A I P S L E T T E R

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National Radio Astronomy Observatory

A newsletter for users of the
*A*stronomical *I*mage *P*rocessing *S*ystem

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News Notes

We regret to announce that the 15JAN86 release of *AIPS* has been cancelled. It was intended to incorporate major changes in directory structures and in the corresponding procedures and Z routines. As a result of the complexity of the changes, we were delayed significantly in shipping test versions to the VLA. Other circumstances then conspired to leave 15JAN86 virtually untested by the staff and visitor community at the VLA and to delay publication of *AIPS* Memo No. 39 which describes the new directory structures and procedures. To provide proper testing and advance documentation, we have therefore renamed the current versions to 15APR86 and 15JUL86, reflecting their new release dates. The version called 15JAN86 in the last *AIPSLETTER* is called 15APR86 henceforth.

On a happier note, the long-awaited UNIX release, dated 15JUL85, was completed in mid December and was shipped to all sites requesting it. The next UNIX release should correspond to 15JUL86 and we hope to keep the UNIX and VMS versions synchronized thereafter. The primary reason for this optimism is that we have replaced the IBM 4341 in Charlottesville with a Convex C-1, a modern UNIX machine described extensively in previous *AIPSLETTER*s and in *AIPS* Memo No. 38 (which is now available). Our Convex has 32-Mbytes of memory, two high performance and two lower performance tape drives, and ten Eagle disk drives. The I^2S display will be moved from our Modcomp to the Convex shortly. A high-speed Ethernet connection to the Charlottesville VAX has also been installed and file transfer and remote login capabilities have been demonstrated. A QMS 800 laser printer has been ordered for the C-1.

We have decided, for the 15JUL86 release, to support images in floating-point format only. Our reader response was light on this subject and reflected the realities of it: namely, this change will cost us in disk space, but it will produce more accurate results in less time with simpler code. The conversion to floating images was also discussed at the NRAO Users' Committee meeting and the *AIPS* Workshop — again with few negative remarks. The impact on our Cray version should be particularly beneficial.

Summary of Changes: 15 October 1985 — 15 January 1986

These changes are listed in detail in the CHANGE.DOC files reproduced later in the *AIPSLETTER*. Despite the holiday season and business trips, the files contain 115 entries for this quarter. Our backlog of gripes received particular attention during the period and many of these entries reflect our responses.

Changes of Interest to Users: 15APR86 as NEW — Part 1

Most of the changes in NEW are bug fixes, but some new features have been added. Among these is a system RUN file called NEWPARMS which allows users to obtain access to all of the "new" adverbs without clearing their old AIPS vocabulary. The slice-plotting routines now use the slice extrema as the default plot range (rather than the image extrema) and QMSPL uses the adverb OPTYPE rather than the overused OPCODE. VBPLT was cleaned up extensively (yet again!) and will now plot correct models for VLA data and will plot data-free baselines only if instructed to do so (see entry 2821 below). CONVL failed previously to do correct scaling for gaussian convolutions (see entry 2836) and a phasing problem in the Fourier transforms of off-center images was corrected in FFT (see entry 2837). All coordinate routines were corrected to handle images with non-square pixels and rotations near ±90° (see entry 2811). The general capability to expand catalog files was made functional. A bug which occasionally prevented copying of clean components files by SUBIM was corrected (see entry 2820). Minor problems in the displays of EXTLIST and PRTIM were corrected and various help files were improved.

Changes of Interest to Users: 15JUL86 as TST — Part 1

15JUL86 will remain as the TST area for six months rather than the usual three. It has already acquired six new tasks and significant improvements to several others. The conversion to floating-point format for imagery has begun. Users will note several effects of this conversion: programs will run faster, use fewer scratch files, and produce more accurate results, but images will occupy more disk and old, integer images will have to be CNVRTed. For example, the revised FFT ran 60% faster (in IO count, real and CPU time) and produced results apparently four orders of magnitude more accurate.

VTESS is one of the new tasks and was written by Tim Cornwell. It is intended to replace VM and to carry out maximum entropy deconvolution on up to five (currently) simultaneous, overlapping fields. The tasks XPORT and MPORT, written by Jeff Brooks and Bob Duquet, have been installed. They are used to transmit images with limited accuracy over slow connections, *i.e.*, intercomputer phone links. Two tasks have appeared to sort tables, merge like rows, and then resort the tables into their original order. TAMRG does this for general table extension files, while the simpler CCMRG allows the user to sum all the clean components which occur at the same pixels. Finally, IMVIM offers the ability to plot one image's intensities against those of another either as a scatter plot or using various binning options.

The list of tasks which support, solely or at least on output, floating-point images already includes UVMAP, APCLN, MX, FFT, CONVL, TAFFY, CANDY, STEER, APGS, APVC, and COMB. APCLN has acquired new capabilities to clean cubes (one plane at a time to an output cube), to handle asymmetric beams (in the major cycle only), and to stop at the first negative component (see entry 2896). COMB was rewritten to be faster, to blank on noise or signal-to-noise ratio, to output a noise image, and to perform the 'RM ' and 'MEAN' operations (see entries 2871 and 2916). (CORMS is now obsolete and was deleted.) The queuing algorithm for the array processor was changed to treat higher *AIPS*-number users more fairly.

A number of tasks received less drastic improvements. CLIP now offers the option of converting the visibilities to Stokes parameters before checking their values. We hope that this will reduce the confusion some users experience in dealing with complex visibilities. MCUBE now allows the input images to reside on more than one disk (if INDISK = 0) and QMSPL allows the user the option of keeping the output print file

(see entry 2869). MOMNT now supports two flux cutoff adverbs having the same meaning as those in XMOM (see entry 2870). TASRT can now sort on a single column and on the absolute value of the entries in a column (see entry 2881). POLCO now does blanking in the standard manner and SUBIM pays more attention to blanking, marking the output header appropriately and dying if there are no valid pixels (see entry 2914). VBANT offers additional control over the weighting of visibilities (see entry 2848). The inputs to UVCOP were renamed to more appropriate names (*i.e.*, TIMERANG rather than APARM — see entry 2872). This change should propagate to other tasks eventually. A number of tasks had the redundant adverb INTYPE removed from their inputs, another continuing process.

The verbs have also not been ignored. TVLOD (and TVALL) offer the option of interpolating small images to fill more of the TV screen. TVFIDL will now handle more than one channel and tests to make sure that the requested channels are actually on. REBOX was changed to get its image name parameters from the displayed TV image rather than adverbs. The fitting verbs, MAXFIT, IMVAL, and QIMVAL, no longer die if the fit fails, but instead set the ERROR adverb. The catalog listing verbs can now alphabetize up to 400 entries at a time and CATALOG displays scratch files only if the input adverbs call for them.

Changes of Interest to Programmers: 15APR86 as NEW — Part 1

The 15APR86 release contains a major change to the directory structure of *AIPS* and programmers should study *AIPS* Memo No. 39 (to be released shortly) since the details cannot be adequately presented in CHANGE.DOC. All procedures have been rewritten during the past six months and should be easier to use. Those Z routines which reference the directory structure, namely ZDCHIN, ZACTV9, ZSETUP, ZTRLOG, ZTOPEN, ZDOPRT, ZMYVER, ZWHOMI, and ZDIR, have been revised. This should have little impact on programmers of VMS machines, but other systems will need changes in order to track the changes so far implemented only under VMS. (We will do the UNIX version during the coming quarter, of course.)

The *AIPS* implementations on DeAnza and Comtal television displays were tested and corrected during the quarter (see 2809, 2812, 2822, 2823, 2826, 2827, and 2829). To the general programmer, the only change is to assign channel NGRAY+1 to the graphics planes in calls to YSCROL and in the scroll arrays kept in common. A new and useful OPCODE was added to YCURSE as well. Various Y and non-Y routines were corrected and improved in order to bring the Comtal and DeAnza implementations apparently into full functionality.

The correction mentioned in the user section for coordinate routines (entry 2821) involved a change in the call sequence to SETLOC. A logical flag was added to tell the routine whether it should switch the x and y axes when the rotation angle is near $\pm 90°$. Typically, the flag is true in display applications and false in analysis applications.

Changes of Interest to Programmers: 15JUL86 as TST — Part 1

So far there have been few changes in 15JUL86 of great concern to programmers — but we have three more months to make some. Tasks which read only integer images or which can write integer images should be revised for this release to handle floating-point format. In doing this, we have relaxed the requirements on program size somewhat and are using larger buffers. (Although the Modcomp is no longer an *AIPS* development machine, there are other "real-memory" machines in the *AIPS* community (notably Crays) and page faulting is expensive and slow on virtual-memory machines.) The IO service routine UVINIT has been made smarter and more flexible (see entry 2911). The call sequence to ZQMSIO was changed to add an output (kept) file name which is used if it is not blank. TABCOP has been corrected (see 2820), TABSRT generalized to handle sorts on absolute value (see 2881), TABMRG written to merge "equal" rows in a table, and the table format enhanced to allow absolute-value sorting (see 2881). PLNGET now correctly scales floating-point input images.

The verification and timing package, previously called PFT, has been revised to handle three different data sets ("small," "medium," and "large") and renamed DDT (see entry 2860). It should be ready for release to β sites sometime during the next quarter.

AIPS Publications

The Order Form at the end of this AIPSLETTER may be used to order the following memoranda and books. During the previous quarter, the AIPS COOKBOOK and the reprint of *Going AIPS* completed the printing process. AIPS Memo No. 38 ("Certification and Benchmarking of AIPS on the Convex C-1 and Alliant FX/8") and AIPS Memo No. 39 ("Shareable Images for AIPS under VMS"), announced in the previous AIPSLETTER, were both delayed. The former is now available and the latter should be available by the time you read this. AIPS Memo No. 40, described below, appeared during the quarter and is available as well. All previous memoranda may also be ordered.

AIPS Memo No. 40: "The AIPS Workshop," Alan H. Bridle, November 1985.

> This memo attempts to capture the main points that were brought out at the AIPS Workshop held in Charlottesville on October 31 and November 1, 1985. There were 35 "official participants" including representatives from 13 institutions other than NRAO. The Workshop contained four sessions of contributed talks on subjects involving future developments in AIPS and the use of AIPS at various institutions, on various architectures, and for processing of non-VLA data. Two discussion sessions were devoted to "AIPS problems and new tasks" and "Future of AIPS." Many new additions to the AIPS Wishlist emerged from the Workshop and there was discussion of the scope of, and the mechanisms for, a proposed AIPS Users' Group.

The 1985 AIPS Site Survey

Survey forms and a covering memo were mailed to 124 AIPS-site contact persons during the last week of December. As of 20 January, 32 forms had been returned by 29 contact persons (one form per machine); more forms arrive every day. The editors are grateful to the contact persons who have already responded, and encourage those who have not yet filled out their form to do it *now* (while you are thinking about it!). A comprehensive directory listing of AIPS sites will be produced from the data before the next AIPSLETTER. The directory will be distributed to all contact persons; sites which want to be represented in this directory should return their forms before the end of February. Gathering this information is the first step toward setting up an AIPS Users' Group. We will summarize the results of the survey in a forthcoming AIPSLETTER.

The Portability Column

CPU/OS Combinations

Data General MV/10000+AOS/VS: Two AIPS-site survey forms returned by Michael Keane at the University of Arizona alerted us to the fact that AIPS is operational on two MV/10000 computers at that site. We called (22 January), and Michael told us that he first installed the 15JUL84 UNIX AIPS kit under a UNIX emulation which DG supports on top of their AOS. Later, he converted the Z-routines to call AOS directly; this both improved performance and gave a fuller implementation. The I^2S Model 75 now works and a QMS 800 laser printer (Talaris version) is nearly ready for operation. Michael has recently processed about 700 VLA snapshot observations using his AIPS. He is currently installing the new 15JUL85 UNIX kit. Contact Michael for further information about AIPS on the DG MV-series of computers (Michael Keane, Steward Obs., Univ. of Arizona, Tucson, AZ 85721; 602/621-3897).

Cray-1/COS: NRAO's installation at Vector Production in Los Angeles now uses a version of task CALPL to plot on a Versatec. Its TVLOD writes a file to the front-end VAX; the file can be displayed on a Ramtek display using software provided by Vector Production. Tape I/O is clumsy, but does work. Tasks to transmit compressed images over DECNET exist. Several large production runs have been made recently (see page 2 of the 1 January 1986 NRAO Newsletter for other details).

Image Displays

Sigma ARGS: Diego Cesarsky sent (using BITNET) the following message on 20 January: "This is a sort of progress report. I have started the long delayed interface ARGS–*AIPS*. It's going faster than expected because of the similarity between ARGS and I^2S calling conventions. (I had started using the DEA interfaces, but clearly I was on the wrong path; much easier from I^2S software.) I'll keep you informed of further progress." A followup message on 23 January began: "TVLOD now works on the ARGS display . . ." *AIPS* sites that need ARGS display interface software can, for now, contact Diego Cesarsky at the Institut D'Astrophysique, 98 Bis Blvd. Arago, 75014 Paris, FRANCE, or at the BITNET/EARN address "DIEGO@FRIAP51.BITNET".

Product Reviews

Culler 7+UNIX: Culler Scientific Systems Corporation (100 Burns Place, Santa Barbara, CA 93117, 805/683-5631) announced their Culler 7 series in October, with shipments anticipated in the near future. (Culler is the first of the four anticipated announcements which were mentioned in the product review column of the 15OCT85 *AIPSLETTER*.) Currently two models are offered, called the "1001" and "1002".

The architecture of the high performance computing engine of the Culler 7, the "application processor," resembles that of the FPS 120B array processor in several ways (Glenn Culler was the architect of the 120B; FPS bought the 120B design from Culler's company circa 1975). The application processor executes 96-bit microcode instructions at 7 MHz; integer instructions, floating adds, and floating multiplies execute in parallel. The peak performance ratings of the application processor are 21 Mips and 14 MFlops. Data sizes of 8, 16, 32 and 64-bits are supported; IEEE single- and double-precision floating point formats are used. As in the 120B, table memories are used to speed up single-precision trigonometric functions. The Culler 7 is a byte-addressing virtual-memory machine; current memory sizes range up to 21 MB and memory bandwidth to the applications processor is 56 MB/sec. The applications processor also has an independent path to a private memory area, called the "array memory," and supports a "staging" memory mechanism which permits the OS to overlap the initiation of one time-shared process with the completion of another. The 1001 model of the Culler 7 consists of one application processor; the 1002 model has *two* processors (aggregate peak performance of 42 Mips, 28 MFlops). Currently the OS supports execution of two independent processes simultaneously in the two CPUs; Culler representatives have stated their intention to support multi-CPU concurrent execution of a single process in a later release of the OS and compiler.

The OS is UNIX 4.2 bsd; it executes in another CPU, which Culler calls the "kernel processor" (actually a SUN Microsystems 68010), rather than in the applications processor. Optimizing Fortran 77 and C compilers are available to support the applications processor. The Ethernet protocol is TCP/IP, and the peripheral interface is Multibus. Currently, conventional disks and streaming tape drives are supported on the Multibus; a much higher performance I/O interface will be supported in the future. Presumably the generic-UNIX *AIPS* kit could be installed on a Culler 7 (success mainly depends on the degree of maturity of the compiler). We estimate that scalar performance is likely to be somewhat better than that of the VAX-8600 or Convex C-1; vector performance is likely to be somewhat better than that of the 120B (due to slightly faster clock and somewhat more versatile architecture), but probably inferior to the C-1. With two application processors the overall throughput should be nearly doubled for compute-bound processes. *AIPS* sites which are considering procurement of the Convex C-1 or the Alliant FX/8 might also want to look at the Culler 7. *Please note that our mentioning of the availability of this product does not constitute any sort of endorsement of it. Also, this review is based on the reviewer's current understanding of these complex and evolving systems.*

CHANGE.DOC: 15APR86 Version as NEW — Part 1

2802. *October 28, 1985* Installation procs *Gary*

These changes made it to the 15OCT85 installation tape. The following fixes were made in the installation procedures:

ICREATE — Changed to create load areas for PSAP and LOAD.
ICOMPNS — Changed to do a CLOSE on PROGLIST and to compile NOTST Z routines used by QWKPL.
IPROMPTL — Added extra DAOO to ASSIGNL for system files.

Moved everywhere.

2803. *October 28, 1985* batch *Eric/Kerry*

Due to Kerry's checking in UNIX, a number of errors were found in batch. Changed AUA and BSTRT1 to use the TASKWT subroutine when activating QMNGR, rather than handling the various conventions themselves. Changed BATER to use TASKWT in CUA and corrected subroutine CUB to address the batch queue file correctly (it had not been changed when the BQ file format was changed).

Moved to 15OCT85 before freeze but after *AIPSLETTER* deadline and, hence, everywhere.

2804. *October 28, 1985* TOVLB *John*

Added by Editors from history file: Corrected output day number error introduced in the 23-Oct changes.

Moved to 15JUL86 this date, nowhere else.

2805. *October 29, 1985* SL2PL *Eric*

Corrected bug in call to GINIT which caused EXTLIST to list incorrect parameter values for the plot file output or to assert that the value was garbage. PRUSER was changed to DOSLIC.

Moved from 15JUL86 this date, nowhere else.

2806. *November 7, 1985* ZDOPRT, ZQMSIO, ZDOPR4 *Gary*

These routines were updated to use the logical name for the output queue found in the AIPS_USER table, rather than the old group logical name.

Moved from 15JUL86 this date, nowhere else.

2807. *November 8, 1985* Compile/Link Procedures *Gary*

Added the capability to log errors and progress reports to a file. The programmer can set this up by doing a DEFINE ERRLOG *some-file* before calling the COMRPL or COMLNK procedures. Also added was the capability to set and unset an automatic purge flag. This flag can be set by doing a LINKPURGE and unset by doing a LINKNOP. The following routines were changed:

COMLNK COMRPL COMTST AIPSPROG COMPILE
LINKPURGE (new) LINKNOP (new)

Moved from 15JUL86, nowhere else.

2808. *November 8, 1985* Command procedures *Gary*

The following command procedures were changed because our new directory structure has propagated to NEW.

AIPS ASSIGNL (deleted) ASSNBAT STARTUP BOOTUP

Moved from 15JUL86, nowhere else.

2809. *November 8, 1985* ZV20XF *Gary*

Changed bad DATA statement for variable N7.

Moved from 15JUL86, nowhere else.

2810. *November 8, 1985* AIPSB *Gary*

Removed debug statement printing to unit 10 which was left in the code.

Moved from 15JUL86 this date, nowhere else.

2811. *November 21, 1985* Positions *Eric*

AIPS has had a long-standing problem dealing with rotated coordinates. In studying the problem, I have found that GEOM and LGEOM should be used to do rotations only if the pixels are square; they rotate the matrix, not the sky as the output headers claim. The routine which sets up the "location" common, SETLOC, also had a bug: it reversed the axis increments when it reversed other parameters to avoid rotations near 90. This has been fixed and the call sequence changed to allow the calling program to control whether this coordinate swap is allowed. Fixed QIKHDR for the call sequence change; it was switching the central pixel values, but not the labels and the like. Also altered the display formats a bit in QIKHDR, LSTHDR, and MSGHDR to avoid some confusion on RAs greater than 24 hours. Also changed the following to forbid coordinate swap in the new call sequence of SETLOC in order to avoid confusion such as encountered in QIKHDR:

PRTIM	GAL	HGEOM	IMFIT	IMLOD	IRING	JMFIT	
PBCOR	PFPL3	PGEOM	XXFIT	FFT			

And changed the following to allow the swap since they handle it properly or need it for plotting:

AU6D	AU9	CNTR	GREYS	IMEAN	PCNTR	PROFL	TKPL
PRTPL	QMSPL	QWKPL	LABINI	MP2SKY	SKY2MP	SLBINI	

Moved from 15JUL86 this date, nowhere else.

2812. *November 21, 1985* YSCROL (DeAnza) *Eric*

Kesteven pointed out two problems: a strange statement with built-in overflow probability and a "jump" when the zoom is changed. Looking at the DeAnza version of YZOOMC it was clear that two corrections were needed: (1) YSCROL needs to store in common the negatives of the requested scroll values, not the values corrected for the current zoom, and (2) the values sent to the TV are the scrolls with zoom center correction without repeated multiplication by the magnification.

Moved from 15JUL86 this date; I hope it works.

2813. *November 25, 1985* GETROW *Eric*

This I/O routine assumed that floating images are not scaled and thereby made an error which screwed up PLROW and any scaled floating images. Corrected this assumption.

Moved from 15JUL86 this date, nowhere else.

2814. *December 2, 1985* CATDIR *Eric*

Corrected the call sequence to ZEXPND. CATDIR was not able to expand catalog directory files to hold more images without this.

Moved from 15JUL86, nowhere else.

2815. *December 6, 1985* Misc. *Eric*

Changed in response to Gripes:

COMB.HLP	—	Added remark about the origin of the output header.
GRADDRES.HLP	—	Added explanation for how the address is used.
GRNAME.HLP	—	Added explanation for why the name is needed.
GRPHONE.HLP	—	Changed it to refer to GRPHONE — it was just the text of GRNAME.
ICUT.HLP	—	Rewrote it to include the change in units.
PCUT.HLP	—	Rewrote it to include the change in units.
QEXIT.HLP	—	Deleted unused antique.
QMSPL.HLP	—	Changed OPCODE to OPTYPE, corrected spelling problems, added brief explanation of the scaling of image intensities.
QMSPL	—	Changed spellings: OPCODE to OPTYPE, GRAY to GREY.
TVFIDL	—	Corrected misspelling in instructions to the user.
UV1TYPE.HLP	—	Added remark on effect of support size changes.
UV2TYPE.HLP	—	Added remarks on effect of parameter changes and added references to the VLA Scientific Memo Series.
UV3TYPE.HLP	—	As UV2TYPE.HLP.
UV4TYPE.HLP	—	As UV2TYPE.HLP.
UV5TYPE.HLP	—	As UV2TYPE.HLP.

Moved from 15JUL86 this date, nowhere else.

2816. *December 6, 1985* NEWPARMS *Eric*

Revised PSEUDO to allow the redefinition of standard AIPS array and string adverbs. Created the run file NEWPARMS.001 to define all fairly recent adverbs and modified the NOADVERB help file to refer to this. Now a user can RUN NEWPARMS whenever a new adverb rears its ugly head. This will work, but only for task adverbs; verb adverbs will need to occur in the correct common location and hence require that the vocabulary be updated by a RESTORE 0. Perhaps, each new verb adverb should cause the SAVE/GET version number to change.
Moved from 15JUL86 this date, nowhere else.

2817. *December 6, 1985* More Gripes *Eric*

Further minor changes:

GINIT	—	Added more precursor remarks, changed the default plot type to 1 (miscellaneous), and added a no disk space message to replace the cryptic ZCREAT error 3 message.
AU8A	—	Corrected EXTLIST handling of PCNTR files: it skipped the vector-file names on DOCONT rather than DOVECT and it always listed the LEVS. Corrected handling of slice files: it had the max and min reversed. (I suspect that SLICE changed and the others were not corrected.)
BLANK.HLP	—	Added more explanation to the SELC operation since users seem confused by the terse, but correct explanation given previously.
TKSLIN	—	Changed to use the slice min/max as the default PIXRANGE.
SL2PL	—	Changed to use the slice min/max as the default PIXRANGE. Fixed it to know all defaults before creating the plot file and to handle some of its buffers correctly.
SL2PL.HLP	—	Changed default for PIXRANGE.
TKSLICE.HLP	—	Changed default for PIXRANGE.
PLCUB	—	Changed tp declare IERR in main program.
PFPL1	—	Changed to declare I in PF1INI subroutine.
PRTIM	—	Fixed two bugs: a rounding error prevented column 1 from being printed and a logic error caused a crash if the image had fewer than 10 columns.

Moved from 15JUL86, nowhere else.

2818. *December 10, 1985* Gripe fixes *Eric*

More fixes:

GREYS	—	Corrected bad call sequence to SETLOC, affected contour image when not the same as the grey image.
MCUBE	—	Corrected it to allow the input images to reside on more than one disk.
DMCU.INC	—	Added variable for this.
CMCU.INC	—	Ditto.
MCUBE.HLP	—	Added remarks about INNAME and INCLASS being the same for all input images, but INDISK=0 allows multiple disks.

Moved from 15JUL86 this date, nowhere else.

2819. *December 13, 1985* WHATSNEW *Eric*

Updated the 15OCT85 and 15APR86 portions of this help file. The 15APR86 version was way out of date. Deleted 15APR85 portion.
Moved nowhere.

2820. *December 13, 1985* TABCOP *Eric*

TABCOP had a serious error in it which caused it to fail whenever the output file was not the same size as the input (*i.e.*, when they were on disks of different geometry). This was most visible as an "error 4" (EOF) from SUBIM copying clean component files, but could also cause files to be only partly copied with no error indication. Corrected TABCOP and relinked SUBIM.
Moved from 15JUL86 this date, nowhere else.

2821. *December 18-19, 1985* VBPLT *Eric*

This task did not compute correct models, at least for VLA data. Corrected the baseline hour angle computation to include the interferometer longitude(!), changed the units of the clean component positions to those required by the phase computations (they were ≈ 9.1 times too large), raised the buffer size to handle line data, added tests to prevent the program from reading more components than it can handle and raised that number from 1000 to 2000, fixed bug which caused the task to fail if no model points fit on a subplot, and changed the task to plot baselines with no data only if a model is being plotted and the user specifically requests the plot. Also changed the progress messages to be more informative and changed the help file to give information about input units. The include files DVBP.INC and CVBP.INC were also revised. Also corrected the model computations for x-axis types of u, v, w, projected spacing, and position angle. Previously, the values of u, v, w used did not correspond to the baseline being plotted. Moved all this to NEW despite the magnitude of the changes because so many of the changes were serious bug fixes.
Moved from 15JUL86, nowhere else.

2822. *December 24, 1985* Improve TV handling *Eric*

There has been a confusion over nomenclature caused by I^2S using "channel 16" to mean the graphics planes as a whole in a few of our routines (YSCROL, YGYHDR, YFDBCK) while we sensibly use channel numbers NGRAY+1 to NGRAY+NGRAPH for the graphics planes elsewhere. Changed the former to the latter and then worked with Susan Neff to test the code on Goddard's DeAnza. Changed subroutines:

AU6 — In OFFSCROL, TVSCROLL, changed to call the graphics planes channel NGRAY+1.

AU6B — In CURVALUE, changed to call the graphics planes channel NGRAY+1 for scroll references. On roamed images, CURVAL had the habit of applying the boundary condition (refusal to wrap around the edge of the TV screen) at some "arbitrary" place in the middle of the screen. Changed the method of cursor reading and the method of finding the true image coordinates to avoid this problem.

TVFIDL — QUAD was not set to −1 (means skip scroll correction) so the zoom algorithm failed when the image was scrolled.

GRBOXS — Changed to call graphics planes channel NGRAY+1 for scroll. It made no sense to unscroll and zero the graphics plane, draw the boxes, and then restore the scroll of the graphics. So I commented out the scroll restoration.

GRPOLY — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.

YCUCOR — (GEN) Changed graphics channel from 16 to NGRAY+1.

YCURSE — (GEN) Changed graphics channel from 16 to NGRAY+1.

YSCROL — (GEN) Changed precursor remarks.

YIMGIO — (DEA) Corrected bad reference to GRPHIC and uninitialized variable IC to use logical variable GRAY instead.

YSCROL — (DEA) Changed sign of scroll as stored in common, changed to use NGRAY+1 for graphics. Added ability to scroll by large amounts.

YOFM — (DEA) This routine was a mess: it rescaled the input OFM once for each requested color (*i.e.*, perhaps a factor of 16 too much), it reversed red and blue, and it read the red OFM no matter what color was requested.

YINIT — (DEA) Fixed to zero all graphics planes and to reference scroll only up to channel NGRAY+1 (which is now all of the graphics planes).

YZOOMC — (DEA) Changed to pick up the scroll with the correct sign.

YIMGIO — (IIS) Changed references to GRPHIC into BIT16.

YZERO — (IIS) Changed references to GRPHIC into BIT16.

YSCROL — (M70) Changed precursor remarks, changed to convert channel NGRAY+1, etc. to IIS channel 16, changed to put graphics scroll in TVSCRX(NGRAY+1).

YSCROL — (M75) Changed precursor remarks, changed to convert channel NGRAY+1, etc. to IIS channel 16, changed to put graphics scroll in TVSCRX(NGRAY+1), changed to upper-case code.

YZERO — (V20) Removed unneeded reference to GRPHIC.

YSCROL — (V20) Dropped reference to GRPHIC and error return if graphics only was requested. Changed precursor remarks — this version does only one channel and graphics doesn't scroll.

Moved this date from 15JUL86, nowhere else.

2823. *December 24, 1985* TV tasks *Eric*

Corrected in the task area are:

BLANK — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.

BLSUM — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.

TVPL — Corrected error: it was using YTVCIN to get TV parameters which it used and then getting the correct ones through a TVOPEN call. Furthermore, it was putting the grey scale data in the IO buffer offset by NTVHDR words! Also dropped INTYPE and changed ZFI3 to ZFIO.

TVPL.HLP — Dropped INTYPE.

Moved from 15JUL86, nowhere else.

2824. *December 26, 1985* WHATSNEW *Eric*

Updated the 15APR86 portion of this help file.

Moved from 15JUL86 this date, nowhere else.

2825. *December 31, 1985* BLANK *Eric*

Corrected bug: it was opening the second image with the disk number of the first. (In many cases, this was okay, but not all.)

Moved from 15JUL86 this date, nowhere else.

2826. *January 6, 1986* Comtal TV *Eric*

In ZV20XF, corrected undeclared variable I and fixed SS$_NORMAL which was misspelled SS$NORMAL.

Moved from 15JUL86 this date, nowhere else.

2827. *January 7, 1986* YCNECT *Eric*

The generic Y routine YCNECT had an error by which it was unable to draw a near-vertical line by a sequence of horizontal lines. This function is needed on Comtal TVs which apparently cannot draw vertical lines directly.

Moved from 15JUL86 this date, nowhere else.

2828. *January 7, 1986* IMSTAT *Eric*

Had a coding error in which a bad window would cause it to try to close the TV, but not the image. This would then block later IMSTATs, TVSTATs, TVLODs, *et al.* Fixed AU6D.

Moved to 15APR86 this date, nowhere else.

2829. *January 9, 1986* TV *Eric*

I don't know why things seemed to work when I tested them. Corrected were:

DLINTR — Corrected to skip any attempt at inhibiting edge crossing if the "previous" cursor position ≤ 0.

AU6B — In CURVALUE, the new method of finding image pixels was in error. Changed to use new opcode in YCURSE and, otherwise, to restore most of the old method.

YCURSE — (YGEN) Added new OPCODE to correct the input cursor position for zoom and scroll without doing any IO.

IENHNS — Changed to initialize previous cursor position to 0.0. The old initialization caused apparent edge crossings when the interactive LUT enhancement was resumed.

YCUCOR — (YGEN) Changed precursor remarks only to try to avoid the mistake I made in AU6B.

Also set the previous cursor position initially to 0.0 for completeness in GRBOXS, GRPOLY, GRLUTS, HIENH, BLANK, BLSUM, TVHLD, and TVHXF.

Moved corrections only from 15JUL86, nowhere else.

2830. *January 10, 1986* ZTRLOG *Pat/Gary*

This routine handles the messy calling sequence to SYS$TRNLNM. Isolating translation of logical names to a Z routine may allow us to make several current Z routines generic.

Moved from 15JUL86, nowhere else.

2831. *January 10, 1986* VMS Z routines *Pat/Gary*

A number of Z routines were cleaned up to use the new ZTRLOG. They are:

ZQMSIO ZTOPEN ZDOPRT ZDOPR4 ZMYVER ZWHOMI

Moved from 15JUL86, nowhere else.

2832. *January 10, 1986* ZACTV9, ZDCHIN, ZSETUP, QMNGR.COM *Pat/Gary*

Changes were necessary in these routines to achieve the removal of all group logical names. All tasks are now spawned in ZACTV9 except for QMNGR. This now runs LOGINOUT.EXE and uses QMNGR.COM to get started. Some of the changes to these 3 routines were needed to avoid processes hogging terminals by permanently allocating them. In principle, it should be possible for AIPSB and batch tasks to write all their messages to BATCH_OUT now.

Moved from 15JUL86, nowhere else.

2833. *January 10, 1986* New VMS AIPS procedures *Pat/Gary*

The SYSVMS: command procedures have been completely rewritten. The major changes are: (1) The need for group logical names for *AIPS* batch has been removed. (2) There are now two logical name tables only — AIPS_USER and AIPS_PROG. (3) USELNM.COM now tries 3 ways to use logical names: access an existing table, create a system wide table, or use the JOB table. Several procedures were cleaned up in this area.

CLRLNM — now removes access to all *AIPS* tables.
BOOTUP — is simplified.
ASSNBASIC — contains essential logical names.
ASSNLOCAL — contains local peculiarities.

Several changes were made to COMRPL, COMLNK and COMTST. They now have a more secure error recovery. We now have the ability to specify options on the command line instead of setting "permanent" flags. Many obsolete procedures were deleted. The following is a complete list of the current procedures:

BACKUP	AIPS	AIPSPROG	AIPSUSER	ARESTORE	ASSNBASIC
ASSNLOCAL	ASSNPROC	ASSNPROG	ASSNSTART	BOOTFINDER	BOOTUP
BUILDSHR	CLRLNM	COMLNK	COMPILE	COMRPL	COMTST
CREADIR	CREATOLB	GRCHANGE	GRTBC	GTTEX	GXTBC
LOGIN	OPTIONS	QMNGR	RUNAIPS	USELNM	VFC

Moved to 15APR86.

2834. *January 10, 1986* XPORT *Eric*

The test version of XPORT was deleted from 15APR86 since it did not work. This included the help file and the includes DXPT, CXPT, and EXPT. Correct versions of XPORT and MPORT were installed in 15JUL86.

Moved nowhere.

2835. *January 13, 1986* VAX ZSETUP *Gary*

Added by Editors from history file: Changed to use CHCOMP rather than COMPAR.

Moved from 15JUL86, nowhere else.

2836. *January 14, 1986* CONVL *Bill/Kesteven*

Added suggestion by Kesteven that the check in the axis increment, which is done on floating values, have a 5% tolerance. Fixed bug by which the units scaling factor was not applied for convolving with gaussians. I'm not sure when this bug was introduced but it can give seriously incorrect answers.

Moved to 15JUL86.

2837. *January 14, 1986* FFT *Kesteven/Bill*

Fixed bug which occurred when the reference pixel is not an even pixel. Changed phase ramps in FMERG and SPLIT.

Moved to 15JUL86

2838. *January 14, 1986* CATDIR, UVCREA *Eric*

Bugs corrected: in CATDIR, the expanded size of the catalog file was being written to record 2 rather than record 1 in the CA file. UVCREA error handling had a strange return to statement label 20 if the write status of the bad catalog was successfully changed. Deleted the 2 escape branches following label 970. These two errors plus a full CA file led to an infinite loop filled with error messages!
Moved from 15JUL86 this date, nowhere else.

2839. *January 14, 1986* PRTACC *Eric*

Corrected bug: bad address in INIT operation.
Moved from 15JUL86, nowhere else.

CHANGE.DOC: 15JUL86 Version as TST — Part 1

2840. *October 29, 1985* SL2PL *Eric*

Corrected bug in call to GINIT which caused EXTLIST to list incorrect parameter values for the plot file output or to assert that the value was garbage. PRUSER was changed to DOSLIC.
Moved to 15APR86 this date, nowhere else.

2841. *October 30, 1985* Undeclared variables *Eric*

Added by Editors from history file: Corrected undeclared variables in YOFM (YGEN version) and in the Q120B versions of APPEEK, BPRLSE, XXPTS, and SEARCH.
Moved to 15JUL86 this date, nowhere else.

2842. *November 6, 1985* Compile/Link Procedures *Gary*

Added the capability to log errors and progress reports to a file. The programmer can set this up by doing a DEFINE ERRLOG *some-file* before calling the COMRPL or COMLNK procedures. Also added was the capability to set and unset an automatic purge flag. This flag can be set by doing a LINKPURGE and unset by doing a LINKNOP. The following routines were changed:
COMLNK COMRPL COMTST AIPSPROG COMPILE
LINKPURGE (new) LINKNOP (new)
Moved to 15APR86.

2843. *November 7, 1985* Command procedures *Gary*

The following command procedures were changed because our new directory structure has propagated to NEW.
AIPS ASSIGNL (deleted) ASSNBAT STARTUP BOOTUP
Moved to 15APR86.

2844. *November 7, 1985* ZDOPRT, ZQMSIO, ZDOPR4 *Gary*

These routines were updated to use the logical name for the output queue found in the AIPS_USER table, rather than the old group logical name.
Moved to 15APR86.

2845. *November 7, 1985* ZV20XF *Gary*

Changed bad DATA statement for variable N7.
Moved to 15APR86.

2846. *November 7, 1985* Undeclared Variables *Gary*

Undeclared variables were declared in the following routines in areas YGEN: and QVMS: —
PLMAKE YCONST YTVMC ZAPGET ZAPGT4 ZAPPUT ZAPT4
Moved nowhere.

2847. *November 7, 1985* AIPSB *Gary*

Removed a debug statement printing to unit 10 which was left in the code.
Moved to new.

2848. *November 7, 1985* VBANT *John*

A new inputs parameter, TYINC, was added. With TYINC, the user may specify a effective integration time for the visibility records which is used to calculate the visibility weights. Setting TYINC negative causes VBANT to reweight the *uv* data, but not to calibrate the visibility amplitudes.
Moved nowhere.

2849. *November 8, 1985* VBLIN *John*

All untyped names have been declared.
Moved nowhere.

2850. *November 18, 1985* TVLOD *Eric*

Changed AU5A, TVWIND and TVLOAD to support an interpolation option in TVLOD. If TXINC < -0.5, columns are interpolated to fill more of the screen if possible in the x direction and if TYINC < -0.5, rows are interpolated to fill more of the screen if possible in the y direction. Also changed TVLOD and TVALL help files and added new Fortran file LINTER whch does linear interpolation of a row. Updated WHATSNEW.HLP also.
Moved nowhere.

2851. *November 18, 1985* IMLOD *Gary*

Added by Editors from history file: Corrected NCOUNT option in IMLOD. Changed RWTAB and TABHDR to make FITS run faster. Corrected TABLIN for a bug arising when records cross block boundaries and corrected SETDEF for a poor choice of default table type.
Moved nowhere.

2852. *November 19, 1985* Positions *Eric*

AIPS has had a long-standing problem dealing with rotated coordinates. In studying the problem, I have found that GEOM and LGEOM should be used to do rotations only if the pixels are square; they rotate the matrix, not the sky as the output headers claim. The routine which sets up the "location" common, SETLOC, also had a bug: it reversed the axis increments when it reversed other parameters to avoid rotations near 90. This has been fixed and the call sequence changed to allow the calling program to control whether this coordinate swap is allowed. Fixed QIKHDR for the call sequence change; it was switching the central pixel values, but not the labels and the like. Also altered the display formats a bit in QIKHDR, LSTHDR, and MSGHDR to avoid some confusion on RAs greater than 24 hours. Also changed the following to forbid coordinate swap in the new call sequence of SETLOC in order to avoid confusion such as encountered in QIKHDR:

PRTIM	GAL	HGEOM	IMFIT	IMLOD	IRING	JMFIT	
PBCOR	PFPL3	PGEOM	XXFIT	FFT			

And changed the following to allow the swap since they handle it properly or need it for plotting:

AU6D	AU9	CNTR	GREYS	IMEAN	PCNTR	PROFL	PRTPL
QMSPL	QWKPL	LABINI	MP2SKY	SKY2MP	SLBINI	TKPL	

Moved to 15APR86 21-Nov, nowhere else.

2853. *November 20, 1985* TVLABEL *Eric*

Corrected IAXIS1 and ITICS to handle interpolated images. They had not allowed for a fractional image pixel to TV pixel ratio and had several other minor bugs.
Moved nowhere.

2854. *November 21, 1985* YSCROL (DeAnza) *Eric*

Kesteven pointed out two problems: a strange statement with built-in overflow probability and a "jump" when the zoom is changed. Looking at the DeAnza version of YZOOMC it was clear that two corrections were needed: (1) YSCROL needs to store in common the negatives of the requested scroll values, not the values corrected for the current zoom, and (2) the values sent to the TV are the scrolls with zoom center correction without repeated multiplication by the magnification.
Moved to 15APR86 this date; I hope it works.

2855. *November 22, 1985* Improve TV handling *Eric*

There has been a confusion over nomenclature caused by I^{2}S using "channel 16" to mean the graphics planes as a whole in a few of our routines (YSCROL, YGYHDR, YFDBCK) while we sensibly use channel numbers NGRAY+1 to NGRAY+NGRAPH for the graphics planes elsewhere. Changing the former to the latter:

AU6 — In OFFSCROL, TVSCROLL, changed to call the graphics planes channel NGRAY+1.
AU6B — In CURVALUE, changed to call the graphics planes channel NGRAY+1 for scroll references.
GRBOXS — Changed to call graphics planes channel NGRAY+1 for scroll.
GRPOLY — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.
BLANK — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.
BLSUM — Changed to call graphics planes channel NGRAY+1 for turning off the scroll.
YCUCOR — (GEN) Changed graphics channel from 16 to NGRAY+1.
YCURSE — (GEN) Changed graphics channel from 16 to NGRAY+1.
YIMGIO — (IIS) Changed references to GRPHIC into BIT16.
YIMGIO — (DEA) Corrected bad reference to GRPHIC and uninitialized variable IC to use logical variable GRAY instead.
YZERO — (IIS) Changed references to GRPHIC into BIT16.
YZERO — (V20) Removed unneeded reference to GRPHIC.
YSCROL — (GEN) Changed precursor remarks.
YSCROL — (M70) Changed precursor remarks, changed to convert channel NGRAY+1, etc. to IIS channel 16, changed to put graphics scroll in TVSCRX(NGRAY+1).
YSCROL — (M75) Changed precursor remarks, changed to convert channel NGRAY+1, etc. to IIS channel 16, changed to put graphics scroll in TVSCRX(NGRAY+1), changed to upper-case code.
YSCROL — (DEA) Changed sign of scroll as stored in common, changed to use NGRAY+1 for graphics.
YSCROL — (V20) Dropped reference to GRPHIC and error return if graphics only was requested. Changed precursor remarks — this version does only one channel and graphics doesn't scroll.

Moved to 15APR86 on 24-Dec, nowhere else.

2856. *November 25, 1985* GETROW *Eric*

This I/O routine assumed that floating images are not scaled and thereby made an error which screwed up PLROW and any scaled floating images. Corrected this assumption.
Moved to 15APR86 this date, nowhere else.

2857. *November 26, 1985* TV buffers *Eric*

I have looked over our TV buffer declarations with three things in mind: reading 4096 floating images, handling TVs with 1280 x pixels, and having all commons of the same name the same size. Changed:

AU5A — TVLOAD buffer changed to 4096 floating in common /IMBUF/.
AU5B — Labeling buffer made 2 times 1280.
AU5C — Wedge buffer made 4096 floating in common /IMBUF/.
AU5D — TVMOVIE buffer changed to 4096 floating in common /IMBUF/.
AU6 — Changed buffer common from /IMBUF/ to /HIMBUF..
AU6A — Buffer made 1536 in new common /HIMBUF/.
AU6B — CURVALUE buffer made 1536 in new common /HIMBUF/.
AU6C — Changed buffer common from /IMBUF/ to /HIMBUF/, changed call sequence of TVFIDL.
AU6D — IMSTAT buffer made 4096 floating in common /IMBUF/.
BLANK — Changed call to TVFIDL.
BLSUM — Changed call to TVFIDL.
HIENH — Renamed buffers common from /IMBUF/ to /HIMBUF/.
HILUT — Renamed buffers common from /IMBUF/ to /HIMBUF/.
ISCALE — Changed declaration sizes for common /IMBUF/.
TVFIDL — Placed buffer in call sequence, dropped it from common.
TVLOAD — Changed declaration sizes for common /IMBUF/.

Moved nowhere.

2858. *November 27, 1985* AP queuing *Eric*

Changed the way in which QINIT delays for higher-priority *AIPS* tasks. Before, QINIT would delay MX6, for example, for MX5 as long as it would for MX1. This isn't fair, so I added counters for each lower *AIPS* number with the maximum delay being the standard formula as a function of the difference in *AIPS* numbers.
Moved nowhere.

2859. *November 27, 1985* AP tasks *Eric*

Corrected:
UVSUB — Fixed one undeclared variable.
GRIDR — 12 diagnostics corrected: all simple declarations.
CONVL — 46 diagnostics corrected: all simple declarations.
Moved nowhere.

2860. *November 30, 1985* DDT *Don/Eric*

Added by Editors from history file: The original PFT set of procedures has been revised to handle three different problems of increasing size. The "small" problem has about 8000 visibilities to make 256^2 images with 2000 clean components. The "medium" problem increases these numbers to 15000, 512^2, and 5000, respectively, while the "large" problem increases them to 50000, 1024^2, and 15000, respectively. The test and verification suite now consists of two RUN files, DDTLOAD.001 and DDTEXEC.001, and two help files, DDT.HLP and DDTSAVE.HLP. Two versions of DDT will be available someday: a 1600-bpi version with the two smaller problems and a 6250-bpi version with all three problems. A few bugs and niceties remain to be worked out.
Moved nowhere.

2861. *December 2, 1985* CATDIR *Eric*

Corrected the call sequence to ZEXPND. CATDIR was not able to expand catalog directory files to hold more images without this.
Moved to 15APR86, nowhere else.

2862. *December 3, 1985* Misc. *Eric*

Changed in response to Gripes:

AU6C	—	Changed call to TVFIDL to bit mask, setting the requested channels to only those which are on and issuing an error if they are not on.
BLANK	—	Changed call to TVFIDL to bit mask (which matched the comments already in the program).
BLSUM	—	As BLANK.
COMB.HLP	—	Added remark about the origin of the output header.
GRADDRES.HLP	—	Added explanation for how the address is used.
GRNAME.HLP	—	Added explanation for why the name is needed.
GRPHONE.HLP	—	Changed it to refer to GRPHONE — it was just the text of GRNAME.
ICUT.HLP	—	Rewrote it to include the change in units.
PCUT.HLP	—	Rewrote it to include the change in units.
QEXIT.HLP	—	Deleted this unused antique.
QMSPL.HLP	—	Changed OPCODE to OPTYPE, corrected spelling problems, added brief explanation of the scaling of image intensities.
QMSPL	—	Changed spellings: OPCODE to OPTYPE, GRAY to GREY.
TVFIDL	—	Corrected misspelling in instructions to the user, changed channel number input argument to bit mask (allows more than one plane to be fiddled).
UV1TYPE.HLP	—	Added remark on effect of support size changes.
UV2TYPE.HLP	—	Added remarks on effect of parameter changes and added references to the VLA Scientific Memo Series.
UV3TYPE.HLP	—	As UV2TYPE.HLP.
UV4TYPE.HLP	—	As UV2TYPE.HLP.
UV5TYPE.HLP	—	As UV2TYPE.HLP.

Moved to 15APR86 (except TVFIDL), nowhere else.

2863. *December 3, 1985* NEWPARMS *Eric*

Revised PSEUDO to allow the redefinition of standard *AIPS* array and string adverbs. Created the run file NEWPARMS.001 to define all fairly recent adverbs and modified the NOADVERB help file to refer to this. Now a user can RUN NEWPARMS whenever a new adverb rears its ugly head. This will work, but only for task adverbs; verb adverbs will need to occur in the correct common location and hence require that the vocabulary be updated by a RESTORE 0. Perhaps, each new verb adverb should cause the SAVE/GET version number to change. Moved to 15APR86, nowhere else.

2864. *December 3, 1985* QINIT *Eric*

Revised the new AP queuing algorithm to make it simpler. After waiting one *POPS* number's worth, a *POPS* number n will now have the priority of a *POPS* number $n+1$ to get one round on the AP.
Moved nowhere.

2865. *December 5, 1985* More misc. *Eric*

More work on the smaller gripes:

CATLST	—	Changed it to alphabetize up to 400 entries at a time (was 200) and to list scratch files on CATALOG only if they are allowed by the usual naming adverbs (used to force them if the name or class fields were blank and the type field was specified).
CATALOG.HLP	—	Deleted the remarks about SC files and changed the size limit remark for DOALPHA.
MCAT.HLP	—	Changed the size limit remark for DOALPHA.
UCAT.HLP	—	Changed the size limit remark for DOALPHA.
GRBOXS	—	Added code to test for a corner being reset that is no longer visible (*i.e.*, by zoom) to avoid forcing it into the visible area.
AU5C	—	Changed REBOX to get image name parameters from the TV rather than from the name adverbs.
REBOX.HLP	—	Made corresponding changes.
AU9	—	Changed to return ERROR adverb FALSE (-1) on good fit/interpolation and TRUE (1) on failure.
MAXFIT.HLP	—	Changed to explain ERROR.
QIMVAL.HLP	—	Changed to explain ERROR.
IMVAL.HLP	—	Changed to explain ERROR.

Moved nowhere.

2866. *December 6, 1985* More Gripes *Eric*

Further minor changes:

GINIT	—	Added more precursor remarks, changed the default plot type to 1 (miscellaneous), and added a no disk space message to replace the cryptic ZCREAT error 3 message.
AU8A	—	Corrected EXTLIST handling of PCNTR files: it skipped the vector-file names on DOCONT rather than DOVECT and it always listed the LEVS. Corrected handling of slice files: it had the max and min reversed. (I suspect that SLICE changed and the others were not corrected.)
BLANK.HLP	—	Added more explanation to the SELC operation since users seem confused by the terse, but correct explanation given previously.
GAL	—	Added code to plot top lines and add version ID to history file.
TKSLIN	—	Changed to use the slice min/max as the default PIXRANGE.
SL2PL	—	Changed to use the slice min/max as the default PIXRANGE. Fixed it to know all defaults before creating the plot file and to handle some of its buffers correctly.
SL2PL.HLP	—	Changed default for PIXRANGE.
TKSLICE.HLP	—	Changed default for PIXRANGE.
PLCUB	—	Changed to declare IERR in main program.
PFPL1	—	Changed to declare I in PF1INI subroutine.
PRTIM	—	Fixed two bugs: a rounding error prevented column 1 from being printed and a logic error caused a crash if the image had fewer than 10 columns.

Moved to 15APR86 (except GAL), nowhere else.

2867. *December 6, 1985* VAX backup procedures *Gary*

Added by Editors from history file: Worked on the VAX backup procedures ABACKUP and ARESTORE and their help files to begin to bring in the new directory structure.
Moved nowhere.

2868. *December 10, 1985* Gripe fixes *Eric*

More fixes:

GREYS	—	Corrected bad call sequence to SETLOC, affected contour image when not the same as the grey image.
MCUBE	—	Corrected it to allow the input images to reside on more than one disk.
DMCU.INC	—	Added variable for this.
CMCU.INC	—	Ditto.
MCUBE.HLP	—	Added remarks about INNAME and INCLASS being the same for all input images, but INDISK=0 allows multiple disks.

Moved to 15APR86 this date, nowhere else.

2869. *December 10, 1985* QMSPL *Eric*

Added a new option to QMSPL to save the output print file in a user-specified file. It will be printed, but not deleted if OUTFILE is not blank. Changed QMSPL and QMSPL.HLP, changed the call sequence to ZQMSIO to specify a file name on opens, and changed the calls to ZQMSIO in AIPLAS and AIPMAN. This option will allow users to retain the print file for their own later use in order to reprint on different paper or transparencies, to modify the file for use in plot or TEX compositions, etc.
Moved nowhere.

2870. *December 10, 1985* MOMNT *Eric*

Changed inputs to allow two flux cutoffs, one on flux and one on absolute value of flux. This option has been in XMOM for some time. Changed MOMNT and MOMNT.HLP to implement the option and changed XMOM to speed up the flux cutoff testing. MOMNT also blanked outputs if the zero moment was smaller than the cutoff (now FLUX). Dropped this, but added a needed test for crazy first moments.
Moved nowhere.

2871. *December 11, 1985* COMB *Eric*

Added new OPCODE = 'MEAN' to produce a weighted mean. This differs from 'SUM ' in that the output is one of the two inputs if the other is blanked (on input or by clipping). The output is blanked only if both inputs are blanked. This operation is desirable for mosaicing. Other minor fixes: dropped clipping message when no clipping will occur and dropped test on sum of squares of the two clipping limits in OPCODEs 'POLI' and 'POLA' and a modification of the output Stokes parameter on 'SUM ' both of which made no sense. Also changed the help file.
Moved nowhere.

2872. *December 11, 1985* UVCOP *Eric*

Changed task to use adverb TIMERANG for the time range and BPARM only for the option selection. Also changed it to use the specified start time with 0 implying the beginning and to use the specified stop time with 0 or stop $\leq$ start implying the end. This was more or less the previous intention, but the coding was not right.
Moved nowhere.

2873. *December 12, 1985* PBSIZE, NOISE *Eric*

Changed DAPL.INC, CAPL.INC, POPSDAT.HLP, and NEWPARMS.001 (RUN file) to define new array adverbs PBSIZE, and NOISE for the mosaicing version of VM. Tim owes us the help files.
Moved nowhere.

2874. *December 12, 1985* VTESS *Tim*

VTESS is a new version of VM which can tesselate images together: it does a joint deconvolution of up to 16 different dirty images (there is a limit of 5 until CFILES is modified). It can combine single dish and interferometer images if a PSF for the single dish is known: this works better than the alternative of using the single dish as a default. It also does primary beam correction of images, using either a circular gaussian of specified width or the VLA primary beam as measured by Napier and Rots, if TELESCOP = 'VLA' in the dirty image header. Some other new features: verbose or terse output, display of residuals, neither GAIN nor NPOINTS now required.

VM will be frozen as is: VTESS is now the preferred MEM deconvolution task. *Editors note:* VM *will continue to be supported for a while and will receive bug fixes and speed improvements, but not new algorithm developments.* New adverbs PBSIZE(16), NOISE(16), with help files. New help file for VTESS, new INC files called DVMT, CVMT, EVMT, and IVMT.

Moved to 15JUL86 at the VLA.

2875. *December 13, 1985* CLIP *Eric*

This task is confusing a lot of people. Stokes I is a *vector* average of two correlators and hence can be very different on, for example, UVPLT displays than the straight correlator values. CLIP has always worked solely with the latter. So I changed things to (1) count deletions by channel number and report them as such, (2) explain more in the help file, and (3) offer the option to apply the clip levels to the data converted to Stokes (I,Q,U,V) rather than applying to the correlator values directly. Also created DCLP.INC and CCLP.INC.

Moved nowhere.

2876. *December 13, 1985* WHATSNEW *Eric*

Updated the 15APR86 and 15JUL86 portions of this help file.

Moved nowhere.

2877. *December 13, 1985* TABCOP *Eric*

TABCOP had a serious error in it which caused it to fail whenever the output file was not the same size as the input (*i.e.*, when they were on disks of different geometry). This was most visible as an "error 4" (EOF) from SUBIM copying clean component files, but could also cause files to be only partly copied with no error indication. Corrected TABCOP and relinked SUBIM.

Moved to 15APR86 this date, nowhere else.

2878. *December 18-19, 1985* VBPLT *Eric*

This task did not compute correct models, at least for VLA data. Corrected the baseline hour angle computation to include the interferometer longitude(!), changed the units of the clean component positions to those required by the phase computations (they were ≈ 9.1 times too large), raised the buffer size to handle line data, added tests to prevent the program from reading more components than it can handle and raised that number from 1000 to 2000, fixed bug which caused the task to fail if no model points fit on a subplot, and changed the task to plot baselines with no data only if a model is being plotted and the user specifically requests the plot. Also changed the progress messages to be more informative and changed the help file to give information about input units. The include files DVBP.INC and CVBP.INC were also revised. Also corrected the model computations for x-axis types of u, v, w, projected spacing, and position angle. Previously, the values of u, v, w used did not correspond to the baseline being plotted. Moved all this to NEW despite the magnitude of the changes because so many of the changes were serious bug fixes.

Moved to 15APR86, nowhere else.

2879. *December 24, 1985* WHATSNEW *Eric*

Added VBPLT, CCMRG, and other table changes to WHATSNEW.HLP.

Moved nowhere.

2880. *December 24, 1985* CCMRG *Eric*

Long-awaited, new task: CCMRG sorts a CC file into position order, adds together those components that are at the same pixel, and resorts to descending absolute value of flux order. Developed general subroutine TABMRG to handle the merge step. Also a help file.

Moved nowhere.

2881. *December 24, 1985* TABLES *Eric*

Doing CCMRG, I found a number of things which needed correcting or improving. Among these were:

TABSRT — Corrected precursor remarks: the column numbers are logical not physical numbers. Added ability to sort on absolute value (KEY < 0).

ITBSRT — Put in support for sort with absolute value. Also corrected the precursor remarks.

OTBSRT — Ditto. The new code for absolute value sort is 256 added with appropriate sign to the table header sort codes.

PRTCC — Dropped INTYPE (forced to 'MA'), corrected column title pick up, changed handling of table sort code.

PRTCC.HLP — Dropped INTYPE.

DPCC.INC — Dropped INTYP.

CPCC.INC — Dropped INTYP.

AU8A — Changed handling of table sort code.

PRTAB — Dropped INTYPE, changed handling of table sort code.

PRTAB.HLP — Dropped INTYPE.

DPTB.INC — Dropped INTYP.

CPTB.INC — Dropped INTYP.

CCINI — Changed sort code to -257 (descending absolute value of column 1, the flux).

TASRT — Changed spellings, dropped INTYPE.

TASRT.HLP — Changed spellings, dropped INTYPE, added explanation of negative column numbers for sort by absolute value.

Moved nowhere.

2882. *December 24, 1985* TV (mostly DeAnza) *Eric*

Susan Neff helped me to find a number of problems with the TV code. Corrected are:

YSCROL — (DEA) I had it right, but fixed a bit of nonstandard coding. Added ability to scroll by large amounts.

YOFM — (DEA) This routine was a mess: it rescaled the input OFM once for each requested color (*i.e.*, perhaps a factor of 16 too much), it reversed red and blue, and it read the red OFM no matter what color was requested.

YINIT — (DEA) Fixed to zero all graphics planes and to reference scroll only up to channel NGRAY+1 (which is now all of the graphics planes).

YZOOMC — (DEA) Changed to pick up the scroll with the correct sign.

GRBOXS — It made no sense to unscroll and zero the graphics plane, draw the boxes, and then restore the scroll of the graphics. So I commented out the scroll restoration.

TVPL — Corrected error: it was using YTVCIN to get needed TV parameters which it used and then getting the correct ones through a TVOPEN call. Furthermore, it was putting the grey scale data in the IO buffer offset by NTVHDR words! Also dropped INTYPE and changed ZFI3 to ZFIO.

TVPL.HLP — Dropped INTYPE.

AU6B — On roamed images, CURVAL had the habit of applying the boundary condition (refusal to wrap around the edge of the TV screen) at some "arbitrary" place in the middle of the screen. Changed the method of cursor reading and the method of finding the true image coordinates to avoid this problem.

TVFIDL — QUAD was not set to −1 (means skip scroll correction) so the zoom algorithm failed when the image was scrolled. Also restored the buffer to the call sequence — where had it gone?!?

Moved to 15APR86, nowhere else.

2883. *December 30, 1985* TAMRG *Eric*

Cleaned up the wording in the help files for TASRT and CCMRG. Changed TABSRT to allow the second key to be null (*i.e.*, sort on the first key only). Corrected minor display bug in AU8A. Created new task, TAMRG, to perform the sort, merge and resort operation on general tables files under very general control of the user. Created new adverb OUTVERS for output extension version number by adding it to POPSDAT.HLP, DAPL.INC, CAPL.INC, and the RUN file NEWPARMS.001. Changed TAMRG, TASRT, and CCMRG to use this adverb. Created help file for new adverb.

Moved nowhere.

2884. *December 31, 1985* IMVIM *Eric*

New task: plots one image's pixel values against another's (*i.e.*, a scatter plot). It includes options to bin the values, counting the number of occurences in each bin and then plotting symbols of a constant size or of a size proportional to the count or log of the count. Options to offset one image with respect to the other are also available. Also corrected bug in BLANK — it was opening the second image with the disk number of the first. Created includes DIVI.INC and CIVI.INC and added to the WHATSNEW.HLP as well.
Moved BLANK fix to 15APR86, nowhere else.

2885. *January 1, 1986* POLCO *Neil*

Changed blanking option default to magic value blanking for consistency with other tasks. Also fixed the help file.
Moved nowhere.

2886. *January 2, 1986* EXTLIST *Eric*

Modified AU8A to display the parameters of IMVIM plot files.
Moved nowhere.

2887. *January 6, 1986* DMPX.INC *Bill*

Increased size of WROW buffer to R*4 (4096) to allow R*4 for all disk transfers in UVMAP.
Moved nowhere.

2888. *January 6, 1986* Comtal TV *Eric*

In ZV20XF, corrected undeclared variable I and fixed SS$_NORMAL which was misspelled SS$NORMAL.
Moved to 15APR86 this date, nowhere else.

2889. *January 7, 1986* YCNECT *Eric*

The generic Y routine YCNECT had an error by which it was unable to draw a near-vertical line by a sequence of horizontal lines. This function is needed on Comtal TVs which apparently cannot draw vertical lines directly.
Moved to 15APR86 this date, nowhere else.

2890. *January 7, 1986* IMSTAT *Eric*

Had a coding error in which a bad window would cause it to try to close the TV, but not the image. This would then block later IMSTATs, TVSTATs, TVLODs, *et al.* Fixed AU6D.
Moved to 15APR86 this date, nowhere else.

2891. *January 8, 1986* New VMS AIPS procedures *Pat/Gary*

The SYSVMS: command procedures have been completely rewritten. The major changes are: (1) The need for group logical names for *AIPS* batch has been removed. (2) There are now two logical name tables only — AIPS_USER and AIPS_PROG. (3) USELNM.COM now tries 3 ways to use logical names: access an existing table, create a system wide table, or use the JOB table. Several procedures were cleaned up in this area.

CLRLNM — now removes access to all *AIPS* tables.
BOOTUP — is simplified.
ASSNBASIC — contains essential logical names.
ASSNLOCAL — contains local peculiarities.

Several changes were made to COMRPL, COMLNK and COMTST. They now have a more secure error recovery. We now have the ability to specify options on the command line instead of setting "permanent" flags. Many obsolete procedures were deleted. The following is a complete list of the current procedures:

BACKUP	AIPS	AIPSPROG	AIPSUSER	ARESTORE
ASSNBASIC	ASSNLOCAL	ASSNPROC	ASSNPROG	ASSNSTART
BOOTFINDER	BOOTUP	BUILDSHR	CLRLNM	COMLNK
COMPILE	COMRPL	COMTST	CREADIR	CREATOLB
GRCHANGE	GRTBC	GTTEX	GXTBC	LOGIN
OPTIONS	QMNGR	RUNAIPS	USELNM	VFC

Moved to 15APR86.

2892. *January 8, 1986* ZACTV9, ZDCHIN, ZSETUP, QMNGR.COM *Pat/Gary*

Changes were necessary in these routines to achieve the removal of all group logical names. All tasks are now spawned in ZACTV9 except for QMNGR. This now runs LOGINOUT.EXE and uses QMNGR.COM to get started. Some of the changes to these 3 routines were needed to avoid processes hogging terminals by permanently allocating them. In principle, it should be possible for AIPSB and batch tasks to write all their messages to BATCH_OUT now.

Moved to 15APR86.

2893. *January 8, 1986* ZTRLOG *Pat/Gary*

This routine handles the messy calling sequence to SYS$TRNLNM. Isolating translation of logical names to a Z routine may allow us to make several current Z routines generic.

Moved to 15APR86.

2894. *January 8, 1986* VMS Z routines *Pat/Gary*

A number of Z routines were cleaned up to use the new ZTRLOG. They are:

ZQMSIO ZTOPEN ZDOPRT ZDOPR4 ZMYVER ZWHOMI

Moved to 15APR86.

2895. *January 9, 1986* UVMAP *Bill*

UVMAP was brought into the *real* world. The output image was changed to be in floating format which saved a scratch file and the final floating to fixed conversion. Cleaned up several problems with buffer size declarations, etc. Also changed UVMAP HLP

Moved nowhere.

2896. *January 9, 1986* APCLN *Bill*

Now reads and writes floating format images only; the output file is used as the residual scratch file a la MX so it can be recovered in the case of a crash. This reduced the number of scratch files by one and eliminated the final REAL to INTEGER conversion.

A new adverb, BLC, was added to allow CLEANing of cubes. One plane can be processed per execution of APCLN, but the output is written into a cube of the same dimensions as the dirty image.

APCLN now partially supports assymmetrical beams. The component finding step still uses half of the beam, but the transform of the beam now keeps the full complex rather than only the real part .and subroutine GRIDER now does the full complex multiply. Thus the correct beam is used in the proper subtraction of the components.

A negative value of NITER will now result in the CLEAN stopping if a negative component is encountered.

Several irregularities involving buffer sizes and other minor things were cleaned up. Changed also APCLN.HLP, DCLN.INC, CCLN.INC.

Moved nowhere.

2897. *January 9, 1986* TV *Eric*

I don't know why things seemed to work when I tested them. Corrected were:

- DLINTR — Corrected to skip any attempt at inhibiting edge crossing if the "previous" cursor position ≤ 0.
- AU6B — In CURVALUE, the new method of finding image pixels was in error. Changed to use new opcode in YCURSE and, otherwise, to restore most of the old method.
- YCURSE — (YGEN) Added new OPCODE to correct the input cursor position for zoom and scroll without doing any IO.
- IENHNS — Changed to initialize previous cursor position to 0.0. The old initialization caused apparent edge crossings when the interactive LUT enhancement was resumed.
- YCUCOR — Changed precursor remarks only to try to avoid the mistake I made in AU6B.

Also set the previous cursor position initially to 0.0 for completeness in GRBOXS, GRPOLY, GRLUTS, HIENH, BLANK, BLSUM, TVHLD, and TVHXF.

Moved corrections only to 15APR86, nowhere else.

2898. *January 9, 1986* PLNGET *Eric*

Corrected and standardized this routine. It now scales both floating and integer images and tests for both floating and integer blanking. When the floating only process has gone further, we should drop the integer capabilities and add the option for extra scaling (for VM in particular). Moved routine from APLNOT: to APLSUB:.

Moved nowhere.

2899. *January 10, 1986* MINS3 *Bill*

Modified to not attempt to use more than 16384 bytes of buffer when several reads are needed for a given "row". It was blowing up when too big a buffer was given.

Moved nowhere.

2900. *January 10, 1986* FFT *Bill*

Converted to read and write only floating format images. This eliminates 2 scratch files and the initial float of the input image(s) and the fix of the output images. The new version ran about 60% faster in a test case and gives significantly better results in a transform–inverse transform test than the older integer version. Also changed FFT.HLP, DFFT.INC, CFFT.INC.

Moved nowhere.

2901. *January 10, 1986* UVUNIF *Bill*

Modified to write a floating sum-of-counts scratch file. Affects MX.

Moved nowhere.

2902. *January 10, 1986* XPORT, MPORT *Eric*

New tasks written by Jeff Brooks and Bob Duquet have been installed with some minor cleanup which included removing hundreds of blank lines, changing call sequences for TVFIDL and YCWRIT, removing a STOP statement from a Z routine, declaring and initializing variables in the COS Z routines, etc. Include files are DMPT, CMPT, EMPT, DXPT, CXPT, and EXPT; the Help files were installed in HLPFIL: and the Fortran files were placed in APGNOT: (XPORT) and YPGNOT: (MPORT). In addition, there are Z routines for VMS and COS. These have been put in the files ZXPORT (routines ZPUTO, ZPUTL, ZPUTN, ZPUTC and, for COS, ZALI16) and ZMPORT (routines ZGETO, ZGETL, ZGETN, ZGETC and, for COS, ZI16AL) in APLNVMS: and APLNCOS:. The routines IAXIS1, ITICS, and LSTHDR were moved from AIPSUB: to YSUB: and APLSUB: to support MPORT. The 15APR86 versions of XPORT were deleted since they will not even compile. Also updated WHATSNEW.HLP.

Moved nowhere.

2903. *January 10, 1986* TAFFY *Bill*

Modified to read and write only floating format pixels. This allowed the elimination of an incore move of the input data. Scaling is now only done if necessary. Some cleanup of the typing. Buffer sizes doubled, it will now handle 4096 images.

Moved nowhere.

2904. *January 11, 1986* VTESS *Tim*

Modified to perform all the entropy-related calculations in a Q-routine, QMENT. Since this is now the only routine which knows about entropy, the form can be changed easily. A VFC version of QMENT has also been provided. The increase in speed on a VAX 11/780 + 120B AP is only about 25%, but it should vectorize quite a bit better than before. I do not know how to insert the VFC routine into the FPS library on CVAX:: so the program has not yet been compiled.

Also, some algorithm changes to aid single-dish observers. The variable NPOINTS is now determined completely automatically and is no longer a free parameter. The typical value is unity. Should also correctly free up input files. Changed the include files also.

Moved to VLA 15APR86 area.

2905. *January 13, 1986* CANDY *Bill*

Now writes only floating format images. Got rid of one buffer and doubled the size of the other; now handles 4096 images. Got rid of OUTMA and call CANHIS from the main routine.

Moved nowhere.

2906. *January 13, 1986* PRTACC *Eric*

Corrected bug: bad address in INIT operation.
Moved to 15APR86, nowhere else.

2907. *January 13, 1986* VAX ZSETUP *Gary*

Added by Editors from history file: Changed to use CHCOMP rather than COMPAR.
Moved to 15APR86, nowhere else.

2908. *January 14, 1986* CONVL *Bill/Kesteven*

Forced CONVL to always write floating images, changed buffers to floating. Because of the fancy subimaging and zero padding involved no improvment was made in the performance.
Added suggestion by Kesteven that the check in the axis increment which is done on floating values have a 5% tolerance.
Fixed bug by which the units scaling factor was not applied for convolving with gaussians. I'm not sure when this bug was introduced but it can give seriously incorrect answers. Also changed DCVL.INC and CCVL.INC.
Bug fix moved to 15APR86.

2909. *January 14, 1986* FFT *Kesteven/Bill*

Fixed bug which occurred when the reference pixel is not an even pixel. Changed phase ramps in FMERG and SPLIT. Increased size of BMUL in DFFT.INC to take care of the extra word used by these changes.
Moved to 15APR86

2910. *January 14, 1986* GRIDR *Bill*

Modified SDGUNF (the uniform weighting routine) to store floating counts of occurrences on the disk.
Moved nowhere.

2911. *January 14, 1986* UVINIT *Bill*

Changed to be smarter about NPIO (the number of visibilities per call). If the value passed is 0, the largest value which can be used with double buffering will be used. If the value is too large, the largest value useable for single buffering will be substituted. The returned value is the value actually used. Did a little other cleaning up.
Moved nowhere.

2912. *January 14, 1986* CATDIR, UVCREA *Eric*

Bugs corrected: in CATDIR, the expanded size of the catalog file was being written to record 2 rather than record 1 in the CA file. UVCREA error handling had a strange return to statement label 20 if the write status of the bad catalog was successfully changed. Deleted the 2 escape branches following label 970. These two errors plus a full CA file led to an infinite loop filled with error messages!
Moved to 15APR86 this date, nowhere else.

2913. *January 14, 1986* CONVRT, PLNGET *Eric*

Corrected CONVRT to zero the integer blanking part of the header after going to floating point and made the test for blanking smarter in PLNGET. This made the new CONVL run better.
Moved nowhere.

2914. *January 14, 1986* SUBIM *Eric*

Changed it to clear the blanking flags and then set the appropriate one only if blanked pixels were found. Also added test and "death by unnatural causes" if the output image is completely blanked.
Moved nowhere.

2915. *January 15, 1986* STEER, APGS, APVC *Bill*

Modified to only read and write floating format images. The minimum changes were made; the code would run faster with more work. The buffer sizes were increased. Also changed: DVC.INC, CVC.INC, DGS.INC, and CGS.INC.
Moved nowhere.

2916. *January 15, 1986* COMB, CORMS *Eric*

Deleted CORMS and its help file, moving its functions into COMB. Changed COMB, DCOM.INC, CCOM.INC, ECOM.INC and the help file. The task now reads only floating-point images, no longer uses a scratch file, and has no subroutine calls in the inner loop. Changed the adverbs around some with the hope of greater clarity and understanding on the part of our *AIPS* users. In all, it should be faster and friendlier and more accurate. Also updated WHATSNEW.HLP.
Moved nowhere.

Changes: 15-Apr-1986 version of *AIPS*

This section is intended normally to provide corrections and updates to the *AIPS COOKBOOK* in order to fill the gap between publication dates. A complete new *COOKBOOK*, labeled as a 15 October 1985 version, has been published. This section, in the next *AIPSLETTER*, will describe changes to that edition caused by the 15APR86 release.

AIPS Order Form

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   (Shipped ≈ 1 week after release date) ☐ 15-Apr-1986

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   (requires 2nd 1600 bpi tape)
   (UNIX only) . . . . . ☐ UNIX tar
   Version of UNIX system in use: _____
   N.B. we need to know this. *e.g.*, bsd4.*x*, Sys III, Sys V, V7, *etc.*
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   ☐ FITS compressed text format
   Version of Z routines desired: ☐ VAX/VMS ☐ ModComp ☐ UNIX

5. Tape density desired: . . . . . ☐ 800 bpi ☐ 1600 bpi ☐ 6250 bpi

6. There are gripes on (returned) tape: . . . ☐ Yes ☐ No

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   ☐ *AIPS* Memo No. 39
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15 January 1986

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A I P S L E T T E R

Volume VI, Number 2: April 15, 1986

National Radio Astronomy Observatory

A newsletter for users of the
*A*stronomical *I*mage *P*rocessing *S*ystem

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TEXset by EWG

News Notes

The installation of *AIPS* on the Convex C-1 in Charlottesville is progressing well. Our installation of an I^2S model 70 TV display turned out to be the first third-party installation on a Convex. It took a while to debug hardware errors in the interface board and software problems in the handler. However, on April 15, all TV functions began to work as advertised. We are pleased to acknowledge the very considerable cooperation and assistance provided by employees of both Convex and I^2S during this project. Good progress has also been made in developing the UNIX version of the 15JUL86 release. We intend to run a "midnight" job on the Convex, as we do on the VLA VAX 11/780s, to force the code there to track that on CVAX at all times. This should allow us to offer UNIX releases as current as the VMS ones.

As part of our new release strategy, we have begun shipping an *AIPS* installation tape to the VLA a couple of weeks before the official release date. It is installed there on a VAX 11/750, called OUTBAX, which runs *AIPS* in the OLD version only. If there are any problems with this installation, they can be fixed before the official release is frozen. We thank Pat Murphy for doing this test installation for 15APR86 and for providing very detailed remarks not only on the few serious problems, but also on the clarity and organization of the documentation.

The NRAO has ordered an IVAS television display from I^2S for eventual use by *AIPS* on the Convex. The IVAS is a 1024×1024 display with either three 8-bit deep or two 12-bit deep image memories and 4 graphics overlay planes. It offers smooth scroll, integer zooms from 1x to 16x, three 8-bit-out LUTs with an additional 12-bit-in/8-bit-out LUT for the 12-bit mode, a 128×128 cursor RAM, and windowing for image loading. The list price for the IVAS is about $25,000.

The DDT timing and verification package will be released in a 15APR86 version to selected β-test sites. We hope to offer the 15JUL86 version as a standard product.

Summary of Changes: 15 January 1986 — 15 April 1986

These changes are listed in detail in the CHANGE.DOC files reproduced later in the *AIPSLETTER*. The reader should note that this is the second issue of the *AIPSLETTER* in which 15APR86 is called NEW and 15JUL86 is called TST. The many changes in these releases which were reported in the previous issue will not be repeated here. Instead, we will report only the further changes made over the last three months. There are 119 total entries in the current CHANGE.DOC files for this quarter, many of which report simultaneous changes to many routines.

Changes of Interest to Users: 15APR86 as NEW — Part 2

After all this time, one would hope that we would have wrung most of the bugs out of this release. Undoubtedly, however, Murphy's Law will strike. In any case, some major bugs were removed. IMLOD can now read multiple files and 32-bit FITS images as advertised (see entry 2919). FITTP had a nasty bug in writing *uv* data, but we believe that that infection was confined to Charlottesville. Scaling problems in CONVL, parameter problems in VSCAL (entry 2931), and buffer size problems in TVLOD were also repaired. A new version of WSLOD was received from Dwingeloo and was inserted in this release.

Changes of Interest to Users: 15JUL86 as TST — Part 2

We have added very little new code to 15JUL86 during the quarter. The only new task, PRTAC, is a revised version of the accounting file printing program PRTACC. This new version may be run either as a stand-alone program or as a task. A new pseudo-verb, ISBATCH, was also added. This sets a system-wide parameter which tells AIPS and all tasks to treat the current session as a "batch" job rather than an interactive job. To see all that this entails, read entries 2992 through 2994 below. This parameter will allow *AIPS* users to run jobs under system batch queues at lower cost with relatively reliable performance.

One of the most visible areas of change is in the routines which write to the line printer. All such verbs and tasks now support the DOCRT option and use formats which depend on the width of the line printer (a system parameter) or the CRT (user-provided parameter). Many of these formats have been improved in clarity and information content. In making this change, many individual tasks were also improved. PRTCC offers a DOCELL option to display the coordinates in pixels. HELP, EXPLAIN and INPUTS pause when the screen is full, allowing the user to continue when he is ready or to abort the display. HELP also has a new line printer capability. PRTGA has new input parameters and a new option to compute and print the mean and rms gains over a specified time range. IMFIT and JMFIT were cleaned up and now offer the ability to write their results in clean component files. UVFND tests the line channels being displayed and EXFND has new inputs and formats similar to those of UVFND. PRTSD, CORER and PRTDR have new, more rational input adverbs and improved capabilities. These changes are covered in entries 2963, 2966, 2968, 2975, 2978, and 2986 below.

Three more coordinate geometries have been added to *AIPS*: "global sinusoidal," Mercator and Aitoff. They are used mostly for very large fields, but the last of them at least will be used by the Space Telescope. As part of this change, a DOCIRCLE option was added to CNTR, PCNTR, GREYS, PROFL and TVLABEL to request that the full coordinate grid, rather than just ticks, be drawn.

Some very useful changes have also been made to the mapping programs. All real-to-complex and complex-to-real FFTs are now done absolutely correctly with no assumptions about zeros in the outermost row (see entry 2969). MX has an altered gridding algorithm which will improve performance, particularly for bandwidth synthesis data (see entry 3018). MX also has new options BIF and EIF to control the selection of IF channels; it copies all tables extension files and no longer doubles the size of small images. UVSUB also acquired the BIF and EIF options and the file-copying capabilities. UVFIX was corrected to leave the

input antennas files alone and was changed to allow the user to override the frequency in the antennas file (entry 2957). The old, mostly non-functional tasks APMAP, NTERP and UVDIS were withdrawn as part of a general clean up. DBCON was changed to handle spectral-line (entry 2980) and pipeline (entry 2999) data better. Continued development of the Cray and Convex pseudo array processor routines has led to numerous improvements in the general Q-routine libraries. Many of these will improve performance in VAX pseudo-AP tasks as well.

On the map-plane side of things, COMB acquired a new operation to correct for noise bias in computing the rms sum (*i.e.*, polarization) of two images and new options and units for the rotation measure operation. IMLOD was corrected and changed to write only floating images and to offer an NFILES option for positioning the tape (see entry 2958).

Changes of Interest to Programmers: 15APR86 as NEW — Part 2

Some changes in 15JUL86 were moved in part to 15APR86, out of necessity rather than conviction, including having NRAO-provided RUN files in a version-specific directory (entry 2921) and changing the format of the inter-task communication (TD) file (entry 2928). The new verification/timing package called DDT will appear in the 15APR86 release RUN and HELP areas, but its use with the standard data tape will be confined to selected β-test sites. The importance of parameterization, even in machine-specific code, was emphasized recently (entry 2934). We threw a hardware switch in our TV which changed it from 512 lines to 480 and only one Y routine had to be repaired.

Changes of Interest to Programmers: 15JUL86 as TST — Part 2

Programmers working in the area of vector code ("Q" routines) should read almost all of the CHANGE.DOC for this quarter. A proper hierarchical directory structure was established (entry 2942) and improved Cray COS (2952, 2948–2950) and Convex (2960, 2995) routines were installed. A secondary memory is now used to extend the "AP" memory in pseudo-AP applications (2962, 2964, 3018). New non-AP FFT routines are available (3015) and all AP tasks are now fully converted to the Q-routine interface (3004). There are numerous other entries for individual routines as well. The call sequences to the basic FFT upper-level routines PASS1 and PASS2 were changed (2964) as was the call sequence to UVGRID (3018). Real-to-complex and complex-to-real FFTs are now done more correctly (2969), requiring more disk space among other things. The routines which can handle multiple fields have improved methods for doing so (2972).

The general importance of coding standards was again emphasized. Single and double precision floating-point numbers are not interchangeable in ways more fundamental than just accuracy (see 2979). We carried out several "housecleaning sweeps." We withdrew or deleted all non-standard Z routines and moved the AIPS Z routines to the APL areas which will be the only repository for Z routines henceforth (3005). We moved all VMS-specific tasks and programs to appropriate "not-standard-VMS" areas to be ignored by our growing UNIX, Cray, *et al.* communities (3005, 3009). TABs and long lines will be found systematically and excised (3035). In ZQMSIO, a non-standard, but apparently legal under VMS, Fortran construct was used with great success in Charlottesville. However, it was found that it would not work on the supposedly identical VMS systems at the VLA (3020)! The lesson to be learned about non-standard Fortran is apparently that "just because it works on your VAX doesn't mean that it will work on someone else's computer, even if it's a VAX."

The format of the inter-task communication file was changed and a new system-wide parameter, ISBTCH, was developed to allow users to specify that the job is to be handled as a "batch" job (no tapes, TVs, terminals; abort on error; ...). All potentially interactive tasks must test this parameter henceforth (entries 2992–2994). The general standards for printing have also been refined and extended to cover all current tasks and verbs. The standards include support for both line printers and terminals of any width (≥ 72, ≤ 132) with a variety of width-dependent formats as needed. Standard interface routines are available to assist in

the paging and I/O. A new call sequence for PRTMSG was required as well. These changes are covered in entries 2963, 2966, 2968, 2975, 2978, and 2986 below.

AIPS now supports three new coordinate geometries: "global sinusoidal" (-GLS), Mercator (-MER), and Aitoff (-AIT). As part of this development, an error return argument was added to the call sequences of DIRCOS, DIRRA, DIRDEC, FNDX, FNDY, XYVAL, XYPIX, MP2SKY, and SKY2MP. In addition, a new argument to specify full coordinate grids, rather than simply tick marks, was added to the call sequences of CLAB1, CTICS, TKLAB, TKTICS, IAXIS1, and ITICS. A new routine, TICINC, was developed to handle the determination of tick mark or grid increments. See entries 3006 and 3007 for the details.

Other things worth pointing out include the development of some more tables subroutines (3011, 3023–3025). The stand-alone tape program RDFITS was given new options, in part to debug the new version of EXPFIT. The latter is not intended to be portable, but is intended to write tapes containing all of the interesting parts of *AIPS* in a "compressed ASCII" FITS format. We now offer tapes of the *AIPS* system in only three formats: VMS BACKUP, UNIX tar, and the compressed FITS. This last has an unblocked card-image file at the beginning containing a sample program for reading the rest of the tape.

AIPS Publications

The Order Form at the end of this *AIPSLETTER* may be used to order the following memoranda. Following legal advice, *AIPS* Memo No. 43 will be restricted to use within NRAO.

AIPS Memo No. 41: "I/O Speeds on a VAX 11/780," R. G. Noble, December 1985.

> This document describes the results of various timing measurements on VAX VMS I/O speeds. Block mode, record mode, virtual memory, and Fortran I/O methods are compared with the basic QIO method now used in *AIPS*. QIO has the least cost in CPU time, but the additional overhead of using RMS block mode I/O is small and gives the advantage of access to all other RMS functions (and DECnet). The differences in elapsed time on a moderately loaded VAX 11/780 are not large for any of the different means of I/O.

AIPS Memo No. 42: "Pseudo-Array Processor Speed," W. D. Cotton, April 1986.

> This memo reports the current state of pseudo-array processor code on the VAX and Convex. Recent developments of the "Q" routines on the Convex have significantly increased its speed. Many of these developments have been moved to the VAX pseudo-AP library and, together with the use of the VAX optimizer for Q routines only, have resulted in improved performance of the VAX pseudo-AP.

AIPS Memo No. 44: "Benchmarking *AIPS* on a VAX-8600 with FPS-120B Array Processor," Donald C. Wells, Gary A. Fickling, April 1986.

> Performance measurements are presented for the PFT benchmarking test executing on a DEC VAX-8600 with FPS AP-120B array processor. The results are compared with the VAX-8600 alone, the VAX-780 with array processor, the Alliant FX/1, and the Convex C-1. Overall, the 8600+120B combination is about 1.4x faster than the 780+120B for a typical *AIPS* job mix, and about half as fast as the Convex C-1. The Alliant FX/1 has about 85% of the speed of the 8600+120B for this *AIPS* job mix. Due to 4x faster scalar speed, an 8600+AP can do more scalar timesharing work while keeping the array processor busy.

The 1985 *AIPS* Site Survey

Forms for the 1985 *AIPS* Site Survey were mailed to all the *AIPS* Contact Persons (CPs — the people who actually manage *AIPS* installations) late in December and further forms have been sent to all new CPs since that time. As of April 15, 1986, NRAO had received 78 responses from the 135 CPs. 70 of these CPs report that they are actively running *AIPS* at their site, or firmly intend to do so; their responses cover 87 machines, including 16 FPS array processors, one Sky Warrior AP, one pipelined-FP machine and three vector register machines. The Survey is very nearly complete with regard to AP sites, and is believed to document a majority of the existing *AIPS* computing power, despite the lack of responses from 57 CPs.

The Site Survey asked questions on a broad range of topics about *AIPS* usage at the sites, hardware configurations, nonstandard peripherals and software supported, frequency of *AIPS* updates, etc. It also asked some questions about network connectivity and preferred modes of communication with NRAO in the context of an *AIPS* Users' Group (see the accompanying article on that topic).

We have compiled the results into an *AIPS* Site-Survey Directory, which has been circulated to all of the CPs who responded to the Site Survey. NRAO's legal department has advised us that we should not provide information on our users' hardware installations in a memo series without first obtaining their permission. We are now in the process of obtaining this permission before releasing the Site-Survey Directory more widely. The following statistical results may be of general interest, however.

There is now about as much total processing power in use for *AIPS* outside NRAO as inside (weighting each machine according to its equivalent processing power for *AIPS* as indicated by NRAO's benchmarks and the reports from our users, and using the statistics supplied by the CPs on fraction of each machine's time actually devoted to *AIPS*). The total *AIPS* machine power accounted for in the survey is equivalent to about nine VAX780+APs. Although the count of machines is dominated by 74 VAXes (including 3 MicroVAX IIs), 1/3 of the total *AIPS* processing power is now in non-VMS machines. These include Convex C-1, Cray XMP/24, Data General MV/10000, Fujitsu M380, Fujitsu VP50, Charles River M68K, and Nord ND570CXD. The predominance of VAXes makes VMS the most popular operating system (68 machines). We note however that *AIPS* is running under UNIX in 13 machines, and our new orders are about equally divided between VMS and UNIX.

Most *AIPS* machines now have four or more Megabytes of memory; 27 of them have eight or more Megabytes. *AIPS* should clearly evolve in the direction of greater utilization of RAM to improve performance, and the Charlottesville group has taken note of this.

A very diverse range of plotters and TVs is attached to *AIPS* machines (for some details, see the Users' Group Column). Altogether, over two dozen different models of TV and three dozen different models of printer/plotter have been interfaced to *AIPS* machines. An interesting detail is that there are now as many QMS laser printers (including the Talaris models) attached to *AIPS* machines as there are Versatec printer/plotters (21 of each). Most of these QMS machines were purchased in 1985. The most popular TVs are I^2S (19 installations) and Gould-DeAnza (9).

Over 40% of the non-NRAO *AIPS* machine power is now devoted to non-VLA processing — mainly to processing data from other radio instruments, though about 10% is for imaging at various non-radio wavelengths, and the responses indicate that this fraction may be growing rapidly.

A substantial body of *AIPS* code now exists outside NRAO. 169 *AIPS* tasks have been coded outside NRAO, but most *AIPS* sites are not producing new code. Forty-one *AIPS* sites express general willingness to contribute code to an *AIPS* Users' Group; eight sites (responsible for 105 of the 169 non-NRAO *AIPS* tasks) have code they are ready to contribute and support immediately; see the Users' Group Column for details. (There are about 200 tasks in NRAO's standard *AIPS* package.)

We intend to track the growth of the *AIPS* community, and to monitor trends in *AIPS* hardware and software resources, by repeating the Site Survey at regular intervals. The responses received to this Survey are contained in a database from which future Site Survey forms will be generated with each site's earlier answers pre-printed. Thus, most sites will need only to make a few corrections or additions to document their system(s) to us fully in future. We are most grateful to the CPs who responded to the 1985 Site Survey, as the information they have provided is very important to planning the future development of *AIPS*.

AIPS Users' Group Column

It was suggested at the *AIPS* Workshop in Charlottesville last October that NRAO should host an "*AIPS* Users' Group" through which non-NRAO *AIPS* users could support nonstandard *AIPS* hardware and software directly to one another using us as a communications channel. It is intended that such a "Users' Group" should supplement NRAO's role as the initial source of *AIPS* code, and should also provide a "public" forum for discussion of *AIPS* problems, solutions and development priorities. The responses to the 1985 *AIPS* Site Survey confirmed that an *AIPS* Users' Group with these aims is welcome. The *AIPS* Users' Group could eventually have two main channels of communication

(1) A regular segment of the *AIPSLETTER*, of which this will be the first, in which offers of code and hardware support from users, letters from users, etc. will be published quarterly. Users may prefer to send code directly to other users who then ask for it, but we will also redistribute user-written code that is sent to us on tape, in a dedicated catalog on future *AIPS* tapes. In either case, the originating user, not NRAO, will initially be responsible for supporting such code. We will make every effort to incorporate any particularly popular code into the main *AIPS* package, though we cannot guarantee to do this on any particular time scale, as our own manpower is limited.

(2) A computer "Bulletin Board System" (BBS) on which *AIPS* users from both outside and inside NRAO could post and read messages, and contribute to special-topic "conferences" on a shorter-term basis. This might be used to report bugs of general interest (and their fixes!), to discuss *AIPS* development priorities, to advertise non-NRAO support for nonstandard *AIPS* code or hardware, etc. Many public domain BBS programs also support uploading and downloading of code; we might also envisage doing this for (small) segments of *AIPS* code between releases, especially for important bug fixes.

To get the first "channel" going, we list below some information on nonstandard TVs reportedly in use at *AIPS* sites, and reprint some offers of code or hardware support that were made in response to the *AIPS* Site Survey. Please send any items for inclusion in an "*AIPS* Users' Group" segment of future *AIPSLETTER*s by regular mail to:

AIPS Users' Group
c/o Alan Bridle
NRAO, Edgemont Road
Charlottesville, VA 22903-2475

or by computer mail to one of

`BRIDLE%CVAX%DEIMOS@CIT-HAMLET.ARPA`	(ArpaNet)
`BRIDLE%CVAX%DEIMOS@CALTECH.BITNET`	(BitNet)
`noao!stsci!nrao1!bridle`	(UseNet/uucp)

It is not yet clear what is the most appropriate mechanism for the second "channel." A model we proposed in the Site Survey cover letter was that user sites with network access to NRAO would send messages to us by computer mail, and NRAO would simply redistribute these to all sites for which we

have network connections and addresses. The survey responses showed that only about 20 of our user sites presently think they have access to NRAO through networks such as ArpaNet, BitNet and UseNet. Despite this, most of the sites that expressed a preference favored such a network-oriented system over a dial-in BBS facility.

As NRAO's network access paths are likely to change (and expand) soon, and the workloads of our computers are also changing rapidly owing to the replacement of the Charlottesville IBM 4341 by the Convex C-1, we feel we should defer setting up a computer BBS for *AIPS* until our own situation is more stable. In the meanwhile, Alan Bridle is examining several software packages that might be used to host this activity, and would appreciate suggestions from anyone who has encountered well-engineered ones that run under UNIX or VMS. For the time being, we will implement only channel (1), and this is it!

Offers of support for nonstandard devices:

The following people have indicated that they are willing to provide support for the "non-standard" peripheral devices listed below. Please contact them directly for more information.

APs

SKYMNK PSAP routines — Colin Lonsdale, Dept. of Astronomy, Pennsylvania State University, 525 Davey Lab, University Park, PA 16802. Tel. (814)-863-3399

Graphics terminals

HP graphics terminals — HP 2648 and HP 2623 — Wilson Bent, Radio Physics Research Dept., HOH-L222, Bell Labs., Holmdel NJ 07723. Tel. (201)-949-3800

Plotters

ZDOPRT for PRINTEK (in C) — Colin Lonsdale, Dept. of Astronomy, Pennsylvania State University, 525 Davey Lab, University Park, PA 16802. Tel. (814)-863-3399

Printronix 4160 as plotter — T. Velusamy, TIFR Radio Astronomy Centre, P.O. Box 8, Ootacamund 643001, INDIA.

TVs

AED512 display — Y routines compatible with JPL written driver for VMS — Wilson Hoffman, Astronomy Dept., University of California, Berkeley, CA 94720. Tel. (415)-642-7768

Interface ARGS to *AIPS* — Diego Cesarsky, Institut d'Astrophysique, 98 Bis Blvd. Arago, 75014 Paris, FRANCE. Tel. 33-1-4320 1425; Net: DIEGO@FRIAPS1.BITNET

TV routines for AYDIN — changes have been made to the standard *AIPS* routines by the Bologna group. — C. Fanti, Instituto di Radioastronomia, Via Irnerio 46, Bologna 40126, ITALY. Tel. 051-2322856, Telex 211664 INFN BO 1. — Bill Cotton (NRAO) also has a manual describing these changes.

Graphics Strategies VGM1024 TV — Y routines — Colin Lonsdale, Dept. of Astronomy, Pennsylvania State University, 525 Davey Lab, University Park, PA 16802. Tel. (814)-863-3399

Grinnell GMR275 — Ed Churchwell, ISC, University of Wisconsin, 1500 Johnson Dr., Madison, WI 53706.

Grinnell — Susan Simkin, Department of Physics and Astronomy, Michigan State University, East Lansing, MI 48824-1116. Tel. (517)-353-4540

Lexidata 90 TV — Willem Baan, Arecibo Observatory, P.O. Box 995, Arecibo, PR 00613. Tel (809)-878-2612, Telex 385638

Z-routines

UNOS Z-routines — Colin Lonsdale, Dept. of Astronomy, Pennsylvania State University, 525 Davey Lab, University Park, PA 16802. Tel. (814)-863-3399

Offers of code support

The following people have offered to support *AIPS* code to the *AIPS* Users' Group and have provided these brief descriptions of what they can support. Please contact them directly for more information about their code.

==========

Louis Noreau, Departement de Physique, Faculte des Sciences et de Genie, Universite Laval, Ste.-Foy, P.Q., G1K 7P4 CANADA

Tel. (418) 656-2857, Telex 0513162

Task to transform intensity image into magnitude one.

3-image median filter, useful to process "sky flat" for CCD observations.

==========

Dave Shone, Nuffield Radio Astronomy Laboratory, Jodrell Bank, Manchester, Cheshire SK11 9DL, ENGLAND

Tel. U.K. 0477 71321, Telex 36149 JODREL G Net: AIPMAN@UK.AC.MAN.JB.STAR (ARPANet)

Set of tasks written by A. Bayley for transferring visibility data and CLEAN components between *AIPS* and OLAF, the mapping package developed at Jodrell for reducing MERLIN data. These are relevant only to anyone running OLAF, since we can provide MERLIN data in FITS format.

==========

Carla Fanti, Instituto di Radioastronomia, Via Irnerio 46, 40126 Bologna, ITALY

Tel. 051-232856, Telex: 211664 INFN BO I

These are very locally tailored programs which might, however, be useful to somebody else:

TOEXP: non-*AIPS* task to write WSRT (EBCDIC) data into *AIPS* EXPORT format. It has an option to load linear polarization channels or to combine them to get CP data. It also handles redundant data.

LINPO: converts visibility data from circularly polarized to linearly polarized channels and vice-versa. Necessary to look for single channel errors in WSRT data.

REMOB: supplies amplitude/phase corrections to WSRT linear polarization channels. It also subtracts point sources from visbilities.

EXPEVN: converts EVN120 VLB data into *AIPS* EXPORT format.

TOEVN: converts VLBI data in *AIPS* to EVN120, to make use of the local VLBI package.

==========

Thijs van der Hulst, Netherlands Foundation for Radio Astronomy, Postbus 2, NL-7990 AA Dwingeloo, NETHERLANDS

Tel. 31-5219-7244, TWX: 42043 SRZM NL

A task which reads in data from disk FITS format.

==========

David Roberts, Department of Physics, Brandeis University, 415 South Street, Waltham, MA 02254

New contouring routine that eliminates staircasing and is suitable for a pen plotter. Also handles plots with fewer points, *i.e.*, VLBI data.

==========

Kerry Hilldrup, NRAO, Edgemont Road, Charlottesville, VA 22903-2475, U.S.A.

Tel. 804-296-0372 (FTS 928-1271), TWX 910-997-0174 Net: noao!stsci!nrao1!khilldru (UseNet/uucp) or KERRY%CVAX%DEIMOS@CIT-HAMLET.ARPA (or @CALTECH.BITNET)

CALPL: Modified TKPL for Gould/Calcomp plotter (developed for use at Vector Productions).

==========

Lars B. Baath, Onsala Space Observatory, S-43900 Onsala, SWEDEN

Tel. Sweden 300 60650 Net: PHOBOS:LBB via NRAO/CalTech DecNet (checks once a week for mail)

Tasks for: VLBI calibration
VLBI editing (TV-editor)
"Wide field mapping technique"

==========

Michael Keane, Steward Observatory, University of Arizona, Tucson, AZ 85721

Tel. (602)-621-3897, Telex: 467175

1. *AIPS* implementation under AOS/VS
2. Plot task for DataSouth DS180 printer
3. Plot task for use with GKS

==========

Dayton Jones, Jet Propulsion Laboratory, Mail Code 138-307, 4800 Oak Grove Drive, Pasadena, CA 91109

Tel. (818)-354-6734, FTS 792-6734 Net LOGOS::DJ via NRAO/CalTech DecNet

Four new verbs (GON, GOFF, GCL and GPR) to allow users with DEC Rainbow PCs as *AIPS* graphics terminals to switch between their text and graphics planes, etc. from within *AIPS*. GPR will plot the graphics plane on DEC printers, *e.g.*, LA-50, connected to Rainbow. Used REGIS graphics commands.

==========

Richard Simon, Code 4134S, Naval Research Laboratory, 4555 Overlook Ave. SW, Washington, DC 20375-5000

Tel. (202)-767-2377, FTS 767-2377

Task IMFLT has been submitted to the *AIPS* group in Charlottesville and is in the 15JUL86 release. I have submitted (VMS) versions of verbs to (1) pop out of AIPS to a subprocess and allow quick return to AIPS, (2) clean up printer files. I have also written an interface for *AIPS* and the VMS batch queues.

==========

Bob Mutel, University of Iowa, Department of Physics and Astronomy, Iowa City, IA 52242

Tel. (319)-353-7205 Net: BLARLMVA@UIAMVS (BitNet)

PGCON: ersatz PRTPL without need for extension PLOT file, nicer format. Supports many more plot devices (HP LaserJet, HP7475 6-pen color plotter, ...)

AVGJY: vector averaging of Stokes parameters of point sources as a function of time, with error estimates.

==========

Claire Russell, Columbia Astrophysics Lab, 538 West 120th St. New York, NY 10027

Tel. (212)-280-2819 Net: OC.CAR@CU20B.Columbia.edu (ARPANet)

We have made a non-standard modification of PRTPL to create a bitmap file for the Printronix printer. It seems to run faster than the standard PRTPL program and the standard Printronix ZDOPRT routine.

==========

David Garrett, Department of Astronomy, RLM 15.220, University of Texas, Austin, TX 78712

Tel. (512)-471-7439 Net: astro.UTEXAS.EDU (ARPANet) {ihup4,seismo}!ut-sally!utastro (UUCP)

BACKUP and RESTORE programs for UNIX systems — a user interface to the UNIX "tar" for backing up users' data sets.

==========

Michael Kesteven, Division of Radiophysics, C.S.I.R.O., P.O. Box 76, Epping, N.S.W. 2121, AUSTRALIA.

Tel. (02)-868-0222, Telex ASTRO 26230

Hard copy:	KONT2	enhanced version of KONTR, for Zeta plotter
	CONHP	enhanced version of KONTR, for HP7221
	BIGHP	enhanced version of KONTR, for HP7585
	ZETPL	plot PLOT file on Zeta
	HPPL	plot PLOT file on HP7221
	ZETSL	plot SLICE file on Zeta
CLEAN:	VXCLN	APCLN optimized for Vax with no AP
	RPCLN	CLEAN with non-symmetrical beam
	XCLN	compress a CC file
uv:	UVCON	concatenate many *uv* files
	UVHGM	useful *uv* histograms
spectral:	DISPC	interactive processing of spectral cube (De Anza specific)
utility:	FETCH	load an array into *AIPS*
	REGRD	regrid map to new co-ordinate system

Mike also sent the following remarks in a letter: "At Radiophysics (CSIRO) we have been running *AIPS* on an installation which consists of two VAXes sharing a single disk farm. *AIPS* has a number of conflict-avoiding routines which examine the processes currently active in the machine, but difficulties can arise because neither machine knows what the other machine is doing. Rather than adopt a network-wide solution, which we felt was likely to be highly non-standard, we have identified three areas in which conflicts occur and have resolved them with minor changes to existing routines.

(1) In a single machine, the startup task (ZSTRTA) ensures that no duplication of *POPS* number occurs. Our solution is to assign numbers 1 to 3 to machine A and 4 to 6 to machine B. This is done in ZSTRTA which examines the logical SYS$PROCESSOR_NAME to identify the processor, and so to define the range of acceptable *POPS* numbers.

(2) Scratch files have been the most serious problem. *AIPS* allows them to be destroyed whenever the task associated with the file appears not to be active. Unhappily, a task running on the other machine will give just such an appearance. To resolve the problem, we have modified SCREAT, CATDIR, and DESCR to assign a processor-identifying tag to each scratch file using the thousands column of the file sequence number.

(3) In our environment, the batch queues became quite erratic — tasks still running were described as 'failed' and the actual machine on which a job would run became unpredictable. The cure to this, and other potential problems, is to separate the system files, *i.e.*, to allocate DA00: to processor-specific directories."

What's out there — TVs ?

As mentioned earlier in this *AIPSLETTER*, many different types of TVs and plotters were reported as being in use at *AIPS* sites. An *AIPS* Site-Survey Directory has been compiled and has been circulated to the sites that replied to the survey. It will be distributed to other *AIPS* users once necessary permissions have been obtained. We list here those sites that reported TV devices other than I^2S, to give some feeling for "what's out there." We will list plotters in the next *AIPSLETTER*. Please note that offers of non-NRAO *support* for nonstandard TVs are listed separately above.

AED512	Astronomy Department, U. Cal. Berkeley
AED767	Dept. of Astronomy, U.C.L.A.
Apollo DN660	Physics Dept., M.I.T.
Aydin	Instituto di Radioastronmia, Bologna, Italy
Comtal 1/20	Astronomy Dept., U. Illinois
	Systems and Applied Sciences Corp.
DeAnza 85	CSIRO Radiophysics, Australia
	NFRA, Dwingeloo, Holland
	Smithsonian Astrophysical Observatory
	NASA-Goddard Space Flight Center
	Space Telescope Science Institute
	E.S.O., Garching, W. Germany
DeAnza FD5000	Dept. of Physics, Arizona State U.
	FCRAO, University of Massachusetts
Graphics 880	Nobeyama Radio Observatory
Graphics Strategies VGM1024	Dept. of Astronomy, Penn State U.
Grinnell (unspecified)	Dept. of Astrophysics, U. Colorado
	Dept. of Phys. and Astron., Michigan State
	Dept. of Astronomy, U. Minnesota
	Astronomy, CalTech
Grinnell GMR270	US Geological Survey, Flagstaff
	Systems and Applied Sciences Corp.
	Washburn Obs., U. Wisconsin
Jupiter 7	Dept. of Astronomy, Univ. Texas at Austin
Lexidata 90	Arecibo Observatory
Peritek	Planetary Science, CalTech
Ramtek (unspecified)	Mt. Stromlo Observatory, Australia
Ramtek 9400, 9460	NRAO (Digital Productions Cray)
Ramtek 9465	US Geological Survey, Flagstaff
Seiko	Dept. of Physics, Brandeis University
Sigma ARGS	NRAL, Jodrell Bank, UK
	Royal Observatory, Edinburgh, Scotland
	Royal Greenwich Observatory, Herstmonceux, UK
	IRAM, U. of Grenoble, France
	Inst. d'Astrophys., Paris, France
	Space and Astron. Res. Center, Baghdad, Iraq
Vaxstation/GPX	Smithsonian Astrophysical Observatory
Vicom	Steward Observatory, U. Arizona

CHANGE.DOC: 15APR86 Version as NEW — Part 2

2917. *January 17, 1986* ZMYVER (VMS) *Pat/Gary*

A number of Z routines were cleaned up to use the new ZTRLOG. Among these was ZMYVER.
Moved from 15JUL86 this date, nowhere else.

2918. *January 23, 1986* FITTP *Gary*

FITTP was blanking out random visibility data when writing *uv* FITS data. This error was in the CVAX 15APR86 and 15JUL86 versions only.
Moved from 15JUL86 and to VLA vaxes.

2919. *January 28, 1986* IMLOD *Eric*

Corrected: (1) Image name display at end — the name was not being moved to the variables being printed. (2) DO loop in FITS data read went by NPINC which was never initialized(!), (3) the I*4 input had the wrong read window, (4) the test on blanking and on max/min for I*4 had errors, (5) the addressing of I*4 pixels was in error, (6) an uninitialized variable NXINC was used in computing the buffer handling, (7) the scratch file was left open so that the NCOUNT option could not work, and (7) the program did not exit on error reading FITS data. Also corrected subroutine MLREOF which was erroneously closing the tape.
Moved from 15JUL86 this date, nowhere else.

2920. *January 28, 1986* ZPARS.MAR *Pat*

An error in ZPARS was causing RMS to return an "invalid wild card operation" message when adverb VERSION was set to cause an implicit area search. Changed ZPARS to use the RMS file name parsing information rather than its own. This should be more robust.
Moved from 15JUL86 on 28-Jan, by Eric, nowhere else.

2921. *January 31, 1986* ZTOPEN, ZTXMAT, ASSNBASIC.COM *Gary*

Fixed *AIPS* to look in a version-specific RUN area (logical name RUNSYS) for run files of user 1, if it cannot find a RUN file in the standard area.
Moved from 15JUL86, nowhere else.

2922. *January 31, 1986* IBMTP *Eric*

Corrected task to read either floating or integer input images. Before it read only integer correctly and failed to test for floating. Also raised the buffer sizes.
Moved from 15JUL86 this date, nowhere else.

2923. *February 10, 1986* CATDIR *Kesteven/Eric*

Corrected bug: it failed to return the sequence number in mode SRCN (return parms of next match).
Moved from 15JUL86 this date, nowhere else.

2924. *February 13, 1986* CONVL *Bill*

A recent "fix" (#2836) caused incorrect scaling. The units conversion factor was being applied in the routine computing the transform of the gaussian. The task was fixed to set this factor to 1.0 internally if it is applied by the gaussian routine.
Moved to 15JUL86 this date.

2925. *February 25, 1986* ZSETUP *Pat/Gary*

This routine was using COMPAR instead of CHCOMP to look for task name AIPSB. Thus AIPSB's priority was mistakenly lowered to BATCH priority and the AP batch jobs spawned by AIPSB could not raise their priority when using the AP. Fixed the problem.
Moved from 15JUL86.

2926. *March 11, 1986* CONVL *Bill*

In subroutine CONVOL, the call argument ICOUNT was declared as I*4, but in the calling routine is was I*2. Changed it to I*2 in CONVOL.
Moved nowhere.

2927. *March 12, 1986* CATCHA *Eric*

The current ZPHFIL is incorrect for this older format conversion utility. Changed it to ZPHOL1.
Moved from 15JUL86 this date, nowhere else.

2928. *March 12, 1986* ISBATCH *Eric*

Changed the format of the TD file for a new parameter, ISBATCH, in the 15JUL86 area. To allow batch to work, all versions must change to the new format. In 15APR86, however, the new parameter is not used. Changed:

DMSG.INC — Added ISBTCH.
CMSG.INC — Added ISBTCH.
AU2 — Changed to pass ISBTCH and support the new TD format.
AU2A — Fixed initial pointer into TD file.
AUA — Changed to new format in TD file, passing MSGKIL and ISBTCH.
AIPSC — Changed TD format in starting QMNGR and in simulating the GO verb.
BATER — Changed TD format in starting QMNGR.
BSTRT1 — Changed TD format in starting QMNGR.
QMNGR — Changed TD format in starting AIPSB.
GTPARM — Changed TD format in picking up parms and to set ISBTCH to that passed or to 32000 if NPOPS > 2*NINTRN + 1.

Requires relinking everything.
Moved nowhere.

2929. *March 13, 1986* TVLOD *Eric*

Raised the buffer size to 4608 floating point which should hold any image thrown at TVLOD in AU5A. This was done in TST a while back in another way.
Moved nowhere.

2930. *March 13, 1986* COMRPL.COM *Pat/Gary*

This routine would replace in a library a specific routine (such as a routine for a certain TV) with a generic routine. The routine now checks to see if a specific routine exists before replacing a generic routine in specific library.
Moved from 15JUL86.

2931. *March 25, 1986* VSCAL *Steve Meyers/Bill*

Fixed a bug in determining the number of parameters being passed by AIPS. It was 115 and should be 130 (114+MAXFLD). This was causing the program not to pick up DOCAT or BADDISK. Thus, gain tables were not left after the program terminated.
Also fixed arguments to QHIST in SCLFND. This has no effect on what the program does but its messages about the number of scans may be correct more often.
Also added description in VSCAL.HLP telling how to invoke the antenna gain constraints in the solutions. This could not be determined from the explanation.
Moved to 15JUL86 this date.

2932. *April 2, 1986* FILAI2, ZDIR *Gary*

Added by Editors from Chkout history: Changed FILAI2 for new installation procedures and added one more file type to ZDIR (VMS).
Moved from 15JUL86 this date.

2933. *April 3, 1986* QPSAP:QCVCON *Bill*

The routine was not properly incrementing the pointers. Effectively did the first element only. Causes errors in the gridded interpolation model computation routines (pseudo AP only).
Moved to 15JUL86 this date.

2934. *April 8, 1986* YCRCTL (M70) *Eric*

The correction to the center pixel of the cursor did not use the MAXXTV(2) value, but assumed 512 instead. This does not work if the I^2S M70 is configured to have only 480 *y* pixels. Fixed it.
Moved nowhere.

2935. *April 11, 1986* UVLOD *Eric*

Fixed bad call sequence to MLREOF from old-format AN file reading routine, adding an IERR.
Moved from 15JUL86 this date, nowhere else.

2936. *April 11, 1986* VBANT *John*

The logic was crossed for applying equatorial and alt-az gain curves. Equatorial gain curves have been applied to data from alt-az antennas, and vice versa. The errors have been corrected.
Moved from 15JUL86.

2937. *April 15, 1986* DDT *Eric/Don*

Moved the full DDT code — DDT.HLP, DDTSAVE.HLP, DDTEXEC.001, and DDTLOAD.001 to 15APR86, revising minor things in the doing.
Moved nowhere — the 15JUL86 version will need work.

2938. *April 15, 1986* WSLOD *Gary*

Installed a new version of WSLOD received from Dwingeloo including DWIN.INC, CWIN.INC, and WSLOD.HLP.
Moved nowhere — the 15JUL86 version will need work.

CHANGE.DOC: 15JUL86 Version as TST — Part 2

2939. *January 16, 1986* COMB *Eric*

More additions: New OPCODE = 'POLC' which applies the POLCO correction (for noise bias) when computing the rms sum of the two inputs. New option for 'RM ' to center the angle differences on some angle besides 0.0. Output units are appropriately vague for 'POLI' and 'RM ' images with non-standard scaling and 'RM ' uses radians/meter/meter by default. Changed help file to reflect this change.
Moved nowhere.

2940. *January 16, 1986* IMMOD *Bill*

Modified to read and write only floating images; also doubled buffer sizes.
Moved nowhere.

2941. *January 17, 1986* ZTOPEN, ZTXMAT, ASSNBASIC.COM *Gary*

Fixed *AIPS* to look in a version-specific RUN area (logical name RUNSYS) for run files of user 1, if it cannot find a RUN file in the standard area.
Moved to 15APR86, nowhere else.

2942. *January 17, 1986* File movement *Eric/Gary/Bill*

A revised directory structure was created for the vector code. The QDEV has two trees: QFPS and QPSAP. Below the first is QFPS32 (for 32-bit FPS APs) and QFPS16 which has sub-nodes for Q120B and Q5000. Below the second are end nodes for QVMS, QCOS (Cray under COS), QVEX (Convex), and QALN (Alliant). Code was moved appropriately: standard pseudo-AP routines from QDEV to QPSAP with the VAX Z and .MAR ones going to QVMS; FPS 16-bit Q routines were moved to QFPS16 from Q120B; and the COS routines were moved from Bill's private area to QCOS. In addition, the "system" RUN files were moved to the RUNSYS area.
Moved all this eventually to VLA and to 15APR86.

2943. *January 20, 1986* ZDOPR4 (VMS) *Pat/Gary*

Added by Editors from Chkout history: Cleaned up version.
Moved nowhere.

2944. *January 20, 1986* POPSDAT *Gary*

Added by Editors from Chkout history: Added more temporary verbs for use by private versions of AUT.
Moved nowhere.

2945. *January 21, 1986* VTESS et al. *Tim*

Found errors when porting to Cray. LIB$INIT_TIMER left in VTESS! Removed illegal TAB character from DVMT.INC and compressed CVMT.INC to fewer continuation lines: this gave the Cray problems although it was < 19! Fixed discrepancy in declaration and call of QMENT (DOGRDS should be INTEGER not LOGICAL).
Moved to Cray, 15APR86 at VLA.

2946. *January 23, 1986* ZPARS.MAR *Pat*

An error in ZPARS.MAR was causing RMS to return an "invalid wild card operation" message when adverb VERSION was set to cause an implicit area search. ZPARS now uses the RMS file name parsing information rather than its own. This should be more robust.
Moved to 15APR86 on 28-Jan, by Eric, nowhere else.

2947. *January 23, 1986* FITTP *Gary*

FITTP was blanking out random visibility data when writing *uv* FITS data. This error was in the CVAX 15APR86 and 15JUL86 versions only.
Moved to 15APR86 and VLA VAXes.

2948. *January 27, 1986* Cray "pseudo AP" update *Bill/Kerry*

Inserted a number of corrections and improvements to the Cray-specific Q routines, also including QUVIN. The details are:
QXXPTS, QPTDIV — Corrected frequency scaling for line-format data. The old version was applying the frequency scaling factor directly from the table rather than 1+table_entry. This essentially caused the components to be subtracted/divided to appear to be very near the phase center for all channels past the first. This bug only affected UVSUB on line data, VBFIT and MX in the bandwidth synthesis mode. MX on line-format data not using bandwidth synthesis was okay.
QMULCL, QCLNSU — Corrected several problems involving multiple fields. Pointers in the tables of x, y, and flux were not being set properly for fields past the first. No components were being found in fields past the first.
QCFFT, QRFFT — Corrected bug which caused the FFT table to be re-computed on each call. The common variable FFTSZE was misspelled when setting it to the new value. This bug only affected the speed of the routine.
Moved from DP Cray this date, nowhere else.

2949. *January 27, 1986* Cray FFT size *Bill/Kerry*

Inserted a number of improvements to the Cray-specific Q routines including a change in FFT "AP" memory size. The work arrays and FFT table were rearranged in the AP memory common (includes INCCOS:DAPC.INC, CAPC.INC and EAPC.INC) to allow doing FFTs using 4 times the memory of the APCORE array. This allows an in-memory 512 × 512 FFT in MX, VM and APCLN. The work vector used in the FFTs was changed not to conflict. In the implementation on the DP Cray (15JUL85), the non-Q routine AP2SIZ was kludged to return an AP memory size 4 times the normal AP memory size. In later releases, the size of the AP memory for FFTs will be added to the /DCHCOM/ and this kludge will no longer be necessary.
Moved from DP Cray this date, nowhere else.

2950. *January 27, 1986* Cray dynamic memory *Bill/Kerry*

Inserted a number of improvements to the Cray-specific Q routines including dynamic memory allocation for the AP memory and work vectors. The new routine QMEMSZ was added to shrink or expand the size of the blank common. The AP memory and work vectors were moved from a named common to the blank common by means of equivalences. QINIT calls QMEMSZ to expand the blank common to be large enough for the FFT table and the AP memory but does not include any of the work vectors. The routines which use the work vectors (QCFFT, QRFFT, QPHSRO, QRFT, and QMULCL) call QMEMSZ to increase the blank common by the necessary amount. QRLSE shrinks the blank common to zero. This could probably be implemented using heap instead of blank common but the current implementation was simpler.

Dynamic allocation of memory makes a dramatic impact on both the real time performance when the machine is busy and on the total cost of the job. The AP tasks now only require the memory they need at the moment rather than the maximum and thus get rolled much less frequently (the maximum AP size corresponds to about a third of all the memory on the DP Cray). Test runs on VM showed that dynamic memory allocation reduced the total cost by about half.

Moved from DP Cray this date, nowhere else.

2951. *January 27, 1986* MX *Bill*

Corrected bug in MXCSUM which caused an unnecessary call to MSGWRT. This gave the extra RESTARTING USING OLD UV WORK FILE message. Also added QRLSE call to beginning of program. This allows the Cray version to give up the memory until it needs it and has no effect on other implementations.

Moved nowhere.

2952. *January 28, 1986* Q routine update (COS) *Bill*

General shuffling and cleanup of the pseudo-AP Q routines; especially the COS versions. The following Q routines are the same in the COS implementation as the generic versions and were removed from QCOS:

QBAKSU	QBOXSU	QCRVMU	QCVCMU	QCVCON	QCVEXP
QCVJAD	QCVMAG	QCVMMA	QCVMOV	QCVMUL	QCVSDI
QCVSMS	QDIRAD	QFINGR	QGET	QGET2	QGRD1
QGRD2	QGRD3	QGRD4	QGRDCC	QGRDFI	QGRDMI
QGRID	QGRIDA	QGSP	QHIST	QINT	QINTP
QLVGT	QMAKMS	QMAXMI	QMCALC	QMTRAN	QPOLAR
QPTFAZ	QPTSUB	QPUT	QPUT2	QRECT	QSEARC
QSVE	QSVESQ	QUVINT	QVABS	QVADD	QVCLIP
QVCLR	QVCOS	QVDIV	QVEXP	QVFILL	QVFIX
QVFLT	QVIDIV	QVLN	QVMA	QVMOV	QVMUL
QVNEG	QVRVRS	QVSADD	QVSIN	QVSMA	QVSMAF
QVSMSA	QVSMUL	QVSQ	QVSQRT	QVSUB	QVSWAP
QVTSMU	QWAIT	QWD	QWR		

The following are routines which were vector function chainer (VFC) from the AP which do all of their work by subroutine calls and which are subject to rewriting expanding the subroutines inline. The old version of these routines are renamed *.VFC are are being kept only because they make a good starting point for implementing these routines on non-FPS APs.

Q1FIN.VFC	Q1GRD.VFC	QGRID.VFC	QRFT.VFC	QFINGR.VFC
QGRDCC.VFC	QGRIDA.VFC	QMULCL.VFC	QMEMT.VFC	QSEARC.VFC
QUVIN.VFC	QUVINT.VFC	QPTDIV.VFC	QPTSUB.VFC	QXXPTS.VFC

The following QCOS: routines are sufficiently generic that they will work better on both scalar and vector machines than the old QPSAP versions and were moved from QCOS: to QPSAP:

Q1FIN	Q1GRD	QCSQTR	QUVIN	QVTRAN

Moved nowhere:

2953. *January 28, 1986* MINS3 *Bill*

Fixed bug in which single buffer, single read mode would attempt to use a 32768-byte buffer instead of only limiting it to 16384 + NBPS. This bug caused tasks using 32768-byte buffers to fail for some sizes of FFTs. The affected size depended on the size of the AP memory used for the FFT.

Moved nowhere.

2954. *January 28, 1986* QPSAP:QHIST, QDIRAD *Bill*

Removed the "no dependency" include from in front of the loop since these routines do have dependencies.
Moved nowhere.

2955. *January 28, 1986* QCOS:QMULCL *Bill*

Modified to accept the residual values with unpacked x and y.
Moved nowhere.

2956. *January 29, 1986* QPSAP:QXXPTS, QPTDIV *Bill*

Replaced subroutine call version with one with the calls expanded in line. This should work well on vector machines (although the Cray version is slightly modified).
Moved nowhere.

2957. *January 29, 1986* UVFIX *Pat*

UVFIX was modifying both its input and output AN files. This has been corrected to leave the input file unchanged. A new option has been added to allow a frequency to be specified, overriding the one in the AN file. This will be of use to VLA P-band observers.
Moved nowhere.

2958. *January 29, 1986* IMLOD *Eric*

Changed: (1) all images to be floating which avoids the need for a scratch file and two passes, (2) added NFILES option to position tape (and NMAPS if one has IBM format), and (3) added code to ignore ends of file between the NCOUNT maps if they are in IBM format. Changed the help file. Also corrected: (1) Image name display at end — the name was not being moved to the variables being printed. (2) DO loop in FITS data read went by NPINC which was never initialized(!), (3) the I*4 input had the wrong read window, (4) the test on blanking and on max/min for I*4 had errors, (5) the addressing of I*4 pixels was in error, (6) an uninitialized variable NXINC was used in computing the buffer handling, (7) the scratch file was left open so that the NCOUNT option could not work, and (7) the program did not exit on error reading FITS data. Also corrected subroutine MLREOF which was erroneously closing the tape.
Moved corrections only to 15APR86 on 28-Jan, nowhere else.

2959. *January 30, 1986* QPSAP:QPHSRO *Bill*

Removed an incorrect "no dependency" include.
Moved nowhere.

2960. *January 30, 1986* Convex Q routines *Bill*

Installed Convex-specific includes ZVND, DAPC, CAPC, and EAPC, Convex-specific assembly routines WHNALT.s and ISAMAX.s, and Convex-specific Fortran Q routines PREFFT, QCFFT, QCLNSU, QGET, QINIT, QMAXV, QMINV, QMOVE, QMULCL, QPHSRO, QPUT, QRFFT, QRFT, QRLSE, QUVIN, QVRVRS, QVTRAN, and QXFOUR.
Moved from the Convex this date, nowhere else.

2961. *January 30, 1986* SYSVMS:AREAS.DAT *Gary*

Fixed a typo in the APLUTS directory structure — UTL was changed to UTS.
Moved to 15APR86.

2962. *January 30, 1986* AP memory *Eric*

For the pseudo-AP routines, it is useful to define a primary AP size (KAPWRD) and a secondary AP size (for FFTs and some other use, but reserved for clean scratch areas). Changed DDCH.INC, CDCH.INC, IDCH.INC to add KAP2WD, ZDCHIN to zero KAP2WD and to pick it up from disk, SETPAR to init NCHPRT and KAP2WD and to display and read KAP2WD, and QINIT (QFPS16:) to zero KAP2WD since a true AP has no 2^{nd} memory.
Moved nowhere.

2963. *January 31, 1986* Printing *Eric*

Changed:

PRTLIN	—	Added ERR= branches to set error code on output to line printers also.
POPSDAT.HLP	—	Added adverb DOCELL.
DAPL.INC	—	Added adverb DOCELL.
CAPL.INC	—	Added adverb DOCELL.
DOCELL.HLP	—	Created new help file.
DPCC.INC	—	Added DOCELL to PRTCC inputs.
CPCC.INC	—	Added DOCELL to PRTCC inputs.
PRTCC	—	Added option to convert to cells (DOCELL) and support for narrow line printers (NCHPRT parm).
PRTCC.HLP	—	Added DOCELL option.
NEWPARMS.001	—	Added DOCELL to this system RUN file.
PRTAB	—	Added support for short printer lines.
PRTTP.HLP	—	Added DOCRT option.
PRTTP	—	Added DOCRT option and support for short printers.
DPTP.INC	—	Added parms.
CPTP.INC	—	Added parms.

Moved nowhere.

2964. *January 31, 1986* PASS1, PASS2 *Bill*

Note: call sequence changed. These routines now determine the size of the AP memory available for FFTs directly from the DCHCOM and this has been dropped from the call sequence; the bytes per pixel array BP is useless and was also dropped. Modified the following subroutines and tasks:

APLNOT:DSKFFT	QPGNOT:CONVL	QNOT:FFTIM	QYPGM:APCLN
QYPGNOT:APGS	QYPGNOT:APVC	QYPGNOT:STEER	QYPGNOT:VM

User software which calls PASS1 and PASS2 will need to have these items removed from the call sequence.
Moved nowhere.

2965. *January 31, 1986* IBMTP *Eric*

Corrected task to read either floating or integer input images. Before it read only integer correctly and failed to test for floating. Also raised the buffer sizes.
Moved to 15APR86 this date, nowhere else.

2966. *February 3, 1986* More printing *Eric*

The DOCRT option needs to be supported and the line printer width control parm must be honored everywhere. Therefore, changed:

PRTALN	—	Created new routine to handle printing in the AIPS program. It use SCHOLD to inquire whether it should continue on the CRT and therefore retains any (one) type-ahead line.
PRTMSG	—	Changed to use PRTALN and handle narrow printers.
AU7	—	Changed PRTHI to handle narrow printers, use PRTALN, and to display the full HI line on DOCRT true.
AU1A	—	Changed Explain and Help to printer standards including allowing Help to go to the printer.
HELP.HLP	—	Added DOCRT < -1 to mean use line printer.
BOUNDS	—	Added error return for both values out of range.

Moved nowhere.

2967. *February 10, 1986* CATDIR *Kesteven/Eric*

Corrected bug: it failed to return the sequence number in mode SRCN (return parms of next match).
Moved to 15APR86 this date, nowhere else.

2968. *February 10, 1986* More printing *Eric*

To improve upon the standards even more, I changed:

`PRTLIN` — Corrected printing of blank line in short printer headers and added user number to page header.

`PRTALN` — Corrected printing of blank line in short printer headers and added user number to page header.

`PRTMSG` — Changed to allow short printer lines longer than 72.

`PRTIM` — Changed to support any printer line length ≥ 72 and to read only floating point up to 4096 pixels.

`PRTTP` — Changed a little to allow full use of printers with line widths > 72.

`PRTCC` — Changed to allow intermediate line printer widths.

`PRTAB` — Changed to allow intermediate line printer widths.

`PRTUV` — Changed to support printer widths less than 132.

`UVFND` — Changed to support printer widths less than 132 and added an attempt to test all line channels being displayed.

`PRTSD` — Changed `DOCRT` support to standards with use of `ZTTYIO` (rather than straight `WRITE`s) and page-full testing, changed to use CRT width and printer line width. Changed adverb handling a bit.

`PRTSD.HLP` — Changed wording to refer to single-dish data, dropped unused `UVRANGE`, changed `CPARM` to `TIMERANG`.

Moved nowhere.

2969. *February 13, 1986* Real FFTs *Bill*

A long-standing problem with real-to-complex and complex-to-real 2-D FFTs was fixed. The problem is that a $n \times m$ real image transforms to a $m \times n/2 + 1$ complex image requiring more space than the real image. The FPS solution to the similar 1-D problem, which we have adopted, is to store the real parts of the first and last cells as one complex pair (the imaginary parts must be zero). In the previous implementation, it was assumed that the NX/2+1 row in the complex image was always zero and didn't involve it in the FFT. This approximation is good almost all of the time, but occasionally added a horizonal stripe to an image.

This has now been cleaned up and the FFT is done properly. Numerous applications routines have to be modified to make sure that (1) the files involved were big enough, (2) NX/2+1 complex rows were generated if necessary and (3) NX/2+1 rows were processed if necessary. `UVGRID` also needed a correction to the phase shifting scheme used to put the center of the image in the center. The affected routines and tasks were:

`QSUB:PASS1`	`QSUB:PASS2`	`QNOT:UVGRID`	`QNOT:ALGSUB`	`QNOT:MAKMAP`
`QNOT:CCSGRD`	`APLNOT:GRDSET`	`APLNOT:SETGRD`	`QYPGNOT:MX`	`QPGNOT:CONVL`
`QYPGNOT:VM`	`QYPGNOT:APGS`	`QYPGNOT:APVC`	`AYPGNOT:STEER`	

Moved nowhere.

2970. *February 13, 1986* UVMTYP, QMTYP *Bill*

`UVMTYP` decides whether it is faster to do a DFT or gridded interpolation *uv* model computation. The details depend on the hardware and in the past the parameters for an FPS 120B array processor on a VAX 11/780 were used. The details of this computation have been moved to a "Q" routine `QMTYP`. At present, the parameters used are still those for the 120B+VAX, but when we figure them out for the other systems they can be inserted in the proper library. Currently, copies of `QMTYP` are in `QPSAP:`, `QFPS16:` and `QFPS32:`.

Moved nowhere.

2971. *February 13, 1986* APCLN *Bill*

Fixed bug introduced in change to all floating images. The grid file was used as the scratch file for FFT even though its contents were to be used later. This resulted in complete trash resulting when FFTs that would not all fit in the AP (usually $> 256 \times 256$) were processed. The output image is not used as the scratch file for the FFT. This increases the fraction of the time when the contents of the output file are not a valid residual (or restored) image.

Moved nowhere.

2972. *February 13, 1986* Number of MX fields *Bill*

The number of fields used by MX (and consequently by ASCAL, UVSUB, VBFIT, VSCAL and some utility routines) has been put in a PARAMETER statement in include INC:DGDS.INC. The equivalencing used for the CC table buffers in MXACLN will only work for up to 16 fields and needs to be changed if more than 16 are to be used. Also the POPSDAT.HLP definitions of the field-specific adverbs must be changed as well as the corresponding definitions in INC:DAPL.INC. The definition of the parameter was also used in the more restricted include files DMPR.INC, DCAL.INC, DFRN.INC, DMX.INC, DSUB.INC and DVCL.INC. Whenever these includes are used, they must be preceded by DGDS.INC (and, of course, CDGS.INC should also be used when DGDS.INC is included). In a number of the routines and tasks involved, locally defined arrays depending on the number of fields were defined following the DGDS.INC include. The routines/tasks modified:

QNOT:MAKMAP QYPGNOT:MX QPGNOT:ASCAL QPGNOT:VBFIT
QPGNOT:UVSUB QPGNOT:VSCAL

Moved nowhere.

2973. *February 13, 1986* CONVL *Bill*

A recent "fix" (#2908) caused incorrect scaling. The units conversion factor was being applied in the routine computing the transform of the gaussian. The task was fixed to set this factor to 1.0 internally if it is applied by the gaussian routine.

Moved to 15APR86 this date.

2974. *February 13, 1986* APCLN *Bill*

Modified the program to return the maximum and minimum of the plane if there is only one plane in the image being processed. Otherwise the max and min in the header are modified only if the range is extended. Clarified/corrected the description of the adverb FLUX in the APCLN.HLP file.

Moved nowhere.

2975. *February 14, 1986* Printer tasks *Eric*

Changed:

- PRTAN — Added DOCRT, use of PRTLIN, corrected many errors in the AN file handling which would affect Crays.
- PRTAN.HLP — Added DOCRT.
- PRTSD — Changed time and position formats to I*n*.*m* form since we are going to allow Fortran 77.
- PRTUV — Changed time and position formats to I*n*.*m* form.
- UVFND — Changed time and position formats to I*n*.*m* form.
- DCRR.INC — Changed this CORER include to add DOCRT, to allow up to 50 antennas (*e.g.*, Clark Lake), and to use TIMERANG and CPARM(5) rather than BPARM.
- CCRR.INC — Corresponding changes to those in DCRR.INC.
- CORER.HLP — Added DOCRT, changed BPARM(1) through BPARM(8) to TIMERANG(1-8) and BPARM(9) to CPARM(5).
- CORER — Changed handling of input parms, added the new standards for doing printing.
- PRTGA.HLP — Changed adverb names BITER and NITER to BCOUNT and NCOUNT, NPOINTS to BCHAN, CHANNEL to STOKES, and added INVERS, DOCRT and TIMERANG. Added mode 6.
- PRTGA — Rewrote it a lot, removing many unused variables and a lot of computation of then unused values. Added correct handling of printing under the new standards. Added a time range print limit as well. Added mode 6 to compute the mean and rms of the gain file limited only by the TIMERANG adverb.

Moved nowhere.

2976. *February 14, 1986* QVEX:WHNALT.S *Don*

Fixed a minor syntactic error in the code.

Moved nowhere (Kerry will move it to Convex)

2977. *February 21, 1986* COMTST *Gary*

This routine will use the default name for new object files and purge but not delete them. If an object file with a date more recent than the source code being compiled exists, then the compile is not done and the procedure goes directly to the link. A warning message is printed when this is done.
Moved nowhere.

2978. *February 24, 1986* Printer tasks *Eric*

Changed:

IMFIT.HLP — Changed DOVECT to DOCRT.

JMFIT.HLP — Changed DOVECT to DOCRT.

IMFIT — Changed all the simple writing to the printer to proper calls to PRTLIN and added calls to BATPRT and ZENDPG. Changed DOVECT to DOCRT. Corrected handling of strings so that it might work on a Cray and fixed up the output header so that it might tell the truth. IMFIT does not become "interactive" when DOCRT is true. There is no way to do this with "WaWa" IO. Instead, it uses the message file and does not plot the images.

JMFIT — Made corresponding changes including the "new" routine DVDMIN.

PRTGA — Made minor corrections.

PRTGA.HLP — Made minor improvements in wording.

DOCRT.HLP — Added some explanation about interactive jobs when DOCRT is true (and the exception for IMFIT and JMFIT).

PRTAC — Changed PRTACC so that it can run stand-alone as before or as a task. Fixed formats to handle various line lengths and to stop printing excess decimal places. Test on task name changed to accept any task matching the characters given.

PRTAC.HLP — New inputs/help file to drive PRTAC.

Moved nowhere.

2979. *February 24, 1986* Standards Bugs *Eric*

Among the many *AIPS* standards is one requiring that the arguments to subroutines be of the same type. This may not matter for large buffers, but it does for REAL variables. On most machines, the only problem with providing, *e.g.*, a REAL*4 when a REAL*8 is expected, is a minor one of accuracy. However, on other machines, notably the Convex, the formats of these two vary in the number of bits used for the exponent, making for real bugs. Fixed so far are CTICS, ITICS, TKTICS, CHNTIC, SKYFRM, and PROFL which sent a REAL*8 to a REAL*4 format routine. Also corrected AXSTRN and SETLOC to declare and blank fill the full SAXLAB variable and removed the FILZCH calls from AXSTRN, substituting I2.2 and I3.2 format types.
Moved nowhere.

2980. *February 24, 1986* DBCON *Bill*

Modified to convert frequencies and frequency reference pixels to pixel 1 before comparing catalogue headers. This takes care of the case when the input frequency reference pixels are not the same but the frequencies of the channels do correspond.
Added a new parameter (using the second, unused, value in the abverb array DOPOS) to indicate if the reference frequencies of two multifrequency data sets should be the same (to within 0.1%). Spectral-line users should use this check, continuum users (*i.e.*, bandwidth synthesis) need not apply this test. Also changed: DBCON.HLP, DDBC.INC, CDBC.INC.
Moved nowhere.

2981. *February 25, 1986* COMLNK *Gary*

If the VAX does a link and a subroutine is missing, a partial executable is created, and an access violation occurs when the subroutine is called. This is dangerous when the link is done during automatic procedures such as the automatic nightly update. COMLNK will now use a temporary name ('NAME'.TMP) for the executable module and rename it only if successful.
Moved nowhere.

2982. *February 25, 1986* ZSETUP *Pat/Gary*

This routine was using COMPAR instead of CHCOMP to look for task name AIPSB. Thus AIPSB's priority was mistakenly lowered to batch priority and the AP batch jobs spawned by AIPSB could not raise their priority when using the AP. Fixed the problem.
Moved to 15APR86.

2983. *February 26, 1986* ZVD.INC *Bill*

Added vector compiler directive to state explicitly that there is a dependency in the following loop; versions affected INCVEX, INCCOS, INCVMS.
Moved nowhere.

2984. *February 26, 1986* MX *Bill*

Added compiler directive includes in MXSEL (DO 160 J) to allow vectorization (ZVND.INC) of a loop involving EQUIVALENCE and MXBHIS (DO 90 J) to suppress vectorization of a loop (ZVD.INC) involving a dependency which was necessary on the Convex.
Moved nowhere.

2985. *February 28, 1986* XGAUS *Pat*

Fixed the scaling routine for the gaussian parameter images to take account of blank pixels from not fitting all possible gaussians.
Moved to OUTBAX.

2986. *February 28, 1986* IMFIT, JMFIT, EXFND, PRTDR *Eric*

Changed printer routines:

- PRTDR.HLP — Changed NPOINTS, CHANNEL, BITER, and NCOUNT to BCHAN, STOKES, BCOUNT, and NCOUNT, and added INVERS, TIMERANG, and DOCRT.
- PRTDR — Changed to support DOCRT and short printer widths and to use TIMERANG, etc. There are no DR files to test this on so far.
- IMFIT — Changed to display axes 3–7, to print initial RMS, and to write a CC file with the output image and the input image. The latter is under control of the new adverb DOMODEL.
- JMFIT — Changed to display axes 3–7, to print initial and final RMS computed from the residual image itself, and to write a CC file with the output image and the input image. The latter is under control of the new adverb DOMODEL.
- IMFIT.HLP — Changed remarks for DOOUTPUT to describe the CC file options and added DOMODEL.
- JMFIT.HLP — Changed remarks for DOOUTPUT to describe the CC file options and added DOMODEL.
- XXFIT — Deleted old, now obsolete, fitting task.
- XXFIT.HLP — Deleted old, now obsolete, fitting task.
- EXFND.HLP — Dropped STOKES, added NCOUNT and DOCRT to options.
- EXFND — Changed input parms, changed to handle various printer widths and the standard output routine (PRTLIN) with a DOCRT option, and changed the output format to be like that of PRTUV and UVFND. Corrected several bugs including an error computing the phase.

Moved nowhere.

2987. *February 28, 1986* Wider CRTs *Eric*

AIPS has assumed that terminals are 72 characters across and all print tasks have modified their formats and information conveyed to fit in that space. Some terminals have the capability of being set to 132 characters (usually at operating system level) and should be allowed to receive more information. Changed code and help files to allow 72 < DOCRT <= 132 to imply the width of such a terminal. Changed help files are PRTMSG, PRTHI, HELP, EXPLAIN, DOCRT, PRTIM, PRTSD, PRTUV, UVFND, PRTAC, CORER, PRTAN, PRTGA, BLSUM, PRTTP, PRTAB, and PRTCC. Changed fortran files are PRTLIN, PRTALN, PRTMSG, AU7 (typo only), AU1A, PRTIM, PRTSD, PRTUV, UVFND, PRTAC, CORER, PRTAN, PRTGA, BLSUM, PRTTP, PRTAB, and PRTCC. The call sequence to PRTMSG had to change, so changed AU1, AIPSB, AIPSC, BATER, and GRIPR to account for the new call sequence. Corrected AU1A to keep INPUTS from asking permission to proceed when it was in fact done. Corrected an undeclared variable in GRIPR. Also changed WHATSNEW.HLP for everything.
Moved nowhere.

2988. *February 28, 1986* Position routines *Eric*

Changed NEWPOS to allow, in the ARC projection, angles up to π radians. The other projections are not meaningful at such large values and are still limited to 1.0 radians.
Moved nowhere.

2989. *March 3, 1986* Commons *Eric*

Changed basic commons: DLOC.INC, CLOC.INC to add parameters for geometry-dependent use; DMSG.INC, CMSG.INC to add 3 dummy parameters plus ISBTCH to state that the present job is a batch job; and DFIL.INC to increase the number of allowed scratch files from 20 to 64. All this requires recompiling all subroutine libraries.
Moved nowhere.

2990. *March 3, 1986* CATCHA *Eric*

The current ZPHFIL is incorrect for this older format conversion utility. Changed it to ZPHOL1.
Moved to 15APR86, nowhere else.

2991. *March 5, 1986* ACOUNT *Eric*

Added by Editors from Chkout history: Added messages giving the final accounting information to the user.
Moved nowhere.

2992. *March 5, 1986* ISBATCH *Eric*

Created a new pseudo-verb ISBATCH to be used to inform a supposedly interactive *AIPS* that it is in fact running in a batch mode. This will allow people to use the host batch system to run *AIPS* at lower cost. This parameter must be passed to tasks, so the format of the TD file must change. Some floating parms were changed to integer to make room for ISBTCH and up to 3 more integer parms without having to move the data values (except on Crays). Changed:

POPSDAT.HLP	—	Changed to define pseudo-verb ISBATCH.
ISBATCH.HLP	—	Created new file to describe ISBATCH.
POLISH	—	Changed branching to call PSEUDO on this pseudo-verb.
PSEUDO	—	Added code to set and reset the flag.
AU2	—	Changed to pass ISBTCH and support the new TD format.
AU2A	—	Fix initial pointer into TD file.
AUA	—	Changed to new format in TD file, passing MSGKIL and ISBTCH.
AIPS	—	Added line to initialize ISBTCH to 0 for each user.
AIPSC	—	Changed TD format in starting QMNGR and in simulating the GO verb.
BATER	—	Changed TD format in starting QMNGR.
BSTRT1	—	Changed TD format in starting QMNGR.
QMNGR	—	Changed TD format in starting AIPSB.
GTPARM	—	Changed TD format in picking up parms and sets ISBTCH to that passed or to 32000 if NPOPS > 2*NINTRN + 1.
ZDCHIN	—	Added ISBTCH = 0 initialization.

Requires relinking everything.
Moved partly to 15APR86 when the need was realized, nowhere else.

2993. *March 5, 1986* Interactive tasks *Eric*

Changed tasks which offer tape and/or DOCRT options to test on the ISBTCH flag as well as NPOPS. Changed in APLPGM: were

AVTP	CORER	EXFND	EXIND	PRTAB	PRTAC	PRTAN
PRTCC	PRTIM	PRTSD	PRTTP	PRTUV	UVEXP	UVFND

In APGNOT:, the tasks changed were

EXPND	FITTP	IMLOD	PRTGA	UVERR	UVLOD	WSLOD

Also removed an erroneous reference to DOCRT from GNMRG. When ISBATCH is true, tape jobs will not run, the DOCRT option is ignored, and the TV and graphics devices are made unavailable by these changes and those made to AU2, VERBS, etc.
Moved nowhere.

2994. *March 5, 1986* Use ISBATCH *Eric*

Changed to use ISBTCH:

TVOPEN — Changed to prohibit TVs if ISBATCH is true.
VERBS — Changed to prohibit interactive verbs for batch jobs.
ZACTV8 — (VMS) Changed to make batch tasks go at lower priority.
ZTQSPY — (VMS) Changed to put SPY to message file if ISBATCH is true.
AU1A — Changed to skip HELP and EXPLAIN on batch jobs, to put both INP and INPUTS in the message file on batch jobs.
AU2 — On GO, the TPUT and TGET files for interactive-numbered jobs are the same regardless of the batch status, but changed it to avoid closing the input "terminal," to set the time cycle longer, and to pass 0 for the assigned TV and TK devices on ISBATCH true.
AUA — Made changes like AU2 for SUBMIT, but this will not be called on ISBATCH true.
AUC — Added more protection to keep batch jobs from entering or playing with gripes.
EDITOR — Changed to prohibit Batch jobs doing MODIFY on procedures.
OERROR — Added code to quit on error when ISBATCH is true.
PRTMSG — Corrected code to force batch jobs to print on line printer.
SCHOLD — Changed to skip pausing on "screen full" when ISBATCH is true.
ZSETUP — (VMS) Changed to set lower priority for ISBATCH true tasks.
BATPRT — Changed to print when ISBATCH true also.
MSGWRT — Changed to treat ISBATCH true as a batch job.
RELPOP — Cleaned up an error test reference to NINTRN.
QINIT — Changed to raise priority on batch jobs when have AP.
QRLSE — (FPS16) Restored missing code which lowers priority of batch jobs and extended it to include ISBATCH.
BPRLSE — (120B) Extended code which lowers priority to include ISBATCH.

Moved nowhere.

2995. *March 7, 1986* Q routines from the Convex *Bill*

A number of pseudo-AP Q routines were moved from the Convex. Some are specific to the Convex and some are generally useable routines which are better than the previous versions and were put in the QPSAP: area.

Routines in QPSAP:

QRECT — Table lookup version.
QCTLUT — Generates table for QRECT.
QXXPTS — Version to use QRECT.
QPTDIV — Version to use QRECT.
QUVIN — Version to use QRECT.
Q1GRD — Version to use QRECT.
QXFOUR — New, vectorizable FFT routine.
QCFFT — Has new call sequence to QXFOUR.
QRFFT — Table lookup for coefficients, vectorizes.
FOURYF — Non-*AIPS*ish version of QXFOUR.
RFFTF — Non-*AIPS*ish version of QRFFT (calls FOURYF).

Routines in QVEX:

QRECT.s — Assembler version of QRECT.
ISAMAX.s — Corrected version.
QGRD4 — Better vector version uses WKVEC1.
QINT — Better vector version uses WKVEC1.
QCFFT — New call sequence to QXFOUR.
QINIT — Drop call to PREFFT.
QPHSRO — Vector version uses QRECT, WKVEC1.
QRFFT — Vector version uses WKVEC2.
QRFT — Vector version.

Dropped from QVEX: were QVRVRS, QRFFT, QUVIN, QVTRAN, QXFOUR. In QVEX:, the older Steve Wallach fortran QXFOUR was renamed SWFOUR and the old QXFOUR in QPSAP: was renamed OLDFOR.

Moved nowhere.

2996. *March 7, 1986* Error handling *Eric*

Added by Editors from Chkout history: Corrected error tests in DIRRA and DIRDEC to test for near 0.0 rather than exactly 0.0. Added tests in GPOS and GVEC to avoid integer overflow.
Moved nowhere.

2997. *March 11, 1986* VM *Bill*

Fixed several bugs introduced in the FFT upgrade. The sizes and dimensions of several files were incorrectly set in FILES. Also corrected the main program to return the correct error code when the program bombed.
Moved nowhere.

2998. *March 13, 1986* COMRPL.COM *Pat/Gary*

This routine would replace in a library a specific routine (such as a routine for a certain TV) with a generic routine. Changed it to check if a specific routine exists before replacing a generic routine in a specific library.
Moved to 15APR86.

2999. *March 17, 1986* DBCON *Bill*

Modified FRMAT to assume that unlabeled random parameters are the same if there are equal numbers of unlabeled random parameters. FITS tapes from the VLA Pipeline have 8 random parameters so the eighth (which no one knows the meaning of anyway) is unlabeled. This change should allow more than two Pipeline FITS tape files to be concatenated.
Moved nowhere.

3000. *March 20, 1986* BCAL1 *Bill*

Added an ABS inside the SQRT function in each occurence. For extremely high signal-to-noise VLA-line data, the RMS values calculated occasionally encountered a negative argument to the SQRT function due to insufficient arithmetic precision.
Moved nowhere.

3001. *March 20, 1986* VTESS *Tim*

Fixed minor bug allowing negative values on input guess. To use a CLEAN map as first guess, rescale it by the number of pixels and fill into the output slot.
Moved nowhere.

3002. *March 25, 1986* VSCAL *Steve Meyers/Bill*

Fixed a bug in determining the number of parameters being passed by AIPS. It was 115 and should be 130 (114+MAXFLD). This was causing the program not to pick up DOCAT or BADDISK. Thus, gain tables were not left after the program terminated.
Also fixed arguments to QHIST in SCLFND. This has no effect on what the program does but its messages about the number of scans may be correct more often.
Also added description in VSCAL.HLP telling how to invoke the antenna gain constraints in the solutions. This could not be determined from the explanation.
Moved to 15APR86 this date.

3003. *March 26, 1986* GRADDR *Nancy*

New program which will read a gripe file and print a listing of names and addresses of the gripers. (It will delete redundant entries.) Use of this program will aid in readying answered gripes for the quarterly distribution.
Moved nowhere (service routine).

3004. *March 27, 1986* GRIDR, VBFIT *Bill*

Changed name of VMOV and VCLR calls in GRIDR to QVMOV, QVLCR. The call arguments were okay (true I*4); should have worked okay on VAXen, failed on reasonable machines. In VBFIT, FRCAL3 had not been changed to the new Q routine interface. It was converted. The old version should have worked okay.
Moved nowhere.

3005. *March 26-27, 1986* Housecleaning *Eric*

We have decided to avoid an even larger blossoming of directories, which we would have to implement if we keep Z subroutine libraries below AIPS, NOTST, Q, and Y areas. Therefore, we have looked over their contents and found most to be old garbage. From QVMS:, I moved all macro and Z routines to LOCAL. From APLNVMS:, I deleted the CalTech macro routines NUMCON, SYSACCT, and TAPEIO, moved ZUNADD and ZUNSGN to LOCAL, appended ZEDIT.MAR to REDIT, ZMPORT to MPORT, ZXPORT to XPORT, and ZQWKPR and ZSBIT to QWKPL. Tasks REDIT, MPORT, XPORT, and QWKPL were then moved down a layer from where they were in order to convey their VMS-specificity. I moved the contents of AIPVMS to APLVMS. Tasks (and helps) APMAP, NTERP, and UVDIS were deleted, saving the text in LOCAL. All non-Q routines in QPSAP: were moved to LOCAL. ZETASUBS was moved from APLNVMS to NOTSUB. XPOSE (in APLNOT:) was deleted and STRTIC (in APLNOT:) was moved to LOCAL. Moved nowhere.

3006. *March 31, 1986* Coordinate routines *Eric*

Changed SETLOC, NEWPOS, DIRCOS, DIRRA, and DIRDEC to allow 3 new geometries: "global sinusoidal," Mercator, and Aitoff. Also changed:

CLAB1 — Changed call sequence, adding DOGRID to pass to CTICS, and changed call to CTICS.
CLAB2 — Changed call to CTICS (DOGRID always false here).
IAXIS1 — Changed call sequence, adding DOGRID to pass to ITICS, and changed call to ITICS.
TKLAB — Changed call sequence, adding DOGRID to pass to TKTICS, and changed call to TKTICS.
CTICS — Changed call sequence to pick up DOGRID, added code to draw the grid, including declination lines which do not intersect the left or right edges, and added code to detect bad pixel positions from the coordinate routines. Also added code to test for very long tick marks and to reduce their size — ticks will no longer be a constant $\Delta\delta$ or $\Delta\alpha$. Changed to use TICINC.
ITICS — Changed to new call sequence and made other changes like CTICS.
TKTICS — Changed to new call sequence and made other changes like CTICS.
TICINC — (New) Routine to determine tick values and lengths. It has more power than the old parts of CTICS and may be used more generally.
DIRCOS — Added error return to call sequence.
DIRRA — Corrected bugs in handling ARC projection and allowed more iterations. Added error return to call sequence.
DIRDEC — Changed to allow more iterations in ARC solution and to force more rapid convergence. Added error return to call sequence.
FNDX — Changed call sequence to add error return, changed calls to DIRDEC and DIRRA.
FNDY — Changed call sequence to add error return, changed calls to DIRDEC and DIRRA.
XYVAL — Changed call sequence to add error return.
XYPIX — Changed call sequence to add error return, changed calls to DIRCOS, DIRDEC and DIRRA.
CHNTIC — Changed calls to position routines and added error handling. Changed to use TICINC.
LABINI — Changed calls to XYVAL, ignores unlikely errors.
LMPIX — Changed call to DIRCOS, error should not occur.
MP2SKY — Changed call sequence to return error from XYVAL.
SETLOC — Changed to pay attention to the error return from NEWPOS.
SKY2MP — Changed call sequence to return error from XYPIX.
TICCOR — Changed to limit correction near the north pole.
SLBINI — Added error handling from position routines.
AU5 — Changed call to MP2SKY and added test on error (IMPOS).
AU5B — Changed call to IAXIS1 and added DOCIRC to TVLABEL.
AU6D — Added error tests for sky position in TVSTAT, IMSTAT.
AU9 — Added error tests for sky position in MAXFIT, IMVAL.
AU9A — Changed call to MP2SKY and added test on error (TKPOS).
AU9B — Changed call to TKLAB (ticks only here).
QIKHDR — Changed call to XYVAL, but left routine ignoring the extremely unlikely error returns.
TKGGPL — Added tests for bad conversion from coordinates to pixels in plotting slice models (guesses).
TKSLAC — Added error return value from new call to XYVAL.

Moved nowhere.

3007. *March 31, 1986* Coordinate tasks *Eric*

Changed:

CNTR.HLP	—	Added option to plot full coordinate grid (DOCIRCLE).
CNTR	—	Added new option, changed call to CLAB1.
GREYS.HLP	—	Added option to plot full coordinate grid.
GREYS	—	Added new option, changed call to CLAB1 and XYVAL.
DGRY.INC	—	Added new parameter for GREYS.
CGRY.INC	—	Added new parameter for GREYS.
PROFL.HLP	—	Added DOCIRCLE option.
PROFL	—	Added DOCIRCLE option, rewrote PFTICS to be like CTICS (above), and changed from an integer-map only task to a floating only task.
PCNTR.HLP	—	Added option to plot full coordinate grid (DOCIRCLE).
PCNTR	—	Added new option, changed call to CLAB1.
PFPL1.HLP	—	Added option to plot full coordinate grid (DOCIRCLE).
PFPL1	—	Added new option, changed call to CLAB1.
MOMFT	—	Changed call to MP2SKY.
DOCIRCLE.HLP	—	Added info about the new usage.
TVLABEL.HLP	—	Added DOCIRCLE.

Also changed call sequence to CTICS in GNPLT, to CLAB1 in IMVIM, SP2PL, UVPLT, VBPLT, GAL, GAPLT, IRING, PFPL2, PFPL3, PLCUB, and PLROW, to TKLAB in XBASL, XGAUS, and XPLOT, and to IAXIS1 in MPORT — none of which allow the full coordinate grid. Changed call sequences to position routines and added error handling in IMEAN, PRTIM, SLFIT, IMFIT, JMFIT, PBCOR, VTESS. Also updated WHATSNEW.HLP.
Moved nowhere.

3008. *March 31, 1986* SETPAR *Eric*

Changed to call ZDCHIN in the normal way when it begins so that it will understand the current system. If INIT is requested, a new, non-disk call to ZDCHIN is issued. Also changed the format of the line printer width parameter to indicate that values between 72 and 132 are allowed.
Moved nowhere.

3009. *March 31 — April 2, 1986* More housekeeping *Eric*

We often complain about severely non-standard routines, *i.e.*, ones which depend upon VMS-specific constructs such as various OPEN options or BYTE or LOGICAL*1 variables. We now have areas to which we may move such code, and have today done so. GRISUB was moved from AIPSUB: to AIPVMS:. GRTOTEX, GETTBC, GRKEY, GRCHEK, GRSORT were moved from AIPPGM: to AIPGVMS:. TVSLV was moved from YPGNOT: to YPGVMS:. BCAL1, BCAL2, CITCC, KONTR, MOMNT, SLOWMOMNT, TOVLB, TVCUB, TVSLD, VBCC, VBCIT, VBLIN, VLBDR, and WSLOD were moved from APGNOT: to APGVMS: Corrected were:

TVHXF	—	Declared a few undeclared variables.
WARP	—	Declared variables, worked on typing, removed illegal comparisons of hollerith and character variables.
XTRAN	—	Declared variables, corrected error due to typo in variable name.
COMCLR	—	Changed order of declarations to avoid using a variable dimension before it was declared.
SOUFIL	—	Corrected lower case variable name.
QKSORT	—	Fixed declaration order (as COMCLR).
FLAT	—	Removed routine to LOCAL. It would not have linked since it required a nonexistent L1AVG.
SGEFA	—	Removed routines (1 file) SGEFA, SGEDI, SAXPY, SSCAL, SSWAP, ISAMAX to LOCAL. These should have been separate routines and the occurrence of ISAMAX causes problems in the COS and Convex Q routines. The others all have local copies in GEOM and LGEOM, the only places where they are used.
L1	—	Changed order of declarations.

In APLNOT:, corrected typing, declared all variables, and removed IMPLICIT statements from BDN, BSC, CD, DA13, DA46, DAPM, DCUV, DERF, DMAP, DTRC, DUVC, EPS, GRD, NUT2, NUT4, and PRECES.
Moved nowhere.

3010. *April 2, 1986* BCAL1 help *Craig*

Added by Editors from Chkout history: Added more information on OUTFIL.
Moved nowhere.

3011. *April 2, 1986* FRQTAB,D/CGDS.INC *Bill*

New routine to fill a frequency table in D/CGDS.INC. This table will allow the use of multiple IFs in the modeling and gridding routines.
Moved nowhere.

3012. *April 2, 1986* UVMDIV,UVMSUB *Bill*

Added call to FRQTAB to fill frequency table. Also changed UVMSUB to not create the scratch files every time it does a gridded subtraction.
Moved nowhere.

3013. *April 2, 1986* MAKMAP *Bill*

Changed to the new call sequence to UVGRID.
Moved nowhere.

3014. *April 2, 1986* IMCREA *Bill*

Corrected order of includes: DGDS.INC must be ahead of DMPR.INC for the PARAMETERs to work.
Moved nowhere.

3015. *April 2, 1986* RFFTF, FOURYF *Bill*

These FFT routines were moved to APLNOT. FOURYF is a non-AP version of an full complex FFT. RFFTF is a real-to-complex or complex-to-real FFT.
Moved nowhere.

3016. *April 2, 1986* FILAI2, ZDIR *Gary*

Added by Editors from Chkout history: Changed FILAI2 for new installation procedures and added one more file type to ZDIR (VMS).
Moved to 15APR86 this date.

3017. *April 3, 1986* QPSAP:QCVCON *Bill*

The routine was not properly incrementing the pointers. Effectively did the first element only. Causes errors in the gridded interpolation model computation routines (pseudo-AP only).
Moved to 15APR86 this date

3018. *April 4, 1986* Bandwidth synthesis *Bill*

Several routines involved in bandwidth synthesis were made smarter. The gridding routine UVGRID (used in MX) will now grid as many frequency channels in one pass as allowed by "AP" memory; it will use any secondary AP memory. This should make a dramatic improvement in the real-time performance in gridding bandwidth synthesis data. Some improvement should also be seen in single-channel cases. Also changed the call sequence to UVGRID. Since it is quite difficult to predict the number of passes needed to grid the data, the work and output scratch files may be switched.

The *uv* model interpolation routine ALGSUB had similar modifications to allow multi-channel interpolation; the call sequence was unchanged. Both UVGRID and ALGSUB use the frequency tables in D/CGDS.INC to allow use of multiple IFs. UVGRID now calls FRQTAB to fill in this table. Affected files were MX; in QNOT: UVGRID and ALGSUB; in Q120B: NRAO.AP and NRAO.LIB (APINT and APGRD4 microcode) and UVINT and AP1GRD; in QFPS: UVINT.VFC and AP1GRD.VFC; in Q5000: UVINT and AP1GRD (UVINT.VFC and AP1GRD.VFC were also updated in Q5000: even though they shouldn't be there); in QPSAP: QUVIN, QINT, Q1GRD and QGRD4; in QVEX: QINT and QGRD4; and in QFPS16: QUVIN and Q1GRD.
Moved nowhere.

3019. *April 4, 1986* VISDFT *Bill*

Modified to take advantage of the frequency table in D/CGDS.INC to determine the frequencies in the data. This allows use of multiple IFs in the data.
Moved nowhere.

3020. *April 7, 1986* ZQMSIO *Eric*

The VMS Z routine was using REAL*4 hollerith strings and CHARACTER to REAL*4 equivalences and getting away with them on the Charlottesville VAX. Apparently, the same tricks are not valid on the VLA VAXes. Changed it to do in-core writes of the hollerith strings to true CHARACTER variables and then to use these correct variables.
Moved nowhere.

3021. *April 8, 1986* YCRCTL (M70) *Eric*

The correction to the center pixel of the cursor did not use the MAXXTV(2) value, but assumed 512 instead. This does not work if the I^2S M70 is configured to have only 480 y pixels. Fixed it.
Moved nowhere.

3022. *April 8, 1986* XSUM *Eric*

Dropped ability to read/write integer images. Fixed it to handle 2-dimensional input images. Had to change COMOF3 also to allow 1-dimensional images. We should relink everything, but maybe we can wait for 15-Apr.
Moved nowhere.

3023. *April 9, 1986* FRQTAB *Bill*

Fixed to read Channel (IF) table if there is 1 IF and it is a regular axis.
Moved nowhere.

3024. *April 9, 1986* CHNCOP *Bill*

New routine. Copies selected portions of a channel (IF) table.
Moved nowhere.

3025. *April 9, 1986* ALLTAB *Bill*

New routine. Copies all tables extension files from one catalogued file to another. Allows a list of table types to exclude.
Moved nowhere.

3026. *April 9, 1986* MX *Bill*

Added the adverbs BIF and EIF to specify an IF range to be averaged in gridding. Also, MX no longer doubles the size of small images when they are not to be CLEANed. Copies all relevant tables. Also affected: MX.HLP, D/CMX.INC.
Moved nowhere.

3027. *April 9, 1986* UVSRT *Bill*

Added call to ALLTAB to copy all tables extension files. Moved to APGNOT: due to use of *not standard* (oh no!) routines.
Moved nowhere.

3028. *April 9, 1986* UVSUB *Bill*

Added the adverbs BIF and EIF to specify an IF range to be processed. Multiple IFs can be processed only if all frequency channels in each IF are processed. Calls ALLTAB to copy all tables extention files. Also: UVSUB.HLP, D/CSUB.INC.
Moved nowhere.

3029. *April 10, 1986* RDFITS *Eric*

Added, to this service program, a multifile capability for the READ operation and a new operation KEYI to index all FITS keywords in one or more files.
Moved nowhere.

3030. *April 10, 1986* EXPFIT *Don/Eric*

Replaced the "standard" EXPFIT — which no longer worked due to the directory changes — with a list-driven one written in Fortran 77 for VAXes by Don. Cleaned it up and changed the handling of exclusions, messages, etc. Moved it to AIPGVMS: along with an EXPFIT.COM procedure to generate an appropriate list and to drive it.
Moved nowhere.

3031. *April 11, 1986* QVEX:QGRD4, QINT *Bill*

Changed WKVEC1 to WKVEC7 since the higher-level routines were using WKVEC1 – WKVEC6 as AP memory.
Moved nowhere.

3032. *April 11, 1986* VBANT *John*

The logic was crossed for applying equatorial and alt-az gain curves. Equatorial gain curves have been applied to data from alt-az antennas, and vice versa. The errors have been corrected.
Moved to 15APR86.

3033. *April 11, 1986* QVEX:QPHSRO *Bill*

Changed WKVEC1 to WKVEC8 because the higher-level gridding routines were using WKVEC1 – WKVEC6.
Moved nowhere.

3034. *April 11, 1986* UVLOD *Eric*

Fixed bad call sequence to MLREOF from old format AN file-reading routine, adding an IERR.
Moved to 15APR86 this date, nowhere else.

3035. *April 11, 1986* TABs, long lines *Eric*

The new EXPFIT program was run on 15APR86 and reported some problems in the text files. Removed TAB characters from GETTBC, GRCHEK, GRSORT, ZDEAOP (VMS), ZDEAXF (VMS), ZDOPR4 (VMS), ZPARS.MAR (VMS), KONTR, VBANT and shortened long comment lines in UPDAT, DICONV, IMFLT, and KONTR.
Moved nowhere.

Changes: 15-Apr-1986 version of *AIPS*

This section is intended to provide corrections and updates to the *AIPS COOKBOOK* in order to fill the gap between publication dates. A complete new *COOKBOOK*, labeled as a 15 October 1985 version, has been published. This section contains the pages changed in that edition due to the 15APR86 release. Note that we are experimenting with a suggestion made by several users, namely that we print the revised pages in their entirety including both sides. This should enable users to replace the old pages with the new in their current *COOKBOOK*s.

7.4. Deleting unwanted plot files (EXTDEST)

Plot files generated by CNTR, PCNTR, GREYS and other plot tasks are archived in your disk catalog as PL extensions to the image file from which they were derived. Running CNTR a second time or some other plot task does not overwrite the previous plot file, but makes another with a higher "version" number.

You can review the parameters of the plot files associated with a given image file by typing:

> INDI *n* ; GETN *ctn* C_R	where *n* and *ctn* select the disk and catalog number of the desired image.
> INEXT 'PL' ; EXTLIST C_R	to select a listing of plot file contents.

Plot files (and other "extension files") are automatically deleted when an image is deleted by ZAP. However, large plot files should be deleted as soon as they are no longer needed:

> INP EXTDEST C_R	to review the inputs required.
> INDI *n* ; GETN *ctn* C_R	where *n* and *ctn* select the disk and catalog numbers of the image file.
> INEXT 'PL' ; INVERS *m* C_R	to set the type to PL (plot) and the version number to be deleted to *m*. $m = -1$ means all and $m = 0$ means the most recent (highest numbered).
> EXTDEST C_R	to do the deletion.
> INVERS 0 C_R	to reset the version number to its default — usually advisable.

7.5. SLICE files (profile plots)

You can generate a one-dimensional slice (profile) through any two-dimensional plane of an image file using the *AIPS* task SLICE. The output file is appended to the image file as an SL extension file. Slices are computed along lines in the two-dimensional image joining any valid pair of points selected by BLC and TRC. The set of software dealing with slice file analysis and display can be obtained on your terminal by typing HELP SL1D. The list is also given in § 14.

To generate a slice:

> TASK 'SLICE' ; INP C_R	reviews the inputs to SLICE.

Use INDISK and GETNAME to select the input image. The beginning (BLC) and ending (TRC) points for the slice can be specified conveniently using the TV cursor if the image to be sliced is first displayed on the TV with TVLOD or TVALL. To set these points with the TV, type:

> TVSLICE C_R

then set the TV cursor to the desired beginning point for the slice, press any trackball button, and repeat for the ending point for the slice. Note that, for slices, BLC need not be below or to the left of TRC. Finally:

> GO C_R	to generate the slice file.

When SLICE has terminated (watch the *AIPS* monitor), the file may be plotted on the Tektronix 4012 (graphics) terminal using the verb TKSLICE:

> INP TKSLICE C_R	to review what you can specify.
> INEXT 'SL' ; EXTL C_R	to find the intensity range and number of points in the interpolated slice.

The default scales will plot all slice points on a vertical scale from the slice minimum to the slice maximum. You can alter the part of the slice that is plotted and the vertical scale by specifying, for example:

> BDROP 100 ; EDROP 225 C_R — to drop 100 points from the beginning and 225 points from the end of the plotted portion of the slice.

> PIXRANGE -0.001 0.004 C_R — to set the range of the vertical axis to be −1 to 4 mJy/beam.

Then:

> TKSLICE C_R — to plot the slice on the TEK screen.

Note: several slices may be put on one TEK plot. Use TKASLICE C_R for the additional ones.

Slice files may be converted into plot files by:

> GO SL2PL C_R

The resulting plot files may then be output by:

> GO QMSPL C_R — to display the plot file on the QMS laser printer.

> GO PRTPL C_R — to display the plot file on the printer/plotter.

to obtain a better-quality plot than can be obtained with the HARD COPY button on the graphics terminal. In addition:

> GO TKPL C_R — to display the plot file on the graphics terminal.

> GO TVPL C_R — to display the plot file on a TV graphics plane.

A one-dimensional fit of up to four Gaussian components to slice data can be calculated using the task SLFIT (see § 8.3.3). Relevant displays of the data, the fit, and the residuals are also available both as verbs (like TKSLICE) and as options in the task SL2PL. See HELP SL1D or the listing in § 14 for complete lists.

Slice files are archived in your disk catalog as SL extensions to the image file from which they were derived. Running SLICE again with new parameters does not overwrite the slice file, but makes another with a higher "version" number. To review and/or delete slice files, follow the instructions for EXTLIST and EXTDEST of plot files in § 7.4 above, but use INEXT 'SL' C_R in place of INEXT 'PL' C_R.

7.6. Other one-dimensional plots

The "slices" described above may, of course, be specified to be single rows of your image (*i.e.*, BLC(2) = TRC(2)). There are several tasks, however, which plot rows more directly. The simplest of these is PLROW which makes a plot file of all selected rows in an image plane. Each row is plotted as a slice offset a bit from the previous row. Low intensities which are "obscured" by foreground (*i.e.*, lower row number) bright features are blanked to keep the plot readable. Example inputs would be:

> TASK 'PLROW' ; INP C_R — to review the inputs.

> INDISK *n* ; GETN *ctn* C_R — to select the image on disk *n* catalog slot *ctn*.

> BLC 100 ; TRC 300 C_R — to select the subimage from (100,100) to (300,300).

> YINC 3 C_R — to plot only every 3rd row.

> PIXRANGE -0.001 0.050 C_R — to clip intensities outside the range −1 to 50 mJy.

> OFFSET 0.002 C_R — to set the intensity scaling such that 2 mJy separates rows of equal intensity.

> INP C_R — to check the inputs.

> GO C_R — to run PLROW.

> GO QMSPL C_R — to display the plot file on the laser printer after PLROW has finished.

8.4. Image analysis

Image analysis is a very broad subject covering essentially all that *AIPS* does or would like to do plus specialized programs designed to analyze a user's particular image in the light of his favorite astrophysical theories. *AIPS* provides some general programs to perform geometric conversions, image filtering or enhancement, and model fitting and subtraction. These are the subjects of the following sections. Specialized programs for spectral-line and VLBI data reduction are described in §§ 9 and 10, respectively.

8.4.1. Geometric conversions

The units of the geometry of an image are described in its header by the coordinate reference values, reference pixels, axis increments, axis dimensions, and axis types. The types of coordinates (celestial, galactic, etc.) and the type of tangent-plane projection (SIN from the VLA, TAN from optical telescopes, ARC from Schmidt telescopes, NCP from the WSRT) are specified in the *AIPS* headers by character strings. See *AIPS* Memo No. 27 for details of these projections. A "geometric conversion" is an alteration of one or more of these geometry parameters while maintaining the correctness of both the header and the image data. The *AIPS* tasks which do this interpolate the data from the pixel positions in the input image to the desired pixel positions in the output image. Most of them require very large internal buffers and hence, are available only on virtual-memory computer systems.

The simplest geometric conversion is a regridding of the data with new axis increments and dimensions with no change in the type of projection or coordinates. Two tasks, GEOM and LGEOM, perform this basic function and also allow rotation of the image. One use of these tasks is to obtain smoother displays by regridding a subimage on a finer grid. To rotate and blow up the inner portion of a 512^2 image, enter:

> TASK 'LGEOM' ; INP C_R	to review the inputs.
> INDISK *n* ; GETN *ctn* C_R	to select the image.
> BLC 150 ; TRC 350 C_R	to select only the inner portion of the image area.
> IMSIZE 800 C_R	to get an 800^2 output image. This will allow the subimage to be blown up by a factor of 3 and rotated without having the corners "falling" off the edges of the output image.
> APARM 0 C_R	to reset all parameters to defaults.
> APARM(3) = 30 C_R	to rotate the image 30° CCW (East from North usually).
> APARM(4) = 3 C_R	to blow up the scale (axis increments) by a factor of 3.
> APARM(6) = 1 C_R	to use cubic polynomial interpolation.
> INP C_R	to check the inputs.
> GO C_R	to run the program.

LGEOM allows shifts of the image center, an additional scaling of the y axis relative to the x axis, and polynomial interpolations of up to 7^{th} order. Type EXPLAIN LGEOM C_R for more information and advice. GEOM is a small-buffer version of LGEOM. As a result, it works on non-virtual-memory computers, but is very limited in the amount of rotation it can do on larger images. These tasks should be used for rotation only if the pixels are square.

A much more general geometric transformation is performed by HGEOM, which converts one image into the geometry of a second image. The type of projection, the axis increments, the rotation, and the coordinate reference values and locations of one image are converted to those of a second image. HGEOM should be used before comparing images (with COMB, GREYS, PCNTR, BLANK, TVBLINK, etc.) made with different geometries, *i.e.*, radio and optical images in different types of projection or VLA images taken with different phase reference positions. Use EXPLAIN HGEOM C_R to obtain the details and useful advice.

A potentially very powerful transformation is performed by PGEOM. In its basic mode, it converts between rectangular and polar coordinates. An example of this operation is illustrated in § 8.4.4. However, PGEOM can also "de-project" elliptical objects to correct for their inclination and "unwrap" spiral objects. Type EXPLAIN PGEOM ↵ for information.

8.4.2. Filtering

For our purposes here, we can define "filtering" as applying an operator to an image in order to enhance some aspects of the image. The operators can be linear or nonlinear and do, in general, destroy some of the information content of the image. As a result, users should be cautious about summing fluxes or fitting models in filtered images. (Technically, these remarks can also be made about CLEAN and self-calibration.) However, filtered images may bring out important aspects of the data and often make excellent, if unfamiliar-looking, displays of particular aspects.

NINER produces an image by applying an operator to each cell of an image and its 8 nearest cells. The task offers three nonlinear operators which enhance edges (regions of high gradient in any direction). It also offers linear convolutions with a 3×3 kernel which can be provided by the user or chosen from a variety of built-in kernels. Among the latter are kernels to enhance point sources and kernels to measure gradients in any of 8 directions. The 'SOBL' edge-enhancement filter can bring out jets, wisps, and points in the data, while the gradient convolutions produce images which resemble a landscape viewed from above with illumination at some glancing angle (as when viewing the Moon). Both are very effective when displayed on the TV or by the GREYS / QMSPL combination (see § 8.4.4). Enter EXPLAIN NINER ↵ for additional information.

MWFLT, at present, applies any one of four nonlinear, low-pass filters to the input image. Each filter is applied in a user-specified window surrounding each input pixel. One of the operators is a "normalization" filter designed to reduce the dynamic range required for the image while bringing out weaker features. The others produce, at each pixel, the weighted sum of the input and the median, the "alpha-trimmed" mean, or the alpha-trimmed mode of the data in the window surrounding the pixel. These last filters can be turned into high-pass filters by subtracting the output of MWFLT from the input with COMB. Type EXPLAIN MWFLT ↵ for further information.

8.4.3. Modeling

The addition of model data to an image or *uv* data set is often useful either to simplify later processing steps or to study processing steps using a "source" of known structure. For example, the removal of the response to an appropriate uniform disk from the *uv* data for a planet will leave CLEAN the task of deconvolving only the remaining fine-scale structure to which it is well suited. The removal of a few bright point sources of known position and strength may allow imaging with significant tapers in a numerically smaller field. The tasks IMMOD and UVMOD will add (or subtract) a point, Gaussian, disk, or rectangular source to the (scaled) input image or *uv* data, respectively. Both tasks can also add noise and both allow the original data to be replaced by the model. Type EXPLAIN IMMOD ; EXPLAIN UVMOD ↵ for details.

The task CCMOD will create a clean-components file representing the chosen Gaussian or disk model. CLEAN may then be "restarted" with the model as its initial set of components. The task UVFIT may be useful for fitting Gaussian or uniform-sphere models to small (< 2000 visibility) *uv* data sets.

9.10. Transposing the cube

The task TRANS will transpose the cube. Typical inputs are:

> TASK 'TRANS' ; INP $\subset_R$	to review the inputs.
> INCLASS 'LMVCUB' $\subset_R$	to select the untransposed cube.
> TRANSC '312' $\subset_R$	to make new axis order 3,1,2 in terms of the old axis order (RA, DEC, VEL becomes VEL, RA, DEC).
> OUTCL 'VLMCUB' $\subset_R$	to give it an outclass reflecting the axis order.
> BLC 0 ; TRC 0 $\subset_R$	to transpose the whole cube.
> GO $\subset_R$	to run the program.

9.11. Further profile analysis

A wide variety of programs is available to do further analysis of the data.

> HELP CUBE $\subset_R$	to list them all on your terminal.

This help file is also listed in § 14.

By displaying the transposed cube you can inspect RA, VEL or DEC, VEL images. The cube can be rotated with LGEOM (if the α–δ pixels are square), *e.g.*, to align one of the axes with the major axis of a galaxy.

A single profile can be produced from these images with SLICE, then plotted using TKSLICE (see § 7.5). PLCUB, PLROW and XPLOT are convenient programs for displaying multiple profiles.

The task XBASL can be used to remove baselines. Be aware, however, that if you have made an error in the calibration, this has most likely caused slopes in amplitude *and* phase. Therefore, it is generally better to track down the error and correct it than to decide (arbitrarily) to take out slopes in amplitude.

Smoothing and blanking are important for almost all analysis programs. CONVL works on cubes and does a spatial smoothing (on LMV cubes). Using all the defaults in XSMTH performs a Hanning smoothing in velocity (on VLM cubes). Smoothing is not just useful for bringing out weak extended signals. Smoothed images can also assist in determining the boundaries of sources to set windows for subsequent spectral analysis. For example, the smoothed cube could be used to set the CLIP limits in task COMB to be applied to the unsmoothed cube.

The task BLANK offers a variety of algorithms for "blanking" out regions of bad data or source-free regions in spectral-line cubes. It has an interactive mode, which allows you to indicate with the cursor on the TV what are "good" regions. Set everything to default, use OPCODE 'TVCU' $\subset_R$ and type GO BLANK $\subset_R$. Then just follow the instructions, pushing button A to lay out the polygon and button D followed by $\subset_R$ to go to the next image. If marking "bad" regions is easier, set DOINV TRUE $\subset_R$ before running BLANK.

The blanked cubes can be used to calculate integral profiles with BLSUM (or PRFPL at the VLA) and to calculate moments 0 to 3 of the profiles with XMOM. Thus, the 0-moment image will be the integral under the profile (*e.g.*, total HI), the first moment is the velocity field, etc. Task MOMNT does the smoothing, blanking and calculating of moments all in one run. This is very easy to use, but can be dangerous since you don't see what is going on. RGBMP computes "integral" images another way — as three weighted sums representing the low, center, and high velocity parts of the cube. An interesting display results from:

> TVINIT ; TBLC 0 ; TTRC 0	to initialize everything.
> INDI *n* ; GETN *ctn* $\subset_R$	to select the RGBMP output.

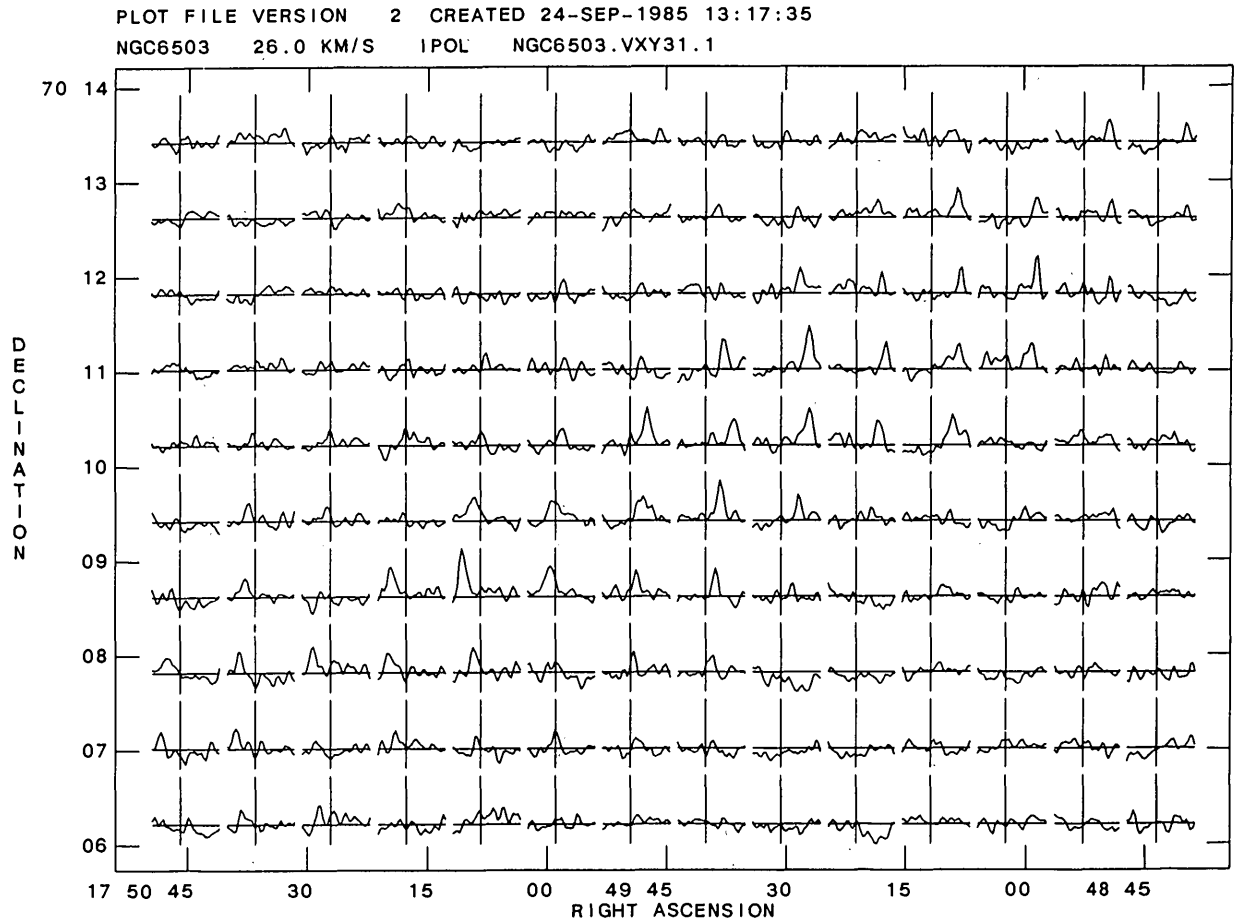
> TV3C ; FOR TVCH = 1 TO 3 ; TBLC(3) = TVCH ; TVLO ; END $\subset_R$

If you prefer to fit Gaussians instead of calculating moments, the program XGAUS can be used. It is a good idea to use XPLOT first to look at (a sample of) the profiles, before you do any Gaussian fitting. In most cases, it is perhaps preferable to use the interactive mode, so that you can see what is happening, but be aware that it might be rather time-consuming. The experimental task NNLSQ performs a constrained, non-linear deconvolution of the spectra in a VLM cube.

GAL fits models of galaxy rotation to images of the predominant velocity (*e.g.*, the first moment images written by XMOM, XGAUS, or MOMNT).

At the VLA, you can plot all your channel images in one plot on the Zeta plotter. Star positions and beams can be included. All this is done with the task KONTR.

9.12. Sample display from PLCUB



PLCUB

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6. There are gripes on (returned) tape: . . . ☐ Yes ☐ No

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   ☐ *AIPS* Memo No. 41
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April 15, 1986

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National Radio Astronomy Observatory

A newsletter for users of the
*A*stronomical *I*mage *P*rocessing *S*ystem

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...!seismo!nrao1!nwiener or 5371::NANCY

TEXset by EWG

News Notes

Gary Fickling is getting married on August 2. The bad news is that he is moving to Reston, Virginia and, by the time you read this, is no longer employed by NRAO. He is taking a position with DBA Systems, a contractor to several government agencies. Gary has been with NRAO since November 1979 and has made significant contributions to the *AIPS* project. His design for the installation procedure has set a new standard for portable image-processing systems. We will miss him and wish him the best of luck in his new life. Although the NRAO has a hiring freeze in effect, we do hope to be allowed to replace Gary. If any of our readers, or someone they know, is interested in this employment possibility, please call Bob Burns in Charlottesville at 804–296–0229.

At the request of several *AIPS* users, the 15APR86 *AIPSLETTER* began a new format for the updates to the *AIPS COOKBOOK* that appear here. We now reprint entire *COOKBOOK* pages (both sides) when changes are made. Starting with this *AIPSLETTER*, the changed text is marked by vertical bars in the margins of the replacement pages, to help you to identify the changes. Future editions of the *COOKBOOK* will be distributed in three-ring binders, making it easier to install the updated pages from the *AIPSLETTER*s. We will also adopt a chapter-based page numbering system (*e.g.*, 9–10 for the tenth page of Chapter 9) so that we can update individual chapters without renumbering the rest of the *COOKBOOK*. We hope that all of these format changes will make it easier for you to keep your *COOKBOOK* copies up to date. In the meantime, you may find it more convenient to install the *COOKBOOK* updates from the *AIPSLETTER* if you extract *COOKBOOK*s from the spiral bindings in which they were distributed, and put them in your own ring binders.

We are considering changing the *AIPS* coding standard to a subset of Fortran 77. In particular, we are thinking of converting all 16-bit integers into "INTEGER." This will have the practical effect of making *AIPS* no longer available to machines with integer formats containing fewer than 32 bits. *We need your help* — are there any computers out there, for which an *AIPS* installation is being considered, which have fewer than 32 bits? Please call Eric, Don, or Bill if you know of any.

Summary of Changes: 15 April 1986 — 15 July 1986

These changes are listed in detail in the CHANGE.DOC files reproduced later in the *AIPSLETTER*. During the quarter, we have concentrated on correcting minor bugs in the code, on making sure that *AIPS* works under UNIX on the Convex in the current, 15JUL86, release, and on consolidating all the Z-routine versions within the appropriate directories on the Charlottesville VAX. As a result, the changes in the NEW area are almost as voluminous as those in the TST area. There are 263 total entries in the current CHANGE.DOC files for this quarter, many of which report simultaneous changes to more than one routine.

Changes of Interest to Users: 15JUL86 as NEW

Normally the NEW area is reserved for bug fixes, with new routines and options appearing only in the TST area. However, in order to complete the DDT test and verification package for 15JUL86, we decided to put a few new things into NEW. These include a new task, UVDIF, to print differences between two *uv* files (see entry #3087), a new option in PRTAC (#3063), new output adverbs for IMSTAT and TVSTAT (#3041), and another coordinate geometry (Stereographic — #3201). The change with the greatest effect on users was an increase in the size of the *POPS* memory area. This change allows a lot more room to create and edit procedures, but makes all old SAVE/GET files obsolete (see #3090). The DDT testing also led to improvements in the Fourier transform method used to compute the gridding correction in MX and UVMAP (#3102), in the convergence testing in ASCAL (#3089), in the handling of shifts and rotations by ASCAL and UVSUB (#3073), and in the use of a default image by VM (#3065). Non-functioning versions of VTESS, XBASL, and HGEOM were corrected (#'s 3110, 3109, 3075). SUMIM, SUMSQ, RM, and PBCOR were corrected to write only floating-point images and to handle history files properly (#3111). Several interactive TV routines were cleaned up a bit (#'s 3037, 3064). The AP queuing algorithm had a significant bug which was corrected and which led to corrections to several VMS Z routines (#'s 3077, 3101, 3104). Fujitsu staff pointed out an insidious bug which caused IMVAL to fail to do correct interpolation.

Changes of Interest to Users: 15OCT86 as TST

All of the improvements and corrections made in the 15JUL86 release were also made in the 15OCT86 release. The latter does contain a new verb and five new tasks. The verb, PUTVALUE, allows the user to set an image pixel to any desired value, including magic blanks (see entry #3233). It gives the users both enough rope to hang themselves and a precise tool for blanking trouble spots, for correcting errors in images (*e.g.*, lobe errors in rotation measure images), and for filling in blanked pixels with sensible values from surrounding pixels. An experimental imaging task BSMAP replaces ASCAL, UVSRT and MX for small fields with poor phase data (see #3266). Maximum entropy and mosaicing methods may be applied to polarization images with the new task UTESS (see #3249). Tables may be plotted and flagged in very flexible ways using the tasks TAPLT and TAFLG (see #'s 3237, 3251, 3252). Positions of "points", such as stars, may be loaded into *AIPS* with the new task STARS. Several plot programs, notably CNTR, PCNTR and GREYS, will draw these positions as plus signs (see #3229 and #3240).

Several tasks received significant revisions for the 15OCT86 release. POLCO was revised to use a better correction algorithm as well as to write floating format images and a fully correct header (#3190). VTESS was improved in several ways including the capability of handling non-symmetric beams (#3244). Both VM and VTESS now use more AP code which should improve their performance. PBCOR was rewritten to handle data cubes in any transposition and to allow the user control over the cutoff and beam shape parameters (#3256). XBASL was changed to handle larger problems and RM was changed to handle logical inputs in standard ways (#3255). A change to a VMS Z routine was made to allow users to abort QMSPL without having a partial plot appear on the laser printer leaving it in an abnormal state (#3257). VBFIT was changed to let the user set the maximum antenna number if needed, which lets the task handle VLA Pipeline spectral-line data (#3157).

Changes of Interest to Programmers: 15JUL86 as NEW

At the beginning of the quarter, the 15JUL85 (note the year) versions of the Cray/COS and all UNIX Z routines were loaded into the Charlottesville VAX directories reserved for them (see #'s 3038–3049). Toward the end of the quarter, the corrected and improved UNIX routines tested on the Convex were brought back to these directories (#'s 3133–3155). The VMS Z routines were also corrected to use "wait-mode" system services — apparently our VAX is so busy that the failures due to "impatience" were rare (#3101, 3104). ZQMSIO was changed to allow a CLOS operation needed by UNIX systems (#3083) and better use of this for VMS is made in the 15OCT86 release (#3257).

The call sequences to CTICS, TICINC and CLAB2 were corrected (#3106). In the "WaWa" or "easy" IO area, subroutine MAPCR was changed to return the header block for non-scratch images. This lets you use it later with the extension-file areas cleared and other parameters properly set. The subroutine MAPFIX will seldom be needed since we no longer write integer images. It did, however, also function to find the image extrema and to copy the image to a cataloged output file. These functions are now available in subroutine MAPCOP (see #3111).

Programmers should review many of the changes to see what sloppy coding habits require of those trying to make code run on non-VMS computers. In particular, passed array dimensions can cause problems (see #'s 3091, 3114–3121). Other causes of trouble include special subroutine names (#3055), assumptions of two integers per real (#3056–3057), constants and expressions in call sequences (#3079), and use of wrong variable types (#'s 3081, 3095, 3105–3106).

Changes of Interest to Programmers: 15OCT86 as TST

We did not intend to make significant changes to 15OCT86 until we felt secure with 15JUL86. As a result, there is little to which we should draw your attention. Paraform tasks TAFFY and CANDY had minor errors corrected (#'s 3158, 3159). ZCPU and ZTQSPY were revised to report all of the IO done (#'s 3239 and 3259) — and that's it. All the rest was done to 15JUL86 as well or is reported above for the scientific users.

AIPS Users' Group Column

This column was added to the *AIPSLETTER* starting with the 15APR86 issue. It is intended to provide a means whereby non-NRAO *AIPS* users can advertise support for nonstandard *AIPS* hardware and software using the *AIPSLETTER* as a communications channel. It could also provide a forum for discussion of *AIPS* problems, solutions and development that is more public than the Gripes, NRAO's *AIPS* Priorities meetings, etc.

This column is meant to be "your" column, rather than "ours." We hope that in future it will be made up from contributions that *AIPS* users send in, rather than, as at present, from those generated by the group in Charlottesville. Please send any items for inclusion in this segment of the 15OCT86 *AIPSLETTER* to:

AIPS Users' Group
c/o Nancy Wiener
NRAO
Edgemont Road
Charlottesville
VA 22903-2475

or by computer mail to Nancy at any of the network addresses given on page 5 and on the front page of the *AIPSLETTER*. To be included in the next *AIPSLETTER*, your contribution should be received by 15 October 1986.

We may eventually set up a computer Bulletin Board for the *AIPS* Users' Group, but NRAO's network connections are changing this summer (see page 5), so we are deferring decisions on this until they stabilize.

What's out there — Plotters ?

Many different types of plotters have been reported as being in use at *AIPS* sites. We list here those sites which reported plotters other than Versatec and QMS/Talaris, to give you some feeling for "what's out there." Clearly, the most common nonstandard plotter family at *AIPS* sites is the Printronix series. Please note that offers of *support* for nonstandard plotters were listed in the 15APR86 *AIPSLETTER*.

Benson	Observatoire de Bordeaux, France
CalComp 1044	Space and Astronomy Res. Ctr., Iraq
CalComp 81	Netherlands Found. for Radio Astron.
Calcomp (unspecified 4-pen)	TIFR Radio Astronomy Center, India
CalComp (unspecified)	Steward Observatory
CITOH	Div. of Planetary Sciences, Cal Tech
	SASC Technologies
COMPLOT	ISC, Univ. of Wisconsin
DS180	Steward Observatory
FACOM 6715E	Nobeyama Radio Observatory, Japan
HP7221C	CSIRO Radiophysics, Australia
HP7475	Dept. of Physics & Astronomy, U. Iowa
HP7550	GAG-CERMO, Grenoble, France
HP7585B	CSIRO Radiophysics, Australia
HP (unspecified pen plotter)	IRAM, U. Grenoble, France
HP LaserJet	Dept. of Physics & Astronomy, U. Iowa
Imagen	Dept. of Astronomy, U. of Toronto, Canada
	Smithsonian Astrophysical Obs.
	Dept. of Astronomy, U. Michigan
Printek 920	Dept. of Astronomy, Penn. St. U.
Printronix 300	ISC, U. Wisconsin
Printronix 4160	TIFR Radio Astronomy Center, India
Printronix MVP	Jet Propulsion Laboratory
Printronix (unspecified)	Columbia Astrophysics Lab.
	Dept. of Astronomy, Cal Tech
	Dept. of Astronomy, UCLA
	Dept. of Astronomy, U. Minnesota
	Dept. of Astronomy, U. Texas
	Dept. of Physics & Astronomy, Michigan St.
	Departement de Physique, U. Laval, Canada
	IRAM, Granada, Spain
	IRAM, Grenoble, France
	Naval Research Lab.
	Physics Dept., Ohio State U.
	Radio Astronomy Div., Shanghai Obs., China
	Steward Observatory
Zeta 887	Beijing Astronomical Obs., China
Zeta (unspecified)	CSIRO Radiophysics, Australia
	Dept. of Astronomy, U. Illinois
	Dept. of Astronomy, U. Texas
	N.R.A.L., Jodrell Bank, U.K.

Electronic Mail Addresses for *AIPS*-Mail

Addresses on two different computer networks have been included in the mastheads of recent issues of the *AIPSLETTER* as a hint to our widely dispersed user community that many of them are able to communicate with the *AIPS* staff in Charlottesville by electronic mail. As of this *AIPSLETTER*, the Charlottesville computers are connected to three different networks (and, through them, to several others), and a fourth connection is expected during the current quarter. The table below lists addresses to use for *AIPS*-related electronic Mail, such as queries about kit orders, gripes, queries about hardware support and benchmark results, or contributions to the *AIPS* Users' Group Column of the *AIPSLETTER*:

net name:	net address:	status:
BITNET (+EARN)	`NANCY%CVAX@CITPHOBO`	since April 85
Internet (ARPA+NSFnet)	`NANCY%CVAX@Hamlet.Caltech.Edu`	since April 85
UUCP/Usenet	`...!seismo!nrao1!nwiener`	since June 86
SPAN (+HEPnet)	`5371::NANCY`	expected August 86?

NRAO node `CVAX` is not connected to NASA's SPAN (Space Physics Analysis Network) as of 15 July, but connectivity is expected soon with 5371 (5.251) as the DECnet numerical address. NRAO node `nrao1` also has UUCP/Usenet service to several other nodes (`astrovax`, `stsci`, `cleast`, `uvacs`). The *AIPS*-mail addresses given above are for Nancy Wiener's accounts; Nancy handles kit orders and gripes herself and forwards other mail to appropriate staff members.

The network addresses, node names and account names given above are subject to changes or temporary disruptions due to the rapid pace of network and electronic mail development. Two examples: (1) work is in progress to give NRAO new connections to both BITNET and the Internet, and either or both may become operational during the current quarter; (2) for about twenty days in June and early July our BITNET and Internet service was disrupted due to network configuration changes in preparation for the anticipated SPAN connection (we apologize for any inconvenience this may have caused). We'll tell you more about this topic in the next *AIPSLETTER*.

Product Review

Culler 7+Unix: In the 15JAN86 *AIPSLETTER* we reviewed several models offered by Culler Scientific Systems Corporation (100 Burns Place, Santa Barbara, CA 93117, 805/683-5631). During the last quarter Culler introduced a new implementation of the Culler 7 which they call the "PSC" (Personal SuperComputer), at a price just under US$100K, with shipments expected in the current quarter. This model is intended to be a computational server for a collection of workstations on an Ethernet, especially Sun workstations (Sun and Culler have a marketing agreement). The original Culler 7 implementation is available in Models 10, 20, 30 and 40 (1-4 CPUs), with prices ranging from about US$275K to about US$750K. No *AIPS* benchmarking data are available for any of these models, and so the following performance estimates are speculative. In the reviewer's opinion, the PSC and Model 10 are probably roughly equivalent to a VAX 8650 plus AP-120B. The 20, 30 and 40 models are probably competitive with the Convex and Alliant models in price-performance ratio for aggregate throughput, but Culler currently has only limited support for concurrent execution and so the full pipeline capability is not available to a single *AIPS* task. In general, the Culler models all have relatively strong scalar capability because of the horizontally-microcoded architecture. *AIPS* sites which are considering the Alliant FX/1 should also consider the Culler PSC, especially if they have Sun workstations. *Please note that our mentioning of the availability of these products does not constitute any sort of endorsement of them. Also, this review is based on our current understanding of these complex and evolving systems.*

AIPS Publications

The Order Form at the end of this *AIPSLETTER* may be used to order the following memoranda. All are available at this time.

AIPS Memo No. 45: "The *AIPS* Wishlist (Update)," Eric W. Greisen, 30 April 1986.

> The informal "wishlist" maintained by the *AIPS* group has been converted to a document for ongoing discussion of *AIPS* development priorities. The items are listed in the categories of (1) general maintenance; (2) projects in progress; (3) system improvements; (4) tasks; (5) miscellaneous; and (6) other. There is a general, but not specific, ordering by priority and some indication of who will do the work and what the chances are for the item to be done in the next year. Memo No. 45 is an updated version of Memo No. 37. It has been TEXset with the additions and completions made during the past eight months indicated by special symbols.

AIPS Memo No. 46: "Additional Non-linear Coordinates," Eric W. Greisen, 20 May, 1986.

> In *AIPS* Memo No. 27 (1983), the basic non-linear coordinates used in *AIPS* were described. These included three projective, tangent-plane geometries called SIN, TAN, and ARC, descriptive of the form of the projection. An additional geometry using a projection to a plane tangent to the pole was also described. In the 15JUL86 release of *AIPS*, four additional non-linear geometries are supported. These are the stereographic projective geometry and the non-projective Aitoff, "global-sinusoidal" and Mercator geometries appropriate to the display of very large fields. The present memorandum describes the algebra and *AIPS* parameters used in implementing these geometries in *AIPS*.

Supercomputer Meeting in November

NRAO is tentatively planning to hold a two-day meeting in Socorro on 19–20 November 1986 with preliminary session titles "AIPS and Supercomputers" and "Displays and Output Equipment [for supercomputers]". Persons who might want to participate can contact Bob Burns at 804-296-0229 for further information.

Coming Attractions

There are a number of significant software changes planned for the next few months. Bill Cotton has been working on a revision of the *AIPS* tape handling tasks and a generalization of the *AIPS* tables format. In particular, antenna files will be converted to take advantage of the generalized table structures. We have Y routines for Lexidata and will install them soon. We also expect to update the COS routines to the new directory structures and procedures using a small amount of time made available to us at the Pittsburgh supercomputer center. We have received our IVAS unit from I^2S, but have no code for it yet. The IVAS is very different from I^2S's earlier models and will not be able to do some of the things done by them (*e.g.*, TVHUEINT). We hope to have a full set of Y routines for the IVAS by the end of August and will be able at that time to give you our evaluation of its usefulness for *AIPS*.

CHANGE.DOC: 15JUL86 Version as NEW

3036. *April 18, 1986* ZDIR (VMS) *Gary*

Added by Editors from CHKOUT *history:* Corrected routine — it did not handle OLD or LOCAL.
Moved to 15APR86 in time for transport and 15OCT86.

3037. *April 25, 1986* TV stuff *Eric*

Several routines were getting into trouble because of the anti-wrap-around algorithm for the cursor. Added some protection for this to BLANK, BLSUM, GRBOXS, GRPOLY, and GRLUTS. The cursor was still giving trouble on our 480-line I^2S. It turns out that the cursor position is a 12-bit twos-complement integer and that it goes by 512 lines per full wrap even on a 480-line display. This led to some fixes in YM70:YCRCTL and explains why the old code, which could request negative cursor positions, worked. Also added error handling for positions outside any image to GRPOLY and code to force the correct orientation of BLC and TRC in the output of GRBOXS. Added an error message to YIIS:YIMGIO to complain about bad input parameters — it was silent before.
Moved from 15OCT86, nowhere else.

3038. *April 26, 1986* APLNCOS:*.* *Kerry*

Removed the defunct routines ZUNADD and ZUNSGN. Removed the routines ZMPORT and ZXPORT to APLCOS.
These actions performed on both 15JUL86 and 15OCT86 this date, nowhere else.

3039. *April 26, 1986* APLCOS:*.* *Kerry*

All 15JUL85 *AIPS* Z-routines for COS.

ARCOS	ARSIN	DARCOS	DARSIN	IAND	IEOR	IOR
NOT	ZACTV8	ZASSYM	ZBYTFL	ZC8CL	ZCLC8	ZCLOSE
ZCMPRS	ZCPU	ZCREA3	ZCREAT	ZDATE	ZDCHIN	ZDEACL
ZDEAMC	ZDEAOP	ZDEAXF	ZDELAY	ZDESTR	ZDIE	ZDIR
ZDM2DL	ZDOPRT	ZENDPG	ZESTEX	ZEXIST	ZEXPND	ZFI3
ZFIO	ZFIO2	ZFREE	ZGETCH	ZGNAME	ZGTBIT	ZGTBYT
ZGTDIR	ZI16IL	ZI32IL	ZI8L8	ZILI16	ZILI32	ZITOCH
ZKDUMP	ZMATH4	ZMCACL	ZMI3	ZMIO	ZMIO2	ZMOUNT
ZMOVE	ZMPORT	ZMSGCL	ZMSGDK	ZMSGOP	ZMYVER	ZOPEN
ZPARS	ZPHFIL	ZPRIO	ZPRMPT	ZPRPAS	ZPTBIT	ZPTBYT
ZPUTCH	ZQASSN	ZQCLOS	ZQCRE3	ZQCREA	ZQDASS	ZQDEVN
ZQEXP	ZQIO	ZQMSG	ZQMSIO	ZQOPEN	ZQRENA	ZQTAPE
ZQTRUN	ZQWIO	ZR8P4	ZRDMF	ZRENAM	ZRM2RL	ZSETUP
ZSTAIP	ZTACT2	ZTACTQ	ZTAPE	ZTCLOS	ZTFILL	ZTIME
ZTKBUF	ZTKCLS	ZTKILL	ZTKOPN	ZTKQIO	ZTOPEN	ZTQSPY
ZTREAD	ZTTYIO	ZTXMAT	ZWAIT	ZWHOMI	ZXCLOG	ZXFREE
ZXHEX	ZXLOC	ZXLPRT	ZXMKTM	ZXMSGS	ZXPORT	ZXSIGC
ZXTLOG	ZXTPIO	ZXTSPY	ZDELA2.CAL	ZTACT2.IJC		

Moved to 15OCT86 this date, nowhere else.

3040. *April 26, 1986* AIPGCOS:ZSTRTA *Kerry*

AIPS startup Z-program for 15JUL85 *AIPS* under COS. Removed from SYSCOS to AIPGCOS.
These actions performed on both 15JUL86 and 15OCT86 this date, nowhere else.

3041. *April 27, 1986* TVSTAT, IMSTAT *Eric*

Added display and return of the minimum pixel value and its position. This required adding PIX2VAL and PIX2XY to POPSDAT.HLP, DAPL.INC, and CAPL.INC, creating PIX2VAL.HLP and PIX2XY.HLP, and modifying IMSTAT.HLP, TVSTAT.HLP, and AU6D. New code was put in NEW because it is needed for the DDT procedures.
Moved from 15OCT86 this date, nowhere else.

3042. *April 28, 1986* AIPGUNIX:*.* *Kerry*

15JUL85 *AIPS* generic UNIX Z-programs for AIPS and BATER startup/shutdown.

STOPA ZSTRTA ZSTRTB

Moved to 15OCT86 this date, nowhere else.

3043. *April 28, 1986* SYSUNIX:*.* *Kerry*

All system files developed for the installation, maintenance and execution of 15JUL85 *AIPS* under UNIX.

AIPPGM.LIS	AIPS	AIPSUB.LIS	AIPZ.LIS	AIPZPGM.LIS	APLAPG.LIS
APLDEA.LIS	APLIIS.LIS	APLM75.LIS	APLNUN.LIS	APLPGM.LIS	APLSUB.LIS
APLY.LIS	APLZ.LIS	APSUB.LIS	APZ.LIS	BASEREGS	BATER
BATER.COM	BSTART	CATCHA	CATCHT	COMLNK	CREXE
CREXES	CRLIB	CRLIBS	DCL.SED	EXPFIT	FILAI2
FILAIP	FILINI	FPSSUB.LIS	GET	GETBASE	GRIPR
GRITP	ILOAD	ILOAD.C	INC.SED	INCS	INCS1
INCS2	INTFIL.SED	LINT	LPR.SED	MAKSRC	MAKSRC.SED
NDCODE.SED	NOTAPG.LIS	NOTPGM.LIS	NOTSUB.LIS	NOTZ.LIS	POPSGN
PP	PPTEST	PRTACC	PUTBASE	SAPSUB.LIS	SAPZ.LIS
SETPAR	SPACE	WATCH	WHERE	ZDIFF	ZXLPRT.MC
ZXLPRT.UTS					

Moved to 15OCT86 this date, nowhere else.

3044. *April 28, 1986* APLUNIX:*.* *Kerry*

All 15JUL85 *AIPS* generic UNIX Z-routines.

ARCOS	ARSIN	DARCOS	DARSIN	ZACTV8	ZC8CL
ZCH2R4	ZCLC8	ZCLOSE	ZCMPRS	ZCREA3	ZCREAT
ZDCHIN	ZDEACL	ZDEAMC	ZDEAOP	ZDEAXF	ZDELAY
ZDIR	ZDOPR3	ZDOPR4	ZDOPRT	ZENDPG	ZEXIST
ZEXPND	ZFI3	ZFIO	ZFREE	ZGNAME	ZGTDIR
ZI16IL	ZI32IL	ZI8L8	ZILI16	ZILI32	ZKDUMP
ZLDFIL	ZM7OCL	ZM7OMC	ZM7OOP	ZM7OXF	ZMATH4
ZMI3	ZMIO	ZMOUNT	ZMSGCL	ZMSGDK	ZMSGOP
ZMYVER	ZOPEN	ZPHFIL	ZPHOLD	ZPRIO	ZQMSIO
ZQWKPR	ZR8P4	ZRENAM	ZSBIT	ZSETUP	ZSTAIP
ZTACTQ	ZTAPE	ZTCLOS	ZTFILL	ZTKBUF	ZTKCLS
ZTKOPN	ZTOPEN	ZTQSPY	ZTREAD	ZTTYIO	ZTXMAT
ZWAIT	ZWHOMI	IAND.C	IEOR.C	IOR.C	ZACTV9.C
ZB2ASC.C	ZBYTFL.C	ZCPU.C	ZCRDIR.C	ZDATE.C	ZDELA2.C
ZDESTR.C	ZDM2DL.C	ZDOPR2.C	ZEDIT.C	ZESTEX.C	ZEXIT.C
ZGETCH.C	ZGTBIT.C	ZGTBYT.C	ZMCACL.C	ZPARS.C	ZPRIO2.C
ZPRMPT.C	ZPRPAS.C	ZPTBIT.C	ZPTBYT.C	ZPUTCH.C	ZQASSN.C
ZQCLOS.C	ZQCRE3.C	ZQCREA.C	ZQDASS.C	ZQDEVN.C	ZQEXP.C
ZQIO.C	ZQIOV.C	ZQMSG.C	ZQOPEN.C	ZQRENA.C	ZQTAPE.C
ZQTRUN.C	ZQWIO.C	ZR42CH.C	ZRDMF.C	ZRM2RL.C	ZTACT2.C
ZTAPIO.C	ZTIME.C	ZTKILL.C	ZTKQIO.C	ZXCLOG.C	ZXFREE.C
ZXHEX.C	ZXLOC.C	ZXLPRT.C	ZXMKTM.C	ZXMOUN.C	ZXMSGS.C
ZXSIGC.C	ZXTLOG.C	ZXTPIO.C	ZXTSPY.C	ZXXIST.C	

Moved to 15OCT86 this date, nowhere else.

3045. *April 28, 1986* APL1VAX:*.* *Kerry*

All Z-routines for Berkeley 4.1 UNIX on VAXs. These are rather dated and should be regarded only as starting points for a modern *AIPS* port.

ZCPU.C ZDATE.C ZPARS.C ZQTAPE.C ZTACT2.C ZTIME.C

Moved to 15OCT86 this date, nowhere else.

3046. *April 28, 1986* APL2VAX:*.* *Kerry*

All Z-routines for Berkeley 4.2 UNIX on VAXs. These are rather dated and should be regarded only as starting points for a modern *AIPS* port.

ZCPU.C	ZDATE.C	ZPARS.C	ZQTAPE.C
ZTACT2.C	ZTIME.C	ZTKILL.C	ZXTSPY.C

Moved to 15OCT86 this date, nowhere else.

3047. *April 28, 1986* APLCVEX:*.* *Kerry*

All 15APR85 *AIPS* Z-routines for Convex's implementation of Berkeley 4.2 UNIX on the NRAO Charlottesville C-1.

ZBYTFL.C	ZCPU.C	ZDATE.C	ZESTEX.C	ZGETCH.C	ZGTBYT.C
ZPARS.C	ZPTBYT.C	ZPUTCH.C	ZQASSN.C	ZQMSG.C	ZQTAPE.C
ZQTRUN.C	ZTACT2.C	ZTIME.C	ZTKILL.C	ZXFREE.C	ZXMOUN.C
ZXSIGC.C	ZXTSPY.C	ZFREE	ZTTYIO		

Moved to 15OCT86 this date, nowhere else.

3048. *April 28, 1986* APLMASC:*.* *Kerry*

All 15JUL85 *AIPS* Z-routines for Masscomp's implementation of Bell System III UNIX on the NRAO Greenbank MC-500.

ZACTV9.C	ZCPU.C	ZDATE.C	ZQASSN.C	ZQTAPE.C	ZTACT2.C
ZTIME.C	ZTKILL.C	ZXFREE.C	ZXMOUN.C	ZXTSPY.C	ZTTYIO

Moved to 15OCT86 this date, nowhere else.

3049. *April 28, 1986* APLUTS:*.* *Kerry*

All 15JUL85 *AIPS* Z-routines for Amdahl's implementation of Bell Version 7 UNIX on the now defunct NRAO Charlottesville IBM 4341.

ZTTYIO	ZCPU.C	ZDATE.C	ZESTEX.C	ZGNAME.C	ZQASSN.C
ZQTAPE.C	ZTACT2.C	ZTIME.C	ZTKILL.C	ZXFREE.C	ZXMOUN.C
ZXSIGC.C	ZXTPIO.C	ZXTSPY.C	AIPS.		

Moved to 15OCT86 this date, nowhere else.

3050. *April 28, 1986* UVLOD *Gary*

Was not reading ANtenna files.

Moved from 15OCT86 and will go out on 15APR86 tape.

3051. *April 29, 1986* ALGSUB, VISDFT *Bill*

Modifications made to support multiple IFs resulted in incorrect scaling of the u, v, and w in MX when CHANNEL > 1. Affects line and bandwidth synthesis work.

Moved from 15OCT86 this date.

3052. *April 29, 1986* UVSUB *Bill*

The default value of the first channel was not being set when CHANNEL = 0 (all channels being divided).

Moved from 15OCT86 this date.

3053. *April 29, 1986* UVGRID *Bill*

Fixed bug which would cause incorrect scaling of the u, v and w for multiple channel data with a negative frequency increment.

Moved from 15OCT86 this date.

3054. *April 30, 1986* SYSCOS:WAIO *Kerry*

Cray proprietary code that was inadvertently submitted to the system has been removed. This was a special version of COS word-addressable I/O that was modified by the Digital Productions Cray analyst to suppress the messages that otherwise flooded the screen on every operation. *Editor: it's gone now!*

Removed from 15JUL86 this date except that REMOVE really didn't delete the file. I guess we'll just have to get sued by Cray. Luckily it was not stored using PUTBCK, otherwise the VLA would already have gotten a copy.

3055. *April 30, 1986* APLCOS:ASSGN, MASSGN, QUICK *Kerry*

Special versions of AIPSUB:ASSIGN, MASSGN, and QUICK necessary because ASSIGN is a COS system verb on which COS/*AIPS* is crucially dependent. ASSGN is simply a copy of AIPSUB:ASSIGN with its entry point renamed to ASSGN. MASSGN and QUICK are simply copies of the AIPSUB versions with calls to ASSGN substituted for calls to ASSIGN. Despite this insidious condition, all requests to similarly rename/modify the official AIPSUB routines have been denied. Hopefully, placing these routines containing the required mods in APLCOS will suffice to save other poor slobs given the task of porting *AIPS* to COS from having to make the same painful discovery. Of course, that's only if they take steps to insure that the AIPSUB versions never make it into any of the *AIPS* link libraries. *Editors' note: forgotten, not denied.*
Moved to 15OCT86 this date.

3056. *April 30, 1986* AU8A *Kerry*

Increased dimension of REAL array RESULT from 128 to 256 for use with TABINI which requires something large enough to accommodate INTEGER*2 DATP(2,128). COS does not have two integers per real. Also changed error branch on return from TABINI from 490 to 489 in order to insure that the extension file gets closed.
Moved to 15OCT86 this date.

3057. *April 30, 1986* FITTP *Kerry*

In the routine FITEXT, the INTEGER*2 array BUFFER and the INTEGER*4 array BUFF4 are EQUIVALENCE'd. Statement label 20 was the assignment NREC = BUFF4(3). This presumes two words per long integer which is not the case on all machines. This assignment was replaced with CALL COPY (NWDPLI, BUFFER(5), NREC). Similarly, in the routine NEWMEX, the INTEGER*4 array I4BUF and INTEGER*2 array BUFFER are EQUIVALENCE'd and the assignment statement NREC = I4BUF(3) made the same presumption. This assignment statement has been replaced with CALL COPY (NWDPLI, BUFFER(5), NREC). It may well be that the arrays BUFF4 and I4BUF are no longer needed in these routines. There may be other cases of this, but these were the only ones detected during the port of 15JUL85 *AIPS* to COS.
Moved to 15OCT86 this date.

3058. *April 30, 1986* PRTCC *Kerry*

Increased field width of FORMAT specifiers to handle large DELTA X and DELTA Y values.
Moved to 15OCT86 this date.

3059. *April 30, 1986* POPSGN *Kerry*

Added a call to ZMYVER that is necessary as an unfortunate consequence of the way text files were implemented under COS (*e.g.*, POPSDAT.HLP in this case). For all other known ports of *AIPS*, the ZMYVER call is no doubt superfluous, but it doesn't hurt either. Whatever version assignment that occurs as a result of the call to ZMYVER is immediately overridden by POPSGN's normal actions. However, ZMYVER may be the preferred way of establishing the default version for all AIPPGM programs that depend on version-specific files (*e.g.*, FILINI in the creation of additional memory files or FILAI2 in the case of DOCTXT:SYSPARM.).
Moved to 15OCT86 this date.

3060. *April 30, 1986* PRTTP *Eric*

Fixed PRTLEV handling for FITS table extensions.
Moved from 15OCT86, nowhere else.

3061. *April 30, 1986* System RUN files *Eric*

Changed NEWPARMS.001, adding PIX2VAL, and PIX2XY, our new adverbs. Also changed DDTLOAD.001 and DDTEXEC.001 to correct the process for the effects of tape formats on the data. Each image and *uv* file must be written to tape and read back as soon as it's generated before it is used as input to the next step.
Moved to 15APR86 (DDT) and 15OCT86, nowhere else.

3062. *May 1, 1986* APLCOS:DIETSK *Kerry*

A special version of APLSUB:DIETSK that is probably no longer necessary. It differs from the standard version in that it calls ZDIE which shuts down the COS inter-job communications established in APLCOS:ZDCHIN. This is probably no longer necessary since task activity queries are no longer done via this COS facility. There were problems with regard to COS interactive jobs, like AIPS itself, communicating with tasks which were initiated as COS batch jobs. Special mods to the COS inter-job communications facility were required and implemented by the Digital Productions Cray analyst, but these were lost when his wife was accepted to Harvard grad school and he left. Neither his replacements nor the regional Cray analyst manager were able to reinstate the required mods, so a less complicated method of task activity tracking was devised. The only reason for keeping this around is that we no longer have a COS implementation with which we can experiment.
Moved to 15OCT86 this date.

3063. *May 1, 1986* PRTAC *Eric*

Added the adverb PRTIME to the help file and the task to allow the display to be limited to times more recent than PRTIME days.
Moved from 15OCT86, nowhere else.

3064. *May 2, 1986* TVBLINK *Eric*

Corrected my (stupid) error in AU6A which made the TV blinking fail if one or more of the TV channels was numbered > 2.
Moved from 15OCT86 this date, nowhere else.

3065. *May 2, 1986* VM *Eric*

Changed FILES subroutine to round the floating inputs rather than just adding 0.1 to insure integerization. The option of setting IN3SEQ = -1 was failing.
Moved from 15OCT86, nowhere else.

3066. *May 5, 1986* Ticks *Eric*

Corrected errors in DOCIRCLE option in CTICS, TKTICS, and ITICS. It was able to get in a loop in which it would replot the same position value and fail to plot some others. Also fixed the routine to use longer lines when the geometries are not so extreme and, for the TV, when the device resolution is not so good either.
Moved from 15OCT86, nowhere else.

3067. *May 5, 1986* ZDOPR5 *Gary/Simon*

The version of ZDOPRT that works for the Printronix printer under VMS 4.*n*.
Moved from 15OCT86

3068. *May 5, 1986* SYSVMS:RUNAIPS.COM *Gary*

This version is designed for sites other than NRAO. It is more like our SYSLOCAL version and it checks to see what Versions of AIPS (OLD, NEW, or TST) are available before telling users how to start up AIPS.
Moved from 15OCT86

3069. *May 5, 1986* GUIDE.RNO, GUIDE.MEM *Gary*

The latest installation guide instructions.
Moved from 15OCT86.

3070. *May 5, 1986* UVLOD *Gary*

Bugs in reading 32-bit tapes. I am still not sure that I have fixed all 32-bit problems since *AIPS* does not write 32-bit tapes and I have no other source.
Moved from 15OCT86.

3071. *May 5, 1986* WSLOD *Gary*

Installed the latest changes received from Dwingeloo.
Moved from 15OCT86.

3072. *May 6, 1986* Digital Productions TV stuff *Kerry*

Special versions of TVCLOS, TVLOAD, TVOPEN and YTVCIN that were kludged together in order to form Digital Productions specific "frame buffers." These were then DISPOSE'd to the front-end VAX for display on Ramtek 9400's and 9460's using their proprietary software.
Moved to 15OCT86 this date.

3073. *May 7, 1986* GRDAT, VISDFT *Bill*

Fixed bug with a combination of shifts and rotates. This affected ASCAL and UVSUB in the DFT mode. The problem occurred when the data and the CLEAN image had different rotations. In this case the model used had an incorrect rotation.
Moved to 15OCT86 this date.

3074. *May 20, 1986* Position routines *Eric*

Added Stereographic geometry to *AIPS* and altered definitions of Aitoff and Mercator a bit. Changed NEWPOS, DIRCOS, DIRDEC, DIRRA, SETLOC, CTICS, ITICS, TKTICS, CHNTIC, TICINC, and LSTHDR. Details are given in the entry for 15OCT86 (#3201).
Moved from 15OCT86, nowhere else.

3075. *May 20, 1986* HGEOM *Eric*

Somehow a bad version of HGEOM appeared in the standard area. Corrected it to have error returns on all position routines, to handle history files correctly on floating inputs (and to refuse integer input images), and to handle images in which the x and y are reversed (*i.e.*, the first is α-δ and the second is δ-α).
Moved from 15OCT86 this date, nowhere else.

3076. *May 22, 1986* Fujitsu reports *Eric*

From reports developed in the Fujitsu installation, changed:

- TABLIN — Cleaned up typing a bit since it was in APLSUB:.
- IMLOD — Dropped one of two statements setting the tape LUN and changed the other to have LUN = 30 + INTAPE. Apparently the Fujitsu implementation depends on this convention — but it should not do so. Removed blank line.
- CUBINT — Used incorrect variable names for the actual cubic interpolation done for IMVAL! Fixed it.
- INDXIN — Corrected the error handling: it used the wrong variable name one place and failed to initialize or set the error code in another place.
- DATGET — Added DATA statements for T and F.
- CSLGET — Added DATA statements for T and F.

Moved from 15OCT86 this date, nowhere else.

3077. *May 22, 1986* Miscellaneous *Eric*

Changed:

- AUT — Added branch points to allow for the new T*n*VERBs.
- AU3A — Changed TIMDEST to continue on certain errors — it was quitting on a given user/disk if a single header file was missing.
- GINIT — Moved Neil's correction from 15OCT86 — an error in an error message format was corrected.
- QINIT — (FPS16) Pat: Changed priority values to correct order to avoid letting batch jobs get the AP too quickly. Eric: Changed the task list and changed to avoid looking for tasks under *POPS* numbers which cannot occur (*i.e.*, those of AIPSC).

Moved from 15OCT86 this date, nowhere else.

3078. *May 23, 1986* Misc *Eric*

Removed TABs and a long comment line from IMPFIT. Removed long lines from help files for APVC, COPY, POLCO, STEER, UVERR, VBANT, VBLIN, VM, and XTRAN. Removed TAB characters from help files for GAL, MWFLT, NINER, PFT, PGEOM, and WARP.
Moved from 15OCT86 this date.

3079. *May 22, 1986* Convex reports *Eric/Kerry*

From reports developed in the Convex installation, changed:

FILAIP — Changed to initialize N4 — it failed to set the batch time limits into the SP file.
CITCC — Declared and DATAed numerous constants previously used directly in call sequences. Also corrected bug.
KONTR — Added variables with DATA statements to fill in calls to MSGWRT with variables rather than constants and removed a blank line.
MOMNT — Changed non-constant variable names N1, N2, and N3 to LN1, LN2, and LN3.
SLOWMOMNT — Changed MSGWRT calls to use N2 and N8 and removed blank lines.
TOVLB — Changed constants in calls to GSTO and MSGWRT to DATAed variables and removed 2 blank lines.
VBCC — Changed constants in calls to DATAed variables.
VBCIT — Fixed N6 (it was used in MSGWRT call without initialization) and removed a blank line.
VLBDR — Declared several N*n* variables, replaced one constant in call.
WSLOD — Removed TAB characters, long lines (including executable ones), replaced constant in call to MSGWRT, cleaned up typing a little (it needs a lot) and removed blank lines.
HGEOM — Corrected yet another set of RCOPYs which were using an incorrect constant in the call.
IRING — Replaced expressions in call sequences.
XTRAN — Replaced constants in calls to MSGWRT.
MCUBE — Added DATA statement for N1 in MALIGN — fortunately CHCOMP handled the VAX default value (0) correctly.
QMULCL — (COS) Added DATA statement for N1.
PREFFT — (Convex) Changed variable name from N2 to LN2, replaced expressions in call sequence.
SWFOUR — (Convex) Changed variable name from N2 to LN2 and removed blank lines.
UVMTYP — Changed variable names.
VTESS — Removed expressions in call sequences (thereby fixing error messages) and removed a blank line.
YLUT — (DEA) Removed TABs and replaced expression in call sequence.
YCRCTL — (V20) Removed blank line and constant in call.
TVHLD — Changed subroutine name TVLOAD12 to TVLO12, expression in call sequence.
UVINIT — Removed blank line.

Moved from 15OCT86, nowhere else.

3080. *May 24, 1986* Minor Janitorial Duty *Kerry*

Changed:

IMIO — (YNOT:) Declared all undeclared items.
IMPFIT — (APGUNIX:) Corrected line longer than 72 characters.
TVCUB — (APGVMS:) MSGWRT(8) to MSGWRT(N8); declared all undeclared items.
TVSLD — (APGVMS:) MSGWRT(8) to MSGWRT(N8).
TVHXF — (YPGNOT:) MSGWRT(8) to MSGWRT(N8).

Moved to 15OCT86 this date.

3081. *May 27, 1986* I*4 in calls to YIMGIO *Kerry*

Several AP tasks contained an I*4 variable as the NPIX argument in calls to YIMGIO including APCLN, MX, VM and VTESS. These caused TV displays from DOTV = TRUE to fail on the Convex since the NPIX argument would be interpreted as zero. In the process of discovering this on the Convex, a missing comma was also detected in a call to CATDIR in the VTESS subroutine FILES. This is because all Convex COMLNKs are performed "clean" and the missing comma resulted in an undeclared variable. The Convex also recognized from earlier calls to CATDIR that the number of arguments in this call was different. VTESS was *not* COMLNKed after being PUTBCK on CVAX and if it was COMLNKed anywhere, it was done with the DIRTY option enabled. Otherwise, this would have been discovered before porting the code to another machine. The DIRTY option should be disabled and it should be mandatory that all code PUTBCK on CVAX be COMLNKed or COMRPLed. Our source code integrity would certainly be improved most of the time by such a requirement, but there would be problems occasionally.

Moved to 15OCT86 this date.

3082. *May 27, 1986* Misc *Eric*

Removed TAB characters from PCNTREQ.INC, YDEA.INC, COMPILE.COM, CREADIR.COM, CREATOLB.COM, and OPTIONS.COM, Deanza routines YCRCTL, YGGRAM, YGRAPH, YMKCUR, YSPLIT, and YTVCIN, and M75 versions YGRAFE and YGRAPH. Fixed long lines in CONDAT.INC, PCNTREQ.INC, and YDEA.INC. Removed blank lines from YCRCTL (YDEA), and Comtal (V20) versions of YCMSET, YLUT, YOFM, and YSTCUR.
Moved from 15OCT86 this date, nowhere else.

3083. *May 27, 1986* QMSPL, ZQMSIO *Kerry*

In QMSPL, added call to ZQMSIO with opcode CLOS (PRINT/DELETE and PRINT/KEEP are VMSisms). Otherwise, on systems that must generate disk files that are ultimately spooled to a print queue, the spooling never occurs (*e.g.*, UNIX, COS and probably most other systems). Added recognition of CLOS as a valid opcode in ZQMSIO although a null operation under the VMS design. Also cleaned up the precursor comments as well declaration types and sizes to reflect the requirements of QMSPL more accurately. The notion of a user specified OUTFILE will require some kludging under UNIX since all string adverbs in *AIPS* are converted to uppercase and UNIX is notorious for lowercase characters in its pathnames (groan).
Moved to 15OCT86 this date.

3084. *May 27, 1986* HGEOM *Kerry*

In the routine GEOHDR, the variable NWDLOC was used and not declared (used as an argument to RCOPY). That this had to be discovered on the Convex is absurd given that the principal development node for *AIPS* is CVAX. I realize that VMS is a wonderful system where the NOI4 option saves your ass time and time again, but there is often no reliable equivalent on other machines. *Please* get rid of the DIRTY option for COMRPL and COMLNK. Heal thyself and forsake the NOI4 crutch as well.
Moved to 15OCT86 this date.

3085. *May 28, 1986* IMLOD *Kerry*

In the routine FITHDR, code was added to initialize the image header by filling it entirely with zeros. Some initialization was already being performed, but not quite enough. This was discovered when multi-file loads were requested in a single execution. If a shifted image was loaded followed by a load of a non-shifted image, the image header on disk of the non-shifted image contained the shift values of the shifted image.
Moved to 15OCT86 this date.

3086. *May 28, 1986* FILAI2, ZTOPEN *Kerry*

In FILAI2, the real array MNAME(2) initialized to 'SYSP','PARM', was used in a call to ZTOPEN which expects INTEGER*2 NMAME(4). This may work under VMS, but it won't on other systems. Changed this to INTEGER*2 MNAME(4), initialized to 'SY','SP','AR','M ' to be consistent with all other calls in *AIPS* to ZTOPEN. Since the FILAI* programs are the ones you must deal with first in any port of *AIPS* to a new system, the former situation served to confuse the development of ZTOPEN. Furthermore, since VMS is the primary development system for *AIPS*, anybody in their right mind would probably think that the VMS Z-routines would get it right. However, in the precursor comments of APLVMS:ZTOPEN, MNAME is described as R*4(2) even though it's declared I*2(4). This is not a very nice introduction to *AIPS* programming standards, so I changed it.
Moved to 15OCT86 this date.

3087. *May 28, 1986* UVDIF *Eric*

New task: prints differences between two nearly identical *uv* files. The user specifies how close the two must be in their u, v, w values and in their (correlator-based) visibilities. Also UVDIF.HLP, DUVD.INC, and CUVD.INC.
Moved from 15OCT86 to assist DDT, nowhere else.

3088. *May 29, 1986* UVDIF, UVFND *Eric*

Corrected UVFND to put a needed message in the message file, to avoid creating a Fortran unit 1 file when DOCRT true, and to have the correct initial line counts for page 1. Changed UVDIF to test weights, to count differences by type through the full file (printing only up to the print limit), and to have the corrections made to UVFND. Added comment to UVDIF.HLP as well.
Moved from 15OCT86 this date, nowhere else.

3089. *May 29, 1986* ASCAL *Eric*

Changed GCALC and GCALC1 to allow a more lenient convergence test after 15 or more iterations. Also changed GCALC to call the solution "converged," after 31 or more iterations, if all antennas but one meet the convergence criterion and that one is no worse than a factor of 10 from the convergence. Also changed the damping factor from 0.9 to 0.5 after 10 iterations. All of these should help in cases where the solution is oscillating a bit, but is otherwise pretty good.
Moved from 15OCT86 and to the VLA by hand (Bill had the file checked out).

3090. *May 30, 1986* POPS storage area *Eric*

Increased the *POPS* storage capacity in order to allow DDT to compile easily on systems other than our own and to allow much easier creation of procedures and new variables. Changed the listing array from 3072 to 4096 words and the K array from 10752 to 18944 words. Changed:

DAPL.INC — Changed non-adverb K array from 7390 to 14770.
DCON.INC — Changed full K array from 10752 to 18944.
POPSGN — Made changes to array sizes, pointer to start of variables (from 7380 to 14760), etc. Changed to use ZMYVER to provide default version rather than NEW.
INIT — Changed "page" sizes from 12 to 16 for procedure listings and from 54 to 90 for the full thing.
STORES — Increased array size for procedure listings.
AU2A — Increased allowed SAVE/GET version number to 8.
SGLOCA — Increased allowed SAVE/GET version number to 8.
SGLAST — Increased buffer for proc text.
FILAIP — Increased ME file size from 229 to 377 records.
FILAI2 — Increased ME file size from 229 to 377 records.

Added calls to ZMYVER in AJAX, DELSG, FILAI2, FILAIP, FILINI, FIXCAT, FIXFIL, FIXUSR, SETPAR, and SETTVP.
Moved from 15OCT86 to assist with DDT, to the VLA by hand since the old ME files had to be recreated in a larger size.

3091. *June 1, 1986* MX *Kerry*

In the routine MXSEL, there was a call to DGGET where the second argument was CATOLD(K2NAX), an INTEGER*2 array element. DGGET uses this argument as an array dimension specifier in which case it should be and is declared simply as INTEGER. However, this means this argument should also be declared as simply INTEGER in the calling program. Declared INTEGER INTIND, assigned it the value of CATOLD(K2NAX) and used INTIND in the call to DGGET instead. Otherwise, on machines that are not word swapped and that do not have compiler options that behave exactly like VMS's NOI4, the value used could and probably would be quite different from the intended. If the NOI4 option was not used for all *AIPS* compilations under VMS, this problem most likely would have been discovered on an NRAO VAX. Instead, it was discovered on the Convex when MX blew up in the face of the first user who tried using MX with bandwidth synthesis data.
Moved to 15OCT86 this date.

3092. *June 2, 1986* DDT *Eric*

Finished revising the DDT test and verification package for the 15JUL86 release. It now assumes that all images are floating point, uses UVDIF to compare *uv* files, displays the peak image difference in *absolute* value, displays the rms image difference in "bits," uses the output of MX clean as the "default" image for VM, and automatically runs PRTAC at the end. An attempt has been made to allow more than 1 disk to be used for cataloged files, but that has not been fully tested. Files are DDTLOAD.001 and DDTEXEC.001 in RUNSYS: and DDT.HLP and DDTSAVE.HLP in HLPFIL:.
Moved to 15OCT86 on 24-June, nowhere else.

3093. *June 2, 1986* POPS SG files *Eric*

Changed STORES and SGLAST to delete old SG files before creating the new one on SAVEs. Otherwise, we get in trouble when the SG file size gets larger.
Moved from 15OCT86.

3094. *June 3, 1986* HIAD80 *Bill/Eric*

Fixed problem with truncating cards starting in columns (IST) > 1.
Moved from 15OCT86 with correction (by Eric), nowhere else.

3095. *June 3, 1986* COORDD *Eric/Kerry*

Changed AXSTRN to handle RA coordinates through COORDD in the standard way rather than by dividing by 15 and calling them DEC. Negative RAs were being displayed as such as a result. The Convex has caught another error of REAL*4 arguments being passed to a routine expecting REAL*8, this time in calls to COORDD. Fixed PRTUV, PRTSD, UVFND, and UVDIF.
Moved from 15OCT86, nowhere else.

3096. *June 5, 1986* PRTCC *Eric*

The page titles were not appearing on the printout. Corrected the initial page and line number so that they appear.
Moved from 15OCT86 this date, nowhere else.

3097. *June 9, 1986* YM75:*.* *Kerry*

General cleanup of these routines which are used by some UNIX/*AIPS* sites. Mods included conversion of VMS style hexadecimal constants to their decimal equivalents (original hex values commented), declaration of all items, conversion of all lowercase code to uppercase and adjustment of typing style to more closely approximate the *AIPS* coding standard. None of this guarantees that the code will actually work, but at least it will compile under something other than VMS. There should no longer be any excuse for compiling this code under VMS using the DIRTY option.
Moved to 15OCT86 this date.

3098. *June 10, 1986* Fix tick routines *Eric*

Changed CTICS to avoid unneeded searching while doing DOCIRCLE and made the same fix to ITICS and TKTICS.
Moved from 15OCT86 this date, nowhere else.

3099. *June 10, 1986* FIXCAT *Eric*

Changed catalog file clearing service program to ignore empty slots in loop over slots.
Moved from 15OCT86, nowhere else.

3100. *June 10, 1986* YCRCTL (YM70) *Eric*

Corrected sign problems with the x cursor position arising from attempts to wrap around at the left side.
Moved from 15OCT86 this date, nowhere else.

3101. *June 12, 1986* ZTACT2 *Pat*

The VMS version of this routine was not waiting for the correct results to arrive. This was causing batch jobs to take the AP erratically.
Moved from 15OCT86 this date, nowhere else.

3102. *June 16, 1986* QRFT, APRFT *Bill*

This AP Vector Function Chainer routine was doing Fourier transforms in a manner which excessively amplified roundoff errors. The new version uses more of the AP memory for temporary work space but has greatly improved error propagation behavior. The pseudo AP version QRFT was rewritten with much of the work expanded inline for better vectorization. Files affected: QFPS:APRFT.VFC, QPSAP:QRFT and the derived AP load routines: Q120B:APRFT, Q5000:APRFT.
Moved from 15OCT86 this date, nowhere else.

3103. *June 16, 1986* UVSUB.HLP *Bill*

Corrected explanation of NCOMP < 0; it incorrectly stated that if NCOMP > 0, then up to the first negative component would be used.
Moved from 15OCT86 this date, nowhere else.

3104. *June 17, 1986* Various VMS Z routines *Pat*

Various VMS Z routines that call system services have been updated. Some were not correctly waiting for results to be available. All routines now use VMS include files to define constants. All routines now use event flag number 0 for synchronization.

ZCPU — Now uses $GETJPIW.
ZFREE — Now uses $GETDVIW.
ZGNAME — Now uses $GETJPIW.
ZMOUNT — Now uses $GETJPIW and $GETDVIW. Also tests asynchronous error status.
ZTQSPY — Now uses $GETJPIW.
ZWHOMI — Now uses ZGNAME.
ZDCHIN — Now uses ZGNAME.
ZESTEX — Now uses $GETJPIW.
ZQDEVN — Was using $GETCHN. This system service is due for deletion. Now uses $GETDVIW.

Moved from 15OCT86 this date, nowhere else.

3105. *June 19, 1986* Call sequence mismatches. *Gary*

The following routines had errors in subroutine calls, usually using an R*4 when an R*8 was expected or vice versa. This works on a VAX but not on many other machines, like Convexes.

IMFIT — Changed XREF, YREF to R*4 in IMFPRT.
JMFIT — Changed XREF, YREF to R*4 in JMFPRT.
NNLSQ — Changed MDA (INT) to MDA2 (I*2) in call to H12.
DATGET — Changed CATUV(K2NAX) (I*2) to NUMAX (INT) in call to DGGET.
PROFL — Changed AYX to R*4 in PFTICS.
SLFIT — Changed TOL to R*8 in several places.
CTICS — Changed AYX to R*4 in several places.
TKTICS — Changed AYX to R*4 in several places.

Moved from 15OCT86, nowhere else.

3106. *June 19, 1986* Misc *Eric*

Gary got the call sequence mismatch wrong. Changed:

CLAB1 — Changed ZERO to R*8 in call to CTICS.
CTICS — Changed call sequence: YX should be R*8. Undid Gary's "fix."
TICINC — Changed call sequence: YX should be R*8.
TKTICS — Undid Gary's "fix."
PROFL — Undid Gary's "fix."
CLAB2 — Changed call sequence and calls to CTICS: AYV and AXV need to be R*8.
PLCUB — Changed variables inside to R*8 to change call to CLAB2.
GNPLT — Changed R*4 constant in call to CLAB1 to R*8 variable.

Moved from 15OCT86 this date, nowhere else.

3107. *June 20, 1986* MX *Bill*

Fixed minor bug in MXIN. Under some conditions when 10 boxes were in use, operations on array WIN1 would affect the memory following the array.

Moved from 15OCT86 this date.

3108. *June 24, 1986* APLVMS:ZRM2RL.MAR, ZDM2DL.MAR *Bill*

Fixed bug in trapping underflows. The test was incorrect and zeroes were being converted to overflows.

Moved from 15JAN87, this date.

3109. *June 24, 1986* XBASL, LABINI *Eric*

Corrected errors made long ago when the maximum polynomial order was reduced — some arrays were being filled with 0's beyond their range.

Also changed LABINI to let an input value of CH(1) < −10 indicate that the characters to the left of the plot should not be counted at this call (via CHNTIC) and corrected SLBINI to use a properly initialized set of CH values in its LABINI call (including CH(1) = -101).

Moved the subroutines and XBASL (fixes only) from 15OCT86, nowhere else.

3110. *June 25, 1986* VTESS *Tim*

Put in changes required for new DSKFFT routine. No other changes. 15OCT86 has fixed and improved version. Moved nowhere.

3111. *June 26, 1986* WaWa IO tasks *Eric*

Corrected FILDES — it was rounding an input variable in all cases, rather than just those cases in which it was supposed to use the variable. As a result, dummy inputs in the other cases were causing failures. Changed MAPCR to return the updated header block for non-scratch images. Created new subroutine MAPCOP which acts like MAPFIX, but simply copies one floating image to another. Changed SUMIM, SUMSQ, RM, and PBCOR to write floating point images only. They were writing *only* integer images. Dropped BADDISK from the inputs and help files for RM and PBCOR. RM needed a good bit of work — cleaning up the typing to determine what the control flow actually was and correcting it to write history files (it was branching over those routines).
Moved to 15OCT86, nowhere else.

3112. *June 26, 1986* UVCREA, MCREAT *Eric*

Both routines would fail on a missing catalog file, so I don't know why I've seen missing ones get created properly within the last few weeks. Changed the error handling in both to let them try to OPEN the new slot, which should create a missing CA file. If the create still fails, then the tasks will fail.
Moved from 15OCT86 this date, nowhere else.

3113. *July 2, 1986* WHATSNEW *Eric*

Changed this general Help file, dropping the 15OCT85 info and adding more stuff for 15JUL86.
Moved to 15OCT86 this date, nowhere else.

3114. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Variables used to specify adjustable array dimensions are supposed to be declared simply as INTEGER. This accomodates compilers that insist these items be 4 bytes (*e.g.*, IBM and Fujitsu) while satisfying compilers that will accept either either 2 or 4 bytes. Because of its non-standard word order, VMS will get it right even if these items are explicitly declared INTEGER*4 and passed to dummy arguments expecting INTEGER*2. Other machines will simply barf all over the user. The notion of declaring these items as simply INTEGER is intended to allow the host compiler to do the proper thing. However, we still use the NOI4 compiler option under VMS, even though everything is supposed to be explicitly declared. This causes items declared INTEGER to be 2 bytes and as a result (on the principal development node of *AIPS*) completely defeats any possible opportunity to detect potential type mismatches for other systems. All of these were detected by developing tools on the Convex to search for all cases of non-constant dimension specifiers in declarations and searching for all calls to subroutines where these were also dummy arguments. Routines changed in AIPSUB:

INQINT — Redeclared dummy argument NUM as INTEGER (also completed missing descriptions of calling sequence in precursor comments).

INQFLT — Redeclared dummy argument NUM as INTEGER (this routine doesn't seem to be called anywhere yet).

PFIT — Replaced INTEGER*2 N3 in call to MATVMU with INTEGER I3 (appropriately initialized).

Moved to 15OCT86, nowhere else.

3115. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Routines changed in QSUB:

LMDER — Redeclared dummy arguments M, N and LDFJAC as INTEGER.

Programs changed in AIPPGM:

RECAT — Replaced N1 and N2 variables in calls to INQINT with appropriately declared and inititalized variables I1 and I2.

UPDAT — Ditto.

Files changed in INCS:

DSRT — Redeclared variable NBUFF as INTEGER (passed to MERGE in UVSRT as adjustable array dimension).

CSRT — Rearranged /UVINF/ to eliminate potential common block alignment error due to INTEGER NBUFF.

Moved to 15OCT86, nowhere else.

3116. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Routines changed in APLSUB:

COVAR — Redeclared dummy arguments N and LDR as INTEGER.

ENORM — Redeclared dummy argument N as INTEGER.

GETERR — Redeclared dummy arguments MDATA and MPARMS as INTEGER and replaced INTEGER*2 NPARMS with INTEGER IPARMS in call to COVAR (assigned value of NPARMS).

LMPAR — Redeclared dummy arguments N and LDR as INTEGER.

LMSTR — Redeclared dummy arguments M, N and LDFJAC as INTEGER and replaced INTEGER*2 J with INTEGER IJ in call to ENORM (IJ assigned value of J).

LMSTR1 — Redeclared dummy arguments M, N, LDFJAC and LWA as INTEGER.

MATVMU — Redeclared dummy argument N as INTEGER.

MERGE — Redeclared dummy argument NBUFF as INTEGER.

QRFAC — Redeclared dummy arguments M, N, LDA and LIPVT as INTEGER.

QRSOLV — Redeclared dummy arguments N and LDR as INTEGER.

RWUPDT — Redeclared dummy arguments N and LDR as INTEGER.

Moved to 150CT86, nowhere else.

3117. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Programs changed in APGNOT:

ASCOR — Replaced INTEGER*2 N56, N756 with INTEGER I56, I756 in calls to LG2BIT.

GAL — Replaced INTEGER*2 N8 with INTEGER I8 in calls to LMSTR1, QRFAC and COVAR. Redeclared variables M, N, and JMX as INTEGER in main program. Replaced INTEGER*2 NPARMS in call to PLINIT with INTEGER IPARMS (assigned value of NPARMS). In routine FCN, redeclared M and N as INTEGER. In routine PLINIT, redeclared NP as INTEGER. In routine PLDATA, redeclared N as INTEGER.

GEOM — In main program, replaced INTEGER*2 NPXI in call to GEOSUB with INTEGER IPXI (assigned value of NPXI). In the routine GEOSUB, redeclared dummy argument NPXID as INTEGER.

GNPLT — Replaced INTEGER*2 N56 in call to LG2BIT with INTEGER I56 (appropriately initialized).

HGEOM — In main program, replaced INTEGER*2 NPXI in call to GEOSUB with INTEGER IPXI (assigned value of NPXI). In the routine GEOSUB, redeclared dummy argument NPXID as INTEGER.

IMFIT — Redeclared LDJAC as INTEGER and replaced INTEGER*2 NN, NVAR and N3120 in call to LMSTR1 with INTEGER INN, INVAR (INN and INVAR assigned value of NN and INVAR, resp.) and I3120 (appropriately initialized).

IRING — In main program, replaced INTEGER*2 NPARMS in call to PLINIT with INTEGER IPARMS (assigned value of NPARMS) and redeclared NRING as INTEGER (used in call to PLDATA). In the routine PLINIT, replaced dummy argument INTEGER*2 NP with INTEGER IP and assigned IP to NP for use in call to GINIT. In the routine PLDATA, redeclared dummy argument N as INTEGER.

PGEOM — In main program, replaced INTEGER*2 NPXI in call to GEOSUB with INTEGER IPXI (assigned value of NPXI). In the routine GEOSUB, redeclared dummy argument NPXID as INTEGER.

SLICE — Redeclared I0 and I1 as INTEGER everywhere except the routine GETROW where it's only used locally.

SMOTH — Redeclared NX and NY as INTEGER everywhere.

WARP — Redeclared M, N and NWA INTEGER and replaced INTEGER*2 N8 with INTEGER I8 (appropraitely initialized), all of which are used in a call to LMSTR1. Redeclared N and LDIM as INTEGER in the routine FOUT. Redeclared M as INTEGER in the routine WTMAP. Redeclared N and M as INTEGER in the routine FCN.

XTRAN — Redeclared NSTDS, NP, LDFJAC and LWA as INTEGER in the routine XY2AD where they are used in calls to LMSTR1. Also redeclared NPNTS and NPAR as INTEGER in the routine FCN and changed FVEC(20) to FVEC(NPNTS).

Moved to 150CT86, nowhere else.

3118. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Routines changed in APLNOT:

BOXBSM — Redeclared dummy argument N as INTEGER (also replaced use of N in call to RCOPY with INTEGER*2 I2N).

BOXSMO — Redeclared dummy argument N as INTEGER (also replaced use of N in call to RCOPY with INTEGER*2 I2N).

DRBSMO — Replaced INTEGER*2 NEXT in call to BOXBSM with INTEGER INEXT (assigned value of NEXT).

L1 — Redeclared dummy arguments M, N, M2 and N2 as INTEGER.

LG2BIT — Redeclared dummy argument N as INTEGER.

NXTFLG — Replaced INTEGER*2 N4 in call to LG2BIT with INTEGER I4 (appropriately initialized).

QKSORT — Redeclared dummy arguments N and LEN as INTEGER.

SELSMG — Redeclared INTEGER*4 NEXT as INTEGER (used in call to BOXBSM).

TABSRT — Replaced INTEGER*2 NBUFF in call to MERGE with INTEGER IBUFF (assigned value of NBUFF).

TABFLG — Replaced INTEGER*2 N4 in call to LG2BIT with INTEGER I4 (appropriately initialized).

Moved to 15OCT86, nowhere else.

3119. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Programs changed in APLPGM:

SLFIT — Redeclared INPTS and INPARM as INTEGER everywhere and substituted INTEGER*2 NPTS and NPARM wherever INTEGER*2 was required. Replaced INTEGER*2 N12 and N2108 with I12 and I2108 (appropriately initialized) in calls to LMSTR1 and GETERR. Redeclared M and N as INTEGER in the routine GFUNC.

Programs changed in APGVMS:

VLBDR — Replaced INTEGER*2 NB, NA, NB2 and NA2 with INTEGER INB, INA, INB2 and INA2 (assigned value of NB, NA, NB2 and NA2, resp.) in call to L1.

Programs changed in YPGM:

XGAUS — Redeclared dummy arguments M, N, LDFJAC plus LWA as INTEGER in the routine XGALMS (used in call to LMSTR1). Redeclared dummy arguments M and N as INTEGER in the routine XGFUNC. Redeclared dummy arguments MDATA and MPARMS as INTEGER in routine GETERR (these are also used in a call to COVAR). Changed precursor comments where required. In the routine DO1FIT, replaced INTEGER*2 INPTS, INPARM and N14 in call to XGALMS with INTEGER JNPTS, JNPARM (assigned values of INPTS and INPARM, respectively) and I14 (appropriately initialized). Also replaced INTEGER*2 INPTS and INPARM in call to XGFUNC with INTEGER JNPTS and JNPARM (assigned values of INPTS and INPARM, respectively). In the routine XGAUGE, replaced INTEGER*2 ND and J in calls to XGAUGE with INTEGER JD and IJ (assigned values of ND and J, respectively). In the routine XGAUFI, replaced INTEGER*2 INPTS, NP and N14 in calls to ENORM and GETERR with INTEGER JNPTS, JP (assigned values of INPTS and NP, repectively) and I14 (appropriately initialized). In the routines GTKINI and GTKGUS, replaced INTEGER*2 INPTS and J in calls to XGFUNC with INTEGER JNPTS and IJ (assigned values of INPTS and J, respectively).

Moved to 15OCT86, nowhere else.

3120. *July 2, 1986* Moved LMDER, LMDER1 and LMSTR1 *Kerry*

Moved routines found in incorrect directories:

LMDER — Moved from QSUB to APLSUB. The reason it was in QSUB is that it calls QRFAC, but QRFAC is an APLSUB routine (*i.e.*, not really a Q-routine).

LMDER1 — Moved from YSUB to APLSUB. There is no apparent reason why this routine was ever put in YSUB. Also redeclared dummy arguments M, N, LDFJAC and LWA as INTEGER (used as adjustable array dimension specifiers). LMDER1 doesn't seem to be called by anyone and also seems to be the only routine to call LMDER.

LMSTR1 — Moved from YSUB to APLSUB (was already in APLSUB as well, but newer version was in YSUB). Again, there is no apparent reason why this routine was ever put in YSUB. This move was made to 15JUL86 only, (15OCT86 YSUB did not contain LMSTR1).

Moves made in 15OCT86 (except LMSTR1) same date.

3121. *July 3, 1986* More Adjustable Array Dimensions *Kerry*

Variables used to specify adjustable array dimensions are supposed to be declared simply as INTEGER. Routines changed in APLNOT:

GNFSMO — Replaced INTEGER*2 NBITWD and NEXT in calls to LG2BIT and BOXSMO with INTEGER IBITWD and INEXT (assigned values of NBITWD and NEXT, respectively).

GNSMO — Replaced INTEGER*2 NBITWD in call to LG2BIT with INTEGER IBITWD (assigned value of NBITWD).

Programs changed in APGNOT:

GAPLT — Replaced INTEGER*2 NBITWD in calls to LG2BIT with INTEGER IBITWD (assigned value of NBITWD).

PRTGA — Replaced INTEGER*2 NBITWD in calls to LG2BIT with INTEGER IBITWD (assigned value of NBITWD).

VBANT — Replaced INTEGER*2 N56 and N756 in calls to LG2BIT with INTEGER I56 and I756 (appropriately inititialized).

Programs changed in QPGNOT:

ASCAL — Replaced INTEGER*2 N56 and N756 in calls to LG2BIT with INTEGER I56 and I756 (appropriately inititialized).

VBFIT — Replaced INTEGER*2 N1, N3, N5 and N7 in calls to L1 with INTEGER I1, I3, I5 and I7 (appropriately inititialized).

VSCAL — Replaced INTEGER*2 N56 and N756 in calls to LG2BIT with INTEGER I56 and I756 (appropriately inititialized).

Moved to 15OCT86 this date.

3122. *July 9, 1986* Cookbook *Eric*

Changed *COOKBOOK* files for 15JUL86 release:

COOK82.MAC — Updated the version string to 15JUL86.

COOKO.TEX — Renamed 5.1.5 and 5.1.6; added 7.7 "Additional displays" renumbering old 7.7–7.9; dropped 9.8; changed ModComp to Convex.

COOK3.TEX — UVMAP now puts out floating images.

COOK4.TEX — PRTHI now uses DOCRT with the width of the terminal.

COOK5.TEX — Added references to CCMRG, VTESS, PRTGA, UVDIF, and the Stokes option in CLIP.

COOK6.TEX — Added NFILES and NCOUNT for IMLOD, interpolation to fill the screen in TVLOD and TVALL.

COOK7.TEX — Added IMVIM in new section "Additional displays."

COOK8.TEX — Changed COMB adding OPCODEs and references to clipping and noise options; dropped CORMS; added PIX2VAL and PIX2XY.

COOK9.TEX — Dropped section on CNVRT and references to APCLN requiring single planes.

COOK12.TEX — Corrected typo.

COOK14.TEX — Added IMVIM, CCMRG, VTESS, UVDIF, MPORT, TAMRG, VTESS, and XPORT; dropped APMAP, CORMS, NTERP, UVDIS.

COOKZ.TEX — Changed for changes in CV VAX *AIPS* Caige and to describe the Convex rather than the ModComp.

Also fixed the general help files PL2D, UVPR, MAPETC, ANALYSIS, APTASKS, TAPU, and INDEX for the same additions and deletions listed above under COOK14.

Moved to 15OCT86, nowhere else.

3123. *July 9, 1986* Help files *Eric*

Four consecutive help files were missing from 15JUL86 for no obvious reason: EXTDEST, EXTLIST, FACTOR, and FFT. Copied them from 15OCT86 today, except FFT which I did a while back.

Moved from 15OCT86, nowhere else.

3124. *July 9, 1986* COMB *Eric*

Fixed the message describing the REAL operation: the constant was not being displayed.

Moved to 15OCT86 this date, nowhere else.

3125. *July 10, 1986* QVEX:QRFT *Bill/Kerry*

Removed Convex-specific version of QRFT since the new and improved version of the QPSAP version is best for the Convex as well.

Removed in 15OCT86 same date.

3126. *July 10, 1986* INC:ZVD and ZVND *Kerry*

Added generic null-op versions of compiler directive INCLUDE files to force scalar optimization (ZVD) and to ignore apparent dependencies (ZVND) to the INC area. Otherwise, systems other than VAX/VMS and Convex would not find any such files to INCLUDE. These additions to INC meant that the INCVMS versions were no longer necessary and were therefore removed.
Additions and removals made in 15OCT86 same date.

3127. *July 14, 1986* IMFIT *Kerry*

In the process of fixing up adjustable array dimensions, some usages were missed. Replaced INTEGER*2 dummy arguments NN and NVAR with INTEGER INN and INVAR in the routine FCN. Inside FCN INTEGER*2 NN and NVAR are assigned the value of INN and INVAR since these are used in calls to other routines. In addition to being passed as an argument to LMSTR1, FCN is also called directly by some of the routines local to IMFIT. Wherever FCN is called, the first two arguments have been replaced by INTEGER INN and INVAR which are first assigned the values of the INTEGER*2 variables that used to be passed to FCN. What an incestuous program! Do we really need both IMFIT and JMFIT?
Moved to 15OCT86 this date.

3128. *July 15, 1986* INC:DVMN, DVMT *Kerry*

Until recently, VM would not run on the Charlottesville Convex although it had been known to work in a port of an earlier release of *AIPS*. The reason eluded me for several months. The reason turned out to be that whereas the UNIX source code preprocessor transforms INTEGER FUNCTION declarations into INTEGER*2 FUNCTION declarations, the functions OPEN, AKCESS and CLOSE were declared INTEGER in DVMN.INC. Both the DVMN and DVMT declarations for these functions have been changed to INTEGER*2. For some (no doubt obsolete) reason, we decided that all integer functions should be declared simply as INTEGER even though they are invariably (almost) declared as INTEGER*2 items in routines where they are called. We should probably reverse ourselves on this point and should instead declare integer functions as INTEGER*2 if that is in fact their intended use. The VMS compiler and all UNIX compilers with which we are familiar seem to be perfectly happy with the TYPE*n FUNCTION statement syntax even though there may be a few weirdos out there.
Moved to 15OCT86 same date.

3129. *July 15, 1986* CMLT.INC *Kerry*

Rearranged the order of variables in the definition of /MLTAP/ to eliminate a potential alignment error.
Moved to 15OCT86 same date.

3130. *July 15, 1986* UVLOD *Kerry*

The second arguments (mean equinox) in several calls to PRECES were REAL*4 whereas REAL*8 is expected.
Moved to 15OCT86 same date.

3131. *July 15, 1986* VBFIT *Gary/Kerry*

Corrected error in earlier change regarding adjustable array dimension specifiers, where in the routine L1AVG, I renamed variables N1, N3, N5 and N7 used in a call to L1 as I1, I3, I5 and I7, but left them declared as INTEGER*2. These errors were detected by Gary's type matching routines on the Convex. Redeclared these as simple INTEGER.
Moved to 15OCT86 same date.

3132. *July 15, 1986* COMCLR *Kerry*

This routine doesn't seem to be called anywhere. While searching for cases of adjustable array declarations, I failed to include type complex declarations. COMCLR contains one such declaration. Redeclared the dummy argument N as INTEGER and substituted INTEGER*2 I2TMP assigned the value of N in a call to the intrinsic MINO. Also replaced 512 in the same call to MINO with INTEGER*2 N512 (appropriately initialized) in order to avoid potential mixed types in this call. Mixed types in calls to intrinsics which are violation of the ANSI standard. Nevertheless, they are all over the place in *AIPS* code, but will have to wait for another day to be fixed (the Alliant compiler at least used to barf justifiably on these).
Moved to 15OCT86 same date.

3133. *July 18, 1986* SYSUNIX *Kerry*

Files removed from the UNIX system areas because they are obsolete were:

AIPPGM.LIS	AIPSUB.LIS	AIPZ.LIS	AIPZPGM.LIS	APLAPG.LIS	APLDEA.LIS
APLIIS.LIS	APLM75.LIS	APLNUN.LIS	APLPGM.LIS	APLSUB.LIS	APLY.LIS
APLZ.LIS	APSUB.LIS	APZ.LIS	BATER.COM	CATCHA	CATCHT
CREXE	CREXES	CRLIB	CRLIBS	EXPFIT	FILAI2
FILAIP	FILINI	FPSSUB.LIS	GET	GRIPR	GRITP
INC.SED	INCS1.FOR	INCS2.FOR	MAKSRC	MAKSRC.SED	NOTAPG.LIS
NOTPGM.LIS	NOTSUB.LIS	NOTZ.LIS	POPSGN	PRTACC	SAPSUB.LIS
SAPZ.LIS	SETPAR	WATCH	WHERE		

Moved also to 15OCT86 this date, nowhere else.

3134. *July 18, 1986* SYSUNIX *Kerry*

The new directory structure made it necessary to rewrite almost all of the UNIX/*AIPS* tool kit. It is now modelled very closely after the VMS/*AIPS* set. Some old friends are now obsolete and have been deleted. Others may have familiar names, but are otherwise unrecognizable. Only terse descriptions are given here. For more detailed descriptions of their syntax and function, see the modules themselves as well as the installation guide for UNIX/*AIPS*. The new and changed files are:

- AIPS — *AIPS* startup procedure — on UNIX systems there's also a lower case `link` file called `aips` for the handicapped, but there's no way to store one of these on CVAX).
- AREAS.CSH — C-shell script text defining *AIPS* programmer-oriented environment variables (new; used by $CDOLD or $CDNEW or $CDTST).
- AREAS.DAT — CVAX "areas" definition file (new; used to generate AREAS.CSH and AREAS.SH).
- AREAS.SH — Same as AREAS.CSH only in Bourne shell syntax (new).
- AREASCSH.SED — sed script used to massage AREAS.DAT into AREAS.CSH (new).
- AREASSH.SED — sed script used to massage AREAS.DAT into AREAS.SH (new).
- AS — Procedure for ASsembler compilations (new).
- ASOPTS.SH — Bourne shell script text to define default options and map *AIPS*-style options into host assembler option syntax for procedure AS (new).
- ASSNBASIC.CSH — C-shell script for defining basic *AIPS* environment variables (new).
- ASSNBASIC.SH — Same as ASSNBASIC.CSH only in Bourne shell syntax (new).
- ASSNLOCAL.CSH — C-shell script for defining local *AIPS* environment variables (new).
- ASSNLOCAL.SH — Same as ASSNLOCAL.CSH only in Bourne shell syntax (new).
- BATER — BATER startup procedure (changed; as in the case of *AIPS*, there's a lower case link file called `bater`).
- CC — Procedure for C compilations (new).
- CCOPTS.SH — Bourne shell script text to define default options and map *AIPS* style options into host C compiler option syntax for procedure CC (new).
- CDVER.CSH — What should get executed under $CDOLD or $CDNEW or $CDTST for *AIPS* accounts whose default shell is the C-shell (new).
- CDVER.SH — Same as CDVER.SH only for *AIPS* accounts whose default shell is the Bourne shell (new).
- COMLNK — Procedure for compiling and linking programs (changed).
- COMRPL — Procedure for compiling and replacing subroutines (new; objects are not actually replaced, but rather staged to the same directory of the proper object library; LINK performs any required replacements).
- CREADIR — Creates all required directories for an *AIPS* installation based on AREAS.DAT (new).
- FC — Procedure for Fortran Compilations (new).
- FCOPTS.SH — Bourne shell script text to define default options and map *AIPS* style options into host Fortran compiler option syntax for procedure FC (new).
- INCS.FOR — Test program that contains hundreds of dummy subroutines which merely INCLUDE all the files of $INC. This can then be preprocessed and compiled as an aid in detecting common block alignment errors on those machines that care about such things (changed to reflect 15JUL86 $INC set).

Moved also to 15OCT86 this date, nowhere else.

3135. *July 18, 1986* SYSUNIX continued *Kerry*

More additions/changes to the UNIX procedure area:

ILOAD — Removed (UTS object form of ILOAD.C that got in by mistake).

INCLUDE.c — Program used by PP to process VMS-style INCLUDE statements using a search path as defined by the environment variable $INCS (new).

INCLUDE.f — Slower, not as developed Fortran version of INCLUDE.c (new).

INCLUDE.SED — sed script used by SEARCH to extract the quoted portion of VMS-style INCLUDE statements. Used in conjuction with sort -u to generate a non-redundant set of $INCS files on which a routine/program depends. Checking the modification dates on this set determines whether an extant preprocessed or object form of a Fortran module is up to date (new).

INTFIL.SED — Increased size of INTFIL to CHARACTER*132 (changed).

LDOPTS.SH — Bourne shell script text to define default options and map *AIPS* style options into host loader option syntax for procedure LINK (new).

LIBR.DAT — Definitions of object library link lists used by LINK and search paths used by SEARCH for the installation of a minimal *AIPS* system (*i.e.*, no TV and generic pseudo AP). This must still be tailored somewhat for each installation, but at least it serves as a starting point; stored in $SYSLOCAL (new).

LIBS — Given an $AIPS_VERSION program directory "logical," prints on stdout the list of object libraries, $AIPS_VERSION/LIBR/.../SUBLIBs, on which programs in that directory depend (new; useful in generating *.OPT files for use with COMLNK and LINK).

LINENO.SED — When compilations fail in AS, CC and FC, a line numbered version of the source code is automatically generated using grep as an aid to debugging. This sed script is used in that process to even the left hand margin by forcing a 5-digit line number field.

LINK — Procedure that links program object modules with a list of object modules/libraries provided by an optional *.OPT file specified on the command line. If no *.OPT file is given and the directory of the program object module "belongs" to $AIPS_VERSION, the list is determined from $SYSLOCAL/LIBR.DAT. Only executables generated by the latter are moved to $LOAD. It also performs any object module replacement in and "randomizations" of $AIPS_VERSION link libraries involved (see COMRPL). It's called by COMLNK, but can be used as a standalone to merely re-link programs (new).

MAKEAT — Attempts to make an "@" file for use with COMRPL or COMLNK (new).

NEWER — A shell script, first attempt at NEWEST (new; slow and should be superseded by NEWEST).

NEWEST.c — Program that, when provided a list of files on the command line, returns the name of the most recently modified (new; used by SEARCH).

PP — Source code preprocessor. A new form of an old friend that no longer uses m4, with its genetic bugs, to handle VMS-style INCLUDE statements files. Uses INCLUDE and sed plus scripts DCL.SED, INTFIL.SED and NDCODE.SED to massage CVAX Fortran source modules into very nearly ANSI-standard source code, except for INTEGER*2 (changed).

REPLACE — Procedure invoked by COMRPL to "replace" object modules in object libraries. In reality, it only moves them to the same directory as the target object library. The procedure LINK performs any required replacements and "randomizations" prior to linking with libraries that require such actions. This way you only pay the price of rebuilding libraries at link time rather than on every invocation of COMRPL (new).

RUN — Procedure which executes the $AIPS_VERSION/LOAD version of the specified program, for example, RUN SETPAR (new).

SEARCH — A procedure that when given the name of a module searches the $AIPS_VERSION file system for the "proper" module based on modification dates of source code (preprocessed and un-preprocessed as well as INCLUDE files in the case of Fortran-oriented modules) and a search path starting with the directory of the given module and all the lower directories as defined in $SYSUNIX/LIBR.DAT. Used by COMRPL and COMLNK to insure, despite what the user types, that both the version of the routine/program actually used is proper for the host implementation of *AIPS* and that the form of the proper routine/program used which will most greatly accelerate the procedure is selected (new).

Moved also to 15OCT86 this date, nowhere else.

3136. *July 18, 1986* SYSUNIX continued *Kerry*

More additions/changes to the UNIX procedure area:

ZQMSCL — Procedure that is invoked by ZQMSCL.C as called by ZQMSIO.FOR to spool files to the QMS laser printer (new).

ZXLPRT.CVEX — *AIPS* routines that produce line printer output in reality produce a disk file in UNIX/*AIPS* that is then spooled to the line printer by invoking a shell script called ZXLPRT from ZXLPRT.C as called by ZCLOSE.FOR. This is the version of that script for the Charlottesville Convex where the disk file is spooled to CVAX via ftp and then queued to the Versatec (new; also stored in SYSCVEX under the name ZXLPRT).

ZXSIGC — Procedure that is invoked by ZXSIGC.C (abort handler) when specific signals (arithmetic exceptions, etc.) are detected. It is invoked to run in the background waiting for the impending "core" file to show up in the current working directory. When it does, it's moved to $ERRORS under the name TASK*n*.pid where *n* is the *POPS* number and pid is the process id for uniqueness (*e.g.*, MX1.12345). *AIPS* programmers can then inspect the $ERRORS directory from time to time to see which programs are blowing up and use the core dumps to perhaps determine why. Users don't always complain when they should and even when they do, the evidence has often evaporated (new).

Moved also to 15OCT86 this date, nowhere else.

3137. *July 18, 1986* APLCOS *Kerry*

In the process of porting the Digital Productions' COS implementation of *AIPS* to a Cray X-MP at NRL, several bugs were uncovered. In particular, CFT 1.14 was not happy with the technique we used in forming the null-terminated hollerith arguments required in calls to COS system verbs. DP's version of CFT was 1.11. We had been using internal WRITEs to generate CHARACTER forms of hollerith strings, creating null-terminated substrings from these in temporary variables, then forming null-terminated holleriths via internal READs into yet another set of temporary variables that were then passed as arguments to the COS system verb calls. All this has been circumvented through the use of the COS library function RBN (replaces trailing blanks with nulls in hollerith strings). This is a much simpler, reliable and elegant solution to the problem. Only lower level Z-routines are involved, so all is fair. These routines were:

ZACTV8	ZDESTR	ZEXIST	ZMOUNT	ZPARS	ZQASSN	ZQCLOS
ZQCRE3	ZQCREA	ZQDASS	ZQOPEN	ZQRENA	ZQTRUN	ZTACT2
ZXLPRT	ZXLPRT	ZXMKTM				

Also, an indexing error in ZXCLOG and ZXTLOG (create and translate a logical, respectively) caused the main frame definition to always be the same as the front end definition.

Finally, the "wait" logic in ZXTPIO was backwards so that we always got a premature end of file for double buffered I/O and tape-oriented tasks always failed (usually on some FITS table extension).

Moved to 15OCT86 same date.

3138. *July 20, 1986* UNIX Z-routines dependent on BYTFLP *Kerry*

ZBYTFL, ZGETCH, ZGTBYT, ZPTBYT and ZPUTCH used to be C routines; however, they needed to know the value of BYTFLP as set in ZDCHIN and carried around in /DCHCOM/. Unfortunately, BYTFLP is not in the calling sequences of these routines and I used an atrocious practice to extract the value of of BYTFLP from /DCHCOM/ within the C versions. I declared /DCHCOM/ as an external character array and hard coded the offset to the address of BYTFLP. When BYTFLP moved and I failed to change the offset, the value I extracted no longer corresponded to this very important machine constant. ZBYTFL, ZGETCH, ZGTBYT, ZPTBYT and ZPUTCH are now Fortran routines that call the new C routines ZBYTF2, ZGETC2, ZGTBY2, ZPTBY2 and ZPUTC2, respectively. These C routines all contain BYTFLP as well as other machine constants as a provision for future generality. In the case of ZBYTFL, ZBYTF2 is only called if BYTFLP is non-zero. This allows any necessary buffer copying on "normal" (*i.e.*, BYTFLP = 0) to vectorize on machines capable of vectorizing. In the past, ZBYTFL also ignored the intended design feature that the input buffer may be the same as the output buffer and always performed a copy. It now has a test for this condition and if true, it immediately returns. Again, this is only true if BYTFLP is zero (*i.e.*, the host is neither byte nor word swapped). Self-contained, pure Fortran 77 versions of ZBYTFL, ZGETCH, ZGTBYT, ZPTBYT and ZPUTCH have been tried using temporary CHARACTER variables with internal READs and WRITEs, but they turned out to be unacceptably slow. Routines are all in APLUNIX:.

Moved to 15OCT86 this date.

3139. *July 20, 1986* UNIX/AIPS task handling *Kerry*

There have been various problems in coming up with a version of ZACTV9, ZTACT2 and ZTKILL for UNIX/*AIPS* that will work reliably for all known flavors of UNIX. Under UNIX, in order to query if a process is active or to kill a process, you must know its process id. In the past, in order to get the process id, we invoked the UNIX command ps as a subprocess and parsed its output to get the required process id for a given process name. This required forking a process which is very slow by itself, but the ps command is also notoriously slow. It also put us at the mercy of the wide variety of ps output formats UNIX implementors seem to enjoy changing. Past solutions have also involved hacking the source code of ps into subroutines with the minimal requirements of ZTACT2 and ZTKILL (also ZXTSPY), however, the source code for ps is rarely available and the conversion process is not simple. Furthermore, the process naming feature of execl as called in ZACTV9 did not always work the same and the command field of the ps output would contain .../LOAD/*program_name*.EXE instead of the process name sought by ZTACT2 and ZTKILL (*i.e.*, *program_nameN* where $N = POPS$ number). There is now a new version of APLUNIX:ZACTV9 and new versions of both ZTACT2 and ZTKILL in APLBELL: and APL4PT2: and APL4PT1: (Berkeley UNIX changed directory formats in 4.2). ZACTV9 now changes to the directory of the desired executable module, forms a hard link to the module with a name identical to the desired process name (soft or "symbolic" links aren't available under all flavors of UNIX), forks a new process and execl's the link file, then deletes the link file before returning. This guarantees that the process is named properly. ZACTV9 also forms a null "lock" file in /tmp whose name consists of the process name and the process id (as returned by fork) separated by a period (*e.g.*, /tmp/MX1.12345). ZTACT2 and ZTKILL have been re-written such that they no longer make use of the ps command as described above. Instead, they search the /tmp directory for a filename of the form generated by ZACTV9 that contains the sought after process name. When found, they extract the process id "extension" and can now do their thing. Both ZTACT2 and ZTKILL police /tmp for terminated *AIPS* process lock files and delete them (all files in /tmp are deleted at boot time anyway). All this now makes task initiating, querying and killing much faster and more generic for UNIX/*AIPS*; however, ZXTSPY still uses the old ps command technique. This may be unavoidable, but I'm thinking about it.

Moved to 15OCT86 this date.

3140. *July 20, 1986* SPY under UNIX/AIPS *Kerry*

SPY has continued to be a troublesome *AIPS* feature under UNIX as well as other operating systems. No simple solution has been devised for the case of UNIX, so ZXTSPY must still depend on the technique of forking a process to execute the ps command and piping its output back into *AIPS* to be parsed. ZXTSPY now executes ps -axl in order to detect *AIPS* processes not being run from the *AIPS* login account. In Charlottesville, this is only possible from *AIPS* group logins as a policy of management. Also, since the forking process is slow to start with, I decided to pipe the output of ps through grep at the same time to eliminate those lines not containing *AIPS*-style process names in the command field. This simplifies the parsing of the remaining output. Also, the process state array has been enlarged to accommodate process state fields of width 5. In the past, only the first state field was returned to ZTQSPY. ZTQSPY has been adjusted accordingly and its call to ZMOVE (defunct) has been eliminated in favor of a character copy. Versions affected are in APLUNIX:, APLMASC:, APLUTS:, APLCVEX:, and APLVAX:.

Moved to 15OCT86 this date.

3141. *July 20, 1986* APLUNIX:ZQCRE* *Kerry*

Under UNIX, the process of reserving disk space still requires that you consume the space by writing it. This causes *AIPS* file creation under UNIX to be slow. In an attempt to speed up this process, ZQCRE3 and ZQCREA have been changed such that they no longer reserve the requested disk space by writing 512-byte chunks at a time, but rather write it in 65536-byte chunks. This requires that a buffer be declared this size. *AIPS* just wants the space reserved. It doesn't care what's in it, so it's not necessary to initialize the buffer in any way. However, to be safe, the buffer should be declared this large. Otherwise you can address beyond the program data segment during the transfer and blow up with a segmentation violation.

Moved to 15OCT86 this date.

3142. *July 20, 1986* Upgrade UNIX Z-routines *Gary/Kerry*

The changes to VMS Z-routines since the last port of *AIPS* to UNIX (15JUL85) have been made to the UNIX versions where applicable. The routines changed in APLUNIX: were:

ZACTV8 — Now calls ZDIR to determine the full pathname of the requested executable module based on the value of the *AIPS* adverb VERSION. ZDIR and ZACTV8 used to go through nearly identical motions on GO, ZDIR for the HELP file and ZACTV8 for the executable module.

ZDCHIN — Added and initialized NCHPRT (number of characters in line-printer line), KAP2WD (1024s of secondary pseudo-AP memory), ISBTCH (batch *AIPS* job indicator). BATER, ZSTRTA and ZSTRTB are now treated like *AIPS* in that their terminal output is not reassigned to the message terminal (if any).

ZDIR — Makes heavier use of logical translations to form pathnames to executable modules, HELP files, RUN files, etc. The old version used to construct these based on only a few logical translations and lots of hard-coded concatenations. Values assigned to AIPS adverb VERSION are converted to uppercase. This precludes the use of a literal pathname under UNIX since pathnames often contain lowercase characters. To get around this, the value of VERSION is always treated as a logical. This means you had best remember to set all the logicals that you expect to use before you initiate an *AIPS* session. Otherwise, when AIPS finds no translation for a given value of VERSION, you'll have to exit AIPS, set the logical and start up AIPS again. At one time, case distinction was implemented for *AIPS* string adverbs, however, it was disabled in response to pressure from users who found this "confusing."

ZMSGXP — A special version of ZEXPND for MSGWRT that writes error messages only to the terminal to avoid recursion. (This is why lorder used to issue messages to cycle in MSGWRT, ZEXPND and ZQEXP when trying to configure a single pass object library module order.)

ZQMSGX — A special version ZQEXP for ZMSGXP.

ZMYVER — Still determines the default version (*i.e.*, OLD:, NEW: or TST:) and stuffs it into the /DCHCOM/ variable VERNAM, but has to jump through some extra hoops to do so. First it translates AIPS_VERSION, then it translates each of OLD, NEW and TST in turn, searching for a match. DEC/VMS came out with multilevel logical definitions, and it was designed into *AIPS*, but UNIX doesn't have such a notion.

ZPHFIL — New physical file naming convention. The volume field now contains a character for indicating the file's data format revision level (currently "A").

ZPHOL1 — Old version of ZPHFIL used by UPDAT when converting old format files under old physical filenames to new format files files renamed using the new physical file naming convention.

ZTXMAT — AIPS used to search only in the $RUNFIL area for RUN files. We now maintain and export useful RUN files in a new directory referred to as RUNSYS. ZTXMAT has been changed to search this directory for RUN files as well.

ZWHOMI — Added TV and TK access privilege messages.

ZTOPEN — Changed REAL*4 MNAME(2) to INTEGER*2 MNAME(4). The declaration of this ZTOPEN argument should now be consistent throughout *AIPS*. Also added code to handle opening of RUNSYS files.

Moved to 15OCT86 this date.

3143. *July 20, 1986* Miscellaneous APLUNIX fixes *Kerry*

The form feed WRITE in ZENDPG has been restored (it had been commented out). Eliminated long lines in ZDEAXF, ZDOPR4 and ZQWKPR, all of which are presently null routines under UNIX/*AIPS*.

Moved to 15OCT86 this date.

3144. *July 20, 1986* APL4PT2:ZDELA2 and ZCPU *Kerry*

The APLUNIX: version of this routine calls sleep to induce a delay; however, sleep has a resolution of one second. This is unacceptable for real-time interactivity applications such as the cursor control of the blink rate with the AIPS verb TVBLINK. For 4.2 Berkeley UNIX and later, there exists a function called setitimer that allows much smaller time delays and this has been implemented in the APL4PT2 version of ZDELA2. Also, 4.2 Berkeley UNIX and beyond contains a function getrusage that has been implemented in APL4PT2:ZCPU to retrieve I/O counts for *AIPS* accounting purposes. Other UNIX versions of ZCPU still lack this feature.

Moved to 15OCT86 this date.

3145. *July 20, 1986* APLUNIX:ZFREE *Kerry*

Increased "volume" field width from 6 to 10 characters in both the declaration of VOLNAM and in the output FORMAT statement. This is used for the name of the file system.
Moved to 15OCT86 this date.

3146. *July 20, 1986* APLUNIX:ZGNAME *Kerry*

Calling GETARG for argument zero using INTEGER*2 NO caused it to fail under 4.2 Berkeley UNIX on a VAX. Redeclared NO as INTEGER*4. The Convex is happy with this as well, so this change has been made to the generic UNIX version.
Moved to 15OCT86 this date.

3147. *July 20, 1986* APLUNIX:ZMOUNT *Kerry*

The calling sequence to ZXMOUN was wrong (IERR and INTFIL were reversed). Fixed this and at the same time, switched INTFIL to MSGTXT. INTFIL is inserted by the preprocessor for use in the transformation of ENCODEs and DECODEs into internal WRITEs and READs. Some UNIX machines (*e.g.*, Convex) can swallow ENCODE and DECODE and don't required this. In these cases, INTFIL is not inserted during the preprocessing. INTFIL was being used to return an error message from ZXMOUN that was then transferred to MSGTXT and printed via MSGWRT. MSGTXT as the argument to ZXMOUN instead of INTFIL eliminates this step.
Moved to 15OCT86 this date.

3148. *July 20, 1986* APL4PT2:ZPARS *Kerry*

The Berkeley UNIX version of this routine was invoking the ls command and parsing its output. This is very slow and has been changed to read the directory itself in much the same way that this is done in the generic UNIX version. However, in 4.2 Berkeley UNIX, they decide to diverge from Bell UNIX and create a new directory format. Berkeley also provided new functions for I/O on directories and these have been implemented to provide a fast version of this routine.
Moved to 15OCT86 this date.

3149. *July 20, 1986* APLUNIX:ZQMSIO and ZQMSCL *Kerry*

With the arrival of the Charlottesville Convex-C1 with its own QMS laser printer, ZQMSIO has become a functioning routine under UNIX/*AIPS*. For opcode 'OPEN', it calls ZXMKTM to create a temporary file via mktemp using /tmp/ZQMSIO.*XXXXXX* as a template. For opcode 'CLOS', it calls ZQMSCL, a new routine that invokes a shell script called ZQMSCL that sends the temporary file to the QMS laser printer and deletes it. ZQMSIO is only called by the task QMSPL. The feature of QMSPL where the user can specify the name of a file in which to save the output of QMSPL is not yet implemented and may be difficult and clumsy for UNIX/*AIPS*. This is because any user-specified values assigned to the string adverb OUTFILE are always converted to uppercase and UNIX pathnames almost always contain lowercase. There may be a workaround for this involving logicals, but I haven't implemented anything yet. For now, this design feature is ignored by ZQMSIO and all QMSPL output is sent to the QMS laser printer and is then deleted.
Moved to 15OCT86 this date.

3150. *July 20, 1986* APL4PT2:ZQTRUN *Kerry*

The generic UNIX version of this routine achieves file truncation by copying, deleting and renaming. This is very clumsy but is the only known solution except for Berkeley 4.2 UNIX and beyond which has the function ftruncate. The APL4PT2 version of ZQTRUN has been added to take advantage of this feature.
Moved to 15OCT86 this date.

3151. *July 20, 1986* APLUNIX:ZXCLOG and ZXTLOG *Kerry*

Berkeley UNIX doesn't have putenv (library function in Bell UNIX that's used to assign a value to an environment variable). To keep ZXCLOG generic, I invented my own version of putenv that I believe will work under all flavors of UNIX. In the case of ZXTLOG, I taught it to ignore colons in logical names passed to it for translation. Also changed it to check the return value of ZXTLOG rather than the string returned.
Moved to 15OCT86 this date.

3152. *July 20, 1986* APLUNIX:ZESTEX and ZXSIGC *Kerry*

In ZESTEX, changed logic such that "hangu" signals are no longer ignored for AIPS and BATER. This means that when you logout, any AIPS or BATER goes away but tasks still continue to run. Several changes were made to ZXSIGC (signal catcher). Fixed calls to MSGWRT where pointers were being passed instead of addresses. On some caught signals, ZXSIGC simply reports the signal received and exits (*e.g.*, interrupt, software kill as from ABORTASK). On other, unexpected signals like floating point exceptions, segmentation violations, etc., a shell script called ZXSIGC is invoked to run in the background and wait for a "core" file to show up in the current working directory. Next, the action for illegal instructions is reset to the default (*i.e.*, a core dump) and a call is made to abort which generates an illegal instruction and a "core" file is generated. When the shell script ZXSIGC sees the "core" file appear, it moves it to the $ERRORS directory under the a unique filename for subsequent examination. Finally, as a precaution, a call to sync is made prior to exiting or aborting. This forces an update of the super-block and may help prevent *AIPS* user data files from getting corrupted.
Moved to 15OCT86 this date.

3153. *July 20, 1986* Misc. APLUNIX changes *Kerry*

Changed:

ZXHEX — Changed so that leading blanks in hexadecimal values are replaced with zero.
ZXLPRT — Changed so that it invokes the shell script ZXLPRT instead of $UNIX/ZXLPRT.
ZXMKTM — Changed to accept a template from the calling routine instead of using a hard coded value.
ZQMSG — Changed so that the call to ZQDEVN is commented out. The routine ZQDEVN is only called by ZQMSG and needs some re-thinking. In its current state, ZQDEVN is practically useless.
ZWAIT — Changed so that it ignores the test for long tape records. Currently, there is no such error detection in UNIX/*AIPS* but I'm thinking about it.

Moved to 15OCT86 this date.

3154. *July 20, 1986* APLUNIX: TV routines *Don/Eric/Kerry*

ZM70MC used to be a Fortran null routine. As part of the development of the I^{2}S Model 70 interface to the Charlottesvile Convex-C1, it is now a functioning C routine. Changed ZM70XF to call ZTVQIO instead of ZQIO. Also replaced N2 in call to ZQMSG with FTAB(UOFF). This should probably be done in the APLVMS: version as well, since this argument is the corresponds to the "channel" associated with the TV. ZTVQIO is a new C routine currently called only by ZM70XF in place of ZQIO. It only differs from ZQIO in that it does not call lseek and, if the number of bytes transferred does not equal the number of bytes requested, it issues an error message to stdout.
Moved to 15OCT86 this date.

3155. *July 20, 1986* APLUNIX:ZXUID *Kerry*

A new C routine designed to set the effective user id to that of the *AIPS* account. So far, it's only called by AIPGUNIX:ZSTRTA and ZSTRTB for running AIPS and BATER from a login other than that of the *AIPS* account. In Charlottesville, this is only allowed for the *AIPS* group.
Moved to 15OCT86 this date.

CHANGE.DOC: 15OCT86 Version as TST

3156. *April 18, 1986* ZDIR (VMS) *Gary*

Added by Editors from CHKOUT *history:* Corrected routine — it did not handle OLD or LOCAL.
Moved to 15APR86 in time for transport and 15OCT86.

3157. *April 18, 1986* VBFIT *Bill*

Can now pass the maximum antenna number in BPARM if no AN file exists. This will allow use of VBFIT to self-cal spectral-line data from the VLA Pipeline which writes no AN file on the FITS tape.
Moved nowhere.

3158. *April 24, 1986* TAFFY *Bill*

In SENDMA, OUTCNT was not being set properly if the first axis was being reduced to a single value. SENDMA was calling DIDDLE and writing the results too many times.
Moved nowhere.

3159. *April 24, 1986* CANDY *Bill*

The wrong variable was being sent to MINI3 for the block offset, causing only the first plane to be written. Only affected 3 or higher dimensional images.
Moved nowhere.

3160. *April 24, 1986* TV stuff *Eric*

Changed BLANK, BLSUM, GRBOXS, GRPOLY, GRLUTS, and YM70:YCRCTL to correct the corners of boxes and to handle cursor wrap-around. See # 3037 for details.
Moved to 15JUL86 25 April, nowhere else.

3161. *April 26, 1986* APLNCOS:*.* *Kerry*

Removed the defunct routines ZUNADD and ZUNSGN. Removed the routines ZMPORT and ZXPORT to APLCOS.
These actions performed on both 15JUL86 and 15OCT86 this date, nowhere else.

3162. *April 26, 1986* APLCOS:*.* *Kerry*

All 15JUL85 *AIPS* Z-routines for COS: see #3039 above for the full list of routines.
Moved from 15JUL86 this date, nowhere else.

3163. *April 26, 1986* AIPGCOS:ZSTRTA *Kerry*

AIPS startup Z-program for 15JUL85 *AIPS* under COS. Removed from SYSCOS to AIPGCOS.
These actions performed on both 15JUL86 and 15OCT86 this date, nowhere else.

3164. *April 27, 1986* TVSTAT, IMSTAT *Eric*

Added display and return of the minimum pixel value and its position. This required adding PIX2VAL and PIX2XY to POPSDAT.HLP, DAPL.INC, and CAPL.INC, creating PIX2VAL.HLP and PIX2XY.HLP, and modifying IMSTAT.HLP, TVSTAT.HLP, and AU6D.
Moved to 15JUL86 this date, nowhere else.

3165. *April 28, 1986* SYSUNIX:*.* *Kerry*

All system files developed for the installation, maintenance and execution of 15JUL85 *AIPS* under UNIX. For a complete list see #3043 above.
Moved from 15JUL86 this date, nowhere else.

3166. *April 28, 1986* APLUNIX:*.* *Kerry*

All 15JUL85 *AIPS* generic UNIX Z-routines. For a complete list see #3044 above.
Moved from 15JUL86 this date, nowhere else.

3167. *April 28, 1986* AIPGUNIX:*.* *Kerry*

15JUL85 *AIPS* generic UNIX Z-programs for AIPS and BATER startup/shutdown: STOPA, ZSTRTA, and ZSTRTB.
Moved from 15JUL86 this date, nowhere else.

3168. *April 28, 1986* APL1VAX:*.* *Kerry*

All Z-routines for Berkeley 4.1 UNIX on VAXs. These are rather dated C routines and should be regarded only as starting points for a modern *AIPS* port:
ZCPU.C ZDATE.C ZPARS.C ZQTAPE.C ZTACT2.C ZTIME.C.
Moved to 15JUL86 this date, nowhere else.

3169. *April 28, 1986* APL2VAX:*.* *Kerry*
All Z-routines for Berkeley 4.2 UNIX on VAXs. These are rather dated and should be regarded only as starting points for a modern *AIPS* port. See #3046 for a complete list.
Moved to 15JUL86 this date, nowhere else.

3170. *April 28, 1986* APLCVEX:*.* *Kerry*
All 15APR85 *AIPS* Z-routines for Convex's implementation of Berkeley 4.2 UNIX on the NRAO Charlottesville C-1. For a complete list see #3047 above.
Moved from 15JUL86 this date, nowhere else.

3171. *April 28, 1986* APLMASC:*.* *Kerry*
All 15JUL85 *AIPS* Z-routines for Masscomp's implementation of Bell System III UNIX on the NRAO Greenbank MC-500. See #3048 for a complete list of routines.
Moved to 15JUL86 this date, nowhere else.

3172. *April 28, 1986* APLUTS:*.* *Kerry*
All 15JUL85 *AIPS* Z-routines for Amdahl's implementation of Bell Version 7 UNIX on the now defunct NRAO Charlottesville IBM 4341. See #3049 for a complete list.
Moved to 15JUL86 this date, nowhere else.

3173. *April 28, 1986* ROTFND *Bill*
Added Y to the list of axis types which have a rotation angle.
Moved nowhere.

3174. *April 28, 1986* UVLOD *Gary*
Was not reading ANtenna files.
Moved to 15JUL86 and will go out on 15APR86 tape.

3175. *April 29, 1986* ALGSUB, VISDFT *Bill*
Modifications made to support multiple IFs resulted in incorrect scaling of the u, v, and w in MX when CHANNEL > 1. Affects line and bandwidth synthesis work.
Moved to 15JUL86 this date.

3176. *April 29, 1986* UVSUB *Bill*
The default value of the first channel was not being set when CHANNEL = 0 (all channels being divided).
Moved to 15JUL86 this date.

3177. *April 29, 1986* UVGRID *Bill*
Fixed bug which would cause incorrect scaling of the u, v and w for multiple channel data with a negative frequency increment.
Moved to 15JUL86 this date.

3178. *April 30, 1986* SYSCOS:WAIO *Kerry*
Cray proprietary code, inadvertently submitted, was removed. See #3054 for details.
Removed from 15JUL86 this date.

3179. *April 30, 1986* APLCOS:ASSGN, MASSGN, QUICK *Kerry*
Special versions of AIPSUB:ASSIGN,MASSGN,QUICK necessary because ASSIGN is a COS system verb. See #3055 for details.
Moved from 15JUL86 this date.

3180. *April 30, 1986* AU8A *Kerry*
Increased dimension of array. See #3056 for details.
Moved to 15JUL86 this date.

3181. *April 30, 1986* FITTP *Kerry*
Corrected errors where two words per long integer were assumed. See #3057 for details.
Moved to 15JUL86 this date.

3182. *April 30, 1986* PRTCC *Kerry*
Increased field width of FORMAT specifiers to handle large DELTA X and DELTA Y values.
Moved to 15JUL86 this date.

3183. *April 30, 1986* POPSGN *Kerry*
Added a call to ZMYVER; the reasons are explained in #3059. *Editors' note:* see also #3090.
Moved to 15JUL86 this date.

3184. *April 30, 1986* PRTTP *Eric*
Fixed PRTLEV handling for FITS table extensions.
Moved to 15JUL86, nowhere else.

3185. *April 30, 1986* System RUN files *Eric*
Changed NEWPARMS.001, DDTLOAD.001 and DDTEXEC.001; see #3061 for details. Also moved the HELP files DDT and DDTSAVE from 15JUL86 to 15OCT86.
Moved to 15APR86 (DDT), 15JUL86, nowhere else.

3186. *May 1, 1986* PRTAC *Eric*
Added the adverb PRTIME to the help file and the task to allow the display to be limited to times more recent than PRTIME days.
Moved to 15JUL86, nowhere else.

3187. *May 1, 1986* APLCOS:DIETSK *Kerry*
A special version of APLSUB:DIETSK that is probably no longer necessary and is described in #3062.
Moved to 15JUL86 this date.

3188. *May 2, 1986* TVBLINK *Eric*
Corrected error in AU6A which made the TV blinking fail if one or more of the TV channels was numbered > 2.
Moved to 15JUL86 this date, nowhere else.

3189. *May 2, 1986* VM *Eric*
Changed FILES subroutine to round the floating inputs rather than just adding 0.1 to insure integerization. The option of setting IN3SEQ = -1 was failing.
Moved to 15JUL86, nowhere else.

3190. *May 2, 1986* POLCO *Neil*
(1) Revised to output only floating point images.
(2) Revised the algorithm to implement the maximum likelihood estimator and replace the asymptotic expression that was previously used.
(3) Included a statement so that the header of the output map correctly states whether magic value blanking has been used.
(4) Revised HELP file to reflect the changes.
Moved nowhere.

3191. *May 5, 1986* Ticks *Eric*
Corrected errors in DOCIRCLE option in CTICS, TKTICS, and ITICS. It was able to get in a loop in which it would replot the same position value and fail to plot some others. Also fixed the routine to use longer lines when the geometries are not so extreme and, for the TV, when the device resolution is not so good either.
Moved to 15JUL86, nowhere else.

3192. *May 5, 1986* ZDOPR5 *Gary/Simon*

The version of ZDOPRT that works for the Printronix printer under VMS 4.*n*.
Moved to 15JUL86

3193. *May 5, 1986* SYSVMS:RUNAIPS.COM *Gary*

This version is designed for sites other than NRAO. It is more like our SYSLOCAL version and it checks to see what Versions of AIPS (OLD, NEW, or TST) are available before telling users how to start up AIPS.
Moved to 15JUL86

3194. *May 5, 1986* GUIDE.RNO, GUIDE.MEM *Gary*

The latest installation guide instructions.
Moved to 15JUL86.

3195. *May 5, 1986* UVLOD *Gary*

Bugs in reading 32-bit tapes. I am still not sure that I have fixed all 32-bit problems since *AIPS* does not write 32-bit tapes and I have no other source.
Moved to 15JUL86.

3196. *May 5, 1986* WSLOD *Gary*

Installed the latest changes received from Dwingeloo.
Moved to 15JUL86.

3197. *May 6, 1986* Digital Productions TV stuff *Kerry*

Special versions of TVCLOS, TVLOAD, TVOPEN and YTVCIN that were kludged together in order to form Digital Productions specific "frame buffers." These were then DISPOSE'd to the front-end VAX for display on Ramtek 9400s and 9460s using their proprietary software.
Moved to 15JUL86 this date.

3198. *May 6, 1986* LIBR.DAT *Gary*

Removed the AIPS.DEV areas, which are no longer in use.
Moved nowhere.

3199. *May 7, 1986* USELNM.COM *Gary*

Changed to use AIPS_STARTUP instead of running things from the procs area. The old way was a bug if a local version of USELNM existed.
Moved nowhere.

3200. *May 7, 1986* GRDAT, VISDFT *Bill*

Fixed bug with a combination of shifts and rotates. This affected ASCAL and UVSUB in the DFT mode. The problem occurred when the data and the CLEAN image had different rotations. In this case the model used had an incorrect rotation.
Moved to 15JUL86 this date.

3201. *May 20, 1986* Position routines *Eric*

Added Stereographic geometry to *AIPS* and altered definitions of Aitoff and Mercator a bit. Changed:

NEWPOS — Added code for STG geometry, changed AIT and MER definitions, went to analytic AIT solution.
DIRCOS — Added code for STG geometry, changed AIT and MER definitions.
DIRDEC — Added code for STG geometry, changed AIT and MER definitions, went to Newton's method for AIT and GLS solution.
DIRRA — Added code for STG geometry, changed AIT and MER definitions, went to Newton's method for AIT solution.
SETLOC — Added code for STG geometry.
CTICS — Added code to get lines when FNDY fails and to avoid zero divides on occasion.
ITICS — Like CTICS.
TKTICS — Like CTICS.
CHNTIC — Added code to avoid tick marks which fail.
TICINC — Added code to test for erroneously small position ranges.
LSTHDR — Fixed format error in pointing position.

Moved to 15JUL86, nowhere else.

3202. *May 20, 1986* HGEOM *Eric*

Somehow a bad version of HGEOM appeared in the standard area. Corrected it to have error returns on all position routines, to handle history files correctly on floating inputs (and to refuse integer input images), and to handle images in which the x and y are reversed (*i.e.*, the first is α-δ and the second is δ-α).
Moved to 15JUL86 this date, nowhere else.

3203. *May 19, 1986* GINIT *Neil*

The FORMAT statement 1021 did not match the ENCODE statement. This could cause an infinite format error. Removed the unwanted IER from the ENCODE statement.
Moved to 15JUL86 by Eric, nowhere else.

3204. *May 21, 1986* QINIT *Pat*

The FPS version of the routine QINIT was using incorrect priority values for AP scheduling. This resulted in batch jobs getting the AP too often.
Moved to 15JUL86 by Eric, nowhere else.

3205. *May 21, 1986* ZTACT2 *Pat*

The VMS version of this routine was not waiting for the correct results to arrive. This was causing batch jobs to take the AP erratically.
Moved to 15JUL86 on 12 June, nowhere else.

3206. *May 22, 1986* Miscellaneous *Eric*

Changed:

AUT — Added branch points to allow for the new T*n*VERBs.
AU3A — Changed TIMDEST to continue on certain errors — it was quitting on a given user/disk if a single header file was missing.
QINIT — Added to Pat's fixes changes to the task list and a change to avoid looking for tasks under *POPS* numbers which cannot occur (*i.e.*, those of AIPSC).

Moved to 15JUL86, nowhere else.

3207. *May 22, 1986* Fujitsu reports *Eric*

From reports developed in the Fujitsu installation, changed TABLIN, IMLOD, CUBINT, INDXIN, DATGET and CSLGET with the details found in #3076. IMVAL was not interpolating correctly before.
Moved to 15JUL86, nowhere else.

3208. *May 22, 1986* Convex reports *Eric/Kerry*

From reports developed in the Convex installation, changed: FILAIP, CITCC, KONTR, MOMNT, SLOWMOMNT, TOVLB, VBCC, VBCIT, VLBDR, WSLOD, HGEOM, IRING, XTRAN, MCUBE, QMULCL (COS), PREFFT (Convex), SWFOUR (Convex), UVMTYP, VTESS, YLUT (DEA), YCRCTL (V20), TVHLD and UVINIT. Again, all the details are found in the 15JUL86 entry #3079.
Moved to 15JUL86, nowhere else.

3209. *May 22, 1986* Various VMS Z routines *Pat*

Various VMS Z routines that call system services have been updated. Some were not correctly waiting for results to be available. All routines now use VMS include files to define constants. All routines now use event flag number 0 for synchronization.

ZCPU — Now uses $GETJPIW.
ZFREE — Now uses $GETDVIW.
ZGNAME — Now uses $GETJPIW.
ZMOUNT — Now uses $GETJPIW and $GETDVIW. Also tests asynchronous error status.
ZTQSPY — Now uses $GETJPIW.
ZWHOMI — Now uses ZGNAME.
ZDCHIN — Now uses ZGNAME.
ZESTEX — Now uses $GETJPIW.
ZQDEVN — Was using $GETCHN. This system service is due for deletion. Now uses $GETDVIW.

Moved to 15JUL86 on 17 June, nowhere else.

3210. *May 23, 1986* Misc *Eric*

Removed TABs and a long comment line from IMPFIT. Removed long lines from help files for APVC, COPY, POLCO, STEER, UVERR, VBANT, VBLIN, VM, and XTRAN. Removed TAB characters from help files for GAL, MWFLT, NINER, PFT, PGEOM, and WARP.
Moved to 15JUL86 this date.

3211. *May 23, 1986* COMTST *Pat*

COMTST now looks in the same area as the code for the options file. This was not working when logical names were used to locate the code.
Moved nowhere.

3212. *May 23, 1986* IRING *Neil*

Attempted to make IRING a little more robust. Protected against possible divide by zero which could occur if the galaxy was deemed to be edge on. Changed a variable (K) from I*2 to I*4 as it was possible to incur an integer overflow for projections in which the galaxy was close to edge on. Changed the HELP file to make the meaning of the inclination angle clear.
Moved nowhere.

3213. *May 24, 1986* Minor Janitorial Duty *Kerry*

Changed: IMIO, IMPFIT, TVCUB, TVSLD and TVHXF. See #3080.
Moved to 15JUL86 this date.

3214. *May 27, 1986* I*4 in calls to YIMGIO *Kerry*

Several AP tasks contained an I*4 variable as the NPIX argument in calls to YIMGIO including APCLN, MX, VM and VTESS. These caused TV displays to fail on the Convex. A bug was fixed in VTESS. See #3081 for details.
Moved to 15JUL86 this date.

3215. *May 27, 1986* Misc *Eric*

Removed TAB characters from PCNTREQ.INC, YDEA.INC, COMPILE.COM, CREADIR.COM, CREATOLB.COM, and OPTIONS.COM, Deanza routines YCRCTL, YGGRAM, YGRAPH, YMKCUR, YSPLIT, and YTVCIN, and M75 versions YGRAFE and YGRAPH. Fixed long lines in CONDAT.INC, PCNTREQ.INC, and YDEA.INC. Removed blank lines from YCRCTL (YDEA), and Comtal (V20) versions of YCMSET, YLUT, YOFM, and YSTCUR.
Moved to 15JUL86 this date, nowhere else.

3216. *May 27, 1986* QMSPL, ZQMSIO *Kerry*

In QMSPL, added call to ZQMSIO with opcode CLOS. This allows the computer, especially non-VAXes, to spool the output. For more see #3083.
Moved to 15JUL86 this date.

3217. *May 27, 1986* HGEOM *Kerry*

Fixed non-declaration bug — see #3084.
Moved to 15JUL86 this date.

3218. *May 28, 1986* IMLOD *Kerry*

Fixed initialization of image header: see #3085 for comments.
Moved to 15JUL86 this date.

3219. *May 28, 1986* UVDIF *Eric*

New task: prints differences between two nearly identical *uv* files. The user specifies how close the two must be in their u, v, w values and in their (correlator-based) visibilities. Also UVDIF.HLP, DUVD.INC, and CUVD.INC.
Moved to 15JUL86 to assist DDT, nowhere else.

3220. *May 28, 1986* FILAI2, ZTOPEN *Kerry*

Corrected declaration in FILAI2 and precursor comments in the VMS version of ZTOPEN to make them match *AIPS* conventions; the details appear in #3086.
Moved to 15JUL86 this date.

3221. *May 29, 1986* UVDIF, UVFND *Eric*

Corrected UVFND to put a needed message in the message file, to avoid creating a Fortran unit 1 file when DOCRT true, and to have the correct initial line counts for page 1. Changed UVDIF to test weights, to count differences by type through the full file (printing only up to the print limit), and to have the corrections made to UVFND. Added comment to UVDIF.HLP as well.
Moved to 15JUL86 this date, nowhere else.

3222. *May 29, 1986* ASCAL *Eric*

Changed GCALC and GCALC1 to allow a more lenient convergence test after 15 or more iterations. Also changed GCALC to call the solution "converged," after 31 or more iterations, if all antennas but one meet the convergence criterion and that one is no worse than a factor of 10 from the convergence. Also changed the damping factor from 0.9 to 0.5 after 10 iterations. All of these should help in cases where the solution is oscillating a bit, but is otherwise pretty good.
Moved to 15JUL86 and to the VLA by hand (Bill had the file checked out).

3223. *May 30, 1986* POPS storage area *Eric*

Increased the *POPS* storage capacity in order to allow DDT to compile easily on systems other than our own and to allow much easier creation of procedures and new variables. Changed the listing array from 3072 to 4096 words and the K array from 10752 to 18944 words. Changed DAPL.INC, DCON.INC, POPSGN, INIT, STORES, AU2A, SGLOCA, SGLAST, FILAIP and FILAI2. Also added calls to ZMYVER in AJAX, DELSG, FILAI2, FILAIP, FILINI, FIXCAT, FIXFIL, FIXUSR, SETPAR, and SETTVP. See #3090 for more information.
Moved to 15JUL86 to assist with DDT, to the VLA by hand since the old ME files had to be recreated in a larger size.

3224. *June 1, 1986* MX *Kerry*

Corrected an array dimension specifier in a subroutine call. See #3091 for a discussion.
Moved to 15JUL86 this date.

3225. *June 2, 1986* POPS SG files *Eric*

Changed STORES and SGLAST to delete old SG files before creating the new one on SAVEs. Otherwise, we get in trouble when the SG file size gets larger.
Moved to 15JUL86.

3226. *June 3, 1986* HIAD80 *Bill*

Fixed problem with truncating cards starting in columns (IST) < 1.
Moved to 15JUL86, this date by Eric, nowhere else.

3227. *June 3, 1986* COORDD *Eric/Kerry*

Changed AXSTRN to handle RA coordinates through COORDD in the standard way rather than by dividing by 15 and calling them DEC. Negative RAs were being displayed as such as a result. The Convex has caught another error of REAL*4 arguments being passed to a routine expecting REAL*8, this time in calls to COORDD. Fixed PRTUV, PRTSD, UVFND, and UVDIF.
Moved to 15JUL86, nowhere else.

3228. *June 5, 1986* PRTCC *Eric*

The page titles were not appearing on the printout. Corrected the initial page and line number so that they appear.
Moved to 15JUL86 this date, nowhere else.

3229. *June 9, 1986* STARS on plots *Eric*

Wrote subroutine STARPL to plot stars found in ST files into an open plot file and LINLIM to interpolate end points of a plotted line so that they will fit inside a plot. Changed POPSDAT.HLP, DAPL.INC, and CAPL.INC to add adverb STFACTOR. Changed CNTR, PCNTR, GREYS, and PROFL and their helps to add STFACTOR and INVERS adverbs to specify the plotting of stars and a call to STARPL. Also changed DGRY.INC and CGRY.INC for GREYS. Changed CTICS to avoid unneeded searching while doing DOCIRCLE and changed the tick routine in PROFL to be like the current version of CTICS. Also made the same fix to ITICS and TKTICS. Finally wrote task STARS and its help to read in a RUN file containing position/size data and to convert the file to a standard *AIPS* table file.
Moved nowhere.

3230. *June 9, 1986* FIXCAT *Eric*

Changed catalog file clearing service program to ignore empty slots in loop over slots.
Moved nowhere.

3231. *June 9, 1986* YM75:*.* *Kerry*

General cleanup of the typing of these routines, discussed in #3097.
Moved to 15JUL86 this date.

3232. *June 10, 1986* QRFT, APRFT *Bill*

This AP Vector Function Chainer routine was doing Fourier transforms in a manner which excessively amplified roundoff errors. The new version uses more of the AP memory for temporary work space but has greatly improved error propagation behavior. The pseudo AP version QRFT was rewritten with much of the work expanded inline for better vectorization. Files affected: QFPS:APRFT.VFC, QPSAP:QRFT and the derived AP load routines: Q120B:APRFT, Q5000:APRFT.
Moved to 15JUL86 on 16Jun, nowhere else.

3233. *June 10, 1986* PUTVALUE *Eric*

New verb: inserts a user-specified pixel value at a user-specified pixel recording what it has done in the history file. An OPCODE value allows the new pixel value to be a magic blank. Changed AU7A and POPSDAT.HLP and created PUTVALUE.HLP to make this new verb. Also changed AU7A and the help files for GETHEAD, PUTHEAD, and ADDBEAM to drop the excess adverb INTYPE.
Moved nowhere.

3234. *June 10, 1986* YCRCTL (YM70) *Eric*

Corrected sign problems with the x cursor position arising from attempts to wrap around at the left side.
Moved to 15JUL86 this date, nowhere else.

3235. *June 12, 1986* STARS *Eric*

Made minor alteration anticipating Bill's changes to tables in which all column types are treated as arrays. The current TABINI can handle it.
Moved nowhere.

3236. *June 13, 1986* UVSUB.HLP *Bill*

Corrected explanation of NCOMP < 0; it incorrectly stated that if NCOMP > 0, then up to the first negative component would be used.
Moved to 15JUL86 16Jun, nowhere else.

3237. *June 13, 1986* TAPLT *Eric*

New task: plots user-selected function of one or two table columns against a user-selected function of one or two more table columns. It has histogram options, bin averaging, and user controllable ranges. The task should enable several forms of analysis of CC files now and will be of greater use when gain and other files become table extensions. Also new help file and includes DTPL and CTPL.
Moved nowhere.

3238. *June 17, 1986* STARS, EXTLIST *Eric*

Changed AU8A (EXTLIST) to handle TAPLT plot files, to treat ST (stars) files as table files, to use more digits for PCNTR parameters, to be fairly impatient when trying to open an extension file currently being used elsewhere, and to support the INVERS adverb as a starting point for the listing. Changed EXTLIST.HLP to add INVERS and to drop an antique reference to CT files. Changed OPEXT to return more useful error codes. And corrected TAPLT to fill in all of its adverb values before creating the plot file, STARS to use the old table format conventions for now (GETCOL can't ignore dimensionality on ordinary columns), and STARPL to use the scaling adverb STFACTOR for something besides a logical flag.
Moved nowhere.

3239. *June 18, 1986* ZCPU *Gary*

This routine was reporting direct I/O only. Fixed to report the sum of direct I/O and buffered I/O.
Moved nowhere.

3240. *June 18, 1986* STARS *Eric*

Changed the Fortran and Help files to convert DeltaRA from arcseconds on the sky (in the user's input file) to an "uncertainty" in RA by dividing by cos(DEC).
Moved nowhere.

3241. *June 19, 1986* Call sequence mismatches. *Gary/Eric*

The following routines had errors in subroutine calls, usually using an R*4 when an R*8 was expected or vice versa. This works on a VAX but not on many other machines, like Convexes. See #'s 3105 and 3106 for the changes in IMFIT, JMFIT NNLSQ, DATGET, SLFIT, CTICS (changed call sequence), CLAB1, TICINC (changed call sequence), CLAB2 (changed call sequence), PLCUB and GNPLT.
Moved to 15JUL86 this date, nowhere else.

3242. *June 20, 1986* MX *Bill*

Fixed minor bug in MXIN. Under some conditions when 10 boxes were in use, operations on array WIN1 would affect the memory following the array.
Moved to 15JUL86 this date.

3243. *June 20, 1986* VBLIN *John*

The code that allows VBLIN to read and translate IBM tapes has been removed. No one uses it and it is difficult to maintain. In addition, VBLIN now is better equipped to recover from tape read errors on regular VAX tapes.
Moved to 15JUL86 this date.

3244. *June 20, 1986* VTESS *Tim*

VTESS had been broken in 15OCT86 for some time following the changes to the DSKFFT routine which were not incorporated into VTESS, although they were put into VM which has very similar innards. I fixed this and some other bugs which turned up. A missing ENCODE caused a very strange message when DSKFFT was called and failed. I also added the capability of handling non-symmetric beams, such as coma and dual-beam observations. Also made some minor algorithm improvements, and cleaned up some format statements.
In future, I would like to be notified of any system changes which will break one of my programs. On a related topic I strongly agree with Kerry's remarks above (#3081) concerning the use of DIRTY. *Editors' note:* DSKFFT *was changed and documented in* CHANGE.DOC *before* VTESS *was installed in AIPS. Kerry's tone may be strident, but how can one object to automatic debugging by the computer?*
Moved nowhere.

3245. *June 20, 1986* VM *Tim*

Now does entropy related calculations via Q-routines just as VTESS does. Should be faster on larger images.
Moved nowhere.

3246. *June 24, 1986* APLVMS:ZRM2RL.MAR, ZDM2DL.MAR *Bill*

Fixed bug in trapping underflows. The test was incorrect and zeroes were being converted to overflows.
Moved to 15JUL86, this date

3247. *June 24, 1986* XBASL *Eric*

Corrected errors made long ago when the maximum polynomial order was reduced — some arrays were being filled with 0's beyond their range. Also changed it to handle much larger rows and to read/write only floating images. Changed XBASL, XBASL.HLP (clarify things), DPLY.INC, DBAS.INC, and EBAS.INC.
Also changed LABINI to let an input value of CH(1) < -10 indicate that the characters to the left of the plot should not be counted at this call (via CHNTIC) and corrected SLBINI to use a properly initialised set of CH values in its LABINI call (including CH(1) = -101).
Moved subroutines and XBASL (fixes only) to 15JUL86, nowhere else.

3248. *June 24, 1986* DDT *Eric*

Moved the DDT package of 2 RUN and 2 HELP files from 15JUL86. See #3092 for information.

3249. *June 25, 1986* UTESS (sic) *Tim*

Another version of VTESS. This allows negative brightness. It tries to maximise the number of zeroes in the deconvolved image. Has all the nice features of VTESS: mosaicing, single aperture capability, asymmetric beams, etc. Also a semi-useful HELP file.
Moved nowhere.

3250. *June 25, 1986* SYSVMS:AIPS.COM *Gary*

This is the default AIPS.COM sent on our installation tape, not the local version (SYSLOCAL) used here and at the VLA. I commented out the part that sets up a message terminal for AIPS1. Thus, all sites will at least be able to see task messages, and sites with message terminals will (I hope) be able to find the instructions for setting up message terminals in the manual.
Moved to 15JUL86.

3251. *June 26, 1986* TAPLT, EXTLIST *Eric*

Added options for scaling and biasing column values and taking the results to any power. Created subroutine SELSTR to build "selection" text strings for axis labeling. Changed TAPLT, TAPLT.HLP, DTPL.INC, CTPL.INC, and AU8A.
Moved nowhere.

3252. *June 26, 1986* TAFLG *Eric*

New task: flags rows in a table which meet specified criteria. A function is performed on one or two columns of the table and the scaled result is compared to a constant or the result of another function on another one or two columns. If the comparison is true, the row is flagged or unflagged. Created TAFLG, TAFLG.HLP, DTFL.INC, and CTFL.INC.
Moved nowhere.

3253. *June 26, 1986* UVCREA, MCREAT *Eric*

Both routines would fail on a missing catalog file, so I don't know why I've seen missing ones get created properly within the last few weeks. Changed the error handling in both to let them try to OPEN the new slot, which should create a missing CA file. If the create still fails, then the tasks will fail.
Moved to 15JUL86 this date, nowhere else.

3254. *June 26, 1986* WaWa IO tasks *Eric*

Corrected FILDES — it was rounding an input variable in all cases, rather than just those cases in which it was supposed to use the variable. As a result, dummy inputs in the other cases were causing failures. Changed MAPCR to return the updated header block for non-scratch images. Created new subroutine MAPCOP which acts like MAPFIX, but simply copies one floating image to another. Changed SUMIM, SUMSQ, RM, and PBCOR to write floating point images only. They were writing *only* integer images. Dropped BADDISK from the inputs and help files for RM and PBCOR. RM needed a good bit of work — cleaning up the typing to determine what the control flow actually was and correcting it to write history files (it was branching over those routines).
Moved to 15OCT86, nowhere else.

3255. *June 27, 1986* RM *Eric*

Continued the clean-up job in 15OCT86 only. Corrected the degrees-to-radians constant (to be more accurate). Changed SCALR1 and APARM(8) to be standard *AIPS* logicals (≤ 0 false, > 0 true). Added lots more information to the history files. Changed RM.HLP to reflect the changes to SCALR1 and APARM(8) and to describe the *non*-standard use of BLC and TRC.
Moved nowhere.

3256. *July 1, 1986* PBCOR *Eric*

Made a variety of improvements. Added adverb DPARM to allow the user to specify (1) the cutoff level for blanking, (2) the need for accurate position computations, (3) the use of GPOS, and (4) beam parameters other than the VLA best-fit ones. Changed PBCOR to use all these, to write a more complete history, and to handle images with more than 2 dimensions in any transposition. PBCOR now uses the pointing position in the header by default rather than the coordinate reference position.
Moved nowhere.

3257. *July 1, 1986* QMSPL *Eric*

Changed ZQMSIO to open the print files with a disposition of DELETE and to change that to PRINT/DELETE (or PRINT if OUTFILE is specified) on closing the file. Changed QMSPL to attempt to finish the print file properly on ZQMSIO error, but to skip the close command if that fails. In this way, partial print files will not go to the laser and then leave it in a strange state.
Moved nowhere.

3258. *July 2, 1986* Adjustable Array Dimensions *Kerry*

Variables used to specify adjustable array dimensions are supposed to be declared simply as INTEGER. This accommodates compilers that insist these items be 4 bytes (*e.g.*, IBM and Fujitsu) while satisfying compilers that will accept either either 2 or 4 bytes. Because of its non-standard word order, VMS will get it right even if these items are explicitly declared INTEGER*4 and passed to dummy arguments expecting INTEGER*2. Other machines will simply barf all over the user. The notion of declaring these items as simply INTEGER is intended to allow the host compiler to do the proper thing. However, we still use the NOI4 compiler option under VMS, even though everything is supposed to be explicitly declared. This causes items declared INTEGER to be 2 bytes and as a result (on the principal development node of *AIPS*) completely defeats any possible opportunity to detect potential type mismatches for other systems. All of these were detected by developing tools on the Convex to search for all cases of non-constant dimension specifiers in declarations and searching for all calls to subroutines where these were also dummy arguments. See #3114–3119 for the lists of routines changed.
Moved from 15JUL86, nowhere else.

3259. *July 2, 1986* ZTQSPY *Gary*

This routine had the same problem as ZCPU, listing I/O count as direct I/O only and not the sum of direct and buffered I/O. Fixed.
Moved nowhere.

3260. *July 2, 1986* WHATSNEW *Eric*

Changed this general Help file, dropping the 15OCT85 info and adding more stuff for 15JUL86 and 15OCT86.
Moved 15JUL86 fixes from 15JUL86 this date, nowhere else.

3261. *July 2, 1986* Moved LMDER and LMDER1 *Kerry*

Moved routines found in incorrect directories: LMDER from QSUB to APLSUB and LMDER1 from YSUB to APLSUB. Fixed adjustable array dimensions.
Moves made in 15JUL86 same date.

3262. *July 3, 1986* More Adjustable Array Dimensions *Kerry*

Variables used to specify adjustable array dimensions are supposed to be declared simply as INTEGER. Routines changed are described in #3121.
Moved to 15JUL86 this date.

3263. *July 9, 1986* PBCOR, RM *Eric*

Fixed bugs: PBCOR was looking too far for the required axes and sometimes finding an apparent conflict and RM was not handling the windows completely correctly.
Moved nowhere (15JUL86 version different).

3264. *July 9, 1986* Cookbook *Eric*

Changed *COOKBOOK* files for 15JUL86 release: see #3122 for list. Also fixed the general help files PL2D, UVPR, MAPETC, ANALYSIS, APTASKS, TAPU, and INDEX, adding IMVIM, CCMRG, VTESS, UVDIF, MPORT, TAMRG, VTESS, and XPORT and dropping APMAP, CORMS, NTERP, and UVDIS.
Moved from 15JUL86, nowhere else.

3265. *July 9, 1986* COMB *Eric*

Fixed the message describing the REAL operation: the constant was not being displayed.
Moved from 15JUL86 this date, nowhere else.

3266. *July 9, 1986* BSMAP *Tim*

Completely new mapping task for small, weak images observed when the phase stability was poor. Averages bi-spectrum for the object (phase part of bi-spectrum is the closure phase) and then reconstructs the image from the averaged bi-spectrum. Can only deal with small images ($< 15^2$), and takes some time to run, but replaces ASCAL, UVSRT, and MX. Eats 'TB' *uv* data and spits out dirty map and beam. Also a somewhat informative HELP file.
Moved nowhere.

3267. *July 10, 1986* QVEX:QRFT *Bill/Kerry*

Removed Convex-specific version of QRFT since the new and improved version of the QPSAP version is best for the Convex as well.
Removed in 15JUL86 same date.

3268. *July 10, 1986* INC:ZVD and ZVND *Kerry*

Added generic null-op versions of compiler directive INCLUDE files to force scalar optimization (ZVD) and to ignore apparent dependencies (ZVND) to the INC area, deleting them from INCVMS:. See #3126.
Additions and removals made in 15JUL86 same date.

3269. *July 10-11, 1986* Cookbook *Eric*

Changed *COOKBOOK* files for 15OCT86 release:

COOKO.TEX — Moved an "additional recipe."
COOK5.TEX — Added references to TAFLG, TAPLT, and UTESS.
COOK6.TEX — Added IMXY ; IMVAL to last section.
COOK7.TEX — Added STARS in new section "Additional displays."
COOK14.TEX — Added ISBATCH, PUTVALUE, STARS, TAFLG, TAPLT, and UTESS and BSMAP.
COOKZ.TEX — Added more comments re Convex and changed all references to user numbers to "NRAO (VLA) user number."

Also fixed the general help files ANALYSIS, APTASKS, CURSOR, GENERAL, INDEX, MAPETC, PL2D, SL1D, and UVPR for the same additions listed above under COOK14.
Moved nowhere (except COOKZ to 15JUL86).

3270. *July 11, 1986* YCURSE (YGEN:) *Eric*

The magical corrections for zoom on the I^2S Model 70E do not appear to be correct when the TV is in the 480-line mode and the zoom factor is 4 or 8. Put in special code to correct by 0.5 and 0.25, resp., pixels.
Moved nowhere.

3271. *July 14, 1986* IMFIT *Kerry*

Fixed adjustable array dimensions; see #3127 for the incestuous particulars.
Moved to 15JUL86 this date.

3272. *July 15, 1986* INC:DVMN and DVMT *Kerry*

Changed declarations of the functions OPEN, AKCESS and CLOSE in these includes. Discussion in #3128.
Moved to 15JUL86 same date,

3273. *July 15, 1986* CMLT.INC *Kerry*

Rearranged the order of variables in the definition of /MLTAP/ to eliminate a potential alignment error.
Moved to 15JUL86 same date.

3274. *July 15, 1986* UVLOD *Kerry*

The second arguments (mean equinox) in several calls to PRECES were REAL*4 whereas REAL*8 is expected.
Moved to 15JUL86 same date.

3275. *July 15, 1986* VBFIT *Gary/Kerry*

Corrected error in earlier change regarding adjustable array dimension specifiers, where in the routine L1AVG, I renamed variables N1, N3, N5 and N7 used in a call to L1 as I1, I3, I5 and I7, but left them declared as INTEGER*2. These errors were detected by Gary's type matching routines on the Convex. Redeclared these as simple INTEGER.
Moved to 15JUL86 same date.

3276. *July 15, 1986* COMCLR *Kerry*

Fixed adjustable array declarations; see #3132.
Moved to 15JUL86 same date.

3277. *July 17, 1986* GUIDE.MEM, MEMO39.MEM *Gary*

Placed in DOCTXT: an upgraded version of the installation guide, plus *AIPS* Memo No. 39, which has valuable information for installers and programmers.
Moved to 15JUL86 same date.

3278. *July 18, 1986* VAX Procedures *Gary*

Changed SYSVMS:BOOTUP.COM and SYSLOCAL:BOOTUP.COM to set the default protection to world read/write so that the batch files would not be protected after BSTRT1 cleans things up. Added code to the SYSLOCAL: one to reserve *AIPS* numbers for *AIPS* programmers during working hours.
Moved SYSVMS: one to 15JUL86.

3279. *July 18, 1986* SYSUNIX *Kerry*

The new directory structure made it necessary to rewrite almost all of the UNIX/*AIPS* tool kit. It is now modelled very closely after the VMS/*AIPS* set. Some old friends are now obsolete and have been deleted. Others may have familiar names, but are otherwise unrecognizable. Terse descriptions are given in #'s 3133–3136. For more detailed descriptions of their syntax and functions, see the modules themselves as well as the installation guide for UNIX/*AIPS*.
Moved from Convex and 15JUL86 this date, nowhere else.

3280. *July 18, 1986* APLCOS *Kerry*

In the process of porting the Digital Productions' COS implementation of *AIPS* to a Cray X-MP at NRL, several bugs were uncovered. Corrected handling of null-terminated hollerith strings in calls to COS system verbs, indexing in ZXCLOG and ZXTLOG, and the "wait" logic in ZXTPIO. The list of routines and additional discussion is given in #3137.
Moved from 15JUL86 this date, nowhere else.

3281. *July 20, 1986* Upgrade UNIX Z-routines *Gary/Kerry*

The changes to VMS Z-routines since the last port of *AIPS* to UNIX (15JUL85) have been made to the UNIX versions where applicable. The routines changed in APLUNIX: are listed in detail in #3142.
Moved from 15JUL86 this date.

3282. *July 20, 1986* UNIX/AIPS task handling *Kerry*

There is now a new version of APLUNIX:ZACTV9 and new versions of both ZTACT2 and ZTKILL in APLBELL: and APL4PT2: and APL4PT1: (Berkeley UNIX changed directory formats in 4.2). The changes make task initiating, querying and killing much faster and more generic for UNIX/*AIPS*. Entry #3139 describes the changes in some detail.
Moved from 15JUL86 this date.

3283. *July 20, 1986* SPY under UNIX/AIPS *Kerry*

ZXTSPY must still depend on the technique of forking a process to execute the ps command and piping its output back into *AIPS* to be parsed. Changed ZXTSPY to execute ps -axl in order to detect *AIPS* processes not being run from the *AIPS* login account and to use grep at the same time to simplify the parsing of the output. See #3140 for further details.
Moved from 15JUL86 this date.

3284. *July 20, 1986* UNIX Z-routines dependent on BYTFLP *Kerry*

ZBYTFL, ZGETCH, ZGTBYT, ZPTBYT and ZPUTCH are now Fortran routines that call the new C routines ZBYTF2, ZGETC2, ZGTBY2, ZPTBY2 and ZPUTC2, respectively. This was done to provide machine constants carried in Fortran commons. See #3138 for further discussion.
Moved from 15JUL86 this date.

3285. *July 20, 1986* APLUNIX:ZQCRE* *Kerry*

In an attempt to speed up file creation, ZQCRE3 and ZQCREA have been changed such that they reserve the requested disk space by writing it in large chunks. See #3141 for details.
Moved from 15JUL86 this date.

3286. *July 20, 1986* Miscellaneous APLUNIX fixes *Kerry*

The form feed WRITE in ZENDPG has been restored (it had been commented out). Eliminated long lines in ZDEAXF, ZDOPR4 and ZQWKPR, all of which are presently null routines under UNIX/*AIPS*.
Moved from 15JUL86 this date.

3287. *July 20, 1986* APL4PT2:ZDELA2 and ZCPU *Kerry*

The APLUNIX: version of this routine calls sleep to induce a delay; however, sleep has a resolution of one second. This is unacceptable for real-time interactivity applications such as the cursor control of the blink rate with the AIPS verb TVBLINK. For 4.2 Berkeley UNIX and later, there exists a function called setitimer that allows much smaller time delays and this has been implemented in the APL4PT2 version of ZDELA2. Also, 4.2 Berkeley UNIX and beyond contains a function getrusage that has been implemented in APL4PT2:ZCPU to retrieve I/O counts for *AIPS* accounting purposes. Other UNIX versions of ZCPU still lack this feature.
Moved from 15JUL86 this date.

3288. *July 20, 1986* APLUNIX:ZFREE *Kerry*

Increased "volume" field width from 6 to 10 characters in both the declaration of VOLNAM and in the output FORMAT statement. This is used for the name of the file system.
Moved from 15JUL86 this date.

3289. *July 20, 1986* APLUNIX:ZGNAME *Kerry*

Calling GETARG for argument zero using INTEGER*2 NO caused it to fail under 4.2 Berkeley UNIX on a VAX. Redeclared NO as INTEGER*4. The Convex is happy with this as well, so this change has been made to the generic UNIX version.
Moved from 15JUL86 this date.

3290. *July 20, 1986* APLUNIX:ZMOUNT *Kerry*

Corrected calling sequence to ZXMOUN and switched INTFIL to MSGTXT. See #3147 for details.
Moved from 15JUL86 this date.

3291. *July 20, 1986* APL4PT2:ZPARS *Kerry*

The Berkeley UNIX version of this routine was invoking the ls command and parsing its output. This is very slow and has been changed to read the directory itself in much the same way that this is done in the generic UNIX version. However, in 4.2 Berkeley UNIX, they decide to diverge from Bell UNIX and create a new directory format. Berkeley also provided new functions for I/O on directories and these have been implemented to provide a fast version of this routine.
Moved from 15JUL86 this date.

3292. *July 20, 1986* APLUNIX:ZQMSIO and ZQMSCL *Kerry*

With the arrival of the Charlottesville Convex-C1 with its own QMS laser printer, ZQMSIO has become a functioning routine under UNIX/*AIPS*. See #3149 for a description.
Moved from 15JUL86 this date.

3293. *July 20, 1986* APL4PT2:ZQTRUN *Kerry*

The generic UNIX version of this routine achieves file truncation by copying, deleting and renaming. This is very clumsy but is the only known solution except for Berkeley 4.2 UNIX and beyond which has the function ftruncate. The APL4PT2 version of ZQTRUN has been added to take advantage of this feature.
Moved from 15JUL86 this date.

3294. *July 20, 1986* APLUNIX:ZESTEX and ZXSIGC *Kerry*

Changed the routines ZESTEX and ZXSIGC which handle abort conditions in UNIX. More conditions are handled now and "core" dumps are, in some circumstances, squirreled away for programmers. See #3152 for details.
Moved from 15JUL86 this date.

3295. *July 20, 1986* APLUNIX:ZXCLOG and ZXTLOG *Kerry*

Berkeley UNIX doesn't have putenv (library function in Bell UNIX that's used to assign a value to an environment variable). To keep ZXCLOG generic, I invented my own version of putenv that I believe will work under all flavors of UNIX. In the case of ZXTLOG, I taught it to ignore colons in logical names passed to it for translation. Also changed it to check the return value of ZXTLOG rather than the string returned.
Moved from 15JUL86 this date.

3296. *July 20, 1986* Misc. APLUNIX changes *Kerry*
Also changed ZXHEX, ZXLPRT, ZXMKTM, ZQMSG and ZWAIT for reasons given in #3153.
Moved from 15JUL86 this date.

3297. *July 20, 1986* APLUNIX: TV routines *Don/Eric/Kerry*
Developed working UNIX versions of ZM70MC, ZM70XF and ZTVQIO.C with the details given in #3154.
Moved from 15JUL86 this date.

3298. *July 20, 1986* APLUNIX:ZXUID *Kerry*
A new C routine designed to set the effective user id to that of the *AIPS* account. So far, it's only called by AIPGUNIX:ZSTRTA and ZSTRTB for running AIPS and BATER from a login other than that of the *AIPS* account. In Charlottesville, this is only allowed for the *AIPS* group.
Moved from 15JUL86 this date.

Changes: 15-Apr-1986 version of *AIPS*

This section provides corrections and updates to the *AIPS COOKBOOK* to fill the gap between publication dates. A complete new *COOKBOOK*, labeled as a 15 October 1985 version, has been published. This section contains the pages changed in that edition due to the 15JUL86 and 15OCT86 releases. Both releases caused changes on some of the same pages. Thus, to save money in publishing the *AIPSLETTER*, we are printing the changes for both releases together. Note that we have implemented a suggestion made by several users, namely that we print the revised pages in their entirety including both sides. This should enable users to replace the old pages with the new in their current *COOKBOOK*s (see "News Notes"). Again, to save money, we will not reproduce changed pages in the Table of Contents, Chapter 14 (lists of tasks and verbs), or the Appendices (Glossary and NRAO site instructions).

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3.4.3. Which to use — UVMAP or MX?

MX is generally a little faster than UVMAP (the exceptions being uncommon combinations of small images made from large datasets). MX makes a *uv* "workfile" which is used in its CLEAN step, so you save some computation by using MX rather than UVMAP for imaging when you want to use MX later for CLEANing. MX has the following advantages over the combination of UVMAP and APCLN (the task which CLEANs images made by UVMAP):

1. MX's CLEANing step allows you to CLEAN almost to the edges of the imaged field, whereas APCLN only CLEANs properly over a quarter of the field. MX's CLEANing step also subtracts the components from the ungridded data, avoiding aliasing of sidelobes into the field of view. These properties of MX make it the best choice for snapshot data.
2. MX lets you image up to 16 rectangular subfields, then CLEAN them all simultaneously. It is therefore the method of choice for all observations where there may be strong but localized sources over most of the primary beam. It could be prohibitively expensive in time and disk space to image and subsequently CLEAN a single huge field with UVMAP and APCLN in such cases.
3. MX is the only imaging program in *AIPS* that permits images as large as 4096 by 4096 cells, as occasionally required for high-resolution imaging of very strong extended sources. Note, however, that you would need more than 525,000 blocks of disk space (400,000 with CLEANing) to make one such image on a VAX, and may then be unable to CLEAN it in an acceptable time. (The disk space requirements of MX are complicated and do not completely scale with image size. A 2048 by 2048 with CLEANing would require 300,000 blocks of disk *plus* enough disk to hold a copy of the input *uv* file.) We strongly recommend that you consult an *AIPS* advisor at your site before making images over 1024 by 1024 in size!
4. MX subtracts components from the gridded *uv* data, taking proper account of the *w* terms. This feature leads to more accurate final CLEAN images than could be obtained with UVMAP and APCLN. The increased accuracy can be important if you seek very high dynamic range.

However, UVMAP may be preferable if you want to make images of several Stokes parameters simultaneously (and with identical *uv* coverage), and if you will CLEAN an area no larger than a quarter of the field area and do not require the ultimate in final dynamic range. Multi-Stokes imaging with UVMAP involves fewer separate steps than with MX. UVMAP may have some advantages for spectral-line work as well (see § 9 of this *COOKBOOK*).

The main danger in using MX is one of observer psychology. Because MX combines imaging and CLEANing, some observers feel encouraged to CLEAN images without ever inspecting the dirty one. This is extremely bad practice. They can thereby CLEAN images that are dominated by noise (wasting both their own time and CPU cycles). Worse, they may fail to specify CLEAN boxes properly, leaving significant emission outside the CLEAN area, or CLEANing large areas of empty sky. These practices can lead to false results and/or needlessly increase the time to produce an image of optimum quality.

Do not use MX blindly. Combine the imaging and CLEANing steps only after you have diagnosed some elementary properties of your field — where the brightest emission is, what shape it is, and whether it is bright enough to justify CLEANing anyway. It is a good idea to make the first images of your field at the lowest resolution (heaviest taper) justified by your data. This will allow you to choose the input parameters for subsequent combined imaging and CLEANing steps optimally.

3.4.4. Helping the deconvolution when imaging

Here are a few points to bear in mind when setting up the imaging parameters in UVMAP or MX if you think you will need to deconvolve the synthesized images later.

Other things being equal, the accuracy of beam deconvolution algorithms (§ 5.1) generally inproves when the shape of the dirty beam is well sampled. When imaging complicated fields, it may be necessary to compromise between cell size and field of view. If you are going to CLEAN an image, you should set your imaging parameters so that there will be at least three or four cells across the main lobe of the dirty beam.

With UVMAP, you must image a large enough field that no strong sources whose sidelobes will affect your image have been aliased by the FFT. With MX, make a small image field around each confusing source.

You help CLEAN to guess what may have happened in the unsampled "hole" at the center of the *uv* plane by including a zero-spacing (usually single-dish) flux density when you make the image. This gives CLEAN a datum to "aim at" in the center of the *uv* plane. Extended structure can often be reconstructed by deep CLEANing when the zero-spacing flux density is between 100% and ~125% of the average visibility amplitude at the shortest spacings (run UVPLT to estimate this average for your data set). If your data do not meet this criterion, there may be no reliable way for you to image the extended structure of your source without adding further information to your observations (*e.g.*, by adding *uv* data from a more compact array, by Fourier transforming a suitably tapered and deconvolved single dish image of the VLA primary beam, or by using such an image as the default image for a maximum entropy deconvolution as in § 5.1.6).

If UVPLT shows a rapid increase in visibility amplitudes on the few shortest baselines in your data, but not to a value near the integrated flux density in your field, you may get better images of the *fine* structure in your source by excluding these short baselines with the UVRANGE parameter.

If your source has complicated fine structure and is at declinations south of +50°, there may be important visibility structure in the outer regions of the *uv* plane which the VLA samples sparsely at these declinations, even after "full synthesis" imaging. In such cases, CLEAN may give images of higher dynamic range if you are not too greedy for resolution at the imaging stage and use either UVTAPER or UVRANGE to down-weight or exclude poorly sampled outer segments of the *uv* plane.

3.5. Coriander banana nut bread

1. Blend together in a large bowl $1\frac{2}{3}$ cups sifted all-purpose flour, 3/4 cup sugar, 1 tablespoon baking powder, 1/2 teaspoon baking soda, 1/2 teaspoon salt, 2 teaspoons ground coriander.
2. Mix in $1\frac{1}{2}$ cups chopped unblanched almonds and set aside.
3. Melt 1/3 cup shortening and set aside to cool.
4. Mix until well blended 1 large well-beaten egg, 1/4 cup buttermilk, and 1 teaspoon vanilla extract.
5. Blend in $1\frac{1}{4}$ cups mashed ripe bananas and the shortening.
6. Make a well in center of dry ingredients and add banana mixture all at one time. Stir only enough to moisten dry ingredients.
7. Turn into greased 9 × 5 × 3-inch loaf pan and spread to corners.
8. Bake at 350° about 1 hour or until a wooden pick comes out clean when inserted in center of bread. Immediately remove from pan and set on rack to cool.

4.2.2. Speedy data file selection

Associated with each catalog entry is an identification number called the "catalog slot number". The CAT column at the left of the listing shows these catalog numbers. They can be used conveniently to initialize inputs for *AIPS* programs which read data sets from disk. Use:

> INDI *n1* ; GETN *ctn1* $\subset_R$ where *n1* selects the disk and *ctn1* is the catalog slot number.

The verb GETNAME (abbreviated through minimum match as GETN above) sets the parameters INNAME, INCLASS, INSEQ, and INTYPE used by many tasks and verbs. Some tasks require a second and even a third set of input image name parameters. For these, use:

> IN2D *n2* ; GET2N *ctn2* $\subset_R$ to set the second set.

> IN3D *n3* ; GET3N *ctn3* $\subset_R$ to set the third set.

4.2.3. Catalog entry status

Note that several catalog slots on disks 2 and 3 in our example catalog listing above do not have blank entries in the STAT column. This listing could have been taken while the user was running a CLEAN under MX on the sorted *uv* data set in slot 36, as this file is opened for READing. The CLEAN image file, ICLN in slot 28, and the scratch and UVWORK files are opened for WRITing. Procedures which attempt to read files which are opened for writing, or vice versa, will be rejected with appropriate error messages, so you should note any non-blank entries in the STAT column carefully. In some situations, mainly involving system crashes or abortion of tasks, files may be left in READ or WRIT status indefinitely. The file status may be reset in such cases by use of CLRSTAT $\subset_R$ following the appropriate INDISK and GETNAME. Note that a WRIT status on a file which is not, in fact, being used at present probably indicates that the file is corrupt and should be deleted using the verb ZAP following use of CLRSTAT.

Check that a data set you are about to use has a clear status before running any *AIPS* programs that will use it. (It is often possible to let two tasks read the same file at the same time, but this is not recommended.) Also note its ordinal number in the catalog, as this will be useful for GETN.

4.2.4. Other catalog listings

You can get a listing of the image header file on your terminal by following the GETNAME step above with

> IMHEAD $\subset_R$ for a detailed listing.

> QHEAD $\subset_R$ for a shorter listing.

QHEAD reports the position at the *numeric* center of the image while IMHEAD reports the position of the "reference pixel". The output of these verbs may also be printed via PRTMSG (at PRIORITY 2).

4.3. History files

Associated with each *uv* and image file is a "history" file giving important information about the processing done so far on the data in the file. Every *AIPS* task and verb, that alters the data or header, records the parameters used by it in this file. In general, each "card" in the file begins with the task or verb name and then gives one or more of the input parameter values actually used (*i.e.*, the defaults are filled in). All or parts of the file may be displayed on your terminal or printed on the line printer. For example, use:

> INDISK *n* ; GETN *ctn* C_R	to select the file to be displayed.
> PRTASK 'UVMAP' C_R	to examine only history information from UVMAP.
> DOCRT *m* C_R	to direct the display to your terminal of width *m* characters.
> PRTHI C_R	to print the UVMAP history.
> PRTASK ' ' ; DOCRT FALSE C_R	to select all history cards and direct the output to the line printer.
> PRTHI C_R	to print the full history file.

4.4. Saving and restoring inputs

All input parameters ("adverbs") are global throughout AIPS. When a parameter value is specified for any program, it will remain at that value in any other program which has an input of the same name until you change it. This global nature of the input parameters is useful in some cases, but can be inconvenient in others. Before running any task or verb check the input parameters carefully with:

> INP *name* C_R where *name* is the program name.

The parameters you have specified for *AIPS* at any given time may be saved on disk by typing:

> SAVE *aaaaa* C_R where *aaaaa* is any string of up to 12 characters.

> GET *aaaaa* C_R will restore these inputs at a later time.

These commands save or restore all the inputs and the rest of your AIPS "environment". For this reason, they must be the only commands on the input line. AIPS automatically saves the environment in an area called LASTEXIT whenever an EXIT or RESTART command is processed. A GET LASTEXIT is automatically executed whenever that user logs back in to the AIPS program. Thus, each user retains his own environment from one use of AIPS to the next. To obtain a null version of the adverb values and the rest of the environment, type:

> RESTORE 0 C_R

There are three temporary areas for saving the user's AIPS environment as well. To save your inputs temporarily, type:

> STORE *n* C_R	to save the inputs in area *n*, where $n = 1$, 2, or 3.
> RESTORE *n* C_R	to recover the inputs previously stored in area *n*.

The input parameter values associated with a task or a verb can be stored by the command:

> TPUT *name* C_R where *name* is the verb or task name.

and retrieved by the command:

> TGET *name* C_R

This avoids, to some extent, the global nature of the adverb values in AIPS. Whenever a task is executed (by the verb GO), TPUT is run automatically. TGET will therefore produce the set of input parameters used for the last execution of the task, unless you deliberately overwrite them with a TPUT of your own.

4.5. The verb GO

GO is shown in examples throughout this *COOKBOOK*. What is not emphasized elsewhere, and is often overlooked by users, is the fact that GO has inputs just like other verbs. You may specify which task you want either with an immediate argument, *i.e.*, GO UVSRT C_R, or with the parameter TASK, *i.e.*, TASK 'UVSRT' ; GO C_R. GO has two other parameters, DOWAIT and VERSION, as well. The former is passed to the

5.1.3. What to do while CLEAN is running

The *AIPS* monitor displays useful information about the progress of the CLEANing, and the TV itself displays the residual images after each major cycle (if DOTV was set to TRUE). You may change the image display parameters (*e.g.*, coloring, transfer function, zoom, etc.) using the display modification commands while the CLEAN is in progress to keep the residual image looking intelligible. When using the TV, APCLN and MX schedule 15-second pauses after each major cycle. The new residual image will be displayed on the TV monitor just before these pauses. Pressing trackball button D during the 15 seconds will end APCLN/MX in an orderly fashion at that point. Pressing any of buttons A, B, or C causes the execution to resume (as does waiting 15 seconds). The *AIPS* monitor prompts you for this action, which allows quasi-interactive CLEANing. Its use is encouraged when images are being CLEANed for the first time.

If you do not specify BMAJ and BMIN, a Gaussian CLEAN beam will be fitted to the central portion of the dirty beam. The results may not be desirable since the central portions of many dirty beams are not well represented by a single Gaussian and since the present fitting algorithm is not very elaborate. If you use the default, check that the CLEAN beam is a satisfactory representation of the dirty beam. Use task PRTIM on the central part of the dirty beam for this purpose.

When APCLN and MX terminate, a record of the CLEANed image is entered into your disk catalog and the image can then be displayed, contoured, etc. as described in §§ 6 and 7 below. The most important parameters of the CLEAN are logged in a "history" file that is cataloged as an extension of the CLEANed image file. This history file can be printed by:

> INDI *n* ; GETN *ctn* ⏎ — to select the CLEAN image, where *n* and *ctn* select its disk and catalog numbers.

> PRTHI ⏎

5.1.4. Restarting CLEANs

CLEANing can be restarted under control of the parameter BITER in the APCLN inputs or BCOMP in the MX inputs. BCOMP is an array of up to 16 values, one for each field imaged by MX. Set BITER / BCOMP equal to the number of components to be used from the previous CLEAN when CLEANing is restarted. When you are restarting a CLEAN, the OUTNAME and OUTSEQ parameters *must* be set explicitly to those of the previous CLEAN image since the CLEAN component list is associated with this image file (as its CC extension). When restarting a CLEAN with MX, you must also spcify IN2N, IN2CL and IN2SEQ explicitly to identify the *uv* workfile. An image can be re-convolved by setting NITER = BITER (in APCLN only) and specifying the desired (new) CLEAN beam.

Both APCLN and MX write over the CLEAN image file(s) as they proceed to clean deeper. Note that intermediate CLEAN images can be preserved if needed either by copying them with SUBIM or by writing them to tape with FITTP.

5.1.5. Manipulating CLEAN components

The list of CLEAN components associated with a CLEAN image can be printed by:

> INDI *n* ; GETN *ctn* ⏎ — to select the CLEAN image, where *n* and *ctn* select its disk and catalog numbers.

> BITER *n1* ; NITER *n2* ; XINC *n3* ⏎ — to list CLEAN components from *n1* to (*n1* + *n2* - 1) with increment *n3*.

> DOCRT *m* ⏎ — to route the list to your terminal of width *m* characters.

> DOCRT FALSE ⏎ — to route the list to the line printer.

> GO PRTCC ⏎ — to execute the task.

The list of CLEAN components associated with a CLEAN image can be compressed by:

> INDI *n* ; GETN *ctn* C_R	to select the CLEAN image, where *n* and *ctn* select its disk and catalog numbers.
> INVERS *m* ; OUTVER *m* C_R	to select the input version of the CLEAN components and to replace it with the compressed version.
> GO CCMRG C_R	to execute the task.

The algorithm used by APCLN and MX assigns to a component only a fraction (GAIN) of the current intensity at the location of that component. As a result, the list of components contains many which lie on the same pixels. CCMRG combines all components that lie on the same pixel which can reduce greatly the size of the list and, hence, the time required for model computations in tasks such as ASCAL and UVSUB.

The list of CLEAN components associated with a CLEAN image can be plotted in a variety of ways with TAPLT. To plot the sum of the components as a function of component number enter:

> APARM 0 ; BPARM 0 ; CPARM 0 C_R	To clear input parameters.
> APARM(6) 1; APARM(10) 1 C_R	To have the component flux summed and plotted on the *y* axis.
> GO TAPLT C_R	To create the plot file.
> GO QMSPL C_R	To display the plot file on the laser printer.

TAPLT offers many options for plotting functions of table columns against each other. Enter EXPLAIN TAPLT C_R for details. There should seldom be a need to edit CLEAN component files. However, task TAFLG allows editing based on comparison of a function of one or two table columns with another function of another one or two columns. One interesting use for TAFLG would be to delete all components below some cutoff before running CCMRG. Enter EXPLAIN TAFLG C_R for details.

5.1.6. Alternatives to CLEAN — VM and VTESS

The subject of image deconvolution has been widely studied and an enormous variety of methods proposed. Three of the alternatives to CLEAN have been implemented as *experimental* tasks in *AIPS*. These are algorithms due to Gerchberg and Saxton (APGS), van Cittert (APVC), and David Steer (STEER). Type EXPLAIN APGS C_R, EXPLAIN APVC C_R, or EXPLAIN STEER C_R for further information on these tasks and, if needed, call Tim Cornwell at the VLA before using them. The most widely used and successful alternative to CLEAN has been the Maximum Entropy Method ("MEM") implemented in *AIPS* by the tasks VM and VTESS. The former requires a dirty image and beam, such as those produced by UVMAP or by MX with NCOMP set to 0, each twice the (linear) size of the region of interest. It deconvolves to produce an all-positive image which has as compressed a range of pixel values as the data allow. The final VM image is usually smooth, but provides "super-resolution" in regions of good signal-to-noise ratio. VTESS uses a similar algorithm to deconvolve multiple images simultaneously. It is of particular interest for mosaicing interferometer images and for combining interferometer and single-dish images. Type EXPLAIN VTESS C_R for details. UTESS is a version of VTESS designed to deconvolve polarization images, for which a positivity constraint cannot be applied.

There are three main reasons for preferring MEM over the CLEAN methods:

1. MEM can be much faster for images which have real signal in many pixels. "Many" seems to be $\geq 512^2$ or so.
2. MEM produces smoother reconstructions of extended emission than does CLEAN. The latter often yields images with many beam-sized lumps in low brightness, apparently smooth regions.

3. MEM allows introduction of *a priori* information about the image in the form of a "default" image.

Contrary to the received wisdom, MEM can be used for quantitative work on regions of good (> 10) signal-to-noise ratio, if the dirty image is convolved with a CLEAN beam prior to deconvolution. Use the *AIPS* task CONVL for this purpose. Note that MEM cannot be used on images which are not intrinsically positive, such as images of the Stokes Q, U, and V parameters. MEM can produce very nice deconvolutions, but requires careful control. We recommend studying the output of EXPLAIN VM CR before using the task. Lecture 7 of the 1985 *NRAO–VLA Workshop on Synthesis Imaging* also provides relevant information.

5.2. Self-calibration

The task ASCAL is a tool for obtaining images with high dynamic range when there is sufficient signal to noise in the *uv* data. It does this by comparing the input *uv* data set with the predictions of a source model in order to compute a set of antenna-based amplitude and phase corrections which would bring the data into better agreement with model, as a function of time throughout the observations. For an n-element array there are $(n-1)/2$ times more observations than unknown antenna gains at any time, so the process is well-determined when n is reasonably large. The input model may be either a point source (parameters set by BPARM(1), BPARM(2), BPARM(3) and BPARM(4) in ASCAL) or a set of CLEAN components derived from a previous image (parameters set by IN2DI, IN2NAME, IN2CLASS, IN2SEQ, INVER and NITER).

Do not use ASCAL unless your data are of sufficiently high signal to noise to warrant improvement. Ask yourself whether your externally-calibrated CLEAN images contain unCLEANable artifacts well above the noise, and whether your source meets the criteria for self-calibration given by Tim Cornwell in Lecture 9 of the 1985 *NRAO–VLA Workshop on Synthesis Imaging.* Note that if your images are limited by receiver noise, self-calibration may produce erroneous results.

5.2.1. Programs to run

If you decide to use ASCAL, a good sequence of steps is:

1. Use UVPLT to make a plot file showing the shape of the visibility function as a function of baseline length in the externally-calibrated data set. *N.B.,* for large data sets, use XINC to reduce the number of points plotted to no more than a few thousand; otherwise it will take too long to make and plot the plot file.
2. Use TKPL and the hard-copy switch on your TEK terminal, or PRTPL or QMSPL, to get hard copy of the above plot file.
3. If you can use a point-source model for the first iteration, *i.e.*, if a range of baselines sufficient to calibrate all antennas is dominated by a single component (flat visibility function well above the noise), go to step 6 directly.
4. If you must use a more complicated model, obtain a CLEAN component representation of it by making and CLEANing an image of the externally-calibrated data using either (UVMAP + APCLN) or MX. Note that you may want to use a higher loop GAIN in a CLEAN to be used as an input model for an early iteration of self-calibration than you would for final deconvolution of a very extended structure.
5. Use PRTCC or TAPLT (as in the example above) to help you decide how many components from this CLEAN to include in the ASCAL model; when you have decided this,

determine the appropriate *uv*-limits for the gain solution by referring to the hard copy of the visibility function you made at step 2. CCMRG may be used to reduce the number of components in the model which will improve the speed of ASCAL. However, unless you were going to include all components, this operation alters the model which is used to compute the gains.

6. Use UVSRT to sort the data from "XY" (pre-imaging) order back to "TB" order (unless you preserved the TB sort for self-calibration purposes).

7. Plan your ASCAL inputs; see the inputs list and the section on "Choosing ASCAL inputs" that follows below (§ 5.2.3).

8. Use ASCAL to calculate the gain corrections, to produce a new TB-sorted data set, and to catalog the gain corrections as an extension to the new *uv* data file.

9. Use GNPLT on the output data file, followed by TKPL, to review the gain corrections before proceeding further. (You may want to take hard copy of this output for future reference also — use the TEK hard-copy switch, or run PRTPL or QMSPL on the plot file extension of the new *uv* data file that was written by ASCAL.) Also use PRTGA with DPARM(1) = 6 to print the mean and rms of the gains. In problem cases, PRTGA and GAPLT should be used to make more detailed displays of the gain file.

10. Ask whether the gain corrections were believable — were they smaller than at the previous iteration of ASCAL, if any? If not, is there a good reason why not — did you change input parameters such as the model, the type of solution, or the solution interval, in a way that may have forced larger corrections than before? Proceed only if you are reasonably sure you understand what is happening at this point — otherwise consult a local expert at your site.

11. If the corrections were believable, run UVSRT to produce a new version of the *uv* data in XY order for imaging. You should consider deleting one or more of the *uv* data sets from the previous iteration at this point to save disk space.

12. Go back to step 4 and repeat the whole process if your new CLEAN image is a significant improvement over the previous one (with comparable CLEANing parameters on both occasions). You may want to go back to step 1 and repeat the process from there if you have been using amplitude self-calibration and wish to check that your amplitude calibration has not drifted significantly. If the new CLEAN image differs little from the previous one, do not continue on with further iterations of steps 5 through 11 unless you feel you can make an informed change to the ASCAL input parameters at step 7. Task UVDIF may help you to decide whether there have been significant changes to your data due to the previous iteration of ASCAL.

5.2.2. Inputs to ASCAL

The following input parameters are used by ASCAL:

> INDI *n1* ; GETN *ctn1* $^{C}_{R}$	to select the 'TB' sorted *uv* data base.
> IN2D *n2* ; GET2N *ctn2* $^{C}_{R}$	to select the CLEAN image to use.
> NCOMP = *n* ; INVERS *m* $^{C}_{R}$	to cut off the model at the n^{th} CLEAN component in the m^{th} CC file associated with this image. If $n < 0$, then use up to ABS(n) components, but stop at the first negative component.
> DOCAT 1 $^{C}_{R}$	to catalog the gain file as an extension to the input *uv* data base. This is necessary to self-cal a spectral line data base and to display the gain solutions.

> APARM(1) = *x1* C_R	minimum baseline (in kilowavelengths) to be given full weight.
> APARM(2) = *x2* C_R	maximum baseline (in kilowavelengths) to be given full weight.
> APARM(3) = *x3* C_R	weight for baselines outside the APARM(1) → APARM(2) range.
> APARM(4) = *n4* C_R	reference antenna (choose a known good one for best results).
> APARM(7) = 1 C_R	to solve for amplitude and phase corrections.
> APARM(7) = 2 C_R	to solve for phase weighted by amplitude.
> APARM(7) = 3 C_R	to solve for phase ignoring amplitude.
> APARM(8) = 0 C_R	to solve for RR and LL separately.
> APARM(8) = 1 C_R	to average RR and LL correlators before solving.
> APARM(9) = *x9* C_R	to set the length of the solution interval (in minutes).
> APARM(10) = 0 C_R	to scale the gain corrections, when APARM(7) = 1, by the mean modulus of all gains to keep the flux density scale from drifting.
> APARM(10) = 1 C_R	to request no gain normalization.
> BPARM(1) = 0 C_R	to use CLEAN components as a model.
> BPARM(1) = 1 C_R	to use a single point source model instead.
> BPARM(2) = *y2* C_R	flux density of point source model (if BPARM(1) = 1).
> BPARM(3) = *y3* C_R	east offset of point source model in arcsec (if BPARM(1) = 1).
> BPARM(4) = *y4* C_R	north offset of point source model in arcsec (if BPARM(1) = 1).
> BPARM(7) = 0 C_R	to do no editing of data.
> BPARM(7) = 1 C_R	to flag "bad" data under control of BPARM(8) and BPARM(9).
> BPARM(8) = *y8* C_R	if BPARM(7) = 1, to flag full weight points that differ from the model by BPARM(8) times the rms residual.
> BPARM(9) = *y9* C_R	if BPARM(7) = 1, to calculate the antenna-IF running mean amplitude correction and flag an antenna-IF if that correction is more than BPARM(9) $\times \sigma$ away from the mean.

The parameter BPARM(5) is not used. Other parameters are defaulted sensibly — type EXPLAIN ASCAL C_R for further information.

5.2.3. Choosing ASCAL inputs

In many cases, only a few ASCAL input parameters need be set, other than those selecting the *uv* data and the input model. The key parameters are NCOMP, APARM(1), APARM(9) and, if you are interested in polarization, APARM(4).

It pays to be conservative when using NCOMP to select the number of CLEAN components which will comprise the input source model. Setting NCOMP too high will fossilize errors from the earlier calibrations in the model for the next one; after this, you are stuck with them as long as you continue feeding ASCAL a model with as much CLEANed flux density. When calibrating I images, do not set NCOMP in ASCAL so high that any negative CLEAN components are included. The first few iterations of ASCAL should be phase-only calibration, since the tropospheric and ionospheric phase errors will almost always dominate amplitude errors due to the atmosphere or to system drifts. In these first iterations, it is prudent to be even more conservative, setting NCOMP so that the total CLEANed flux included in the model is between 50% and 80% of that at which the first negative CLEAN component appeared. If your field is dominated by a few very strong, small-diameter regions, it is a good idea to make the first iterations of ASCAL work on CLEAN components from these regions alone, restricting the range of baselines suitably via APARM(1).

It is always important to restrict the high-weight domain of the ASCAL solution to the part of the *uv* plane that is described well by the model. In the early stages of self-calibration, the trustworthy part of your CLEAN model will almost always contain less flux density than was measured in the visibility function at the shorter baselines. Another way of putting this is that the large-scale structure of the source will be poorly represented by the model. You should set APARM(1) so that the total flux density in the input model (the sum of the CLEAN components to the CLEAN iteration selected by NCOMP) exceeds the peak visibility amplitude in your data at a baseline of APARM(1) kilowavelengths (read this off a plot file output from UVPLT).

APARM(9) sets the length of the time interval, in minutes, over which the model and the data are averaged when computing the gain corrections. This must be *short* enough that the gain corrections can track the fluctuations produced by the atmosphere over the longer baselines with sufficient accuracy. It must be *long* enough that the variances of the computed gain corrections (which depend on the signal-to-noise ratios in the data over the *uv* range in which the model is being compared with the data) are acceptably small. These constraints vary from source to source, frequency to frequency, and (because of the "weather") from day to day. They may not in fact be reconcilable for weak sources, especially in the wider VLA configurations and/or at the higher frequencies. In many combinations of these circumstances, you may not be able to self-calibrate your data. See Lecture 9 in the 1985 *NRAO–VLA Workshop on Synthesis Imaging* for details of how to make this assessment.

APARM(4) selects the number of the reference antenna for the gain solutions. For total intensity continuum calibration, the choice of this ASCAL input is unimportant. It is always best, however, to choose a reference antenna that was stable and present in all data throughout the run, if only because this prevents propagation of noise or glitches in the reference antenna through the gain solutions (and plots of them) for the other antennas. For polarization work it is important to select an antenna for which both polarizations were always present, otherwise any polarization calibration which preceded ASCAL may be seriously compromised. For spectral line work, where ASCAL's companion program ASCOR may be used for interpolation of the antenna/IF gains, it is also preferable to select a stable antenna with a full duty cycle as the reference.

Note that ASCAL should almost always be run with APARM(7) set to its default (selecting phase-only calibration) for the first iteration or two. Consider turning on amplitude calibration by setting APARM(7) = 1 only when either the phase adjustments being made are generally small (*i.e.*, the worst cases being a few tens of degrees) or the new reCLEANed image is clearly dominated by amplitude errors — which will give symmetric Y-shaped patterns around strong point sources. In general, you will want to use the default APARM(10) = 0 when using APARM(7) = 1, to restrict drifting of the flux-density scale during amplitude self-calibration.

Use of ASCAL to edit out bad data is a good idea during the later iterations at which the adjustments are becoming reasonably small (see above). The editing is turned off by default. To turn it on, set BPARM(7) = 1 and then ASCAL will flag those points used at full weight in the solution whose residuals are greater than BPARM(8) times the rms residual.

For further guidance and information on other ASCAL inputs, type EXPLAIN ASCAL $^{C}_{R}$ and/or read Lecture No. 9 in the 1985 *NRAO–VLA Workshop on Synthesis Imaging.*

5.3. Editing *uv* data

There are many programs which aid in the processing, display, and editing of *uv* data. A summary of this software is listed on your terminal by:

> HELP UVPR $\subset_R$

and is also in § 14 of the *COOKBOOK*. In particular, there are facilities in ASCAL, CLIP, and CORER to flag *uv* data in *AIPS* based on deviations from specified norms. There is also a task, UVFLG, which allows flagging and unflagging by antenna-IF or by correlator. Type HELP ASCAL $\subset_R$, HELP CLIP $\subset_R$, or HELP UVFLG $\subset_R$ for details. The task UVPLT plots various combinations of *uv* data — type HELP UVPLT $\subset_R$ for details. The task UVFND is also recommended for printing out suspicious portions of the data base. Note that CLIP examines the data correlator by correlator, but UVFND normally converts the data to Stokes components (using the same criteria as UVMAP) before checking that the amplitudes are in range. To examine the correlators individually, use STOKES 'CORR' in UVFND, or to flag the data based on their values after conversion to true Stokes use APARM(5) = 1 in CLIP.

CLIP is a very useful task for flagging data on the basis of its discrepancies from the visibility predicted by a set of CLEAN components. The task UVSUB can be used to subtract the Fourier transform of the CLEAN components from the visibility data. UVPLT enables the residuals to be displayed and CLIP can be used to flag abnormally high points. Cautious users may prefer to run UVFND to display such points before running the automatic CLIP task. Of course, after flagging, UVSUB should be run again to add the transform of the CLEAN components back into the data (using the input FACTOR = −1.0).

Another method for finding suspicious data is provided by the task FFT. Transform your image back into the *(u,v)* plane by running FFT and then display the results on the TV. Verbs like CURVALUE and IMPOS will help you find the *u* and *v* values for abnormally high cells. Then UVFND with OPCODE 'UVBX' will print the data surrounding these cells and UVFLG can be used to delete the bad data. This method is particularly effective on the residual images from CLEAN. (You can instruct APCLN and MX to put out a residual image by setting BMAJ less than 0.)

5.4. Banana poundcake

1. Mix in large bowl until blended:
   - $1\frac{1}{3}$ cups mashed bananas (4 medium)
   - 1 pkg. ($18\frac{1}{2}$ oz.) yellow cake mix
   - 1 pkg. ($3\frac{3}{4}$ oz.) instant vanilla pudding mix
   - $\frac{1}{3}$ cup salad oil
   - $\frac{1}{2}$ cup water
   - $\frac{1}{2}$ teaspoon cinnamon
   - $\frac{1}{2}$ teaspoon nutmeg
   - 4 eggs at room temperature
2. Beat at medium speed for 4 minutes.
3. Turn batter into greased and lightly floured 10-inch tube pan.
4. Bake in 350° oven for 1 hour or until cake tester inserted in cake comes out clean.
5. Cool in pan 10 minutes, then turn out onto rack and cool completely.
6. If desired, dust with confectioners sugar before serving.

Thanks to the United Fresh Fruit and Vegetable Association.

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6. READING AND DISPLAYING IMAGES

In many cases, images will be generated outside of *AIPS* (*e.g.*, on the VLA "Pipeline" imaging system or on non-NRAO optical or radio telescopes). Such images are transported to *AIPS* by writing them on magnetic tape using the standard FITS format. A listing of the software associated with tape handling, reproduced in § 14, can be viewed on your terminal with HELP TAPU $\subset_R$.

A listing of the software associated with TV displays can be found by listing the HELP files CURSOR, TVGEN, TVINTER, and TVCOLOR. These files are reproduced in § 14 of the *COOKBOOK*.

6.1. Loading an image from tape to disk

The task IMLOD is used to load images from tape to disk. It can read images in either the standard FITS format (which has one image per tape file) or in the CV-IBM image format (which may have more than one image per file). IMLOD assumes that the tape is positioned at the beginning of the image file. To move the tape forward or backward by a specified number of file marks, enter:

> INTAPE *n* $\subset_R$ to specify the tape drive labeled *n*.

> NFILES *nf* $\subset_R$ to specify the number of file marks to move the tape.

> AVFILE $\subset_R$ to move the tape.

If $nf > 0$, AVFILE will advance the tape the specified number of file marks. If $nf = 0$, the tape is moved backward to the beginning of the current file. If $nf < 0$, the tape is moved backwards to the abs(nf) previous file. In all cases, the tape is left at the beginning of a file. With a CV-IBM format tape, the verb AVMAP may also be needed. Type HELP AVMAP $\subset_R$ for details.

To make sure that the tape is positioned correctly, type:

> TPHEAD $\subset_R$

This verb will display on the terminal information about the image header at which the tape is positioned. The tape position is not altered. Once the tape has been positioned at the desired image, enter:

> OUTNAME '*your-chosen-name*' $\subset_R$ to specify the output disk file name in *AIPS*.

> NFILES 0 $\subset_R$ to have no further files skipped.

> GO IMLOD $\subset_R$ to run the task.

The string *your-chosen-name* can be any (< 12-character) title that you want to use as the image name within *AIPS*. To cross-reference your bookkeeping on multiple computers, it is often useful to specify the name of the image file and its extension from a previous machine (*e.g.*, the VLA "Pipeline"). *AIPS* provides equivalents of the DEC-10 extensions, which it calls the image "Class". IMLOD allows you to specify this 6-character parameter, OUTCLASS '*abcdef*' $\subset_R$, as well.

If OUTNAME is unspecified, it defaults to the "name" of the image read from the FITS header — either the name previously used in *AIPS* or the source name. If OUTCLASS is unspecified, it defaults to the Class previously used in *AIPS* or to a compound name (*e.g.*, IMAP, IBEM, QMAP, ICLN) which attempts to describe the image. You can change the *AIPS* image and class names later using RENAME (see § 4.2.1 of this *COOKBOOK*).

To load further images from the same tape in sequence:

> OUTNAME '*your-chosen-name*' $\subset_R$ to set a new name.

> GO IMLOD $\subset_R$ to run the task again.

To load *n* consecutive images from tape using the system default OUTNAME (the name from the FITS header):

> OUTNAME ↵ to specify that the system default is wanted.

> NCOUNT *n* ↵ to specify the number of consecutive images.

> GO IMLOD ↵ to run the program.

To dismount the tape when IMLOD is done:

> DISMOUNT ↵

6.2. Loading an image from disk to the TV display

To select an image file for display you must assign a number of input parameters to the values carried by the chosen file. If you know the disk and catalog numbers of the file from an MCAT listing, you can initialize all of the name parameters together with the instruction:

> INDI *n* ; GETN *ctn* ↵ where *n* and *ctn* select the required image.

Alternatively, you may specify the parameters individually.

The procedure TVALL incorporates most of the major display functions and will be described here. See §14 for a complete listing of available display verbs.

You should use one of the following commands to specify the initial transfer function converting your image file intensities to display pixel intensities (the slopes and intercepts of the display transfer functions can be modified later, but you have an initial choice between linear, logarithmic, and negative linear displays and a choice of the range of intensities loaded):

> FUNC 'LN' ↵ linear—this is the default.

> FUNC 'LG' ↵ logarithmic.

> FUNC 'NE' ↵ negative linear.

> FUNC 'NG' ↵ inverse logarithmic.

> PIXRA *x1*, *x2* ↵ to load only image intensities *x1* to *x2* in the units of the image. The default is to load the full range of intensities in the image.

Then

> TVALL ↵ to load the selected image.

The image should appear on the TV screen in black-and-white. If you don't get what you expected, hit button D to get out of TVALL and review your inputs to the loading routine with:

> INP TVALL ↵

If *no* image was loaded, check which image channel (TVCHAN) is specified by your inputs. There are several image channels available on most TV display systems (*e.g.*, 4 on NRAO's I^2S systems). Try:

> TVON ↵ to turn on channel TVCHAN.

If this still does not display your image, call the *AIPS* Manager for your site. If a labeled wedge does not appear on the display, you should also call your system Manager, as the display may need adjustment.

After your image has been displayed on the TV by TVALL, the trackball and its buttons (labeled A, B, C, and D) can be used to modify the display. Pressing button A will enable black-and-white and color-contour coding of the image intensities, successively. Adjustment of the cursor position on the TV (using the trackball) will vary the slope and intercept of the display transfer function. TVALL will superpose a calibrated horizontal wedge on the image. This should help you to choose the optimum cursor setting for the display.

The I^2S display can show images up to 512 by 512 in size. If the image is larger than about 424 pixels in the y-direction, portions of the labeling of the wedge (the units) will be omitted or superposed on top

of the wedge (the tick numeric values). Other television systems will have comparable, but not necessarily identical, numeric limits. A useful technique for displaying large images is to load only alternate pixels. The command:

> TXINC 2 ; TYINC 2 $\subset_R$ to load every other x and y pixel.

before TVALL would do this. Also use:

> TBLC = *n1, n2, n3, ...* $\subset_R$ bottom left pixel to load.

> TTRC = *m1, m2, n3, ...* $\subset_R$ top right pixel to load.

to limit the displayed field. A small image may be interpolated to fill the TV screen by setting TXINC = -1 ; TYINC = -1 $\subset_R$.

You will find that the TV display does not respond instantaneously to the changes in the transfer function requested by adjustment of the trackball, especially when the computer is being used heavily. It's best to turn the trackball slowly.

Pressing buttons B and C adjusts the zoom of the display: B to increase the magnification and C to decrease it. When these buttons are enabled, the cursor controls the position of the center of the zoomed field of view. Magnification factors of 1, 2, 4 and 8 are available on the I^2S.

Pressing button D will exit from the TVALL display modification routine, leaving your display parameters as they were when button D was pressed. Note that your terminal issues instructions when buttons are pressed, but that it is in the death-like grip of TVALL otherwise until you press button D to exit from it.

You may resume the image modification without reloading the image by typing:

> TVFIDDLE $\subset_R$

6.2.1. Alternative color coding

To obtain alternative color coding of the TV image type:

> TVPSEUDO $\subset_R$

and then follow the instructions listed on your terminal.

A rich zoo of color coding is available. First-time users should take a little time to experiment with the AIPS coloring options until they develop a feel for the effects of the trackball settings on the image appearance. The wedge displayed by TVALL will adjust to the alternative colorations selected with TVPSEUDO. Remember that the TV image does not respond instantaneously to trackball motions; move the ball slowly. Aficionados of certain Dutch color contouring schemes or of the old VLA *IMPS* "spectrum colors" will find these options available in TVPSEUDO using trackball button C.

6.2.2. Transfer functions

To fiddle the (black-and-white) transfer function of the display without reusing TVALL type:

> TVTRAN $\subset_R$

and then follow the instructions listed on the terminal.

When using TVTRAN, notice that the TV display does not respond instantaneously to modifications you make to the transfer function using the trackball. It's best to turn the trackball slowly. Also, the transfer function is displayed in the top right corner of the image only when the zoom is used at lowest magnification.

6.3. Reading out image data using the trackball/cursor

There are several facilities for reading out intensity and position information from displayed images using the TV cursor and the trackball:

> IMPOS ⏎	reads out the two coordinate values (*e.g.*, RA and Dec) from the cursor position when any trackball button is depressed.
> IMXY ; IMVAL ⏎	reads out the image intensity and the two coordinate values (*e.g.*, RA and Dec) from the cursor position and when any trackball button is depressed.
> CURV ⏎	continuously reads out pixel coordinates and the pixel intensity in user-recognizable units at the position selected by the TV cursor. The pixel parameters are displayed in the upper left corner of the image.
> TVSTAT ⏎	determines the mean, rms, and extrema of a set of polygonal regions in the image currently displayed on the TV. The regions are selected with the TV cursor. Type EXPLAIN TVSTAT ⏎ for details.
> TVWIN ⏎	reads pixel coordinates from the next two cursor positions at which a trackball button is depressed. The TV graphics shows the current shape and position of the window. Button A allows you to switch to (re)setting the other corner while the other buttons exit after both corners have been set. TVWIN uses the pixel coordinates to set up the bottom left (BLC) and top right (TRC) corners of an image subsection, *e.g.*, for input to the contouring programs CNTR and PCNTR, to the mean/rms calculator IMEAN, and to many other tasks.
> SETXWIN (*dx,dy*) ⏎	reads pixel coordinate of the center of a *dx*-pixel by *dy*-pixel window and sets the adverbs BLC and TRC.
> TVBOX ⏎	works like TVWIN above except that it is used to set up pixel coordinates to define CLEANing areas for the *AIPS* CLEAN routine (APCLN). The adverb NBOXES must be entered before the TVBOX command and is the number of rectangular CLEANing boxes to be set with the TV cursor, trackball, and buttons.
> REBOX ⏎	allows revision using the TV of the CLEANing areas set previously with TVBOX.
> TVSLICE ⏎	works like TVWIN above to set BLC and TRC. Instead of a rectangle however, the display shows a diagonal line which is useful for setting the ends of slices.

Additional interactive TV functions are available. Type HELP TVINTER ⏎ and HELP CURSOR ⏎ for additional information. These help files are also reproduced in § 14.

The plot files produced by PLROW are a simple, special case of those produced by PROFL. PROFL makes a plot file of a "wire-mesh" representation of an image plane complete with user-controlled viewing angles and correct perspective. Enter EXPLAIN PROFL C_R for a full description. Both of these tasks are especially useful where the signal-to-noise ratio is high.

Two other row-plotting tasks, PLCUB and XPLOT, are designed primarily for spectral-line and other data "cubes" (see § 9). PLCUB makes one or more plot files showing the intensities in each selected row. The row subplots are positioned in a matrix in the coordinates of the 2nd and 3rd axes of the cube. XPLOT, unlike the tasks described previously, does not create plot files. Instead, it is an interactive task which plots selected rows on the graphics terminal. Rows are selected not only with the usual inputs BLC, TRC, YINC, and ZINC, but also with inputs designed to limit the rows displayed to those with peak intensities falling within the flux range of interest.

7.7. Other displays

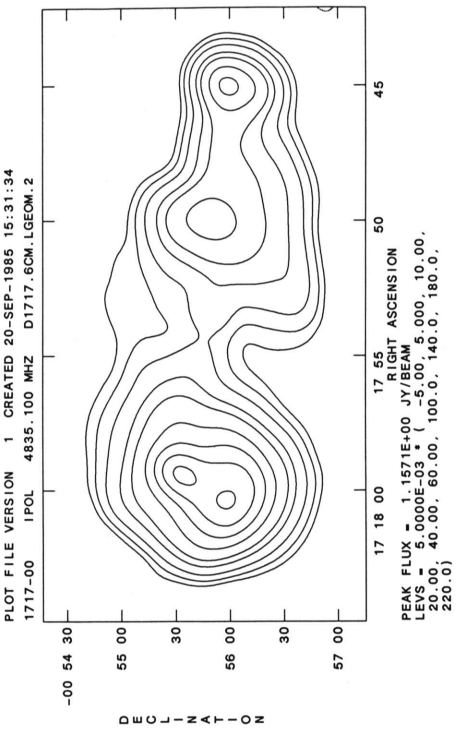
IMVIM allows a variety of image comparisons by plotting the pixel values of one image against the pixel values of another image. The special options include binning the values (and plotting symbols proportional to the number of samples in a bin) and shifting one of the images in x and/or y with respect to the other. The former reduces large scatter diagrams to more managable sets of numbers while the latter allows cross-correlation functions to be developed.

Plus signs may be drawn on the plots produced by CNTR, PCNTR, GREYS, and several other tasks. In these tasks, the parameter which controls the plotting is STFACTOR, a scale factor for the plus signs. When using this option, there must be a table of "star" positions associated with the image being plotted. To create one, enter EXPLAIN STARS C_R to learn the format of the input data file and the parameters for the task. See also Appendix Z or your local equivalent for instructions on editing RUN files.

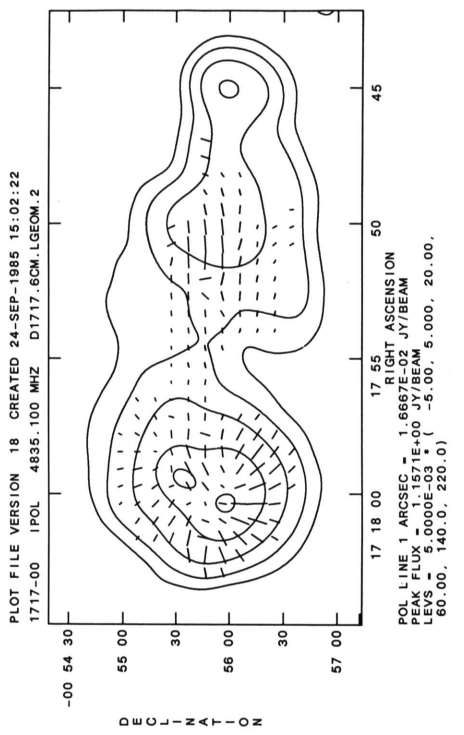
7.8. Dicomed copies of images

At the time of this edition of the *COOKBOOK*, there is no *AIPS*-standard method for recording images on the Dicomed film recorders. However, ad hoc methods exist both at the VLA site and in Charlottesville for doing this. At neither site are the image recorders directly connected to an *AIPS* computer by *AIPS* software. Thus the images must be transferred to a non-*AIPS* system. At the VLA site, Decnet is used for the transfer (see Appendix Z, § Z.1.9). In Charlottesville, a FITS tape is used (see Appendix Z, § Z.2.9).

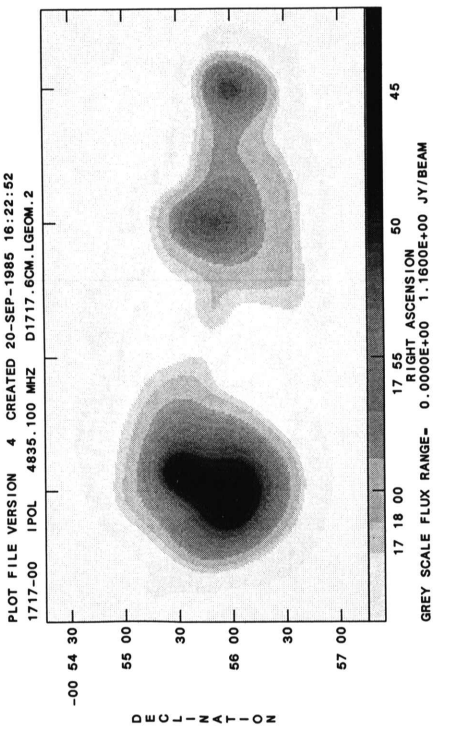
7.9. Sample displays



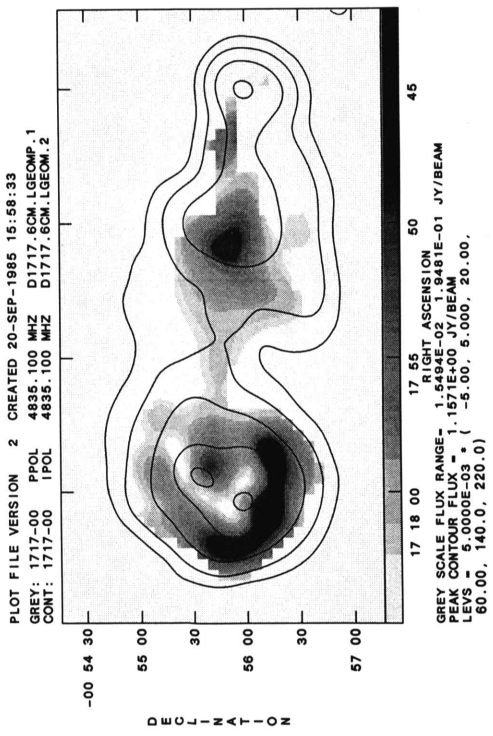
CNTR



PCNTR



GREYS



GREYS with contours

8.1.2. Other image combination options

COMB may also be used to add or subtract images, to rescale them, and to compute spectral indices, optical depths, *et al.* Type:

> HELP COMB ↵ to review the available options.

At the time of writing the options include:

'SUM '	Addition	$a_1 M_1 + a_2 M_2 + a_3$
'MEAN'	Average	$a_1 M_1 + a_2 M_2$ *except* M_j *where* M_i *blanked*
'MULT'	Multiplication	$a_1 M_1 M_2 + a_2$
'DIV '	Division	$a_1 M_1 / M_2 + a_2$
'SPIX'	Spectral Index	$a_1 \ln(M_1/M_2) \,/\, \ln(\nu_1/\nu_2) + a_2$
'OPTD'	Opacity	$a_1 \ln(a_3 M_1/M_2 + a_4) + a_2$
'POLI'	RMS sum	$a_1 \sqrt{M_1^2 + M_2^2} + a_2$
'POLC'	RMS sum	$a_1 C(M_1, M_2) \sqrt{M_1^2 + M_2^2} + a_2$ where C is a noise-based correction
'POLA'	Arctangent	$a_1 \tan^{-1}(M_2/M_1) + a_2$
'REAL'	Real part	$a_1 M_1 \cos(a_2 M_2) + a_3$
'IMAG'	Imaginary part	$a_1 M_1 \sin(a_2 M_2) + a_3$
'RM '	Rotation measure	$a_1 RM(M_1, M_2) + a_2$
'CLIP'	Clipping	M_1 *except blanked where* $a_1 > M_2 > a_2$ *or* $a_2 > a_1 > M_2$ *or* $M_2 > a_2 > a_1$

where the a_i are user-adjustable parameters and M_1 and M_2 are the images selected by INNAME, *et al.* and by IN2NAME, *et al.*, respectively. COMB may also be instructed to write an image of the estimated noise in the combination rather than the direct result of the combination.

8.1.3. Considerations in image combination

For some applications of COMB, undefined pixel values may occur. For example, if the spectral index is being calculated and the intensity level on either image is negative, the index is undefined. In this case, the pixel value is given a number which is interpreted as undefined or "blanked." Blanking also arises naturally in operations of division, opacity, polarization angle, and clipping and, of course, the input images may themselves be blanked. In addition, the output image can be blanked (set BPARM(4) = 0) whenever either M_1 <APARM(9) or M_2 <APARM(10). Alternatively, blanking may be done on the basis of the estimated noise (set BPARM(4) = 1) or signal-to-noise ratio (set BPARM(4) = 2) in the combination. See HELP COMB ↵ for a description of these options and certain limitations in their use. With APARM(8) = 1 ↵, the user may specify that all undefined pixels are to be assigned an apparently valid value of zero, rather than the "magic" undefined-pixel value.

When combining two or more images, COMB, PCNTR, *et al.* must decide which pixels in the 2nd image go with which pixels in the 1st image. The user input parameter DOALIGN controls this process. A value of 1 requires the two headers to be correct and sufficiently similar that an alignment by coordinate value is possible. A value of −2 tells the programs to ignore the headers and align by pixel number. Enter HELP DOALIGN ↵ for details and intermediate options. In some cases, the images may have been created on different grids which are correctly described in the headers. The observations, for example, could have differed in the phase reference position or projective geometry used or the imaging could have been done with different axis increments. Such images should *not* be combined directly. Instead, the header of one should be used as a template for re-gridding the other. Task HGEOM provides this service with up to 7th-order polynomial interpolation. See § 8.4.1 and type EXPLAIN HGEOM ↵ for more information.

8.2. Image statistics and flux integration (IMEAN, IMSTAT, TVSTAT, BLSUM)

The task IMEAN is used to determine the statistics of the image over a specified rectangular area. It derives the minimum and maximum value and location, the rms, the average value and, if the image has been CLEANed, an approximate flux density within the area. A typical run might be:

> TASK 'IMEAN' ; INP C_R	to list the input parameters.
> INDI *n* ; GETN *ctn* C_R	where *n* and *ctn* select the disk and catalog numbers of the relevant image file.
> BLC *n1, n2* ; TRC *m1, m2* C_R	to set the window from (*n1,n2*) to (*m1,m2*) — or use TVWIN with the cursor on the TV.
> DOHIST TRUE C_R	to make a plot file of the pixel histogram.
> PIXRANGE *x1, x2* C_R	to set the range of the histogram from *x1* to *x2*.
> NBOXES *n* C_R	to set the number of boxes in the histogram.
> GO C_R	to run the task.

The statistics will appear on the *AIPS* monitor. For a hard copy type:

> PRTASK 'IMEAN' ; PRTMSG C_R	with PRIO ≤ 5.

To see the histogram of the intensities, an example of which is shown in § 7.9, type one of:

> GO TKPL C_R	to display histogram on the Tektronix.
> GO PRTPL C_R	to display histogram on the printer/plotter.
> GO QMSPL C_R	to display histogram on the laser printer.

The verbs TVSTAT and IMSTAT provide similar functions to IMEAN without the histogram option. Both return their results as AIPS parameters PIXAVG (mean), PIXSTD (rms), PIXVAL (maximum), PIXXY (pixel position of the maximum), PIX2VAL (minimum), PIX2XY (pixel position of the minimum). IMSTAT uses the same file name, BLC, and TRC parameters as IMEAN. TVSTAT, however, works on the image plane currently displayed on the TV and is not limited to a single rectangular area. Instead, the TV cursor is used to mark one or more polygonal regions over which the function is to be performed. Type EXPLAIN TVSTAT C_R for a description of its operation.

The interactive task BLSUM employs a method similar to that of TVSTAT. The TV cursor is used to mark a region of interest in a "blotch" image. Then BLSUM finds the flux in that region not only in the blotch image but also in each plane (separately) of a second image. More than one region of interest may be done in any given execution of the task. In spectral-line problems, the blotch image is often the continuum or the line sum while the second image is the full "cube" (see § 9.4) in almost any transposition. However, numerous continuum applications also exist (*e.g.*, polarization, comparison across frequency). Type EXPLAIN BLSUM C_R for a description of the operation.

8.3. Fitting of images

There are three programs which estimate the position and intensity of a component on a two-dimensional image. The simple and fast method is the verb MAXFIT. This fits a two-dimensional parabola to the maximum within a few pixels of an image position, and gives the peak and its position. The tasks IMFIT and JMFIT are similar and fit an image subsection with up to four Gaussian components with error estimates. In one dimension, the task SLFIT fits Gaussian components to slice data and the task XGAUS fits Gaussian components to each row of an image.

> TVMOVIE ↵ to load the images and start the movie.

Now follow the instructions on your screen on how to change the transfer function, change speed, etc. To restart the movie, type:

> REMOVIE ↵

Once you are done, type:

> OFFZOOM ↵ to show one of the memory planes with a number (16 in our example) of images.

To look at a different TV channel with the remaining images, type:

> TVON 2 ; TVOFF 1 ↵ depending on which one you were looking at.

Be aware that the order of planes is reversed in even numbered planes.

In general, if you want to use any of the other display programs, you must specify which plane in the cube you want to see. So, *e.g.*, if you want to do TVALL on channel 16, which is on pixel 16 at the third axis, you type:

> TBLC 0 0 16 ; TVALL ↵

Note that adverbs TBLC and TTRC are used for TV displays while BLC and TRC are used for tasks.

9.7. Subtracting the continuum

The continuum can be subtracted in a variety of ways. XBASL may offer the best method, but the standard is still to combine a group of line-free dirty channel images and subtract that from the cube. Let us assume that there is no line emission in channels 1 through 10 and 21 through 31. We first make two images of channels 1–10 and of 21–31 with SUMIM. Type:

> TASK 'SUMIM' ; INP ↵ to review the inputs.

> INNA 'N315' ; INCL 'IMAP' ↵ to select the images.

> INSE 1 ; IN2SE 10 ; IN3SE 1 ↵ to select the first and last image and the step in the loop.

> OUTN 'N315C1,10' ↵ to select an output file name.

> FACTOR 0 ↵ to use the default, which takes the average of the images.

> GO ↵ to run SUMIM.

To do the other set of images:

> INSE 21 ; IN2SE 31 ; IN3SE 1 ↵

> OUTNAME 'N315C2131' ↵

> GO ↵

With COMB, these images can be averaged by typing:

> TASK 'COMB' ; INP ↵ to review the inputs.

> INNA 'N315C1,10' ; INCL 'SUMIM' ↵ to select the first image.

> INSE 1 ↵

> IN2NA 'N315C2131' ; IN2CL 'SUMIM' ↵ to select the second image.

> IN2SE 1 ↵

> OPCODE 'SUM' ↵ to take APARM(1) × MAP_1 + APARM(2) × MAP_2.

> APARM 0.5, 0.5, 0 ↵ to average the images.

> OUTN 'N315CON' C_R	to select an output file name.
> GO C_R	to run COMB.

and then subtracted from the cube by entering:

> TASK 'COMB' ; INP C_R	to review the inputs.
> INNA 'N315' ; INCL 'LMVCUB' C_R	to select the cube.
> INSE 1 C_R	
> IN2NA 'N315CON' ; IN2CL 'COMB' C_R	to select the continuum.
> IN2SE 1 C_R	
> OUTN 'N315L-C' ; OUTCL 'LMVCUB' C_R	to give it an output name.
> OPCODE 'SUM' C_R	
> APARM 1, -1 C_R	to take $MAP_1 - MAP_2$.
> GO C_R	to run COMB.

In general, this will work fine; however, in some cases, *e.g.*, if you have used very broad bandwidth or if you have a very strong continuum source, you might want to do the subtraction in the *uv*-plane. Use SUMIM and COMB to combine the beams of the line-free channel images. Use APCLN to CLEAN the mean continuum image with the mean continuum beam. Use UVSUB to subtract these clean components from all the *uv* data sets. Remake the channel images, form a mean residual continuum image, and subtract it from the channel images.

9.8. Decomposing the cube into separate images

Most programs work on cubes, including APCLN. However, you may find it convenient, on occasion, to work with single-channel images. To separate the images from the cube, use task SUBIM; type:

> TASK 'SUBIM' ; INP C_R	to review the inputs.
> INNA 'N315L-C' ; INCL 'LMVCUB' ; INSE 1 C_R	to select the cube.
> OUTN 'N315L-C' ; OUTCL 'IMAP' C_R	to give it an output name and class.
> BLC 0 ; TRC 0 C_R	to select full planes.

> FOR J=10:20 ; BLC(3)=J ; TRC(3)=J ; PRIN J ; OUTSE J ; GO ; WAIT ; END

This runs the program 11 times, taking planes 10 to 20 and creating separate images for them. To put the images back into the cube after they have been modified, see § 9.4.

9.9. Transposing the cube

The task TRANS will transpose the cube. Typical inputs are:

> TASK 'TRANS' ; INP C_R	to review the inputs.
> INCLASS 'LMVCUB' C_R	to select the untransposed cube.
> TRANSC '312' C_R	to make new axis order 3,1,2 in terms of the old axis order (RA, DEC, VEL becomes VEL, RA, DEC).
> OUTCL 'VLMCUB' C_R	to give it an outclass reflecting the axis order.
> BLC 0 ; TRC 0 C_R	to transpose the whole cube.
> GO C_R	to run the program.

AIPS Order Form

1. Name and address of Contact Person: _____

   ☐ Address label on back is correct _____

   _____

   _____

   _____

2. ☐ new order ☐ reorder (*N.B.*: If you have received a plastic mailing container from us, we insist that you use it for a reorder.)

   Version of *AIPS* currently running: _____

3. *AIPS* version desired: . . . . . ☐ 15-Jul-1986
   (Shipped ≈ 1 week after release date) ☐ 15-Oct-1986

4. Tape type desired:
   (*AIPS*, VMS only) . . . . . ☐ VAX/VMS BACKUP
   (*AIPS*, UNIX only) . . . . . ☐ UNIX tar
   Version of UNIX system in use: _____
   N.B. we need to know this. *e.g.*, bsd4.*x*, Sys III, Sys V, V7, *etc.*
   (*AIPS*, neither UNIX nor VMS) . . . . ☐ FITS compressed text format
   (DDT test package: ≥ 15JUL86) . . . . . ☐ RUN files, FITS binary data

5. Tape density desired: . . . . . ☐ 800 bpi ☐ 1600 bpi ☐ 6250 bpi

6. There are gripes on (returned) tape: . . . ☐ Yes ☐ No

7. Printed documents requested: . . . . . ☐ 15OCT85 *COOKBOOK*
   ☐ 15JUL85 *GOING AIPS* Vol 1
   ☐ 15JUL85 *GOING AIPS* Vol 2
   ☐ *AIPS* Memo No. 45
   ☐ *AIPS* Memo No. 46

Send order form to: *AIPS* Group
National Radio Astronomy Observatory
Edgemont Road
Charlottesville, VA 22903-2475 USA

July 15, 1986

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A I P S L E T T E R

Volume VI Number 4: October 15, 1986

National Radio Astronomy Observatory

A newsletter for users of the
*A*stronomical *I*mage *P*rocessing *S*ystem

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or ...!seismo!nrao1!aipsmail

TEXset by EWG

Attention Programmers

There are currently openings for programmers in Socorro, NM, to develop application software for the VLA. The general areas to be addressed are observation scheduling, observation preparation, calibration, and image processing. The programming effort will not necessarily be directly connected to the *AIPS* system, but, like *AIPS*, will be mostly in Fortran. The code will be developed on a Vax or a mini-supercomputer, so some familiarity with VMS or UNIX would be an advantage. We are looking for people at all levels, from bright young students to experienced interferometrists. So, if you are interested, please call Gareth Hunt (505)-772-4213; if you know of anyone else (a colleague or student) who would be interested, have him or her call Gareth.

Supercomputer Workshop in January

The NRAO is planning to hold a two-day meeting in Socorro in January 1987, with preliminary session titles "*AIPS* on Supercomputers" and "Displays and Output Equipment [for supercomputers]". The tentative dates are January 20 and 21. Persons who might want to participate can contact Bob Burns at (804) 296-0229 for further information. This workshop was originally scheduled for November 19-21, 1986.

The 1986 *AIPS* Site Survey

NRAO will perform its annual *AIPS* Site Survey during the current quarter. The survey will be mailed to all contact persons and the forms will contain all of the data we already have for your site. We urge all contact persons to correct and complete the forms and return them to us promptly. We will be asking on the forms for explicit permission to distribute the resulting Site Survey Directory to all *AIPS* users, rather than just to the contibuting sites, as our legal department required of us this year. The results are expected to be available for the 15APR87 *AIPSLETTER*.

Summary of Changes: 15 July 1986 — 15 October 1986

These changes are listed in detail in the CHANGE.DOC files reproduced later in the *AIPSLETTER*. During the quarter, we have made a variety of changes — there are 316 entries in the files listed below! Of particular interest are the beginnings of a calibration system and the additions to the television display support. The latter appear in the 15OCT86 release in order to get them to owners of the newly supported TV display devices (I^2S's IVAS and Lexidata).

Changes of Interest to Users: 15OCT86 as NEW

There were a number of changes made to the television code to support IVAS displays and to be more general in our model of TV display devices. In the current release, the most notable changes to the user are an improved set of colors for TVPSEUDO and the use of button C to decrement zoom in TVZOOM and TVROAM (see #s 3439 and 3464). Several help files and the *COOKBOOK* referred to VMS procedures for invoking GRIPR, BATER, AJAX, and other useful stand-alone utilities Unfortunately, since 15APR86, these procedures did not exist. They do in this release and are invoked as VMS symbols, without the @ sign (see #s 3323, 3325, 3328). Some tasks have too many input parameters for the old format of the TPUT/TGET files. This was corrected, but all old TS files must be deleted. VM and VTESS have been repaired (see #s 3308 and 3315); the 15JUL86 release of these tasks did work. Two corrections were made which may reduce the number of directory entries with no header file (see #s 3303 and 3319).

Changes of Interest to Users: 15JAN87 as TST

An *AIPS* calibration package is coming and this release contains a considerable number of changes and additions to support it. The package will be in α/β testing by black-belt interferometrists over the next few months and is still changing too rapidly to be documented extensively here. Bill has promised a substantial article on the subject for the next issue of the *AIPSLETTER*. The 15JAN87 release contains a format revision for *AIPS* tables files, including a conversion of antennas files into the new tables form. Users (or *AIPS* managers) must run UPDAT on user data files to convert them to the new format. New tasks in this area are TACOP to copy tables files from one catalog entry to another (# 3428), SPLIT to detach the data for a source from a multi-source *uv* data file including the application of flagging and calibration, CALIB to determine delay, rate, amplitude and phase solutions for specified sources in either a single source or multi-source *uv* data file (# 3521), TABED to do simple editing on tables files (# 3522), WTMOD to modify the *uv*-data weights (# 3523), USUBA to modify the subarray assignment of a subset of a *uv* data set (# 3524), ANCAL to apply Cal Tech format calibration to *AIPS* calibration tables (# 3527), and VLBIN to replace VBLIN to read NRAO DECODE tapes from the VLBI correlator into *AIPS* multi-source data files (# 3537).

To support development of the calibration package, the area of tape I/O was also revised. All tape tasks now go through a single, powerful routine which allows I/O both from real tapes and from pseudo-tape disk files. In addition, a new FITS extension format has been defined to write tables which can include, as a single column, an array of data, and to write these tables in a binary format. This should speed up the handling of clean component files. However, this is a new format that cannot be read by versions of *AIPS* prior to the 15JAN87 release and which has no international support as yet. See #s 3356, 3409, 3411, and 3412.

Other new functions added to 15JAN87 include the experimental deconvolution task SDCLN which does a slightly modified Clark CLEAN followed by an enhanced version of the Steer, Dewdney, and Ito algorithm (# 3507, *Astron. Astrophysics*, 1984, **137**, 159). In addition, the experimental imaging task BSMAP was corrected, refined and streamlined (# 3341) and the algorithm in VM and VTESS was improved (# 3500). There are new verbs to set and reset the output name adverbs (GETONAME and CLRONAME, # 3505) and a new adverb OBJECT to replace SOURCE in order to avoid minimum match problems (# 3505). There are also

new TV verbs: TVANOT to add annotation to graphics or grey (multi-bit) planes, TVSPLIT to perform image comparison using split screens, and TVCUBE to do TVMOVIE with the subimages displayed in a different order (# 3505). The order of the subimages in TVMOVIE was also revised. The order chosen by TVCUBE is from left to right, top to bottom, and is thus good for viewing unzoomed but is not so good for movies. The order chosen by TVMOVIE is rather different, but should produce smoother transitions between frames in the movie mode.

There were some minor revisions as well. *AIPS* batch no longer prints the messages automatically. You must include a PRTMSG in the batch job or do one later in another interactive or batch session (before the TIMDEST limit gets the messages). QMSPL has two new adverbs to support a non-linear, grey-scale transfer function (# 3448). LGEOM, HGEOM and PGEOM now tell the truth about blanked pixels in the output image and their help files have been improved on this subject (#s 3513, 3514, 3516). Users have had trouble with low-resolution source models being applied to higher-resolution *uv* data sets. Some messages have been added to MX to warn the users and some error handling was added to UVSUB to prevent disasters (#s 3544 and 3545).

Changes of Interest to Programmers: 15OCT86 as NEW

The main changes of interest to programmers occurred in the area of Y routines. Two new libraries have appeared, one for IVAS and one for Lexidata displays (see #s 3461, 3462, 3553). The former uses libraries provided by I^2S, but is otherwise a standard *AIPS* TV library. The latter consists of Y routines written in C sent to us by Bret Goodrich at Haystack. We are unable to support these ourselves as we cannot even compile C routines on our VAX. They have not been revised to handle the changes described below and are included for the benefit of sites who will find them useful "as is." Any questions about them should be addressed to Colin Lonsdale at Haystack.

The IVAS pointed out several problems with our TV interface. In particular, buffers for LUTs must be larger, zooms can go in simple steps rather than just power-of-two steps, and the peak intensities out of LUTs and into, and out of, OFMs cannot be predicted from the peak intensity into the LUTs. These were resolved by raising the buffers to 2048, allowing MXZOOM to mean simple steps when it is negative, and adding three new parameters (LUTOUT, OFMINP and OFMOUT) (see #S 3438–3439). A new Y routine, YFILL, was added, but the "generic" version will work for most supported TVs (see # 3465). The zoom and scroll routines for most TV devices needed work and, in particular, the "generic" YCURSE turned out not to be useful for anything but I^2S Model 70s (see #s 3439, 3470). The support for two TVs, particularly two TVs of different type, was also found to be lacking and was corrected (see # 3434).

The installation procedures for VMS were cleaned up a bit (# 3317) and will include the IVAS load modules only for 6250 bpi tapes (# 3336). More subdirectories were created (#s 3328, 3335) and some old procedures were resurrected (#s 3323, 3325, 3328). Our full experience under UNIX has been moved onto the transport tapes, including a highly generic set of Z routines plus special ones for Convex, Alliant, and SUN (#s 3558–3614).

Programmers interested in the problems of transportability should read #s 3306, 3329, 3380, 3381, and 3441 and should contemplate the wisdom of writing a subroutine library in C to call, and be called by, libraries written in, or for, Fortran.

Changes of Interest to Programmers: 15JAN87 as TST

The CHANGE.DOC file for this release makes hard reading since it is mostly concerned with the "leaves" of a calibration "forest" for which the map or overview is still forthcoming. Bill has promised an article for the next *AIPSLETTER* when the details should have settled down somewhat. In the meantime, there are things to note. The basic format of *AIPS* table files has been revised to allow arrays as the values of columns (#s

3342, 3343), antenna files are now in the (new) *AIPS* tables format (#s 3347 and 3348), and the file format code has been changed to B with a new release of UPDAT to support the conversion (#s 3385, 3386). Tapes are now handled by subroutine TAPIO (# 3356) which allows virtual-tape disk files as well as real tapes. There is a new FITS extension type for the new tables which allows writing the data in binary, including IEEE floating point (see the user section above). New Z routines for this have been written (#s 3365, 3583, 3596, 3597) and the basic tape tasks already support it. A variety of other tables subroutines have also been written or revised, including revisions to the calling sequences. They include ISTAB which determines whether a file is a standard table file (# 3352), GETKEY and TABHDR which deal with table keywords among other things (# 3361) and many others dealing with the myriad tables used for calibration. There is an interesting PARAMETER include file to allow the *uv*-data programs flexibility in the number of antennas and the like (# 3463). Finally, compressing CC files is now available as a subroutine called CCMERG (#s 3447, 3471).

AIPS Users' Group Column

This column is intended to provide a means whereby non-NRAO *AIPS* users can advertise support for nonstandard *AIPS* hardware and software in use at their sites. It could also provide a forum for discussion of *AIPS* problems, solutions and development that is more public than the "Gripes" or NRAO's *AIPS* Priorities Meetings. So far this column has been gleaned mainly from information provided by the sites at the time of the last *AIPS* Site Survey – but it should become "your" column, not "ours," if it is to serve its full purpose. Please send any items for inclusion in this segment of the 15JAN87 *AIPSLETTER* to the *AIPS* Users' Group by 15 January 1987. Send your contribution to the postal address, or to aipsmail at any of the computer mail addresses, listed on the front page of this *AIPSLETTER*.

What's out there – CPU's and operating systems ?

We list below the non-VAX CPU's and non-VMS operating systems reported to us as being actively in use at *AIPS* sites (though not necessarily with the current versions of *AIPS*). We expect that this list is now somewhat incomplete, as it is based on data that are up to 9 months old. It does, however, illustrate the emerging diversity of machines at *AIPS* sites. The various flavors of UNIX are not distinguished here, as we do not have sufficient detail to do this for all sites.

Apollo DN660 (UNIX)	Department of Physics, M.I.T.
Convex C-1 (UNIX)	NRAO (Charlottesville)
CRAY XMP (COS)	Naval Research Laboratory
Charles River CRDSM68K (UNIX)	Department of Astronomy, Penn. State U.
Data General MV10000 (AOS/VS)	Steward Observatory
Fujitsu M380 (MSP)	Nobeyama Radio Observatory
Fujitsu VP50 (VSP)	Nobeyama Radio Observatory
Jupiter (UNIX)	Jet Propulsion Laboratory
MassComp MC500 (UNIX)	Departement de Physique, U. Laval
MICROVAX (VMS)	Royal Greenwich Observatory
	Dept. of Astronomy, U. Illinois
	Div. of Planetary Sciences, Cal Tech
Nord ND570CXD (SINTRANIII)	Onsala Space Observatory
SUN/3 (UNIX)	Princeton University
VAX (UNIX)	Department of Astronomy, U. Texas
	Radio Physics Research Department, Bell Laboratories

Non-radio use of *AIPS*

Many *AIPS* sites have reported some use of *AIPS* for processing non-radio images, and a few are devoted exclusively to non-radio processing. At the time of the 1985 *AIPS* Site Survey, we asked respondents to classify the wavelength bands of any non-radio *AIPS* use at their site, and obtained the following responses:

Infrared	Astronomy Program, S.U.N.Y.
	Columbia Astrophysics Laboratory
	CSIRO Division of Radiophysics
	Department of Astronomy, Cal Tech
	Department of Astronomy, U. Minnesota
	Department of Astronomy, U. Texas
	Institut d'Astrophysique, Paris
	NASA/Goddard Space Flight Center
	Naval Research Laboratory
	NRAO (Charlottesville)
	SASC Technologies
	Space Telescope Science Institute
	Steward Observatory
Optical	Astronomy Department, U. Washington
	Astronomy Program, S.U.N.Y.
	Columbia Astrophysics Laboratory
	Department of Astronomy, U. Illinois
	Department of Astronomy, U. Minnesota
	Department of Astronomy, U. Texas
	Department of Astronomy, U. of Toronto
	Department of Astrophysics, U. Colorado
	Department of Physics, Arizona State U.
	Department of Physics, M.I.T.
	Departement de Physique, U. Laval
	Department of Physics & Astronomy, L.S.U.
	European Southern Observatory
	Instituto di Radiastronomia, Bologna
	IRAM, U. Grenoble
	ISC, U. Wisconsin
	NASA/Goddard Space Flight Center
	National Optical Astronomy Obs.
	Netherlands Foundation for Radio Astronomy
	NRAO (Charlottesville)
	Physics Department, Ohio State U.
	Steward Observatory
Ultraviolet	Department of Astrophysics, U. Colorado
	Department of Physics, Arizona State U.
	NASA/Goddard Space Flight Center
	Naval Research Laboratory
X-ray	Columbia Astrophysics Laboratory
	Department of Astronomy, Penn. State U.
	Department of Astronomy, U. of Toronto
	NASA/Goddard Space Flight Center
	Naval Research Laboratory

X-ray (continued) . . . . . NRAO (Charlottesville)
Smithsonian Astophysical Observatory
Space Telescope Science Institute
"Other" . . . . . ITT
Simulations . . . . . Jet Propulsion Laboratory

Electronic Mail Addresses

We have changed the recommended *AIPS*-mail target from "nancy" to the generic "aipsmail". Early in October, all NRAO account names were revised to have a standard form, which is the first initial plus the last name, truncated to eight characters. Thus, traffic directed to `aipsmail` now forwards to `nwiener`, not `nancy`. Nancy handles kit orders and gripes herself and forwards other mail to appropriate staff members, such as `egreisen`, `bcotton`, `khilldru`, `dwells`, `bburns`, `tcornwel`, `abridle`, etc. (Note: any such NRAO account name can now be substituted for "aipsmail" in the address strings given in the masthead, if you wish to contact the staff person directly.)

Early in October, NRAO became a full BITNET/EARN node, with the name "nrao". The address given in the masthead for ARPA/Internet (`aipsmail%cvax@hamlet.caltech.edu`) utilizes the gateway service which Caltech has graciously provided for NRAO during the past 18 months. We expect that NRAO will become a full Internet node during the current quarter. Three Charlottesville machines will be visible initially: "`nrao.arpa`" (a SUN-3/52 gateway machine), "`nrao-nrao1.arpa`" (the Convex C-1), and "`nrao-cvax.arpa`" (the VMS VAX-780). By the end of the current quarter, it should be possible to direct *AIPS*-related mail to "`aipsmail@nrao.arpa`". NRAO's connections to NASA's SPAN (Space Physics Analysis Network) are expected to undergo further revisions during the current quarter; we'll tell you more about this topic in the next *AIPSLETTER*.

Bulletin Board: on Bulletin Boards

Greg Lindahl (Brandeis University) writes (by papermail) on 11 August 1986:

"If you don't want the *AIPS* Bulletin Board based in Charlottesville, why don't you put it on a national service like CompuServe? These services give you a wide variety of nooks and crannies to leave messages, and since you can search for keywords in a subject we can just set up shop in some corner. This would allow us to leave messages of general interest: *i.e.*, 'Help! I had such-and-such a problem when installing `15JUL86` *AIPS* on a VAX ...' Perhaps then, Charlottesville could be used to download and upload large files if people want to exchange source code, etc. The cost of CompuServe is $12/hour at night, or $14/hour if you live outside major cities and have to call in through Tymnet (a national packet-switched network which also includes Montreal). This charge is cheaper than long distance calls to Charlottesville. Other national services (like GEnie, owned by General Electric) charge as little as $6/hour (all rates are for 1200 baud)."

This is indeed a type of mechanism we are considering if and when we go into the computer Bulletin Board business for *AIPS*. But we have not in fact decided against a BBS based in Charlottesville – the project is simply on hold until we have some experience with the new computer network connections that are now being installed in Charlottesville. We could also consider operating a PC-based board, *e.g.*, `FIDO` or `PCBOARD`, on a dedicated system with rapid file transfer to and from one of our *AIPS* machines. There are some very competent packages in existence that support uploading and downloading of code, "conferences," search-by-keyword, etc. as well as the usual bulletin facilities such as public and private messages, read-new-only, etc. The main disadvantage of all such approaches is that it would be difficult for our many users outside the U.S. and Canada to take advantage of them, whereas some of the network alternatives appear to offer true world-wide connectivity. If any *AIPSLETTER* readers have comments or suggestions on this topic, please send them to Alan Bridle in Charlottesville.

Bulletin Board: on *AIPS* on μ-VAX

David Garrett (Univ. of Texas) writes (by E-mail, from `utastro!dbg`) on 27-Oct-86:

"I thought you might like to know of our experiences with putting *AIPS* on a μ-VAX II workstation running VMS. I'm sure lots of people have already done this or soon will, but since I haven't heard from others, I would like to let you know about it.

We recently purchased several μ-VAXen for the department, one of which is a two-user system dedicated to image processing programs (mainly *AIPS*, *IRAF*, and *IDL* so far). This μ-VAX has 5 Mbytes of memory and about 900 Mbytes of disk space.

Besides modifying the Y and Z routines for our TV (which I will discuss in a moment) and a few minor local changes, the only change I made to the standard VMS routines was to add a Z routine to create some windows on the workstation for the task message output and the Tektronics plotting output. So, when the user wants to use *AIPS*, he or she creates a VT100 window and invokes `AIPS`; the `AIPS` program then creates these two other windows which pop up whenever they are first written to. It is very nice to have these three windows on one screen instead of on three separate CRTs.

The TV display is implemented with an Image Analytics QD-512 graphics board and an Electrohome color monitor. The facilities provided are fairly basic, but adequate for most needs. One drawback is that, although the graphics board can store a 512 x 512 image, it only displays 512 x 480. The main advantage to this system is that the graphics board and monitor were less than $5,000. We will be giving the TV a mouse in the near future, but for now all cursor motions and button keys are implemented using the VT100 arrow keys and auxiliary keypad.

I ran a comparison reduction on the μ-VAX and on our VAX 11/780. The test source was an observation with 11000 *uv* points. I made a map that was 256 x 256 and cleaned a box around the center that was roughly 20 x 20 pixels down to 200 clean components. There is an added complication in comparing the CPU times for the various tasks used in this reduction: not only are we comparing two different computers but also two operating systems since our 11/780 runs UNIX. The difference is clearly seen in tasks that do a lot of disk I/O since the UNIX version of *AIPS* does not implement double-buffered I/O. But in tasks that are CPU-intensive, the μ-VAX seems to be about 80% of the 11/780 as expected. The comparison of CPU times in seconds is:

task	μ-VAX	VAX 11/780
`UVLOD`	12.23	30.72
`UVSRT`	36.51	64.01
`UVMAP`	233.35	186.54
`APCLN`	226.12	179.92

(Note: neither machine has an array processor; the μ-VAX had only one user, the 11/780 was lightly loaded.)"

The Portability Column

CPU/OS Combinations

SUN/Unix: Kerry recently installed *AIPS* on a SUN-3 system at Princeton. The success of this installation presumably certifies *AIPS* on the whole SUN-3 product line.

Alliant/Unix: Kerry recently re-certified the installation on the Alliant product line. Performance is improved in some areas over the 1985 tests.

Image Displays

I^2S IVAS: The implementation for IVAS displays is being shipped with the 15OCT86 *AIPS* release. The IVAS is manufactured by International Imaging Systems of Milpitas, CA and has a list price of about $25,000. The image display is 1024 pixels on a side, with an image depth of 24 bits plus four graphics overlays. It is controlled with a three-button mouse. The implementation allows *AIPS* managers to select one of two image modes: an 8-bit mode with three image planes (but with the black and white ("LUT") and color ("OFM") lookup tables being the same) or an 11-bit mode with 2 image planes and separate LUTs and OFMs. The choice of 11 rather than 12 bits was made to allow a separate LUT for each image, rather than to use a single 12-bit LUT for both images. Our virtual TV interface assumes that the graphics planes are single-bit planes and the implementation for the IVAS enforces this. The problem of having only three buttons on the mouse is solved using software which regards any two or three different buttons hit over a short time span to be "button D." The IVAS will provide our users with considerably more image pixels than older models of display and will provide almost all of the functionality to which they have become accustomed. The two functions which will not be available are (1) a rapid histogram generator used in an interactive histogram-equalization algorithm (TVHLD and TVHXF) and (2) an interactive hue-intensity algorithm (TVHUEINT) which requires the ability to display two images at once and to use all of the adders and lookup tables of the IIS Models 70 and 75. Of course, these functions have never been available to many of our users who run *AIPS* with DeAnza, Comtal and other displays. The *AIPS* implementation depends on IVAS firmware release 1.1 and on software to run on the host computer provided by I^2S. A variety of hardware, firmware, and software problems were found during the installation. However, adequate work-arounds were generated for most of them and I^2S is actively working on correcting all of the problems discovered.

News Notes

Gary Fickling has left NRAO, as announced in the previous *AIPSLETTER*, and NRAO has tendered an offer of employment to fill the vacancy. As presently envisioned, the new employee will devote his efforts to developing new code, primarily for interferometer calibration. In the meantime, Pat Moore has announced his intention of leaving NRAO to return to England. We wish him the best of luck and thank him for his very considerable efforts in support of *AIPS* at the VLA. These two departures mean that any system changes in *AIPS* will be deferred due to our present lack of high-level VMS expertise.

In the last *AIPSLETTER*, we promised a 15JUL86 release for UNIX systems. Unfortunately, the directory reorganization required us to rewrite the installation procedures and documentation completely. The procedures have been developed to the point that Kerry was able to make a remote installation on a SUN machine at Princeton. However, the documentation has not developed to the point that we can release it generally. We expect it to reach that stage soon and to ship 15OCT86 UNIX kits. Readers should remember that there is no single UNIX. Instead, there are several "official" flavors of UNIX, based on Bell and Berkeley developments modified by the computer manufacturers, and a variety of "pseudo" UNIXes which emulate with varying degrees of success one or more of the standard UNIX releases. As a result, no UNIX installation can be as simple as our standard VMS installations. (Remember, however, that those users with VMS revisions prior to 4.0 cannot directly install our code anymore.) The *AIPS* Z routines are as "generic" as they can be and Kerry continues to improve their portability. However, *AIPS* does need to know such things as tape controller error codes (to detect end-of-file, beginning-of-medium, *et al.*) and the format of the ps output (to do a pretty SPY display), which we have found to vary among computers. The difficulties found in systems which only emulate official UNIX versions tend to be much more severe. The UNIX installation kit provides several examples of solutions to these problems and the documentation describes what to do, but the UNIX installer must resolve these issues before compiling and linking the system.

This *AIPSLETTER* has been typeset with the latest release of TEX, version 2.0. The main difference between this version and the previous one is the fonts. They have become "Computer Modern" rather than "Almost Modern" with the differences being subtle but real in the standard fonts and more substantial in the less normal ones such as the ones used for *AIPS*. The *COOKBOOK*, now being printed in Green Bank, has also been typeset with this new version of TEX.

AIPS Publications

There are two new *AIPS* Memos this quarter. They are described below and the Order Form at the end of this *AIPSLETTER* may be used to order them. The *COOKBOOK* is being reprinted in Green Bank to correspond to the 15OCT86 release of *AIPS*. The changes between this version and the previous one (15OCT85 release of *AIPS*) have all been published in the *AIPSLETTER* in a form suitable for inserting in your *COOKBOOK*. The only unpublished changes are in the pagination (we are now on a chapter-based page numbering to make partial updates easier for you and for us), in Chapter 14 (the verb and task lists), and in Appendix Z (descriptions of the NRAO *AIPS* facilities). You may order the new *COOKBOOK* either en masse or a chapter at a time. Please order only what you need. This and all future reprints of the *COOKBOOK* will be on three-hole punched paper for insertion in ring binders. Specially printed ring binders are available from NRAO. However, they are not free — send $5 (US) with your order for each binder which you require. Make checks payable to the National Radio Astronomy Observatory in US currency. Please note: the printed text for the *COOKBOOK* remains free of any charge; fees are charged only to cover the expense of printing and mailing the optional, specially-printed ring binders. *GOING AIPS* is undergoing revision and there are very few copies of the 15JUL85 edition left.

AIPS Memo No. 47: "Installing NRAO's *AIPS* on Vector Computers", D. Wells, 22 August 1986.

> This memo, intended for vector-computer analysts, gives an overview of the strategy and tactics appropriate for a vectorized *AIPS* installation. It mentions vector-library code which *AIPS* needs, and gives special attention to the vectorization of gridding and CLEANing and to the vectorization-directive INCLUDE files. It concludes: "obtaining a good implementation of the *AIPS* Q-routine library on a new vector computer, especially one with small or modest $n_{\frac{1}{2}}$, will probably be easy; almost all of the work has already been done in the previous ports."

AIPS Memo No. 48: "Benchmarking *AIPS* on a VAX 8800", M. Calabretta and P. Rayner (CSIRO), November 3 or so.

> The 15APR86 *AIPS* DDT benchmarking package was run on a VAX 8800 and several smaller DEC computers, the VAX 11/750, VAX 11/780, VAX 8200, and VAX 8500. Results of an arithmetic benchmark unrelated to *AIPS* are also presented. As a dual processor machine, we considered the VAX 8800 in terms of its peak throughput processing power (11×VAX 11/780), and also its ability to satisfy an individual *AIPS* user (4×VAX 11/780). The IO performance of a VAX 8800 running *AIPS* cannot quite satisfy its enhanced CPU processing capability, but this shortcoming diminishes as more and more *AIPS* jobs are loaded onto it.

15-October-1986 Statistics

From the EXPFIT program comes the following statistics for the 15OCT86 release:

Number of directories	74
Number of text files	3,188
Number of text lines	512,935
Number of bytes in compressed form	16,839,059

CHANGE.DOC: 15OCT86 Version as NEW

3299. *July 24, 1986* APCLN *Bill*

Modified MAPPAK to order the residuals when boxes were being used. The vector versions of QMULCL and QCLNSU were expecting that the residuals be ordered in y; this was not always the case when multiple boxes were in use.
Moved from 15JAN87, this date.

3300. *July 24, 1986* MX *Bill*

Modified MXMPAC to order the residuals when boxes were being used. The vector versions of QMULCL and QCLNSU were expecting that the residuals be ordered in y; this was not always the case when multiple boxes were in use.
Moved from 15JAN87, this date.

3301. *July 29, 1986* APLVMS:ZRM2RL.MAR, ZDM2DL.MAR *Bill*

Fixed bug which caused 0.0 to be trapped as an overflow. Was doing a short integer subtraction rather than a longword subtraction when correcting the exponent bias.
Moved from 15JAN87, this date.

3302. *August 12, 1986* TABMRG *Bill*

The output file record number is now always set to the actual number of table entries. It formerly only reset the record count if the input and output tables were the same. If the output file previously existed, but was not the input file, the total record count was not updated. In task TAMRG this caused a merge to an existing table (such as an in-place merge) to retain the old record count which would (almost) always be wrong.
Moved from 15JAN87 this date.

3303. *August 19, 1986* File creates *Eric*

Changed error handling in MCREAT and UVCREA. The particular error ("CATIO I/O ERROR") is extremely unlikely to occur, but, with the error handling found in the routine, could produce the reported errors with bad CB files. Unfortunately, no user has provided a message file for the period in which the error actually occurs. We have so far received only complaints about the aftereffects.
Moved from 15JAN87 this date, nowhere else.

3304. *August 21, 1986* R*4 vs R*8 again *Eric*

The misuse of R*8 in subroutines calls where R*4 is expected continues to be discovered on the Convex. Corrected this time both QIKHDR and PRTIM.
Moved from 15JAN87 this date, nowhere else.

3305. *September 5, 1986* QXXPTS, QPTDIV *Bill*

Removed the assumption that the u, v and w terms were correct for the first channel in the pseudo-AP versions of QXXPTS and QPTDIV. This was causing the DFT subtraction in MX to subtract components from the wrong position for some spectral-line data from the VLA pipeline (also DEC-10?). The AP version was okay.
Moved from 15JAN87 this date, also Charlottesville Convex.

3306. *September 6, 1986* APGNOT:LGEOM *Kerry*

Redeclared variables used as adjustable array dimension specifiers from INTEGER*2 to simple INTEGER. Some compilers insist that 4-byte integers be used for this purpose. Simple INTEGER allows this, whereas INTEGER*2 forces an error. Also replaced all integer constants used as arguments in function and subroutine calls with properly declared and initialized INTEGER*2 variables with names of the form N*n*. Not all compilers have a robust counterpart to the NOI4 option under VMS and these constants default to 4-byte items. This makes little difference on VAXes due to their byte order; however, the results can be catastrophic on other architectures. Please be careful. I spend a ridiculously large fraction of my time correcting this category of bug.
Moved to 15JAN87.

3307. *September 13, 1986* IMLOD *Bill*

IMLOD has been unable to read the old *AIPS*-style tables because MLTABL was reading the record past the table header. MLTABL now skips the read and conversion of record IREC=1.
Moved from 15JAN87 this date, nowhere else.

3308. *September 17, 1986* VM *Tim*

VM had been completely broken since my last change. I fixed it. Would look like it was working for ERRORs round about 1 Jy/beam.
Moved from 15JAN87.

3309. *September 17, 1986* VBFIT *Bill*

Patched up problem due to FPS software: the attempt to read I*4 values from the AP memory gave trash values instead. Substituted a call to QGET to get an I*2 with appropriate logic for values 32768–65536. This solution is not satisfactory for large physical memory vector machines. This problem was fixed in 15JAN87 some time ago, but didn't seem to make it to 15OCT86.
Moved nowhere.

3310. *September 20, 1986* TV changes *Eric*

Moved the TV changes resulting from the IVAS installation to 15OCT86 in order to get them to the sites which have already received their IVASes. In the TV area, changed zoom control to allow simple steps (MXZOOM < 0) rather than just powers of two and changed LUT and OFM control by adding three more parameters specifying the LUT output and OFM input and output peak intensities. See entry #s 3434, 3438, 3439, 3464, and 3465 in the 15JAN87 area for the details.
Changed in YGEN: YCNECT, YCUCOR, YCURSE, YFILL; in INC: DTVC.INC, CTVC.INC; in AIPSUB: AU5, AU5D, AU6, AU6A, AU6B, AU6C, GRLUTS, HIENH, HILUT, TVMOVI, TVROAM; in YSUB: BLTFIL, IENHNS, ILNCLR, IMANOT, IMCCLR, IMLCLR, IMPCLR, IMVECT, IZERO, TVFIDL; and in AIPPGM: SETTVP.
In the system area, we need to correctly support more than one TV in link edits and in starting *AIPS*, so changed in SYSVMS: AIPS.COM, COMLNK.COM, AREAS.DAT, LIBR.DAT; in APLVMS: ZACTV8, ZWHOMI, ZIVSOP; and in AIPGVMS: ZSTRTA.
Moved from 15JAN87 this date, nowhere else.

3311. *September 20, 1986* IVAS Y routines *Eric*

See entry #s 3461 and 3462 in the 15JAN87 area for details.
Moved from 15JAN87 this date, nowhere else.

3312. *September 22, 1986* POLCO *Neil*

Reduced subroutine MAXLIKE to MAXLIK and made some minor typing changes.
Moved from 15JAN87 this date, nowhere else.

3313. *September 22, 1986* Zoom and Scroll *Eric*

Changed YV20:YSCROL and YZOOMC to round and use MOD in the computation of the upper left pixel; corrected YM75: YZOOMC and YSCROL so that they work together and possibly give the correct results finally. Moved the supposedly, but not actually generic, YCURSE and YCUCOR to YM70: and moved the (probably) generic YCURSE and YCUCOR from the IVAS area to YGEN:. Details are given in CHANGE.DOC for 15JAN87 — see # 3470. The changes to the code for DeAnza, I^2S Model 75, and Comtal will need to be tested at sites owning these devices; please help — TVZOOM, TVSCROLL, and TVMOVIE are the verbs to use along with IMXY.
Moved from 15JAN87 this date, nowhere else.

3314. *September 24, 1986* TGET Files *Eric*

Some INPUTS files have grown beyond what was previously thought to be reasonable bounds. The format of the TS file must consequently be changed to allow 5 records per task or verb rather than just 2. Some tasks, *e.g.*, UVFLG, overwrite the following task otherwise. All old TS files must be deleted.
Moved from 15JAN87, nowhere else.

3315. *September 24, 1986* VM, VTESS *Tim*

The new, "corrected" release of these tasks had a bug affecting flux-constrained deconvolution, which I did not detect before since I never use that mode. Caught in VM by DDT and AHB independently.
Moved from 15JAN87 by Eric this date.

3316. *September 25, 1986* APCLN *Miller Goss/Bill*

The number of components to use was being sent to IROUND. Now the value is rounded by adding 0.5.
Moved from 15JAN87 this date.

3317. *September 27, 1986* Installation procs *Eric*

Changed the VMS installation procs:

IBATCH	—	As IBUILD.
IBUILD	—	Changed relinks to copies from our subsidiary load libraries where possible.
ICREOPT	—	Added extra IVAS and XANTH and system libraries to *.OPT files if the TV type is 5 (IVAS).
IPROMPT	—	Added IVAS to list of TVs.
IREADTAP	—	Changed the excludes of MC4, COS and UNIX to messages suggesting that the installer may wish to delete them.
IREBUILD	—	Added YIVAS, YPGVMS, and APGVMS to compile and link lists.
IREDOALLTV	—	Added YPGVMS to link list.
IREDOSOMTV	—	Added YPGVMS to link list.
TRANSPRT	—	Dropped the non-functional excludes which tried to avoid sending MC4, COS and UNIX and added excludes of the link "option" files for a second model of TV. Also dropped the exclusion of DOCTXT: (the *COOKBOOK* and *AIPSLETTER*s).

Also changed the installation guide text some: DOCTXT: GUIDE.RNO and GUIDE.MEM.
Moved to 15JAN87 this date.

3318. *September 27, 1986* Cookbook *Eric*

Changed the TEX macro files AL82.MAC, COOK82.MAC for the new version 2.0 of TEX. Changed COOK82.MAC for chapter-based page numbering. Changed all *COOKBOOK* text files, COOK0.TEX through COOK14.TEX plus COOKG.TEX and COOKZ.TEX, for this page numbering and other very minor matters. Rewrote the VLA section of COOKZ (done mostly by Pat Moore and Pat Murphy at the VLA), dropped the Modcomp section, and added a Charlottesville Convex section, plus some additional recipes.
Moved to 15JAN87 this date.

3319. *September 29, 1986* CATDIR *Eric*

Changed CATDIR. If the header file failed on create, open, or write, the routine did not clean up after itself. Fixed to delete the file if created and then clear the catalog entry. Should relink all.
Moved from 15JAN87.

3320. *September 30, 1986* Misc *Eric*

Changed

GUIDE.RNO	—	Added suggestions on what people may wish to delete.
COOK14.TEX	—	Corrected 1 description of IMERASE.
NOBAT	—	Specified too few files in the ZDCHIN call; the minimum number of disk files is 2 (AC and MS).
AU5	—	Increased size of display string to 20 characters.
CTRA.INC	—	Buffer alignment was off — moved buffers to separate common.

Moved from 15JAN87 this date.

3321. *October 1, 1986* Misc *Eric*

ZCREAT	—	Added message giving requested file size in 512-byte blocks when there is no room. Did both VMS and UNIX (generic).
REDIT	—	Moved to Local, deleted from APGVMS: as non-functional.
ZSTRTA	—	(VMS) Changed the system service used to determine the current terminal ID from SYS$TRNLNM to SYS$GETDVI. This allows the terminal to be a "virtual" terminal. Also corrected the error handling logic.

Moved from 15JAN87, nowhere else.

3322. *October 2, 1986* Help files *Eric*

Cleaned up the help files for:

- BY — Corrected description. Changed *RANCID* to AIPS.
- FOR — Corrected description. Changed *RANCID* to AIPS.
- ELSE — Corrected description. Changed *RANCID* to AIPS.
- PRINT — Changed *RANCID* to AIPS.
- WHILE — Changed *RANCID* to AIPS.
- PRTAN — Changed CC to AN in inputs section.
- IMLOD — Changed notes re types of tables files read.
- TVOFF — Changed "on" to "off".
- GETHEAD — Added note that GCOUNT is the number of visibilities.
- TAMRG — Tried to improve the wording for APARM. The concepts can be confusing in such a general task.
- UVPLT — Corrected typo.
- COPY — Added notes that the task only works on VAXes.
- STARS — Added paragraph explaining that STARS uses the first line of the RUN file, unlike the files for the RUN command.
- UVSRT — Corrected explain information; UVSRT uses two (2) scratch files.
- PCNTR — Removed any limits on PCUT and ICUT; they are in image units now and can have no *a priori* limits.
- PLROW — I forgot to change the explain file when I changed the program. Changed FACTOR to OFFSET and fixed the words describing it.

Moved from 15JAN87, nowhere else.

3323. *October 10, 1986* VAX procs *Eric*

Corrected SYSVMS and SYSLOCAL versions of COMRPL.COM to allow them to compile Macro routines without an explicit .MAR and to remove a redundant branch. Made the first correction also to SYSVMS and SYSLOCAL versions of COMLNK.COM and to the SYSVMS version of COMTST.COM. Also corrected IREBUILD.COM (VMS installation proc), removing repeated COMRPLs of QFPS and QFPS16, and a COMRPL of a non-existant area. Changed AIPSUSER.COM to make symbols for GRIPR, BATER, and AJAX and added new COM files of these names to SYSVMS.
Moved from 15JAN87 this date, nowhere else.

3324. *October 10, 1986* Misc *Eric*

Corrected AU5D; it had the wrong call sequence to MOVIST, blocking REMOVI on channels other than 1. Corrected AIPSB to print all the messages at the end; a bug caused it to print only one.
Moved from 15JAN87 this date.

3325. *October 11, 1986* Misc *Eric*

Changed the help files for BATER, GRIPE, GRIPR, and RUN to reflect the new use of VMS symbols (*e.g.*, GRIPE) rather than procedures (*e.g.*, @GRIPE). Made corresponding changes to *COOKBOOK* TEX files COOK11, COOK13 and COOKZ. Added SCRATCH to AIPSUSER.COM and a SCRATCH.COM in SYSVMS. Also made some corrections to help files NEWTASK and PANIC. Copied SPACE.COM from the VLA.
Moved from 15JAN87 this date.

3326. *October 11, 1986* TVMOVIE *Eric*

Forgot to make all the fixes caused by the IVAS to the code telling what the movie mode is. Changed AU5D and MOVIST.
Moved nowhere — 15JAN87 was okay and different.

3327. *October 11, 1986* Batch *Eric*

Corrected bug in BATER; QUEUES was listing to 64 jobs when there can be no more than 51 and hence printing garbage. Added more messages to AUB and BATER for UNQUE and JOBLIST to clarify why the job is not available.
Moved from 15JAN87 this date, nowhere else.

3328. *October 14, 1986* Misc *Eric*

Changed SPACE.COM to add instructions about 2 parameter responses — the 2 must be separated by commas and no blanks. Also changed TST version to look for format level B. Changed AREAS.DAT to add some logicals for installation (INSVMS, INSCOS, INSUNIX), Z routines (APLPSC for Pittsburgh Supercomputer Center, APLSUN for SUNs), procedures (SYSSUN for SUNs, SYSCVEX for Convex and SYSPSC for Pittsburgh mess). Also updated WHATSNEW.HLP.

Moved from 15JAN87 this date, nowhere else.

3329. *October 15, 1986* SUN discovered *Eric*

Kerry found on the Princeton SUN:

DBCON — It is apparently improper to do IF (L1.EQ.L2) where L1 and L2 are logical variables. Changed two statements to do the equivalent operation properly.

FITTP — Corrected error: logical equivalence name was mistyped as the I*4 name in a table routine. Changed hex format to a machine portable method (A format in array of hex digits).

HGEOM — Fixed several EQUIVALENCE statements out of order.

IMFLT — Fixed use of illegal functions SIND, COSD, and ATAND and corrected handling of blanking flag.

IMLOD — Declared IAND two places.

JMFIT — Declared FX as EXTERNAL in DVDMIN and changed to acceptable usage rather than ASSIGN statements in DNRM2.

NNLSQ — Changed to acceptable usage rather than ASSIGN statements in NNLS.

SLICE — Corrected long comment line.

SMOTH — Corrected comparison of integer variable with CHARACTER constant. The construct will not work on Crays.

WARP — Declared FCN external in main and corrected order of declarations in 2 subroutines.

CORER — Rearranged typing of two ENCODEs to avoid long lines after UNIX pre-processing.

RWTAB — Cleaned up typing and changed from Z format to A format with tests to determine the desired result.

TABMRG — Same problem with logicals as DBCON.

Moved corrections to 15JAN87 this date.

3330. *October 15, 1986* HGEOM *Neil*

Corrected HGEOM so that it now outputs a header that correctly describes whether the image has magic blanking or not. Also clarified HELP file as to the meaning of APARM(2), the zero or blank adverb.

Moved this date from 15JAN87 by Eric.

3331. *October 16, 1986* Misc TV *Eric*

Changed AU5 code to specify all graphics channels better on GRCLEAR and GROFF defaults. Changed YDEA:YINIT to specify the null y scroll better (*i.e.*, 511 rather than 0). Removed an "I^2S-ism" from TVZOOM.HLP.

Moved from 15JAN87 this date.

3332. *October 16, 1986* Batch *Eric*

AIPSC did not handle the failure to activate QMNGR properly. Fixed it to leave job marked ready to run and exit fairly gracefully. It was going into an infinite loop of sorts. Also fixed the printing of messages on error.

Moved from 15JAN87 this date.

3333. *October 16, 1986* IMLOD *Eric*

IMLOD could not read the *very* old CC table format (pre-FITS agreement). Corrected the code of MLTABL and changed it to pass the buffers into which the first record of the table had been read.

Moved nowhere, the 15JAN87 code was okay.

3334. *October 20, 1986* GO *Eric*

Changed the default parameter range from $\pm 10^{10}$ to $\pm 10^{16}$.

Moved from 15JAN87 this date, nowhere else.

3335. *October 21, 1986* Misc for port *Eric*

Changed AREAS.DAT to define SYSALLN, a system area for special Alliant procedures. Copied Lexidata Y routines into an area [.Y.DEV.LEX.LEXC]. These are routines provided by Bret Goodrich of Haystack. They are written in C for no apparent reason and, hence, have been put in a nonstandard area one layer below normal. We can't compile or test them and they may not meet all the current requirements. However, they are there for anyone who may want to use them.
Moved from 15JAN87 this date.

3336. *October 21, 1986* Installation procs *Eric*

Changed IBUILD.COM, IBATCH.COM and TRANSPRT.COM to drop the IVAS load modules from the VMS transport. This was needed to keep the transport at 1600 bpi down to two tapes. I don't know what we will do next time. The IVAS routines did go out in all forms on the 6250 bpi tape and in all forms but the load modules on the 1600 bpi tape.
Moved to 15JAN87 this date.

3337. *October 21, 1986* UNIX/*AIPS* *Kerry*

Made numerous improvements to the UNIX versions of procedures, tools and Z routines. Installed Convex and Alliant specific code, including an improved Alliant Q-routine library. For the many details see #s 3558–3614.
Moved also to 15JAN87 and earlier to the CV Convex, Princeton SUN, and Alliant's machine as appropriate.

CHANGE.DOC: 15JAN87 Version as TST

3338. *July 24, 1986* APCLN *Bill*

Modified MAPPAK to order the residuals when boxes were being used. The vector versions of QMULCL and QCLNSU were expecting that the residuals be ordered in y; this was not always the case when multiple boxes were in use.
Moved to 15OCT86, this date.

3339. *July 24, 1986* MX *Bill*

Modified MXMPAC to order the residuals when boxes were being used. The vector versions of QMULCL and QCLNSU were expecting that the residuals be ordered in y; this was not always the case when multiple boxes were in use.
Moved to 15OCT86, this date.

3340. *July 29, 1986* APLVMS:ZRM2RL.MAR, ZDM2DL.MAR *Bill*

Fixed bug which caused 0.0 to be trapped as an overflow. Was doing a short integer subtraction rather than a longword subtraction when correcting the exponent bias.
Moved to 15OCT86, this date.

3341. *August 1, 1986* BSMAP *Tim*

New version of BSMAP with numerous improvements and bug fixes. Is about an order of magnitude faster than previous version, and is now quite acceptable. Also expanded help file.
Moved nowhere.

3342. *August 5, 1986* TABINI *Bill*

Modified to use arrays as column entries for all data types, to carry a word giving the keyword/value data type, to encode a string in the first record to verify that it is a tables file and to carry a flag in the first record to say if it can be written as a FITS ASCII table. Now checks old files to be sure they are, in fact, tables.
Moved nowhere.

3343. *August 5, 1986* TABIO *Bill*
Modified for new table structure in which keyword/values have a word giving the data type and arrays are allowed as table entries.
Moved nowhere.

3344. *August 5, 1986* TABKEY *Bill*
Modified to read or write keyword/value pairs with the new structure. New OPCODE='ALL' reads all keyword/value pairs.
Moved nowhere.

3345. *August 5, 1986* GETCOL *Bill*
Modified to new structure in which entries can be arrays and the dimension can be zero.
Moved nowhere.

3346. *August 5, 1986* ANTINI *Bill*
New routine to initialize/create antenna tables.
Moved nowhere.

3347. *August 5, 1986* TABAN *Bill*
New routine to read/write antenna tables.
Moved nowhere.

3348. *August 5, 1986* ANTDAT *Bill*
Modified to use the new AN tables.
Moved nowhere.

3349. *August 5, 1986* ALLTAB *Bill*
Removed AN and GA files from the list of non-tables files.
Moved nowhere.

3350. *August 5, 1986* GETNAN *Bill*
Modified to read new antenna table.
Moved nowhere.

3351. *August 5, 1986* GNFSMO, GNSMO *Bill*
Modified to use GETNAN to get number of antennas.
Moved nowhere.

3352. *August 5, 1986* ISTAB *Bill*
Now checks for verification string to determine if the file is a table file. Also returns a flag to tell if the table can be written as a FITS ASCII table.
Moved nowhere.

3353. *August 5, 1986* DANT.INC *Bill*
Declarations needed for ANTINI and TABAN for passing keyword/value and table data. Uses same names as in ANTINI and TABAN.
Moved nowhere.

3354. *August 5, 1986* CCINI *Bill*
Made array dimensions 1 in CC table.
Moved nowhere.

3355. *August 5, 1986* SKPEXT, TABLIN, EXTREQ *Bill*
Modified to use new tape I/O. Deleted C/DTAB.INC where used.
Moved nowhere.

3356. *August 5, 1986* TAPIO *Bill*

Added by Editors from CHKOUT *file:* New routine to do tape I/O either to actual tape or to pseudo-tape disk files. It handles open, close, read, write, I/O initialization and re-initialization, etc. Also new routine TPIOHD to read a tape record and determine the actual format in use.
Moved nowhere.

3357. *August 5, 1986* RWTAB, TABHDR, ATCONV *Bill*

New call to TABLIN, or TAPIO; dropped bit arrays. Removed /PNCOM/ nonsense from TABHDR — it had the task name; this is already in MSGCOM.
Moved nowhere.

3358. *August 5, 1986* New subroutines *Bill*

Several new routines for FITS 3-D files:
GTF3D — Reads byte stream from input.
PTF3D — Writes byte stream to output.
R3DTAB — Reads 3-D FITS table and writes to *AIPS*.
TABF3D — Decodes formats for 3-D tables.
ZBYMOV — Moves bytes, VAX version.
Moved nowhere.

3359. *August 5, 1986* MAKTAB *Bill*

MAKTAB was incorrectly calling RCOPY instead of COPY.
Moved nowhere.

3360. *August 5, 1986* GTPAIR *Bill*

Modified to read type code from *AIPS* table. Unfortunately the type codes returned by GTPAIR did not correspond to the *AIPS* current conventions. The returned type code now uses the *AIPS* convention.
Moved nowhere.

3361. *August 5, 1986* GETKEY, TABHDR *Bill*

Junked portion using old *AIPS* conventions for keyword data types. These were never used in practice and now all data types are determined from the value rather than the keyword. Also the data types are returned in an array rather than encoded into the keyword. The argument ITYPE is no longer necessary and is no longer passed to GETKEY. The keyword type array (KEYTYP) is also returned from TABHDR.
Also changed the convention of passing the keywords as 8 characters per R*8 and put in separate R*4 KEYWRD(2,100).
Minimum element count for reading ASCII tables is now 1.
Moved nowhere.

3362. *August 5, 1986* VBOUT *Bill*

Modified to use TAPIO to write output.
Moved nowhere.

3363. *August 5, 1986* ALLTAB *Bill*

Corrected call sequence to ISTAB; FITASC was missing.
Moved nowhere.

3364. *August 5, 1986* SEARCH.VFC, QSEARC *Bill*

Removed the use of PHSROT to rotate the center of the fringes. The appropriate offset to the delay and rate channels must be be made in FRCAL3 in VBFIT. Made changes in the FPS AP version and also in QPSAP:. Updated Q120B:SEARCH.FOR and Q5000:SEARCH.FOR.
Moved nowhere.

3365. *August 5, 1986* IEEE data translation routines *Bill*

Changed name of IEEE translation Z routines and added functional versions for VAXen and Convex.

ZRLR32 — Local R*4 to IEEE 32 bit (VAX and Convex).
ZR32RL — IEEE 32 bit to local R*4 (VAX and Convex).
ZRLR64 — Local R*8 to IEEE 64 bit (Convex).
ZR64RL — IEEE 64 bit to local R*8 (Convex).
ZRLR64.MAR — Local R*8 to IEEE 64 bit (VAX).
ZR64RL.MAR — IEEE 64 bit to local R*8 (VAX).

Moved nowhere.

3366. *August 5, 1986* CHNDAT, SOUINI, NDXINI, TABSOU, TABNDX *Bill*

Modified to use new table structures. In particular, added element count. SOUINI, NDXINI, TABSOU and TABNDX now have the element count array in the call sequence. Source file routines (SOUINI, TABSOU) were modified to include the keyword INOGRP (= number of IF groups) and the table values (LSRVEL, PMRA, and PMDEC).
Moved nowhere.

3367. *August 5, 1986* TABSOU, TABAN, TABNDX, TABCAL *Bill*

Added an error message if TABIO failed; also will now loop on read until an unflagged record is found.
Moved nowhere.

3368. *August 5, 1986* FLGINI, TABFLG, NXTFLG *Bill*

Modified to new table structure and changed the type of the table from FM to FG.
Moved nowhere.

3369. *August 5, 1986* FLAGUP *Bill*

Modified to new table structure.
Moved nowhere.

3370. *August 5, 1986* D/CSEL.INC *Bill*

Modified for new tables.
Moved nowhere.

3371. *August 5, 1986* SOUFIL *Bill*

Modified to use SOUINI and TABSOU to read new tables format SU table. Also now removes any "-" from the start of a source name and traps "*" to imply all.
Moved nowhere.

3372. *August 5, 1986* INDXIN *Bill*

Modified to use NDXINI and TABNDX to read INDEX table.
Moved nowhere.

3373. *August 5, 1986* DATCAL *Bill*

Cleaned up precursor comments.
Moved nowhere.

3374. *August 5, 1986* GAININ, CSLGET *Bill*

Modified to use new Cal. table. Added PARAMETER to DSEL.INC to declare the maximum number of IFs. CSLGET changed to use TABIO rather than TABCAL for efficiency.
Moved nowhere.

3375. *August 5, 1986* VISCNT *Bill*

New routine, counts the number of vis. records in the selected time range and fills it into CATBLK.
Moved nowhere.

3376. *August 5, 1986* DGHEAD *Bill*
Now calls VISCNT for single source output files.
Moved nowhere.

3377. *August 5, 1986* UVGET *Bill*
Now clears status on input file when closing.
Moved nowhere.

3378. *August 5, 1986* CALCOP *Bill*
Fixed call sequence to CATIO to update the catalogue header. It was only working correctly for scratch files.
Moved nowhere.

3379. *August 5, 1986* SELSMG *Bill*
Modified to use CL table rather than gain table. Now smooths pair of values (except for amplitude only) and added a phase only option. Some questions about how to update the total model values remain unresolved.
Moved nowhere.

3380. *August 5, 1986* Adjustable array dimensions *Kerry/Bill*
Changed to declarations of adjustable array dimensions in calls to external routines in GNFSMO, GNSMO, GAPLT, PRTGA, VBANT, ASCAL, VBFIT, and VSCAL.
Moved nowhere.

3381. *August 5, 1986* More Adjustable array dim. etc. *Kerry/Bill*
Declared internal adjustable array dimensions in ASCAL, VSCAL and VBFIT. In VSCAL and VBFIT, also did major cleanup of *LINPACK* routines, removed all ASSIGN and ASSIGN GO TO statements. Declared all internal integers I*2 rather than INTEGER. There were a number of type conflicts which would occur with compilers without the NOI4 option.
Moved nowhere.

3382. *August 5, 1986* Polarization translation in UVGET *Bill*
Modified UVGET, DATGET, DGINIT, DSEL.INC and CSEL.INC for use of the common input value STOKES. A blank value now means do not translate the data. The common logical variable, TRANSL tells if this is the case.
Moved nowhere.

3383. *August 5, 1986* CALINI *Bill*
Added by Editors from CHKOUT *file:* New routine to create and initialize calibration extension tables.
Moved nowhere.

3384. *August 5, 1986* Changes to GA and CL table *Bill*
Added reference antenna for each IF/polarization. Affected files: DSEL.INC, CALTAB, TABCAL, GAINI, TABGA, SELSMG, CSLGET.
Moved nowhere.

3385. *August 5, 1986* ZPHFIL *Bill*
Changes version code to "B" in APLVMS:.
Moved nowhere.

3386. *August 5, 1986* UPDAT *Bill*
Added antenna and general tables conversion for 15JAN87. Also fixed numerous other problems. Added "Z" routine ZPHOLV (ZPHFIL) which accepts a version code. Also added OLDTAB, a new package of routines to convert an old tables file to a new table file, to UPDAT. Also added UPANT, a new routine to convert an antenna extension file to a new antenna table.
Moved nowhere.

3387. *August 5, 1986* PRTAB *Bill/Eric*
Modified to print the new format tables files (arrays as entries), to list keyword/value pairs and to tell if the file can be written as FITS ASCII. Also fixed a number of page formatting bugs.
Moved nowhere.

3388. *August 5, 1986* PRTAN *Bill*
Modified to print the new format tables files (arrays as entries).
Moved nowhere.

3389. *August 5, 1986* CORFQ *Bill*
Modified to change keyword in AN table.
Moved nowhere.

3390. *August 5, 1986* UVEXP *Bill*
Modified to read new format AN tables.
Modified to use new VBOUT (TAPIO).
Moved nowhere.

3391. *August 5, 1986* BLOAT *Bill*
Now calls ALLTAB to copy tables.
Moved nowhere.

3392. *August 5, 1986* AVER *Bill*
Modified to use ANTINI and TABAN to read IAT - UTC. Uses ALLTAB to copy tables.
Moved nowhere.

3393. *August 5, 1986* FILLR *Bill*
Modified to write new AN table. Changed names of UT1UTC and IATUTC in DFLR.INC and CFLR.INC and source to XUTC, XIAT so as to avoid conflict with DANT.INC.
Modified to use TAPIO. Also changed C/DMC.INC.
Modified to use new table versions of SOUINI, TABSOU, NDXINI, and TABNDX.
Moved nowhere.

3394. *August 5, 1986* GAPLT *Bill*
Modified to read new format AN table.
Moved nowhere.

3395. *August 5, 1986* PRTDR *Bill*
Modified to read new format AN table.
Moved nowhere.

3396. *August 5, 1986* PRTGA *Bill*
Modified to read new format AN table.
Moved nowhere.

3397. *August 5, 1986* STRIP *Bill*
Now uses ALLTAB to copy tables.
Moved nowhere.

3398. *August 5, 1986* UVAVG *Bill*
Now reads new tables AN files; uses GETNAN to get the number of antennas, and ALLTAB to copy tables. Also changed the maximum number of antennas to 50 and converted messages to upper case.
Moved nowhere.

3399. *August 5, 1986* UVFIL *Bill*
Modified to write new AN table.
Moved nowhere.

3400. *August 5, 1986* UVFIX *Bill*
Modified to use new AN table. Now stores old position in catalogue header in the antenna pointing position slot if the value there is zero.
Moved nowhere.

3401. *August 5, 1986* UVMOD *Bill*
Now uses ALLTAB to copy tables.
Moved nowhere.

3402. *August 5, 1986* VBANT *Bill*
Modified to use new AN table.
Moved nowhere.

3403. *August 5, 1986* VBCAL *Bill*
Now uses ALLTAB to copy tables. Removed update in the AN file since antenna factors are no longer in this table.
Moved nowhere.

3404. *August 5, 1986* VBCOR *Bill*
Now uses ALLTAB to copy tables.
Moved nowhere.

3405. *August 5, 1986* VBMRG *Bill*
Now reads new AN table and uses ALLTAB to copy tables.
Moved nowhere.

3406. *August 5, 1986* VBPLT *Bill*
Now reads new AN table.
Moved nowhere.

3407. *August 5, 1986* ASCAL, VSCAL, UVSUB *Bill*
Now uses ALLTAB to copy tables.
Moved nowhere.

3408. *August 5, 1986* VBFIT *Bill*
Now reads new format AN tables. The common variable IATUTC was changed to IATOFF in VBFIT, DFRN.INC and CFRN.INC to avoid conflict with the declaration in DANT.INC used for ANTINI. ALLTAB is now used to copy tables.
In FRCAL3, some calling parameters to QSEARC were I*2 rather than I*4; now temporary I*4 variables are used.
In FRCAL3, removed sending phase ramp information to QSEARC and add appropriate offset to the delay and rate solutions. Also changed the message about the solution to label the output and give delays in nsec and rates in mHz.
Moved nowhere, but FRCAL3 fix should be moved to 15OCT86.

3409. *August 5, 1986* UVLOD *Bill*
Numerous modifications to use TAPIO and new FITS 3-D tables. Deleted use of C/DTAB.INC. Added parameters to help file for pseudo-tape disk files and changed DUIN.INC and CUIN.INC. Also modified UVERR for the new AN format.
Modified UVFDAT to be more efficient in reading *uv* data.
Moved nowhere.

3410. *August 5, 1986* UVMOD *Bill*
Corrected bug (typo) in BESJ which caused the disk model not to work. Tim pointed this out.
Moved nowhere.

3411. *August 5, 1986* FITTP *Bill*
Modified to use TAPIO for output and to write 3-D tables. Deleted FTUVAN and revised FITEXT into a general routine to write either FITS ASCII (if possible) or 3-D tables. Added parameters to help file for pseudo-tape disk files and changed DFTP.INC, CFTP.INC and EFTP.INC.
Moved nowhere.

3412. *August 5, 1986* IMLOD *Bill*
Modified to use TAPIO to talk to input device. Also modified to be able to read FITS ASCII or 3-D tables. Added parameters to help for pseudo-tape disk files and changed DMLT.INC and CMLT.INC.
Moved nowhere.

3413. *August 5, 1986* EXIND, EXFND, EXPND *Bill*
Modified to use TAPIO. Also D/CXPN.INC for EXPND.
Moved nowhere.

3414. *August 5, 1986* IBMTP *Bill*
Modified to use TAPIO.
Moved nowhere.

3415. *August 5, 1986* PRTTP *Bill*
Added by Editors from CHKOUT *file:* Modified to use TAPIO. Also changed DPTP.INC and CPTP.INC.
Moved nowhere.

3416. *August 5, 1986* UVFLG *Bill*
Modified to new table structure. Also revised the wording of the description in UVFLG.HLP to be more informative. Changed D/CFLG.INC.
Moved nowhere.

3417. *August 5, 1986* SPLIT *Bill*
New task: splits a multi-source data file into single source data files. Also SPLIT.HLP.
Moved nowhere.

3418. *August 5, 1986* UVSRT *Bill*
Removed use of EXTCOP to copy antenna files.
Moved nowhere.

3419. *August 5, 1986* INDXR *Bill*
New task: indexes a multi-source *uv* data file. *i.e.*, creates an NX table. Also created INDXR.HLP.
Moved nowhere.

3420. *August 5, 1986* DBCON *Bill*
All of the antennas tables associated with the first input file are now copied to the output file. Previously, only the first antenna file associated with the first input file was copied.
Moved nowhere.

3421. *August 5, 1986* UVCOP *Bill*
Changed to call ALLTAB to copy tables, and to update the frequency in the new AN tables rather than EXTINI/EXTIO files.
Moved nowhere.

3422. *August 5, 1986* FUDGE *Bill*
Now uses ALLTAB to copy all tables rather than EXTCOP for AN and GA tables.
Moved nowhere.

3423. *August 8, 1986* UVAVG *Bill*

Fixed bug introduced in tables update. Both LUNs sent to ALLTAB were the same value.
Moved nowhere.

3424. *August 8, 1986* UVCOP *Bill*

Added by Editors from CHKOUT *history:* Changed to copy old gain files.
Moved nowhere.

3425. *August 8, 1986* Y routines *Eric*

In developing the Y routines for the IVAS, I found some corrections to make to existing Y routines. Changed YGEN:YCUCOR, adding the correction for 480-line I^2S Model 70s that was put in YCURSE before the last release.
Moved nowhere — should go to 15OCT86 and did eventually.

3426. *August 10, 1986* TABCOP *Bill*

TABCOP will now copy an extension table from one version number in a catalogued file to a higher, previously nonextant, version number.
Moved nowhere.

3427. *August 11, 1986* TABCOP *Bill*

TABCOP now ignores warnings from CATIO instead of dying.
Moved nowhere.

3428. *August 11, 1986* TACOP *Bill*

New task which copies tables files from one catalogue entry to another or from one version number to another. Also created TACOP.HLP.
Moved nowhere.

3429. *August 12, 1986* INDXR *Bill*

Modified to allow multiple, simultaneous subarrays. The output index order is now sorted if multiple subarrays are encountered. The current limit on the number of subarrays is 100. Several other bugs were fixed.
Moved nowhere.

3430. *August 12, 1986* TABMRG *Bill*

The output file record number is now always set to the actual number of table entries. It formerly only reset the record count if the input and output tables were the same. If the output file previously existed but was not the input file the total record count was not updated. In task TAMRG, this caused a merge to an existing table (such as an in-place merge) to retain the old record count which would (almost) always be wrong.
Moved to 15OCT86 this date.

3431. *August 12, 1986* SOUFIL, D/CSEL.INC *Bill*

Two new arrays were added to the data access common in CSEL.INC. These arrays give the SoUrce table row numbers corresponding to the sources and calibrators selected. The previous assumption that the source id number corresponded to the table entry is unnecessary and appears to be unwise. SOUFIL enters the correct values in these arrays.
Also added KLOCSU to this common to contain the pointer to the source number random parameter in the input data. This is set by UVGET and used by DATGET.
Added trap to replace nulls in source name in the SoUrce table with blanks.
Moved nowhere.

3432. *August 12, 1986* UVPGET *Bill*

Now returns INCIF = 0 if there is no IF axis. Also improved the description of how to get at desired data in a visibility record.
Moved nowhere.

3433. *August 14, 1986* VBFIT, VBCOR *Bill*

Fixed call sequence to ALLTAB so that both LUNs were not the same. Put trap in VBFIT routine FRCAL3 to avoid bad exponentiation in computing the SNR.
Moved nowhere.

3434. *August 14-15, 1986* VMS stuff *Eric*

In order to have more than 1 TV device, the start-up procedure must select which TV device to use and start the correct version of AIPS, the link procedures must produce the correct versions, and the GO verb must look first in the libraries for the assigned TV. Therefore, changed

AIPS.COM — (VMS) Changed to inquire of the user which TV to use if there is more than one. Does not ask remote users and sets the TK access to distinguish remote users from local. It was giving the local TK number to remote users and hence messing up that catalog.

COMLNK.COM — (VMS) Changed LINKLOOP to continue the loop 7 times, skipping the link part if the ...OPT*n* file is missing. Before, it quit on the first missing one. However, OPT1 refers to pseudo-AP with or without TV1, OPT2 refers to TV2 with or without FPS, ... So YPGM would have an OPT2 but not an OPT1.

ZACTV8 — (VMS) Dropped call to ZDIR. Instead it builds its own file name for the load module and loops looking for it. When found, it calls ZACTV9. This implements multiple TVs with a pseudo-AP choice without using complicated logicals (OLDPSAP, NEWPSAP, TSTPSAP are no longer required).

ZWHOMI — (VMS) Corrected errors: it was comparing the TV number assigned to the maximum *AIPS* number allowed to use a TV rather than testing it against the maximum number of TVs. Fixed the two tests. Also did the same for graphics devices and added code to test for "remote" users and assign a suitable TK number to them.

ZSTRTA — (VMS) Corrected it to assign *AIPS* numbers as intended. It now checks all interactive *AIPS* numbers to see if they are supposed to be reserved to a specific terminal and if that terminal matches the current terminal. If no match is found, it goes through all unreserved numbers to see if one is available. If a match is found, it tries only the assigned *AIPS* number. The previous "logic" of the program is too hard to describe.

AREAS.DAT — Added YIVAS for IVAS Y routines, LOAD2 for IVAS versions of load modules (with or without FPS), LOAD3 for IVAS and PSAP load modules.

LIBR.DAT — Added YIVAS to library list.

Moved to 15OCT86 on 20-Sep, nowhere else.

3435. *August 15, 1986* FRQTAB *Bill*

Put in a trap for the input file being a scratch file.
Moved nowhere.

3436. *August 17, 1986* VISCNT *Bill*

Added check for desired subarray.
Moved nowhere.

3437. *August 18, 1986* STARS *Bill*

Modified for new tables format.
Moved nowhere.

3438. *August 18, 1986* TV intensities *Eric*

In our model of a TV there are really four TV intensities: MAXINT to define the peak grey-scale value and the size of the LUT, LUTOUT to define the peak output intensity of the LUT, OFMINP to define the peak intensity into the OFM look-up table, and OFMOUT to define the peak intensity out of the OFM. Previously, these were badly defined: LUTOUT was assumed equal to MAXINT and OFMINP was assumed equal to OFMOUT and 1023. This works for I^2S Model 70s, but just about nothing else. For the IVAS (and other units to come), the LUT needs to be larger than 256 since more than 8 bits are stored. Changed LUT spaces to accomodate 2048 intensities. Zooms are often available in TVs by any integer factor up to some limit. Changed things so that, if MXZOOM is negative, the zooms are taken to be in simple integer steps rather than powers of 2.
Moved to 15OCT86 on 20-Sep, nowhere else.

3439. *August 18, 1986* TV intensities continued *Eric*

Changed per # 3438:

DTVC.INC — Added the 3 new parameters.
CTVC.INC — Added the 3 new parameters.
SETTVP — Added code to allow setting the new parms. Also added info on the input formats.
AU5D — Changed computation of zoom magnifications to allow non-power-of-two cases.
AU6 — Changed OFFCOLOR to use new LUT parameters, TVZOOM to allow intermediate zooms, and TVHUEINT to test whether it might be allowed to run and to use the new parameters if so.
AU6A — Changed buffer size and handling of OFFTRAN.
AU6B — Changed handling of zoom parms for CURVALUE.
AU6C — Raised the buffer size for TVFIDL to 3072.
GRLUTS — Changed plot to use LUTOUT on Y axis, to scale by scaling factors (rather than assuming MAXINT < MAXXTV(1)), and to use a separate temporary variable for packed strings rather than an assumed special place in the input scratch buffer.
HIENH — Raised LUT size to 512 — the 2048 size of the IVAS is not needed since the IVAS cannot do TVHUEINT. Changed to use LUTOUT in the LUT computation.
HILUT — Raised LUT size to 512 — the 2048 size of the IVAS is not needed since the IVAS cannot do TVHUEINT. No change in the LUT computation since it goes through a second lookup table set up by HIENH.
IENHNS — Changed LUT computation to use LUTOUT to scale and changed plot scaling to handle the possible range of numbers.
ILNCLR — Changed name from YLNCLR to ILNCLR since it is no longer TV-dependent. Changed it to use the OFM parameter values.
IMCCLR — Changed to use the new parms in computing the OFM and setting the defaults values for NLEVS.
IMLCLR — Changed YLNCLR to ILNCLR and changed limit test to use OFMINP+1 rather than 1024.
IMPCLR — Changed to use the new parms in computing the OFM and setting the defaults values for NLEVS.
TVFIDL — Changed computation of null LUTs and OFMs and changed handling of zoom magnification.
TVMOVI — Changed zoom computations and the computations of the null color and LUT tables.
TVROAM — Changed zoom computations.
SETTVP — Added code to set the new parameters.
YCUCOR — (YGEN) Changed zoom computations.
YCURSE — (YGEN) Changed zoom computations.
YTVCIN — (YM70) Added new parms (LUTOUT equal to 255, OFMINP equal to OFMOUT and 1023).
YOFM — (YM75) Dropped scaling by factor of 4 since code will now set OFMs correctly.
YSCROL — (YM75) Changed handling of scroll adding correction for current zoom.
YTVCIN — (YM75) Changed to set the new parameters (LUTOUT equal to OFMOUT and to 255, OFMINP equal to 1023).
YZOOMC — (YM75) Changed handling of zoom center; added correction for current scroll.
YOFM — (YDEA) Dropped scaling by factor of 4 since code will now set OFMs correctly.
YSCROL — (YDEA) Changed to support simple steps in zoom if selected in the TV description.
YTVCIN — (YDEA) Changed to select simple steps in zoom and to set the new parameters (all 255).
YZOOMC — (YDEA) Changed to support simple steps in zoom if selected in the TV description.
YOFM — (YV20) Changed to return the OFM on READ and to drop the scaling of the input.
YSCROL — (YV20) Changed to support simple steps in zoom if selected in the TV description.
YTVCIN — (YV20) Changed to select simple steps in zoom and to set the new parameters (all 255).
YZOOMC — (YV20) Changed to support simple steps in zoom if selected in the TV description. Fixed it to incorporate scroll in the zoom centering.

Moved to 15OCT86 on 20-Sep, nowhere else.

3440. *August 19, 1986* File creates *Eric*

Changed error handling in MCREAT and UVCREA. The particular error ("CATIO I/O ERROR") is extremely unlikely to occur, but, with the error handling found in the routine, could produce the reported errors with bad CB files. Unfortunately, no user has provided a message file for the period in which the error actually occurs. We have so far received only complaints about the aftereffects.
Moved to 15OCT86 this date, nowhere else.

3441. *August 21, 1986* R*4 vs R*8 again *Eric*

The misuse of R*8 in subroutines calls where R*4 is expected continues to be discovered on the Convex. Corrected this time QIKHDR and PRTIM.
Moved to 15OCT86 this date, nowhere else.

3442. *August 21, 1986* TVPSEUDO *Eric*

Changed IMLCLR to produce continuous colors of a more pleasing variety than the literal triangles used previously.
Moved nowhere.

3443. *August 21, 1986* AIPS.COM *Eric*

Changed AIPS.COM in SYSVMS and SYSLOCAL to make them correctly assign a second TV without DCL errors.
Moved nowhere.

3444. *August 23, 1986* UVINIT *Bill*

It was barfing on files which were shorter than a sector; now it's okay.
Moved nowhere.

3445. *August 23, 1986* SOURNU *Bill*

Modified to use revised call sequences to SOUINI and TABSOU. Currently used only in UVFLG.
Moved nowhere.

3446. *August 23, 1986* UVINIT *Bill*

Was complaining that the buffer was too short if the file was less than a sector long. Now works okay.
Moved nowhere.

3447. *August 25, 1986* CCMRG *Eric*

Corrected TABMRG — it has to do a MOD by 10 to drop the dimensionality terms from the summing column types. Also changed it to apply the equality tests and summing to each element of array columns. Wrote new subroutine to merge CC files (a version, really, of CCMRG) and then revised CCMRG to call it. This new subroutine, CCMERG, should be a useful "module" for various application tasks. Revised TAMRG to destroy the old extension file having the same version number as the desired output. This is needed to get the right output file size since TABSRT does not use TABIO to write its records.
Moved nowhere.

3448. *August 28, 1986* QMSPL *Robert Braun*

Have added some extra flexibility in defining transfer functions for GREYS output. There is now FUNCTYPE='PL' for power law and 'NL' for "inverse" power law. The power law index is given by the FACTOR adverb. S-shaped transfer functions can be obtained with the additional use of the AXVAL adverb which specifies the inflection point (in/out) below which a 1/FACTOR and above which a FACTOR index is used for the transfer function. Fixed help file accordingly.
Moved nowhere.

3449. *September 5, 1986* QXXPTS, QPTDIV *Bill*

Removed the assumption that the u, v and w terms were correct for the first channel in the pseudo-AP versions of QXXPTS and QPTDIV. This was causing the DFT subtraction in MX to subtract components from the wrong position for some spectral-line data from the VLA pipeline (also DEC-10?). The AP version was okay.
Moved to 15OCT86 this date, also Charlottesville Convex.

3450. *September 5, 1986* ALLTAB call sequence *Bill*

Corrected call to ALLTAB; the same LUN was being passed twice in the following: UVMOD, UVSUB, UVFIX, VBCAL, and VBMRG.
Moved nowhere.

3451. *September 6, 1986* D/CSEL.INC *Bill*

Added DOAPPL to indicate that any unapplied SN tables are to be applied to the CL table. These includes are used in the data selection and calibration routines.
Moved nowhere.

3452. *September 6, 1986* APGNOT:LGEOM *Kerry*

Redeclared variables used as adjustable array dimension specifiers from INTEGER*2 to simple INTEGER. Some compilers insist that 4-byte integers be used for this purpose. Simple INTEGER allows this, whereas INTEGER*2 forces an error. Also replaced all integer constants used as arguments in function and subroutine calls with properly declared and initialized INTEGER*2 variables with names of the form N*n*. Not all compilers have a robust counterpart to the NOI4 option under VMS and these constants default to 4-byte items. This makes little difference on VAXes due to their byte order; however, the results can be catastrophic on other architectures. Please be careful. I spend a ridiculously large fraction of my time correcting this category of bug.
Moved to 15OCT86.

3453. *September 12, 1986* D/DSEL.INC *Bill*

Added arrays RATFAC and DELFAC as IF-dependent scaling factors to scale delay and rate into the units needed to apply to the data.
Moved nowhere.

3454. *September 13, 1986* IMLOD, UVLOD, MLREOF *Bill*

Both IMLOD and UVLOD were having problems reading old files. IMLOD has been unable to read the old *AIPS*-style tables because MLTABL was reading the record past the table header. UVLOD in the 15JAN87 release only had an error which caused it to fail when the complex axis had only two values.
Both IMLOD and UVLOD were failing to detect the end of file tape mark in MLREOF because of the read ahead in TAPIO and the use of ZTAPE in MLREOF. The file mark was missed and the entire next file was read and reported as unknown records. MLREOF was modified to use TAPIO rather than ZTAPE which caused a change in the call sequence.
Moved IMLOD changes to 15OCT86 this date, nowhere else.

3455. *September 13, 1986* LG2BIT *Bill*

Replaced the explicit 16 bits per integer with NWDBIT from /DCHCOM/. The previous version would only work on systems and installations with 16-bit integers. (This assumption may also be made in some applications code calling LG2BIT.)
Moved nowhere.

3456. *September 15, 1986* TABKEY *Bill*

TABKEY now checks the existing keywords in a table header to see if a keyword/value pair it is trying to write already exists and, if so, replaces the value. Also fixed not to check if all keywords were found on OPCODE='ALL' (read all) and to return the actual number of keyword/value pairs present.
Moved nowhere.

3457. *September 15, 1986* D/CSEL.INC *Bill*

These includes contain the commons used to communicate with, and internally by, the calibration software. Added new values DXTIME, DXFREQ, CNTREC. DXTIME is used to pass the integration time to the calibration routines to allow for a correction of the amplitudes due to a rate error. DXFREQ is used internally for the channel bandwidth. CNTREC is used to communicate the number of records which were good, partly or fully flagged.
Moved nowhere.

3458. *September 15, 1986* UVLOD *Bill*

Added by Editors from CHKOUT *history:* Fix bug with COMPLEX axis of length two.
Moved nowhere.

3459. *September 16, 1986* CALINI *Bill*

Precursor misstated the order of the delay and rate residuals columns.
Moved nowhere

3460. *September 16, 1986* TABCAL *Bill*

New routine, does I/O to CL tables.
Moved nowhere.

3461. *September 16, 1986* IVAS Y routines *Eric*

The IVAS-specific code was developed in Fortran to use I^{2}S's IVAS Baseline Support package. I hope that they do not start charging for it — at least charging very much. Created YIVAS versions of:

- YBUTON — (New) A special routine to poll the buttons with time delays to see if more than 1 button is hit. The mouse has only 3 buttons, so "Button D" is any 2 or 3 buttons.
- YCHRW — Changed generic to double the basic characters for grey scale planes (is still basically generic) and to use the IVAS graphics processor to write characters in the graphics planes (non-generic, of course). Redesigning the grey scale fonts should be done, but will have to wait.
- YCNECT — Added special code to use the Hitachi graphics processor to draw lines in the graphics planes. Routine is still the generic one for grey channels.
- YCRCTL — Changed to use MOUSE routines and call YBUTON to handle the special code to make 3-button mice look like 4-button trackballs.
- YCUCOR — Changed to use a simpler, but probably more correct formulation — it may be IVAS specific, but I wonder if the "generic" one really is generic.
- YCURSE — As YCUCOR, including the doubts.
- YDOERR — (New) A special IVAS routine to issue the master clear.
- YGRAPH — Implemented new version: the colors are set here in order to handle plane intersections. Routine uses and sets YBUFF(13)-YBUFF(16).
- YIMGIO — Implemented new version: on 12-bit grey scale it masks the data to 11 bits and inserts the 12th bit in channel 2. This allows a separate LUT for each channel. For graphics, it must convert to a packed byte buffer which begins on an even pixel and contains an even number of pixels. It does this by placing zeros on either side as needed. The IVAS cannot write in the y direction.
- YINIT — Implemented primarily using VPSETUP, does the graphics colors (also set in YGRAPH), builds large plus-sign cursor.
- YLUT — Implemented as 11-bit input dta with channel number setting high bit in 12-bit mode; implemented with OFM in 8-bit mode.
- YOFM — Changed: uses only first 256 values writing to TV.
- YSCROL — Needs to compute upper left corner of window including the current zoom values. Uses either power of two or simple steps in zoom.
- YSPLIT — Use IVAS split areas 2 and 4 for quadrants 1 and 3 only.
- YTVCIN — Changed to IVAS parameter values including simple steps for zoom (factors 1 - 16).
- YTVCLS — No Z routine is needed: closes pseudo-entry in FTAB, resets transfer restrict, calls FIVASCLOSE.
- YTVMC — No Z routine is needed — calls RESET.
- YTVOPN — Calls ZIVSOP.
- YVRTR — (New) A special routine to switch transfer restrictions on and off to handle the VRTRTC argument of several of the Y routines.
- YZERO — Trickier routine than on the M70: using inhibited VPSETUP for grey scale and GPHFILL in "AND" mode for graphics.
- YZOOMC — Needs to compute upper left corner of window including the current scroll values. Uses either power of two of simple zoom steps.
- ZIVSOP — (VMS) The only Z routine for IVAS is needed to translate the logical name. The rest of the open operation is host independent.

Moved to 15OCT86 on 20-Sep to speed its delivery.

3462. *September 16, 1986* IVAS Y routines *Eric*

The IVAS will use the YGEN versions of

YALUCT	YCONST	YFDBCK	YGRAFE	YGYHDR	YIFM
YISDRM	YISDSC	YISJMP	YISLOD	YISMPM	YMAGIC
YMNMAX	YRHIST	YSHIFT			

because the corresponding subunits are not present,

YGGRAM	YMKCUR	YMKHDR	YSTCUR

because the functions are done differently, and

YCINIT	YCOVER	YCREAD	YCWRIT	YFIND	YLNCLR
YLOCAT	YLOWON	YSLECT	YTCOMP		

because the generic solution is okay for the IVAS.

Moved to 15OCT86 on 20-Sep to make it available sooner.

3463. *September 16, 1986* Parameter include *Bill*

A new include file PUVD.INC contains parameters frequently used to dimension arrays involving *uv* data. These parameters are referenced in the include files DGDS.INC, DMPR.INC and DSEL.INC as well as a number of local task include files. "P" type include files should preceed all other include files. Files changed are:

INC:PUVD.INC	INC:DSEL.INC	INC:CSEL.INC	APGNOT:SPLIT
QNOT:MAKMAP	APLNOT:CGASET	APLNOT:CSLGET	APLNOT:DATCAL
APLNOT:DATFLG	APLNOT:DATGET	APLNOT:DGHEAD	APLNOT:GAININ
APLNOT:IMCREA	APLNOT:INDXIN	APLNOT:NXTFLG	APLNOT:SELSMG
APLNOT:SOUFIL	APLNOT:UVGET	APLNOT:VISCNT	QYPGNOT:MX
QPGNOT:ASCAL	QPGNOT:UVSUB	QPGNOT:VBFIT	QPGNOT:VSCAL
QNOT:ALGSUB	QNOT:CCSGRD	QNOT:FFTIM	QNOT:GRDCOR
QNOT:GRDCRM	QNOT:GRDSUB	QNOT:UVGRID	QNOT:UVMDIV
QNOT:UVMSUB	QNOT:UVMTYP	QNOT:UVUNIF	QNOT:VISDFT
APLNOT:FRQTAB	APLNOT:GETCTL	APLNOT:GRDAT	APLNOT:GRDSET
APLNOT:SETGDS	APLNOT:SETGRD	APLNOT:UVDOUT	

Moved nowhere; some not even putback until 13 Oct.

3464. *September 16, 1986* Other IVAS-suggested *Eric*

During testing of the IVAS a number of bugs were found and corrected. Also, the zoom algorithm was changed to have button C decrement the zoom (as in TVFIDDLE). Changed are:

- AU5 — Increased scratch buffer for use with YINIT.
- AU5D — Corrected minor bug.
- AU6 — Changed the TVZOOM algorithm to have button C decrement the magnification — it takes too many button hits to go all the way around on the IVAS.
- AU6B — Changed to use the TV to read back an image if the ZOPEN call fails (*i.e.*, it has been ZAPped). Corrected it to test TV positions against the TV window rather than the image window (!) and to avoid doing extra work if all quadrants are the same.
- GRLUTS — Corrected bug which gave bad coordinate for plot.
- TVROAM — Changed in a manner similar to AU6.
- TVZOOM.HLP — Cleaned up the wording and added the new button C function.
- TVROAM.HLP — Cleaned up and changed description of buttons.
- ROAM.HLP — Cleaned up and changed description of buttons.
- IMVECT — Changed to use grey-scale MAXINT or graphics equivalent rather than turning on all bits. The IVAS uses MAXINT = 2046 to avoid a hardware "feature".
- BLTFIL — As IMVECT.
- YCNECT — (YGEN) Changed handling of position when making a vertical line with length 1 horizontal lines and vice versa.
- IENHNS — Changed the algorithm for setting slope and offset some more; corrected plotting.
- MOVIST — Corrected to return error code as advertised.
- TVLHDR — Deleted as obsolete.

Moved to 15OCT86 on 20-Sep, nowhere else.

3465. *September 16, 1986* YFILL *Eric*

The IVAS has the capability to fill ares of graphics quickly with any value. Therefore, I have made a new Y routine — YFILL — to fill an area of any channel with a specified value. Changed are:

YFILL — (YIVAS) Uses YIMGIO for grey planes and uses the graphics processor for graphics planes.
YFILL — (YGEN) Basically the old IZERO routine: uses YZERO for full planes and YFILL for partial planes.
IMANOT — Simplified the background fill, calling YFILL.
IZERO — Just calls YFILL adding the NO argument.
AU6B — Call YFILL to prepare display area.

Moved to 15OCT86 on 20-Sep, nowhere else.

3466. *September 17, 1986* VM *Tim*

VM had been completely broken since my last change. I fixed it. Would look like it was working for ERRORs round about 1 Jy/beam.
Moved to 15OCT86.

3467. *September 18, 1986* FILLR *Bill*

Corrected bad call sequence to TABSOU in FLRUV.
Moved nowhere.

3468. *September 18, 1986* VTESS *Tim*

Changed limit in HLP file to allow up to 16 fields. My mind must be going: I thought that I had fixed this a long time ago.
Moved nowhere.

3469. *September 22, 1986* POLCO *Neil*

Reduced subroutine MAXLIKE name to MAXLIK and made some minor typing changes.
Moved to 15OCT86 this date.

3470. *September 22, 1986* Zoom and Scroll *Eric*

In working on the zoom and scroll for the IVAS, I found that the code for the other TV devices is suspect. I have made my best guess on what will be correct and am putting that in the current two releases in the hope that it will get tested as soon as possible at sites which have these devices. Like the IVAS, the I^2S Model 75, DeAnza and Comtal Vision 1/20 specify the upper left pixel number when talking to the zoom/scroll subunit. Moved the supposedly generic YCURSE and YCUCOR to YM70: and moved the YIVAS: version to YGEN: since I think they are generic. Changed:

YSCROL — (YM75) Old version ignored previous zoom and set it to zero, apparently, without changing the *AIPS* commons. The old version also seemed to specify, if graphics scroll was requested, that the channels 8–15 be displayed, although channels 0–7 contained the *AIPS* images. The M75 seems to work the same as the IVAS, specifying the pixel number of the upper left corner of the resulting display, so we can use IVAS-like code. Changed to do grey and graphics channels separately and to include the zoom in the command and in the computation of the upper left pixel.

YZOOMC — (YM75) Changed to include the scrolls of the lowest on grey channel and graphics separately and to do a very different computation of the upper left corner pixel (like YSCROL above and the IVAS code).

YSCROL — (YV20) Changed to round off corner pixel computation and to do modulo arithmetic on displacements.

YZOOMC — (YV20) Changed to round off corner pixel computation and to do modulo arithmetic on displacements.

Moved to 15OCT86 this date.

3471. *September 22, 1986* CCMERG *Eric*

Corrected routine: service "package" routines must clean up after themselves. In this case, a test program was calling CCMERG repeatedly and blew up when over 250 scratch files had been created. Changed CCMERG to delete all scratch files created by the routines it calls.
Moved nowhere.

3472. *September 22, 1986* VM, VTESS *Tim*
The new, "corrected" release of these tasks had a bug affecting flux-constrained deconvolution which I did not detect before since I never use that mode. Caught in VM by DDT and AHB independently.
Moved to 15OCT86 on 24 Sep.

3473. *September 23, 1986* FNDCOL *Bill*
FNDCOL was only checking a number of column titles no larger than the number of actual columns in the table header. It now looks for all columns asked for.
Moved nowhere.

3474. *September 23, 1986* TOVLB *Bill*
Modified to read new antenna tables.
Moved nowhere.

3475. *September 24, 1986* IMLOD *Bill*
Changed to open and close history table in each routine which can make history entries rather than open the history and the beginning and leave it open. This is in an attempt to avoid the problem with history files which occurs on the Convex.
Moved nowhere.

3476. *September 24, 1986* TGET Files *Eric*
Some INPUTS files have grown beyond what was previously thought to be reasonable bounds. The format of the TS file must consequently be changed to allow 5 records per task or verb rather than just 2. Some tasks, *e.g.*, UVFLG, overwrite the following task otherwise. All old TS files must be deleted.
Moved to 15OCT86, nowhere else.

3477. *September 25, 1986* INDXR *Bill*
FNDCOL was being called after all TABIO calls writing the Index (NX) table but before it was closed. FNDCOL destroys the contents of the current TABIO buffer so the last buffer load of records was lost. FNDKOL is now called before any TABIO calls.
Moved nowhere.

3478. *September 25, 1986* TABAPP *Bill*
New subroutine to copy the contents of one table to the end of another.
Moved nowhere.

3479. *September 25, 1986* DBCON *Bill*
Modified to deal correctly with tables. The antenna tables are now correctly copied and none should be lost. The contents of the SU and CL tables associated with the second input file are appended at the end of the corresponding file from the first input data set. These tables may then need to be compressed via the task TAMRG.
Moved nowhere.

3480. *September 25, 1986* ANTINI *John Benson/Bill*
IATUTC was misspelled UT1UTC when copying to/from the array writing/reading the keywords to/from the table header.
Moved nowhere.

3481. *September 25, 1986* VBFIT.HLP *Bill*
The INPUTs section description of APARM had two lines misordered. This lead to the appearance that the default SNR cutoff was 10 min.
Moved nowhere.

3482. *September 25, 1986* APCLN *Miller Goss/Bill*
The number of components to use was being sent to IROUND. Now the value is rounded by adding 0.5.
Moved to 15OCT86 this date.

3483. *September 25, 1986* UPDAT *Eric*

Added by Editors from CHKOUT *file:* Corrected to rename all versions of extension files. It was doing the first only for the 15JAN87 format change.
Moved to the VLA this date.

3484. *September 27, 1986* Installation procs *Eric*

Changed the VMS installation procs:

IBATCH	—	As IBUILD.
IBUILD	—	Changed relinks to copies from our subsidiary load libraries where possible.
ICREOPT	—	Added extra IVAS and XANTH and system libraries to *.OPT files if the TV type is 5 (IVAS).
IPROMPT	—	Added IVAS to list of TVs.
IREADTAP	—	Changed the excludes of MC4, COS and UNIX to messages suggesting that the installer may wish to delete them.
IREBUILD	—	Added YIVAS, YPGVMS, and APGVMS to compile and link lists.
IREDOALLTV	—	Added YPGVMS to link list.
IREDOSOMTV	—	Added YPGVMS to link list.
TRANSPRT	—	Dropped the non-functional excludes which tried to avoid sending MC4, COS and UNIX and added excludes of the link "option" files for a second model of TV. Also dropped the exclusion of DOCPUBL: (*AIPSLETTER*s and *COOKBOOK*).

Also changed the installation guide text some: DOCTXT: GUIDE.RNO and GUIDE.MEM.
Moved to 15JAN87 this date.

3485. *September 27, 1986* Cookbook *Eric*

Changed the TEX macro files AL82.MAC and COOK82.MAC for the new version 2.0 of TEX. Changed COOK82.MAC for chapter-based page numbering. Changed all *COOKBOOK* text files, COOK0.TEX through COOK14.TEX plus COOKG.TEX and COOKZ.TEX, for this page numbering and other very minor matters. Rewrote the VLA section of COOKZ (done mostly by Pat Moore and Pat Murphy at the VLA), dropped the Modcomp section, and added a Charlottesville Convex section, plus some additional recipes.
Moved to 15JAN87 this date.

3486. *September 29, 1986* FILLR *Bill*

When multiple IFs (*i.e.*, B-D) were present, the visibilities on the second IF were not being flipped when the baseline was flipped due to *AIPS* conventions. This was causing most of the B-D IF data to be the complex conjugate of the correct values. Also, the INDEX table entries now have the time label as the center of the scan rather than the start.
Moved nowhere.

3487. *September 29, 1986* INDXR *Bill*

The Index (NX) table entry time labels are now the center time rather than the start time.
Moved nowhere.

3488. *September 29, 1986* Misc *Eric*

Changed:

CATDIR	—	If the header file failed on create, open, or write, the routine did not clean up after itself. Fixed to delete the file if created and then clear the catalog entry. Should relink all.
MDESTR	—	Inhibited messages about deleting extension files when the primary file is a scratch file. Yes — they now sometimes have such things.
DESCR	—	Changed it to call MDESTR so that scratch files will be fully destroyed including their extensions.
DMLT.INC	—	The upgrade for disk tape files in IMLOD had an error in the declaration of the 2nd copy of the inputs. As a result, some other potentially crucial common was having 24 bytes copied onto it. Fixed.
IMLOD	—	Supposedly was saving the input parms and restoring them for reuse on each image being loaded. However, the code was backwards and just copied the used common to the save area (otherwise unused) on each iteration. This copy statement was the one where the DMLT.INC bug had its affect. Fixed it.

Moved CATDIR to 15OCT86, none of the others.

3489. *September 29 1986* COPY *Pat*

Updated data version character to B for 15JAN87.
Moved nowhere.

3490. *September 30, 1986* ASCAL, VSCAL *Bill*

Changed internal variable named MAXANT to MXANTS to avoid conflict with the PARAMETER include PUVD.INC.
Moved nowhere

3491. *September 30, 1986* Misc *Eric*

Changed

GUIDE.RNO — Added suggestions on what people may wish to delete.
COOK14.TEX — Corrected 1 description of IMERASE.
NOBAT — Specified too few files in the ZDCHIN call, the minimum number of disk files is 2 (AC and MS).
AU5 — Increased size of display string to 20 characters.
CTRA.INC — Buffer alignment off — moved buffers to separate common.

Moved to 15OCT86 this date.

3492. *October 1, 1986* VLBDR *Bill*

Removed VLBDR. This task is no longer of use and has been replaced by VBFIT.
Moved to the big *AIPS* bin in the sky, this date; R.I.P.

3493. *October 1, 1986* VBCIT *Bill*

Modified to use the new Antenna tables.
Moved nowhere.

3494. *October 1-2, 1986* Misc *Eric*

Changed:

ZCREAT — Added message giving requested file size in 512-byte blocks when there is no room. Did both VMS and UNIX (generic).
REDIT — Moved to Local, deleted from APGVMS: as non-functional.
ZSTRTA — (VMS) Changed the system service used to determine the current terminal ID from SYS$TRNLNM to SYS$GETDVI. This allows the terminal to be a "virtual" terminal. Also corrected the error handling logic.
ASCAL — Dropped word "experimental" from the non-standard message. (TST only).

Moved to 15OCT86 this date (except ASCAL).

3495. *October 2, 1986* UVERR *Bill*

Replaced with the source for UVLOD with the appropriate modifications to read to bad FITS tapes. Also created UVERR.HLP.
Moved nowhere.

3496. *October 2, 1986* SPLIT *Bill*

Checked back in to make the midnight job happy. This version should work without the calibration options which are currently under active development.
Moved nowhere.

3497. *October 2, 1986* KEYIN, CITC2R *Bill*

Changed CITC2R to return time like numbers as hours. The out version would decode 12:30:30 as $(12 * 60 + 30) * 60 + 30$ (*i.e.*, seconds); 12:30 as $12 * 60 + 30$ (*i.e.*, min.). The new version will decode 12:30:30 as $12+30/60+30/(60*60)$ (*i.e.*, hours) and 12:30 as $12+30/60$ (*i.e.*, hours). Thus, the units will be independent of the precision used. The precursor comments in KEYIN were changed to reflect this change.
Moved nowhere.

3498. *October 2, 1986* VBANT *Bill*

Modified to expect times in hours from KEYIN reading T_{sys} and T_{ant} tables.
Moved nowhere.

3499. *October 2, 1986* VBLIN *Bill*

VBLIN was removed from the system. The new routine VLBIN will replace the function of VBLIN for reading DECODE tape from the NRAO VLBI correlator.
Moved to the *AIPS* bin in the sky, this date. R.I.P.

3500. *October 2, 1986* VM/VTESS *Tim*

Revised versions of VM and VTESS. VM now performs a subset of the functions of VTESS and therefore will be frozen as is. VM now refers the user to VTESS. Following suggestions by Bob Sault (U. Ill.), I have changed the algorithm slightly to behave rather more nicely near convergence. Specifically, it will no longer oscillate in FLUX/ERROR around the true values when close to convergence. The DDT test should be changed to reflect these changes (the current DDT test of VM is pretty daft anyway).
Moved nowhere.

3501. *October 2, 1986* Help files *Eric*

Cleaned up the help files for:

BY	—	Corrected description. Changed *RANCID* to AIPS.
FOR	—	Corrected description. Changed *RANCID* to AIPS.
ELSE	—	Corrected description. Changed *RANCID* to AIPS.
PRINT	—	Changed *RANCID* to AIPS.
WHILE	—	Changed *RANCID* to AIPS.
PRTAN	—	Changed CC to AN in inputs section.
IMLOD	—	Changed notes re types of tables files read.
TVOFF	—	Changed "on" to "off".
GETHEAD	—	Added note that GCOUNT = number of visibilities.
TAMRG	—	Tried to improve the wording for APARM. The concepts can be confusing in such a general task.
UVPLT	—	Corrected typo.
COPY	—	Added notes that the task only works on VAXes.
STARS	—	Added paragraph explaining that STARS uses the first line of the RUN file, unlike the files for the RUN command.
UVSRT	—	Corrected explain information; UVSRT uses two (2) scratch files.
PCNTR	—	Removed any limits on PCUT and ICUT; they are in image units now and can have no *a priori* limits.
PLROW	—	I forgot to change the explain file when I changed the program. Changed FACTOR to OFFSET and fixed the words describing it.

Moved to 15OCT86, nowhere else.

3502. *October 3, 1986* VM *Kerry*

Variables RESMIN and RESMAX in the routine CONV were undeclared and caused the Convex automatic update procedure to fail.
Moved nowhere.

3503. *October 3, 1986* UVFIX *Bill*

Fixed a number of minor problems relating to the new AN tables format. These problems caused the program to fail in rather obvious ways.
Moved nowhere.

3504. *October 7, 1986* QMSPL *Eric*

Changed help and Fortran: to reorder the adverbs more logically, to handle defaults for power-law transfer functions (to avoid the failure of GO on null adverb values of no interest to most users), and to complain about (and turn off) fast-mode grey-scale displays when they cannot be done (too few or too many pixels). When the last arises, the grey-scale pixels are ignored and it will be up to the user to resubmit QMSPL with a OPTYP set to the more expensive algorithms (*i.e.*, BITS).
Moved nowhere.

3505. *October 7, 1986* New verbs *Eric*

Changed POPSDAT.HLP, AU8, AU6A, AU5D, TVMOVI, MOVIST, and AU5B, and created new help files for the verbs:

CLRONAME — Clears the output name adverbs.
GETONAME — Sets the output name adverbs.
TVANOT — Puts a string on the screen in grey or graphics planes.
TVCUBE — Does TVMOVIE with a pattern of images better designed for display unzoomed and rather poor for movies. Changed TVMOVIE's pattern of images for better movies.
TVSPLIT — Does an interactive movement of split point with enhancement options.

Also fixed TVBLINK.HLP; it had an extra line of minuses which made part of the HELP portion appear to be an EXPLAIN portion. The call sequences to TVMOVI and MOVIST changed to allow 2 sequences of images. Added note to TVMOVIE.HLP about TVCUBE.
Moved nowhere.

3506. *October 7, 1986* New adverbs *Eric*

Changed SOURCE to OBJECT since the old name conflicted with the array-adverb SOURCES. This required changing POPSDAT.HLP, DAPL.INC, CAPL.INC and the help files for CANDY, EXFND, EXPND, FILLR, UVERR, UVLOD, VBLIN, and WSLOD and, of course, OBJECT. WSLOD actually uses INNAME (WSRT has 12-character source names) so corrected the help to reflect this throughout rather than just in the Inputs part.
Also created the new adverb CUTOFF, changing POPSDAT.HLP, DAPL.INC, and CAPL.INC to specify it. Changed NEWPARMS.001 RUN file to specify only STFACTOR and CUTOFF, since all the other adverbs in it were created before the last increase of the SAVE/GET version number. Created CUTOFF.HLP.
Moved nowhere.

3507. *October 7, 1986* SDCLN *Eric*

New task — experimental version of APCLN which can switch to the Steer/Dewdney/Ito ("SDI") algorithm when enough pixels get into the upper portions of the histogram of the residuals. This implementation differs from the implementation in STEER and APVC in several ways: (1) The components found in the SDI portion are treated as ordinary CLEAN components. They are written to a CC file along with those found by the BGC algorithm in the early iterations and are restored to the output image after convolution with a clean beam. (2) The residual image is added into the output image as well. (3) The SDI loop gain is a parameter, but it is modified in each cycle to account for the "beam volume"; STEER uses a constant loop gain. The effective loop gain is found by iteratively evaluating the convolution of the center part of the dirty beam with the potential components and varies for each component. This is a more advanced procedure than that used by SDI. In addition, SDCLN merges the CC file after every 10 major loops, since so many components lie on the same cells and does the following subtraction using all components from the initial dirty map. The latter operation should avoid cumulative arithmetic errors. This task could replace APCLN after some experimentation, since APCLN is, roughly, the default option.
Moved nowhere.

3508. *October 7, 1986* Bug fixes *Eric*

Corrected SDCLN, putting correct include file names into the text. Added new includes DSDI and CSDI to INC:.
Changed AU6A to allow diagonal splits in TVSPLIT when possible.
Moved nowhere.

3509. *October 10, 1986* TAPLT *Bill*

Modified to use new tables format; FNDTXY was not taking the "type" returned from GETCOL modulo 10. The row number was being plotted aginst itself. Also cleaned up several misunderstandings about the data type code.
Moved nowhere.

3510. *October 10, 1986* Batch *Eric*

Changed AIPSB to exit without printing any messages. The job's messages may be printed with an explicit PRTMSG in the job or in a later interactive session.
Moved nowhere.

3511. *October 10, 1986* VAX procs *Eric*

Corrected SYSVMS and SYSLOCAL versions of COMRPL.COM to allow them to compile Macro routines without an explicit .MAR and to remove a redundant branch. Made the first correction also to SYSVMS and SYSLOCAL versions of COMLNK.COM and to the SYSVMS version of COMTST.COM. Also corrected IREBUILD.COM (VMS installation proc), removing repeated COMRPLs of QFPS and QFPS16 and a COMRPL of a non-existant area. Changed AIPSUSER.COM to make symbols for GRIPR, BATER, and AJAX and added new .COM files of these names to SYSVMS.
Moved to 15OCT86 this date, nowhere else.

3512. *October 10, 1986* Misc. *Eric*

Corrected SDCLN: it thought its name was STCLN internally. Changed TVMOVI to handle 480 line I^2S screens (it needs special zoom center corrections). I wonder if it will work okay for odd magnifications on the IVAS; I'll have to test it later when the IVAS is reconnected. Corrected AU5D; it had the wrong call sequence to MOVIST, blocking REMOVI on channels other than 1.
Moved nowhere except AU5D fix.

3513. *October 11, 1986* LGEOM *Neil*

Corrected LGEOM so that it now outputs a header that correctly describes whether the image has magic blanking or not. Also clarified help file as to the meaning of APARM(9), the zero or blank adverb.
Moved nowhere.

3514. *October 11, 1986* HGEOM *Neil*

Corrected HGEOM so that it now outputs a header that correctly describes whether the image has magic blanking or not. Also clarified help file as to the meaning of APARM(2), the zero or blank adverb.
Moved 15OCT86 on 15 Oct 1986 by Eric.

3515. *October 11, 1986* Misc *Eric*

Changed the help files for BATER, GRIPE,.GRIPR, and RUN to reflect the new use of VMS symbols (*e.g.*, GRIPE) rather than procedures (*e.g.*, @GRIPE). Made corresponding changes to *COOKBOOK* TEX files COOK11, COOK13 and hboxCOOKZ. Added SCRATCH to AIPSUSER.COM and a SCRATCH.COM in SYSVMS. Also made some corrections to help files NEWTASK and PANIC. Copied SPACE.COM from the VLA.
Moved to 15OCT86 this date.

3516. *October 11, 1986* PGEOM *Neil*

Corrected PGEOM so that it now outputs a header that correctly describes whether the image has magic blanking or not. Also clarified help file as to the meaning of APARM(10), the zero or blank adverb. There is a lot of duplicated code in the *GEOM family; these programs should be combined into one, so that changes such as those I have just made only have to be done once. I have not corrected GEOM, as LGEOM has pretty much superseded it.
Moved nowhere.

3517. *October 11, 1986* Batch *Eric*

Corrected bug in BATER; QUEUES was listing to 64 jobs when there can be no more than 51 and, hence, printing garbage. Added more messages to AUB and BATER for UNQUE and JOBLIST to clarify why the job is not available.
Moved to 15OCT86 this date, nowhere else.

3518. *October 13, 1986* PRTUV *Bill*

Added BIF adverb to specify the IF number of the data to display. Also changed PRTUV.HLP.
Moved nowhere.

3519. *October 13, 1986* Calibration routines *Bill*

"Finished" extensive revision of the routines applying the calibration and solution (CL and SN) tables to data. The routines affected are: DATGET, UVGET, DGHEAD, GAININ, CGASET, DATCAL, CSLGET, DATFLG, VISCNT. Added the following new routines:

CLUPDA — Updates CL tables by smoothing SN tables via SNSMO and applying them to the CL table via SN2CL.

SNSMO — Does boxcar smoothing of SN tables.

SN2CL — Applies a SN table to a CL table; if the output CL table does not exist or there is no overlap, then the contents of the SN table are copied to the CL table.

Moved nowhere.

3520. *October 13, 1986* SPLIT *Bill*

Made numerous improvements to the handling of subarrays; now gives a summary of the data flagging and the number of visibilities. Also changed SPLIT.HLP.
Moved nowhere.

3521. *October 13, 1986* CALIB *Bill*

New task. CALIB determines delay/rate/amplitude/phase solutions for specified sources in either a single source or multi-source data file. This general purpose, continuum calibration routine is intended to replace tasks, VBFIT, ASCAL and VSCAL and to allow general calibration of interferometer data. At a later date, this program will be split into two tasks, one for delay/rate/phase solutions and the other for amplitude/phase solutions. CALIB can currently handle line data, but no frequency-dependent corrections are determined (except for the group delay). Also added CALIB.HLP, DCLB.INC, CCLB.INC, DCL2.INC, and CCL2.INC.
Moved nowhere.

3522. *October 13, 1986* TABED *Bill*

New task. This task allows simple editing operations to be done on tables. Also TABED.HLP.
Moved nowhere.

3523. *October 13, 1986* WTMOD *Bill*

New task. This task allows modification of weights associated with *uv* data. The weights can be multiplied by a factor, raised to a power and cliped at some maximum value. Also WTMOD.HLP.
Moved nowhere.

3524. *October 13, 1986* USUBA *Bill*

Changes a specified subset of a *uv* data set to a specified subarray. Both the visibility data and the CL tables are updated. The labeled times are not changed in the data.
Moved nowhere.

3525. *October 13, 1986* SN tables *Bill*

New routines: SNINI, TABSN, initilize and do I/O to solution (SN) tables.
Moved nowhere.

3526. *October 13, 1986* TY (System temperature) Tables *Bill*

New routines: TYINI, TABTY, initilize and do I/O to system temperature (TY) tables. Used by ANCAL.
Moved nowhere.

3527. *October 13, 1986* ANCAL *Bill*

New routine. Reads Cal Tech format VLBI calibration files and applies them to a specified CL table. Also created ANCAL.HLP, DANC.INC, CANC.INC.
Moved nowhere.

3528. *October 14, 1986* TABSRT *Bill*

Modified to destroy the scratch files it created when it is done.
Moved nowhere.

3529. *October 14, 1986* QINIT *Bill*

Added CALIB to the list of AP tasks to check for. FPS 16-bit version.
Moved nowhere.

3530. *October 14, 1986* TAPIO *Bill*

Changed the test for physical tape to be the range of LUNs 31 to 30 + number of tape drives.
Moved nowhere.

3531. *October 14, 1986* Misc *Eric*

Changed SPACE.COM to add instructions about 2-parameter responses — the 2 must be separated by commas and no blanks. Also changed TST version to look for format level B. Changed AREAS.DAT to add some logicals for installation (INSVMS, INSCOS, INSUNIX), Z routines (APLPSC for Pittsburgh Supercomputer Center, APLSUN for SUNs), procedures (SYSSUN for SUNs, SYSCVEX for Convex and SYSPSC for Pittsburgh mess).
Moved to 15OCT86 this date, nowhere else.

3532. *October 15, 1986* SUN discovered *Eric*

Kerry found on the Princeton SUN:

- DBCON — It is apparently improper to do IF (L1.EQ.L2) where L1 and L2 are logical variables. Changed two statements to do the equivalent operation properly.
- FITTP — Corrected error: logical equivalence name was mistyped as the I*4 name in a table routine. Changed hex format to a machine portable method (A format in array of hex digits).
- HGEOM — Fixed several EQUIVALENCE statements out of order.
- IMFLT — Fixed use of illegal functions SIND, COSD, and ATAND and corrected handling of blanking flag.
- IMLOD — Declared IAND two places.
- JMFIT — Declared FX as EXTERNAL in DVDMIN and changed to acceptable usage rather than ASSIGN statements in DNRM2.
- NNLSQ — Changed to acceptable usage rather than ASSIGN statements in NNLS.
- SLICE — Corrected long comment line.
- SMOTH — Corrected comparison of integer variable with CHARACTER constant. The construct will not work on Crays.
- WARP — Declared FCN external in main and corrected order of declarations in 2 subroutines.
- CORER — Rearranged typing of two ENCODEs to avoid long lines after UNIX pre-processing.
- RWTAB — Cleaned up typing; the code which needed changing is not in the 15JAN87 version.
- TABMRG — Same problem with logicals as DBCON.

Moved corrections to 15OCT86 this date.

3533. *October 15, 1986* CLUPDA *Bill*

Un-commented out a section of code which caused already applied SN tables to be ignored.
Moved nowhere.

3534. *October 16, 1986* UVAVG *Bill*

Relaxed the test for time ordering of the data slightly. The former test was occasionally failing due to roundoff errors in the funny way this task deals with time.
Moved nowhere.

3535. *October 16, 1986* Misc TV *Eric*

Changed AU5 code to specify all graphics channels better on GRCLEAR and GROFF defaults. Changed YDEA:YINIT to specify the null y scroll better (*i.e.*, 511 rather than 0). Removed an "I^2S-ism" from TVZOOM.HLP.
Moved to 15OCT86 this date.

3536. *October 16, 1986* Batch *Eric*

AIPSC did not handle the failure to activate QMNGR properly. Fixed it to leave job marked ready to run and exit fairly gracefully. It was going into an infinite loop of sorts. Also fixed the printing of messages on error.
Moved to 15OCT86 this date.

3537. *October 16, 1986* VLBIN *John Benson*

New task. This is a replacement for VBLIN, which reads NRAO DECODE tapes (from the VLBI correlator) and writes multi-source data files. Also VLBIN.HLP, D/CVLB.INC, D/CSET.INC, D/CKIN.INC and D/CREC.INC.
Moved nowhere.

3538. *October 16, 1986* Flagged table entries *Bill*

Fixed the following calibration routines to ignore flagged SN and/or CL records: SNSMO, SN2CL, CSLGET. Also fixed SNSMO to keep correct count of records when appending them to the end of a table.
Moved nowhere.

3539. *October 16, 1986* TAFLG *Bill*

Modified to use new tables format; FNDTXY was not taking the "type" returned from GETCOL modulo 10. The row number was being plotted against itself. Also cleaned up several misunderstandings about the data type code. FNDTXY was not returning the correct value when a constant was specified.
Moved nowhere.

3540. *October 16, 1986* SPLIT *Bill*

Fixed logic problem which caused it to not do anything if all sources were specified.
Moved nowhere.

3541. *October 16, 1986* DGHEAD *Bill*

Epoch was being taken from the R*4 array rather than the R*8 array so the msb of the RA was being used as the Epoch in the header record.
Moved nowhere.

3542. *October 16, 1986* CLUPDA *Bill*

The input CL table was being sorted to antenna-time order and the first SN table was being applied if all SN tables were marked as being applied. Now this sort of the CL table and the call to SN2CL are not done if all SN tables have already been applied.
Moved nowhere.

3543. *October 16, 1986* UVGET *Bill*

The contents of the common /MAPHDR/ were getting wiped out now that TABSRT destroys its scratch files. The contents of /MAPHDR/ are now restored if it is possible that TABSRT may have run. Also suppressed ZCLOSE messages when closing the input *uv* data file.
Moved nowhere.

3544. *October 17, 1986* Friendliness and *uv* grid size *Bill*

The use of tapering in images causes many of the user's visibility points to lie outside of the region of the *uv* plane covered by the *uv* grid. This is "no problem" for MX which simply discards data outside of the grid; but UVSUB was not trapping this case and was blowing up. MX now tells the user that n of m visibility points were used, to alert the user if a large fraction of his data is being discarded. UVSUB (via routine ALGSUB) tells the user that he has violated the limits and quits. Affected routines: MX and ALGSUB.
Moved nowhere.

3545. *October 17, 1986* Overridding CMETHOD *Bill*

In a number of instances, various routines would override the user-specified value of CMETHOD (the method for computing the transform of a model) if the specified method was incompatable with other parameters such as the sort order of the data. In these cases, the user is now explicitly warned that his instructions have been overriden. In addition, UVMSUB and UVMDIV now give an estimate of the CPU time required whenever the requested method has been overridden. This change required a change to the call sequence to UVMTYP to return the estimates of the time. QVEX:QMTYP was added; it estimates the times for the DFT and gridded interpolation by using the VAX+AP parameters and then dividing by 3. Affected routines: UVSUB, UVMSUB, UVMDIV, UVMTYP, SETGDS, QVEX:QMTYP.
Moved nowhere.

3546. *October 17, 1986* UVGET *Bill*
Now checks that BCHAN, ECHAN, BIF, EIF do not exceed the values available in the data.
Moved nowhere.

3547. *October 18, 1986* MX *Bill*
Changed call sequence to UVMTYP in MXSUB.
Moved nowhere.

3548. *October 20, 1986* UVGET *Bill*
The flag table was being sorted into time order only if it was already in time order.
Moved nowhere.

3549. *October 20, 1986* DATFLG *Bill*
Fixed indexing problem in loop checking if all data was flagged.
Moved nowhere.

3550. *October 20, 1986* NXTFLG *Bill*
Fixed to make sure the baseline was specified with the smaller antenna number as antenna 1.
Moved nowhere.

3551. *October 20, 1986* SOUFIL *Bill*
Added PUVD.INC PARAMETER include. An earlier entry incorrectly stated that this had been done.
Moved nowhere.

3552. *October 20, 1986* GO *Eric*
Changed the default parameter range from $\pm 10^{10}$ to $\pm 10^{16}$.
Moved to 15OCT86 this date, nowhere else.

3553. *October 21, 1986* Misc for port *Eric*
Changed AREAS.DAT to define SYSALLN, a system area for special Alliant procedures. Copied Lexidata Y routines into an area [.Y.DEV.LEX.LEXC]. These routines were provided by Bret Goodrich of Haystack. They are written in C for no apparent reason and, hence, have been put in a nonstandard area one layer below normal. We can't compile or test them and they may not meet all the current requirements. However, they are there for anyone who may want to use them.
Moved to 15OCT86 this date.

3554. *October 21, 1986* QPSAP:QRECT *Bill*
Changed the intrinsic function IAND to JAND.
Moved nowhere.

3555. *October 21, 1986* CLUPDA *Bill*
CLUPDA called TABSRT with an I*4 buffer size; this has been fixed. Also error handling improved.
Moved nowhere.

3556. *October 21, 1986* ANCAL *Bill*
Several arguments to TABTY were declared R*8 instead of R*4 in GETCAL.
Moved nowhere.

3557. *October 21, 1986* Installation procs *Eric*
Changed IBUILD.COM, IBATCH.COM and TRANSPRT.COM to drop the IVAS load modules from the VMS transport. This was needed to keep the transport at 1600 bpi down to two tapes. I don't know what we will do next time. The IVAS routines did go out in all forms on the 6250 bpi tape and in all forms but the load modules on the 1600 bpi tape.
Moved from 15OCT86 this date.

3558. *October 21, 1986* SYSCVEX: AIPS *Kerry*

AIPS is the UNIX startup procedure for AIPS. The NRAO Convex version differs from the SYSUNIX version in that for users on the terminals reserved for AIPS1 and AIPS2, ZSTRTP is executed instead of ZSTRTA. ZSTRTP is identical to ZSTRTA, except that it is linked with a special version of ZXUID which, before setting the effective user id to that of the *AIPS* account, momentarily becomes the superuser and elevates its, and its childrens', execution priority. This requires superuser privilege, so ZSTRTP must therefore belong to root and have the set-effective-user-id bit set in its file permissions as well.
Moved to 15OCT86.

3559. *October 21, 1986* SYSUNIX: AREAS* *Kerry*

The AREAS* files are used to establish the environment variable definitions for the various directories in the *AIPS* programming environment. These have been updated to incorporate new directories and include:

- AREAS.DAT — The main "areas" data file (very similar to the SYSVMS version, but not quite).
- AREAS.CSH — C shell syntax for defining the necessary environment variables.
- AREAS.SH — Same as AREAS.CSH but in Bourne shell syntax.
- AREAS — A new procedure that will massage AREAS.DAT via sed into AREAS.SH and AREAS.CSH (used AREASCSH.SED and AREASSH.SED).

Moved to 15OCT86.

3560. *October 21, 1986* SYSCVEX: AREAS.CSH, AREAS.SH *Kerry*

Because of a system bug, the Convex versions of these files have been trimmed down to eliminate rarely used directories. Otherwise the environment created causes procedures to fail with "floating point exceptions" (bizarre). Convex is aware of the problem and they hope to remedy the situation soon. Until then, our programming environment is compromised, particularly in the case of the update job that runs every night. We have not seen this problem on any other modern UNIX system.
Moved to 15OCT86.

3561. *October 21, 1986* ASSNLOCAL.*, ASSNBASIC.*, LOGIN.* *Kerry*

ASSNBASIC.CSH and ASSNBASIC.SH were originally designed as part of the effort to imitate the VMS/*AIPS* environment. The distinction between the actions of ASSNLOCAL.CSH and ASSNLOCAL.SH versus ASSNBASIC.CSH and ASSNBASIC.SH were found to be purely artificial in a UNIX environment. Furthermore, the *.CSH (C shell) versions are unnecessary since these are only invoked from Bourne shell procedures and have therefore been eliminated. Some of the actions of ASSNBASIC.SH have been merged into ASSNLOCAL.SH, whereas the rest have been put into the new files LOGIN.CSH and LOGIN.SH. The LOGIN.* files are designed to be executed by the *AIPS* and *AIPS* programmer login procedures. The one to use depends on your default login shell (C versus Bourne). The ASSNLOCAL.SH file is only executed by the program startup procedures AIPS, BATER and RUN. Part of the ASSNLOCAL.SH strategy is intended as a means by which the size of the environment can be minimized in order to avoid the Convex system bug mentioned above. Once Convex resolves its problem, the actions of ASSNLOCAL.SH can be absorbed into the LOGIN.* files and ASSNLOCAL.SH, like ASSNBASIC, will disappear. In any case, the LOGIN.SH files require no modification for UNIX/*AIPS* installations, but the ASSNLOCAL.SH file which contains device definitions must be installation-specific. Changes made in SYSUNIX:.
Moved to 15OCT86.

3562. *October 21, 1986* SYSCVEX: ASSNLOCAL.SH *Kerry*

ASSNLOCAL.SH is installation-specific and this version contains NRAO-CV Convex-specific device definitions. It is rather naive to think that the only Convex that will ever run *AIPS* is the Charlottesville machine. Instead, we should create another level of directories to serve as a repository for local definitions.
Moved to 15OCT86.

3563. *October 21, 1986* SYSCVEX: ZDIFF *Kerry*

ZDIFF is a programming tool that will take a list of files from one directory and difference the files with identically named files in a second directory. If the files are the same, the file in the first directory is deleted. If they are different, the differences are recorded in a *.DIF file and the process continues.
Moved to 15OCT86.

3564. *October 21, 1986* SYSUNIX: PP, INCLUDE.C, INCS.SH *Kerry*

The UNIX source code preprocessor (PP) uses a search path for INCLUDE files as an environment variable called INCS defined as a blank-delimited list of directories. INCS was formerly defined as part of the login procedure for *AIPS* programmers. This meant that programmers, being the clever people they often are, could redefine the path to be anything that they pleased, including private directories. A possible result was that source code could be preprocessed, compiled and installed in the official system successfully without a prayer of ever being maintained. PP now defines the offical search path on each invocation by executing . $SYSLOCAL/INCS.SH. INCLUDE.C will include unofficial files, but warning messages are issued. This way the official search path is the only interpretation of the "INCS:" prefix in the VMS-style INCLUDE statements used in *AIPS* source code. The INCS.SH stored in SYSUNIX defines the generic UNIX search path which consists of $INC only ($INCNOT and $INCUNIX are currently empty directories and are left out for the sake of speed). Recipients should copy this version of INCS.SH to their local *AIPS* "system" directory and modify it to the requirements of their installation. Modification should only be necessary to incorporate installation-specific INCLUDE files directories (*e.g.*, INCS.SH in SYSCVEX and SYSALLN).
Moved to 15OCT86.

3565. *October 21, 1986* SYSCVEX: *OPTS.SH, LIBR.DAT *Kerry*

The *OPTS.SH files are compile and link options files for the Convex C-1 and include: ASOPTS.SH, CCOPTS.SH, FCOPTS.SH and LDOPTS.SH. The options files map host compiler/loader syntax into *AIPS*-style programming procedure syntax (*e.g.*, optimization levels, link map generation, etc.). LIBR.DAT defines source code and link libraries for the NRAO-CV Convex. This serves as an example only and should be edited by recipients to reflect the *AIPS* installation file system.
Moved to 15OCT86.

3566. *October 21, 1986* PP, ENCODE.SED, UNDCL.SED, INCS.SH *Kerry*

Changes in SYSCVAX: The *AIPS* source code preprocessor (PP) for a Convex is very similar to both the generic UNIX version found in SYSUNIX and the version for the Alliant FX series found in SYSALLN. ENCODE and DECODE are supported in Convex Fortran, so the tranformation to internal WRITEs and READs is unnecessary. However, the last release of the Convex compiler generates code for those ENCODEs which contain error branching that *always* branches. Convex is aware of the problem, but, until they can implement a fix, all ENCODE error branching in *AIPS* source code is stripped out as part of the preprocessing using sed and the sed script ENCODE.SED. We have to do the same under COS since Cray's version of ENCODE/DECODE does not support error branching at all (ENCODE/DECODE is not part of the ANSI standard). In any case, the error branching that is done is mostly residual debugging code so there is little harm in stripping it out. UNDCL.SED is used with sed to insert IMPLICIT NONE statements at the beginning of each program unit in order to detect undeclared items (both Alliant and Convex should provide the -u compiler option that the UNIX portable f77 compiler has; even VMS now has a compiler option for this). INCS.SH is used by the preprocessor (PP) to define the Convex-specific INCLUDE file search path. On a Convex, this is INCVEX followed by INC (both INCNOT and INCUNIX are currently empty directories and have been left out for the sake of speed).
Moved to 15OCT86.

3567. *October 21, 1986* SYSSUN: *OPTS.SH *Kerry*

Based on a recent port of *AIPS* to the Princeton Observatory SUN/3, the compiling and linking options files have been developed: ASOPTS.SH, CCOPTS.SH, FCOPTS.SH and LDOPTS.SH. Recipients should take note that the -O level of Fortran optimization is *not* the default because, in a few cases, it produced code that went into infinite loops. Anyone installing *AIPS* on a SUN should first install with this optimization level selected only for the Q-routines. Even then, it will only improve performance marginally. After *AIPS* seems to be working satisfactorily, this level of optimization can be enabled for the remainder of *AIPS* and the problem routines can be identified and handed to SUN as examples of compiler bugs.
Moved to 15OCT86.

3568. *October 21, 1986* SYSUNIX: MAKELIB *Kerry*

This is a new procedure that will create a randomized archive file (*i.e.*, object library) suitably ordered for one-pass linking. This is intended for use by the UNIX/*AIPS* installation procedures only.
Moved to 15OCT86.

3569. *October 21, 1986* SYSALLN: *Kerry*

Alliant system procedures and definitions used in the programming, maintenance and execution of *AIPS* on the FX series, including:

```
ASSNLOCAL.SH    CCOPTS.SH    FCOPTS.SH    INCS.SH    LDOPTS.SH
LIBR.DAT        PP           UNDCL.SED    ZXLPRT
```

ASSNLOCAL.SH and ZXLPRT should be taken as examples only. LIBR.DAT can be used after pathnames have been edited to reflect the host file system. PP is nearly identical to the Convex version (except Alliant Fortran doesn't have the current problem with error branching in ENCODE statements). Both use sed with the sed script UNDCL.SED to insert IMPLICIT NONE at the beginning of every program unit (both Alliant and Convex should provide the -u compiler option that the UNIX portable f77 compiler has; even VMS now has a compiler option for this). ENCODE and DECODE are supported in Alliant Fortran, so the tranformation to internal WRITEs and READs is unnecessary. INCS.SH is used by the preprocessor (PP) to define the search path for INCLUDE files. On an FX series machine, this is INCALN followed by INC (INCNOT and INCUNIX are currently empty directories and have been left out for the sake of speed). Recipients should examine the optimization levels defined in FCOPTS.SH and compile code according to their system configuration. Consulting with the *AIPS* group is probably a good idea.

Moved to 15OCT86.

3570. *October 21, 1986* CHAIPS.C *Kerry*

CHAIPS.C is a new addition to the family of UNIX/*AIPS* programming tools (in SYSUNIX: and SYSCVEX:). It is a simple C program intended to perform the combined action of the UNIX commands chmod (change mode) and chown (change owner) in a specific way. CHAIPS is used by the procedure LINK to (1) change the ownership of the resulting executable to the *AIPS* account and (2) change the permission bits on the resulting executable to 4775 (sets effective-user-id to that of the owner upon execution). Changing ownership requires superuser privilege and this may not be available to some recipients, so the SYSUNIX version has this step commented out. The SYSCVEX version reflects the NRAO-CV mode of operations where ownership changing is allowed. This is necessary because *AIPS* group members are allowed to program from their private logins and the resulting executables would otherwise belong to them (and execute as them). In any case, for CHAIPS to change ownership, its corresponding executable must be owned by root and have the set-effective-userid bit enabled. This is not necessarily the best approach, but it will have to do for now.

Moved to 15OCT86.

3571. *October 21, 1986* SYSUNIX: INCS.FOR *Kerry*

INCS.FOR is a file that contains a dummy main program with dummy subroutines. The main program contains VMS style INCLUDE statements for all *AIPS* I*.INC files and the subroutines contain INCLUDE statements for all D*.INC, C*.INC, E*.INC and V*.INC sets from the *AIPS* INCLUDE file library. The purpose of INCS.FOR is to provide a file that an *AIPS* installer can preprocess and compile to detect any INCLUDE files that may cause problems on the target system (*e.g.*, common-block alignment errors on those systems that care about such things, like VAXes running 4.2bsd UNIX). Performing this simple test prior to invoking the lengthy installation scripts can be well worthwhile.

Moved to 15OCT86.

3572. *October 21, 1986* SYSCVEX: ZXLPRT, ZQMSCL *Kerry*

In UNIX/*AIPS*, ZXLPRT is the procedure that is executed in order to spool *AIPS* printer output to the line printer. On the NRAO-CV Convex, this is the Versatec printer on CVAX. This means ZXLPRT must transfer the file to the CVAX print queue LPA0. This is done via ftp and the ethernet connection between the two machines. This assumes both that the ethernet connection is intact and that CVAX is up. The NRAO-CV Convex version of ZXLPRT will attempt the transfer 10 times at 10-second intervals and, if unsuccessful, tells the user to notify the *AIPS* system manager. ZQMSCL is the counterpart of ZXLPRT for files that need to be sent to the QMS Lasergrafix 800 on the Convex. It spools the file and then displays the printer queue which contains lowercase characters. This can drive the TEC terminals, that we often use as *AIPS* message terminals, crazy. The printer queue display is piped through sed using TOUPPER.SED to convert everything to uppercase in order to avoid this.

Moved to 15OCT86.

3573. *October 21, 1986* Print Spooling Procedures *Kerry*

Several commands have been developed in SYSCVEX: to facilitate printing files on the various NRAO-CV machine room printers including:

QMSLAND	—	Sends file to the QMS Lasergrafix 800 on the Convex in landscape mode.
QMSLAND.HDR	—	Landscape setup header file used by QMSLAND.
QMSPORT	—	Sends file to the QMS Lasergrafix 800 on the Convex in portrait mode.
QMSPORT.HDR	—	Landscape setup header file used by QMSPORT.
SPINCVAX	—	Transfers file via ftp to the NEC Spinwriter on CVAX.
VERSATEC	—	Transfers file via ftp to the Versatec printer on CVAX.

Moved to 15OCT86.

3574. *October 21, 1986* Alliant Fortran/C Interface *Kerry*

On all UNIX systems to which NRAO has had firsthand experience porting *AIPS* (UTS, Masscomp, Convex, Sun, VAX), the position of the extra arguments passed with arguments of type CHARACTER to C procedures has been the same, except for the Alliant FX series. The absence of complaints from those who have done ports to other machines suggests that this is at least a de facto standard. However, since there is no official standard for such extra argument positioning, the practice of depending on them at all should be discontinued (even if Alliant sees its way clear to joining the rest of the UNIX world). However, until this practice can be corrected in the generic versions of the UNIX/*AIPS* Z routines, the Alliant versions have been kludged to avoid the problem by passing these extra arguments as formal parameters in the following routines:

ZACTV8	ZACTV9	ZCLOSE	ZDCHIN	ZDESTR	ZDIR	ZESTEX
ZEXIST	ZFREE	ZGTDIR	ZMYVER	ZOPEN	ZPARS	ZQCRE3
ZQCREA	ZQMSIO	ZQOPEN	ZQRENA	ZTOPEN	ZTXMAT	ZWHOMI
ZXCLOG	ZXFREE	ZXLPRT	ZXMKTM	ZXMSGS	ZXTLOG	ZXXIST

These routines are otherwise the same as their APLUNIX, APLBERK and APL4PT2 counterparts.
Moved to 15OCT86.

3575. *October 21, 1986* APLALLN: ZQASSN, ZQTAPE *Kerry*

All UNIX/*AIPS* tape interfaces are grossly device-dependent. The interface for the Alliant FX series is no different, however, Alliant has introduced a different twist by providing "virtual" status registers. I'm not sure what the advantage is over the nearly standard mt_dsreg registers found in sys/mtio.h on other systems. In any case, having seen almost every variation the UNIX world has to offer, it didn't take long to figure out how to implement tapes on the FX series.
Moved to 15OCT86.

3576. *October 21, 1986* APLALLN: ZTTYIO *Kerry*

Contrary to my experience with other Berkeley UNIX systems, the Alliant FX series required "carriage control" for Fortran terminal output.
Moved to 15OCT86.

3577. *October 21, 1986* APLALLN: ZDELA2 *Kerry*

For all other UNIX systems, this is a C routine and either calls the standard C library function sleep (Bell UNIX and pre-4.2bsd UNIX) for one-second resolution or the system call setitimer (4.2bsd UNIX) for finer (10 ms) resolution. However, the Alliant FX series seems to be allergic to the alarm clock signals used by these routines and would get fatal run time errors complaining about "concurrent i/o calls in ZPHFIL." I resorted to using the Alliant Fortran Library version of sleep and therefore ZDELA2 is a Fortran routine for the FX series. However, it only has a resolution of one second and the finer resolution of the 4.2bsd UNIX setitimer is much preferred (*e.g.*, for blinking TV images).
Moved to 15OCT86.

3578. *October 21, 1986* INCALN: *APC, ZVD, ZVND *Kerry*

These are the pseudo-AP (CAPC, DAPC and EAPC) and compiler-directive (ZVD and ZVND) INCLUDE files for use on Alliant FX series machines.
Moved to 15OCT86.

3579. *October 21, 1986* Alliant Q-routines *Kerry*

During a recent port of *AIPS* to the Alliant FX series, a set of Q-routines evolved that resulted in performance equal, or superior, to our best efforts of a year ago. Many of these are the same as the Convex versions, whereas others required slightly different treatment. The Alliant set consists of

QCFFT	QCLNSU	QGRD3	QGRD4	QINIT
QINT	QMAXV	QMINV	QMULCL	WHNALT

QCLNSU and QMULCL call ISAMAX, which Alliant provides as part of their Linpack library. QMULCL calls WHNALT, a proprietary assembler routine that we can only distribute in object form. QCFFT calls CFFT from Alliant's Scientific Subroutine Library. CFFT takes double-precision arguments whereas *AIPS* uses single-precision. Therefore, extra overhead is incurred by conversion (plus de-normalization on inverse transforms) loops before and after the call to CFFT. Alliant is working on providing a single-precision form.
Moved to 15OCT86.

3580. *October 21, 1986* APLALLN: ZXTSPY *Kerry*

This routine invokes the UNIX ps command and parses its output to get the information displayed by the SPY verb. The 4.2bsd output format of ps is fairly standard; however, Alliant chose to be different. Perhaps it's time to concede defeat on this *AIPS* feature and simply let the local ps command do its thing. Afterall, it's not going to make or break a UNIX/*AIPS* implementation and I'm getting really tired of fighting with it.
Moved to 15OCT86.

3581. *October 21, 1986* UNIX File System Synchronization *Kerry*

AIPS overlays the host file system with its own notion of a file system. In UNIX parlance, the user catalog (CA file) roughly corresponds to the superblock and the catalog blocks (CB files) roughly correspond to inodes. The UNIX file system superblock is only updated from memory periodically and, as such, the *AIPS* file system is subject to windows of vulnerabilty in which a system crash can leave "ghost" CB files around as well as "ghost" CA file entries. In order to minimize this possibilty, calls to sync have been added to all Z-routines that modify the *AIPS* file system, including ZQCRE*, ZQRENA, ZQTRUN and ZDESTR. sync is also called by the abort handler, ZXSIGC, although this probably has little effect except on those systems equipped to deal with power failure signals.
Moved to 15OCT86.

3582. *October 21, 1986* APLCVEX: ZQMSG, ZXSIGC *Kerry*

We still reference MSGTXT via the labeled common MSGCOM in these routines. On all other UNIX systems, it is possible to reference Fortran labeled commons as label_. Under Convex C, you must use _label_. Convex is aware of this and may in fact do something about it, but we should instead avoid this practice.
Moved to 15OCT86.

3583. *October 21, 1986* APLUNIX: ZBYMOV *Kerry*

A new routine that moves a string of "bytes" from INB to OUTB where a "byte" is 1/2 a small integer.
Moved nowhere, it's for 15JAN87 and later only.

3584. *October 21, 1986* APLUNIX: ZPHFIL, ZPHOLV *Kerry*

The data format version code in the *AIPS* physical filenames changed from "A" to "B" in 15JAN87 and ZPHFIL changed accordingly. ZPHOLV is a special version of ZPHFIL needed by the program UPDAT for updating physical filenames from old to new formats (*e.g.*, DA01:UVA* to DA01:UVB*).
Moved nowhere, it's for 15JAN87 and later only.

3585. *October 21, 1986* APLCVEX: ZCREA*, ZQCRE* *Kerry*

On the NRAO-CV Convex we have implemented an extra *AIPS* disk that can only be used for *AIPS* scratch files. On reboot, all files on this extra disk are deleted, much like the case of /tmp. The APLCVEX versions of ZCREA* and ZQCRE* are otherwise the same as the APLUNIX versions. This notion is not officially supported by the *AIPS* design, but could be. Other sites may like to do the same.
Moved to 15OCT86, nowhere else.

3586. *October 21, 1986* UNIX/AIPS Terminal I/O *Kerry*

LUN 5 is preconnected to the process control terminal under UNIX and is nominally read-only. It seems that on Bell UNIX systems, you can CLOSE (UNIT=5) and re-open it read/write without any trouble. However, on some Berkeley UNIX systems, closing LUN 5 and re-opening it read/write has disastrous consequences. Also, there seems to be no consistency among UNIX systems in regard to the necessity of carriage control FORMAT statements used for terminal output. This is no big deal, but in order to make the left margin of *AIPS* terminal output line up, sometimes the "1X" carraige control is required and sometimes not. Perhaps it's time to concede defeat on this point and relegate terminal I/O entirely to C routines under UNIX where there seems to be much greater consistency. Until then, the APLUNIX versions of ZOPEN and ZCLOSE actually open and close LUN 5 and ZTTYIO respects the logical unit number passed to it. The APLBERK versions of ZOPEN and ZCLOSE have the opening and closing of LUN 5 commented out and ZTTYIO forces output to LUN 6. This subverts the design implementation of user terminals versus message terminals on systems that have such things, but it's better than having *AIPS* blow up in your face.
Moved to 15OCT86, nowhere else.

3587. *October 21, 1986* APLUTS: ZTTYIO *Kerry*

Contrary to my experience with other Bell UNIX systems, Amdahl's UTS (version 7 UNIX implementation) required no carriage control for Fortran terminal output. This may be different in their System V implementation.
Moved to 15OCT86, nowhere else.

3588. *October 21, 1986* APLMASC: ZTTYIO *Kerry*

The Masscomp version of ZTTYIO required the addition of the ":" FORMAT control. Otherwise, the I/O does not terminate at the end of the I/O list. This is based on experience of a year ago and may no longer be true.
Moved to 15OCT86, nowhere else.

3589. *October 21, 1986* APLUNIX: ZQTAPE *Kerry*

This is a routine that is grossly device-dependent and invariably requires some local development. The APLUNIX version is stubbed, but is a good starting point. It contains all the logic normally required; however, the values of mt_dsreg status bits described in sys/mtio.h will be different for each system. Some values for systems with which we have had experience are included in the comments, but installers will need to do a bit of research to get this routine right. It may even be necessary to extract the required information from the vendor if it can't be found in one of the system include files.
Moved to 15OCT86, nowhere else.

3590. *October 21, 1986* APLCVEX: ZQTAPE *Kerry*

This is the Convex-specific version of ZQTAPE including all the proper mt_dsreg status bit values.
Moved to 15OCT86, nowhere else.

3591. *October 21, 1986* APLSUN: ZQTAPE *Kerry*

This is the SUN-specific version of ZQTAPE, including all the proper mt_dsreg status-bit values based on experience with the Princeton Observatory SUN/3 with a Xylogics 472 tape controller. It will probably work for all ports of *AIPS* to SUN machines.
Moved to 15OCT86, nowhere else.

3592. *October 21, 1986* APLSUN: ZXTPIO *Kerry*

For some bizarre reason, the SUN would return an I/O error on partial-record reads. To avoid this, this version reads 32768 bytes from the tape into a temporary buffer, then copies the number of bytes actually requested into the true return buffer. This problem should be investigated. It did not occur in a program I used to debug the tape Z-routines, but does occur in *AIPS*. I suspect the problem is that the formatter is still busy, with a backspace of a file followed by an immediate read. Perhaps testing to see if the formatter is busy and/or inserting a delay would help. I entertained implementing this notion, but ran out of time to play on the Princeton SUN.
Moved to 15OCT86, nowhere else.

3593. *October 21, 1986* APLUNIX: ZQASSN *Kerry*

Added comments regarding tape driver status bits indicating "file protected" for all systems for which we have had experience. This is grossly device-dependent. ZQASSN first opens tapes read-only, tests for a write ring and, if found, closes and re-opens the tape read/write. This is necessary because *AIPS* opens all files/devices read/write. On some systems it may not be possible to detect the presence of a write ring. In these cases, there is no alternative to attempting a tape open read/write and, if that fails, opening it read-only. However, this approach causes some distressing tape controller error messages to be displayed on the user's terminal for tapes intentionally mounted with a write ring and I have found that it is impossible to suppress these messages. Also, code has been added for the opening of Tektronix-like devices that will take exclusive use, enable CBREAK mode (allowing "punctual" reads) and set the I/O baud rates to 4800. The baud rates may not be appropriate for all systems. This is a routine that will no doubt require at least some local development for each UNIX/*AIPS* port.
Moved to 15OCT86, nowhere else.

3594. *October 21, 1986* APLCVEX: ZOPEN, ZQASSN *Kerry*

The Convex tape driver insists on writing end-of-file marks upon closing any tape that has been opened read/write regardless of whether any writing was actually done and regardless of where you are on the tape. This means that opening a tape read/write, issuing a rewind and closing the tape results in a logical end-of-tape being written at the beginning of your tape. In addition, the driver leaves the tape positioned after the second tape mark instead of between the two. Further writing produces a tape with files separated by logical end-of-tape indicators beyond which many machines will not let you read or otherwise advance. Convex is aware of the problem and promises to cure it in the next release of their operating system. Until then, we must continue to stand on our heads to get around it. To do this, the APLCVEX version of ZOPEN contains a list of *AIPS* tasks that write on tapes and the APLCVEX version of ZQASSN has an extra argument to indicate the mode under which the tape is to be opened, read-only or read/write. If, and only if, the process opening the tape matches one in the list of tape-writing tasks listed in ZOPEN is the tape opened read/write. Otherwise it is opened read-only. *AIPS* issues tape-mark writing of its own. Most often, the action of *AIPS* is to write four tape marks, then backfile over three of them to leave you positioned properly. However, since the Convex driver writes two more upon closing the tape, the Convex version of ZOPEN backspaces records until no more file marks are encountered and then advances one file (unless the beginning-of-tape was encountered).
Moved to 15OCT86, nowhere else.

3595. *October 21, 1986* APLCVEX: ZESTEX, APL4PT2: ZESTEX, ZXSIGC *Kerry*

The APLUNIX version of ZESTEX traps a generic set of UNIX signals, whereas the APL4PT2 version traps the Berkeley 4.2 UNIX signal set. Programs AIPS and BATER are treated differently in that hangups and interrupts are not ignored. It also detects if you are running under the control of a debugger and immediately returns. Otherwise, the the normal debugger signal handling is largely defeated. The APL4PT2 version of ZXSIGC also reflects the Berkeley 4.2 signal set.
Moved to 15OCT86, nowhere else.

3596. *October 21, 1986* APLUNIX: ZR32RL, ZR64RL, ZRLR32, ZR64RL *Kerry*

These are new routines for use in converting between local and IEEE floating point formats. These routines should be examined carefully for each system. On systems that use IEEE floating point formats, the process is reduced to a copy. On others, the process is a bit more complicated. We should try to prepare versions for all systems for which we have knowledge, but haven't done so yet. In addition, hexadecimal constants are involved and there is no ANSI standard for their syntax, nor is there any standard in the world of UNIX Fortran. Therefore, the APLUNIX versions are stubbed; they will issue a message saying so and STOP.
Moved nowhere, it's for 15JAN87 and later only.

3597. *October 21, 1986* APLCVEX: ZR32RL, ZR64RL, ZRLR32, ZR64RL *Kerry*

Convex-specific versions of the routines for converting between local and IEEE floating-point formats.
Moved nowhere, it's for 15JAN87 and later only.

3598. *October 21, 1986* APLUNIX: ZSETUP *Kerry*

Now that data formats are distinguished by a code letter in the *AIPS* physical filenames and files of different formats can reside in the same directory, the need for TST data areas is no longer necessary. Therefore, the code for toggling the DA0*n* device logicals between the TST and "normal" data areas has been eliminated in this routine.
Moved to 15OCT86, nowhere else.

3599. *October 21, 1986* APLUNIX: ZTKCLS, ZTKCL2 *Kerry*

ZCLOSE used to call ZQDASS to close Tektronix-like devices. Now ZTKCLS.FOR is called, which calls ZTKCL2.C to perform the actual close and any required cleanup actions. This is a good idea in general and should be implemented for other device types as well, instead of calling ZQASSN and ZQDASS for everything. ZTKCL2 turns off CBREAK mode and gives up exclusive use.
Moved to 15OCT86, nowhere else.

3600. *October 21, 1986* APLUNIX: ZTKQIO *Kerry*

This routines now sets Tektronix-like devices to RAW mode for writes and turns it off on exit. Otherwise, output to the device is subject to normal terminal I/O processing and this doesn't work very well for graphics commands.
Moved to 15OCT86, nowhere else.

3601. *October 21, 1986* APLUNIX: and APLBERK: ZXCLOG *Kerry*

This routine is designed to created a logical (*i.e.*, environment variable) definition. This is straightforward under Bell UNIX using putenv in the APLUNIX version. However, Berkeley UNIX chose not to support this function and the APLBERK version consists of a home-brewed equivalent. Adjusting the UNIX enviroment from a program can be tricky; however, this routine seems to work on the NRAO-CV Convex. Recipients should be wary of its portability until proven otherwise.
Moved to 15OCT86, nowhere else.

3602. *October 21, 1986* APLUNIX: ZXTLOG *Kerry*

Unlike putenv, the function getenv is common to both Bell and Berkeley UNIX so this routine can be generic. However, it has been improved to avoid the different interpretations of NULL as a string in various systems and also has parameterized string sizes for logicals and their translations.
Moved to 15OCT86, nowhere else.

3603. *October 21, 1986* APLUNIX: and APLMASC: ZXFREE *Kerry*

The APLUNIX version of this routine has been made more generic and should suffice for most systems, however it does depend on the output format of the UNIX df command. This is why the APLMASC version is different. Bell UNIX systems should have the ustat system call that could, and should, be used for this routine, since it would result in both a more portable, as well as faster, implementation of the FREESPACE verb in AIPS.
Moved to 15OCT86, nowhere else.

3604. *October 21, 1986* UNIX ZDATE and ZTIME *Kerry*

These are routines that must be different for Bell UNIX versus Berkeley UNIX at the irritating level. The difference is that the include file time.h is stored in /usr/include on Bell systems and in /usr/include/sys on Berkeley systems. Future releases of UNIX/*AIPS* may solve this problem via a preprocessor for C routines, but, for now, the APLUNIX version will satisfy Bell systems and the APLBERK version will satisfy all Berkeley systems.
Moved to 15OCT86, nowhere else.

3605. *October 21, 1986* APLUNIX: ZILI32, ZI32IL *Kerry*

The Alliant compiler very rudely pointed out to us that we have been using mixed data types in calls to intrinsic functions. Whereas this is a violation of the ANSI standard, it is nevertheless a commonly accepted practice. Alliant has since been convinced to play by the same rules in the next release of their Fortran compiler. In addition, this will also be cured by our proposed move away from INTEGER*2. Until then, we should rid all such violations in *AIPS* so that we don't get tripped up by other purist compiler writers. These routines have at least been fixed.
Moved to 15OCT86, nowhere else.

3606. *October 21, 1986* APLUNIX: and APLCVEX: ZM70MC *Kerry*

This routine issues a master clear to I^2S models 70 and 75 TV devices. The ioctl argument for this is driver-dependent. The APLCVEX version contains the proper definition. The APLUNIX version is the same, only stubbed with a message to that effect, followed by an exit (since there is no error return).
Moved to 15OCT86, nowhere else.

3607. *October 21, 1986* APLUNIX: and APLCVEX: ZM70OP *Kerry*

This is the routine for opening I^2S models 70 and 75. It calls ZQASSN to perform the actual opening, but, because of the Convex tape-mark bug mentioned above, the APLCVEX version of ZQASSN has an extra argument which must be specified in the APLCVEX version of ZM70OP as well. Otherwise the two versions are identical. This is just another argument for the segregation of I/O by device type rather than using the ZQASSN/ZQDASS catch-all.
Moved to 15OCT86, nowhere else.

3608. *October 21, 1986* APLUNIX: and APL4PT2: ZPARS *Kerry*

In regard to the directory structure, Berkeley UNIX chose to diverge from Bell UNIX at the 4.2 juncture. The APLUNIX version of this routine reflects the Bell strategy (also good up to 4.1 on Berkeley systems).
Moved to 15OCT86, nowhere else.

3609. *October 21, 1986* APLUNIX: ZTXMAT, ZDIR *Kerry*

CHARACTER variables were declared too short to handle the longest *AIPS* text filenames.
Moved to 15OCT86, nowhere else.

3610. *October 21, 1986* APLCVEX: ZXMOUN *Kerry*

Unlike most UNIX systems, Convex has provided a means by which tapes can be allocated/deallocated much like in VMS. The APLCVEX version of ZXMOUN invokes these commands via a call to system and then calls ZXCLOG to define the MT0*n* logical involved. Traditionally, UNIX tape drives are readable/writable by anyone. This may be okay for small computing environments, but the UNIX world should address the potentially disastrous consequences of this notion in large multi-user, multi-drive situations.
Moved to 15OCT86, nowhere else.

3611. *October 21, 1986* APLUNIX: ZXMSGS *Kerry*

This routine is invoked by ZDCHIN if, and only if, *AIPS* task output is to be reassigned to a message terminal. ZXMSGS has been improved to handle this more elegantly. Formerly, the user had to be logged onto both the process control terminal as well as the message terminal. At NRAO, we remove message terminals from the interactive group which allows us to treat them as dumb devices. This means ZXMSGS has to open these terminals and set their status properly, particularly the baud rate. We set it to 4800, but this may not be correct for the terminal ports being used on some systems.
Moved to 15OCT86, nowhere else.

3612. *October 21, 1986* General UNIX Z-routine Cleanup *Kerry*

Cleaned up typing and comments in APLUNIX routines:

ZDOPRT ZFIO ZGTDIR ZMSGCL ZTKBUF

Due to the greater generality of the routines now found in the upper levels of the UNIX Z-routine directory hierarchy, many machine-, UNIX-, or version-specific routines could be eliminated in the lower level directories.

In APL1VAX, the routines deleted were:

ZCPU ZDATE ZPARS ZTACT2 ZTIME ZXTSPY

In APL2VAX, the routines deleted were:

ZCPU ZDATE ZPARS ZTACT2 ZTIME ZTKILL ZXTSPY

In APLCVEX, the routines deleted were:

ZBYTFL ZCPU ZDATE ZESTEX ZFREE ZGETCH ZGTBYT
ZPARS ZPTBYT ZPUTCH ZQTRUN ZTACT2 ZTIME ZTKILL
ZTTYIO ZXFREE ZXTSPY

In APLMASC, the routines deleted were:

ZACTV9 ZCPU ZDATE ZQASSN ZTACT2 ZTIME ZTKILL

In APLUTS, the routines deleted were:

ZTACT2 ZTKILL

Moved to 150CT86, nowhere else.

3613. *October 21, 1986* APLUNIX: JIAND *Kerry*

The generic pseudo-AP version of QRECT had calls to IAND which is not ANSI standard. IAND is called in other places as well, but the problem for UNIX has long since been solved via a "Z"-routine version of IAND which was good for small-integer arguments only. However, QRECT was calling IAND with large integer arguments (both Convex and Alliant provide IAND as an intrinsic so the problem was not exposed during ports to these machines and there is an assembler version QRECT for Convex anyway). The compromise is to change the call to IAND in QRECT to a call to JIAND (*i.e.*, IAND for large integers) and provide a "Z"-routine version of JIAND for systems that don't support this intrinsic. This results in a slow version of QRECT on such systems, but allows systems that support JIAND (*e.g.*, VMS) to take advantage of it.

Moved to 150CT86, nowhere else.

3614. *October 21, 1986* APLUNIX: ZPRMPT *Kerry*

This routine had a very real problem in that it was reading into a finite buffer with no limit on the number of bytes actually transferred. The call to gets has been replaced by a call to fgets to transfer a maximum of 80 characters. Before, it was possible for a user to enter more than 80 characters, saturate the buffer provided and clobber things in memory. Another problem fixed has to do with what happens when the process control terminal disappears as when the process is put in the background, continued, and the user logs out. Before, the process would go into an infinite terminal read loop. Now, if fgets returns null, the EXIT is filled into the buffer so that AIPS will exit gracefully and go away.

Moved to 150CT86, nowhere else.

COOKBOOK Changes: 15-Oct-1986 version of *AIPS*

This section provides corrections and updates to the *AIPS COOKBOOK* to fill the gap between publication dates. A somewhat revised *COOKBOOK*, labeled as a 15 October 1986 version, is being published. It is in chapter-based form to allow users to request updates of the *COOKBOOK* on a chapter-by-chapter basis. We have implemented a suggestion made by several users, namely that we print in the *AIPSLETTER* the revised *COOKBOOK* pages in their entirety, including both sides. This should enable users to replace the old pages with the new in their current *COOKBOOK*s. To save money, we will not reproduce changed pages in the Table of Contents, Chapter 14 (lists of tasks and verbs), or the Appendices (Glossary and NRAO site instructions).

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