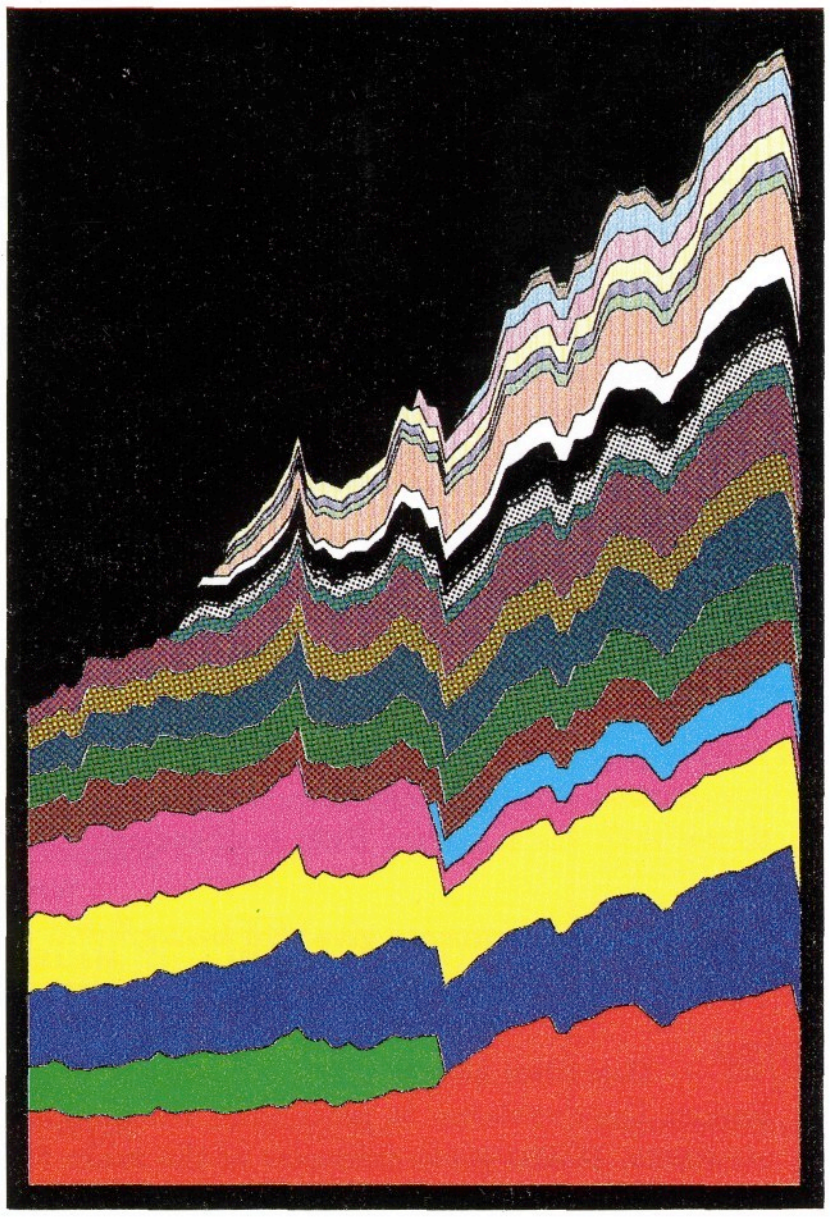
Starlink

BULLETIN

Rutherford Appleton Laboratory



Starlink's Expanding Universe

Page 7 brings news of two new Starlink sites: Glasgow and Liverpool. These are the latest galaxies to condense in the Starlink Project's expanding universe.

The picture on the left shows this expansion over the past 7.5 years, as measured by the number of user registrations. The height of each colour shows the number of registrations at each Starlink site, beginning in March 1986 (left) and ending in September 1993 (right).

In March 1986 there were 10 sites. The four big ones (reading from the bottom up) were Cambridge, ROE, UCL and RAL. Inserted on top of Cambridge (red) is RGO (light green). In 1990, RGO merged with Cambridge to produce the modern Cambridge site, so the green merges into the red. At the same time RAL (magenta) split into RAL Astrophysics (magenta) and RAL Project (cyan).

You can see new sites gradually appearing as time goes by. The two largest are Oxford (the colour above white) and QMW (black). Currently, the *big three* are: Cambridge (red), ROE (blue), and UCL (yellow) who, between them, have 46% of our users.

Looking at the figure, a cosmologist would probably conclude that Starlink's 'big bang' happened in May 1979. Not bad really; the actual date was April 1980.

November 1993 **Issue no. 12**

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Editorial

Starlink's move from VMS to Unix is gathering momentum. We already have two Unix-only sites (Jodrell Bank and Glasgow), and several more sites will make this transition soon. The two principal constraints on the speed of the move are the cost of replacing VMS machines with Unix machines, and the work of porting existing VMS software to Unix.

At the moment about half Starlink's machines are VMS-based and half are Unix-based, but there is more Unix power than VMS power. On the software front, the crucial port of ADAM is complete. Of the 40 major application packages, 17 are available already on Unix, with more on the way. There is still a lot of kit to buy and work to do, but the transition should be completed in 1995.

Change is unsettling.

If you doubt my word, go to Inverness and ask a supporter of Clachnacudden Football Club what he thinks of the proposed merger with his deadly enemies across the road to form Inverness United. I heard one of them on the radio and strong emotions were expressed.

Supporters of the Clach are not the only people who are having to face up to change. Many Starlink employees are due for a change in their employer. At present they are employed by the Science and Engineering Research Council (SERC). However, this will cease to exist at the end of March 1994 and will be replaced by two new Research Councils—the Engineering and Physical Sciences Research Council (EPSRC) and the Particle Physics and Astronomy Research Council (PPARC). Most of the work currently being done by the SERC will be assigned to one or other of these new Research Councils (a few activities will go elsewhere).

The management of Starlink is centred at the SERC's Rutherford Appleton Laboratory (RAL). The position of RAL is complicated because its activities span several of the new councils. The precise nature of the new management structures are still being discussed and what effect, if any, they will have on the management of Starlink is unclear.

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Unix life-lines

The Starlink documents listed below are intended to help you make the transition from VMS to Unix. You can get them from your Site Manager. Start by reading the introductory document:

SUN/145 — This is Starlink's introduction to Unix for novices. It doesn't go very deep, but gives you an initial set of commands and options which will enable you to do useful work. It comes with a handy reference card to keep by your side which summarises the commands mentioned. This is useful for your first few Unix sessions when you can't quite remember how to list a file or find out what is in a directory. You may also find it useful when you start using Unix again after a break.

Several documents give advice on choosing and using editors and mail:

SUN/170 — Tells you what editors and mail facilities are available on Unix within Starlink and gives advice on how to choose the ones appropriate for you.

MUD/122 & 123 — Describe the vi editor; the most generally available Unix editor. MUD/123 is a quick reference card. If you're serious about vi, try to get hold of the book *Learning the vi editor* by Linda Lamb (O'Reilly & Associates).

SUN/168 — Describes the jed editor, which provides a reasonably good emulation of EDT.

SUN/169 — Describes the pine mail system. This is designed for inexperienced users and is much easier to use than the standard Unix mail system.

The following documents give you background information:

SSN/66 — Describes how Starlink software is organised on Unix systems; in particular, the directory structure. It also gives examples of the make files which build Starlink software from source programs. (SSN/66.2 is getting out of date, but a new version should appear eventually.)

SUN/144 — Describes how to use and develop programs for the Unix version of ADAM.

MUD/146 — Answers the most frequently asked questions (FAQ) about Unix. This was obtained from outside Starlink and may not always be relevant. However, it's worth a browse if you get stuck.

There are also many good books on Unix which may be begged, borrowed or bought. One we particularly recommend for VMS users is *Unix for VMS Users* by Philip E. Bourne (Digital Press). And don't forget the on-line documentation that comes with Unix. It isn't user-friendly, but is useful for finding out what options are available for commands, and what they mean.

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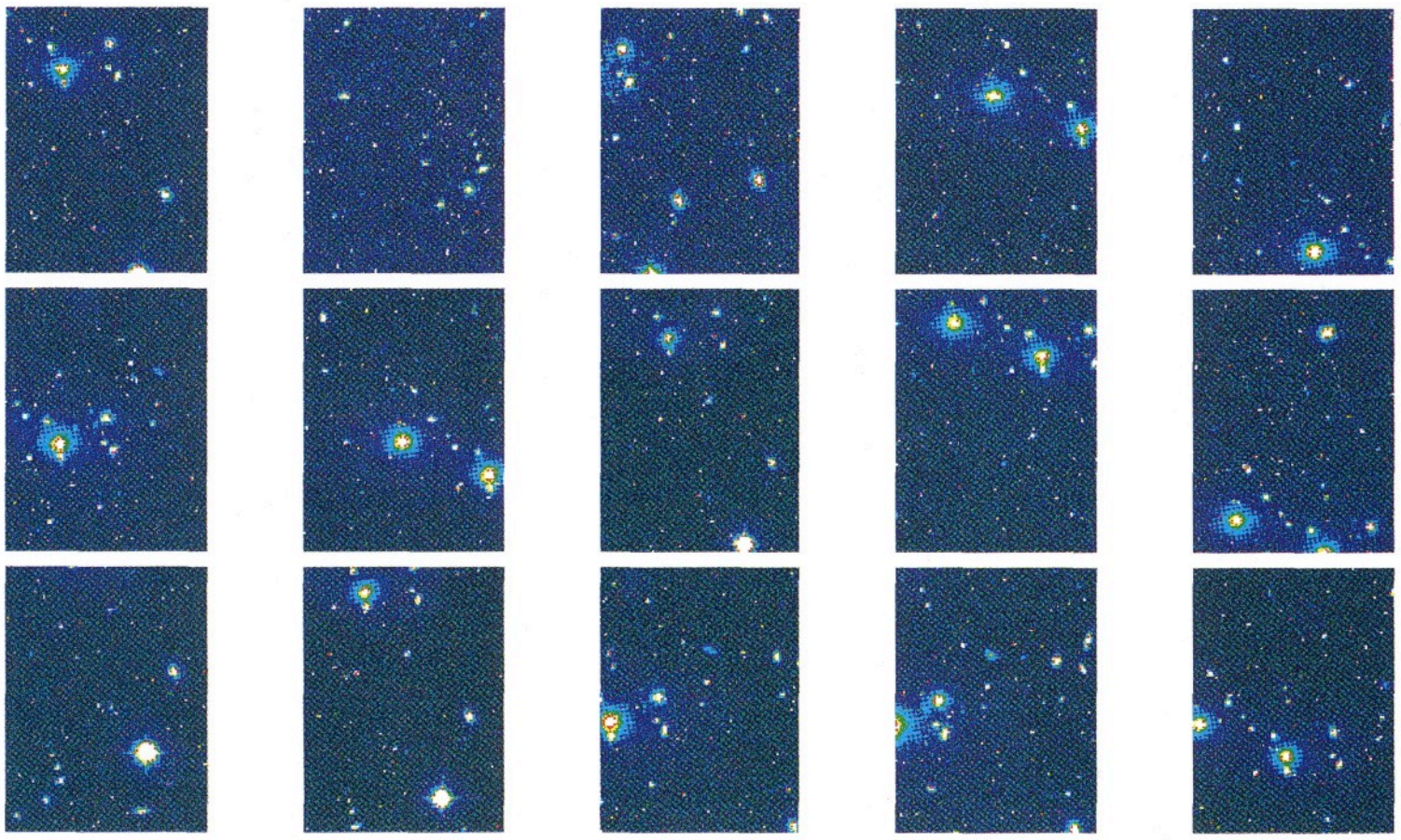
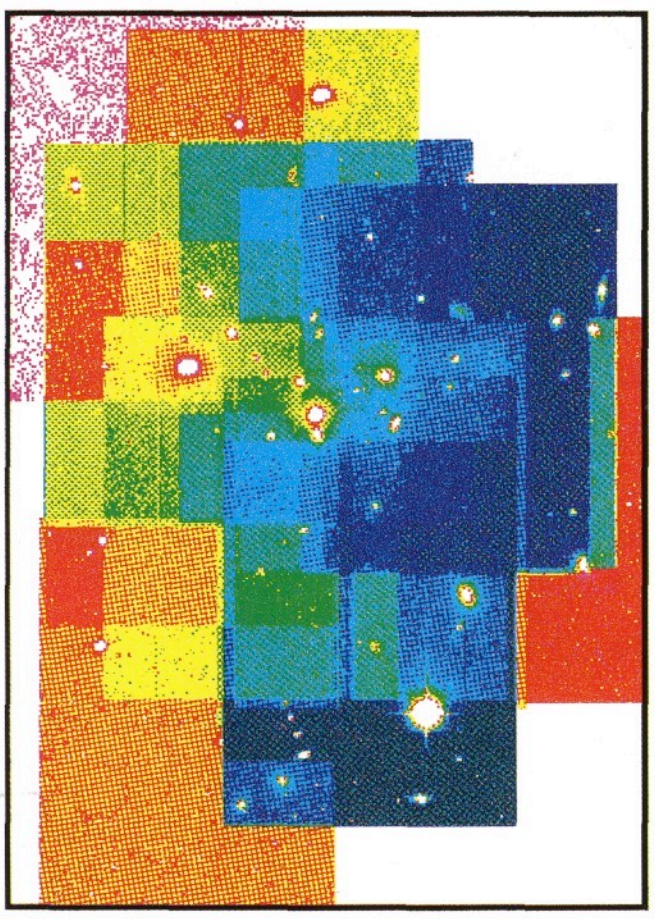
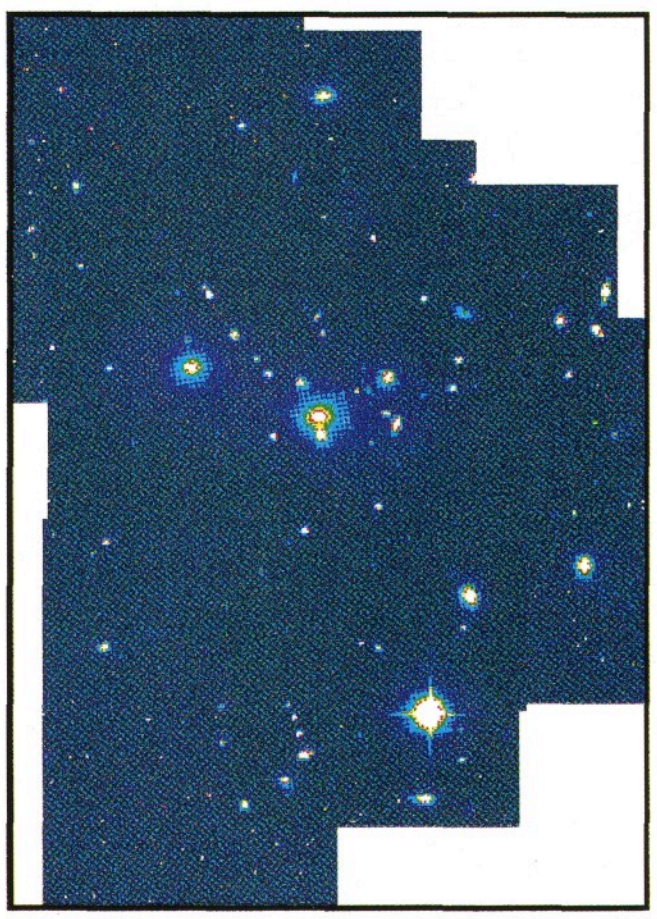
CCDPACK — Automatic mosaicing







This is an illustration of new facilities for producing mosaic images which will be released shortly as part of enhancements to the CCDPACK package.

Top: a set of 15 simulated CCD frames taken at different overlapping positions on the sky. *Bottom left:* a raw mosaic produced by aligning and "median stacking" these frames. *Bottom right:* the final photometrically uniform mosaic obtained after image normalisation.

The processing shown here can be performed completely automatically (including the frame alignment which uses pattern matching algorithms to pair stellar images) and requires no interaction apart from identifying the frames to be combined. Full analysis of the statistical errors on each pixel may also be performed. The elapsed time for processing this example (15 frames, each 384 x 512 pixels) is typically 3 or 4 minutes on an Alpha workstation.

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New products

From April to September 1993 inclusive there were 20 releases within Starlink's VMS software collection affecting 25 software items, and there were 12 Unix releases affecting 22 items.

Software — VMS

Two new software items were released:

LOOKUP: given a command name, it reports on what that command does in all the Starlink applications which have a command with that name. *(SUN/173)*

PERIOD: searches for periodicities in data. It accepts ASCII files up to a maximum of 10000 rows and 20 columns. *(SUN/167)*

Twenty three other software items were changed. Some just had bug fixes:

ADAM	**AGI**	**CDCOPY**
FIGARO	**FIO**	**GKS**
GNS	**GRP**	**HELP**
JCMTDR	**NDF**	**PISA**
PSMERGE	**TAPECOPY**	

Some had minor updates:

CLUSTAN	**DOCFIND**	**FORMLOAD**
IDI	**IKONPAINT**	**REF**
WFCSORT		

Some had major updates:

GENSTAT	**IDL**	**MAPLE**

There are too many changes for them to be described in detail. If you are interested in a particular package, get a copy of its latest document. Look in the tables in the loose-leaf insert to find out what the software listed above does and where it is documented.

Software — Unix

The Unix software releases overlap the VMS ones. However, several items were released within the Unix system independently of the VMS system: Of these, seven were new items for Unix:

generic: is a tool for creating Fortran subroutines tailored to a particular type of variable, from a generic format. *(SUN/7)*

jed: is a Unix editor which emulates EDT. It is provided as part of the Base Set to allow users to have reasonably familiar tools on first migrating to Unix. *(SUN/168)*

memsys: is a Maximum Entropy Data Consultants package of subroutines for image deconvolution. It allows the MEM2D routine in KAPPA to be used on Unix systems. *(SUN/117, MUD/53)*

nbs: is a Noticeboard system, needed for ADAM and ASTERIX. *(SUN/77)*

pine: is a simple and easy to use "teach yourself" Unix email interface; part of the Base Set. *(SUN/169)*

psmerge: is a tool for manipulating PostScript files. It allows merging and scaling of PostScript images. *(SUN/164)*

saoimage: is a version of the saoimage image display and manipulation package that can read Starlink NDFs. *(SUN/166, MUD/140)*

Updated items were:

ary	**ccdpack**	**kappa**
mag	**vmsbackup**	

Of these, **kappa** was an interim release containing the FITS tape reader, and, for Sun systems, the MEM2D image deconvolution routine, and statically linked executables. This speeds up the executable load times by factors of 30.

Documents

In addition to the documents associated with the software releases listed above, there have been other new issues, in particular:

SUG is a revision of the Starlink User's Guide. This should be the starting point for new Starlink users.

SUN/20.4 explains how to access the IUE Uniform Low-dispersion Archive.

SUN/77.2 describes version 2.4 of NBS, the Noticeboard System.

SUN/82.4 describes the latest IRAS data products.

SUN/128.2 is a correction to the QDP (Quick and Dandy Plotter) document.

SUN/145.4 is an expanded introduction to Unix. Now comes with a handy Quick Reference Card.

SUN/170.1 is a guide to the Editors and Mail systems available on Unix.

MUD/142 defines FITS, the Flexible Image Transport System.

MUD/143 is version 1.1 of the user guide to the UK ROSAT Data Archive Centre.

MUD/146 answers some "Frequently Asked Questions" about Unix.

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Captain Starlink* and Muon in Astroeconomics

*As seen on television.

CACVAD ASTRONOMERS HAVE DISCOVERED δ RAYS COMING FROM THE GALACTIC CENTRE

.. BUT, DESPITE OUR NOBEL-PRIZE WINNING WORK, OUR BID FOR FUNDS TO STUDY THIS PHENOMENON HAS BEEN REJECTED

.. APPARENTLY, THERE ARE "NO COMMERCIAL APPLICATIONS" FOR δ RAY ASTRONOMY

?

FEAR NOT! I SHALL RAISE THE MONEY - SOMEHOW

HOO RAH!!

CAPTAIN STARLINK MAKES MONEY EATING PIZZAS...

GRAND PIZZA-EATING COMPETITION
FIRST PRIZE: LOADS OF MONEY

CONGRATULATIONS! HERE'S YOUR PRIZE

BURP!

... JUGGLING...

JUST YOU WAIT!

... TELLING FORTUNES

JUPITER HAS JUST ENTERED TAURUS...

I HATE DOING THIS!

BACK AT CACVAD

WELL DONE C.S., YOU'VE RAISED £ 213·68 ...

... BUT WE STILL NEED ANOTHER £ 2 MILLION

WE'LL ALL HAVE TO STOP OUR RESEARCH AND BECOME ACCOUNTANTS

MEANWHILE, AT THE GALACTIC CENTRE

STRANGE THAT THE EARTHLINGS DID NOT REPLY TO OUR δ RAY MESSAGE

YES, THEY USED TO BE SO INQUISITIVE

WE COULD HAVE GIVEN THEM A CURE FOR AIDS, WORLD PEACE, LIMITLESS CLEAN ENERGY, FLYING PIGS ETC. ETC.

THEY WOULD HAVE BEEN NICE IN A SANDWICH TOO

ADAM workshop

During the week of 13-17 September, a workshop was held on the island of La Palma to discuss the future direction of ADAM, particularly its rôle as a data acquisition system. It was attended by 27 people from RAL, RGO, ROE, JACH, LPO, AAO and the Gemini Project Office in Tucson. The two main topics discussed were how UK work for the Gemini project would affect other software efforts, and how work at the AAO to implement some "ADAM Mk II" ideas from the previous ADAM workshop should be integrated with current systems. This AAO software is called DRAMA, and although it only provides current ADAM features that are important for data acquisition, it implements them in a more modern and efficient way. However, not all future instruments will use DRAMA. ROE will provide control software for SCUBA using current ADAM, and SuperCOSMOS will use ADAM on a Sun. The two-degree-field project at AAO will use a combination of DRAMA and ADAM.

There was a lot of discussion of the relative merits of Fortran and C. Historically, Starlink has been mainly a Fortran project, although certain parts of the software have always been written in other languages. However, the combination of a world-wide increase in the use of C, driven by the increasing popularity of Unix, X windows and Microsoft Windows, the publication of the ANSI standard in 1989, and the fact that some systems important to real-time developers do not have Fortran compilers, has lead to an increased use of C within the UK astronomical community. Although an increasing amount of ADAM infrastructure uses C, there has not been any commitment to providing C-callable versions of subroutine libraries. It was decided at the workshop that such versions should be provided in future. Clearly, it will take a while for this to be done. For some libraries a C version may not be sensible, but to whet your appetite, a C version of SLALIB will appear shortly.

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Windows/NT

For months now, the computer magazines have been full of stories about Windows/NT, the next operating system from Microsoft. According to some of the hype, it will sweep away all other operating systems and in five years time we will all be using it. How does this affect Starlink?

First of all, it is important to understand what Windows/NT actually is. Unlike the Microsoft Windows on your PC, Windows/NT is a complete operating system—it does not require DOS. Moreover, it is a true multi-tasking 32-bit operating system. This may not seem very exciting to those who have been using 32-bit operating systems like VAX/VMS or Unix for years, but in the PC world it is a real step forward. A feature that will be a hit with programmers is that the MS-DOS 640K byte memory barrier has been eliminated. Windows/NT also supports networking and provides a secure programming environment. This means that it is possible for more than one person to use the machine and for each person to have confidence that no one else can fiddle with their files. It should also run all current Microsoft Windows programs; an important consideration if you've invested a lot in PC software.

Does Windows/NT have any direct relevance to Starlink? The obvious attraction is that if Starlink software ran under Windows/NT, you could run traditional PC-type software and Starlink software on the same hardware, at the same time. This sounds exciting, but it is clearly too early to say whether or not Windows/NT will actually come into widespread use, let alone within Starlink. Listening to hype is not the best way of planning a software strategy. At present, Starlink plans to evaluate Windows/NT. This is particularly important as we have had conflicting reports about its functionality. The first task is to decide whether or not it is a suitable platform for Starlink software. There is then the much bigger question of whether or not it is suitable for Starlink use in general. Whatever happens, you can be sure that Windows/NT is not the last great operating system. IBM and Apple are working on an object-oriented one called Taligent, and Microsoft itself is working on one called Cairo. Then again, there's always Unix.

Stop Press: The latest articles say that Windows/NT is not so wonderful after all. It needs at least 12 Mbyte of RAM, 70Mbyte disk, 33MHz 486DX, and is no faster than Windows. We'll see

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Ten years ago

Ten years ago Starlink entered its "Dark Age".

The statistics tell their own story. In 1983 Starlink acquired 4 new staff compared with its long term average of 9 per year, and the total staff head count went down by 3. Only 2 new items of software were issued compared with an average of 12 per year. The Starlink newsletter "Enterprise" ceased publication. User numbers were still increasing, however (detailed records have not survived, but at that period they were going up by about 120 per year).

The basic problem, of course, was money. As part of a widespread programme of cuts, Starlink was asked to reduce its expenditure by £150K (about 30% of its annual budget at that time). Financial constraints are nothing new!

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New Starlink sites

Two new Starlink sites are in the process of becoming established as a result of successful grant applications.

One is in the Department of Physics and Astronomy at the University of Glasgow, headed by Professor John Brown. The Site Manager is Shashi Kanbur and they will be operating Sun equipment.

The other is in the School of Chemical and Physical Sciences at Liverpool John Moores University, headed by Professor Mike Bode. The Site Manager is Alan Scott and they will be operating DEC Alpha equipment.

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Xadam — A graphical user interface for ADAM

The pictures on the following two pages illustrate the X Windows front end for running ADAM applications that will be available on Starlink Unix workstations soon (it may well have been released by the time you read this).

At the bottom of the first picture is the command selection window; alphabetic lists of KAPPA and IRAS90 commands are displayed—other packages such as CCDPACK or FIGARO could equally well have been selected. In the case of KAPPA and FIGARO there is also a panel of buttons labelled with command categories; pressing one of these pulls down a menu listing all the commands in that category.

In the next picture is the window that appears when a particular application is selected (the KAPPA fast contouring program in this case). The names and descriptions of the most commonly used parameters are displayed along with a box for entering a value for each parameter. In the case of the parameter *mode*, which must have one of a predefined set of character values, the allowed values are displayed as a "radio box" so that an option can be selected with a single mouse click. The menu that has been posted down the right hand side of the window lists all the parameters for the `turbocont` application and can be used to select which ones are currently displayed.

Below the parameters is a box in which any output from an application is displayed; the results of a previous "stats" command can be seen. Text from this window can be pasted into the parameter entry boxes so the results from one command can easily be used as input to another. Next is an area where application programs prompt for further information, if necessary, and a box for entering replies. In this case the application has suggested a value which can be edited before resuming execution. At the bottom of the window are buttons for starting or resuming execution of the application, getting help on the parameter being prompted for, aborting the application, and copying the reply to a prompt into the appropriate parameter box to be used automatically the next time the application is run.

The main part of the top window in the first picture is a directory browser that lists all the HDS data files in the current directory (other file types can be selected if desired). File names can be pasted from this list into the parameter and prompt boxes in the application window.

Other features include the creation of graphics windows with control over the size, number of colours *etc*, automatic display of the output data arrays using a user-selected display application and logging of the interactions between applications and the GUI to either a file or a terminal window.

The applications that can be run with Xadam are exactly the same programs that are used when running ADAM from a terminal—they haven't even been relinked—so adding new applications is quick and easy. The first release will probably not allow you to add your own applications, but the ability to do this easily will appear soon after.

The first release of Xadam is a prototype in the sense that many further developments are possible and feedback from astronomers is crucial. It may be that it develops in several incompatible directions to suit different applications and data reduction strategies and that there will be a family of Xadam interfaces. In this context "prototype" is not a euphemism for "full of bugs"!

Xadam is not intended to supesede running ADAM by typing commands in a terminal window or writing command scripts; assembling a sequence of commands that can be executed with a single action or repeating the same command on many data sets automatically will continue to be done using a command language. Xadam is expected to be used for exploring what facilities are available in a package and for experimenting with data reduction strategies—once the right sequence of steps has been evolved, a script can be written that automates the process for many data sets.

Xadam was written using an interpreted language called *Tcl*, developed by John Ousterhout at the University of California at Berkeley, and a program called *expect* written by Don Libes of the National Institute of Standards and Technology. Tcl allows X windows applications to be developed very rapidly and with far less code than would be required if it were written in C; the whole of Xadam is currently less then 3000 lines of code. I would like to thank Paul Alexander (MRAO) for drawing Starlink's attention to the possibilities offered by Tcl, and the users of the Southampton Starlink node for testing Xadam during its development.

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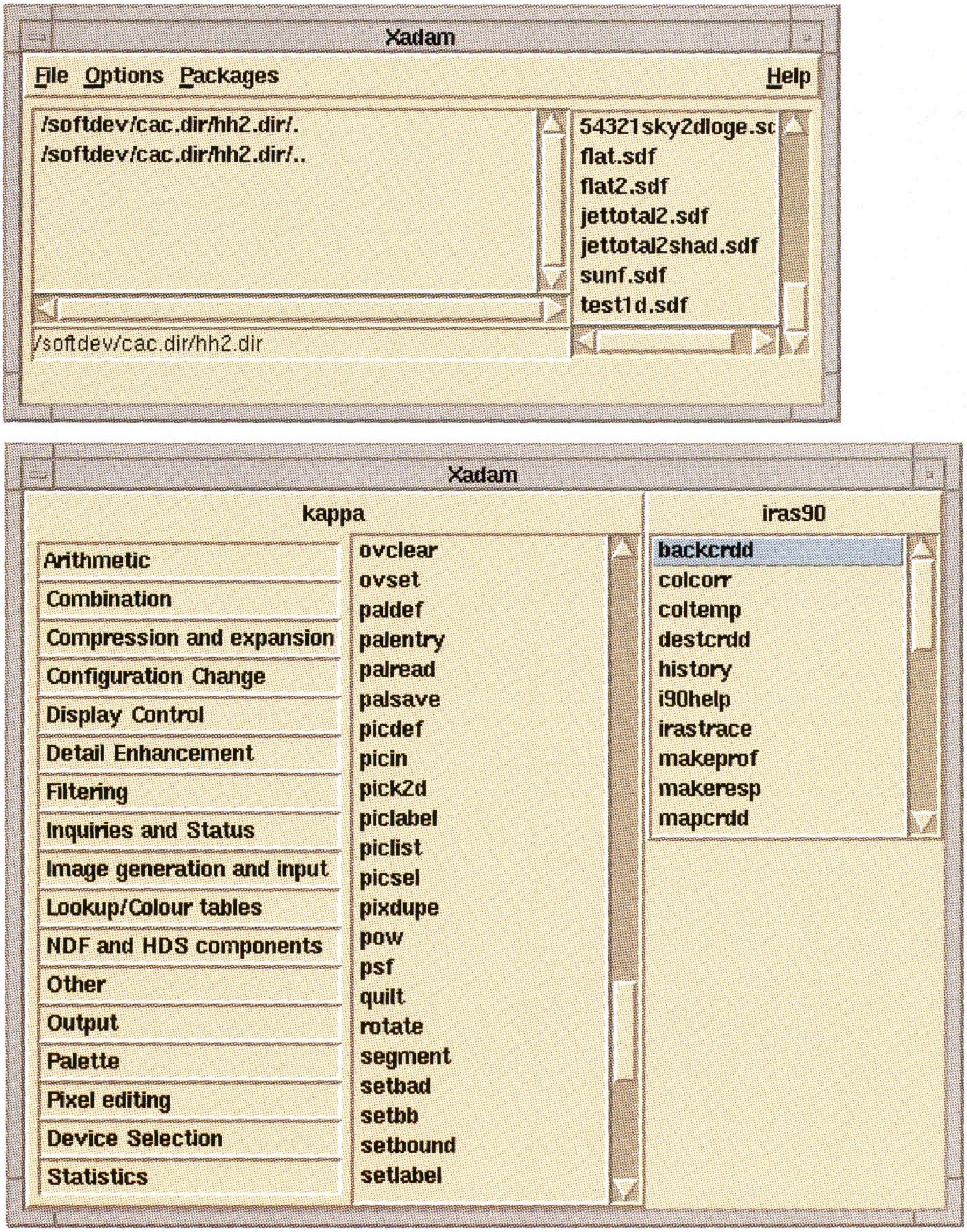

Figure 1. *An example of a display from the "Xadam" X Windows front end for running ADAM applications. At the top is a directory and file browser. At the bottom is a command selection window showing KAPPA and IRAS90 commands. The KAPPA display includes a selection of buttons labelled with command categories. These determine which list of commands is displayed.*

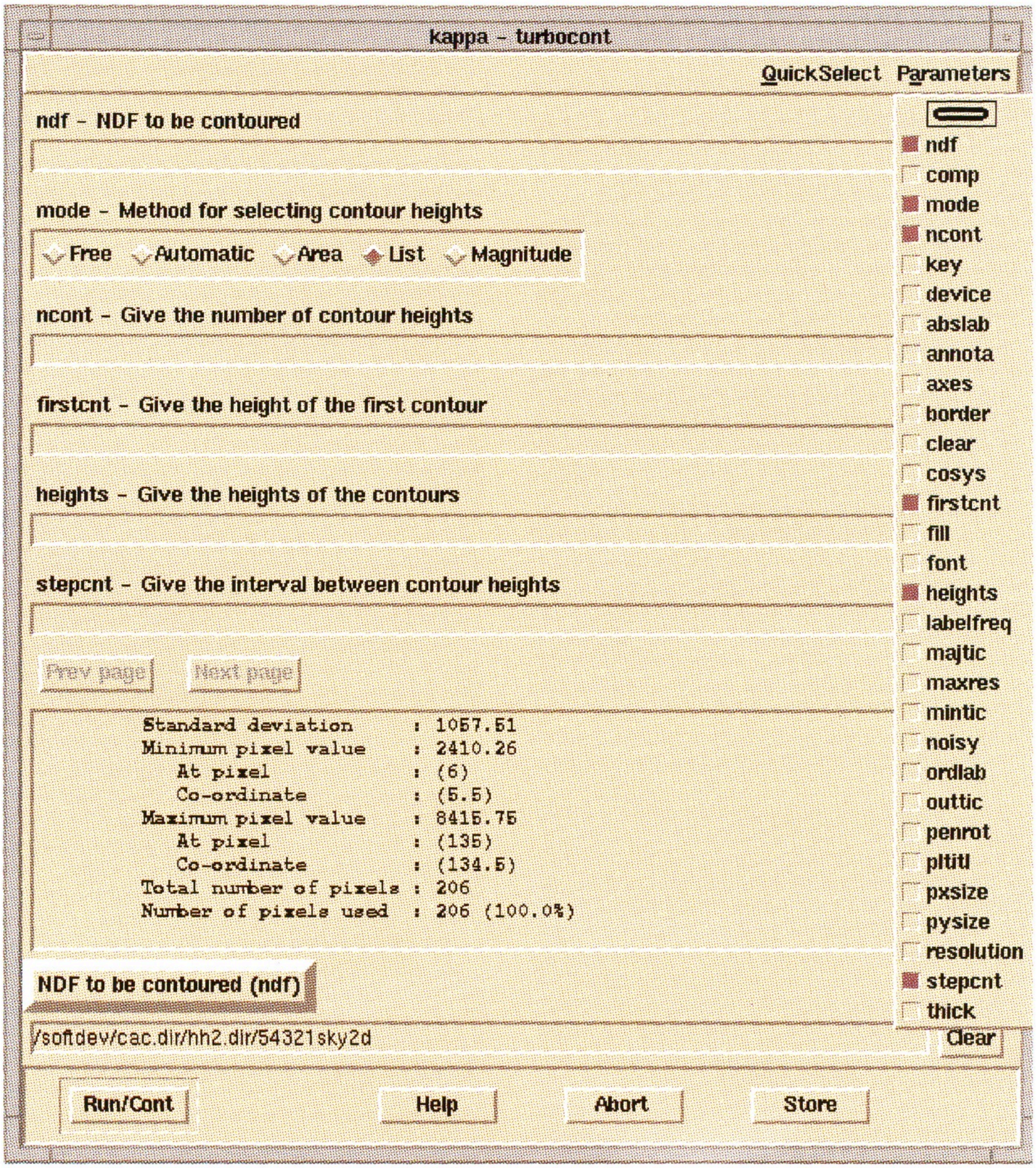

Figure 2. *An example of a display from the "Xadam" X Windows front end for running ADAM applications. This shows a window in which a particular application is running (the KAPPA fast contouring program* `turbocont` *in this case). The names of the program parameters are displayed on the right hand side. For those whose check boxes are highlighted, descriptions are displayed on the left hand side and values can be entered in the boxes provided.*

Unix Figaro? — Portable Figaro!

Port of Figaro to Unix completed

With Starlink's migration from VMS to Unix it was clear that we needed a Unix version of Figaro, based on the VMS version 3.0. It would also have to run on more than one sort of Unix box. At first, Sun4 workstations seemed the most likely machines, but DECstations were also an option and are now superseded by Alpha machines. As a matter of aesthetics, the new Figaro should also be able to run on VMS, though the users have decided to keep the existing version.

In August 1992 the Figaro Port Group formed, consisting of Michael Ashley and Brad Carter at the University of New South Wales, Stephen Meatheringham at Mt. Stromlo and Siding Spring Observatories, Keith Shortridge at Anglo-Australian Observatory, and myself. Some steps towards a portable Figaro had already been made. Caltech had had a Convex version and later a Sun version, maintained by Sam Southard. Caltech's Sun Figaro had also taken on board the Starlink data format and access library (HDS version 4).

A pre-condition for the work of the Figaro Port Group was that the necessary Starlink and ADAM infrastructure be available on Unix. So credit is also due to Starlink staff at RAL, notably the ADAM Support Group. To complete the credits, I should mention the system group at the Radioastronomisches Institut der Universität Bonn, who allowed me to try the "Figaro plus minimum Starlink" on their genuine non-Starlink machines.

We worked from the VAX/VMS source code of version 3.0. First Keith ported the DSA library—he had already ported DTA for Sun Figaro. Then I could go through the application code and the remaining libraries to look for VMS-specifics. With a few corners cut, we had a first release of what is called Portable Figaro (3.1-0) out in January 1993. It was labelled a test release because any user would test the `image` application first...and find it didn't exist. In May 1993 version 3.1-1 came out, and it included `image` and `icur` *etc*. Version 3.2 includes `rdfits` and `wdfits` and can be regarded as a complete package.

It looks as if there will be two parallel versions of Figaro. One is "Portable Figaro", starting at version 3.1 and now at 3.2. This is a Starlink release, intended for Starlink sites, but available to any bona fide astronomical site. It relies as much as possible on Starlink and ADAM software. The other will be "Standalone Portable Figaro," starting at version 4.0 (*cf.* [2]). This is being assembled by the Australian side of the Figaro Port Group and is in the beta test stage. It focuses on a more traditional look and feel for the Figaro package. It uses as little Starlink/ADAM as possible, though probably more than VAX Figaro 3.0 did. Both versions are closely related: the source code for applications and most libraries is identical.

What has changed?

Portable Figaro 3.2 is a Starlink release. Up to version 3.0 we distributed the release from AAO, and Starlink sites may have noticed that about one in six applications have been changed in a series of releases under the name of National Figaro. This indicates that much of the software maintenance for Figaro is done by Starlink anyway.

I am somewhat concerned about the considerable maintenance task that Figaro presents. That is why Portable Figaro is cut back to the essentials, *i.e.* the applications. In the Starlink release, as much infrastructure software as possible is used from standard Starlink libraries rather than Figaro's own libraries.

The main rôles taken over by Starlink/ADAM libraries are the parameter system and the graphics display. Those who have tried ICL Figaro on the VAX and found the parameter system wanting can be reassured that the interface between Figaro and the ADAM parameter system is much improved on Unix. As for graphics, TVPCKG is now obsolete and all graphics is done through PGPLOT, which in turn uses GKS. On an X display you can use the same GWM window for `image` and `splot`, or different windows if you prefer.

This strategy of as much ADAM as possible also explains the speed of the port. Most of the problematic bits in Figaro could be dropped by using ADAM and Starlink, and thus had been ported by the ADAM Support Group even before the Figaro Port Group formed.

And the strategy is already paying off. Figaro was run on an Alpha without any of the Figaro Port Group knowing. Similarly, Portable Figaro can be slotted into the Motif-based graphical user interface Xadam, just like KAPPA or other application packages. Thus your Figaro GUI comes without any effort (on the Port Group's part).

The Australian Standalone Portable Figaro is more concerned with the traditional ways of the Figaro package, the details of the parameter system and of how user-programmers link their own applications. I don't think this is actually a question of Starlink versus non-Starlink or ADAM versus non-ADAM. Any Figaro will depend on ADAM; at the very least it must use the HDS library and support its error reporting mechanisms.

What is missing?

As a drawback of relying on ADAM, programmers will find things have changed. They have to use `alink` and need an extra routine wrapping around their existing application routines. They also have to convert their connection files to ADAM interface files. A more detailed description can be found in [1].

Even though the applications are the essential component of Figaro, some did not make it from VMS to Unix. There were a number of file format readers that

seem obsolete now. I also decided to restrict FITS support to disk-FITS and to the old standard. Thus, there is no tape-handling. It is possible to copy FITS files between disk and tape with Unix commands. But users are best off if they use the comprehensive FITS readers in KAPPA, and its FITS writers when they become available.

Other applications not ported concern the display of two images, blinking *etc*. In version 3.0 these use 4 bits of the display depth for each image, assuming the display has exactly 256 colours. That assumption is no longer valid. It is hoped that a future version of the Graphics Window Manager (GWM) will support these functions so that no dedicated applications would be needed.

How do I run it?

To a large extent, Portable Figaro 3.2 runs like DCL Figaro 3.0 on the VAX—that is, unless you use the Xadam GUI where you can browse through application lists alphabetically or by category, fill in a form with some or all parameters of an application and then let it do its job by pressing a button. There is no ICL version for the moment, because there is no ICL yet on Unix *(real soon now - Ed)*.

So, how is Portable Figaro run from the Unix shell? You will use the C shell or a similar shell, and its startup will include the standard Starlink startup. Then you will have available a command alias to initialise Figaro. In response, it prints a reassuring message:

```
% figaro

----------- Initialising for  Figaro ------------
             General data reduction
            Version 3.2   6 Oct 1993

        Type "fighelp figaro" for help
   or "fighelp news" for news on 3.1-1 and 3.2
```

This sets up a large number of further command aliases, two for each Figaro application. Now you can use any Figaro application by using its name or "fig_" followed by its name as a command. For example, either `image` or `fig_image` will invoke the image display application.

You can copy data files across from the VAX, either with the Unix command `cp` if the VAX disk is NFS-mounted by the Unix machine, or otherwise with `ftp` in binary mode.

This is all the information you need to make your first steps. But tread carefully and make sure any unexpected small differences don't corrupt your data and throw you back a couple of days. You should have a look at the printed documentation [1]. It has a section called "Getting started" and other information about differences between VAX Figaro 3.0 and Portable Figaro 3.2.

[1] Meyerdierks, H., 1993, SUN/86
[2] Shortridge, K., 1993, AAO Newsletter No. 65

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Comings and goings

The last six months have been an exceptionally busy period on the personnel front with 7 comings and 6 goings. Part of the reason has been a turnover in application programmer contracts and the creation of two new Starlink sites.

No less than seven site managers have been appointed:

Peter Bunclark has moved from La Palma to Cambridge to head the site management team at the largest Starlink site. **Ian Skillen**, the former "Facilities Manager" at Cambridge, left in May to go to Australia.

Shashi Kanbur has become manager of the new Starlink site at the University of Glasgow.

Barry Kellett has replaced **Barbara Bromage** as the manager of the RAL site. (This is situated in the Astrophysics Division of RAL and is separate from the "Project" node at RAL which is in the Planetary and Astronomical Data Division.)

Subhash Rehan has replaced **Rolf Habing** as the manager at the University of Kent at Canterbury.

Alan Scott has become manager of the new Starlink site at Liverpool John Moores University.

Two assistants have been appointed:

John Deacon has become an assistant to the site manager at UCL.

Geraint Lewis has become user support assistant at Cambridge. These new posts have been created in recognition of the fact that the larger Starlink sites can no longer be looked after properly by a single site manager.

There has been one change in the applications programmer contract staff:

Richard Saxton has completed his contract at Leicester and has joined the staff of an ESA contractor in Holland.

Finally, two more changes at RAL:

Stuart Robinson has finished his contribution to the ADAM port.

Andrew Broderick completed his term as a sandwich course student working for **Brian McIlwrath** and escaped to work in a summer camp in the USA before returning to his studies at Teesside University.

Mike Lawden, Starlink, RAL
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On-line bibliographic databases

Traditionally, finding references to papers on some topic has involved poring over the weighty volumes of *Astronomy and Astrophysics Abstracts.* Recently, a number of on-line bibliographic databases have become available which allow searches to be performed automatically. The advantages of computerized searches over manual ones are that they are quicker, less tedious, less error-prone, and larger and more complex searches may be attempted. Many of these bibliographic databases can be accessed from Starlink computers. This article lists some of these facilities which are likely to be of interest to astronomers and which are available free-of-charge. There are additional facilities, such as the abstracting service INSPEC, which are available commercially. The discussion here is necessarily brief and concentrates on describing what is available. Details of how to access these facilities, or at least how to find out how to access them, can be found in SUN/174 and SUN/162.

Bibliographic databases and similar services are developing rapidly and the list of facilities given here is not complete. Omission of a facility is in no way pejorative of it. Indeed, I welcome suggestions for additional facilities to include in future revisions of SUN/174.

Bibliographic databases

The following on-line bibliographic databases are available.

BIDS (Bath Information and Data Services) at the University of Bath provides access to three multidisciplinary citation indices:

- *Science Citation Index*
- *Social Science Citation Index*
- *Arts and Humanities Citation Index*

These citation indices are supplied and owned by the Institute for Scientific Information Inc. in the United States. The *Science Citation Index* will be of most interest to astronomers. It covers a wide number of scientific journals, including most astronomical ones, and a large number of conference proceedings. For each article full bibliographic details, but not abstracts, are available. The period covered is from 1981 to the present.

You must register before you can access BIDS, and you must be affiliated to an institution which subscribes to it. Virtually all the 'old' (pre-1990) universities have subscribed, though subscription amongst the former polytechnics is less complete. Normally you will access BIDS from a computer belonging to your University Computer Centre, rather than a Starlink machine. Your local University (or Institutional) library should be able to advise. BIDS is not available outside the United Kingdom.

STELAR (Study of Electronic Literature for Astronomical Research) is a project to investigate computerized access to astronomical literature. It is managed by the Astrophysics Data Facility (ADF) at the NASA Goddard Space Flight Center. Much of the work is still experimental. However, as a pilot project, a database of bibliographic details, including abstracts, for articles appearing in eight eminent astronomical journals is available publicly. The journals covered are:

- *Astrophysical Journal*
- *Astrophysical Journal Supplement*
- *Astronomical Journal*
- *Publications of the Astronomical Society of the Pacific*
- *Astronomy and Astrophysics*
- *Astronomy and Astrophysics Supplement*
- *Monthly Notices of the Royal Astronomical Society*
- *Journal of Geophysical Research*

The database is a subset extracted from the NASA RECON system, which is supplied by the NASA Scientific and Technical Information (STI) programme. It contains some articles dating back to the 1960s, though the coverage is pretty complete since the mid-1970s.

ADS (Astrophysics Data System) is a distributed information system run by NASA. It includes a bibliographic database. This database is also extracted from the NASA RECON system. It is compiled from articles appearing in over 200 journals, conference proceedings and internal NASA reports. All the major astronomical journals are covered. For each article the service provides full bibliographic details, including an abstract. The period covered is from 1975 to the present. Complete coverage of any of the sources is not guaranteed.

Currently (September 1993) the ADS bibliographic database is only available to users outside the United States on an experimental basis. It is possible that in the future the service may be restricted to users within the United States.

ESIS (European Space Information System) is a distributed information system run by ESA. It also includes access to a bibliographic database. This database is also extracted from the NASA RECON system and is very similar to the one available through the ADS (see above).

SIMBAD (Set of Identifications, Measurements and Bibliography for Astronomical Data) is a database containing information for individual astronomical objects. It is operated by the Centre de Données Stellaire de

Strasbourg (CDS). SIMBAD contains data for approximately 650,000 stars and about 100,000 non-stellar objects. The information stored for each object includes a list of references to papers pertaining to that object. Bibliographic details, but not abstracts, are stored for each reference.

A charge is made for the use of SIMBAD.

NED (NASA/IPAC Extragalactic Database) contains information for individual galaxies and other extragalactic objects. It is operated by the Infrared Processing and Analysis Center at the California Institute of Technology. Currently NED contains data for over 82,000 objects. The information stored for each object includes a list of references to papers pertaining to that object. Bibliographic details, including abstracts, are stored for each reference. Some references relevant to extragalactic astronomy, but not pertaining to any particular object, are also included.

Preprint lists and collections

The following lists of preprints and preprint collections are available.

NRAO — The National Radio Astronomy Observatory maintains a list of preprints received in its library at Charlottesville. The list contains about 13,000 entries and covers the period from 1986 to the present. For each preprint the title and authors are stored, and when the paper is published full bibliographic details are added.

STScI — The Space Telescope Science Institute maintains a list containing details, including abstracts, of all the preprints produced at that institute.

SISSA/ISAS — The International School of Advanced Studies, Trieste maintains an archive of preprints of astronomical papers. This archive contains the complete text of the preprints. It covers a wide range of astronomical topics, but is particularly strong in the field of cosmology. The archive became operational in April 1992 and currently (September 1993) contains about 300 preprints.

LANL, CERN — The Los Alamos National Laboratory and European Centre for Nuclear Research, Geneva maintain extensive collections of preprints covering many areas of physics. Some of these preprints may be of interest to astronomers.

Journal tables of contents

Tables of contents for:

- *Astrophysical Journal*
- *Astrophysical Journal Supplement*
- *Astronomical Journal*
- *Publications of the Astronomical Society of the Pacific*

are maintained at the Center for Astrophysics, Cambridge, Massachusetts. The period covered is from January 1988 to the present.

In addition, a table of contents, with abstracts for the individual papers, for the *Publications of the Astronomical Society of the Pacific* is available at the Space Telescope Science Institute. The coverage starts on January 1993.

Which bibliographic database?

All the systems listed here have their strengths. The one which you will find most useful depends as much on your requirements and circumstances as on the inherent strengths and weaknesses of the system.

If you are looking for references pertaining to an individual, named astronomical object then you should use either NED or SIMBAD: NED for external galaxies and other extra-galactic objects and SIMBAD for everything else. Remember that NED has abstracts and SIMBAD does not. BIDS is particularly unsuitable for searching for named astronomical objects because a feature in the BIDS search software prevents numbers being included in the search strings. This restriction precludes searches for most astronomical object designations.

If you are searching for some specific topic, rather than an object designation, then the choice is probably between BIDS and one of the systems derived from the NASA RECON system. I suspect that BIDS offers a wider range of journals and more complete coverage of those journals, but it does not have abstracts, which the RECON based systems do. Thus, use one of the RECON based systems if abstracts are important to you and BIDS if they are not. Which of the three RECON based systems (ADS, ESIS, STELAR) you would choose depends on which you can get access to most conveniently. There seems little to choose, in terms of journal coverage, between the ADS and ESIS systems. You would probably only use STELAR if you could not get adequate access to either ADS or ESIS and were prepared to accept the limited number of journals covered by STELAR. The NRAO preprint list is sufficiently extensive that it too may prove useful if you cannot get access to the ADS or ESIS systems.

The SISSA preprint archive is a rather more specialized facility, but it is certainly worth investigating if you are interested in cosmology or related fields.

The various systems vary widely in their functionality, ease of use and terminal requirements. NED is particularly easy to use. ADS, ESIS and STELAR all require an X-terminal. All the systems allow the details of selected articles to be returned to your host computer, either as e-mail messages or text files.

I do not think that any of these systems will replace the *Astronomy and Astrophysics Abstracts*, not least because traditionalists (amongst whom I am happy to be numbered) actually *prefer* to sit in front of a printed book rather than at a computer terminal. Rather, the on-line systems should be seen as complementing the printed abstracts by allowing large and complex searches which were not practical hitherto.

Further information

Further information on the various facilities described here, including details of how to access them, their functionality, terminal requirements, ease of use *etc*, are given in SUN/162 and SUN/174. SUN/162 covers SIMBAD, NED, ADS and ESIS. The remaining facilities are covered in SUN/174. A further source of useful information is the article by F. Murtagh and H.-M. Adorf in *The ESO Messenger*, June 1993, Number **72**, pp45-47.

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End of an era

At their October meeting, the Starlink Panel made the historic decision to suspend distribution of VMS Starlink applications software from 1st January 1994, ending nearly 14 years of service.

VMS infrastructure software will continue to be distributed, but installation at your site will be optional. The reason for not changing the present distribution procedures for VMS infrastructure software is that Starlink has an obligation to supply this to the Observatories, who will continue to run ADAM on VMS machines for telescope and instrument control.

The VMS software collection, both infrastructure and applications, will be placed on-line at RAL and will be available for sites to copy as they wish. Parts of it will be updated from time to time—it will not be completely frozen—but not all Unix developments will have VMS counterparts so that VMS applications software will gradually fall behind the Unix version.

The major benefit of the change is that Starlink will save effort (both RAL staff and Site managers) which is currently going into the distribution and installation of VMS software. This effort will be redeployed into Unix-related areas.

There are also subsidiary benefits. Firstly, by no longer attempting to provide an up-to-date VMS version of every Unix application, we ameliorate a problem that faces our contract programmers. This is that they will not, in general, have VMS hardware available locally to work with. Secondly, some overseas institutions still ask for VMS versions of our software. By not completely freezing the VMS version we are helping to maintain Starlink's international profile, as recommended by the Starlink Review Panel.

The main disadvantage of the change is that the VMS versions of applications will, in general, gradually fall behind the Unix versions. However, for applications where the pace of development is slow, the impact will take many years to become appreciable.

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John Sherman, Starlink, RAL
RLVAD::JCS, jcs@star.rl.ac.uk

Starlink logo quest

Can you do better than this?

```
★ STARLINK ★
```

We're trying to produce a new, exciting Starlink logo. We want an elegant, evocative logo to grace the front cover of the Bulletin and other Starlink material.

So far our own efforts have not come up with anything near suitable, so we thought we would ask Bulletin readers for their own Starlink logo design ideas.

Please send any ideas you have to Adrian Fish at UCL (see back page for the address). E-mail entries are welcome if you can manage it. We hope that the Bulletin editor will allow us to publish the most suitable and amusing examples in the next issue.

Before you dash off to jot down your ideas, here are one or two guidelines:

- The word "STARLINK" must be a single word.
- A suitable font for the word "STARLINK" plus a device of some sort would be most appropriate.
- Ideally, the font should be selected from readily available TEX fonts or X11 fonts (MIT or other distributions), but they don't have to be. The STAR TREK font is not allowed (too easy).
- The device should be simple and uncluttered. Preferably easily constructable in PostScript, but could be distributed as a bitmap for more complicated designs.

Adrian Fish, Starlink, UCL
ZUVAD::AFISH, afish@star.ucl.ac.uk

Statistician's corner

The graphs on the next page show the history of Starlink staff numbers. These are based on head counts and they overestimate the manpower resources actually available to Starlink.

Mike Lawden, Starlink, RAL
RLVAD::MDL, mdl@star.rl.ac.uk

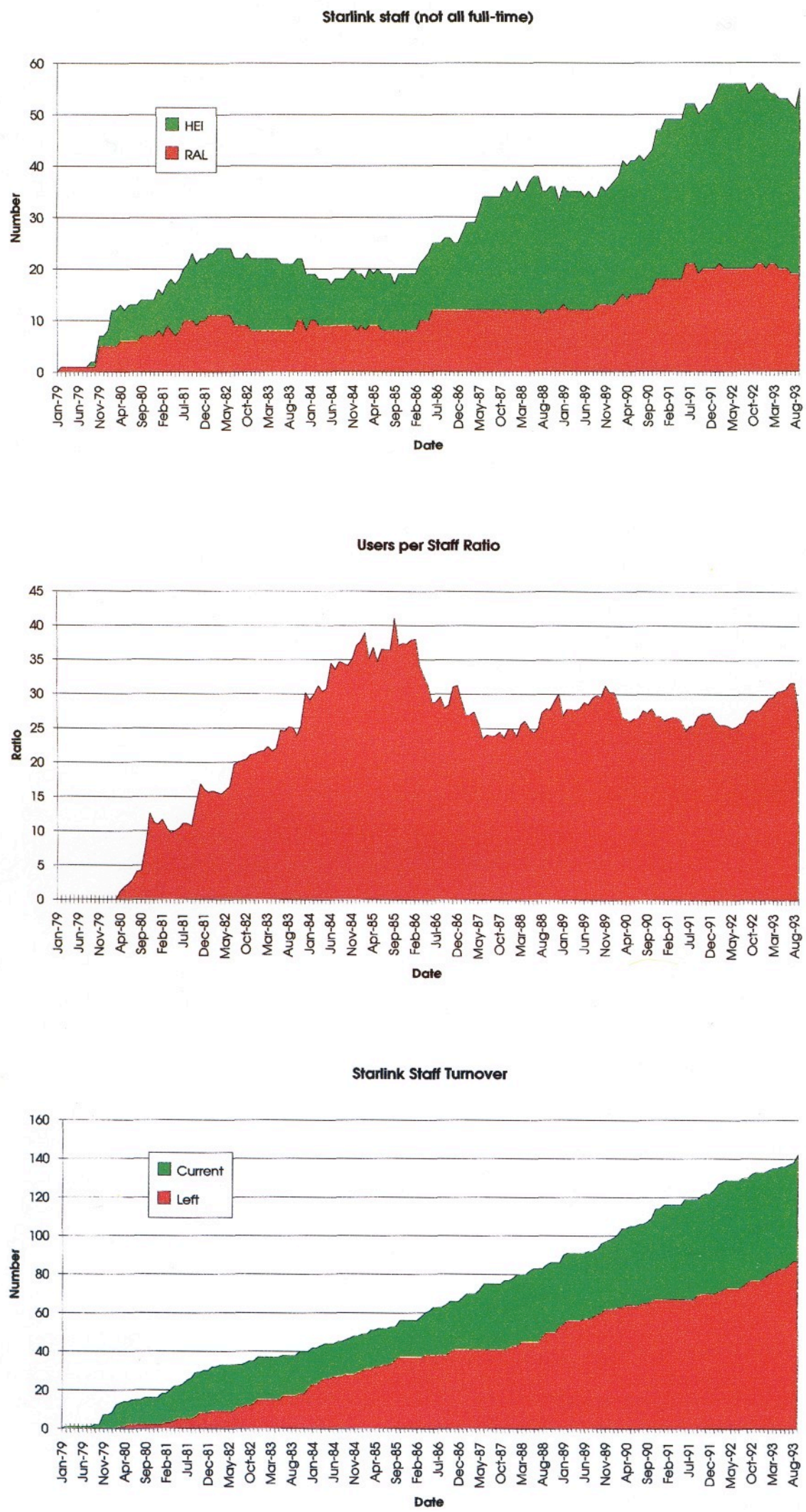

Figure 1. *The top frame shows the history of the number of staff in the Starlink Project since it began. The red area shows the number of staff working at RAL and the green area shows the number of staff working outside RAL at Higher Educational Institutes. The middle frame shows the history of the user/staff ratio. The bottom frame shows the cumulative number of staff who have worked for Starlink since the beginning of the Project. At any particular date, the red ordinate measures the number of staff who have left and the green ordinate measures the number of staff who are currently employed. The ratio of red to green measures the staff turnover.* N.B. These graphs are based simply on head counts and do not represent accurately the manpower resources available to the Project.

STARLINK INFORMATION

Starlink sites & site managers:

Site Managers can be contacted on username **oper**.

BIRMINGHAM: School of Physics and Space Research, University of Birmingham, Edgbaston Park Road, BIRMINGHAM, B15 2TT. Tel: 021-414-6447. *Bill Wilson.* BHVAD/star.sr.bham.ac.uk.

CAMBRIDGE: This is a single Starlink node with a single computer cluster serving three organisations: (1) Royal Greenwich Observatory, Madingley Road, CAMBRIDGE, CB3 0EZ. Tel: 0223-374000. (2) Institute of Astronomy, University of Cambridge, Madingley Road, CAMBRIDGE, CB3 0HA. Tel: 0223-337528. (3) Mullard Radio Astronomy Observatory, Cavendish Laboratory, Madingley Road, CAMBRIDGE, CB3 0HE. Tel: 0223-337200.
Peter Bunclark, Phil Herridge, Steve Percival, Geraint Lewis. CAVAD/mail.ast.cam.ac.uk (1 & 2);
David Titterington. MRAOCL/phy-ravx.cam.ac.uk (3).

CARDIFF: Dept of Physics & Astronomy, University of Wales College of Cardiff, PO Box 913, CARDIFF, CF2 3YB. Tel: 0222-874000 X5282. *Rodney Smith.* CARDIF/astro.cf.ac.uk.

DURHAM: Dept of Physics, University of Durham, South Road, DURHAM, DH1 3LE. Tel: 091-374-2131. *Alan Lotts.* DUVAD/star.dur.ac.uk.

EDINBURGH: Royal Observatory, Blackford Hill, EDINBURGH, EH9 3HJ. Tel: 031-668-8377. *John Barrow.* REVAD/star.roe.ac.uk.

GLASGOW: Dept of Physics & Astronomy, University of Glasgow, GLASGOW, G12 8QQ. Tel: 041-339-8855 X4268. *Shashi Kanbur.* astro.gla.ac.uk

HATFIELD: Dept of Physics & Astronomy, University of Hertfordshire, College Lane, HATFIELD, Herts, AL10 9AB. Tel: 0707-279607. *Tim Gledhill.* HATVAD/starlink.hat.ac.uk.

ICSTM: Astrophysics Group, Dept of Physics, Blackett Laboratory, ICSTM, Prince Consort Rd, LONDON, SW7 2BZ. Tel: 071-589-5111 X6685. *Nick Eaton.* ICVAD/star.ph.ic.ac.uk.

JODRELL BANK: Nuffield Radio Astronomy Lab, University of Manchester, Jodrell Bank, MACCLESFIELD, Cheshire, SK11 9DL. Tel: 0477-71321 X293. *Richard Nicholson.* jb.man.ac.uk.

KEELE: Dept of Physics, University of Keele, KEELE, Staffs, ST5 5BG. Tel: 0782-621111 X7889. *James Albinson.* KLMV1/astro.keele.ac.uk.

KENT: Electronic Engineering Lab, University of Kent, CANTERBURY, Kent, CT2 7NT. Tel: 0227-475406. *Subhash Rehan.* KENVAD/star.ukc.ac.uk.

LEICESTER: Dept of Physics and Astronomy, University of Leicester, University Rd, LEICESTER, LE1 7RH. Tel: 0533-523599. *Geoff Mellor.* LTVAD/star.le.ac.uk.

LIVERPOOL: School of Chemical and Physical Sciences, Liverpool John Moores University, Byrom St, LIVERPOOL, L3 3AF. Tel: 051-231-2338 *Alan Scott.* star.livjm.ac.uk.

MANCHESTER: Dept of Astronomy, University of Manchester, Oxford Road, MANCHESTER, M13 9PL. Tel: 061-275-4236. *Vassilis Laspias.* MAVAD/star.ast.man.ac.uk.

NORTHERN IRELAND: The following two sites are regarded as a single Starlink node:
(1) Armagh Observatory, College Hill, ARMAGH, BT61 9DG. Tel: 0861-522928. *Martin Murphy.* star.arm.ac.uk.
(2) Dept of Pure and Applied Physics, Queen's University of Belfast, BELFAST, BT7 1NN. Tel: 0232-245133 X3648. *Paul Brown.* QUVAD/star.phy.qub.ac.uk.

OXFORD: Dept of Astrophysics, Nuclear Physics Building, Keble Road, OXFORD, OX1 3RH. Tel: 0865-273311. *Paul Collison.* OXVAD/astro.ox.ac.uk.

PRESTON: Dept of Physics & Astronomy, University of Central Lancashire, PRESTON, PR1 2HE. Tel: 0772-893564. *Andy Adamson.* LPVAD/star.uclan.ac.uk.

QMW: Dept of Physics, Queen Mary and Westfield College, Mile End Road, LONDON, E1 4NS. Tel: 071-975-5053. *Kevin Richardson.* QMCMV/star.qmw.ac.uk.

RAL: Rutherford Appleton Laboratory, Chilton, DIDCOT, Oxon, OX11 0QX Tel: 0235-821900.
(1) Project cluster: Building R68. *David Rawlinson,* X6471. RLVAD/star.rl.ac.uk.
(2) Astrophysics cluster: Building R25. *Barry Kellett,* X6361. RLSAC/ast.star.rl.ac.uk.

ST ANDREWS: Dept of Physics and Astronomy, University of St Andrews, North Haugh, ST ANDREWS, Fife, KY16 9SS. Tel: 0334-76161. *Roger Stapleton.* SASTAR/st-and.ac.uk.

SOUTHAMPTON: Dept of Physics, University of Southampton, SOUTHAMPTON, SO9 5NH. Tel: 0703-592112. *Laurence Jones.* SOTON/phastr.soton.ac.uk.

SUSSEX: Astronomy Centre, Division of Physics & Astronomy, University of Sussex, BRIGHTON, East Sussex, BN1 9QH. Tel: 0273-678478. *Stuart Keir.* SUSTAR/star.susx.ac.uk.

UCL: Dept of Physics & Astronomy, University College London, Gower Street, LONDON, WC1E 6BT. Tel: 071-380-7147. *Adrian Fish, John Deacon.* ZUVAD/star.ucl.ac.uk.

Starlink contacts at RAL:

Tel: 0235-821900. All usernames are on star.rl.ac.uk (RLVAD).

Project Manager:	*Patrick Wallace*	X5372	(PTW)
Project Scientist:	*Alan Penny*	X5675	(AJP)
Operations Manager:	*John Sherman*	X6367	(JCS)
Applications:	*Rodney Warren-Smith*	X6165	(RFWS)
ADAM Support Group:	*Peter Allan*	X6735	(PMA)
Document Librarian:	*Mike Lawden*	X5363	(MDL)
Software Librarian:	*Martin Bly*	X5363	(USSC)

Starlink contract programmers:

David Berry, Manchester, MAVAD::DSB.
Clive Davenhall, Leicester, LTVAD::ACD.
Peter Draper, Durham, DUVAD::PDRAPER.
Horst Meyerdierks, Edinburgh, REVAD::HME.
Dave Mills, UCL, ZUVAD::DMILLS.
Rhys Morris, Cardiff, rahm@astro.cf.ac.uk
Grant Privett, Cardiff, gjp@astro.cf.ac.uk

STARLINK SOFTWARE

Applications

Image Analysis & Photometry

KAPPA	Kernel applications
DAOPHOT	Stellar photometry
STARMAN	Stellar photometry
PHOTOM	Aperture photometry
RGASP	Galaxy photometry
PISA	Object finding

Spectroscopy

FIGARO	General
SPECDRE	General
DIPSO	General
SAM	General
APIG	Absorption profiles
HRTS	NRL high-res telescope

Specific Wavelengths

ASTERIX	X-ray
SPECX	mm-wave
NOD2	Radio
AIPS	Radio

Specific Instruments

CCDPACK	CCD
SCP	CCD
CGS4DR	UKIRT
IRCAM	UKIRT
IUEDR	IUE
HXIS	SMM
XRP	SMM/XRP
IRAS	IRAS
JCMTDR	JCMT/UKT14

Polarimetry

TSP	Time-series & Polarimetry

General Purpose

ASPIC	General
IDL	General
IRAF	General
MIDAS	General

Statistics

GENSTAT	General
CLUSTAN	Cluster analysis
ASURV	Data with upper limits
PERIOD	Time series analysis

Database Management

CATPAC	Catalogues & tables
SCAR	Catalogues
REXEC	Relational

Utilities

CONVERT	Format conversion
TRACE	HDS object listing
SST	Simple software tools

Astronomical Utilities

Archive Access

IUEDEARCH	IUE archive
USSP	IUE ULDA

Data Copying & Format Conversion

EDFITS	Copy FITS tapes
WFCSORT	Format conversion
FORMCON	Format conversion

Observation Preparation etc

COCO	Coordinate conversion
CHART	Finding chart
ASTROM	Astrometry
RV	Radial velocity correction
RPS	Submit Rosat proposals
ECHWIND	UCL echelle spectrograph
TPOINT	Telescope pointing analysis
APLATE	Aperture plate preparation
AATGS	Guide probe predictions
FORMLOAD	Electronic form filler
OBSERVE	Check star observability

General Utilities

Document Preparation & Search

TEX	Document typesetting
LTEX	Document typesetting
DOCFIND	Starlink document search
LOOKUP	Look up a command
STEVE	Starlink EVE editor
PSMERGE	Merge PostScript files

Graphics

MONGO	Interactive plotting
PONGO	Interactive plotting
IKONPAINT	Ikon & X (GWM) to Inkjet
QDP	Quick & dandy plotter
VSHC	Hardcopy of display
HONEY	Honeywell camera output

Device & Data Handling

TPU	Magnetic tape
LZCMP	File compression
TAPECOPY	Magnetic tape
CDCOPY	CDROM
XDISPLAY	X window setup

Mathematical

MAPLE	Mathematical manipulation

Operational

NETWORK	DECNET utilities
QUOTAS	Disk quotas
NEWSMAINT	News maintenance
NOCBS	CBS error reporting
PAD_AUDIT	PAD auditing
PSSMB	Postscript print symbiont
LOG	Logical names
EMAIL	E-mail help
COLDMON	File use monitoring

Programming Support

SPAG	Fortran code improver
LIBMAINT	Library maintenance
LIBX	Library maintenance
FORCHECK	Fortran program checker
FTNCHEK	Fortran code checker
STARLSE	Language-sensitive editor
GENERIC	Generic Fortran routines
TOOLPACK	Software tools
SPT	Porting tools

Subroutine Libraries

Astronomical & Mathematical

NAG	Numerical maths & statistics
SLALIB	Positional astronomy
JPL	Solar system ephemeris
TRANSFORM	Coordinate transformation
MEMSYS	Maximum entropy

Data Management

NDF	Access NDF objects
HDS	Hierarchical data system
PRIMDAT	Process primitive data
ARY	Access ARRAY objects
REF	Reference HDS objects
GRP	Object group management
CHI	Catalogue handling
FITSIO	FITS I/O on disk
FIO	Fortran I/O

Graphics

PGPLOT	High-level
NCAR/SNX	High-level
GKS	Low-level
SGS	Simple
GNS	Workstation name service
AGI	Graphics database
IDI	Image display interface
GWM	X window manager

Other

TAPEIO	Magnetic tape handling
CHR	Character handling
EMS	Error message service
HELP	Interactive help system
CNF	C/Fortran programming
PSX	Posix interface

05/11/93

STARLINK DOCUMENTS

05/11/93

G=SG; S=SUN; M=MUD