AXAF News

Published by the AXAF Science Center (ASC) for future users of AXAF data & for other interested individuals

Issue number 1 September 1993

CONTENTS

* Please return central page if you wish to remain on our mailing list for AXAF News *

Message from the ASC Director

Last year the AXAF program underwent a major restructuring in response to immense budget pressures, leading to a faster, lower-cost program with two flight elements. AXAF-I is built around the High Resolution Mirror Assembly which has a resolution of approximately $0''.5$, to the extent that it can be characterized by a single number. AXAF-I will carry two imaging instruments (the High Resolution Camera and the AXAF CCD Imaging Spectrometer) and two sets of gratings (High Energy and Low Energy Transmission Gratings). Hardware development is well underway, with outstanding X-ray performance demonstrated in September 1991 for the two largest of the 8 flight mirror elements. AXAF-I is scheduled for launch in September 1998 into a high earth orbit of at least $10,000 \times 100,000$ km, possibly with a perigee above 60,000 km.

AXAF-S is built around the X-ray Spectrometer which will have an energy resolution of approximately 10 eV over the $0.3 - 10$ keV band. Two options, both optimized for high throughput, are under consideration for the AXAF-S optics: an improved version of the foils developed for the successful Broad-Band X-ray Telescope shuttle experiment, and a replicated set of metal mirrors. The anticipated mirror resolution is $30'' - 90''$, although both larger and smaller numbers are still possible and acceptable at this time. AXAF-S will be boosted into a low-earth, sun-synchronous orbit, with launch scheduled for December 1999.

Future newsletters will provide more specifics about the contractor and principal investigator teams (AXAF-I has TRW for its prime contractor, and AXAF-S is being developed in-house at Marshall Space Flight Center); about technical features of the spacecraft, optics, and science instruments; about AXAF scientific capabilities; and about program status, budgets, and schedules. During the past year a major emphasis for both AXAF-I and -S has been on mirror work and on the formal statement and review of requirements for the spacecraft and science instruments.

The AXAF Science Center (ASC) is charged with assisting users and helping to maximize the scientific return from the AXAF-I and -S observatories. In response to a NASA request for proposals, SAO organized a team which includes MIT, TRW, The University of Chicago, The University of Hawaii, and Stanford University, and we were extremely pleased to be selected in 1991 to develop and operate the ASC. Our primary responsibility is to support you, the AXAF users: to make it easy for you to write proposals; to help NASA organize a fair and competent peer review; to help the AXAF Operations Control Center with the scheduling of successful proposals; and to develop an ASC Data System to receive, process, archive, and distribute the data. We are also working with the contractor and principal investigator teams to support the development and ground calibration of AXAF-I and

AXAF-S, to create an effective interface between the instrument developers and the eventual scientific users, and to plan for on-orbit calibrations. ASC scientists also carry out their own scientific research, so as to increase their knowledge and understanding of AXAF and sharpen the skills needed for a first-rate ASC which can provide expert assistance to users.

Articles in this first newsletter provide preliminary information about calibration and the expected satellite orbits. An AXAF Users' Committee has already been formed; its membership list and a report of the first meeting are presented. Concepts for communications between users and the ASC, and for an interface between users and the ASC Data System, are presented through two pilot software facilities available for your use and comment: ASCinfo and ASSIST. At future AAS meetings, in subsequent newsletters, through the AXAF Users' Committee, and in other ways, we will describe our plans for the ASC. More importantly, we will interact with the astronomical community to obtain your inputs, reactions, criticisms, advice, etc., as we strive for a successful AXAF program.

– Harvey Tananbaum

AXAF Calibration Plans

The frontier astrophysics which the AXAF-I and AXAF-S missions will accomplish requires that the telescopes, science instruments, and other spacecraft systems (such as the aspect star cameras) be fully calibrated on the ground and in orbit. The ASC is responsible for collecting and archiving the calibration data, coordinating the analysis of the data, archiving the results of the analysis, and making the data and the analysis results available to AXAF users.

For the science instruments and the telescope, the calibration activities are conducted in three sequential stages:

1. Subassembly Calibration

This stage involves the separate calibration of the science instruments and the telescope. Laboratory calibration of each Science Instrument (SI) is conducted by the instrument team as part of the SI development activities, under Marshall Space Flight Center (MSFC) cognizance. The calibrations include determinations of the detectors' quantum efficiencies, spatial uniformity, and count-rate linearity. The periods of the Low-Energy and High-Energy Transmission Gratings will also be measured. The SI teams are working with the AXAF Calibration Task Team (which is chaired by the NASA AXAF Project Scientist, Martin Weisskopf, and includes members from the MSFC AXAF Project, the SAO Mission Support Team, the SI teams, TRW, and the ASC) to formulate laboratory calibration plans for AXAF-I and -S. The ASC will collect and archive the laboratory data, together with algorithms and software for their analysis, and will evaluate the calibration results. We expect most of the laboratory test data on the AXAF-I flight instruments will be obtained in 1995, but with significant amounts of data available in 1994.

As part of the telescope calibration, the SAO AXAF Mission Support Team is conducting a program of synchrotron measurements to determine the reflectivity function of the AXAF-I mirror coating, while Hughes Danbury Optical Systems (HDOS) is characterizing the properties of the mirror surface. Kodak will measure the alignment of the mirror pairs. The ASC will archive these telescope calibration data and the analysis results. We will begin collecting the synchrotron measurements and the HDOS metrology in 1994.

2. Calibration at the X-ray Calibration Facility

The SIs and the telescope for AXAF-I will undergo calibration at the MSFC X-ray Calibration Facility (XRCF). This calibration is currently scheduled from October 1996 to May 1997. At the XRCF, X-rays from a particular target (e.g., aluminum), located 1700 feet from the telescope, are focussed by the telescope onto a detector. The XRCF calibration will determine the effective area of the telescope/detector combination, the instrument scale, the spectral resolution, and the point response function as a function of energy and angle from the telescope axis. The ASC will receive and archive these calibration data and the analysis results, and make them accessible to users; included in the results are models which will be used in the ASC-developed software to assist users in planning proposals and analyzing data from observations. The mirror assembly and X-ray Spectrometer (XRS) for AXAF-S will undergo an integrated ground calibration to measure the instrument alignment, the point response function, and the effective area.

3. On-orbit Calibration

The ASC performs the initial and on-going on-orbit calibrations. The on-orbit calibrations will involve observations of celestial sources and the bright earth, as well as observations where the instrument is not at the telescope focus, in order to measure instrument backgrounds and characteristics.

Our current work is concentrating on planning for the AXAF-I calibration; a MSFC document which details the scientific requirements for this calibration is in the final stages of preparation.

– Christine Jones

The AXAF Orbits

Many of the properties of the AXAF missions are dictated by the orbits occupied by the satellites: a scaled drawing of these orbits in the immediate neighborhood of the earth appears as the graphic in the title block of this newsletter. Although no final selection of the orbits has been made, it is possible to make some general remarks about the types of constraints that they might impose on observations with AXAF-I and AXAF-S.

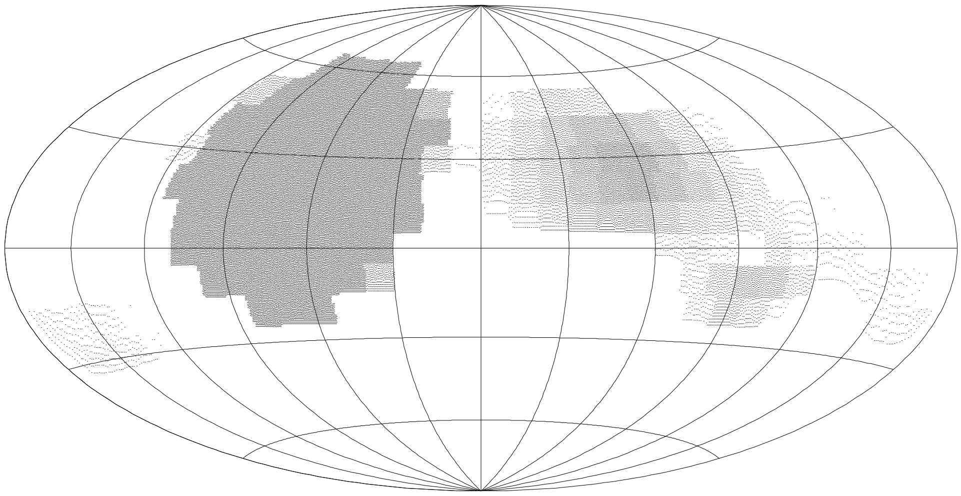

Figure 1. The visibility function for the sky in equatorial coordinates for AXAF-I averaged over two of its 35.6-hour orbits about two months after launch. The coordinate grid is drawn at intervals of $2^{\rm h}$ in RA and 30° in dec, with $(0^{\rm h}, 0°)$ at the center, $(0^{\rm h}, +90°)$ at the top, $(2^{\rm h}, 0°)$ to the left of center, and $(22^{\rm h}, 0°)$ to the right of center. The grey scale indicates the fraction of time that the satellite may be used to observe in a given direction, running from dark (< 10 % of time available) to light (> 70 % of time available). The large dark forbidden region near $\alpha = 5^{\rm h}$, $\delta = +30°$ is caused by the presence of the Sun, the Earth is an important obstruction near $\alpha = 20^{\rm h}$, $\delta = +30°$ (and less important in other parts of its path across AXAF-I's sky), and the small region near $\alpha = 17^{\rm h}$, $\delta = -10°$ is caused by the Moon.

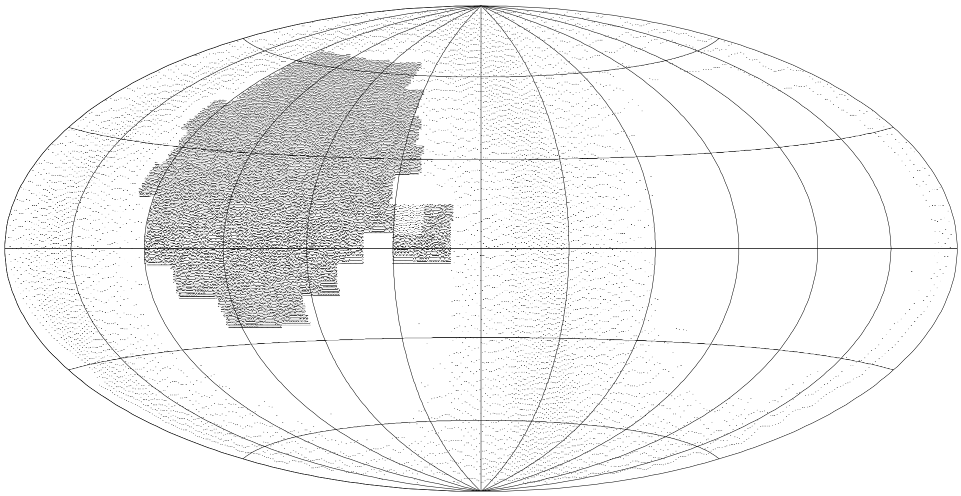

Figure 2. Same as Fig. 1, but for two of the 98-minute orbits of AXAF-S about two months after launch. The large dark forbidden region near $\alpha = 5^{\rm h}$, $\delta = +20°$ is caused by the presence of the Sun, while the Moon appears near $\alpha = 1^{\rm h}$, $\delta = 0°$, and the orbital plane (which is partially obscured by the Earth) can be seen as a grey great circle. The restriction to a 'normal observing zone' within ±20° of the orbital plane has not been taken into account in this diagram since observations outside this region are permitted.

The baseline AXAF-I orbit is elliptical, with initial semi-major axis 55,000 km, eccentricity 0.818, inclination 28°.5, and ascending node at right ascension 240°. The perigee of this orbit (10,000 km) lies well inside the radiation belts, while the apogee distance of 100,000 km is an appreciable fraction of the distance to the Moon. Over the mission lifetime the orbit gradually becomes more circular (under the combined gravitational effects of the Sun, Moon, and Earth), the orbital semi-major axis and inclination change slightly, and the orbit precesses slowly.

At any one time some parts of the sky will be unavailable for observation because they lie too close to the Moon, the Sun, or the bright Earth. For example, six months after launch (scheduled for September 1998) the visibility function for the sky appears as shown in Figure 1. In this diagram (which represents the average visibility function for the sky over two 35.6-hour orbits) the lightest regions are visible for 72% of the spacecraft orbit (where data are assumed to be taken only during the period that AXAF-I is at geocentric distance $> 60,000$ km, when the radiation background is low), while the darker regions cannot be observed because of their proximity to the Sun, Moon, or Earth. Observers with sources that lie out of the ecliptic plane can benefit from the long continuous integrations (up to 92.6 ks) that are possible. Sources near the ecliptic plane are observable only under favorable configurations of the Sun and Moon, and provided that the plane of the orbit has not precessed to a 'bad' right ascension, when the Earth blocks the viewing direction while the satellite is above the radiation belts. Thus regions of the sky near $\alpha = 5^{\rm h}$, $\delta = +30°$ and $\alpha = 20^{\rm h}$, $\delta = +30°$ are unobservable at the dates represented by Figure 1.

It is still possible that AXAF-I will be launched into a near-circular orbit with radius $\sim 60,000$ km, rather than the elliptical orbit described above. If this is the case, then AXAF-I remains above the radiation belts for the entire orbit, so that the peak viewing efficiency on the sky rises to nearly 100%, a larger fraction of the sky can be seen on any one orbit, and very long continuous observations become possible.

The baseline AXAF-S orbit is circular, with an initial altitude of 635 nautical miles (semi-major axis 7014 km), an orbital inclination of 97°.9, and with the ascending node at right ascension 90°. This orbit is sun-synchronous, and subject to the effects of the South Atlantic Anomaly (SAA) during some intervals.

Averaged over two representative orbits a few months after launch (currently scheduled for December 1999), and when the satellite is not strongly affected by the SAA, the visibility function for the sky is as shown in Figure 2. The best regions for observation are those that lie in the anti-solar hemisphere ($\alpha \approx 16^{\rm h}$, $\delta \approx 0°$ in Fig. 2), but normally the viewing directions are expected to lie in a region within $\pm 20°$ of the orbital plane (which corresponds to the grey great circle that passes through $\alpha = 22^{\rm h}.5$, $\delta = 0°$ on Fig. 2), so that only 50–60% of each orbit is likely to provide useful data, and the maximum continuous duration of an observation segment will be substantially less than the 98-minute orbital period. Care must be taken in the choice of sources for simultaneous observation with AXAF-S and ground-based observatories because of the rapidly-varying visibility of most of the sky.

It is anticipated that visualization tools for the orbits will be provided to allow time-critical observations to be evaluated by prospective users of AXAF-I and AXAF-S, based on predictions for the satellite orbits during the coming scheduling periods. The appearance and use of these tools have not yet been defined, and input from prospective users of the satellites is warmly solicited.

– Mark Birkinshaw

AXAF Users' Committee: Report

The first meeting of the AXAF Users' Committee was held on June 24th and 25th, 1993, at SAO, Cambridge, MA. Attending were J. Bechtold, J.P. Caillault, W. Cash, L. Cominsky, K. Flanagan, S. Kahn, J. Patterson, C. Sarazin, F. Seward (chair), H. Spinrad, A. Tennant, and M. Watson. [See page 8 for a full list of committee members and their contact addresses.]

Presentation of Overview

The meeting started with a presentation by Harvey Tananbaum on the status of AXAF and the AXAF Science Center (ASC).

Last year, AXAF was restructured and divided into two missions; AXAF-I (imaging) and AXAF-S (spectroscopy). The emphasis of AXAF-I is on high resolution imaging (0″.5 resolution) and grating spectroscopy. The high resolution mirror assembly (HRMA) contains four mirror pairs (reduced from six). There are two imaging instruments in the focal plane and two sets of gratings. One imaging instrument is the AXAF CCD imaging spectrometer (ACIS), similar to the CCD array now taking data on the Japanese spacecraft ASCA. The second imager, the high resolution camera (HRC), is similar to the HRI instruments carried by *Einstein* and ROSAT. The two sets of transmission gratings are made so that efficiency peaks at high energies (HETG) and at low energies (LETG). It is planned to put AXAF-I in a 10 by 100 thousand km elliptical orbit, where observing efficiency will be much higher than in low-earth orbit and continuous observations longer than a day can be made. Launch is scheduled for September 1998.

The AXAF-S mission will carry one instrument, a state of the art, cryogenically-cooled, X-ray bolometer. The telescope will be capable of moderate spatial resolution ($\sim 1'$). A near-earth, sun-synchronous, polar orbit is planned. The lifetime will be limited to about

5 years by the cryogen. The launch of AXAF-S is planned for December 1999.

The role of the ASC is to coordinate key activities and help astronomers from different backgrounds observe with AXAF. The ASC's responsibilities include the review and assessment of AXAF calibrations, observation planning, development and operation of data processing software and procedures, development of proposal review procedures, development of data analysis software, and the preparation of documents and software to aid users in proposal preparation and data analysis. Most current work concerns detailing requirements for an ASC data system which will support these functions.

The Users' Committee asked about the lifetime of the ACIS CCD detectors in high-earth orbit. The answer depends on the orbit, which is not yet definite. The CCD detectors on ASCA will supply useful data concerning radiation damage, and steps might be taken to protect the ACIS detectors during solar flares.

Function of the Users' Committee

Fred Seward reviewed the function of the AXAF Users' Committee, which is the official interface between the ASC and the user community.

The primary function of the committee is to inform the ASC of the users' needs and concerns. This should happen naturally since committee members are all users and have contacts, friends, and collaborators. Comments, suggestions and complaints can be passed easily to the ASC via the committee. The ASC expects to be informed of any problems which are brought to the attention of committee members. Anything that affects the users is the concern of the committee, particularly the interaction of the ASC with the users.

There are important policy issues that the Users' Committee and the ASC will develop together. For example, possible conflicts of interest between ASC staff and the external user community. These issues will be identified, discussed, and resolved. The charter says the ASC will do many things "in consultation with the Users' Committee".

The Users' Committee is advisory to the Director of the ASC, to whom the chair of the committee will make a report after every meeting. If there are actions required of the ASC, the ASC will report on these at the next meeting of the committee or sooner. We expect to resolve most issues informally.

Before each meeting, the ASC will publicize the names of the Users' Committee members and a list of topics to be discussed.

A preliminary list of topics which the committee will discuss before policy decisions are made was presented at the first meeting. When complete, this list will also contain the time frame when each topic will be discussed, and the list will be made generally available so that comments and additions can be received and incorporated.

There are beta test sites at Stanford University and the Universities of Hawaii and Chicago. The ASC-developed software will be exercised first by these institutions, and changes will be made before general release. The Users' Committee suggested that the role of the beta test sites be clearly delineated and that the principal testers present their findings to the Users' Committee at the appropriate time.

AXAF Observing Time

Alan Bunner from NASA headquarters presented a summary of the guaranteed-time observations in the restructured program. Originally, there were 4,270 hours for guaranteed-time observers (GTOs) distributed as follows: Months 1-2, 100%; 3-20, 50%; 21-30, 20%; > 30, 0%. Considering the increased observing efficiency of AXAF-I, the fact that there will be two spacecraft available for most of the time, and the reduced area of both the I and S mirror systems, this allotment will have to be reworked by NASA and the AXAF Science Working Group, which is chaired by the NASA AXAF Project Scientist, Martin Weisskopf. One proposal is to increase the time to 5,148 hours and to keep the guaranteed time fraction the same as outlined above. The guaranteed time will be split between the instrument principal investigators (A. Brinkman, C. Canizares, G. Garmire, S. Holt, and S. Murray), the telescope scientist (L. Van Speybroeck), and the five interdisciplinary scientists (A. Fabian, R. Giacconi, J. Linksy, R. Mushotzky, and A. Wilson).

The Users' Committee was vocal on this topic. They endorsed the concept that the developers of the AXAF instruments should receive a large fraction of the early time. It is obviously beneficial to all if those responsible for proper operation of the instruments get the first data, and that this data should be scientifically exciting. The principal concern was that a very large number of targets could be reserved and made unavailable to others in the community. The committee remarked that some members of the community keenly desire the opportunity to write good proposals to get the specific targets they want, and would like to see peer-refereed scientific competition for all targets.

It would be a good idea if some of the guaranteed time were used for projects not likely to be awarded by peer review. It was noted that historically it has been difficult to get large blocks of observing time through peer review.

Several alternate ways of handling the guaranteed time were suggested. Some of these systems have actually been used in other missions.

1. Time is guaranteed, but targets are not. All targets are subject to proposal and peer review.

2. A GTO target list is submitted but only a fraction of the targets, 20-50%, are considered primary and are not subject to peer review. A general observer (GO) could propose for GTOs' secondary targets and would win if his or her proposal was deemed one of the better proposals by the peer review committee. The GTOs would then pick other targets to fill their time.
3. GTOs pick targets not for the entire AXAF mission but for the first 6 months or one year. The remaining time is then awarded to GOs through the usual process. The GTOs then pick targets for subsequent observing periods.
4. Some combination of the above.

The Users' Committee members realized that this is not their decision to make. They would, however, like to start a dialogue with the AXAF Science Working Group to see if a system might be arranged so some first-choice targets are also available to GOs. It should be advantageous to the GTOs to have an arrangement whereby later targets can be chosen to fill guaranteed time after seeing the initial AXAF results. Perhaps a joint meeting of the Science Working Group and the Users' Committee might be useful with respect to this and other topics.

<u>ASC Data System</u>

Rich Simon and Dave Huenemoerder presented plans for the ASC data system and analysis software. The data system will sustain all ASC activities such as receiving, processing, and distributing AXAF data, and supporting mission planning, the proposal process, and data analysis. The immediate goal is to determine the requirements for the ASC data system by November 1993. There will be both a graphical user interface and a command line interface. The graphical user interface currently used, the ASSIST package, was demonstrated for some members of the Committee. [See page 9 of this newsletter for more information.]

The design goals and some current thoughts and issues related to the ASC data system were presented. Ways of using IRAF tools in other environments are being explored. The goal is to have a set of scientific functions that can be run in multiple environments – a so called "open architecture". The ASC organization chart and science data processing and analysis plans were presented. The division of data products into level 0,1,2,3 was reviewed, and there was discussion of the data analysis tools to be developed for the general user.

The ASC expressed an interest in getting from members of the Users' Committee some examples of software tasks which are run sequentially to accomplish scientific analyses; examples of such "scripts" generated within the ASC were shown.

The committee had the following comments:

1. Software analysis tools should be prioritized. It is unrealistic to expect all tools to be ready at launch.
2. The plan should make clear how scientific algorithms progress through the ASC organization chart. What people are responsible for taking a project from an idea to a finished tested product?
3. It was mentioned that EUVE has produced a "lessons learned" document that the ASC should review.
4. It was noted that a user commonly tries an analysis program and finds it will not do exactly what the user wants. It is highly desirable for a user to have the capability of modifying programs easily.
5. The committee considered difficulties encountered by users in small colleges. IDL must be purchased, which diverts funds from the support of students. IRAF is free, but it must be installed, it uses significant memory and disk space, and it is time-consuming to keep up with changes and upgrades. A scientist who has to maintain the software has less time available for science. The committee commented that a number of users have had problems with the proposal support software for ASCA. The package was imported and installed, but didn't always work. The alternative, remote login to use the software, was very slow; at proposal submission time many users were logged on and using the system at the same time.
6. The committee commented that many parallel systems are presently being developed within the community: e.g., Ftools, XANADU, IRAF/PROS, ASTERIX (U.K.), and MIDAS/EXSAS (Germany), all applicable to ROSAT data. It is expensive to have parallel efforts, and increased cooperation within the astronomical community is desirable.
7. In the progress of a mission, as data-processing codes evolve (e.g., to incorporate improved calibration models), the results can depend on when the data was processed. Data products should have information embedded into them to indicate exactly which version of the code was responsible for producing them. The system should be such as to enable easy reference in the literature and thus avoid confusion concerning published results.
8. Proprietary rights to level 3 data products (catalogues and compilations) should be discussed and clarified.
9. Provisions should be made to incorporate new ideas and techniques that will be available in the next few years.
10. The archives should contain the raw data. Inclusion of only the rev 0, rev 1, etc. products is insufficient, since these products are dependent on processing assumptions.
11. The beta test sites are a good idea. The ASC should make sure that some testing at these sites is at the level of the unsophisticated general user. Results of the beta testing of analysis software should be reported to the Users' Committee. It would be advantageous for the west coast Users' Committee

members to interact informally with the beta test sites at Stanford University and The University of Hawaii.

12. There should be some discussion concerning the allocation of software development time aimed at sophisticated and unsophisticated users.
13. It is desirable to have the capability of producing output in ASCII files.

ASC Documents

The ASC is presently generating documents to be used in the ASC Requirements Review this coming November. Allyn Tenant invited members of the Users' Committee to participate in this review. It was decided that the most convenient form of participation would be for those who are interested to read the documents and send their comments to the ASC and to Allyn. The ASC will forward a copy of the appropriate documents (particularly the Science Plan) to the committee members.

AXAF Calibration Plans

The calibration plans for AXAF were presented to the Users' Committee by Christine Jones, Ed Kellogg, Dan Dewey and Brian McNamara. The talks included science goals, descriptions of the instruments, layout in the spacecraft, and laboratory calibrations (quantum efficiency, spectral resolution, spatial uniformity, count rate linearity). Plans for ground and on-orbit calibration of the assembled mirror-detector system were described (point spread functions, alignment, spatial resolution, boresight, focus). Results of the testing of the first mirror pair were presented; the first analysis showed a large asymmetry in the image due to distortion of the mirror by gravity, but this was corrected analytically and mechanically and the final image had a deconvolved FWHM as small as $0\overset{''}{.}2$. The X-ray Calibration Facility (XRCF) at MSFC was described; it comprises an X-ray source, a 1700 foot evacuated pipe, and a target chamber. Instrumentation used during the mirror calibrations was described.

The calibration of the flight instruments and mirror assembly is a major project. The ASC estimates that 4 to 6 months of continuous calibration at the XRCF will be required for AXAF-I. Calibration at the XRCF cannot commence until the mirrors and instruments are assembled; the end date is driven by the overall schedule for the project. The more the launch is delayed, the more expensive the project becomes.

The committee had the following comments concerning calibration:

1. A 1% measure of mirror reflectivity is very difficult to achieve since there may be larger changes with age. [Ground calibration, however, must be accurate enough so it does not limit the final calibration of the system.]
2. The absolute energy calibration is very important.
3. The gratings should be well calibrated with both the HRC and ACIS in case of failure of one detector.
4. The goals of the calibration are challenging, perhaps impossible. One wonders where to stop if it becomes apparent that all desired measurements cannot be done. The planned calibration tasks should be prioritized to ensure that the most important calibrations are completed.

Concluding Discussion

The meeting ended with a roundtable discussion concerning what kind of computers the members use and how they use them. Members were very modest about their skills and achievements, and unsophisticated computer users were in the majority.

Action Items from the Meeting

- Joe Patterson will draft a letter to the AXAF Science Working Group concerning GTO observations and will send it to Fred Seward for comment.
- Fred Seward will circulate and publish a list of Users' Committee members and E-mail addresses. [See page 8 of this newsletter.]
- The ASC will send committee members documents prepared for the ASC requirements review.
- Committee members will think about and add to the list of topics to be discussed at future meetings.
- Committee members will send Fred Seward lists of software tasks run sequentially to accomplish a particular scientific analysis; such "scripts" are useful to the ASC in the development of data analysis tools.
- Fred Seward will contact members in the Spring to arrange the next meeting 9-12 months from June 1993.

– Fred Seward

ASC Contact Personnel

Director:	Harvey Tananbaum	Development and Operations:	Dan Schwartz
Associate Director:	Claude Canizares	Calibration:	Christine Jones
Manager:	Roger Brissenden	Mission Planning:	Bill Forman
Systems Engineering:	John Gibbons	Science Data System Planning:	Martin Elvis
Data Systems:	Pepi Fabbiano	User Support:	Fred Seward
	Rich Simon		Diana Worrall

Note: E-mail address is of the form: <first-initial-lastname>@asc.harvard.edu

AXAF Users' Committee: Membership List

Name	Organization	E-mail address	Telephone
Jill Bechtold	U. of Arizona	jbechtold@as.arizona.edu	(602) 621 6533
J. P. Caillault	U. of Georgia	jpc@jove.physast.uga.edu	(706) 542 2883
Webster Cash	U. of Colorado	cash@cygx3.colorado.edu	(303) 492 4056
Lynn Cominsky	Sonoma State U.	lynnc@charmian.sonoma.edu	(707) 664 2655
Kathryn Flanagan	SAO	kaf@cfa.harvard.edu	(617) 495 7141
Steve Kahn	U.C. Berkeley	skahn@physics.berkeley.edu	(510) 642 4391
Rich Kelley	NASA/GSFC	kelley@lheavx.span.nasa.gov	(301) 286 7266
Joe Patterson	Columbia	jop@carmen.phys.columbia.edu	(212) 854 3276
Craig Sarazin	U. of Virginia	cls7i@virginia.edu	(804) 924 4903
Fred Seward (chair)	SAO	fds@cfa.harvard.edu	(617) 495 7282
Hy Spinrad	U.C. Berkeley	spinrad@bigz.berkeley.edu	(510) 642 2078
Allyn Tennant	NASA/MSFC	tennant@ssl.span.nasa.gov	(205) 544 3424
Mike Watson	U. of Leicester, U.K.	mgw@star.le.ac.uk	(0533) 523553

ASCinfo: An ASC Information System

What is ASCinfo?

The ASCinfo system is an on-line bulletin board service that makes a collection of ASC documentation files available to the astronomical community. ASCinfo resides at the SAO and is accessible to any user over the Internet. It features a menu-based interface (borrowed from the *einline* system), as well as on-line help and E-mail document retrieval.

How do I access ASCinfo?

- Over the Internet:

To use the program over the Internet, use the command telnet:

% `telnet asc.harvard.edu` (128.103.41.101)

Once connected, login as user `ascinfo`. No password is required.

- Telephone dial-up:

To use the multiplex modem at CfA, dial `(617) 495-7031` (9600/2400/1200 baud; data bits=8, parity=none, stop bits=1). Press the 'return' (or 'enter') key and a message will appear to say that you are connected to the terminal server. Enter inputs to prompts as follows:

Enter username> `ascinfo`
Xyplex> `c asc`
login: `ascinfo`

The program will start automatically.

- When visiting the CfA:

Type `ASCinfo` or `ascinfo` at any Unix prompt on the HEAD network.

How do I use ASCinfo?

ASCinfo is an easy to use, flexible, bulletin-board program. Users familiar with the *einline* service for the *Einstein* observatory will find a similar interface.

The service's features are hierarchically organized. At the topmost level are the DOC (documentation) and COM (communication) areas.

The DOC area is the repository for documents and information. Files are sorted into directories by subject, and are available to read and mail. Upon selecting the DOC service, you'll be presented with a list of directories. Select one, and use the commands in the subsequent menu to list, read, or mail the available documents. HELP is available at any juncture.

The COM area is dedicated to news about ASCinfo itself and to user communication with its custodians. The NEWS command accesses articles on the system which may be read or mailed. Use the SYSMAIL feature to make comments, bug reports and suggestions to the ASCinfo system administrators. As always, HELP is available at any juncture.

ASCinfo hints:

1. You need only type the shortest nonambiguous abbreviation for any command. e.g., to access the DOC area from the main menu, you can type `D` (or `d`).
2. Please help us keep track of program use by entering your name and institution when queried at startup.
3. We value your comments! Please use the SYSMAIL feature to send us your suggestions.

– Eliot Shepard

The ASSIST Graphical User Interface

A graphical user interface (GUI) helps new users find their way around a data system. A single GUI which can be layered easily on otherwise disparate command-line interfaces provides familiarity to users while allowing a data-system to incorporate software from many existing and new sources. The ASSIST is such a GUI which was developed at SAO by the High Energy Division Software Research and Development group in cooperation with the ASC, and it is incorporated in the ASC pilot data system for evaluation. We are particularly interested in feedback from users and encourage you to try out the ASSIST. This article presents a short description of its capabilities, followed by information on how to obtain a version for installation on your home computers.

The ASSIST is an X Window System GUI that provides a uniform mechanism for interacting with analysis systems (including IRAF), documents, and other information. The system is written in C and has been ported to several of the most popular machines, such as Sun, DecStation, HP, and SGI. The ASSIST overlays the Answer Garden Substrate which was developed by Mark Ackerman, now at the University of California, Irvine.

A major problem that users face when using single-screen command-driven systems is that valuable information is constantly disappearing off the screen as new information is displayed. The ASSIST overcomes this difficulty by providing a multi-dimensional view of the analysis environment, with separate windows for viewing lists of available programs (including IRAF packages and tasks), for browsing help files and tutorials, for setting up and running programs, and for inspecting analysis results.

The ASSIST display consists of a number of graphical "trees" arranged in a hierarchy (Fig. 3). Each "leaf" on a tree represents a program, a piece of documentation, other information, or another branch of the tree. Pressing the left mouse button on one of the leaves will activate it, resulting in the display of a program, a document, or another part of the tree. Users can traverse the trees in the hierarchy to locate program or document "leaves", and then activate these "leaves".

Clicking the left button on a program name in the appropriate graphical tree will bring up a parameter editor window (Fig. 4) which displays the names and values of the user parameters, along with valid ranges (if applicable) and short descriptions of the parameters. Users can select a parameter by moving the mouse to that parameter and then edit the parameter's fields.

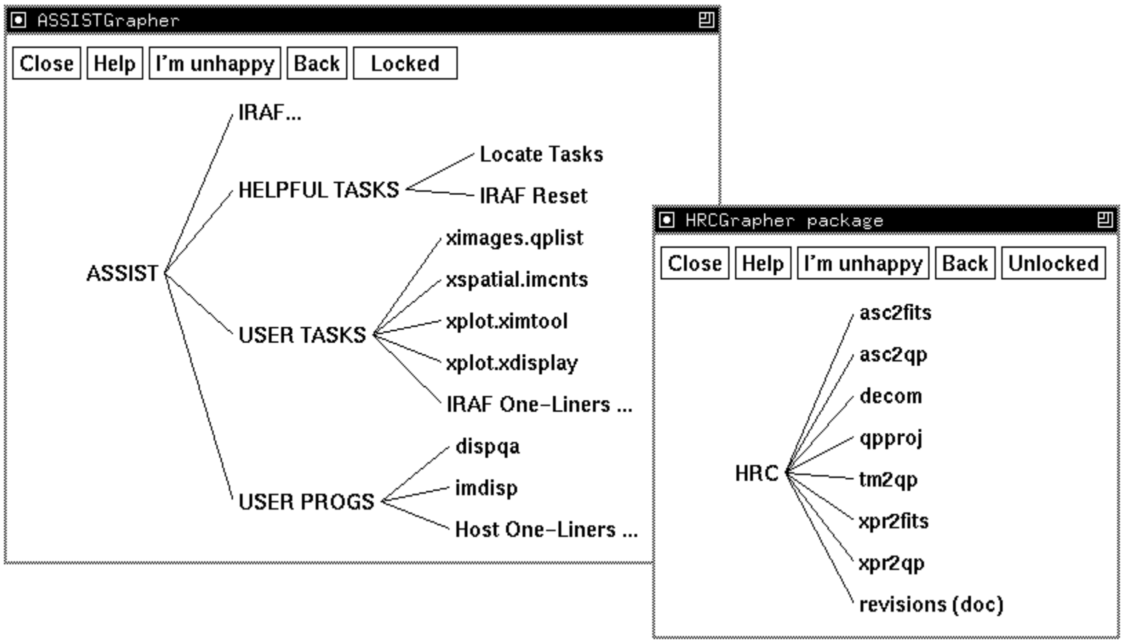

Figure 3. Programs are displayed in a hierarchical tree structure. Clicking the left mouse button displays a limb, or shows the parameters of a program and allows their editing; the middle button displays help files. In the figure, the top-level ASSIST tree is at the left, showing the IRAF leaf and often-used programs that can be accessed directly. The HRC laboratory software, a local subpackage of IRAF, is shown on the right.

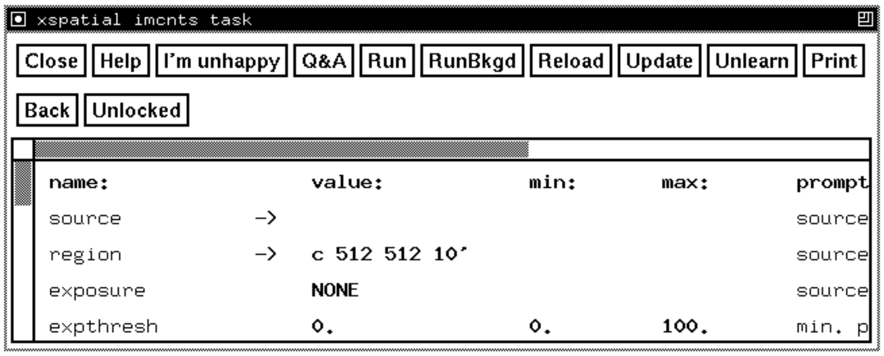

Figure 4. Parameter windows show full information and allow editing. This example is for the xspatial.imcnts task seen in Fig. 3.

When a value is changed in the parameter editor, an update command is sent to the associated analysis window to change the stored value of the parameter. Pressing the `Run` button in the parameter editor's command strip will execute the program by causing the appropriate command execution string to be sent to the analysis window. Pressing the `Help` button will display the program's help page in a separate window (Fig. 5). (The middle mouse button pressed on the program name in the graphical tree is an alternative way of displaying the help page directly, without having to display the parameter editor first.)

The ASSIST also supports help concerning the current development status of a program. Pressing the `Q&A` button in a parameter editor's command strip will display a window containing bug reports, enhancement requests, or discussions pertaining to the program. A user can browse through these reports for information on the nuances of a particular program. If this search does not provide sufficient information, the `I'm unhappy` button can be pressed, which allows one to send mail to an expert in order to ask a question, make a comment, report a bug, or request an enhancement (Fig. 5). These queries are sent to the appropriate expert (as determined by the ASSIST based on a set of heuristic algorithms) for resolution. The answers can be integrated back into the `Q&A` part of the ASSIST by the system administrator, adding to the growth of knowledge.

The ASSIST also allows the system administrator to install tutorials and recipes. These are ASCII files which are interspersed with simple command button specifications so that a user can page back and forth through the explanations (Fig. 6). The command buttons in the tutorial can be used to execute the programs being described, providing "live" interaction along with the textual explanations. The ASSIST currently provides a few IRAF/PROS tutorials as examples. Users also can maintain their own informal "notes" file, consisting of personal notes and recipes. Like the system-installed tutorials, a simple ASCII file is used and it may incorporate command buttons which allow direct access to programs (Fig. 6).

The ASSIST currently supports IRAF tasks, as well as UNIX scripts and C (or Fortran) programs that use the IRAF-compatible parameter interface to make the parameter input and output similar to the IRAF style. This interface is provided with the ASSIST system. Individuals can tailor their use of the ASSIST by adding programs or scripts which use this parameter interface to the top of the standard tree hierarchy. A system installer of ASSIST can add a "tree" of programs which are related to a specific topic. The current release of ASSIST contains simple instructions to install the IRAF package tree.

The ASSIST has been developed on Sun workstations under X11R4 and X11R5. Ports (with varying amounts of testing) have been made to the SGI, to the DecStation running Ultrix, and to the HP9000s700. To install and run ASSIST you must have X11 (R4 or R5) available. The ASSIST system also works under Sun OpenWindows and DecWindows. Other ports will be performed in the future to meet the needs of the astronomical community.

The ASSIST can be retrieved via anonymous ftp:
% `ftp sao-ftp.harvard.edu` (128.103.42.3)
Name: `anonymous`
Password: <`your complete e-mail address`>
ftp> `cd pub/asc`
ftp> `get README.FIRST`
ftp> `get README_ASSIST.BUILD`
ftp> `quit`

Read these two ASCII files to decide which other files you wish to retrieve (from the same anonymous ftp directory).

Send E-mail to assist@cfa.harvard.edu if you would like more information.

– Eric Mandel

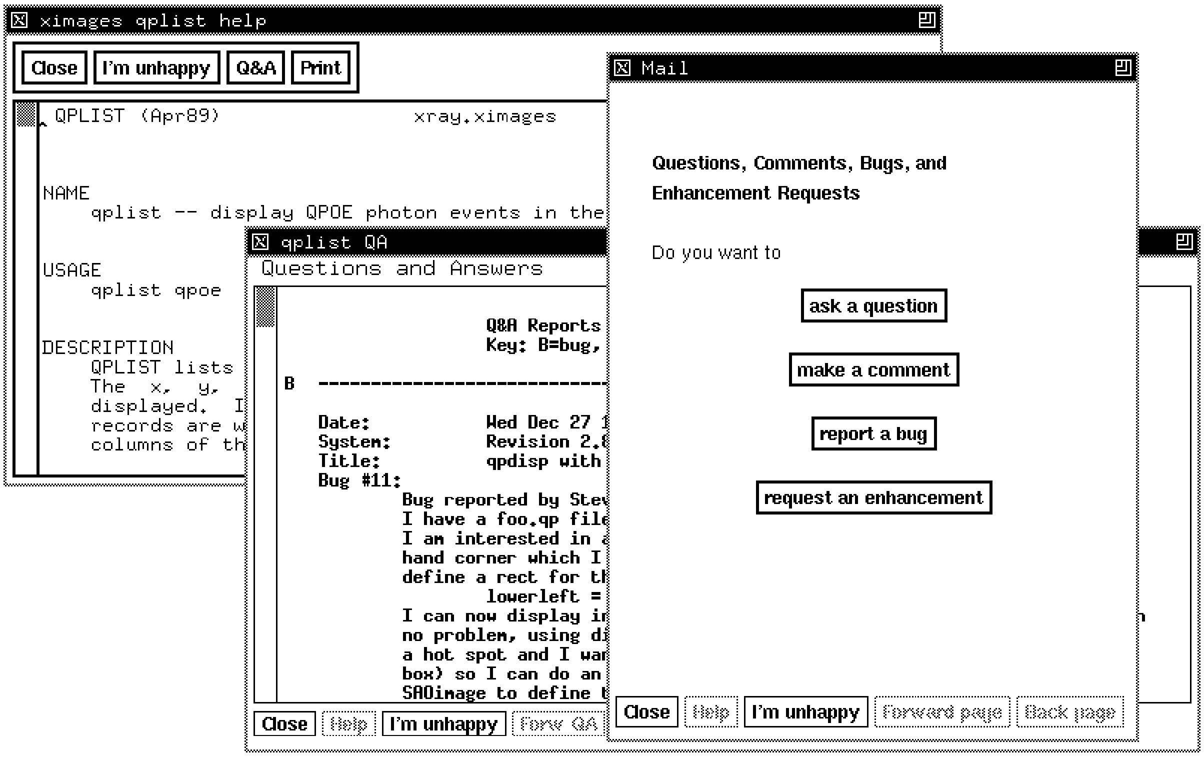

Figure 5. The ASSIST provides several kinds of help for users including help pages (left), current bug reports (center), and the ability to send questions to experts (right).

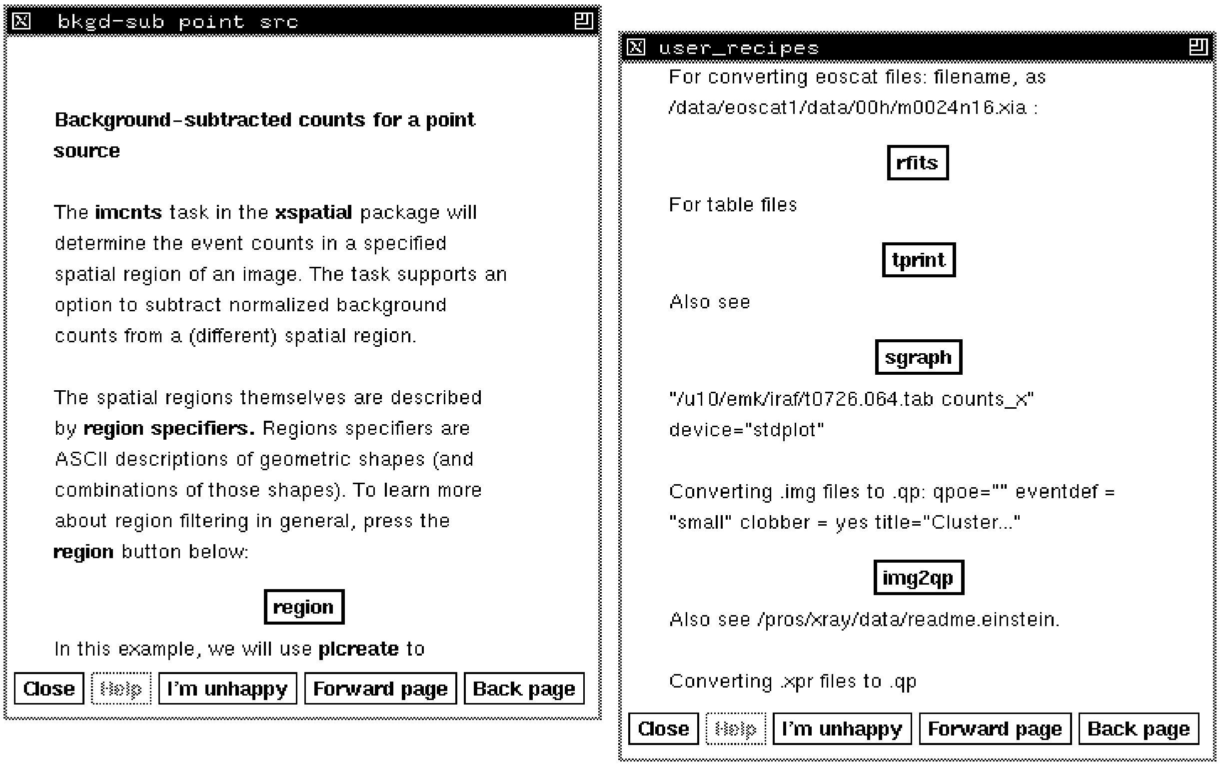

Figure 6. The ASSIST supports on-line tutorials (left) and personalized user notes (right).

IMPORTANT DATES

Next Users' Committee Meeting	April 1994, approximately
AXAF-I Calibration at MSFC X-ray Calibration Facility	October 1996 – May 1997
First Guest Observer NASA Research Announcement for AXAF-I	September 1997
AXAF-I launch	September 1998
First Guest Observer NASA Research Announcement for AXAF-S	December 1998
AXAF-S launch	December 1999

HANDY ACRONYM LIST

Mission, Telescopes, Instruments

ACIS	AXAF CCD Imaging Spectrometer (for AXAF-I. Principal Investigator: G. Garmire)
AXAF	Advanced X-ray Astrophysics Facility
AXAF-I	AXAF Imaging mission
AXAF-S	AXAF Spectroscopy mission
CCD	Charge-Coupled Device (see ACIS instrument)
HETG	High-Energy Transmission Gratings (for AXAF-I. Principal Investigator: C. Canizares)
HRC	High Resolution Camera (for AXAF-I. Principal Investigator: S. Murray)
HRMA	High Resolution Mirror Assembly (telescope for AXAF-I)
HTMA	High Throughput Mirror Assembly (telescope for AXAF-S)
LETG	Low-Energy Transmission Gratings (for AXAF-I. Principal Investigator: A. Brinkman)
SI	Science Instrument (detector)
XRS	X-ray Spectrometer (for AXAF-S. Principal Investigator: S. Holt)

Organizations, Facilities, Groups

ASC	AXAF Science Center
GO	General observer (anyone but a GTO)
GSFC	Goddard Space Flight Center (NASA)
GTO	Guaranteed-time observer (SI teams, TS, IDSs)
HDOS	Hughes Danbury Optical Systems
IDS	Interdisciplinary scientist (A. Fabian, R. Giacconi, J. Linsky, R. Mushotzky, A. Wilson)
MIT	Massachusetts Institute of Technology
MSFC	Marshall Space Flight Center (NASA)
NASA	National Aeronautics and Space Administration
OCC	Operations Control Center (for AXAF at MSFC)
PS	Project Scientist (M. Weisskopf)
PSU	Penn State University
SAO	Smithsonian Astrophysical Observatory
TRW	TRW, Inc.
TS	Telescope Scientist (L. Van Speybroeck)
XRCF	X-ray Calibration Facility

The ASC newsletter will appear at an initial frequency of roughly one every year, but increasing towards launch. We welcome contributions from readers. This issue has been typeset in TEX. The editor is Diana Worrall.

All ASC personnel, including the editor and authors of this newsletter, may be contacted via E-mail at
<first-initial-lastname>@asc.harvard.edu
Comments may also be sent to ascinfo@asc.harvard.edu or communicated via login to ASCinfo (see item on page 8).

PLEASE DETACH CENTRAL PAGE

Complete and mail the form back to us

if you wish to be on the mailing list for

future issues of AXAF News

PLEASE DETACH CENTRAL PAGE

Complete and mail the form back to us

if you wish to be on the mailing list for

future issues of AXAF News

ASC Newsletter Order/Suggestions Form

This first issue of the ASC newsletter has been sent to a large distribution list. If you wish to remain on the mailing list and receive subsequent issues, please return this form.

Name . . . . Today's Date . . . .

Address . . . .

. . . .

. . . .

. . . . E-mail address . . . .

Please check as appropriate:

- ☐ Please RETAIN my name on the ASC Newsletter mailing list
- ☐ Please ADD my name to the ASC Newsletter mailing list
- ☐ Please CORRECT my name and address, as given above
- ☐ I would like to see the following topics in the newsletter:

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

. . . .

Please fold and return this form to the address printed overleaf.

From:

Place
Stamp
Here

ASC Newsletter
Mail Stop 6
Smithsonian Astrophysical Observatory
60 Garden Street
Cambridge
MA 02138
U.S.A.