicon Graphics IRIX 5.2
☐ Linux 1.2.8/Intel (PC) (a.out)	☐ Linux (ELF format)	☐ IBM RS6000/AIX 3.2
☐ Dec Alpha/OSF-1 1.2	☐ Dec Alpha/OSF-1 3.2	☐ HP 9000/7xx HP/UX 9.01

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/