# AIPSLETTER

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A newsletter for users of the NRAO
*Astronomical Image Processing System*

Written by a cast of *AIPS*

Edited by

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## General developments in *AIPS*

### Current and future releases

The October 15, 1999 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. 15OCT99 is also available on CDrom as well as the more traditional tape media. *AIPS* is now copyright © 1995 through 1999 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*. A convenient order form is found from our Web page at http://www.cv.nrao.edu/aips. A paper order form and the ftp address appear on the last page of this *AIPSLetter*.

We do not intend to have any further formal releases. Instead, the next "release" of *AIPS* is called 31DEC99 and is already available via the Internet. We will continue to correct and improve *AIPS* in this "*AIPS* for the Ages" version indefinitely. You may fetch and install a complete copy of this version at any time. Having done so, you may update your installation whenever you want either as a whole or by running the so-called "midnight job" which uses transaction files to copy and compile the code selectively based on the code changes and compilations we have done. See articles later in this *AIPSLetter* for details of this change in procedure and for information on new tools to make such installations very much easier to do. Note that the midnight job allows your site to receive the latest improvements and bug fixes, at the cost of also receiving the latest bugs. The latter can and will be fixed as rapidly as possible when the programmers are notified of them at daip@nrao.edu.

### Highlights

The October 15, 1999 version contains only three new tasks and as many new pseudoverbs. Of these, the most significant is SETFC which prepares field description cards for input to IMAGR including outlier fields taken from a summary of strong sources in the NVSS, a copy of which is now provided with *AIPS*. IMAGR itself was changed to allow up to 512 fields, to allow very large shifts, to do the SDI Clean method optionally, and to filter away weak, isolated Clean components. CLIPM is a version of CLIP for multi-source files and EXTAB replaces TAPQL for preparing contents of *AIPS* tables for use in spread sheets and the like. Print routines, run interactively, can now adjust themselves to the width of the user's display window. Significant bugs related to FITAB, UVCOP, IMAGR, and CLIP were corrected and released as patches to 15APR99.

# Improvements of interest to users in 15OCT99

*The* 15APR98 *release introduced numerous changes which are not compatible with previous releases. Disk files written by previous versions are read transparently by* 15APR98 *and later releases (including* SAVE/GET *files), but users must not attempt to read disk files written by any of the modern versions with earlier versions.* 15APR98 *and later* AIPS *cannot start previous versions of tasks and the TV displays of the versions are incompatible. The TV displays of* 15OCT98 *and* 15APR98 *are also not fully compatible.* SAVE/GET *files for* 15OCT98 *and later releases cannot be read by* 15APR98 *and earlier releases;* 15OCT98 *and later releases will translate old* SAVE/GET *files when they encounter them. Releases prior to* 15OCT98 *are not fully Y2k compliant.*

## Imaging

### SETFC

The new task SETFC has been written to prepare field-descriptor cards for input to IMAGR in its BOXFILE option. The work on this task was begun by T. Joseph W. Lazio (NRL) and continued by Bryan Butler (NRAO) before being completed by the *AIPS* group. The task first prepares a list of fields to sample fully the center of the region toward which the array was pointed. Then, optionally, it searches the NVSS (21-cm NRAO VLA Sky Survey) catalog for strong sources near the pointing position and puts fields on them. Finally, if the Sun is near the pointing position, it puts a field on it. User adverbs control the size of the fields, the degree of overlap, and the definitions of "strong" and "near." The NVSS catalog is provided in a minimal form (only the coordinates and the flux) in text files supplied with the *AIPS* release. The full NVSS catalog and image data base may be accessed through http://www.cv.nrao.edu/~jcondon/nvss.html.

### IMAGR

The Steer-Dewdney-Ito (SDI) flavor of the Clean algorithm is designed to handle extended objects. At some stage in every deep Clean, the residual image will have had all small-diameter objects removed and will effectively contain only extended areas of emission. An option to switch from the familiar Clark-Cotton-Schwab Clean to the SDI Clean at this point has been added to IMAGR. It is triggered by a user parameter specifying how negligible the high-flux tail of the histogram of the residual must be to use SDI rather than BGC Clean. The task can actually switch back and forth between the two methods. Rather than taking a single component at the peak of the residual image, the SDI method takes components at all pixels in the residual image having flux above some current level. If the same gain is applied to all such components, the residual image after they are subtracted will have bright rims around each extended region since less flux is subtracted at the edges than is subtracted when all adjacent pixels have components. *AIPS* task SDCLN uses a rather expensive algorithm to adjust the gains of the components to try to avoid this problem. IMAGR's algorithm is much faster but less effective. Nonetheless, the SDI method does help avoid the corrugations which standard Cleans add to extended sources.

Clean has been found to remove flux from real sources and to place it instead in pixels selected by noise bumps and sidelobes. The task CCSEL was devised to eliminate weak, isolated Clean components from a CC file. An improved version of this algorithm has now been added to IMAGR. Clean components which have flux less than a user-specified amount within a user-specified radius are removed from the CC files before the Clean components are restored to the output images. The filtering action may also be selected from the TV menu during the Clean, when it will likely be more useful.

IMAGR and all tasks which accept image Clean components as models can now handle up to 512 fields. The various field-specifying adverbs (FLDSIZE, RASHIFT, BCOMP, etc.) retain the old dimension of 64. You must use the BOXFILE option to specify these adverbs to IMAGR. A new kind of card has been added to this option so that all of the BCOMPs may be specified. At the same time, the meaning of RASHIFT, DECSHIFT, and SHIFT was changed for IMAGR and many other tasks. These are no longer shifts in arc seconds in the -SIN projection. Instead they are "simple" shifts in the -GLS projection:

$$\texttt{RASHIFT} = (\alpha - \alpha_0) * \cos(\delta_0)$$

$$\texttt{DECSHIFT} = \delta - \delta_0$$

This new convention allows for the very large shifts required at low frequency to which the -SIN projection cannot be applied. (Users of large projections will of course set DO3DIMAG to true when using IMAGR.) All tasks were also corrected at this time to recognize the -NCP projection used by East-West interferometers and to do the correct phase shifts for this projection.

Lesser changes to IMAGR included:

- IMAGR now deletes its work file on exiting unless one of IN2NAME, IN2CLASS, or IN2SEQ are set. The work file is sometimes useful for finding bad data through excessive residuals seen in various *uv* printing and plotting tasks.
- The methods by which IMAGR selects the next field to Clean in OVERLAP 2 mode were improved and a bug that caused it to re-select fields that had just been done was corrected.
- A TV option to override IMAGR's selection of the next field to Clean was added. You may specify the next field and have it recomputed rather than having to force all fields to be recomputed. This option is available when the number of fields is $> 64$ or when the user specifies DOWAIT true before starting IMAGR.
- Two bugs in the data weighting routine were corrected. In one, microscopic differences in round off could cause it to seek incorrect rows and get into all sorts of trouble. In the other, the absence of data near $|u| \approx 0$ could cause memory addressing problems and incorrect results.

## Data display

**PLOTR** is a new task designed to read a text file containing plot labels and $x - y$ data and make an *AIPS*-standard plot file. Up to 5 different data types each with its own symbol may be plotted.

**DOCRT** was changed in all printing tasks and verbs to request the actual width of the terminal window so long as $0 <$ DOCRT $\leq 72$. Larger values of DOCRT are used without regard for the window width as before.

**FUNCTYPE** = 'SQ' for a square-root transfer function was added to all TV displays using this adverb. It is often a good compromise between linear and logarithmic transfer functions, showing both low and high levels.

**LWPLA** was changed to allow multiple plot files to be written in a single job to the printer or a saved output file. Plots may be added to the latter in later jobs. Such multi-page plot files are then not encapsulated and may have to be broken apart if you need to include them in a paper.

**SNPLT** was changed to plot dispersive delay. It was then substantially rewritten. It can now plot multiple polarizations and/or IFs and is able to plot them separately or plot both polarizations and/or all IFs on single plots (per antenna).

**POSSM** was corrected to plot small time averages efficiently. Previously, when SOLINT was specified, the task could spend vast amounts of time looking at and calibrating data it did not need. Problems caused by the first plot on a page having no data were corrected.

**UVHGM** had the PIXRANGE adverb added.

## General and miscellaneous matters

### New task to export table data

It is sometimes useful to be able to analyze *AIPS* table data outside *AIPS*. The new task EXTAB will write *AIPS* table data to a simple text file that can easily read by other programs such as spreadsheets, database programs, and data analysis programs like IDL. You may select specific rows and columns to be exported in the same way as you select rows and columns to be printed in PRTAB. The task TAPQL was deleted; it exported data for a specific database format which is no longer used.

### New pseudoverbs

Three new pseudoverbs were written to help users manipulate the task-specific adverbs. If you enter `DEFAULT` followed by a task name, the adverb values for that task alone are changed to the values they would have on a full initialization (`RESTORE 0`) without changing any other adverb values. Prior to `15OCT98`, adverb values were stored only in a single `TPUT/TGET` files and were over-written on any `TPUT` or `GO` for that task. These files function as always in the new release, but users may set up parallel `VPUT/VGET` files specified by adverb `VNUMBER` from 1 through 35 for their own use in storing and retrieving adverb values in a task-specific way. No special meaning is attached to any of these files by *AIPS*, although some canned procedures may (in future) use one or more of them. `GO` does not write into these files; otherwise their use is the same as `TPUT` and `TGET`. The new verb `VGINDEX` will list the contents of the specified `VPUT/VGET` file.

### Tape problems

The relatively new task `FITAB` was found to have several errors and a rather complex "gotcha." If a *uv* file was written by `FITAB`, then read back in and modified in some way (*e.g.*, `UVCOP`), and then written out by `FITTP`, the output would not be read correctly thereafter. The problem arose from a liberal use of *AIPS* history cards in `FITAB` and the retention of these histories by the FITS readers. After the correction, old *AIPS* history cards are no longer written by `FITTP` and `FITAB`. Before the correction, `FITAB` had no problems because it wrote the current information after the history file, but `FITTP` had to write the current file descriptors before the history, thereby confusing the FITS readers. If you have files which may have this problem, try setting the new `ERROR` adverb in the FITS readers (`UVLOD`, `IMLOD`, `FITLD`) to 2 after encountering a problem reading the file with `ERROR` set at any other value. This bypasses the history parsing to avoid the bug.

Two serious errors caused the output of `FITAB` to be useless under different conditions. Quantized images did not have meaningful data written. Tables with no time column were written with no data when a *uv* file was being written out in multiple pieces. Both of these errors crept in after most of the testing due to "simple" fixes. `FITAB` now writes the coordinates in both an *AIPS*-normal fashion and in the new proposed FITS keywords for tables extensions.

### Single dish

`OTFUV` was found to have an internal limit to the number of channels. It was changed to use the global `MAXCHA` and `MAXCHA` was changed to 16384, the same as `MAXCIF` which is the product of channels, IFs, and polarizations. The single-dish data translation and indexing routines were fixed to run correctly on byte-swapped computers. The tasks used for beam-switched imaging were enhanced. `BSGRD` now allows two different convolution functions for the two convolutions it has to do (to azimuth-elevation and then to RA-Dec) and it corrects for a rotation in the switch direction with a shift rather than a rotation (which was a wrong thing to do). A new modeling task `BSMOD` was installed to generate totally artificial data to test various aspects of this observing mode. A poster was presented at ADASS IX on the subject by Eric Greisen. The four-page paper may be accessed at `ftp://ftp.cv.nrao.edu/egreisen/SWpaper.ps.gz` and the poster at `ftp://ftp.cv.nrao.edu/egreisen/SWposter.my.ps.gz`. Pat Smiley did a nicer version of the poster but it is a large file found at `ftp://ftp.cv.nrao.edu/egreisen/PatPost.eps.gz`.

### Miscellaneous

**CCEDT** had its `CPARM`s reordered and changed to allow circular as well as rectangular apertures. It was corrected to handle `CC` tables with 7 as well as 3 columns. It now uses image increment based tolerances and defaults and uses dynamic memory so that it can try to handle any size of problem.

**XTRAN** was changed to do only its "plate-solution" mode. There are several better tasks for re-gridding image geometries. An option to copy the image and alter only the output header was added to avoid any re-gridding. Finally serious errors in the re-gridding and in the handling of sub-images were corrected. This task is still not correct for large images, but it now works very much better for smaller ones.

**ORDER** is a new adverb to specify the order of a polynomial fit. It is used by `FLGIT`, `UVLSF`, `UVLIN`, `IMLIN`, and other tasks. The first 3 of these were changed to allow 0-order as well as first-order fits.

**IMEAN** was changed to be able to write the actual rms and mean into the image header under control of the adverb `DOCAT`. The `ACTNOISE` header parameter is used by `SAD`, `IMFIT`, and `JMFIT` in evaluating the errors in their Gaussian fits.

**IRING** was changed to take `APARM` as relative to the reference pixel rather than the "center" of the current sub-image.

**COMB** had a bug handling blanked pixels in the `MEAN` operation corrected.

## VLBI data processing

### FITLD

The handling of VLBA weights in `FITLD` has been improved. The weights assigned to VLBA data are now proportional to their integration time so that data from baselines using shorter integrations are not weighted too highly relative to those from baselines using longer integration times.

### Miscellaneous changes

**CVEL** now supports the `QUAL` adverb to improve the selection of which sources are shifted.

**PCCOR** allows selection of IFs for the case when two separate bands are observed simultaneously. Selection of good data was improved.

**ANTAB** was modified to attempt to cope with Tsys measurements made by non-NRAO telescopes between scans. The adverb `OFFSET` was added to allow the user to specify the amount of time that should be added to both ends of a scan to include the Tsys measurements in the apparent scan range.

**COHER** was given the option to solve for a variable coherence time as a function of baseline and time. The output is in a format suitable for direct input to `BLING`. This option is likely to be particularly relevant at millimeter wavelengths.

**CL2HF** was modified at GSFC by Dave Gordon and the modifications installed in the official release. Good results have been reported.

### Fringe fitting

This release fixes a number of errors associated with the exhaustive baseline search option of `FRING` which is controlled by `DOFIT` and `APARM(9)`. These errors caused the least-squares routines to be called with faulty starting estimates for the delays and rates with the result that the exhaustive baseline search would sometimes fail to find fringes that would have been found in the default mode or would sometimes arrive at an incorrect delay and rate.

Some errors in the allocation of array processor memory that caused `FRING` to claim that it was out of memory when channels were selected using `BCHAN` and `ECHAN` have also been fixed in this release.

The least-squares stage of `KRING` has now been completely replaced. This was necessary for reworking the SNR calculation to use the same methods as found in the FFT. For test data, the two stages now produce SNRs that agree to within 1%. Many inputs were removed from `KRING` including the ability to create/fill an output file for single source data. Since `KRING` requires an `NX` table, this was disallowed anyway. Averaging the frequencies within an IF is not allowed anymore either; `KRING`'s more efficient use of memory renders this sort of option unnecessary. The default SNR cutoff threshold has been lowered to 3. The help file has been updated somewhat but likely still needs some user input. The output format has been cleaned up as well to be more readable and the print levels consolidated.

## Interferometric data handling

### Data modeling

When CC files are used as a source model, the model computations may be controlled with NCOMP. A previously undocumented feature of this was the ability to cut off the computation at the first negative in each CC file if any of the NCOMP was specified as a negative number. This feature has now been documented and a new, scientifically correct, cut off method has been added. The adverb FLUX was added to all such tasks to specify the minimum absolute value of the component flux to be used in modeling.

### Editing

A new task called CLIPM was written to edit multi-source files. It writes entries in the flag table based on amplitudes out of range for observations selected and calibrated with all of the usual (numerous) adverbs. For spectral-line data, it works hard to keep the number of flags minimal. Nonetheless, a great many may be created. UVCOP is able to apply up to 50000 flags to a single time which allows users to avoid the 5000 limit in the rest of *AIPS*. An option to flag all channels if $\geq n$ are clipped was added to both CLIPM and the older CLIP used on single-source files. An error handling compressed data from the VLBA correlator was corrected in CLIP.

The interactive editing tasks EDITA, EDITR and SNEDT received some attention. The adverb EXPERT was added to instruct these tasks to begin in "expert" (keyboard input) rather than menu (mouse input) mode. Bugs applying current flags to data in the one antenna at a time mode, in getting the correct value of DOTWO in TY editing, in recognizing the new FLAG QUICKLY function, and in flagging the first point in that mode were corrected. The method used to handle times was revised; the old method should have failed frequently but only did so on Linux systems. The defaults for SOLINT and DETIME were changed to plot every point.

### Ugly error in UVCOP

UVCOP set a mask to select the desired spectral channels and IFs. Unfortunately, it used the increments in the output data set rather than the input data set. If the frequency axis precedes the IF axis, data selection errors occurred if both BIF $> 1$ and BCHAN/ECHAN selected fewer than all of the spectral channels. The error appeared in 15OCT98 on August 24, 1998 when a line of code a long ways away was changed to correct another problem and that changed variables in a COMMON. We can hope that people do not normally sub-select both IFs and channels at the same time.

### Miscellaneous corrections and additions

**CALIB** has a new adverb ANTUSE to control which antennas are used in the calculation of the mean gain modulus. An error applying an Lpol-only model to data with all polarizations was corrected.

**QUACK** has a new option to flag data at the end of each scan. The handling of times was corrected and some control given to the user for data with short integration times.

**SPLAT** and UVAVG had their handling of random parameters generalized to handle all current ones and to do something reasonable with future ones. An unnecessary operation was removed from SPLAT and the program now runs very much faster when averaging.

**LDGPS** and APGPS continued to be developed and tested. They load GPS data to a GP table and then use the GPS delay data to calculate phase corrections due to the excess path length of the ionosphere and to calculate the ionospheric Faraday rotation.

# Matters of interest to programmers and *AIPS* Managers

## Support for the Intel Platform Edition of Solaris

The 15OCT99 release of *AIPS* includes support for the Intel Platform Edition of Solaris. This is the version of Solaris that is used on PC-compatible computers. Sun have made both the Intel platform and the SPARC platform editions of Solaris available to non-commercial users for the cost of media, shipping and handling. See `http://www.sun.com/developers/tools/solaris/solarispromo.html` for details on this offer.

There are no precompiled *AIPS* binaries for this platform so you will have to build *AIPS* from the sources using INSTEP2 and INSTEP4. The default configuration assumes that you are using the GNU Compiler Collection. Prebuilt versions of the GNU Compiler Collection (as well as other useful tools) are available at `http://www.sunfreeware.com` for both SPARC and Intel.

As is the case with the SPARC Platform Edition of Solaris, the Intel Platform Edition is not optimally configured to run *AIPS* efficiently as shipped. Some hints on tuning Solaris for *AIPS* are available at `http://www.aoc.nrao.edu/ cflatter/solaris-.html`.

## Problems with GNU FORTRAN Under Solaris

We have recently uncovered a fault in the Solaris implementation of the standard C library that gives rise to a minor problem in versions of *AIPS* that have been compiled using GNU FORTRAN 77 under Solaris. If you append output text to an existing file in programs that have an OUTFILE-like adverb, then you will lose some of the data in that file. There is no problem if you always specify a new output file so few *AIPS* users are likely to be inconvenienced by this problem.

We are still investigating this problem and will publish any further information to the `alt.sci.astro.aips` newsgroup and the `bananas` mailing list as it becomes available. This problem is known to occur under all versions of Solaris from 2.5.1 onwards (both platform editions) but does not occur if you are using the Sun compilers.

## Brief items

**AIPSEXEC** now allows the user to specify the debugger (*e.g.*, `debug=dbx`) on the `aips` command line. If AIPS itself is to be debugged, the command becomes, for example, `debug=gdb:aips`. The prompt for debugger name failed occasionally under Linux.

**NETSP** warnings for disks not defined have been restricted to the AIPS program itself.

**MNJ** Midnight jobs will henceforth be required to use the secure shell (`ssh`). The methods used previously lacked security and would not be able to expand to meet the expected increase in demand.

**FSTVS3** is a variable in the DSEL.INC calibration commons that was not used seriously before. It is now a counter of the true visibility record number. A new subroutine FINDUV uses this variable to find the next desired time interval in a data set and the corresponding range of visibility numbers.

# AIPS for the Ages

The 15OCT99 release of Classic *AIPS* will be the last formal release of *AIPS*. The current distribution model for *AIPS* of periodic releases continues to serve the community well. However, faced with declining *AIPS* staffing levels, we feel it is necessary to reduce the amount of system work and concentrate on application programming and bug-fixes. The final "release" of *AIPS* will be 31DEC99, the so-called "*AIPS* for the Ages" (*AIPS* for the Aged?). This version is already available, for complete download or for incremental updates, from the *AIPS* Web page. Bug-fixes and new tasks will implemented in 31DEC99 (and the *AIPSLetter* will continue to appear approximately every six months) until the NRAO user community completes the transition to the recently-released AIPS++.

## Installing Aips for the Ages

We are intending to make the installation and updating of 31DEC99 as painless as possible. As we see it, there are four categories of installation situations:

1. installing 31DEC99 as the site's first *AIPS* installation,
2. installing 31DEC99 for the first time, but the site has earlier *AIPS* version(s) installed,
3. installing all of 31DEC99 over the top of an old installation of 31DEC99, and
4. installing any updated pieces of 31DEC99 over the top of a relatively current copy of 31DEC99.

In the first 3 categories, the *AIPS* Manager begins by obtaining a copy of `31DEC99.tar.gz` via our Web pages. This Gnu-zipped "tarball" is created every night and contains a current copy of all *AIPS* source code and documentation. It is currently 31 Mbytes in size and can usually be copied over the Internet in a reasonable time. The on-line *AIPS* Order Form will eventually provide a way to order 31DEC99 on CDrom.

*At present,* the Manager in category 1 has to install *AIPS* in the usual sequence of steps. This involves downloading and unpacking the tarball, running the INSTEP1 script, optionally downloading binaries from Charlottesville or compiling them locally, and setting up and initializing the *AIPS* control files using FILAIP, POPSGN, and SYSETUP. All of this is well documented in the installation summary (`http://www.cv.nrao.edu/aips/install.ps`). *In the future,* a new `install.pl` perl script will permit a much easier installation process. Watch the *AIPS* Web site for an announcement of this script.

The Manager faced with category 2 or 3 problems can already use a new and tested perl script called `update.pl`. Category 3 is really category 2 except for a first step of renaming the old 31DEC99 directory tree to something else before creating the new one. Category 4 is particularly simple. The installation procedures now create (or will when category 1 is upgraded) files needed to run what is known as the "midnight job" (MNJ, so named as it should be run between midnight and 8 a.m. US/Eastern time). This "job" detects changes to the *AIPS* transaction files in Charlottesville, and then performs any needed operations for the local site. This may include copying modified files from Charlottesville, compiling subroutines, and linking tasks. The job ends by generating a nice report which shows what it did and all new entries in CHANGE.DOC made by the *AIPS* Group. This midnight job is usually run as a `cron` job at a regular time every day, week, or month. In addition or instead, it can be run manually whenever the Manager decides to do so.

The above-mentioned `update.pl` script for a category 2/3 update greatly simplifies the process. The Manager (1) gets the tarball and puts it in the `$AIPS_ROOT` area, and then (2) copies `update.pl` to disk, makes it executable, and runs it. `update.pl` won't (yet) run INSTEP2 or INSTEP4 or POPSGN for you, but it does just about everything else, Anything left over is summarized for you in a checklist that is printed out when the script ends. This will be a *very small* subset of the work *AIPS* Managers had to contend with in previous updates. The first line of `update.pl` will need to be edited if perl is not located at `/usr/local/bin/perl`. The script requires perl version 5 or better.

`update.pl` runs MAKE.MNJ to prepare for later use of the midnight job. Sites with "legacy" entries in the master UPDCONFIG file should delete the `$SYSLOCAL/UPDCONFIG` that MAKE.MNJ now creates; new MNJ sites will use this local file.

The requirements for the new midnight job are:

- A moderately recent version of the `ssh` client is available on your system (*e.g.*, 1.2.25).
- You have already set up a key for the account which will run the *AIPS* midnight job by running the `ssh-keygen` program.
- You chose `$HOME/.ssh/` as a location for the keys when you ran `ssh-keygen` (this is the default).
- You *only* want to use the secure version of the MNJ for your primary access to `mnj.cv.nrao.edu`.
- You have gotten the "MNJ" private key (a binary file) from Pat Murphy, preferably via secure mail (PGP preferred; his public key is available on the web at

`http://www.cv.nrao.edu/~pmurphy/plan.html`).
Place the MNJ file in the `$HOME/.ssh/` directory, and `chmod` it to mode 0600.

- You have set up a `do_daily.`*xxxx* script to run your MNJ on computer *xxxx*. If you plan to run it via `cron`, make sure the script sets `$PATH` enough that `ssh` and other basic utilities are found. A sample `do_daily` script is given below.

- You are not running the ssh-agent program; if the variable `SSH_AGENT_PID` is *not* set, then you can proceed to the next step. You can check if it's set by typing the command: `echo $SSH_AGENT_PID`. If this command only shows a blank line, you are not running an agent. If it shows a number like 20415, you are. If you are, you *must* first invoke the command: `ssh-add -D` before proceeding to the next step. This command temporarily deletes all identities from your agent. You can add them back after the next step; it's only necessary when first setting up the MNJ (or if running the job by hand when you have an agent running; ssh likes to use your main identity even when told to use the MNJ one).

- "Prime" the system by giving the command:
  `ssh mnj.cv.nrao.edu -i .ssh/mnj -l aipsmgr /AIPS/31DEC99/COPYING`
  (do this from your home directory, or alter the path to the `.ssh/` directory) and answer "yes" when it asks if you want to add `mnj.cv.nrao.edu` to the list of known hosts. If this command is successful, it will print out a copy of the *AIPS* General Public License (The "GNU GPL"). Once you have verified this ssh command works, you can add back any identities to your agent if you deleted them.

- Run your `do_daily.`*xxxx* script interactively, check the logs, look for the output from `AIPSUPD` in the log that says `AIPSUPD - Using the SECURE SHELL for copying`. If there are no other obvious errors (and files were really copied!) then you're ready to run the MNJ whenever you want. Otherwise you may need to contact Pat Murphy for assistance.

A site may run more than one midnight job. In that case, typically, the site will have only one copy of the *AIPS* source code and one computer will run a "primary" MNJ to Charlottesville. After that has run, other computer architectures may run "secondary" MNJs using NFS access to the single copy of the source code and running only the compilation and link edit parts of the transactions. In this way, a site's storage of *AIPS* is kept simple by having a single copy serving more than one architecture and the load on the Charlottesville computers is kept to a minimum. Converting secondary MNJ jobs to use the secure shell can be tricky; contact Pat Murphy if you really want to do this. The following is a sample `do_daily.`*xxxx*:

```
#!/bin/sh
#                                    fix path for cron, etc.
######################## Change for local account names/files
[ "$HOME" = "" ] && HOME=/home/jenlan/egreisen
. $HOME/.profile.path
########################
# following assumes "something.hostname" as name of file
myname=`basename $0 | awk -F. '{print $2}'`
[ "`uname -n | awk -F. '{print $1}'`" = "$myname" ] || exit
#                                    set AIPS logicals
######################## Change for local $AIPS_ROOT
cd /home/analysis/aips
########################
. ./LOGIN.SH
$CDTST >/dev/null 2>&1
#                                    remove any old binaries
(cd $LOAD; find . -name '*.EXE.OLD' -atime +2 -exec rm -f {} \;)
#                                    Go to MNJ area
cd $AIPS_VERSION/$ARCH/UPDATE
#                                    Now do the MNJ
./AIPSUPD TST
```

## Patch Distribution

As before, important bug fixes and selected improvements in `15OCT99` can be downloaded via the Web at:

`http://www.cv.nrao.edu/aips/15APR99/patches.html`

Alternatively one can use *anonymous* `ftp` on the NRAO cpu `aips.nrao.edu`. 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 `15OCT99` are found, the patches will be placed in the `ftp`/Web area for `15OCT99`. No matter when you receive your `15OCT99` "tape," *you must* fetch and install these patches if you require them.

The `15APR99` release had a number of important patches announced. These were:

1. `TVCPS` and other tasks that use the image catalog (1999-05-14, 1999-06-18).
2. `APGPS` and `TECOR` (delay calibration modes) (1999-05-14).
3. `CLIP`, `RESEQ`, `DTCHK` problems with compressed data (1999-05-25).
4. `REGRD` crashed under Solaris, others (1999-07-06).
5. `UVCOP` errors selecting channels (1999-07-21).
6. `IMAGR` in `OVERLAP 2` mode selects wrong fields (1999-07-22).
7. `FITAB` followed by `FITTP` makes unreadable files (1999-07-27).
8. `FITAB` did not write image tables and quantized floating images (1999-08-09).
9. `PRTTP` patched code did not convert `DOCRT` to reasonable values (1999-09-07).

## Progress on a world-coordinates standard

At the ADASS meeting held in Boston in the Fall of 1992 it was decided that a standard for conveying coordinate information within the FITS format needed to be developed. Eric Greisen was, in his absence, volunteered for the effort. Versions of possible standards authored by Greisen and Mark Calabretta (of the ATNF in Australia) began appearing in June 1993 and have appeared at irregular intervals since. At the 1999 ADASS meeting held in Kona Hawaii, Eric and Mark were instructed to make a few minor corrections to the current drafts of the papers and then to submit them for formal review by the U.S., European, and Japanese FITS Committees. The paper is now divided into three parts: a general paper, a celestial-coordinates paper, and a spectral-coordinates paper. All three of these are available via the WWW and we encourage you to fetch and read them. When these are adopted — and something very much like them will become part of the FITS standard — they will affect the ways in which we think about astronomical data. For that reason alone, they are important and we solicit your comments (`egreisen@nrao.edu` and `mcalabre@atnf.csiro.au`). The papers are:

I. Representations of world coordinates in FITS, by Greisen and Calabretta
(`ftp://ftp.cv.nrao.edu/NRAO-staff/egreisen/wcs.ps.gz`)

II. Representations of celestial coordinates in FITS, by Calabretta and Greisen
(`ftp://ftp.cv.nrao.edu/NRAO-staff/egreisen/ccs.ps.gz`)

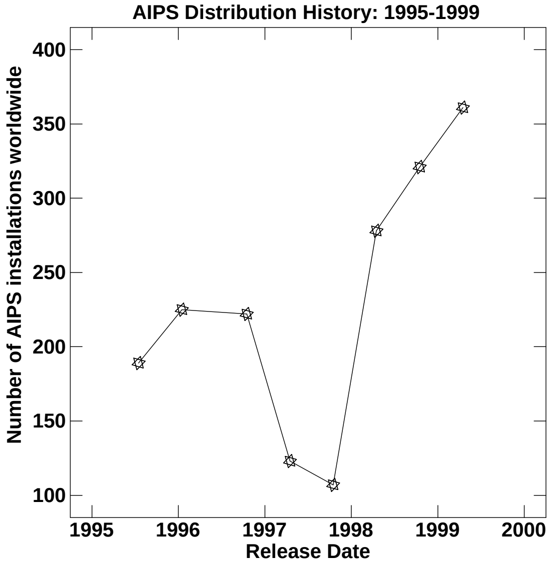
III. Representations of spectral coordinates in FITS, by Greisen
(`ftp://ftp.cv.nrao.edu/NRAO-staff/egreisen/scs.ps.gz`)

The 1999 ADASS poster on WCS is also available as a

- 4-page summary (`ftp://ftp.cv.nrao.edu/NRAO-staff/egreisen/Paper99.ps.gz`)
- poster (`ftp://ftp.cv.nrao.edu/NRAO-staff/egreisen/Poster99.ps.gz`)

# *AIPS* Distribution

The total distribution of the 15OCT98 release was under-reported in the last *AIPSLetter* due to a glitch in accessing log files following an upgrade to our FTP server. Instead of 263 copies, we actually distributed 321. The *AIPS* distribution history over the last few years is plotted in the accompanying figure (prepared with the new PLOTM task) and shows a gratifying and continued increase over the last year and a half. This increase probable reflects both the new capabilities in *AIPS* and the improvements in the installation process.




A total of 361 copies of the 15APR99 release were distributed to 344 non-NRAO sites. Of these, 187 were in source code form and 174 were distributed as binary executables. The figures on computers using *AIPS* are affected by the percentage of *AIPS* users that register with NRAO. Of 344 non-NRAO sites receiving 15APR99 only 85 (25%) have registered. We remind serious *AIPS* users that registration is required in order to receive user support. The first table below shows the breakdown of how the copies of 15APR99 were distributed and includes both source-code distributions and binary distributions. The second table below is based on the disappointing number of registered installations of 15APR99. It lists total numbers of computers and indicates that the distribution over operating systems was heavily weighted toward Solaris with Linux as a distant second. However, when asked about "primary" architecture, 46% of our users answered Linux and 40% answered some flavor of Sun OS. This indicates how far Linux has penetrated as the system used on the more powerful computers used by astronomers today. The third table gives information about the geographic distribution of the systems shipped.

| | ftp | CDrom | 8mm | 4mm | ZIP | Floppy |
|---|---|---|---|---|---|---|
| 15OCT98 | 242 | 71 | 8 | 1 | 0 | 0 |
| 15APR99 | 290 | 69 | 0 | 2 | 0 | 0 |

| Operating System | 15APR99 No. | 15APR99 % | 15OCT98 % | 15APR98 % | 15OCT97 % | 15APR97 % | 15OCT96 % |
|---|---|---|---|---|---|---|---|
| Solaris/SunOS 5 | 196 | 53 | 61 | 66 | 50 | 66 | 46 |
| PC Linux | 99 | 27 | 27 | 19 | 23 | 16 | 19 |
| SGI | 47 | 13 | 1 | 3 | 1 | 1 | 5 |
| Dec Alpha | 14 | 4 | 3 | 7 | 9 | 6 | 10 |
| HP-UX | 7 | 2 | 5 | 2 | 3 | 6 | 4 |
| SunOS 4 | 3 | 1 | 1 | 4 | 14 | 5 | 13 |
| IBM /AIX | 1 | 0 | 2 | 1 | 0 | 0 | 4 |
| Alpha Linux | 0 | 0 | 0 | | | | |
| Total | 367 | | | | | | |

| | ftp sites | | physical media sites |
|---|---|---|---|
| Domain | Location | Number | Number |
| ar | Argentina | 1 | 4 |
| au | Australia | 6 | |
| be | Belgium (Kingdom of) | 1 | |
| br | Brazil (Federative Republic of) | 1 | |
| bg | Bulgaria | 1 | 1 |
| ca | Canada | 14 | 2 |
| com | U.S.A. (commercial) | 29 | |
| | China | | 3 |
| de | Germany (Federal Republic of) | 5 | 1 |
| edu | U.S.A. (education) | 81 | |
| es | Spain (Kingdom of) | 10 | |
| fi | Finland (Republic of) | 3 | |
| fr | France (French Republic) | 4 | |
| gov | U.S.A. (government) | 5 | |
| gr | Greece | 1 | |
| hu | Hungary | 1 | 1 |
| in | India (Republic of) | 3 | 2 |
| | Israel | | 1 |
| it | Italy (Italian Republic) | 6 | 2 |
| jp | Japan | 20 | 1 |
| kr | Korea (Republic of) | 2 | 1 |
| mil | U.S.A. (military) | 2 | |
| mx | Mexico (United Mexican States) | 3 | |
| net | Network (largely U.S.A.) | 42 | |
| nl | Netherlands | 7 | 1 |
| no | Norway | 1 | |
| pt | Portugal | 2 | |
| org | Organization (largely U.S.A.) | 4 | |
| ru | Russia (Russian Federation) | 2 | 1 |
| se | Sweden (Kingdom of) | 6 | |
| tw | Taiwan | 5 | |
| | United Arab Emirates | | 1 |
| uk | United Kingdom (Great Britain) | 8 | 7 |
| us | United States of America | 1 | 36 |
| za | South Africa | 1 | |
| | TOTAL | 278 | 65 |
| | Totals: USA=200, foreign=143 | | |

# *AIPS* on CDrom

Starting with `15APR98`, we have made *AIPS* available on CDrom. The initial tests using recordable CD's were very successful, and resulted in a CD with source code, two binary versions (Linux and Solaris), all `DDT` files, and a GNU-zipped version of the documentation (`TEXT`) area. It is possible to either perform a full installation on disk (*i.e.*, copying the binaries from CD to local disk), or to run from the CD. In the latter case, the "footprint" on the local disk is under 10 Megabytes! (This figure does not include user data, obviously.) Furthermore, the setup script was given the ability to switch between a "run from CD" installation and a "full" installation. The fact that 69 copies of the `15APR99` CDrom were distributed suggests that this functionality, and the availability of *AIPS* on this new medium, are of considerable use to the Astronomical Community.

*AIPS Order Form for* **15OCT99** ***(Unix, "tar" format)***

*Available under the Free Software Foundation's General Public License*

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*AIPS is available via anonymous ftp to aips.nrao.edu (192.33.115.108)*

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***

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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: ............. ☐ CDROM (with Linux and Solaris binaries, and DDT package)

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

☐ Exabyte (5GB) ☐ Exabyte (2.2G) ☐ 4mm DDS DAT

☐ Check here for BINARY TAPE (load and go), exabyte or DAT only, and indicate OS/hardware

☐ Sparc/Solaris 2.6 (SC4.2) ☐ Sparc Ultra (SUL) 2.6/SC4.2 ☐ HP-UX (HP2, 9000/780 up)

☐ Intel Linux (g77/egcs, glibc) ☐ Alpha Linux (g77/egcs, glibc) ☐ Silicon Graphics IRIX 6.4

☐ Dec Alpha/OSF-1 4.0

4. Computer(s) make, model and OS version: ____________________

Include hardware/software/quantity info, e.g. ____________________

Sparc Ultra 2/SunOS 5.5/21, 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 `/aips/DDT/*` and on the CDROM

6. 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`

7. Custom 3-ring binders may be requested when you register your copy of AIPS.

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

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

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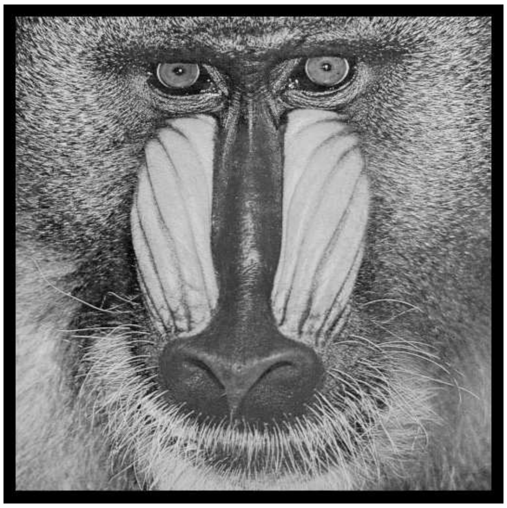
Web: http://www.cv.nrao.edu/aips/

Anonymous ftp: aips.nrao.edu/pub/aips/



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