European Southern Observatory

MIDAS Courier

Newsletter of the MIDAS Users' Community

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Editorial

As has been announced in the previous issue of the Courier and in the recent MIDAS Users Meeting, starting this year MIDAS will be officially released only once per year; the next release is to be expected in November (release 92NOV). For the *Courier* this has some consequences. Since it was published shortly after the semi-annual MIDAS release, part of its contents was dedicated to new features in that release. With the annual release to appear in November, it is obvious that this kind of information will be more suitable for the December issue of the *Courier*. Clearly, the *Courier* will continue to inform you about current developments in and plans for MIDAS. However, in particular in the June issue, we will try to obtain more user contributions. At the last MIDAS Users Meeting several people have already indicated their willingness to contribute.

During the MIDAS Users Meeting we again have tried to get your judgement about MIDAS (installation, application software, documentation, user-support) via a questionnaire. A similar action was taken two years ago. A quick look at the response and comparison with the previous questionnaire shows that we are on the right track: after verifying the basic MIDAS commands, and rewriting several parts of the User Manual and installation documentation, we found that the users' appreciation has clearly improved over the whole range of our activities. We also noticed that a substantial number of questionnaires have not been returned. We hope that you can find time to complete and return them. It would help us to find out where users see room for improvements.

In and outside ESO four major — long term — MIDAS projects have started recently. These projects should result in off-line MIDAS data analysis software for four VLT instruments that were approved ESO's Governing bodies in the last year as part of the VLT Instrumentation Plan. These four instruments are: ISAAC, **I**nfrared **S**pectrometer **A**nd **A**rray **C**ameras; UVES, **U**V-**V**isual **E**chelle **S**pectograph; FORS, **FO**cal **R**educer/Low Dispersion **S**pectrograph; CONICA, **CO**udé **N**ear-**I**nfrared **CA**mera. The first two instruments will be built by ESO, and MIDAS data reduction software will be written in-house. The two other instruments will be built by two consortia. The MIDAS software for these instruments will be created by these consortia. In these cases, members of the MIDAS Group operate as consultants to assure that the software is written according to MIDAS standards and is compatible with other parts of the system. The most recent issue of *The Messenger* (No. 67 — March 1992) contains detailed information about FORS and CONICA.

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1992 MIDAS Users Meeting

Dietrich Baade,
European Southern Observatory

For technical reasons, the annual MIDAS Users Meeting could in 1992 be held only in May. This change from the rainy Aprils of previous years was most audibly appreciated by many participants. But also otherwise the meeting was held in a rather constructive atmosphere.

The meeting followed the same pattern as in previous years. In the hour before the coffee break, Preben Grosbøl gave an overview of the most relevant changes that had taken place in the past year, including new or modified procedures for the distribution, upgrading and maintenance of MIDAS. Selected technical aspects were then expanded upon in more detail by other Image Processing Group (IPG) members who had been involved in developing them. Most of this has been or is being reported separately in the *MIDAS Courier*. Therefore, this summary will rather concentrate on the two hours' general discussion (chaired by the undersigned).

Useful nuclei for the discussion were questionnaires distributed in advance. From the roughly 60-70 participants, only about 10 filled-in forms were received, and no clear common concern could be extracted from them. The surmise that this would indicate that the MIDAS community did not feel plagued by very general problems was confirmed during the discussion. It happened only very rarely that when a question had been asked or a comment made some other participant raised his hand and seconded the previous speaker.

One of the concerns expressed was about sudden and not obviously technically inescapable changes in the syntax and names of commands or how and where results are stored. The negative impact which such discontinuities have on user-written command procedures was seen as an unnecessary nuisance. A conscientious effort should be made to minimize such modifications. Where they really are unavoidable, it was suggested, there should at least be a tool which can scan procedures files for the occurrence of commands which may cause troubles of this kind so that the user can check what modifications may be required. The IPG agreed that such a tool can and will be made available.

Some debate developed around the question how it might be possible to start a MIDAS command procedure in background and let it continue running even after logout from the main session. Several people suggested recipes but no one could say for sure whether his method would also work on other hardware platforms. Klaus Banse of the IPG will investigate the portability issue.

A comment that saw relatively many attendants nodding approvingly was that often the error messages issued by MIDAS commands are not very meaningful or misleading. Although cases can probably be found where single low-level commands show such a deficiency, this problem most often arises from the nesting of basic commands in more complex procedures where more specific error messages would be more appropriate. This problem is well known. But the IPG does not see much of a chance for improvements without heavy investment of manpower which might be more productively used by expanding the functionality to MIDAS. However, even more rigorous checking by such commands of input parameters for being of correct type and within range should provide an improved shielding.

In connection with the new procedures for the dissemination of patches, some discussion spawned off about the accessibility of the ESO computers through the networks. ESO is fully aware of this problem. Yet, there is little that ESO can do itself to improve this situation because ESO depends entirely on the services available through the Deutsche Bundespost Telekom and Deutsches Forschungsnetz. Nevertheless, ESO will continue to make its dissatisfaction with the present situation known.

A capability which would facilitate many data reduction tasks would be the consistent handling of undefined pixels. With the concept of the `NULL` value keyword, this capacity can be integrated into any applications command. However, the IPG does not presently have the capacity to implement this feature throughout the existing MIDAS. Within the forthcoming CCD package this point will be given full consideration.

Often, users find it desirable to do computations only on the `SELECT`ed rows of a table rather than on all of them. In the 91NOV release, this could still be achieved only by going through the tedious step of first copying the selected rows to a new table, working on that copy, and then copying them back to the original table. The argument against deviating from the convention that certain commands such `COMPUTE/TABLE` reset the selection

flag to ALL before execution is, of course, that operations restricted to the selected rows could very quickly lead to a status of the table which can no longer be traced back to its origin. As a compromise, from the next release on the command COMPUTE/TABLE :column = SEL will create a column with only 0's or 1's according to whether or not a row is selected. This column can then be used to restrict the effect of subsequent operations to the selected rows only and nevertheless not generate an undocumentable chaos. In this way, also a question by two participants in the users meeting could be answered.

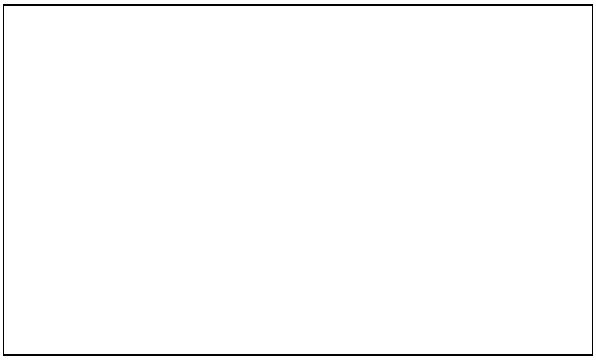
Most of the remaining suggestions or questions dealt with relatively well confined, individual problems or bugs. Often they concerned various applications packages, and it was noted that they, too, could benefit from a systematic verification as has been carried out for the MIDAS core commands. ESO will keep this in mind. However, these more specialized packages usually require a real expert for their proper testing, and the expertise among ESO's scientific staff does not cover all areas equally well, certainly not at all times. In this connection, a reminder may be in order that two years ago ESO's Scientific and Technical Committee and Council endorsed a document outlining the MIDAS policy which a.o. encourages the formation of regional centers of MIDAS expertise for just this purpose, namely to develop and maintain dedicated packages which require a very special scientific interest.

Finally, a participant inquired whether there will be more HST instrument-specific data reduction and calibration software in MIDAS. While MIDAS provides a perfectly suitable platform for such tools, their development or implementation clearly is outside the scope and responsibility of the IPG. Therefore, the question was passed on to the deputy head of the Space Telescope-European Coordinating Facility, Rudolf Albrecht, who was among the participants. Although no clear answer was given, it appeared that no major efforts are being made by the ST-ECF to offer HST calibration and reduction software to the European MIDAS users community.

A personal observation is that in spite of this lengthy report, my feeling at the meeting was that the discussion would perhaps have significantly benefited from more and more spontaneous contributions. The more lively and intense the interaction between MIDAS users and IPG is, the stronger MIDAS should grow.

The MIDAS users meeting was concluded in the afternoon with various demos of new or much improved packages and especially the new graphical user interface which on a trial base has been implemented for the echelle and general spectroscopy packages. The demos found surprisingly much interest even among old-time MIDAS users. Many people also used this opportunity for numerous individual contacts among MIDAS users or between MIDAS users and IPG staff.

A parallel demonstration of the brand-new remote control system for the NTT with EMMI and SUSI by Anders Wallander was also very well attended. Apart from being based entirely on the UNIX operating system and X-Window techniques, it also deploys MIDAS as the on-line data reduction system which can be run both on the remote and the local workstation. By using a new MIDAS feature which permits one to run a MIDAS session on some workstation but use an image or graphics display window on some other terminal or workstation, even a time-efficient alternative to transferring the complete file is available.



Artist impression of the MIDAS Users meeting. Drawing courtesy of Daniel Ponz .

General, System, and Application News

The MIDAS Group, European Southern Observatory

General News

The MIDAS Sites Database

A MIDAS sites Database is now in use at ESO IPG. The Database has been developed within STARCAT by Miguel Albrecht from the ESO Archive Group. Detailed site information such as hardware configuration, MIDAS release in use, etc. is entered into the Database. A hardware specification form was mailed out in April of this year, to obtain the most accurate data. Approximately 50% of all user sites actually completed and returned this form. As the use of this Database will play a vital role in speeding up the distribution process and making it more efficient, it is rather important for us to have the correct information. We, therefore, kindly ask all user sites who have not returned the hardware specification form to do so. In future, we would also appreciate receiving information concerning changes at the MIDAS user sites.

As an additional service to the user community, external users who have a network connection to ESO will be able to access (through STARCAT) the MIDAS Sites Database to obtain information about other user sites with possible similar configuration and, therefore similar experiences/problems. More detailed information concerning the external user interface will be provided in a circular letter within the next few weeks.

MIDAS Environment document

Currently, the MIDAS Group is working on the update of the MIDAS Environment document, which contains all information for the development of MIDAS application code, either in the MIDAS Control Language, or in Fortran or C. Besides improvements of various chapters, we will include more coding examples. Also, to facilitate easier use, the new version will contain an index. We hope to send copies of the new version to all MIDAS sites around August-September. Additional copies can be obtained from the MIDAS Group at ESO; contact Resy de Ruijsscher.

MIDAS installed on Silicon Graphics

At the Max Planck Institute for Extraterrestrial Physics at Garching near Munich, MIDAS is now running on a Silicon Graphics, Model IRIX 4D35, running under IRIX 4.01. Minor modifications were needed in some makefiles because of default rules of the `make` utility on this machine. Also, because of a conflict between the MIDAS `oserror` variable and the system one, the MIDAS one was renamed. These installation adjustments and their verification took a couple of hours, after which MIDAS was successfully installed.

System News

AGL upgrade to Version 3.6

During the past year we received a number of requests from MIDAS users for an enhancement of the graphics software. Speed improvements and additional functionality were among the main wishes. The MIDAS graphics relies heavily on the lower-level Astronet Graphic Library software, written by Luca Fini of the Osservatorio di Arcetri, Florence. Therefore, we invited Luca Fini for the period December 1991 to February 1992 to visit ESO, and to upgrade AGL in close collaboration with the MIDAS Group. In the three month period, Luca was able to implement most of the requests, as well as a number of other features in the new version. An overview of these improvements is given in a separate contribution elsewhere in this *Courier*.

Obviously, the upgrade of the AGL will only become beneficial to the MIDAS users if corresponding adjustments are made in the MIDAS graphics commands. Therefore, we also upgraded the MIDAS Graphic system to take full advantage of the enhanced performance of the AGL software. A summary of new features in MIDAS graphics system will be given in the next issue of the *Courier*.

The new version of AGL (Version 3.6), together with the improved MIDAS commands, is currently tested in the MIDAS development version at ESO. The

complete graphic package will become available in the 92NOV release.

Application News

MIDAS photometry package

A general-purpose package to plan and reduce photometric observations is being developed by Andrew T. Young, who is spending a year in Garching for this purpose. There will be two main parts: a planning program, to choose and schedule observations of standard and extinction stars so that the necessary observations can be obtained in a minimum of observing time; and a reduction program, to remove the effects of the Earth's atmosphere, and to convert the results to a standard system.

A major problem in this effort is to adapt the reductions to the wide variety of data formats produced by various data-logging systems. To help solve this problem, it would be helpful if photometric observers at many observatories would send a sample of their raw data, with a brief explanation of the quantities recorded, to Andrew Young. The aim here is to make sure the tools provided with the package will be able to digest as many kinds of data as possible. Observers who would like to contribute to this effort should e-mail a sample data file and a brief description to ayoung@eso.org.

More information will be given in later issues of the *Courier*, when the project is farther along.

New CCD package

Currently, a new CCD package for the calibration of CCD images is under development. The package will replace the old one that has become rather dated, and was only available until the last VAX/VMS version of MIDAS (88OCT). Since then, CCDs have improved substantially, allowing a large variety of observing modes, and consequently, producing increasing amounts of widely diverse data. The new package will basically take care of the pre-analysis calibration steps like subtraction of bias and dark frames, flat field, and illumination correction. More sophisticated tools will be implemented at a later stage.

The package will be able to run the calibration procedures automatically (a pipeline process) with a minimum of user interaction, as well as in a step by step mode where the user has full control and flexibility over the data processing. To provide the automatic mode, extensive use will be made of the image descriptors written at the telescope during data acquisition. In addition, a keyword structure will contain all settings that control the reduction processes.

The package, in a basic version, is planned to be become available in the 92NOV version, or shortly after via ftp. Suggestions for the package are welcome. You can send them to rwarmels@eso.org.

FILTER/COSMIC: Suggestion for improvement

Below, Hans Schwengeler (Astronomical Institute, University of Basel) describes a proposed change to the `FILTER/COSMIC` routine in MIDAS to handle a strongly varying background.

During the reduction of CCD images of the galaxy NGC 5236, we found that no chosen value of the sky was really adequate as input to the routine `FILTER/COSMIC`. The frame (1100x1050 pixels) has intensities ranging from 4000 in the lower right corner up to about 8000 in the upper left corner, in the direction where the center of the galaxy lies. We now did first a median filtering, i.e. `FILTER/MEDIAN N5236 MEDIAN 2,2,0.0`. Then we tried `FILTER/COSMIC N5236 MEDIAN OUT 4500.0,10.0,4.0,10.0`. This resulted in good cleaning for only the lower right corner. Using 8000.0 for the sky had the effect that some *stars* were already affected by the filtering. So the need arose to adapt the filtering to a *varying* background.

After some experimenting, I found out that a small number of changes do the trick. I introduced a "local" sky estimator into the program. Now the user does not have to specify a sky value himself, but the program will determine it. Since I wanted to keep the original version for "normal" CCD frames, I made a new command, called `XFILTER/COSMIC` (X stands for eXtended). I defined the command in the file `MID_MONIT:NEWCOM.IN` as `@ xcosmic`. The file `MID_PROC:XCOSMIC.PRG` is a copy of `RCOSMIC.PRG`, but without the sky parameter. Of course, I also provided help files, `XFILTE.HLC` and `XFILTECOSM.HLQ`, both in the `MID_HELP` directory.

The program itself is a copy of `RCOSMIC.FOR` (in the directory `/midas/91nov/prim/general/src` (UNIX)) and named `XCOSMIC.FOR`. The compiled and linked program goes into directory `MID_EXE`.

The code, help files, and procedure files can be obtained from me. Please, send mail to: `schwengeler@urz.unibas.ch` (internet) or `CHGATE::YOGI::SCHWENGELER` (decnet).

New IUE context

A new context has become available to read IUE data in GO format from tape and convert them into MIDAS Bulk Data Frame format (BDF) on disk. MIDAS BDF files are created for the data types RAW, PHOT, (E)LBL and FES; tables are created for the MELO and MEHI extracted spectra. The package was made available by Daniel Ponz at the IUE Station in Vilspa, Spain. More information about the context will follow in the next *Courier*.

AGL Upgrade to Version 3.6

Luca Fini, *Osservatorio di Arcetri, Florence*

The graphic functions provided by MIDAS are implemented by two levels of code:

1. an upper-level layer that is "MIDAS aware" and knows of data structures, environment, commands, and the like;
2. a bottom layer that provides the basic graphic primitives (lines, text, symbols) and that interacts with the graphic devices.

AGL (Astronet Graphic Library) is the set of tools which underlies the graphic functions provided by MIDAS: it provides a consistent and device-independent access to the various graphic devices supported, and the basic functionalities needed to produce graphic output.

The 92NOV version of MIDAS will include a thoroughly revised version of AGL. The revision was planned both in order to solve some problems with the previous version and to provide more functionalities required by MIDAS users.

In this respect one must consider that functionality improvements seen by a MIDAS user require two steps: a) the graphic library must provide tools to implement the new features; b) the MIDAS-specific graphic code must be modified in order to use those new features, and to provide both more graphic commands and new capabilities of existing ones. The following lines give an overview of point a); a description of point b) will be given in the next issue of the *Courier*.

As a first improvement, the source code of AGL has been thoroughly restructured to allow separate compilation of modules. In fact, the previous AGL code structure caused the overflow of compiler internal tables on some machines. Moreover, the AGL code has been profiled in order to spot some efficiency bottle necks. A re-coding of those parts has led to a 36% improvement of drawing speed (measured on a Sun Sparcstation).

In the new version, a number of new capabilities have been included:

1. Colour management: consistent support of named colours and background colour control. A driver for colour PostScript printers has also been added;
2. The axis drawing routines have been redesigned to allow more flexibility. Arbitrarily oriented axes can now be drawn, and labels may be written in degrees (hours), time and arc minutes, time and arc seconds format;
3. Support for non-linear coordinate transformations: polar and many other sky-mapping transformations have been included;
4. Polygon drawing and filling routines.

Some users have also requested a well-defined programming interface, like the ST/SC or TB/TC interfaces, to be used in MIDAS application programs. Using these interfaces one then could provide graphic output without using MIDAS commands. This wish has not, as yet, been provided, because of a number of considerations which I will try to clarify below:

1. AGL is such an interface and could in principle be used for that purpose, but, unfortunately, it is much too "low level" to be useful: it cannot manage the MIDAS environment and is not aware of MIDAS data structures;
2. The set of routines in the upper part of the graphic code in MIDAS is regularly updated, and is thus not suitable to be frozen into an interface definition;
3. The upper layer of the MIDAS graphic code is currently written in FORTRAN. Hence, it could only provide an interface for Fortran applications, which is a major limitation for a general interface. A Fortran and C interface would require the

rewriting of that layer in C, which, obviously, is a major task.

Thus, although the issue of a graphic interface for MIDAS programming is not closed, it must be carefully evaluated, and a workable solution is not, at the moment, available.

As a final remark, the version of AGL used within MIDAS is a special customized version, which is not suitable for stand-alone applications. Programmers who want to use AGL outside the MIDAS environment must get the standard version of AGL from the author (email: lfini@astrfi.astro.it) or from:

Astronet Documentation Facility (ADOC)
Osservatorio Astronomico di Trieste
C.P. Succ. TS 5
Via G.B. Tiepolo 11
34131 Trieste, Italia
`SPAN: ASTRTS::ADOC`
`Internet: adoc@astrts.astro.it`

Graphical User Interfaces: First Experiences

Pascal Ballester, *European Southern Observatory*

Graphical user interfaces (GUIs) have been released for the first time in MIDAS 91NOV. In this version, two interfaces are available: ***XSpectra*** provides reduction procedures for long slit and 1D spectra and ***Filters*** provides characteristic curves of ESO's filters. A new interface ***XEchelle*** is available in the in-house MIDAS 92N03 version and is an interface to the Echelle package. All these interfaces are based on the Athena widget set provided with the MIT version of X11. These GUIs were experimented at ESO on La Silla and Garching by internal users and visitors.

Along with these first realizations came up two concerns: The definition of a standard presentation (the so-called "Look and Feel"), and the optimization of the production process. Many ESO projects involve the realization of GUIs and the definition of an ESO "Look and Feel" is currently discussed.

Also, different GUI builders have been compared. GUI builders are tools which enable the interactive development of an interface, either through a form editor or a specification language. They present many advantages:

1. generation of bug-free, immediately executable code;
2. clear separation between the graphical interface and the application code;
3. code is generated in a standard way, allowing less personal programming style and less differences between applications.

GUI builders can be separated between management systems (UIMS) interpreting a specification file, and design systems (UIDS) producing a source code which can be implemented in the applications. UIMS permit a quick prototyping of interfaces but their capabilities are limited to what allows the specification language. Because they produce source code, UIDS are more adapted for the development of MIDAS applications. In addition, UIDS give a complete freedom for the specification of interfaces and are only limited by the possibilities of the widget set.

The standard X11 environment is distributed with the set of Athena widgets. Applications developed with this set of widgets are fully portable. Additional public domain widget sets are available. However those widget sets are limited and do not constitute a coherent package. For this reason it has been chosen to use the MOTIF widget set for the development of MIDAS GUIs. The existing interfaces will be rewritten with MOTIF widgets to conform to the ESO standard "Look and Feel".

Using UIM/X, the GUI builder retained to develop MIDAS application, a new interface ***XHelp*** has been realized which will be implemented in the in–house 92N07 version of MIDAS and the next release. The ***XHelp*** interface is based on the Motif widget set and provides access to MIDAS help files. At creation time, the list of all available MIDAS commands is displayed in the text area. This list results from the MIDAS command `HELP`. The help file of any command is obtained in a maximum of two clicks. A first click on

a command name (e.g. `CREATE`) corresponds to the MIDAS command `HELP CREATE` and results in the list of all commands `CREATE/...` Then a click on a complete command name provides the corresponding help file. In the same way can be obtained the help files corresponding to commands referred in another help, as found in the section "See also" of the help files. The interface runs in parallel with the MIDAS monitor, which means that help files can be read while MIDAS is executing a command and that the interface survives a MIDAS exit (`BYE`).

Two XHelp display windows. Top: the display window containing all available MIDAS commands for which help is available. Bottom: the help text of a specific MIDAS command after two clicks in the XHelp window, or after entering the command in the type-in area (area left to the "Main" button).

150 ESO–MIDAS User Agreements

On June 1st we have reached the next milestone in the ESO-MIDAS project: the 150th ESO-MIDAS User Agreement has been signed. The Agreement was signed by ESO and Instituto Isaac Newton at Santiago de Chile. Indeed, it is a nice coincidence that the 150th ESO-MIDAS site is located in the capital of the host country of ESO's observatory on La Silla. We congratulate the Institute Isaac Newton and, once more, thank the MIDAS users for their confidence in MIDAS.

MIDAS Used for Data Acquisition of IRAC 2

Gert Finger and Peter Biereichel,
European Southern Observatory

The new infrared camera IRAC 2 equipped with a large format NICMOS3 256*256 $Hg_{1-x}Cd_xTe$ array detector was installed last May at the 2.2 meter ESO/MPIA telescope on La Silla. Since no software support was available to adapt the software of IRAC1 running on the HP1000, a new concept based on UNIX workstations was implemented which allows to use MIDAS for data acquisition and quick look data reduction at the telescope.

Instrument Workstation

The general system overview can be seen in Figure 1. The central instrument control of IRAC 2 is performed by rocky mountain basic (rmb) which is an application running on top of the UNIX operating system of an HP 370 workstation. Rmb fully supports the X11 window system. The user interface is mouse driven displaying status information of detector, instrument and telescope by separate pop up windows. Additional support is given to the observer by graphics windows displaying the measured transmission curves of the selected filters, the wavelengths of neighbouring orders of the Fabry Perot, the instrument efficiency as a function of wavelength after execution of the MIDAS command `MAGNITUDE` on a calibration star, transmission of the atmosphere, etc.

The instrument functions are controlled by CAMAC which is accessed from rmb via the GPIB bus. A serial RS232 interface in CAMAC establishes the link to the HP1000 telescope computer via TCINT which is needed for getting the telescope coordinates, doing automatic focus exposures, mosaicing of large fields or microsteping the telescope for deep imaging.

Communication to the Detector Preprocessor via FTP

The rmb statement `EXECUTE` allows access to the underlying UNIX operating system taking advantage of the full power of UNIX enhancements. Rmb operation is suspended and the UNIX command specified by rmb is executed.

The detector data acquisition system is VME based. The controller is a motorola 68030 processor (Eltec E6) on which the detector preprocessor software (pps) is running under the OS9 operating system. The communication to the pps software is established via the ethernet 1 link. Command files for the detector setup which have been created by rmb are transmitted via socket communication calling a C program from rmb. This program sends commands to the pps and stores the replies into a file which is sent back to the calling program via ftp. Detector images are also transmitted from pps to the instrument workstation via ftp. The data format is double precision.

It should be noted that pps is galvanically decoupled by an ethernet fiber optics link in order to avoid ground loops which is mandatory for achievement of excellent detector noise performance. The pps system contains also a graphics board for a real time display which is connected to a monitor in the control room by an rgb fiber optics video link. The fiber optics is necessary to keep the detector electrically isolated as just mentioned before.

Figure 1. Control setup for IRAC 2 installation at the 2.2–m telescope used in May 92.

Communication to the MIDAS Host via NFS

If rmb receives an image from pps, it adds the fits header corresponding to the instrument setup used for the current exposure. The resulting fits file is created on the disk belonging to the midas workstation HP 730. This disk is remotely mounted on the instrument workstation by nfs and can be directly accessed by rmb.

On the HP730 two parallel MIDAS sessions are active. The monitor of the first MIDAS session is set in the background mode using the midas command `MODE(4)=2`. In this mode the midas monitor looks in its working directory `(MID_WORK)` for mailbox files to use as input. The mailbox file or send box is created by rmb. It instructs midas to call a procedure which does the following: It converts the fits file created by rmb to a bdf file. It flips the image to get the correct orientation on the sky. Optionally a stored sky frame can be subtracted from the image. A bad pixel mask can be applied to replace bad pixels by neighbouring good pixels before the image is displayed using appropriate cut levels. The bdf image is copied to files numbered sequentially and an entry to an image catalogue is made. Then rmb waits for the creation of the receive box. After obtaining the return status the receive box is deleted and a new send box can be created for the next MIDAS command. This background MIDAS session allows to control incoming images without interference of the observer.

A second MIDAS session running in the foreground gives the observer the possibility to interactively reduce the images for a quick look during acquisition of new exposures using the full power of the MIDAS imaging package.

Conclusions

The described setup is provisional. It was used for lab testing in Garching and is currently in use at the telescope, until the final La Silla software is available. The rmb software running on th HP370 will be transferred to the HP730 workstation implementing the user interface developed by La Silla staff. So only one workstation will be needed to control the instrument and to run MIDAS. Special rmb image

processing routines for IRAC 2 are presently translated into MIDAS application programs.

Installation of a new processor board (Eltec E7 68040 / 25 MHz) in the pps data acquisition system will allow to use nfs. Thus image files will be directly written on the disk of the HP730 instrument workstation. The CAMAC motor controllers will be replaced by a VME based system which can be accessed via ethernet.

The use of two separate LAN's increased the reliability. Ethernet 1 is a completely separated instrument LAN for undisturbed data flow between the detector preprocessor, the instrument workstation and the image processing workstation. Ethernet 2 communicates to the rest of the world. Before separation of the instrument LAN from the outside world a faulty bridge caused data communication problems.

Two workstations reduce the load of the less powerful instrument workstation, which in principle could also run MIDAS. The use of two monitors is very convenient and should be maintained in the final setup by means of an additional X-terminal.

During the first installation of IRAC 2 in May 92 the presented concept proved to be reliable. Each night 100 first quality infrared images have been acquired. MIDAS was a very powerful and flexible observing tool which could be easily adapted to our needs.

ROSAT Data Analysis with EXSAS

Hans-Ulrich Zimmermann, *Max Planck Institute for Extraterrestrial Physics, Garching bei München*

The X-ray astronomy satellite ROSAT, since its launch in June 1990, is performing an extremely successful observatory mission. About 60,000 X-ray sources (and with the XUV telescope in the order of 1000 XUV sources) have been detected in the initial All-Sky Survey, and a similar number of sources is expected to show up in the many images taken since the pointed observations started 1.5 years ago. That wealth of information — before ROSAT in the order of 5000 X-ray sources were known — offers exciting scientific research possibilities that can be explored effectively only in connection with appropriate analysis tools.

With EXSAS — the **EX**tended **S**cientific **A**nalysis **S**ystem developed with an effort of 20 man years by the ROSAT Scientific Data Center at the Max-Planck Institut für Extraterrestrische Physik (MPE, Garching) — a comfortable system for the reduction of data from the ROSAT X-ray and XUV instruments has been made available. EXSAS comprises a large collection of application modules as typically required in analyzing data of this wavelength regime, and runs as a specific context in the ESO-MIDAS environment. Building EXSAS on top of MIDAS using already existing applications (mainly for graphic and image presentation) facilitated to a large extent the development of the package and makes it easy to install and use the software at the many sites already familiar with MIDAS. EXSAS, completely written in FORTRAN 77, takes full advantage of all the standards used in MIDAS and therefore reflects the same portability. To maintain independence from the specifics of different operating systems also on the data input side all ROSAT data are distributed in the widely accepted FITS format.

EXSAS analysis modules are grouped into 4 application packages dealing with Data Preparation, Spatial Analysis, Spectral Analysis and Timing Analysis. A special EXSAS header, read and updated by each application, maintains general information on the origin, the history and the parameter space of the data stored in tables and images.

The basic data set for all analysis is the so-called Photon Event Table (PET). This is a space- and time-ordered list of all the X-ray photons collected during a specific observation, each entry containing the detector and (projected) sky coordinates plus the amplitude (energy) and the time of the event. The Data Preparation package is used to select data from this file according to spatial, spectral and timing criteria, and bin them into images, spectra or lightcurves. At the same time, or as a separate task, instrument corrections like telescope vignetting, filter transmission, detection efficiencies and point-spread-function dependencies can be applied. Additional modules allow the user to manipulate spectra in different ways and prepare them (by background subtraction and error calculation) for spectral fitting procedures.

The Spatial Analysis section contains a sophisticated package for detection of point-like and moderately extended sources in X-ray images. Besides other methods, a maximum-likelihood algorithm that takes into account full information of all individual photons, is used to evaluate best estimates for the position, extent, and intensity, and corresponding errors of individual sources. Other functions deal with analyzing point-spread functions, extended structures or offer coordinate manipulation and presentation utilities.

For the Spectral Analysis branch, an instrument-independent scheme has been implemented that fits observed X-ray spectra with a multitude of standard and user-defined source models, including different error-calculation methods. The package is complemented with utilities to determine fluxes and luminosities, assuming different cosmological models, and to present spectral fitting results.

In the Timing Analysis package the observer can select power-spectrum calculations, auto-correlation or cross-correlation methods, period folding with barycentric correction of arrival times, or perform different statistical tests on source variability.

A number of predefined procedures for standard analysis tasks facilitate the reduction of data by astronomers not intimately acquainted with all the details of X-ray data evaluation. A comprehensive EXSAS User's Guide, as well as the internal help facilities in MIDAS style, and some tutorials, comprise the internal documentation of the system.

The EXSAS software package can be requested directly from the ROSAT Scientific Data Center at MPE (by email to `MPE::EXSAS` or `exsas@mpe.mpe-garching.mpg.de`). The only prerequisite is access to a MIDAS installation. At MPE, EXSAS is presently used by about 70 scientists. In addition, the software has been distributed to 38 institutes all over the world. Some astronomers also come directly to the Data Center to use the system there. For this purpose a number of image processing workstations and some visitor service are available.

The Data Center will also in the future provide full support and service for the package, updating and extending the functionality at regular intervals.

Expeditions into the MIDAS Jungle: Images and Descriptors

Klaus Banse, *European Southern Observatory*

In this second tour we explore the internal structure of MIDAS images and their descriptors. We also take a closer look at the possible operations involving descriptors.

The data structure for images consists of three main parts: a Frame Control Block (`FCB`) of 512 bytes, the image data (pixels) and the descriptors containing the descriptive information about the image. Among other internal variables, the `FCB` contains the MIDAS version with which the image was created, the number of pixels and their format, as well as pointers to the descriptor and pixel sections of the image.

The detailed layout of the `FCB` is **not** documented to allow for upgrades of the internal structure of images. Therefore, we strongly recommend accessing MIDAS images and descriptors only via the `ST` or `SC` interfaces in an application program.

If you *really* need to get at a MIDAS image (or parts of it) directly, you should look into the file `fcbdef.h` which is in the directory `$MIDASHOME/$MIDVERS/incl` (UNIX) or `MID_DISK:['MIDASHOME'.'MIDVERS'.INCL]` (VMS). Together with a dump of the image file, this should help you in locating the address of the data you are interested in. Examples of this kind of image access are in the IDL procedures, written by the ST-ECF at ESO, to convert MIDAS images to IDL in a restricted but quick way. But beware, there is no guarantee that this method will work from one MIDAS release to the next; if the internal format is updated, your program has to be changed as well!

The `FCB` is followed by space for an initial set of descriptors, then comes the space reserved for the pixels of the image. Additional descriptor data is appended to the end of the image. By the way, MIDAS tables also use this data structure.

The number of pixels of an image and their internal format is fixed after the creation of an image, so if you want to change the size or data format of an image you have to copy the image to another one and rename it back to the original name.

The descriptors of an image contain all the additional information related to the image data, and correspond to the KEYWORDS of the FITS files (an in-depth article about the MIDAS FITS-reader/writer and its handling of descriptors is planned for a future issue of the MIDAS *Courier*). Each descriptor has an entry in a 'descriptor directory' containing the descriptor name, type, size and a pointer to the actual descriptor data. This directory itself is a *normal* MIDAS descriptor named DIRECTORY.MIDAS with restricted access, though.

Descriptors may be expanded after their creation, but the maximum size of a descriptor is currently 32767 elements. You may also add descriptors at will to an image, but since the descriptor directory has the same limits in size as the other descriptors, and 30 bytes are used for each entry in the directory at the moment, only 1092 descriptors can be created currently. Each image needs a minimum set of descriptors, the *standard* descriptors, which contain the information needed to interpret the data correctly, like number of axes, number of pixels in each axis, etc. See the MIDAS Environment document for more information about that.

Other descriptors are used by MIDAS applications, e.g. the descriptors STATISTIC and HISTOGRAM, to save results from calculations on an image and therefore have predefined usage. And for the ESO Archive we are currently implementing hierarchical descriptors.

Creating, updating and expanding descriptors is done by the command WRITE/DESCR. To get rid of descriptors, use DELETE/DESCR. READ/DESCR and SHOW/DESCR display the contents of the descriptors and the descriptor directory. PRINT/DESCR not only prints the descriptor contents, but may also be used to convert descriptor data and store it in an ASCII file (using ASSIGN/PRINT FILE myascii_file before). And since MIDAS tables also have descriptors, all these commands apply to tables as well; just add the file type '.tbl' to the table name. E.g., SHOW/DESCR mytable.tbl will display all descriptors of the table mytable.tbl.

The COPY/... commands copy descriptors to keywords and images, and vice versa. Furthermore, descriptor data may be manipulated directly via the substitution mechanism provided by the MIDAS Command Language, e.g.:
COMP/KEY inputd(1) = {myfile,step(1)}
puts the x-step of image myfile.bdf into keyword inputd(1).

PLOT/DESCR and OVERPLOT/DESCR draw the contents of a descriptor. All descriptors are saved in FITS keywords when writing an image on tape via the OUTTAPE/FITS command.

Soon[1], you can edit the contents of a descriptor via the application procedure dscedit.prg.

Normally, all (sensible) descriptors of an input image are copied to the result image at the end of an operation on images. This can be changed via the command SET/MIDAS_SYSTEM DSCCOPY=...[1].

Finally, we want to draw your attention to the descriptor HISTORY, where all the MIDAS commands applied to a given image/table are recorded automatically. If that is not exhaustive enough for you, how about adding another descriptor to individually log what you did?

[1] from the 92NOV release on

Deadline for the next ESO-MIDAS Courier

The next issue of the ESO-MIDAS Courier, Volume 2, Number 2, will be prepared and printed in December 1992. The issue will contain information about the MIDAS 92NOV release: upgrades of existing software, as well as new packages. In order to improve the communication between the MIDAS Group and the MIDAS users, the latter are encouraged to make contributions to the *Courier*. Please, send your contributions, preferably in computer-readable format, to the MIDAS account or to the editor (see the back cover for the mail addresses) before December 1, 1992.

MIDAS Questions and Answers

The MIDAS Group, *European Southern Observatory*

This column presents answers to questions which the MIDAS Group encounters frequently. If you have your own bag of questions which are asked very often at your site, or any other suggestion or commentary, please send them to us.

This time we will discuss some questions concerning graphics. Because of the upgrade of the underlying AGL software (see elsewhere in the *Courier*), the MIDAS graphics system will be upgraded in the coming 92NOV release. In that release you will find additional functionality and more tools to compose your graphics layout. The upgrade will be mainly on the command level; the way the graphics system work (concept) remains unchanged.

The problems discussed here are partly related to the system as a whole, and partly related to the functionality of the individual commands. As far as the concept is concerned, the answers will also apply to the coming MIDAS releases. Answers to individual commands will also preview some of the new features in the new release (just to give you some taste). In the next issue of the *Courier* a larger article will discuss the upgrade of the graphic system.

Problem: I want to plot a line (row or column) of an image. The plot I get contains a coordinate box but no data are plotted.

Answer: As in the answer in the last *Courier* concerning the command `LOAD/IMAGE`, the problem is probably the wrong setting of the *cut values*. The graphic system looks at these cut values to determine the range of coordinate axes. Obviously, with wrong cut values the coordinate box has a wrong range and the data values may, partially or completely, fall outside the box. The solution is to set the cut values (in the descriptor `LHCUTS`), correctly yourself, using the command `CUTS/IMAGE`. In the previous issue of the *Courier* you will find more information about the descriptor `LHCUTS` and the meaning of its values.

A second reason might be that you have preset the graphic axes with the command `SET/PLOT`[2]. This will have a similar effect: the data values may fall outside the defined graphic coordinates and will not be plotted. A similar situation will occur if you plot table data which range falls outside the preset graphic area coordinate range.

Problem: How can I make more than one graph on one sheet of paper (or in one graphics window)?

Answer: Currently, in the 91NOV release, the possibilities are rather limited. The only way of doing it is to use the command `OVERPLOT/AXES` where you can specify the ranges and sizes of the axes and the location where the graph is to be drawn. Subsequently, one can use *e.g.* the `OVERPLOT/ROW`, `OVERPLOT/COL`, `OVERPLOT/TAB` commands to overplot data.

In the coming 92NOV release, tools will be available to enable easy overplotting. All PLOT commands can then also be used in overplot mode, *i.e.* without erasing the screen first. In addition, offset parameters can be used to position the graphs.

Problem: Can I use a nice quality font to make publication quality output?

Answer: Yes, you can, though the possibilities are limited again. There is only one quality (roman) font available. This is enabled if you set `PMODE=3` in the command `SET/PLOT`.

In the new release this restriction will be lifted and more (six) fonts will be available. The font setting will then also be decoupled from the layout setting (`PMODE`).

Problem: When I have two graphs in the graphics window I obtain wrong numbers when running the GET/GCURSOR command on the first graph.

Answer: All essential information of the last graph drawn , *e.g.* axes, boundaries, and data, is stored in the MIDAS keyword structure. Hence, when making a new graph with an `OVERPLOT` command, the information about the first graph is overwritten and cannot be retrieved when running the graphics cursor. Similar, when drawing a new graph in another graphic window, the keywords will only contain information about that last graph.

Also, in overplotting data on an existing graph the information, is updated. The values returned by the graphics cursor will refer to the data plotted last.

[2] from the 92NOV release onwards all qualifiers `/PLOT` will be replaced by the qualifier `/GRAPHIC`

Problem: When I copy a square graph to the printer the frame isn't square anymore; its dimensions have changed completely.

Answer: All graphics output produced is stored in a plotfile, the metafile. The information in that file is based on so-called normalized coordinates: the physical area of the assigned graphics device is mapped onto a coordinate system that runs from 0,0 for the lower left position to 1,1 for the top right position. Hence, if one sends a metafile, produced together with a graph in the graphics window, to an A4 format laser printer, using the command `SEND/PLOT`[3], the normalized coordinates in the metafile will now be mapped onto the (new) physical dimensions of the receiving laser printer. Since the laser printer has a larger output area, the graph will be stretched in both x and y directions.

To solve the problem one should first do the assignment of the output graphics device (`ASSIGN/GRAPHICS` with possibility the `NOSPOOL` option). Then, one can execute the `PLOT/...` and `OVERPLOT/...` commands. Finally, dump the graph on the graphic device with the `SEND/PLOT` command.

Clearly, if you create a graphic window that has the same dimension ratio as a DIN A4 piece of paper, sending a square graph to the printer will produce a square graph. Only the size of the graph will be scaled, but that scaling will be the same for the x and y directions.

[3] in the new 92NOV release the command `SEND/PLOT` will be replaced by the command `COPY/GRAPHICS`

The MIDAS Patch File Summary (from the anonymous ftp account)

The following text contains the header summary of the patch file 91NOV.0001 that can be obtained by anonymous ftp (from 134.171.8.4). Please refer to the ESO-MIDAS Courier Vol. 2 Number 1 for a detailed description.

```
Archive-name: P91NOV.01
Submitted-by: cguirao@eso.hq.org (Carlos Guirao)

    This is official patch 01 for MIDAS 91NOV.
    Please apply it by:
        % cd $MIDASHOME (eg. /midas)
        % patch -N -p < P91NOV.01

NOTE: "patch" is public domain software that can be very easily installed
      in any UNIX machine. There is a compressed tar file called "pub/patch.tar.Z"
      available on our anonymous "ftp" account in "ftphost.hq.eso.org"
      (134.171.8.4). Follow README for installation details.

NOTE: This patch file should be applied on the original release MIDAS 91NOV.
      If you have already modified files by hand,the command "patch" could
      fail, leaving the file partially or completely unpatched. A correct
      execution should print only "Hunk" messages like:
     Hunk #<a number> succeeded at <a_number>.

NOTE: After applying all the patches, you will have to run the "update MIDAS"
      procedure, for the modifications to take effect:
        % cd $MIDASHOME/91NOV
        % ./config
        ............
        Select: 7       (update MIDAS)
        ...........
        Do you want to continue [yn]? (y): y
        ...........
        Select: q       (quit config)

Fixes:
        - Creates the file "patchlevel.h" with this header.
        - In Fortran_to_C interface: Temporary strings need to contain
          original Fortran strings.
        - Bug fixed for COPY/II with delete flag set.
        - For VMS: Plotting is now a bit faster.
        - AGL: The cursor does not misbehave on Tektronix compatible
          devices (only on BSD platforms)
        - Number of points that can be plotted is increased from 10000 to
          100000
        - Mathematical library -lm is needed on IBM6000.
        - Undefined errors when compiling module "ost.c" now solved.
        - Tapeserver returns a proper message when DEVCAPFILE not defined.
```

```
- AGL makefile excludes the installation of Versatec commands.
- Double definitions in "cc.c" are better treated.
- Some modifications in "osu.c"  to deal with SunOs 4.1.1.
- Corrections to the FITS reader.
- Corrections to the command COMPUTE/PRECESSION
- Corrections to the command CREATE/TABLE with a format file.
- Corrections to the command COMPUTE/BARY & COMPUTE/AIRMASS
- Corrections to the command COMPUTE/UT & COMPUTE/ST
- Elimination of two extra planes in the graphic output when plotting.
- Disabling catching float exceptions (For DecStations)
- AGL3CONFIG definition has been corrected for Bourne-Shell users.
```

Problems found in the 91NOV Release

The following text contains a listing of problems found in the 91NOV release. Some of these problems are detected on both VMS and UNIX systems, some only on one of these two. If you find one of the problems described below, check with your local MIDAS site manager to get the solutions implemented.

The previous issue of the Courier (Volume 1, Number 2) contains the problems found until December 1991. The present listing contains the problems found between December 1991 and June 1992.

VMS and UNIX Systems

1. The source code for the perspective plotting will produce two extra planes in the graphics output. The problem is caused by comments in a number of lines in the subroutine `NXTVU` in the file `plper.for` in the directory `/midas/91nov/prim/plot/libsrc` (UNIX) or `[midas.91nov.prim.plot.libsrc]` (VMS). These comments, those in lines starting with '`CC`', should be taken out. The line numbers are 545 and 547, 570 and 572, 586 and 588, 634 and 636, 651 and 653, 687 and 689, 704 and 706.
2. A bug was found in the command `SKY/ROMAFOT` in the context ROMAFOT. In the source file `rfotsky.for` in the directory `/midas/91NOV/contrib/romafot/src` (UNIX) or `[midas.91NOV.contrib.romafot.src]` (VMS) the variable `AMA` is declared as `INTEGER`. However, `AMA` like `AMI` should have type `REAL`.
3. In the command `GROUP/ROMAFOT` in the context ROMAFOT the minimum allowed value for the background intensity was 1.0. This value caused severe problems for lower background levels. The restriction was therefore removed. The source file is `/midas/91NOV/contrib/romafot/src/rfotgroup.for` (UNIX), or `[midas.91NOV.contrib.romafot.src]rfotgroup.for` (VMS). The lines 327 to 329 should be commented out.
4. In `DAOPHOT` an integer overflow may occur due to normalizing if the variable ISEED in the routine SEED3 is in the range 1–1073741823. The overflow then causes a crash in the routine `DAORAN` when computing the value of `IDUM`. The problem can be fixed by changing the value 1073741823 to 524288 in the file `/midas/91NOV/contrib/daophot/libsrc/addstar.for` (UNIX), or `[midas.91NOV.contrib.daophot.libsrc]addstar.for` (VMS).
5. On systems having not enough memory or swap space the array dimensioning in both `ALLSTAR` and `DAOPHOT` may be too large. One can change the dimensions with the parameter `MAXPIC` in `/midas/91NOV/contrib/daophot/src/daophot.for` (UNIX) or `[midas.91NOV.contrib.daophot.src]daophot.for` (VMS), and the parameter `MAXFRM` in `allstar.for` in the same directory.

UNIX Systems

1. In the file /midas/91NOV/libsrc/os/unix/ost.c the following lines should be deleted.
   line 100: `static jmp_buf  env;`
   line 102: `VOID ostalarm();`
   line 676:`#if ((OS_ULTRIX||OS_BSD) && TIMEOUT)    /* ALARM function to stop */`
   line 686:`#endif`

   The next line included:
   line 136:`VOID ostalarm();`
   line 137:`static jmp_buf  env;`

   Do modify this file according to the above lines, and if you have not yet installed MIDAS, just follow the installation notes. If you have already installed MIDAS, you will need to update the installation:

```
% cd /midas/91NOV/install/unix
% config
...........
Select: 7     (update MIDAS)
Do you want to continue [yn]? (y): y
...........
Select: q     (quit config)
```

2. Tapeserver installation (only on UNIX systems). In the file `/midas/91NOV/system/tapeserv/inmtaped.c`
   line 472: `l = getdev(name);`
   should be changed to:
   line 472`if ( (l = getdev(name)) < 0) {`
   line 473: `P_ERROR;`
   line 474: `(void)ret_client(-1,oserror,osmsg());`
   line 475: `return(-1);`
   line 476: `}`
   Then run the script: */midas/91NOV/system/unix/makemidas*
   to generate the `/midas/91NOV/system/exec/inmtaped.exe`and follow the documentation for a complete installation.
3. This patch applies only to DecStation/Ultrix running the Fortran compiler f77 release 3.0.2. In the file `/midas/91NOV/libsrc/st/scst.c`
   line 189: `osscatch(SIGFPE,interf);`
   should be put in comments:
   line 189: `/* osscatch(SIGFPE,interf); */`
   In the file `/midas/91NOV/local/make_options` (after "5 - preinstall MIDAS") or `/midas/91NOV/install/unix/systems/decstation/make_options`(before "5 - preinstall MIDAS"):
   add the line:
   `F_OPT=-fpe1`

   Do modify this file according to the above lines, and if you have not yet installed MIDAS, just follow the installation notes. If you have already installed MIDAS you will need to update the installation:

```
% cd /midas/91NOV/install/unix
% config
...........
Select: 7     (update MIDAS)
Do you want to continue [yn]? (y): y
...........
Select: q     (quit config)
```

VMS Systems

1. In the context `DAOPHOT` on some VAX/VMS systems `ALLSTAR` produces an “access violation”. It appear that the subroutine `WRARRAY` in the DAOPHOT library is called with two constants instead of two variables. To correct the code, include before line the call to `WRARRA` (line 1488) the lines `LX=1` and `LY=1`, and change the call to `WRARRAY` accordingly.

ESO-MIDAS™ Request Form

This is a request for the latest release of the ESO-MIDAS[1] system. To obtain a new release, please complete this form and return it to us (see reverse). Material will be shipped only to users with a valid ESO-MIDAS User Agreement. If you still have a tape or a tape mailing box from the last release, you MUST return these before we send the new release.

1. ESO-MIDAS User Agreement No.[2] _____

2. Technical Support Coordinator _____

3. E-Mail _____

4. **Tape format**
   VAX/VMS backup format, density: O 1600 bpi O 6250 bpi
   Tar format, density: O 1600 bpi O 6250 bpi
   O QIC-24 O exabyte 8mm
   O DDS/DAT 4mm
   O ftp

5. **Documentation requested**
   (one set per site)
   O MIDAS User Guide 91NOV
   O MIDAS Environment Ver. 1.1
   O IDI-routines
   O AGL Reference Manual

6. **Computer facilities**
   Computer model: _____, RAM (Mb): _____, Disk (Mb): _____

   Operating system: _____, Version _____

   Display systems: _____

   Graphic terminals: _____

   Plotters: _____

   Modem connection: Baud rate _____, Telephone _____

   Network address: EARN _____ SPAN _____

   Internet _____ Others _____

   Date: _____ Signature: _____

[1] ESO-MIDAS™ is copyright protected software developed by the European Southern Observatory for the purpose of Image Processing of Astronomical Data.
[2] for new user agreements t.b.a.

The ESO-MIDAS Courier is published twice per year (June and December) by the MIDAS Group at the European Southern Observatory.

Contributions as well as suggestions and comments are invited and can be sent to the editor. In particular, authors of MIDAS application software that would be of general interest for the MIDAS community, are invited to make this software available.

If you are not on the mailing list and want to receive future issues of the Courier, contact the editor. More updated information about MIDAS can be obtained from the MIDAS Bulletin Board, accessible via anonymous ftp.

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The following MIDAS support services are available for sending suggestions, comments or to obtain help when problems arise:

Telephone:	+49-89-32006456
Telex:	5282822 eso d, attn. MIDAS Courier
Telefax:	+49-89-3202362, attn. MIDAS Courier
SPAN:	ESO::MIDAS
EARN:	MIDAS@DGAESO51
Eunet:	midas@eso.uucp
Internet:	midas@eso.org
anonymous ftp:	ftphost.hq.eso.org (134.171.8.4)