Z SYSTEM-DEPENDENT *AIPS* TIPS

Although *AIPS* attempts to be system independent, some aspects of its use depend inevitably on the specific site. These vary from procedural matters (*e.g.*, assignment of workstations and location of sign-up sheets, tape drives, and workstations or other terminals) to the hardware (*e.g.*, names and numbers of workstations and tape and disk drives, the parameters of television and array processor devices) to the peculiar (*e.g.*, the response of the computer to specific keys on the terminal, the presence of useful job control procedures). This appendix contains information specific to the NRAO's individual *AIPS* installations. It is intended that non-NRAO installations replace this appendix with one describing their own procedures, perhaps using this version as a template. The general description of using *AIPS* on workstations was given in Chapter 2 and will not be repeated here.

Within the NRAO, *AIPS* is installed on two main architectures — Sun workstations and IBM RS/6000 systems. All our old CONVEX C–1 and DEC VAX 11/750 and 11/780 systems have been decommissioned. Currently the fastest *AIPS* machines in the Observatory are the IBM/RS6000 model 580 systems `rhesus` in Charlottesville, and `kiowa` and its clones at the Array Operations Center. *AIPS* also runs in Charlottesville on a DEC Alpha workstation and on a 486/66 personal computer. The former is available for general use and would be an interesting computer if it had more memory.

Z.1 NRAO workstations — general information

All NRAO workstations run some version of the Unix operating system, AIX on IBMs and SunOS (or Solaris) on Suns. Unix systems are intrinsically sensitive to the difference between upper and lower case. Be sure to use the case indicated in the comments and advice given in the following notes. *AIPS* itself is case-insensitive, however; conversion of lower-case characters to upper-case occurs automatically. (Unix systems have a variety of characters for the prompt at monitor (job-control) level, and allow users to set their own as well. We will use `$` as the prompt in the text below.)

Z.1.1 The "midnight" jobs

The versions of *AIPS* on all NRAO Sun, IBM, DEC, and Intel systems are kept up to date continually with the master versions on the Charlottesville Sun called `baboon`. This is achieved by automated jobs that start running at very antisocial hours of the early morning. Any changes formally made to the `TST` version of *AIPS* are copied to the relevant computers and recompiled/relinked. At the time of writing, midnight jobs run on `rhesus` (CV IBM), `tamarin` (CV Solaris 2.3), `tarsier` (CV Intel Linux), `pongo` (CV Dec Alpha), `aguila` (AOC Sun), `laphroaig` (AOC Solaris 2.3), `kiowa` (AOC IBM), and `miranda` (VLA Sun). At "quarterly" (*sic*) update time, `NEW` is also updated via the midnight jobs while it is still unfrozen.

There are at least two sites outside of the NRAO that are also served by the midnight job and this number may be greater by the time you read this.

Z.1.2 Generating color hard copy

Z.1.2.1 Color printers

Color printers are, these days, simply printers that understand the color extensions to the PostScript language used to describe plots. The NRAO owns two Tektronix 4511a color printers, one in Charlottesville and one at the AOC in Socorro. You may display your PostScript file on these printers simply by typing

$ lpr -Ppscolor *filename* C_R where *filename* is the name of your file.

$ lp -d pscolor *filename* C_R for Solaris systems on Suns

Just before doing this, make sure that the desired type of special Tektronix paper (plain or transparency) is in the cassette mounted in the printer. The paper size is 8.5×11 inches, which is the default for *AIPS* tasks `TVCPS` and `LWPLA`. If you do not wish to save the plot as a disk file, you may also print it directly from within *AIPS*. The color printer is one of the printer choices when you start up `AIPS`, but you probably want to select a regular PostScript printer as your default printer. *AIPS* print routines will re-direct PostScript files that actually contain color commands to `pscolor`, but will not re-direct ordinary print jobs to some printer other than `pscolor`. There are some special instructions for the color printer at the AOC in § Z.3.3.

Z.1.2.2 Software to copy your screen

To obtain a color hardcopy of what is on your screen, there are three software options you can choose. These are `TVCPS`, `xv`, and `xgrab`. Having created a PostScript file, you can print it on color printers and film recorders at the NRAO, or copy the file via e-mail or `ftp` to some other site for printing.

The `TVCPS` task in *AIPS* will create a color Encapsulated PostScript file from whatever is displayed on the *AIPS* TV server (`XAS`). If you use the `OUTFILE` adverb, this file is saved with whatever name you specify (see § 3.10.1). If you specify a black-and-white output to `TVCPS`, then the output can be sent to any PostScript printer. Color PostScript must be sent to `pscolor` or the Solitaire. You can, of course, edit the save file (if you are a PostScript wizard) and can insert the file (since it is encapsulated) in another document. See the Charlottesville Workstation Guide for a short chapter on PostScript

The `xv` program (in version 2) is a Unix utility program available on most systems at the NRAO. (Version 3 of `xv` is significantly improved, but, due to copyright restrictions, is not yet generally available at the NRAO.) It is mainly intended for image display of GIF, JPG, TIFF, and other format files. When you start `xv`, click the right button mouse anywhere in the `xv` window to bring up the control window. One of its features is a screen grab which is controlled by the "Grab" button in the lower right corner of the control window. *Before* you press this, arrange your windows and icons so that you can see exactly what it is you want to grab (*e.g.*, the `XAS` server). Now press the "grab" button. The bell will ring and the cursor will change to a white cross symbol; move it to the top left of the area you want to grab. Then press and hold down the left mouse button, and drag the mouse cursor until it is at the bottom right of the area you want to grab. As you do this, you will see a box pattern on the screen outlining the area selected. Once you are done selecting the area, release the mouse cursor. When `xv` has finished grabbing the screen, it will beep twice, and whatever you grabbed appears in the main `xv` window. You can now use the "save" button of the control window to save this as any format you want. Once nice feature of this is the "save as Postscript" option. It allows you to scale, rotate, and position the image in relation to the page. Its user interface is better than most image utilities.

The `xv` program can either be started by typing `xv` from the Unix command line, or by choosing the XV option from the programs menu (which is obtained by pressing the middle mouse button on the root window of the X-Windows display).

Finally, the `xgrab` program provides similar functionality to the "grab" feature of `xv`, with fewer output formats but much more control over how the grabbing is done. By default it allows three seconds in between starting the grab and when it actually starts to read the screen; this can be useful for setting things up. Also, it un-maps itself from the window when grabbing so you don't have to worry about getting it out of the way. Unfortunately, there appears to be some problems with its encapsulated PostScript output.

Z.1.3 Color film recorders

The NRAO owns two Solitaire film recorders, one in Charlottesville and one (currently non-functional) at the AOC in Socorro. These recorders support two film sizes, 35mm and 4×5 (inches that is). Our normal film type, for which the recorder is very well calibrated, is Ektachrome 100+ Professional. The film recorder has 3 scan resolutions, 2048, 4096 and 8192 lines. Any one of these may be used with any input image. The higher resolution scans take rather longer to do, but will clearly do a better job on larger input images.

Actually, the Solitaire is driven by software called Freedom of Press (`freedom`) from Custom Applications, Inc. which interprets/filters PostScript input files into a form understood by the Solitaire. (The Freedom of Press software has a great many other options as well, with a wide variety of output formats. See the chapter on the Solitaire in the Charlottesville "Sun Workstation Notes" for details.) For PostScript files that need no special processing by `freedom`, you may simply "print" them to special queues set up for the Solitaire. These queues are, of course, actually filtered by `freedom` on the way to the film recorder. The apparent plot size for the Solitaire is 7.33×11 inches for 35mm film and 8×10 inches for 4×5 film. *AIPS* tasks `LWPLA` and `TVCPS` Should be given these dimensions in their inputs for plots intended for NRAO's film recorders. These tasks can print directly to the Solitaire queues, if they are among the choices offered when you start `AIPS`, but we recommend that you send the plots to disk text files instead. In this way, you may send the plots to the film recorder in the queue of your choice `after` making sure that the device has the correct film type mounted and ready for use.

The details of how you may have the film type changed, have the film processed, get the resulting pictures/slides back, have the unit cleaned and repaired, and the like differ between the two sites and will be discussed in the appropriate Sections below.

In the hopes of producing both better pictures and a usable NRAO image library, Pat Smiley of the Charlottesville Graphics department has volunteered to coordinate the making of photographs using the Charlottesville film recorder. To avail yourself of this offer, you must (1) copy the picture file to the appropriate disk and (2) notify Pat that you have done this. In particular, to copy the file from a Charlottesville computer:

$ cp *file_name* /net/solitaire/solitaire/ftp/pub/slides C_R

Use anonymous ftp to copy the file from more remote computers:

$ ftp ftp.cv.nrao.edu C_R	or 192.33.115.79
`Connected to tarsier.cv.nrao.edu.`	connect message returned
`220 tarsier FTP server (...) ready.`	server message returned
`Name (ftp.cv.nrao.edu:...):` anonymous C_R	reply with anonymous or ftp.
`331 Guest login ok, send ident as password.`	login message and suggestion.
`Password:` *your_address* C_R	reply with your account and e-mail address, *e.g.*, `anewman@nrao.edu`; it will not be visible on the screen.
`230 Guest login ok, access restrictions apply.`	login is successful
`ftp>` cd pub/slides/slides C_R	change to slides directory
`ftp>` put *file_name* C_R	to copy *file_name* from your computer to the Solitaire slides area.
`ftp>` quit C_R	to exit and log out.

Note that *file_name* must be a file in PostScript format suitable for the film recorder, such as the files produced by the *AIPS* task `TVCPS`. To assist Pat in previewing your picture, its name should be no longer than eight characters plus an extension of no more than three characters, all preferably in lower case.

Having copied the file, you should then send Pat an e-mail message (`psmiley@nrao.edu`) telling her your name, postal and e-mail addresses, file name, any special requirements you and your picture may have, and whether you would be willing to allow Pat to include your picture in the NRAO image library. There are a number of reasons to ask Pat for this service, even if you are at the AOC. She is able to get 35mm slides processed in one day and mailed off, if needed, by Federal Express the next day. Special requests, such as 4x5 film for very detailed (*e.g.*, multi-panel) images, larger format overheads to bring out special detail or Black-and-white negative films for non-color prints, can be handled a bit more slowly. Pat cleans the film recorder before making pictures, giving the best possible quality in the photos. (The devices have been found to be "dusty" intrinsically.) You may choose to allow Pat to keep your images in the NRAO image library. If you do, she will need extra information from you about the image and the NRAO telescope used, as well as a release date and a statement allowing NRAO to distribute the image. Besides giving your image and science greater currency and helping the NRAO in its publicity and educational rôles, leaving your image in the NRAO image library will allow you to request duplicates and prints at any time at no charge.

Z.1.4 Gripe, gripe, gripe, ...

With the effort currently going into AIPS++, the "designated AIP" program has been discontinued mainly due to lack of people and time. At the AOC in Socorro, contact the *AIPS* Manager if you have a problem. Likewise in Charlottesville.

Suggestions and complaints entered on NRAO computers with the `GRIPE` verb (see § 11.1) are collected regularly and, at least, read. From `15JAN96` and later releases, they are sent immediately by e-mail from any *AIPS* computer to several addresses in the *AIPS* programming group. The most urgent are addressed and, sometimes, answered. All gripes are entered into a database which resides on `zia.aoc.nrao.edu` (otherwise known as `146.88.1.4`). Users may read the contents of this database in as much detail as they can stand. To do so, login to the account called `gripe` on `zia`. This is a "captive" account, requiring no password, and allowing you only to execute an especially prepared version of the text editor `emacs`. When you tire and exit the special `emacs`, you will be logged out of `zia`.

After you log in, you will be presented with a selection/options menu. Fill in and/or alter some of the selection criteria to limit which gripes you will view. Then, select display option `index`, and, `only` when you are fully ready, hit a C_R. You will be shown a descriptive list of the selected gripes. If you wish to read one of them in detail, move the cursor to it and hit C_R. The space bar gets you the text of the next gripe and typing the letter `q` returns you to the index. Another `q` returns you to the selection/option form. Typing a `?` in any of the displays will provide you with information on all the options available at that level of the system.

AIPS Memo No. 88 describes the system in some detail. This memo may be available on your *AIPS* system as file `$AIPSPUBL/AIPSMEMO88.PS` in PostScript form. It is also available to the "World-Wide Web" (start with "URL" `http://info.cv.nrao.edu/aips/aips-home.html`) so that it may be examined and retrieved over the Internet. The file used is also available via anonymous `ftp` on host `baboon.cv.nrao.edu` (or `192.33.115.103`) as a PostScript file named `/pub/aips/TEXT/PUBL/AIPSMEMO88.PS`.

Z.1.5 Solving problems at the NRAO

Below are details specific to the Charlottesville and Socorro systems for handling some of the problems which may arise in *AIPS*.

Z.1.5.1 Booting the workstations

Modern workstations, especially the powerful IBM RS/6000s, are complex Unix systems which may have remote users within the NRAO and guests from elsewhere on the Internet. Users should *never* attempt to boot the system on their own. If the machine appears to be dead, find or call one of the people listed on the bulletin boards in the *AIPS* Caige for this purpose.

Z.1.5.2 Printout fails to appear

Check the *AIPS* output messages that appeared shortly after you submitted your print job, whether it be from `PRTMSG` or `LWPLA`, or some other task. You should see the output of the Unix command to show the printer queue status. If anything went wrong with the print submission, an error message should be obvious. If not, check the output of the `lpq` (or `lpstat` for Solaris 2.*x*) command, see what print queue was involved, and check it again from the Unix command level (not from inside `AIPS`).

`AIPS` will delete spooled files about 5 minutes after they are submitted. If the print queue is stalled (due, say, to a jammed printer) or backed up with a lot of jobs, it is possible that the file was deleted before it was gobbled up by the print spooler. This time delay has been made a locally-controlled parameter, so it is possible to set it to values higher than 5 minutes. At this writing, the Charlottesville systems are using a 20-minute delay time.

Finally, check to see if the printout was (a) diverted to the "big" printer (`lp27` in room 213 at the AOC or `ps3dup` in the Charlottesville library) because it was too long for the smaller printers, (b) you forgot which printer you had selected on `aips` startup, or, at the AOC, (c) someone has taken the output and filed it in the "today" file bin on the left side of the post directly behind the `psnet` printer.

Z.1.5.3 Stopping excess printout

To find out what jobs are in the spooling queue for the relevant printer, type, at the monitor level:

$ lpq C_R	to list default print queue
$ lpstat C_R	to list default print queue under Solaris

or to display a specific queue

$ lpq -P*ppp* C_R	to show printer *ppp*
$ lpstat *ppp* C_R	to show printer *ppp* under Solaris

where *ppp might* be `psnet` at the AOC or `ps3dup` in Charlottesville. If the file is still in the queue as job number *nn*, you can type simply

$ lprm -P*ppp nn* C_R	to remove the job
$ cancel *nn* C_R	to remove the job under Solaris

`lprm` and `cancel` will announce the names of any files that they remove and are silent if there are no jobs in the queue which match the request.

Unfortunately, it is now very difficult to stop long print jobs. The large memories of modern printers mean that more than one print job can already be resident in the printer while your long unwanted job is being printed. Therefore, turning off the printer is not an option. Try to be more careful and not generate excess printout in the first place (save a tree).

A nice option available for most *AIPS* print tasks or verbs is adverb `OUTPRINT` which allows you to divert the output to a text file. Then you can use an editor like `emacs` to examine the file in detail before printing. The Unix command `wc -l file` will count the number of lines in a text file called `file` for you; note that `-l` is the letter ell, not the number one. Beginning with the `15JUL94` release, *AIPS* provides a "filter" program to convert plain (or Fortran) text files to PostScript for printing on PostScript printers. The command

$ F2PS -*nn* < *file* | lpr -P*ppp*

will print text file *file* on PostScript printer *ppp*. The parameter *nn* is the number of lines per page used inside *AIPS*; it is likely to be 97 if direct printing comes out in "portrait" form or 61 if the direct print outs come out in "landscape" form.

It is not unusual for *AIPS* jobs to be in the 1 Mbyte or more in length, which will take 5–10 minutes to print. For large text files, it is quite likely that the `ZLPCL2` shell script will divert the job to a "big" printer (in Socorro, `lp27` in room 213). However, graphics files are not subject to such restrictions.

If you plan on generating large or very complex plot files which you intend to print, please select the `psnet` printer at the AOC or the `ps3dup` printer in Charlottesville. Since they are, effectively, on the ethernet, the bandwidth to it is usually an order of magnitude faster than any serial line. You — and others — will have to spend less time waiting for jobs to come out of the printer. If you are submitting jobs which you know are several Mbyte in size, we ask that you wait until after local business hours to avoid tying up the printer.

Z.1.5.4 CTRL Z problems

The last process placed in the background via `CTRL Z` can be brought back to the foreground by typing fg C_R in response to the monitor level `%` or `$` (or whatever) prompt Alternatively, the user can type jobs C_R, which displays all background processes associated with the current login and can bring a specific process to the foreground by typing fg *% m* C_R, where *m* is the job number as displayed by the `jobs` command as `[`*m*`]`. For example, if a user initiated his `AIPS`*n* by typing aips new pr=4 C_R and:

`^Z`	`CTRL Z` typed by accident (or intentionally).
`Stopped`	`aips new` is put in the background as "stopped" and user is returned to the Unix level.
$ jobs C_R	to display status of background jobs.
`[1] + Stopped    aips new`	info from Unix, where `[1]` means job 1, "Stopped" is job 1's state and "aips new" is the command used to start up job 1.
$ fg *m* C_R	to return job *m* to the foreground.
`aips new`	appears on the screen just to tell the user to which job he is talking (*i.e.*, it does *not* re-execute `aips new`). You should now be talking to your `AIPS`*n* again.
C_R	to get `AIPS`*n* > prompt.

Z.1.5.5 "File system is full" message

The message `write failed, file system is full` will appear when the search for scratch space encounters a disk or disks without enough space. This is only a problem when none of the disks available for scratch files has enough space, at which point the task will shut down.

Z.1.5.6 Tapes won't mount

Occasionally, both local and remote tape mounts may not work successfully. The source of the problem is often your failure to load the tape physically into the device or to wait until the device is ready to read the tape. DATs and Exabytes, in particular, go through lots of clicking and whirring before they are really ready. An error message like

```
AIPS 1:  ZMOUN2:  Couldn't open tape device /dev/nrst0
```

(or some other tape-device name gibberish) is to be expected in this case.

If you attempt to mount a remote tape and get the messages:

```
AIPS 1:  ZMOUNR: UNABLE TO MOUNT REMOTE TAPE DEVICE, ERROR 96
AIPS 1:  AMOUNT: TAPE IS ALREADY MOUNTED BY TPMON
```

it means that your `AIPS` and the tape dæmon that you are using disagree on whether the tape is already mounted in software. The most probable reason for this is that you are attempting to mount someone else's tape (check your inputs and the labels on the device closely) — or that the previous user of the device dismounted the tape from the hardware but neglected to do it from software. In this case, you have two choices: (1) find the culprit and have him do a software dismount, or (2) find an *AIPS* Manager to kill the confused dæmon and restart it. (If you are using tape device n on computer *host_name*, then you need to stop the process called `TPMON`m, where $m = n + 1$ on computer *host_name* and then start it again by running `/AIPS/START_TPSERVERS` on that computer. This should be done by an *AIPS* Manager.)

If you attempt to mount a remote tape and see, instead, the messages:

```
ZVTPO2 connect (INET): Connection refused
AIPS 1:  ZMOUNR: UNABLE TO OPEN SOCKET TO REMOTE MACHINE, ERROR 1
AIPS 1:  ZMOUNT: ERROR 1 RETURNED BY ZMOUN2/ZMOUNR
```

then the tape dæmons are not running on the remote machine. Log into the remote machine as user `aips` and type:

```
/AIPS/START_TPSERVERS
```

After a minute or two, you should see some messages from `STARTPMON` about starting `TPMON` dæmons. Alternatively, you could exit from `AIPS` and start back up again, including `tp=`*host_name* on the `aips` command line; see § 2.2.3. If the tape still doesn't mount after doing this, see the *AIPS* Manager.

Z.1.5.7 I can't use my data disk!

If at some point during your work you find you are prevented from reading or writing files on a data disk, it could be that your *AIPS* number does not have access to that area. If you encounter the message:

```
AIPS 2:  CATOPN: ACCESS DENIED TO DISK 8 FOR USER 1783
```

it means that user 1783 has not been given access to write (or read) on disk 8. This can be seen by typing `FREESPAC` in the `AIPS` session, listing the mounted disks. If you see a data disk listed with an access of `Not you`, it means your *AIPS* number has not been enabled for that disk. If you feel that you should have access to that particular disk, see Jon Spargo (at the AOC) or an *AIPS* Manager about enabling your user number.

Z.2 *AIPS* at the NRAO in Charlottesville

The Charlottesville *AIPS* Caige is located in Room 111 on the first floor of the Edgemont Road Office Building. There are three public workstations available there: "`rhesus`'' an IBM RS/6000 580, "`ringtail`" an IBM RS/6000 560, and "gibbon" a Sun IPX. For normal plots and print jobs there is an HP LaserJet printer called ps1 just outside the Caige in the corridor. This printer is on a slow serial line and prints on only one side of the paper. Large graphics plots from LWPLA should be sent to the network HP printer in the library (called ps3), while long print jobs should be (and will automatically be) sent to this printer in duplex mode (called ps3dup). There is a Tektronix 4511a color printer known as pscolor in the *AIPS* Caige for special plotting and color displays (*e.g.*, from TVCPS) on either paper or transparencies. Color slides may also be made by directing the output in PostScript form to 35mm2k, a Solitaire film recorder across the hall.

The IBM workstations run under relatively current releases of AIX, IBM's version of the Unix operating system, while the Suns run under versions of SunOS, now called Solaris. They are equipped with color display screens, 1280×1024 on IBMs and 1152×900 on Suns. All display in 8-bit pseudocolor, although ringtail has the ability to display 24-bit "true" color images for applications that use it (not *AIPS*' XAS). Each system has substantial amounts of disk space. At this writing, rhesus has the most with 8 *AIPS* "disks" (12.2 Gbytes), ringtail has 4 (7.8 Gbytes), and gibbon has 3 (1.8 Gbytes). All three systems have at least one 4mm DAT and one 8mm Exabyte (low density) tape drive, while rhesus has two of each plus one 800/1600/6250 bpi 9-track tape drive.

Z.2.1 Using the Charlottesville workstations

Z.2.1.1 Signing up for *AIPS* time in Charlottesville

The sign-up sheet for *AIPS* on rhesus is found on the notice board just to the left of the entrance to the *AIPS* Caige, Room 111. If you wish to be certain of the availability of rhesus, it is advisable to sign up for your *AIPS* time in advance. To promote fair and efficient use of the system, users are asked to restrict the amount of time that they reserve. Formal rules are not now in effect, but may be imposed should the need arise.

AIPS on the RS/6000 systems supports up to eight simultaneous interactive users, plus two batch queues. The user signed up for AIPS1 has priority for the use of the cpu, console (display), and local tape drives, but is expected to be reasonable about sharing these resources, particularly the tape drives. Visitors to Charlottesville should call Jim Condon, in advance of their arrival, to avoid conflicts with other visitors and to arrange for sign-up time.

Sign-up time for ringtail is no longer available, although you may use it on a *caveat emptor* basis. It is implicitly reserved for anyone wishing to use the advanced visualization facilities available through the *AVS* or *Data Explorer* software systems. If you are using *AIPS* on it, and someone needs to run either of these systems, you can be bumped off the system at that time.

Z.2.1.2 Managing workstation windows in Charlottesville

After you have logged on to any Sun or IBM as user-id aips, the X-Window system should appear. Unlike the AOC where there are different window managers for IBMs and Suns, at Charlottesville the aips account always uses the twm window manager (or possibly tvtwm which is a superset of twm). *AIPS* may also be run from your own account — we prefer that you do that — but your account must be included in the aipsuser group and your startup procedures must start some X-Windows window manager, preferably twm or tvtwm.

The window manager allows you to create, destroy, modify, and select an active window on the screen. When you first start up (in the aips account, there will be at least two xterm terminal emulator windows on the screen, one green and one blue. The green one is for console messages and is usually quite small. The blue one is intended to be the main work area and it is in this window that you probably will start up AIPS itself. There may be additional windows like a clock and an xload load meter.

The default behavior of the window manager is "focus follows pointer." What this means is that in order to use one of the windows, you merely move the cursor with the mouse so that it is within the main part of the window and start typing. Most windows will have a title bar on the top; you can "grab" this title bar by moving the mouse cursor onto it and holding and keeping down the left mouse button; then moving the mouse will also move the window. There is a small square symbol on the left of the title bar that, if pressed with the left mouse button, will iconify the window (you can grab and drag icons too). Clicking once with the left mouse button on any icon will de-iconify, or open it.

The mouse buttons bring up a series of menus when they are pressed on the background, or root window. The left mouse button shows various window operations such as "redraw screen", "raise", "move", and of course "Exit X11". The middle mouse button brings up a menu of useful programs, including a desk calculator, the emacs editor, xv, xgrab, and more. The right mouse button brings up the System menu; the most useful item on this is a "pull-right" option "X Terminal Emulator" which, when you press it and "pull right" by dragging the mouse a little to the right, shows another menu with different foreground/background colors. Choose one of these and you will get an xterm terminal emulator with those color combinations. There is also a pull-right menu for remote login to various other useful machines in Charlottesville and other NRAO sites.

To start AIPS, choose the xterm window that you want to work with (or create a new one), and type, *e.g.*, from rhesus

```
aips tst pr=3 da=ringtail tp=gibbon
```

This example command selects the TST version of AIPS (the default anyway), chooses printer number 3 (on the ground floor) as the default printer for text and graphics output, makes the data areas from ringtail accessible (via NFS) in addition to local data areas on rhesus, and makes sure that the TPMON daemons for remote tape access are running on remote host gibbon. These options are explained in some detail in § 2.2.3 and may be viewed in even greater detail by typing HELP AIPS C_R inside AIPS or by typing man aips C_R from the Unix command line.

Z.2.1.3 Data disk management in Charlottesville

A public 150-Mbyte disk partition on an IBM RS6000 580 called polaris was set aside for use as the main disk where message and SAVE/GET files are kept. *AIPS* looks for these files only on disk "1," whichever data area that happens to be. If the same disk area is always disk 1, no matter what computer you are using, then you would always get the same set of message and SAVE/GET files. The fly in this ointment is that the Network File System has to wait while disk reads and writes are completed, while reads and writes on local disks may be done asynchronously using large memory buffers in the Unix operating system. Thus, the writing of messages, in particular, is virtually instantaneous on local disks, but costs about one second per message over NFS.

The same consideration applies to disks used for image and *uv* data files. It is not too expensive to read such files over NFS, but you should only write data to disks on the computer you are using. You should also restrict all scratch files to be on local disks, using the adverb BADDISK to inhibit all NFS disks. Note, that the computer you are using does not have to be the one which you are sitting in front of. You may do an rlogin or telnet from an xterm window on, say, the Sun on your desk to, for example, rhesus. Then, when you run AIPS in that window, the local disks will be the ones attached to rhesus. Under most circumstances, the aips procedure will be able to figure out which Sun you are actually typing on and use it for the *AIPS* TV, message, and graphics servers (all both executing and displaying on your Sun).

Z.2.2 Using the tape drives in Charlottesville

For a general discussion of magnetic tapes, including the *required* software mount, see § 3.9. The following describes how to deal with the physical tape drives themselves.

Z.2.2.1 Mounting and removing tapes on 9-track drives

If the front door of the tape unit is not open, it may be in use. Ask around before doing anything. When you're certain that it's okay, press the "offline" button, then press the "Unload/Open" button. The door should drop open for you.

Once the door is open, get ready to put your 9-track tape in. Put a write ring in the tape only if you intend to write on the tape during this *AIPS* session. These drives do not support auto-load rims, so all rims must be removed from the tape before loading. Slide the tape spool in sideways with the label facing up until it sits on the central hub (it will feel like it's balanced). Then close the door. After the display indicates that the drive is ready, you can perform the software mount from `AIPS`.

Z.2.2.2 Mounting tapes on Exabyte and DAT drives

Exabyte (8mm) and DAT (4mm) drives have a window or opening through which a mounted tape may be seen. Before touching anything, look in the window or opening to see if there is already a tape in the drive. If there is, ask around to make sure that the tape is no longer in use. Remember that the user of the drive may be in an office as much as two floors away and that Unix does not provide much protection. If you dismount a remote user's tape and mount your own, that user may well write on it, thinking that he is writing on his own tape, without knowing that he is destroying all your data.

On most drives, there will be a single button on the front panel of the device somewhere. When the device becomes available, press this button to open the door. If there was already a tape in the drive, it will be ejected after some whirring and clanking and a few seconds. If a tape is ejected, remove it. Now put your tape in the drive, label facing upwards. On Exabytes, push the door closed gently. For DAT drives, lightly push the tape into the drive until the device "grabs" the tape and pulls it in the rest of the way. Exabyte and DAT tapes have a small slide in the edge of the tape which faces out which takes the place of the write ring of 9-track tapes. For 8mm (Exabyte) tapes push the slide to the right (color black shows) for writing and to the left (red or white shows) for reading. With 4mm DAT tapes, the slide also goes to the right for writing (but white or red shows) and to the left for reading (black shows).

It is necessary to wait until the mechanism in the drive has "settled down", *i.e.*, when the noises and flashing lights have stopped, before you can access the drive. The first access is, of course, the software `MOUNT` command from inside `AIPS`.

Z.2.3 Color hard copy in Charlottesville

Having created a PostScript file containing color commands or pictures (see § Z.1.2.), you can print it either on a Tektronix 4511a color printer known as `pscolor` in the *AIPS* Caige (with plain or transparency "paper") or send it to the Solitaire film recorder. Special Tektronix "paper" is loaded into cassettes, one of which is inserted into the printer. One cassette is used for plain paper and the other for transparency paper. The latter is rather expensive, so be reasonable in its use. Additional boxes of paper may be found inside the cabinet on which the printer rests. When the little green light on the right hand side of the printer is blinking, the printer is either receiving data or computing on data already received. The computer inside the printer is actually rather fast, but a color picture is usually a large data file which takes a while to transmit and display. When the printer starts actually printing, it must move the paper in and out three times, onece for each color. When it is done, it will eject the paper fully.

The Solitaire film recorder is in the room across the hall from the *AIPS* Caige. To see details on its use, consult the appropriate chapter of the Charlottesville "Sun Workstation Notes." In those notes, it tells you how to change film and to swap film holders. We suggest that you do *not* do these operations. Instead, have someone from the Graphics Department (George Kessler or Pat Smiley) preferably or a computer technician (Warren Richardson or Gene Runion) to assist you. Cleaning and repairs to the device should be done only by Gene and Warren. We have found that pictures made by the device are very sensitive to dust and particles of paint (from the device itself) and, hence, think it best if the device is handled only by trained personnel.

The Solitaire has an LCD display which usually shows the status of the film recorder. On the left is the film counter, telling how many frames have been exposed since a film load or a counter reset. Towards the middle is the machine's status, which usually displays Idle, Calibrating, Computing Geometry, or Exposing. When the machine is idle, output can be dumped to it (assuming there is no PostScript in the process of being interpreted for the film recorder already). Image recorder calibration is done every half hour, as well as when any job is sent to the recorder. Computing Geometry is displayed whenever a new film holder has been placed onto the Image Recorder. On the upper right, G2 is normally displayed, which means that it's listening to GPIB address 2 (GPIB is similar to SCSI). Under G2, the number of frames left on the roll is shown. The Solitaire has two status lights on the console; a green light for exposing (the light will vary in intensity with the actual light beam), and a red light to signify that it's not ready.

You should check the status display, then send your PostScript file to the film recorder, and then check the display again, all to make sure that the desired operation has taken place. The queues are named `35mm2k`, `35mm4k`, `35mm8k`, `4x5-2k`, `4x5-4k`, and `4x5-8k`, all with the obvious meaning. Have the film holder changed to the desired one before submitting a job to its queue. After you have exposed the film, ask someone from the Graphics Department to remove the film and have it processed. Rolls of 35mm slides taken to be processed before 10 a.m. can be back as early as 2 p.m. All other processing takes until the next business day. If you are not in a hurry, you should wait for more pictures on a roll to be exposed. However, the cost of processing a whole roll for one picture, on an occasional basis, is not significant.

Even though you are in Charlottesville, you should consider Pat Smiley's offer of help with your photographs. See the comments and instructions given in § Z.1.3.

Z.3 *AIPS* at the NRAO AOC in Socorro

The computing power at the NRAO Array Operations Center ("AOC") in Socorro is no longer concentrated solely in the *AIPS* "Caiges" — there are now several public Sun IPX workstations scattered throughout the building, most with at least one Exabyte and one DAT tape drive and 2 Gbyte or more of disk space. There are also eight public IBM RS/6000 machines, ranging from a 320 (Zuni) to several 580s. Each IBM is equipped with at least one Exabyte tape drive, and many have a DAT drive as well. The disk space on the IBMs ranges from 4 to 16 Gbytes. Several printers are accessible, most of which are located in the computer room, ranging from a DEC LP27A line printer to a Tektronix color printer ideal for color prints or overheads. Color slides may also be made by sending your picture files to Charlottesville; see § Z.1.3.

Z.3.1 Using the AOC workstations

Z.3.1.1 Signing up for AIPS time in Socorro

Jon Spargo (505-835-7305) is responsible for the assignment of time on all public AOC machines; reservations must be made at least two weeks in advance. Last-minute sign-ups for vacant time and any exchanges of assigned time must also be cleared by Jon. Normally, sign-ups will be limited to a maximum of two weeks, although exceptions are made occasionally. Visitors have exclusive rights to their assigned workstations during their visit, although tape drives (when not in use) are fair game for remote users. Any data left on disk after a user's scheduled time will be deleted promptly. See "Dr. Delete's Public Workstation Allocation Board" next to room 258 for the machine assignments.

Z.3.1.2 Managing workstation windows at the AOC

The Suns and IBMs have different window managers at the AOC.

To start AIPS on either architecture, choose the window that you want to work with (or create a new one), and type:

```
aips tst pr=7
```

This example command selects the TST version of AIPS (the default) and chooses printer number 7 (the psnet printer in the computer room) as the default printer for text and graphics output. Other options (such as cross mounting data disks from other machines and checking the status of remote tape daemons) can be chosen on the command line as well. These options are explained in some detail in § 2.2.3 and may be viewed in even greater detail by typing HELP AIPS C_R inside AIPS or by typing man aips C_R from the Unix command line.

Z.3.1.3 IBM workstation windows at the AOC

The IBMs use the Motif window manager (mwm). Before you begin on your assigned IBM, you should have a black screen with a login prompt. If a window system is already running, that means someone else has not completely logged out of the machine. Check the windows to see if any processes are running; if not, press ALT, DELETE, and BACKSPACE keys (all at the same time) to exit the window system. Then log in as user-id aips, and the window system will start afresh. If you wish to use your own user account, you must make sure you are in the aipsuser group (type id C_R and check your group listings).

You will be greeted by several windows: a cordial lawyer-ese greeting from IBM (feel free to kill the window), a window-manager screen, and a blue window which might exhibit some strange characteristics at first. If you type stty sane C_R, the window will behave in a much more civil manner.

The default behavior of the window manager is "focus follows mouse pointer." What this means is that in order to use one of the windows, you merely move the cursor with the mouse so that it is within the main part of the window and start typing. Click once on a border and that window will pop to the front. Most windows will have a title bar on the top. You can "grab" this title bar by moving the mouse cursor onto it and holding and keeping down the left mouse button; then moving the mouse will also move the window. You will see the outline of the window as it is being moved. A window can be resized by moving the cursor to a window corner and holding the left mouse button and "dragging" the corner. A window can be resized in width or height only by grabbing a side of the window. A window can be closed (iconified) by clicking once on the "dot" on the right side of the title bar. A window icon can be opened by moving the cursor to the icon and clicking twice rapidly with the left mouse button. Clicking once on the square to the extreme right of the title bar will enlarge the window to fill the workstation screen; clicking again will reduce it to the previous size. Clicking once (and holding) on the "dash" to the extreme left of the title bar will give a menu to move, resize, open and close the window. *Note, depending on the nature of the window, if you click on this dash* twice *in rapid succession, the window will disappear and all processes in it will die.* Don't do this unless you really mean it.

There are some shortcuts to these window functions as well; pressing `ALT` and `F3` at the same time will push the highlighted window (the one with the cursor in it) behind all the other windows. Pressing `ALT` and `F4` at the same time will close (*i.e.*, kill) a window. `ALT` and `F9` will minimize (iconify) the current window.

The left mouse button brings up a series of menus when it is pressed on the background, or root, window. The first item will open an `xterm` window well-suited for the running of *AIPS*. The second item starts an *AIPS* session; this window will ignore `CTRL-Z` commands and will disappear when `AIPS` is exited, so it might not be well suited to all applications. The next item will open an `emacs` window for editing text files. There is also an option to open a window suitable for running `OBSERVE`. Finally, one of the options will allow you to exit the windowing system.

Z.3.1.4 SUN workstation windows at the AOC

The AOC Suns use the `OpenWindows` system. At the login prompt, type `aips` and enter the password. You will then be asked if you wish to start `OpenWindows` — answer yes, and the window manager will begin. You will see several windows open up — a virtual desktop, a clock, a performance meter, a console window, and an `xterm`. The `xterm` is well suited for running *AIPS*, but does not allow scrolling back a large distance; opening a `command tool` enables a larger scroll range.

A whole host of `OpenWindow` options can be chosen by clicking once with the right mouse button on the background (*i.e.*, not in a window). If you go to `Programs` and drag the cursor to the right, you will see a second menu with various types of windows (xterm, command tool, shell tool), tools (mail tool, print tool, calculator, etc.) and managers (file manager, calendar manager, etc.). The next option of the main menu, `Utilities` allows you to refresh the screen or lock the terminal. Note that if you change your window setup, you should *not* `save the workspace`, since this will affect all other users of the `aips` account. Finally, you can exit `OpenWindows` by dragging down to `Exit`; note that it will not, however, log you out of the *AIPS* account.

Windows can be moved or resized in much the same manner as the IBM windows. Clicking (and holding) once on the title bar with the left mouse button allows you to drag the window to another location. Clicking once (and holding) at a window corner with the left mouse button allows resizing of a window. Each of these jobs can also be done from a menu for each window; click once on the title bar with the right mouse button to see the options.

An icon can be opened into a window by clicking on it twice in rapid succession with the left mouse button. A window can be closed by clicking once on the box to the left side of the title bar.

Z.3.1.5 Data disk management at the AOC

A public 2-Gbyte disk partition on the Auspex server (`Arana`) was set aside for use as the area where message and `SAVE/GET` files are kept. *AIPS* looks for these files only on disk "1," whichever data area that happens to be. If the same disk area is always disk 1, no matter what computer you are using, then you will always get the same set of message and `SAVE/GET` files. The public Sun workstations are set up so that the `Arana` data disk is always mounted as the first disk. The drawback is that the Network File System (NFS) has to wait while disk reads and writes are completed, while reads and writes on local disks may be done asynchronously using large memory buffers in the Unix operating system. Thus, the writing of messages, in particular, is virtually instantaneous on local disks, but is time consuming over NFS. It is for this reason that the `Arana` data disk is no longer automatically mounted on the IBM workstations; if you wish to mount the `Arana` disk, you must do so with the `da=arana` option at *AIPS* startup. If you don't want to mount the `Arana` data disk, you can create your own disk access file which excludes all external disks. Talk to your assigned *AIPS* friend or the *AIPS* Manager for more details.

The same consideration applies to disks used for image and *uv* data files. It is not too expensive to read such files over NFS, but you should *only* write data to disks on the computer you are using. You should also restrict all scratch files to be on local disks, using the adverb `BADDISK` to inhibit all NFS-mounted disks. It also helps to "spread around" your data on multi-disk machines; if you are reading files from one disk, write the output file to a different disk.

Z.3.2 Using the tape drives at the AOC

For a general discussion of magnetic tapes, including the *required* software mount, see § 3.9. The following describes how to deal with the individual tape drives at the AOC.

Z.3.2.1 Mounting and removing tapes on 9-track drives

The Sun workstation `Sol` in the second- (ground-) floor computer room has a nine-track HP drive. If there is no tape in the drive, the readout panel will read `READY`. If you want to make sure there is no tape in the drive before pushing any buttons, the top panel can be lifted (push the button on the right side of the box) and the reel inspected. Pushing the `REW/UNLD` button will open the drive. Put a write ring in the tape only if you intend to write on the tape; if you only want to read, make sure there is no write ring. Take the outer plastic rim off the tape before loading. Slide the tape in sideways with the label facing up until it sits on the central hub (it will feel like it's balanced), then close the door. The display panel will read `LOADING`, with the `ONLINE` light flashing. When the tape is ready to be accessed, the panel will read `BOT`, with the `ONLINE` indicator on (not flashing). After the display indicates that the drive is ready, you can perform the software mount from `AIPS`. As you access the tape, the panel will read `IDLE` in between operations. When you are finished with the tape, dismounting the tape in the `AIPS` window will free the tape lock and unload the tape by opening the drive door. Please close the door after you've removed the tape to keep out dust and dirt.

Two more nine-track drives are located on the Sun workstation `Iolani`, also located in the second-floor computer room. This machine is primarily for use of the tape archivists, and the drives should only be used if urgency reigns and `Sol` is in use. Contact the data archivists (currently Theresa McBride and Gayle Rhodes) before using these drives.

Z.3.2.2 Mounting tapes on Exabyte drives at the AOC

There are several different types of Exabyte (8mm) drives at the AOC. All of the public Sun workstations have dual-density Exabyte drives, either a TTi 8501 or a COCOMP drive. The TTi 8501 drive has a window through which the tape (or lack thereof) can be seen; the COCOMP drives have a screen displaying the status of the tape. Before opening the drive to insert your tape, make sure there is not a tape present (on the COCOMP drives, the `current tape operation` reads `NotRdy`). If there is a tape present, ask around to make sure that the tape is no longer in use. Remember that the user of the drive may be in an office as much as two floors away and that Unix does not provide much protection. If you dismount a remote user's tape and mount your own, that user may well write on it, thinking that he is writing on his own tape, without knowing that he is destroying all your data.

To open the drive, push the button on the lower left of the tape door. If there was already a tape in the drive, it will be ejected after some whirring and clicking and a few seconds. If a tape is ejected, remove it. Exabyte tapes have a small slide in the edge of the tape which faces out which takes the place of the write ring of 9-track tapes. For 8mm (Exabyte) tapes push the slide to the right (color black shows) for writing and to the left (red or white shows) for reading. Now put your tape in the drive, label facing upwards; gently push the door closed.

It is necessary to wait until the mechanism in the drive has "settled down" before you can access the drive. On both the TTi 8501 and COCOMP drives the flashing green light will stay lit (and the whirring and clicking will stop) when the tape is ready to be accessed. The COCOMP `current tape operation` will read `IDLE`. Each drive will also show some indication of the tape remaining (or capacity); the number should be on the order of 2200 for low-density tapes and 4500 for high-density. If it is a new tape, the display will be at 4500; if you mount at low density, the display will not change to the appropriate value until you start writing. Once the green light on the drive has stopped flashing, the tape is ready to be accessed. The first step is the software `MOUNT` command from inside `AIPS`.

The IBM workstations also have varying types of Exabyte drives. Most have an internal Exabyte drive (in the cpu box) which work at low density only; they have windows allowing you to see if a tape is currently mounted. Kiowa's internal drive is dual density, but has no display (the green light will be lit or flashing quickly if a tape is being accessed). Several of the IBMs also have external Exabytes. The TTi 8501 on Hopi works as those on the Suns. Several IBMs have TTi 8505 dual-density drives (about half the height of the TTi 8501 drives); these drives don't have viewing windows (although you can push the door in *gently* to look for a tape). If there is a tape in the drive, the green light will be lit (or flashing quickly) and the `tape remaining` indicator will be non-zero. If there is no tape in the drive, the green light will either not be lit or blink very slowly. *Note:* please use only "data-grade" tapes on the IBMs.

Z.3.2.3 Mounting tapes on DAT drives at the AOC

The Falcon DAT tape (4mm) drives (manufactured by HP) at the AOC have a window which has a cover. When the cover is down and the two green lights under the door are not lit, there is no DAT tape in the drive. When a tape is in the drive, it is visible from the outside (*i.e.*, the door does not come down and cover the tape) and the two lights will be on (continually lit if the tape is not being accessed; flashing if the tape is in use). If the drive is not in use, insert the tape, label up, and push it gently into the opening; the drive will eventually "grab" it and bring it in the rest of the way. With 4mm DAT tapes, the write-protection works differently from Exabytes; the slide goes to the right for writing (but white or red shows) and to the left for reading (black shows). When the green lights stop flashing, the tape is ready to be accessed.

Z.3.3 Color hard copy at the AOC

Having created a PostScript file containing color commands or pictures (see § Z.1.2.), you can print it on a Tektronix Phaser II PXi color printer known endearingly as `Farbdrucker` in the second- (ground-) floor computer room. Two queues have been set up for this printer; one for color paper (`pscolor`) and one for color overhead transparencies (`psoverhd`). Once the file has been routed to the appropriate queue using the `psprint` or `lpr` command, go to the terminal to the right of the color printer (labelled `Farbdrucker only!!!`). To log in, press the `F2` key for the `pscolor` queue, `F3` for the `psoverhd` queue. You will then be shown the print queue, asked if you want to route the files to the printer, and asked to check that the proper cartridge is in place (paper or transparencies). When the printer starts actually printing, it must move the paper in and out three times, one for each color. When it is done, it will eject the paper fully. Please note that color paper and transparencies are not cheap, so be reasonable in their use. To obtain additional paper or transparencies for empty cartridges, see Theresa McBride.

The AOC no longer has a working film recorder. Send PostScript picture files to Pat Smiley at the NRAO in Charlottesville for processing and mailing; see § Z.1.3. Fast turn-around and special processing, if needed, are both available through Pat. Use `TVCPS` or `TVRGB` to produce color image picture files or `LWPLA` to translate plot files into black-and-white picture files.

Z.4 *AIPS* at the NRAO Very Large Array site

AIPS is installed on a Sun IPX workstation called `Miranda` in the control room at the VLA site. While there is not enough disk space to allow large-scale data reduction, there is adequate space to allow running on-line `FILLM` to inspect your data as it is acquired. `Miranda` is equipped with a 800-Mbyte data disk and a low-density Exabyte (8mm) tape drive. There is also a nine-track tape drive on the operator's Sun (`Banshee`) which can be used remotely, but check with the operator before using it. The *AIPS* QMS printer is located in the computer room next to the control room.

Z.4.1 Using the VLA workstation

Z.4.1.1 Signing up for *AIPS* time at the VLA

There is no official sign-up for visitor use of `Miranda`; if the workstation is not in use, feel free to use it. However, if there is more than one observing team at the site at any one time, priority goes to the current observer.

If you are planning on using on-line `FILLM`, you must contact George Martin (505–835–7287) prior to your arrival. It would also be wise to contact George or Gustaaf van Moorsel (505–835–7396) to get some documentation on on-line `FILLM` before heading out to the site.

'subsubsectionManaging workstation windows at the VLA

`Miranda` uses the `OpenWindows` system and will behave in a manner very similar to the AOC Suns. If the window system is not running, type `aips` at the login prompt, then enter the password. You will be asked if you wish to start `OpenWindows` — answer yes, and the window manager will begin. You will see several windows open up, currently some command tools, a clock, a performance meter, a console window, and a file manager. Further information on dealing with `OpenWindows` options can be found in § Z.3.1.4.

Z.4.1.2 Data disk management at the VLA

Unlike the AOC, there are no "optional" disks to be mounted on `Miranda`. The two data areas which appear when you start `aips` are actually just two partitions on the same disk.

If, when you start `aips`, you find little or no space on the disks, contact the *AIPS* Manager to clear off some space. Due to the limited size of the data disk, there is an automatic time destroy running on `Miranda` which will delete data which has not been used in three days. Sometimes even this interval is too long to keep a usable amount of space on the disk and the *AIPS* Manager is forced to take draconian measures. *Caveat emptor:* if you want a copy of the data on the `Miranda` disk, copy it onto a tape immediately!

Z.4.2 Using the tape drives at the VLA

For a general discussion of magnetic tapes, including the *required* software mount, see § 3.9. The following describes how to deal with the Exabyte drive at the VLA site.

The Exabyte drive at the VLA is a COCOMP drive. Unlike the COCOMP drives at the AOC, there is no display panel covering the window. Before opening the drive to insert your tape, make sure there is not already a tape in the drive. If there is a tape present, check with any other observers and the telescope operator to make sure that the tape is no longer in use.

To open the drive, push the button on the lower left of the tape door. If there was already a tape in the drive, it will be ejected after some whirring and clicking and a few seconds. If a tape is ejected, remove it. Exabyte tapes have a small slide in the edge of the tape which faces out which takes the place of the write ring of 9-track tapes. For 8mm (Exabyte) tapes push the slide to the right (color black shows) for writing and to the left (red or white shows) for reading. Now put your tape in the drive, label facing upwards; push the door closed gently.

It is necessary to wait until the mechanism in the drive has "settled down" before you can access the drive. On the COCOMP drive the flashing green light will stay lit (and the whirring and clicking will stop) when the tape is ready to be accessed. Once the green light on the drive has stopped flashing, the tape is ready for the software `MOUNT` command from inside `AIPS`.

On-line `FILLM` requires several "pseudo-tape" devices in the AIPS software, so the first "real" tape device on `Miranda` is tape number 6. Therefore, to access the local tape on `Miranda`, you need to use `INTAPE` (and `OUTTAPE` when needed) `= 6`. If you need to access one of the tapes on `Banshee` remotely, make sure to use one of the remote tape device numbers, either `INTAPE` 7 or 8.

Z.5 Additional recipes

Z.5.1 Banana daiquiri

1. Combine in an electric blender: 2 oz. `light rum`, 0.5 oz. `banana liqueur`, 0.5 oz. `lime juice`, 1/2 small `banana` peeled and coarsely chopped, and 1/2 cup crushed `ice`.
2. Blend at high speed until smooth.
3. Pour into large saucer champagne (or similar) glass. Serves one.

Z.5.2 Bananes rôties

1. Preheat oven to 375 deg.
2. Place 6 (peeled) `bananas` in a baking dish.
3. Sprinkle bananas with juice of 1/2 `lemon`.
4. Pour 2 tablespoons melted `butter` and 2 tablespoons `dark rum` over the bananas. Sprinkle with 2 tablespoons `brown sugar`.
5. Place in oven for 10 minutes.
6. Pour on 2 more tablespoons `melted butter` and 2 more tablespoons `dark rum` and bake for 5 minutes more.
7. Serve at once, spooning some sauce over each banana.

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