Working Group on Astronomical Software
Annual Report
Submitted by R. J. Hanisch, Chair
May 1990
Revised, 18 June 1990

This report covers the period from June 1989 (after the AAS Meeting) through June 1990 (including the Albuquerque meeting).

FITS. This was a busy year in the area of the FITS standard, with WGAS involvement in a number of new initiatives. Following approval of an IEEE floating point agreement by both the European FITS Committee and the WGAS, the FITS Committee of IAU Commission 5 gave its approval of the agreement. Effective 1 January 1990, FITS data files may now utilize the IEEE floating point formats for both single and double precision values (denoted by `BITPIX = -32` or `-64`). The use of IEEE floating point will increase the accuracy of data interchange and improve the efficiency of FITS I/O software, since no scaling to integer form is required.

Members of the WGAS participated in a FITS meeting sponsored by NRAO and held in Green Bank, WV, in October 1989. Although the nominal purpose of this meeting was to standardize the representation of single-dish radio astronomical data, it was clear that extensions to FITS are required for certain types of data. In particular, there is great interest in a binary table extension; this would provide an efficient transport mechanism for spectral data and for photon-counting instruments (such as X-ray detectors). Also, the need for and possible implementations of a hierarchical keyword structure were discussed extensively. Owing to a considerable range of opinions in the latter area, no specific proposal for hierarchical keywords is expected in the near future. Opinions about the need and possible implementations of hierarchical keywords are still quite varied, and further discussions on this matter will have to be held. We expect that we may be able to propose the binary table extension as used by NRAO, with minor modifications, to the various FITS committees within the next year. Hopefully we will have a solid proposal in place prior to the IAU meeting in 1991.

There has also been discussion concerning FITS blocking factors on various media (8 mm Exabyte tapes, 4 mm DAT tapes, QIC cartridges, erasable optical disk, WORM optical disk, CDROM, magnetic disk, etc.) in addition to the standard half-inch 9-track magnetic tapes. Because the standard 2880-byte FITS record is not appropriate for some of these devices, the FITS committees will have to define the manner in which FITS files can be written to these media. A draft proposal is now in circulation, and this was discussed during the June 1990 WGAS meeting.

During this last year NASA began to take a much more active role in the area of FITS, and this activity has been closely coordinated with the WGAS. NASA has created a FITS Standards Office within the National Space Science Data Center, and this office will help to establish both a formal standards document for FITS and FITS verification services. The FITS Standards Office is not to be viewed as a standards *setting* office, but rather as a standards verification and enforcement office. Hanisch, as chair of the WGAS, was asked to chair the NASA technical committee which is recasting the various FITS papers into a document suitable for use within NASA as a standards reference.

NASA headquarters also funded the writing of a FITS User's Guide, and this has now been turned over to the FITS Standards Office for review and distribution. The first draft of this document needs additional work, however, so it will still be a few months before it is distributed widely. Taken together, the FITS standard being written by the NASA FITS technical committee and the FITS User's Guide should be the definitive references for the FITS format. Once these documents are completed, we would expect that the IAU would be asked to approve these documents as the official FITS definition, superceding the several papers published in *Astron. Astrophys. Suppl.*

NASA headquarters issued a statement to all NASA-funded astrophysics projects that FITS was the accepted format for export of data to the scientific community. This marks a profound victory for the FITS format, and indicates the continuing importance of the FITS standards work.

In recognition of the increasing importance of the FITS standard, a formal WGAS FITS Committee will be formed under the leadership of Don Wells (NRAO). This committee will be chosen to be representative of both the observatories that are the primary source of data as well as of the users who receive this data. The WGAS FITS Committee will have voting authority on all FITS matters presented before the WGAS, and will strive to get broader community review on all FITS issues. Along these lines, Wells will be establishing a FITS e-mail exploder to help improve communications about FITS. People interested in being on the FITS e-mail exploder distribution list should send mail to `fitsbits-request@fits.cx.nrao.edu`.

BAAS. The summer edition of the *BAAS* will be the second issue in which status reports and technical reports concerning astronomical software will be published. Last year we had six contributions, and this year there are sixteen! The number of contributions we received this year indicates the need for this means of disseminating information about developments in astronomical software. Given the strong response from the astronomical software community, we hope that the AAS Council will continue to endorse the use of the *BAAS* for this sort of information, and possibly expand the scope to the other technical working groups.

Electronic Publishing. The WGAS continues its involvements in exploring the feasibility of more automated means of publishing astronomical papers. Two papers were presented at the Albuquerque meeting describing the status of this work. Hanisch has recently been appointed to the AIP Subcommittee on Information Technology, and in this position should be able to help coordinate this work with the AIP.

C. Biemesderfer and Hanisch will be making a set of LaTeXmacro files available via anonymous ftp logins at both NOAO and ST ScI. People are invited to try out these macros and send their comments to the authors.

Other WGAS Business. In addition to the topics mentioned above, the WGAS meeting included discussions of software distribution mechanisms (e.g., an ftp archive) and the possible creation of a WGAS e-mail exploder. There was considerable interest in an on-line astronomical software directory, and the WGAS will pursue ways to establish such a facility. It was felt that the FITS e-mail exploder could also serve the more general needs of the WGAS, and if e-mail traffic indicates that a separate exploder is needed it can easily be set up.

In addition to three contributed papers and a number of poster papers, the agenda included five invited papers from groups developing on-line astronomical data base systems. These papers were very well-attended, and there was considerable interest in having other special-interest sessions at future WGAS meetings.