CSCTR-86/6007

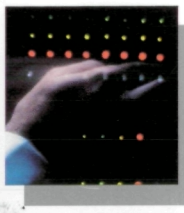
INTERNATIONAL ULTRAVIOLET EXPLORER OBSERVATORY OPERATIONS

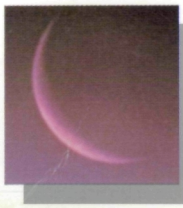
FINAL REPORT

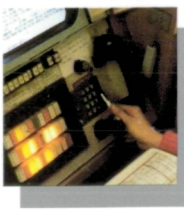
Prepared for
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Goddard Space Flight Center
Greenbelt, Maryland

CONTRACT NAS 5-28787

NOVEMBER 1986



CSC
COMPUTER SCIENCES CORPORATION

CSC/TR-86/6007

INTERNATIONAL ULTRAVIOLET EXPLORER

OBSERVATORY OPERATIONS

CONTRACT NAS5-28787

FINAL REPORT

Prepared for

GODDARD SPACE FLIGHT CENTER

By

COMPUTER SCIENCES CORPORATION

Under

Contract NAS5-28787

PREFACE

This volume contains the Final Report for the International Ultraviolet Explorer (IUE) Observatory Operations contract, NAS5-28787. The report summarizes the activities of the IUE Observatory over the 13-month period from November 1985 through November 1986 and is arranged in sections according to the functions specified in the Statement of Work (SOW) of the contract. In order to preserve numerical correspondence between the technical SOW elements specified by the contract and the sections of this report, project management activities (SOW element 0.0) are reported here in Section 7, following the reports of technical SOW elements 1.0 through 6.0. Routine activities have been summarized briefly whenever possible; statistical compilations, reports, and more lengthy supplementary material are contained in the Appendices.

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LIST OF ABBREVIATIONS

AAS	-	American Astronomical Society
ABG	-	Gyro Body Angles
AIPS	-	Astronomical Image Processing System
ATR	-	Assistant Technical Representative
C&SA	-	Calibration and Systems Analysis
CCD	-	Charge Coupled Device
CCIL	-	Control Center Interactive Language
CDA	-	Condensed Data Archive
CDMS	-	Command and Data Management System (UIT)
CP-R	-	Control Program for Realtime (Sigma-9 operating system)
CPU	-	Central Processing Unit
CRAB	-	Computer Resources Advisory Board
CSC	-	Computer Sciences Corporation
CTR	-	Contractor Task Report (projects cost estimates for the task)
CU	-	University of Colorado
DASS	-	Data Accounting Software Support
DBMS	-	Data Base Management System
DEC	-	Digital Equipment Corporation
DEP	-	Dedicated Experiment Processor (UIT)
DIDL	-	Double Precision Version of Interactive Data Language (IDL)
DMC	-	Data Management Center
DN	-	Data Number (digital pixel value from camera)

DOC	-	Data Operations and Control
DR	-	GSFC Discrepancy Report
DTUTF	-	Digital Tape Unit Test Facility
ECIO	-	Experiment Computer Input/Output
ECOS	-	Experiment Computer Operating System (UIT)
EDS	-	Experiment Display System
EPROM	-	Eraseable Programmable Read Only Memory (UIT)
ESA	-	European Space Agency
ETC	-	Eastern Training Center
FAX	-	Telefacsimile
FES	-	Fine Error Sensor
FITS	-	Flexible Image Transport System
FN	-	Flux Number (photometrically corrected digital pixel value)
FPM	-	Flux Particle Monitor
FSS	-	Fine Digital Sun Sensors (ACS)
FUSE	-	Far Ultraviolet Spectroscopic Explorer
GBF	-	GSFC Browse File
GMT	-	Greenwich Mean Time
GO	-	Guest Observer
GOTL	-	Guest Observer Target List
GSA	-	General Services Administration
GSFC	-	Goddard Space Flight Center
HRS	-	High Resolution Spectrograph
IADAF	-	Interactive Astronomical Data Analysis Facility
IDL	-	Interactive Data Language

IGSE	-	Instrument Ground Support Equipment (UIT)
I/O	-	Input/Output
IPC	-	Image Processing Center
IPL	-	Image Processing Log
IPS	-	Image Processing Support, or Image Processing Specialist
IRAF	-	Interactive Data Reduction and Analysis Facility
IRAS	-	Infrared Astronomical Satellite
ITF	-	Intensity Transfer Function
IUE	-	International Ultraviolet Explorer
IUEAIMS	-	IUE Automated Information Management System
IUEPROP	-	IUE Proposer Data Base System
IUESIPS	-	IUE Spectral Image Processing System
JCL	-	Job Control Language
JPL	-	Jet Propulsion Laboratory
JSC	-	Johnson Space Center
KSC	-	Kennedy Space Center
LAN	-	Local Area Network
LASP	-	Laboratory for Astronomy and Solar Physics
LBLS	-	Line-by-line Spatially Resolved Spectral File
LED	-	Light-emitting Diode
LWLA	-	Long Wavelength Large Aperture
LWP	-	Long Wavelength Prime Camera
LWR	-	Long Wavelength Redundant Camera
LWSA	-	Long Wavelength Small Aperture
MEHI	-	Merged High Dispersion Spectral File

MELO	-	Merged Low Dispersion Spectral File
MSFC	-	Marshall Space Flight Center
NASA	-	National Aeronautics and Space Administration
NOAO	-	National Optical Astronomy Observatory
NRAO	-	National Radio Astronomy Observatory
NSESCC	-	NASA Space & Earth Sciences Computing Center
NSSDC	-	National Space Science Data Center
OBC	-	On-board Computer
OCC	-	Operations Control Center
OD	-	Operations Director (GSFC)
ODD	-	Optical Data Digitizer (Finder Fields)
PBI	-	Photometrically Corrected Byte Image
PBX	-	Private Branch Exchange
PDL	-	Program Design Language
PHCAL	-	Photometric Calibration Program Identification
PI	-	Principal Investigator, or Photometrically Corrected Halfword Image
POCC	-	Payload Operations Control Center
POD	-	Project Operations Director
POT	-	Preplanned Operations Tape
PPMR	-	Production Processing Modification Report
PROC	-	Procedure
PROM	-	Programmable Read Only Memory (UIT)
PS	-	Payload Specialist
Pt-Ne	-	Platinum-Neon (wavelength calibration lamp)
PW	-	Photowrite

QC	-	Quality-Control
RA	-	Resident Astronomer
RAD	-	Rapid Access Device (disk on Sigma computers)
RDAF	-	Regional Data Analysis Facility
RI	-	Raw IUE Image (Unprocessed)
S/C	-	Spacecraft
SCAMA	-	Switching, Conferencing, and Monitoring Arrangement
SCRIPTS	-	Observing Specifications
SDAS	-	Science and Data Analysis System of STScI
SEC	-	Secondary Emission Conduction Vidicon Tube (Camera)
SEID	-	Spacelab Experiment Interface Device (UIT)
SERC	-	Science and Engineering Research Council of the UK
SI	-	Scientific Instrument
S/N	-	Signal to Noise Ratio
SOC	-	Science Operations Center
SPAN	-	Space Physics Analysis Network
STScI	-	Space Telescope Science Institute
SWLA	-	Short Wavelength Large Aperture
SWP	-	Short Wavelength Prime (Camera)
SWR	-	Short Wavelength Redundant (Camera)
SWSA	-	Short Wavelength Small Aperture
TC	-	Transfer Characteristic
TFLOOD	-	Tungsten-flood
THDA	-	Camera Head Amplifier Temperature
TOC	-	Telescope Operations Center
TS&O	-	Telescope Scheduling and Operations

TSSF	-	Tape Staging and Storage Facility
UC	-	Users' Committee
UIT	-	Ultraviolet Imaging Telescope
US1	-	NASA IUE Observing Shift 1
US2	-	NASA IUE Observing Shift 2
UV	-	Ultraviolet
UVC	-	UV Image Converter (Camera)
UVF	-	UV Flood Lamp
UVFLOOD	-	UV Flood Lamp
VILSPA	-	Villafranca del Castillo, Spain
VIPS	-	VILSPA Image Preprocessing System
WNRC	-	Washington National Records Center
WPS	-	NASA Wallops Flight Facility, Wallops Island, Virginia
XDS	-	Xerox Data Systems

INTRODUCTION

The fundamental operational objective of the International Ultraviolet Explorer (IUE) program is to translate competitively selected observing programs into IUE observations, to reduce these observations into meaningful scientific data, and then to present these data to the Guest Observer in a form amenable to the pursuit of scientific research. The IUE Observatory is key to this objective since it is the central control and support facility for all science operations functions within the IUE Project.

In carrying out the operation of this facility, CSC coordinated and provided a number of complex functions beginning with telescope scheduling and operation, proceeding to data processing, and ending with data distribution and scientific data analysis. In support of these critical-path functions, a number of other significant activities were also provided, including scientific instrument calibration, systems analysis, and software support.

The contract period was from November 1, 1985 to November 29, 1986. The work performed constitutes the ongoing activities of the IUE Observatory and is expected to be continued under the follow-on IUE Observatory Operation contract NAS5-29375.

SECTION 1 - IUE DATA MANAGEMENT CENTER OPERATIONS

The IUE Data Management Center (DMC) managed, monitored, and distributed the scientific output products of the IUE astronomical observatory and provided support for the IUE proposal review process. The DMC also provided user support in the form of Guest Observer travel reimbursement, and travel, logistical, and technical support for meetings of IUE advisory groups. Through the IUE Hardcopy Facility (HCF) it provided the management, production, and quality control functions required for the creation of the IUE scientific film products.

1.1 MANAGEMENT

The DMC, HCF, and user-support task leaders and technical supervisors established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of effort relating to the data management element of the SOW. This included the creation and distribution of the weekly data status graphs and tables and regular attendance by the CSC IUE Deputy Project Manager or his representative at the weekly NASA/CSC IUE Project meetings. Additional reports and meetings were accommodated on an as-needed basis.

1.2 DATA PRODUCTS

A compilation of IUE data production statistics is contained in Appendix A.

IUE data tapes were received, entered into the appropriate log books, and distributed to their assigned areas. Quick-look (raw image), processed-image, and VILSPA-image photowrite film products were generated in a coordinated fashion using Photowrite Systems 2 or 3. Photowrite contact prints were generated using the Miller-Holzwarth printing equipment.

CalComp plots were logged in and distributed after plotting and quality control checking were performed by image processing support personnel. Magnetic tapes and corresponding listings containing the standard IUE Observatory logs were generated and distributed according to an approved milestone schedule. Photowrite film prints were mounted in viewgraph frames, labeled, and, when releasable, placed in the Observatory Browse File.

Ten volumes of the IUE observing scripts were photocopied, sent for microfiching, and indexed.

1.3 DATA BASE

Daily entry and quality control of observation information, image processing information, and product completion dates were performed. These data were merged into the IUE data base twice a week. MARK IV reports using the IUE data base were generated for use by CSC and GSFC personnel.

1.4 DATA DISTRIBUTION

Packages containing GO data products were shipped weekly. Archive tapes, photowrite film sheets, and MARK IV listings were staged and delivered to NSSDC. Completed observatory log products were sent to ESA and SERC, and copies of the standard GSFC PHCAL data products were sent to the ESA Observatory Controller. Boxes of tapes were sent to, or recalled from, storage at the WNRC as necessary.

1.5 MAINTENANCE AND SUPPLIES

The observatory petty cash fund was used to obtain GSFC-authorized supplies for the IUE Observatory. Scheduled preventive maintenance and nonscheduled remedial maintenance support was provided for the two Photowrite systems, the contact printing equipment, the photolab hardware systems, and the Lektriever Browse File equipment. As necessary, photowrite system software recommendations were coordinated with other operational areas of the observatory.

1.6 USER SUPPORT

Travel support for limited numbers of authorized Guest Observers was provided. Travel support for the IUE Users' Committee, Peer Review panel, and Long-Range Planning Committee members was provided, as was meeting support for the IUE Users' Committee meetings, IUE Three-Agency meetings, IUE Long-Range Planning Committee meetings, and IUE Peer Review meetings held at GSFC. For the Users' Committee and Three-Agency meetings, technical meeting records were compiled and published, and for the IUE Peer review meetings, clerical support was provided. In support of the Peer Review process, the computerized data base of proposers was maintained, with updates added at each new observng episode. MARK IV reports using this data base were generated for use by project personnel. Statistical reports summarizing institutional and principal investigator involvement with IUE by episode are contained in Appendices B and C.

1.7 IMPLEMENTATION OF LONG-RANGE PLANS

The DMC supported the implementation of new capabilities and operational and procedural changes developed under the Long-Range Planning effort (Section 6) as they applied to DMC activities.

SECTION 2 - SI CALIBRATION AND SYSTEMS ANALYSIS

The SI Calibration and Systems Analysis (C&SA) group provided support in the calibration of, development of control procedures for, and analysis of, the scientific instruments on board the IUE. It also provided IUE experience in science operations, data analysis, software development, and hardware support to the design, operation, and analysis of current and future space astronomy missions.

2.1 MANAGEMENT

The task leaders and technical supervisors established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of effort relating to the calibration and systems analysis element of the SOW. This included the regular attendance by the CSC IUE Deputy Project Manager or his representative at the weekly NASA/CSC IUE Project meetings and participation by technical personnel in IUE Three-Agency meetings, Calibration Coordination Committee meetings, and IUE Users' Committee meetings.

2.2 SI CALIBRATION

Observations were planned, conducted, and analyzed to perform the photometric calibration of the scientific instrument. These included data for obtaining new absolute calibrations and spectra for monitoring the sensitivities and absolute calibrations of all three operational cameras (SWP, LWR, LWP). Observations were also planned, conducted, and analyzed to perform the calibrations relating to wavelength determination and target acquisition. Data bases on the variation of dispersion constants, on records of wavelength calibration data products, and on maneuvering, maneuver errors, and telescope focus were updated and maintained.

2.3 SCIENCE OPERATIONS CONTROL PROCEDURES SUPPORT

Support was provided for the procedures for control and calibration of the IUE telescope, spectrographs, cameras, and FES. Continuing efforts were made to identify areas of possible improvement to enhance efficiency and reliability. Continuing support was provided for the maintenance, analysis, and enhancement of the scientific data handling system and the EDS, including the identification of the existence and impact of system software deficiencies.

2.4 SYSTEMS ANALYSES

Records of maneuvers and monthly analysis of maneuver errors were provided. Gyro scale factors were redetermined as necessary. Task personnel developed test plans to analyze S/C maneuvering and guidance accuracy following modifications to the two-gyro plus FSS flight software. Test results were analyzed and the impact or improvement in telescope pointing and slewing accuracy determined. These tests provided important data for the first stages of the one-gyro system development.

The performance of the components of the scientific instrument (telescope, FES, spectrographs, and cameras) was analyzed. Statistics on daily peak radiation levels were compiled.

Scientific analyses of data and operations were provided as appropriate. Support was provided to ongoing and future space astronomy experiments through IUE experience in spacecraft operations, data analysis, and software and hardware development. Specific areas supported include UIT software/hardware development, FUSE/LYMAN ground-system requirements analysis, gamma-ray astronomy mission planning and data analysis, and infrared-source cataloging.

2.5 SI CALIBRATION AND SYSTEMS ANALYSES SOFTWARE

Support was provided for developing and maintaining the software required for SI calibration and systems analysis.

2.6 IMPLEMENTATION OF LONG-RANGE PLANS

The SI C&SA group supported the implementation of new capabilities and operational and procedural changes developed under the Long-Range Planning Effort (Section 6) as they applied to SI C&SA activities.

SECTION 3 - TELESCOPE SCHEDULING AND OPERATIONS

The Telescope Scheduling and Operations (TS&O) group provided the planning and scheduling of IUE observations and the operation of the IUE scientific instrument in support of Guest Observer science programs. It also provided expert technical advice to the IUE project in the analysis of the feasibility of Guest Observer proposals and special requests.

3.1 MANAGEMENT

The task leader and technical supervisor established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of efforts relating to the telescope scheduling and operation element of the SOW. This included the regular attendance by the CSC IUE Deputy Project Manager or his representative at the weekly NASA/CSC IUE Project meetings and participation by technical personnel in IUE Three-Agency meetings, IUE Users' Committee meetings, and meetings with the GSFC IUE Project Operations Director and with Operations Control Center personnel. Additional reports and meetings were accommodated on an as-needed basis.

3.2 TELESCOPE SCHEDULING

Extensive pre-visit planning and consultation with Guest Observers was provided in order to develop efficient telescope-time schedules. This activity became increasingly more difficult as spacecraft constraints became tighter and observing programs more complex. Telescope-time schedules, once generated, were distributed and updated as necessary. Target lists were maintained, and skymaps and Prelanned Operation Tapes were prepared regularly in support of the planning activities.

3.3 TELESCOPE OPERATIONS

The TOC was operated by Resident Astronomers and Telescope Operators in support of Guest Observer programs, discretionary time programs, and calibration, maintenance, and engineering test

programs. As necessary, the scientific instrument was operated during VILSPA shifts which ESA was unable to support due to contingency situations. This included 8 days during September 1986 when the VHF command antenna at VILSPA was being overhauled. Continuing efforts were provided to assist Guest Observers in interpreting their data by explaining the details of the spacecraft instrumentation and data analysis procedures.

Technical feasibility reviews were provided to the IUE Project for all observing and archival research proposals, including the many hundreds received in response to the annual announcements of opportunity and the discretionary time proposals received at other times. Additional reviews were provided as special circumstances arose, due to more restrictive power-negative operations and LWR camera use.

Continuing efforts were made to minimize time losses to science operations and to upgrade telescope operations. New observing techniques and operational procedures were developed to circumvent changed S/C performance characteristics of the two-gyro plus FSS control system. Observing efficiency with the two-gyro plus FSS control system is virtually identical to that of the former three-gyro system.

Support was provided for developing and maintaining the software required for operations analysis and planning.

Task personnel worked closely with OCC staff to effect a smooth transition of normal operational support to the Wallops Island, Virginia, tracking station.

A statistical summary of IUE science observation efficiency is contained in Appendix D.

3.4 QUALITY ASSURANCE

Quality assurance and verification were provided for all TOC records and logs, including observing schedules, observing scripts, manual entries to image header records, maneuver records, handover records, observing logs, and other critical information items.

3.5 IMPLEMENTATION OF LONG-RANGE PLANS

The TS&O group supported the implementation of new capabilities and operational and procedural changes developed under the Long-Range Planning effort (Section 6) as they applied to TS&O activities.

SECTION 4 - IMAGE PROCESSING AND SOFTWARE SUPPORT

The Image Processing and Software Support (IP&SS) group operated the IUE Image Processing Control Center and provided maintenance, enhancement, and configuration control for IUE Observatory software including the IUE Spectral Image Processing System, the IUE Automated Information Management System, and the IUE Observatory Scheduling Software. It also provided scientific analysis, image-processing related support to Guest Observers, and coordination of data exchange among the NASA, ESA, and SERC IUE Projects and the NSSDC.

4.1 MANAGEMENT

The task leaders and technical supervisors established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of efforts relating to the image processing and software support element of the SOW. This included the regular attendance by the CSC IUE Deputy Manager or his representative at the weekly NASA/CSC IUE Project meetings and participation by technical personnel in IUE Three-Agency meetings and IUE Users' Committee meetings. Additional reports and meetings were accommodated on an as-needed basis.

4.2 IMAGE PROCESSING

The Image Processing Center was operated to provide routine production processing of current IUE images, approved archival-image reprocessing, reprocessing of images affected by operational problems, and special tests for IPC and other observatory areas.

Routine quality assurance operations were performed on all image processing output products, including CalComp plots, Guest Observer and archive tapes, and all hand-kept records within the IPC. The impact of approved observing programs on image processing activities was assessed as necessary, and priority processing was coordinated as appropriate.

4.3 SOFTWARE SUPPORT

Maintenance, enhancement, and change control were provided for the IUESIPS software, the IUE Observatory scheduling software, and the IUEAIMS software, and general software support was provided to other areas of the observatory as needed. An electronic mail link using the BITNET network was established between GSFC and VILSPA and between GSFC and SERC. New software was written to format a new version of the VILSPA data bank into a data base compatible with IUEAIMS. The NASA IUE Newsletter mailing list was transferred to the GSFC mailroom's Automated Addressing System. Extensive interfaces were maintained with ESA and SERC to support data exchange activities.

4.4 GUEST OBSERVER SUPPORT

Guest Observer support was provided through the preparation and distribution of documentation describing image processing software and standard procedures, consultation with Guest Observers, and special processing services as approved by GSFC.

4.5 ANALYSIS AND DEVELOPMENT: ENHANCEMENT STUDIES

Scientific analysis of IUE data and the development of new techniques designed to improve the usefulness of reduced data were provided. Specific areas of accomplishment include the further development of ITF analysis techniques, advances in understanding reseau motion and spectral format registration errors, and progress toward the correction of high-dispersion order overlap. Interfaces with other areas of the IUE Observatory and with VILSPA were maintained and utilized to coordinate activities.

4.6 IMPLEMENTATION OF LONG-RANGE PLANS

The IP&SS group supported the implementation of new capabilities and operational and procedural changes developed under the Long-Range Planning effort (Section 6) as they applied to IP&SS activities. In particular, significant effort was devoted to the development and specification of requirements for relocating IPC

functions from the Sigma-9 computer to a VAX 8300 computer. The document International Ultraviolet Explorer Advanced Spectral Image Processing System Requirements Specification was completed, and work on the preliminary design of the new system, based on the established requirements, was initiated.

SECTION 5 - GSFC REGIONAL DATA ANALYSIS FACILITY SUPPORT

The Regional Data Analysis Facility (RDAF) was operated to provide IUE users ready access to reliable, uniform software and procedures for analyzing IUE data. The RDAF group provided user assistance and consultation, software maintenance, analysis and software development, and hardware maintenance support.

5.1 MANAGEMENT

The task leader and technical supervisor established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of efforts relating to the RDAF element of the SOW. This included the regular attendance by the CSC IUE Deputy Project Manager or his representative at the weekly NASA/CSC IUE Project meetings and participation by technical personnel in IUE Users' Committee meetings. Additional reports and meetings were accommodated on an as-needed basis.

5.2 OPERATIONS

Normal scheduling of users was provided on a continuing basis as requests were received, with careful coordination of the visitors' schedules and need for terminal time, disk storage space, tape input/output, instruction and advice. User support in the form of training, supervision, advice, scientific consultation, software development, and data input/output operations was provided to close to 120 different users, involving more than 180 visits by non-local scientists. More than 3,000 spectral files were retrieved from the Condensed Data Archives for RDAF users. An additional 3000 extracted spectral files on magnetic tape were sent to astronomers on request, a new capability developed during this contract period. Special assistance was provided to several long-term visitors, and support for remote usage was provided. The remote mode has been used successfully by a number of users.

5.3 SOFTWARE MAINTENANCE

Maintenance and change control of RDAF software and data bases were provided according to established procedures involving the RDAF User Problem Reports, Software Modification Reports, and Software Review Meetings. These activities encompassed user-generated software, facility-generated software, software provided by the RDAF at the University of Colorado, and access to the IUE Condensed Data Archives and merged log. Data bases supported include the IUE Merged Log, the IUE Standard-Star Catalog, the GSFC Catalog of IUE Fluxes, the Kurucz flux models, the IUESIPS configuration control entries, an IUE data analysis reference list, and various IUE calibration tables.

5.4 ANALYSIS AND SOFTWARE DEVELOPMENT

Analysis and development of new software, procedures, and data bases to extend the capabilities of the RDAF were provided by the RDAF staff. This included the installation of about 16 new procedures, 62 improved procedures, and 43 additional procedures modified to run under a new version of IDL. A new version of IDL was installed which permits use of double-precision computations and several new capabilities. The new IUE Reference Data Base was installed and upgraded. Preliminary work was performed to convert the RDAF procedures to run on a VAX computer. Work continued on conversion of IUESIPS routines to the VAX computer.

5.5 FACILITY MAINTENANCE AND SUPPLIES

Routine maintenance and minor repairs and supplies were procured for the RDAF through a petty cash fund. All such expenditures were made with GSFC approval.

5.6 IMPLEMENTATION OF LONG-RANGE PLANS

The RDAF group supported the implementation of new capabilities and operational and procedural changes developed under the Long-Range Planning effort (Section 6) as they applied to RDAF activities.

SECTION 6 - LONG-RANGE PLANNING ACTIVITIES SUPPORT

CSC provided support to the long-range planning effort of the IUE Observatory, including the performance of analyses and trade-off studies and the development and implementation of new capabilities. This effort encompassed the planning of changes in response to changing observatory requirements and preparation for the eventual end of the IUE mission.

6.1 MANAGEMENT

The task leader and technical supervisor established and implemented formal and informal interface channels and procedures to ensure efficient and effective working relationships and overall coordination of efforts relating to the long-range planning element of the SOW. This included the regular attendence by the CSC IUE Deputy Project Manager or his representative at the weekly NASA/CSC IUE Project meetings and participation by technical personnel in IUE Three-Agency meetings, IUE Users' Committee meetings, NASA IUE Long-Range Planning Working Group meetings, and IUE Three-Agency Long-Range Planning Committee meetings. Additional reports and meetings were accommodated on an as-needed basis.

6.2 MISSION DOCUMENTATION PLANNING

Efforts were continued in defining the material needed to fully document the acquisition and processing of IUE science data over the course of the mission. This activity is part of the crucial effort of creating, collecting, and preserving critical documents that will be needed by research scientists at the end of the IUE mission.

6.3 OPERATIONS AUGMENTATION PLANNING

CSC continued its planning for the implementation of new or modified IUE operational capabilities as necessitated by changing spacecraft constraints and operational status in order to maintain IUE's observing flexibility and efficiency. In particular, CSC continued to evaluate spacecraft performance and operational constraints under the two-gyro/Fine Sun Sensor control system to determine the effects of these factors on the long-range scheduling of observations.

6.4 RETROACTIVE DATA ENHANCEMENTS PLANNING AND ANALYSES

CSC continued to plan and evaluate various alternatives associated with the implementation of an IUE image processing capability on a VAX computer. These efforts included the definition of an appropriate system architecture based on a VAX 8300 and the performance of trade-off analyses relating to the selection of an image-display device and a high-level command language environment. Operational concepts were developed and the system was sized so that reprocessing of the IUE data archives will be possible as well as processing of new or current IUE images.

6.5 DATA BASE PRESERVATION AND UTILIZATION

CSC continued to collect information relevant to the modernization of the IUE archives and enhancement of the data base contents needed to better document IUE data for its long-term use.

SECTION 7 - IUE OBSERVATORY PROJECT MANAGEMENT

CSC IUE Observatory Project Management provided the overall project control and administration necessary to operate, coordinate, and monitor the diverse elements of the IUE Observatory, including both onsite technical activities and offsite financial management and reporting activities.

7.1 INTERFACES AND PROCEDURES

Project management established, implemented, and maintained interfaces and the procedures governing them in the areas of CSC interfacing with NASA, CSC interfacing with Guest Observers and other scientists, CSC interfacing with external agencies and enterprises as they relate to the project, and CSC internal interfacing.

7.2 OBSERVATORY STATUS REPORTING PROCEDURES

Project management established and implemented all necessary reporting procedures and compiled, produced and distributed the monthly project progress reports. Project management approved all financial reports issued by CSC in relation to the project, coordinated the generation of unscheduled (as-needed) reports, and compiled the contract Final Report. A compilation of contract highlights taken from the monthly progress report transmittal letters is contained in Appendix E.

7.3 Participation in Meetings

Project management participated in regularly scheduled and as-needed formal and informal meetings relating to the project work. The CSC IUE Deputy Project Manager or his representative participated in the weekly NASA/CSC IUE Project meetings, and project management coordinated the participation by technical personnel in those and other meetings, such as the IUE Three-Agency meetings and IUE Users' Committee meetings.

7.4 OVERALL COORDINATION

Project management provided the overall coordination required to ensure the maintenance of smooth interfaces and efficient working relationships among the various elements of the CSC IUE Project by means of biweekly staff meetings and frequent informal contact.

A compilation of commendations received by CSC IUE project personnel is contained in Appendix F.

SECTION 8 - NEW TECHNOLOGY

There were no reportable items developed under the new technology clause of this contract.

APPENDIX A - IUE DATA PRODUCTS SUMMARY

APPENDIX A - IUE DATA PRODUCTS SUMMARY

In the following tabular data, summary statistics of IUE image acquisition and processing are presented as calculated by the IUEAIMS program ACT. For this compilation, Period 1 is defined as the date of launch (January 26, 1978) through October 31, 1985. Period 2 covers the period of this contract, November 1, 1985 through November 29, 1986. Total numbers are the sum of Period 1 and Period 2 and hence are cumulative since launch.

ACCOUNTING SUMMARY

PERIOD 1=78/ 26 TO 85/304
PERIOD 2=85/305 TO 86/333

LONG WAVELENGTH SPECTRA AND IMAGES TAKEN
HIGH DISPERSION

	NO. SPECTRA							NO. IMAGES			
PERIOD	TAKEN	CRI	DNP	LOST	REQ	CRI	DNP	LOST	DOUBLE	TAKEN	REQ
PERIOD 1	6492	233	0	2	6490	231	0	2	4	6488	6486
PERIOD 2	649	0	0	0	649	0	0	0	1	648	648
TOTAL	7141	233	0	2	7139	231	0	2	5	7136	7134

SHORT WAVELENGTH SPECTRA AND IMAGES TAKEN
HIGH DISPERSION

	NO. SPECTRA							NO. IMAGES			
PERIOD	TAKEN	CRI	DNP	LOST	REQ	CRI	DNP	LOST	DOUBLE	TAKEN	REQ
PERIOD 1	6158	203	0	2	6156	197	0	2	6	6152	6150
PERIOD 2	671	1	0	0	671	1	0	0	1	671	671
TOTAL	6829	204	0	2	6827	198	0	2	7	6823	6821

LONG WAVELENGTH SPECTRA AND IMAGES TAKEN
LOW DISPERSION

	NO. SPECTRA							NO. IMAGES			
PERIOD	TAKEN	CRI	DNP	LOST	REQ	CRI	DNP	LOST	DOUBLE	TAKEN	REQ
PERIOD 1	11638	132	0	15	11623	125	0	11	1870	9768	9757
PERIOD 2	1453	0	0	0	1453	0	0	0	105	1348	1348
TOTAL	13091	132	0	15	13076	125	0	11	1975	11116	11105

SHORT WAVELENGTH SPECTRA AND IMAGES TAKEN
LOW DISPERSION

	NO. SPECTRA							NO. IMAGES			
PERIOD	TAKEN	CRI	DNP	LOST	REQ	CRI	DNP	LOST	DOUBLE	TAKEN	REQ
PERIOD 1	12734	162	0	12	12722	151	0	11	1702	11032	11021
PERIOD 2	1424	1	0	0	1424	1	0	0	92	1331	1331
TOTAL	14158	163	0	12	14146	152	0	11	1794	12363	12352

ORIGINAL PAGE IS
OF POOR QUALITY

TOTAL SPECTRA TAKEN

PERIOD	ALL SPECTRA LONG	SHORT	HI	LOW	HI+LOW	CRI HI	LOW	HI+LOW	DNP HI	LOW	HI+LOW	LOST HI	LOW	HI+LOW
PERIOD 1	18130	18892	12650	24372	37022	436	294	730	0	0	0	4	27	31
PERIOD 2	2102	2095	1320	2877	4197	1	1	2	0	0	0	0	0	0
TOTAL	20232	20987	13970	27249	41219	437	295	732	0	0	0	4	27	31

TOTAL IMAGES TAKEN

PERIOD	ALL IMAGES FES	DOUBLE	HI	LOW	HI+LOW	HI+LO+FES	CRI HI	LOW	HI+LOW	DNP HI	LOW	HI+LOW	LOST HI	LOW	HI+LOW
PERIOD 1	522	3582	12640	20800	33440	33962	428	276	704	0	0	0	4	22	26
PERIOD 2	78	199	1319	2679	3998	4076	1	1	2	0	0	0	0	0	0
TOTAL	600	3781	13959	23479	37438	38038	429	277	706	0	0	0	4	22	26

TOTAL COMPUTER PROCESSING REQUIREMENTS

	SPECTRA						IMAGES						
PERIOD	CRI	HI	LOW	HI+LOW	SHORT	LONG	CRI	HI	LOW	HI+LOW	SHORT	LONG	FES
PERIOD 1	730	12646	24345	36991	18878	18113	704	12636	20778	33414	17171	16243	508
PERIOD 2	2	1320	2877	4197	2095	2102	2	1319	2679	3998	2002	1996	78
TOTAL	732	13966	27222	41188	20973	20215	706	13955	23457	37412	19173	18239	586

TOTAL COMPUTER PROCESSING COMPLETED LOW DISPERSION

	SPECTRA					IMAGES	
PERIOD	CRI	SHORT	LONG	PROC	REDO COMP	DOUBLES	TOTAL PROC
PERIOD 1	294	12685	11587	24272	1143	3549	20723
PERIOD 2	1	1449	1476	2925	184	213	2712
TOTAL	295	14134	13063	27197	1439	3762	23435

NOTE THAT ALL REDO TOTALS USE ACTUAL VALUES FROM DATA BASE HOWEVER, REDO C FOR PERIODS 1 AND 2 ARE A MAXIMUM OF ONE PER SPECTRA

TOTAL COMPUTER PROCESSING COMPLETED HIGH DISPERSION

	SPECTRA					IMAGES	
PERIOD	CRI	SHORT	LONG	PROC	REDO COMP	DOUBLES	PROCESSED
PERIOD 1	436	6091	6478	12569	2086	10	12559
PERIOD 2	1	729	654	1383	61	2	1381
TOTAL	437	6820	7132	13952	2382	12	13940

TOTAL COMPUTER PROCESSING COMPLETED

	SPECTRA							IMAGES		
PERIOD	CRI	HIGH	LOW	SHORT	LONG	HI+LOW	REDO C	DOUBL	HI+LOW	FES
PERIOD 1	730	12569	24272	18776	18065	36841	3229	3559	33282	507
PERIOD 2	2	1383	2925	2178	2130	4308	245	215	4093	78
TOTAL	732	13952	27197	20954	20195	41149	3821	3774	37375	585

COMPUTER PROCESSING BACKLOGS

	SPECTRA							IMAGES			
PERIOD	HIGH	LOW	SHORT	LONG	HI+LOW	CRI	REDO	HI	LOW	FES	HI+LOW+FES
PERIOD 1	77	73	102	48	150	0		77	55	1	133
PERIOD 2	-63	-48	-83	-28	-111	0		-62	-33	0	-95
TOTAL	14	25	19	20	39	0	6	15	22	1	38

DATA PRODUCTS SUMMARY

PERIOD 1=78/ 26 TO 85/304
PERIOD 2=85/305 TO 86/333

PHOTOWRITE PRODUCTS (IMAGES)

	TAKEN	NOT REQ	REQ	PROCESSED			PRODUCT COMPLETED			BACKLOGS (HI+LOW)		
PERIOD	HI+LOW	D+C+L	HI+LOW	HI	LOW	HI+LOW	HI	LOW	HI+LOW	REQ-PC	PC-COM	REQ-COM
PERIOD 1	33440	730	32710	12131	20447	32578	12054	20410	32464	132	114	246
PERIOD 2	3998	2	3996	1381	2710	4091	1420	2687	4107	-95	-16	-111
TOTAL	37438	732	36706	13512	23157	36669	13474	23097	36571	37	98	135

CALCOMP PRODUCTS (SPECTRA)

	TAKEN	NOT REQ			REQ	PROCESSED			PRODUCT COMPLETED			BACKLOGS (HI+LOW)		
PERIOD	HI+LOW	D+C+L	NAHI	NALOW	HI+LOW	HI	LOW	HI+LOW	HI	LOW	HI+LOW	REQ-PC	PC-COM	REQ-COM
PERIOD 1	37022	761	5292	7107	23862	6990	16940	23930	6991	16957	23948	-68	-18	-86
PERIOD 2	4197	2	1083	1864	1248	240	1001	1241	226	946	1172	7	69	76
TOTAL	41219	763	6375	8971	25110	7230	17941	25171	7217	17903	25120	-61	51	-10

GO TAPE PRODUCTS (SPECTRA)

	TAKEN			NOT REQ	REQUIRED			PROCESSED			PRODUCTS COMPLETED				BACKLOGS (TOTAL)		
PERIOD	HI+LOW	FES	TOTAL	D+L	HI+LOW	FES	TOTAL	HI+LOW	FES	TOTAL	HI	LOW	FES	TOTAL	RQ-PC	PC-COM	RQ-COM
PERIOD 1	37022	522	37544	31	36991	508	37499	36841	507	37348	12564	24264	507	37335	151	13	164
PERIOD 2	4197	78	4275	0	4197	78	4275	4308	78	4386	1378	2920	78	4376	-111	10	-101
TOTAL	41219	600	41819	31	41188	586	41774	41149	585	41734	13942	27184	585	41711	40	23	63

SPECTRAL PACKAGES

	TAKEN			NOT REQ	REQUIRED			PROCESSED			PRODUCTS COMPLETED				BACKLOGS (TOTAL)		
PERIOD	HI+LOW	FES	TOTAL	D+L	HI+LOW	FES	TOTAL	HI+LOW	FES	TOTAL	HI	LOW	FES	TOTAL	RQ-PC	PC-COM	RQ-COM
PERIOD 1	37022	522	37544	31	36991	508	37499	36841	507	37348	12459	24129	507	37095	151	253	404
PERIOD 2	4197	78	4275	0	4197	78	4275	4308	78	4386	1453	2987	78	4518	-111	-132	-243
TOTAL	41219	600	41819	31	41188	586	41774	41149	585	41734	13912	27116	585	41613	40	121	161

ARCHIVE TAPE PRODUCTS (SPECTRA)

	TAKEN			NOT REQ	REQUIRED			PROCESSED			PRODUCTS COMPLETED				BACKLOGS (TOTAL)		
PERIOD	HI+LOW	FES	TOTAL	D+L	HI+LOW	FES	TOTAL	HI+LOW	FES	TOTAL	HI	LOW	FES	TOTAL	RQ-PC	PC-COM	RQ-COM
PERIOD 1	37022	522	37544	31	36991	508	37499	36841	507	37348	12387	24163	505	37055	151	293	444
PERIOD 2	4197	78	4275	0	4197	78	4275	4308	78	4386	1526	2972	80	4578	-111	-192	-303
TOTAL	41219	600	41819	31	41188	586	41774	41149	585	41734	13913	27135	585	41633	40	101	141

APPENDIX B - IUE RESEARCH INSTITUTION STATISTICS FROM PROPOSER DATA BASE

APPENDIX B - IUE RESEARCH INSTITUTION STATISTICS FROM PROPOSER DATA BASE

The following tables list all previous and current institutional sponsors of IUE Principal Investigators. The first table is arranged in alphabetical order by institution name; the second table is arranged according to the IUE episode in which the institution was first involved in a regular IUE research program. In the second table, the last section lists those institutions which have been involved in only Project Scientist's Discretionary Time programs.

Each of the tables presents the following data:

- Institution name
- Number of approved programs belonging to PIs from the institution. For regular programs, this is given for each episode. For Project Scientist's Discretionary Time programs, no differentiation by episode is made; the total number of such programs is listed under the heading "OD."
- Total number of approved programs belonging to PIs from the institution.

Occasionally, an institution's only IUE involvement is via a scientist who has moved to that institution from another where he/she was previously an IUE PI. These cases are marked with an asterisk (*). The specific cases are:

SIXTH EPISODE

J. H. Hecht - from NASA/GSFC to Aerospace Corp.
G. A. Wegner - from Penn. State to Dartmouth College
M. S. Giampapa - from CFA-SAO to NOAO-NSO

SEVENTH EPISODE

J. B. Holberg - from USC-Arizona to Arizona LPL
F. C. Bruhweiler - from CSC to Catholic University

NINTH EPISODE

W. M. Jackson - from Howard Univ. to UC - Davis

INSTITUTIONS - LISTED ALPHABETICALLY

ALL EPISODES (4/78-5/87) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
*AEROSPACE CORP.						1			1		2
AIR FORCE SPACE DIVISION		1				1					2
ANGLO-AUSTRALIAN OBS., AUSTRALIA	1										1
APPLIED RESEARCH AND SYSTEMS				1							1
APPLIED RESEARCH CORP.							2	2	6		10
ARECIBO OBS.							1	1			2
*ARIZONA - LPL							2	2	2		6
ARIZONA STATE UNIVERSITY			1	1	1	1	2	2	4		12
BOSTON UNIVERSITY	1								1		2
BOWLING GREEN UNIVERSITY			1		1	1	2		1	1	7
BRIGHAM YOUNG UNIVERSITY			1								1
C. I. D. A. VENEZUELA					1						1
CALIFORNIA INSTITUTE OF TECHNOLOGY	2	8	5	5	5	6	1	1		1	34
CARNEGIE INSTITUTION, WASHINGTON,D.C.				1							1
CASE-WESTERN RESERVE UNIVERSITY				1	2	1					4
*CATHOLIC UNIVERSITY							4	6	3	2	15
CFA - HARVARD	2		1	1	1				1		6
CFA - SAO	1	9	9	12	15	15	18	13	8	8	108
CFA - S&T CHINA						1				2	3
CHICAGO-YERKES OBSERVATORY					1	2	1		1		5
CLEMSON UNIVERSITY					1						1
COLUMBIA UNIVERSITY	1								5		6
COMPUTER SCIENCES CORPORATION		5	6	10	14	22	15	19	14	31	136
*DARTMOUTH COLLEGE						1	1	2	2		6
DOMINION ASTROPHYSICAL OBS., CANADA	2	1	2	1	1	1	1	1		3	13
ELECTRO-MAGNETIC APPLICATIONS, INC.				1							1
FRANKLIN AND MARSHALL COLLEGE							1				1
GEORGE MASON UNIVERSITY				1	1	3	1		1	4	11
GEORGIA STATE UNIVERSITY					1	1	1		1		4
HALE OBSERVATORIES	1										1
HAO-NCAR							1				1
HERZBERG INST. OF ASTROPHYSICS										1	1
HOWARD UNIVERSITY	1	1	1	1				4			8
I.A.F.E.,ARGENTINA	1									1	2
I.A.R.,ARGENTINA										5	5
IMAD-AD-DEAN, INC.						1	1		2	2	6
INDIANA UNIVERSITY				1	1	2	2	6	4	1	17
IOWA STATE UNIVERSITY				1	1			1	1		4
JET PROPULSION LABORATORY	1	3	4	4	3	1	1	3		3	23
JOHNS HOPKINS UNIVERSITY	1	6	4	3	4	4	6	7	5	2	42
LEHIGH UNIVERSITY		1	1	1	1	1	1	1		2	9
LOCKHEED CORPORATION	1		1	1		3	1	1		1	9
LOS ALAMOS, NEW MEXICO			1	1	1		2	1	1	1	8
LOUISIANA STATE UNIVERSITY			1	2	3	3	2		2		13

ALL EPISODES (4/78-3/86) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
MASSACHUSETTS INSTITUTE TECH.			2	2	1	1			1	2	9
MICHIGAN STATE UNIVERSITY							1			1	2
MIDDLEBURY COLLEGE									1		1
MT. WILSON & LAS CAMPANAS OBS.							1				1
NASA - AMES RESEARCH CENTER							1				1
NASA - GODDARD SPACE FLIGHT CENTER	16	10	12	12	12	15	14	11	9	36	147
NASA - JOHNSON SPACE CENTER	2										2
NASA - MARSHALL SPACE FLIGHT CENTER							1	2	1		4
NAVAL RESEARCH LABORATORY		2				1					3
NEW MEXICO INST. OF MINING AND TECH.							1	1		1	3
NEW YORK UNIVERSITY			2	2	2	2	2	2		3	15
NOAO - KPNO		1	1			1	2	3	4	1	13
*NOAO - NSO						1	1	2	1	1	6
NORTHWESTERN UNIVERSITY	1										1
NRAO	1					1				1	3
OHIO STATE UNIVERSITY	2	1	4	1		2			1	1	12
PENN STATE UNIVERSITY			2	2	2	3	2	2	3	2	18
PRINCETON UNIVERSITY	1	1	2	3	2	1	1	1	1		13
RICE UNIVERSITY		1	1		2	1	2	2	2		11
RUTGERS UNIVERSITY			1	1							2
S M SYSTEMS, INC.				1		1		1			3
SPACE RESEARCH INST., U. S. S. R.		1									1
SPACE TELESCOPE SCIENCE INST.							2	3	6	1	12
ST. MARY'S UNIVERSITY, NOVA SCOTIA		1	1								2
STANFORD UNIVERSITY		1	1	1							3
STRUVE ASTRO. OBS., U.S.S.R.	1										1
SUNY, STONY BROOK	1	1	1	1	1	3	1	3	1	2	15
SYSTEMS AND APPLIED SCIENCES CORP.			1	1							2
TATA INST. OF FUND. RESEARCH, INDIA						1					1
THE CITADEL		1		1		1	2	1		1	7
TOKYO ASTRON. OBS., JAPAN	1			1	1		1	1		1	6
TUFTS UNIVERSITY							1	1	1		3
U. N. A. DE MEXICO	1	1	2			1		1	1		7
UNIVERSITY CALIFORNIA BERKELEY		2	3	4	4	7	2	5	1	4	32
*UNIVERSITY CALIFORNIA DAVIS									2		2
UNIVERSITY CALIFORNIA LOS ANGELES	1	2	3	3	2	2	4	4	8	2	31
UNIVERSITY CALIFORNIA SAN DIEGO			2	3	3	2	1			1	12
UNIVERSITY CALIFORNIA SANTA CRUZ		1		3		1	1			2	8
UNIVERSITY OF ARIZONA	1	2	4	5	3	6	3	4	3	3	34
UNIVERSITY OF CHICAGO		1	1			2	4	7	3		18
UNIVERSITY OF COLORADO		1	4	6	2	1	3	3	3	2	25
UNIVERSITY OF COLORADO-CASA									21		21
UNIVERSITY OF COLORADO-JILA	2	2	6	5	9	14	12	12	13	7	82
UNIVERSITY OF COLORADO-LASP		1	2	6	6	10	15	15	1	4	60
UNIVERSITY OF DELAWARE		1	1	1		3	1	3			10

ALL EPISODES (4/78-3/86) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
UNIVERSITY OF DENVER		1									1
UNIVERSITY OF FLORIDA										1	1
UNIVERSITY OF GEORGIA					1	1	1			1	4
UNIVERSITY OF HAWAII	1			2	5	3	4	3	4	1	23
UNIVERSITY OF ILLINOIS		1		1	2	2	1		1	4	12
UNIVERSITY OF IOWA									1		1
UNIVERSITY OF KENTUCKY					1	1	1	1			4
UNIVERSITY OF KYOTO, KYOTO, JAPAN					1						1
UNIVERSITY OF MARYLAND		4	2	3	3	2	3	4	3		24
UNIVERSITY OF MASSACHUSETTS								1			1
UNIVERSITY OF MICHIGAN		1			2	3	1	1	1	3	12
UNIVERSITY OF MINNESOTA	1	1	2	3	3	2	2	1		1	16
UNIVERSITY OF MISSOURI - ST. LOUIS		1	1		1	1	1				5
UNIVERSITY OF MONTREAL, CANADA							2	2	1		5
UNIVERSITY OF NEBRASKA		1	1		1				2		5
UNIVERSITY OF NEW MEXICO										1	1
UNIVERSITY OF NORTH CAROLINA							1				1
UNIVERSITY OF OKLAHOMA										1	1
UNIVERSITY OF PENNSYLVANIA			1							3	4
UNIVERSITY OF PITTSBURGH		1	1		1	1	1	1			6
UNIVERSITY OF ROCHESTER			2	1			1			1	5
UNIVERSITY OF SOUTHERN CALIFORNIA		2	1	2			2	1	4	1	13
UNIVERSITY OF SOUTHERN CALIFORNIA,AZ						2	2	3	1	1	9
UNIVERSITY OF TEL AVIV, ISRAEL		1									1
UNIVERSITY OF TEXAS	4	3	2	3	4	2	1	3			22
UNIVERSITY OF TOLEDO	1	2	2	2	3	2	2	2	1	3	20
UNIVERSITY OF TORONTO	1			2	2					1	6
UNIVERSITY OF TORONTO-SCARBOROUGH C.	1										1
UNIVERSITY OF TORONTO-ERINDALE COLL.		2			2						4
UNIVERSITY OF VICTORIA, CANADA		1									1
UNIVERSITY OF VIENNA, AUSTRIA		1		1	1						3
UNIVERSITY OF VIRGINIA			1		2		2		1		6
UNIVERSITY OF W. ONTARIO, CANADA		1	2	1	1	2				1	8
UNIVERSITY OF WASHINGTON	1	3	4	4	8	13	11	9	8	8	69
UNIVERSITY OF WISCONSIN	1	7	4	4	3	7	6	5	4	1	42
VANDERBILT UNIVERSITY				2	1		1	1	2		7
VILLANOVA UNIVERSITY		1		1	1	4	1	3	3	2	16
W. CONNECTICUT STATE UNIVERSITY						1					1
WASHINGTON STATE UNIVERSITY		1	1				1	1			4
WELLESLEY COLLEGE							1				1
WESLEYAN UNIVERSITY							1				1
WESTERN KENTUCKY UNIVERSITY	1	1	1		1					3	7
WHEATON COLLEGE		1		1	1	1	1	1	1		7
YALE UNIVERSITY						1					1
YORK UNIVERSITY, CANADA		1								1	2

INSTITUTIONS - LISTED BY EPISODE OF FIRST IUE INVOLVEMENT PAGE 1

FIRST EPISODE (4/78-3/79) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
ANGLO-AUSTRALIAN OBS., AUSTRALIA	1										1
BOSTON UNIVERSITY	1								1		2
CALIFORNIA INSTITUTE OF TECHNOLOGY	2	8	5	5	5	6	1	1		1	34
CFA - HARVARD	2		1	1	1				1		6
CFA - SAO	1	9	9	12	15	15	18	13	8	8	108
COLUMBIA UNIVERSITY	1								5		6
DOMINION ASTROPHYSICAL OBS., CANADA	2	1	2	1	1	1	1	1		3	13
HALE OBSERVATORIES	1										1
HOWARD UNIVERSITY	1	1	1	1				4			8
I.A.F.E.,ARGENTINA	1									1	2
JET PROPULSION LABORATORY	1	3	4	4	3	1	1	3		3	23
JOHNS HOPKINS UNIVERSITY	1	6	4	3	4	4	6	7	5	2	42
LOCKHEED CORPORATION	1		1	1		3	1	1		1	9
NASA - GODDARD SPACE FLIGHT CENTER	16	10	12	12	12	15	14	11	9	36	147
NASA - JOHNSON SPACE CENTER	2										2
NORTHWESTERN UNIVERSITY	1										1
NRAO	1					1				1	3
OHIO STATE UNIVERSITY	2	1	4	1		2			1	1	12
PRINCETON UNIVERSITY	1	1	2	3	2	1	1	1	1		13
STRUVE ASTRO. OBS., U.S.S.R.	1										1
SUNY, STONY BROOK	1	1	1	1	1	3	1	3	1	2	15
TOKYO ASTRON. OBS., JAPAN	1			1	1		1	1		1	6
U. N. A. DE MEXICO	1	1	2			1		1	1		7
UNIVERSITY CALIFORNIA LOS ANGELES	1	2	3	3	2	2	4	4	8	2	31
UNIVERSITY OF ARIZONA	1	2	4	5	3	6	3	4	3	3	34
UNIVERSITY OF COLORADO-JILA	2	2	6	5	9	14	12	12	13	7	82
UNIVERSITY OF HAWAII	1			2	5	3	4	3	4	1	23
UNIVERSITY OF MINNESOTA	1	1	2	3	3	2	2	1		1	16
UNIVERSITY OF TEXAS	4	3	2	3	4	2	1	3			22
UNIVERSITY OF TOLEDO	1	2	2	2	3	2	2	2	1	3	20
UNIVERSITY OF TORONTO	1			2	2					1	6
UNIVERSITY OF TORONTO-SCARBOROUGH C.	1										1
UNIVERSITY OF WASHINGTON	1	3	4	4	8	13	11	9	8	8	69
UNIVERSITY OF WISCONSIN	1	7	4	4	3	7	6	5	4	1	42
WESTERN KENTUCKY UNIVERSITY	1	1	1		1					3	7

INSTITUTIONS - LISTED BY EPISODE OF FIRST IUE INVOLVEMENT PAGE 2

SECOND EPISODE (4/79-3/80) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
AIR FORCE SPACE DIVISION		1				1					2
COMPUTER SCIENCES CORPORATION		5	6	10	14	22	15	19	14	31	136
LEHIGH UNIVERSITY		1	1	1	1	1	1	1		2	9
NAVAL RESEARCH LABORATORY		2				1					3
NOAO - KPNO		1	1			1	2	3	4	1	13
RICE UNIVERSITY		1	1		2	1	2	2	2		11
SPACE RESEARCH INST., U. S. S. R.		1									1
ST. MARY'S UNIVERSITY, NOVA SCOTIA		1	1								2
STANFORD UNIVERSITY		1	1	1							3
THE CITADEL		1		1		1	2	1		1	7
UNIVERSITY CALIFORNIA BERKELEY		2	3	4	4	7	2	5	1	4	32
UNIVERSITY CALIFORNIA SANTA CRUZ		1		3		1	1			2	8
UNIVERSITY OF CHICAGO		1	1			2	4	7	3		18
UNIVERSITY OF COLORADO		1	4	6	2	1	3	3	3	2	25
UNIVERSITY OF COLORADO-LASP		1	2	6	6	10	15	15	1	4	60
UNIVERSITY OF DELAWARE		1	1	1		3	1	3			10
UNIVERSITY OF DENVER		1									1
UNIVERSITY OF ILLINOIS		1		1	2	2	1		1	4	12
UNIVERSITY OF MARYLAND		4	2	3	3	2	3	4	3		24
UNIVERSITY OF MICHIGAN		1			2	3	1	1	1	3	12
UNIVERSITY OF MISSOURI - ST. LOUIS		1	1		1	1	1				5
UNIVERSITY OF NEBRASKA		1	1		1				2		5
UNIVERSITY OF PITTSBURGH		1	1		1	1	1	1			6
UNIVERSITY OF SOUTHERN CALIFORNIA		2	1	2			2	1	4	1	13
UNIVERSITY OF TEL AVIV, ISRAEL		1									1
UNIVERSITY OF TORONTO-ERINDALE COLL.		2			2						4
UNIVERSITY OF VICTORIA, CANADA		1									1
UNIVERSITY OF VIENNA, AUSTRIA		1		1	1						3
UNIVERSITY OF W. ONTARIO, CANADA		1	2	1	1	2				1	8
VILLANOVA UNIVERSITY		1		1	1	4	1	3	3	2	16
WASHINGTON STATE UNIVERSITY		1	1				1	1			4
WHEATON COLLEGE		1		1	1	1	1	1	1		7
YORK UNIVERSITY, CANADA		1								1	2

THIRD EPISODE (4/80-3/81) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
ARIZONA STATE UNIVERSITY			1	1	1	1	2	2	4		12
BOWLING GREEN UNIVERSITY			1		1	1	2		1	1	7
BRIGHAM YOUNG UNIVERSITY			1								1
LOS ALAMOS, NEW MEXICO			1	1	1		2	1	1	1	8
LOUISIANA STATE UNIVERSITY			1	2	3	3	2		2		13
MASSACHUSETTS INSTITUTE TECH.			2	2	1	1			1	2	9
NEW YORK UNIVERSITY			2	2	2	2	2	2		3	15
PENN STATE UNIVERSITY			2	2	2	3	2	2	3	2	18
RUTGERS UNIVERSITY			1	1							2
SYSTEMS AND APPLIED SCIENCES CORP.			1	1							2
UNIVERSITY CALIFORNIA SAN DIEGO			2	3	3	2	1			1	12
UNIVERSITY OF PENNSYLVANIA			1							3	4
UNIVERSITY OF ROCHESTER			2	1			1			1	5
UNIVERSITY OF VIRGINIA			1		2		2		1		6

FOURTH EPISODE (4/81-3/82) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
APPLIED RESEARCH AND SYSTEMS				1							1
CARNEGIE INSTITUTION, WASHINGTON,D.C.				1							1
CASE-WESTERN RESERVE UNIVERSITY				1	2	1					4
ELECTRO-MAGNETIC APPLICATIONS, INC.				1							1
GEORGE MASON UNIVERSITY				1	1	3	1		1	4	11
INDIANA UNIVERSITY				1	1	2	2	6	4	1	17
IOWA STATE UNIVERSITY				1	1			1	1		4
S M SYSTEMS, INC.				1		1		1			3
VANDERBILT UNIVERSITY				2	1		1	1	2		7

FIFTH EPISODE (4/82-3/83) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
C. I. D. A. VENEZUELA					1						1
CHICAGO-YERKES OBSERVATORY					1	2	1		1		5
CLEMSON UNIVERSITY					1						1
GEORGIA STATE UNIVERSITY					1	1	1		1		4
UNIVERSITY OF GEORGIA					1	1	1			1	4
UNIVERSITY OF KENTUCKY					1	1	1	1			4
UNIVERSITY OF KYOTO, KYOTO, JAPAN					1						1

SIXTH EPISODE (4/83-3/84) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
*AEROSPACE CORP.						1			1		2
CFA-S&T CHINA						1				2	3
*DARTMOUTH COLLEGE						1	1	2	2		6
IMAD-AD-DEAN, INC.						1	1		2	2	6
*NOAO - NSO						1	1	2	1	1	6
TATA INST. OF FUND. RESEARCH, INDIA						1					1
UNIVERSITY OF SOUTHERN CALIFORNIA,AZ						2	2	3	1	1	9
W. CONNECTICUT STATE UNIVERSITY						1					1
YALE UNIVERSITY						1					1

SEVENTH EPISODE (4/84-3/85) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
APPLIED RESEARCH CORP.							2	2	6		10
ARECIBO OBS.							1	1			2
*ARIZONA - LPL							2	2	2		6
*CATHOLIC UNIVERSITY							4	6	3	2	15
FRANKLIN AND MARSHALL COLLEGE							1				1
HAO-NCAR							1				1
MICHIGAN STATE UNIVERSITY							1			1	2
MT. WILSON & LAS CAMPANAS OBS.							1				1
NASA - AMES RESEARCH CENTER							1				1
NASA - MARSHALL SPACE FLIGHT CENTER							1	2	1		4
NEW MEXICO INST. OF MINING AND TECH.							1	1		1	3
SPACE TELESCOPE SCIENCE INSTITUTE							2	3	6	1	12
TUFTS UNIVERSITY							1	1	1		3
UNIVERSITY OF MONTREAL, CANADA							2	2	1		5
UNIVERSITY OF NORTH CAROLINA							1				1
WELLESLEY COLLEGE							1				1
WESLEYAN UNIVERSITY							1				1

EIGHTH EPISODE (4/85-5/86) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
UNIVERSITY OF MASSACHUSETTS								1			1

NINTH EPISODE (6/86-5/87) EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
MIDDLEBURY COLLEGE									1		1
*UNIVERSITY OF CALIFORNIA - DAVIS									2		2
UNIVERSITY OF COLORADO - CASA									21		21
UNIVERSITY OF IOWA									1		1

OD PROPOSALS ONLY(4/78-11/86)EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
HERZBERG INST. OF ASTROPHYSICS										1	1
I.A.R.,ARGENTINA										5	5
UNIVERSITY OF FLORIDA										1	1
UNIVERSITY OF NEW MEXICO										1	1
UNIVERSITY OF OKLAHOMA										1	1

APPENDIX C - IUE PRINCIPAL INVESTIGATOR STATISTICS FROM PROPOSER DATA BASE

APPENDIX C - IUE PRINCIPAL INVESTIGATOR STATISTICS FROM PROPOSER DATA BASE

The following table lists statistics concerning the number of accepted proposals for all previous and current IUE Principal Investigators. The table is arranged in alphabetical order by PI name and presents the following data:

- o PI name
- o PI home institution (more than one if the PI moved)
- o Number of approved programs for the PI (at each institution). For regular programs, this is given for each episode. For Project Scientist's Discretionary Time programs, no differentiation by episode is made; the total number of such programs is listed under the heading "OD."
- o Total number of approved programs for the PI.

Each PI who has changed institutions has multiple entries which show the PI's IUE programs as a function of institution and episode. Such cases are highlighted by asterisks (*).

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
A'HEARN, MICHAEL F.	UNIVERSITY OF MARYLAND		1	1	1	2	2	2	2	1		12
ABBOTT, DAVID C.	UNIVERSITY OF COLORADO - JILA										1	1
ADELMAN, SAUL J.	THE CITADEL		1		1		1	2	1		1	7
AGRAWAL, PRAHLAD C.	TATA INST. OF FUND. RESEARCH, INDIA						1					1
AHMAD, IMAD A.	IMAD-AD-DEAN, INC.						1	2		2	1	6
AIKIN, A. C.	NASA - GODDARD SPACE FLIGHT CENTER										1	1
AKE, THOMAS B.III	COMPUTER SCIENCES CORPORATION				1	2	1	3		1	3	11
ALLER, LAWRENCE H.	UNIVERSITY CALIFORNIA LOS ANGELES		1	1	1	1	1	1		1		7
ALTNER, BRUCE M.	APPLIED RESEARCH CORP.							1	1	3		5
AUER, LARRY H.	*PENN STATE UNIVERSITY				1							
AUER, LARRY H.	*LOS ALAMOS, NEW MEXICO							1				2
AYRES, THOMAS R.	*UNIVERSITY OF COLORADO - LASP				3	3	5	4	4			
AYRES, THOMAS R.	*UNIVERSITY OF COLORADO - CASA									2		21
BAAN, WILLIAM A.	ARECIBO OBS.							1				1
BAIRD, SCOTT R.	CLEMSON UNIVERSITY					1						1
BALIUNAS, SALLIE L.	CFA - SAO					3	1	2	1	1		8
BARKER, PAUL K.	UNIVERSITY OF W. ONTARIO, CANADA				1	1	2				1	5
BARKER, TIMOTHY	WHEATON COLLEGE		1		1	1	1	1	1	1		7
BARRY, DON C.	UNIVERSITY OF SOUTHERN CALIFORNIA		1					1				2
BASRI, GIBOR S.	UNIVERSITY CALIFORNIA BERKELEY						1		2	1		4
BEAVERS, WILLET I.	IOWA STATE UNIVERSITY				1							1
BEGELMAN, MITCHELL C.	UNIVERSITY OF COLORADO - JILA							1				1
BELL, ROGER A.	UNIVERSITY OF MARYLAND		1						2	2		5
BELTON, MICHAEL J. S.	NOAO - KPNO			1								1
BERGSTRALH, JAY T.	JET PROPULSION LABORATORY								1			1
BERNAT, ANDREW	NOAO - KPNO		1									1
BLACK, JOHN H.	UNIVERSITY OF MINNESOTA	1										1
BLAIR, GUY N.	ELECTRO-MAGNETIC APPLICATIONS, INC.				1							1
BLAIR, WILLIAM P.	*CFA - SAO					1	1	3				
BLAIR, WILLIAM P.	*JOHNS HOPKINS UNIVERSITY								1			6
BLESS, ROBERT C.	UNIVERSITY OF WISCONSIN										1	1
BOGGESS, ALBERT	NASA - GODDARD SPACE FLIGHT CENTER	2	3	1	3	2	2	1	1	1		16
BOHANNAN, BRUCE	UNIVERSITY OF COLORADO - CASA									1		1
BOHLIN, RALPH C.	*NASA - GODDARD SPACE FLIGHT CENTER		2								1	
BOHLIN, RALPH C.	*SPACE TELESCOPE SCIENCE INSTITUTE									2		5
BOHM, KARL-HEINZ	UNIVERSITY OF WASHINGTON			1	1	1	2	1	1	1		8
BOHM-VITENSE, ERIKA	UNIVERSITY OF WASHINGTON	1	1	1	1	3	3	6	2	2	6	26
BOLTON, C. THOMAS	UNIVERSITY OF TORONTO										1	1
BOND, HOWARD E.	*LOUISIANA STATE UNIVERSITY				1	2	2	1				
BOND, HOWARD E.	*SPACE TELESCOPE SCIENCE INSTITUTE								1	1	1	9
BOPP, BERNARD W.	UNIVERSITY OF TOLEDO			1		2		1	1		1	6
BOTHUN, GREGORY D.	CFA - SAO					1						1
BOWYER, C. STUART	UNIVERSITY CALIFORNIA BERKELEY			1	3	3	6	2	2		1	18
BREGMAN, JOEL	*NEW YORK UNIVERSITY										1	
BREGMAN, JOEL	*NRAO										1	2
BROWN, DOUGLAS N.	UNIVERSITY OF WASHINGTON						1	2	2	1		6
BROWN, ROBERT L.	NRAO	1										1

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
BRUGEL, EDWARD W.	*UNIVERSITY OF COLORADO - LASP						1	1			1	
BRUGEL, EDWARD W.	*UNIVERSITY OF COLORADO - CASA									1		4
BRUHWEILER, FREDERICK C.	*COMPUTER SCIENCES CORPORATION			1	1	1	3				1	
BRUHWEILER, FREDERICK C.	*CATHOLIC UNIVERSITY							4	6	3	2	22
BRUZUAL, GUSTAVO A.	C. I. D. A. VENEZUELA					1						1
BURSTEIN, DAVID	ARIZONA STATE UNIVERSITY								1	2		3
CALDWELL, JOHN J.	SUNY, STONY BROOK		1	1	1	1	3	1	2	1	2	13
CARDELLI, JASON A.	UNIVERSITY OF WISCONSIN									1		1
CARNEY, BRUCE W.	UNIVERSITY OF NORTH CAROLINA							1				1
CARPENTER, KENNETH G.	UNIVERSITY OF COLORADO - CASA									1		1
CARRASCO, LUIS	U. N. A. DE MEXICO			1								1
CASH, WEBSTER C.,JR.	UNIVERSITY OF COLORADO				1							1
CASSINELLI, JOSEPH P.	UNIVERSITY OF WISCONSIN		1					1				2
CHAPMAN, ROBERT D.	NASA - GODDARD SPACE FLIGHT CENTER					1	1	2	1		3	8
CHENG, FU-ZHEN	CFA - S&T CHINA										1	1
CHU, YOU-HINA	UNIVERSITY CALIFORNIA BERKELEY			1							1	2
CLARKE, JOHN T.	*UNIVERSITY CALIFORNIA BERKELEY										1	
CLARKE, JOHN T.	*NASA - MARSHALL SPACE FLIGHT CENTER								1			
CLARKE, JOHN T.	*NASA - GODDARD SPACE FLIGHT CENTER									1		3
CLAYTON, GEOFFREY C.	UNIVERSITY OF TORONTO					1						1
CODE, ARTHUR D.	UNIVERSITY OF WISCONSIN		2	2	1		1					6
COHEN, JUDITH G.	CALIFORNIA INSTITUTE OF TECHNOLOGY			1	1	2						4
COHEN, MARTIN	*NASA - AMES RESEARCH CENTER							1				
COHEN, MARTIN	*UNIVERSITY CALIFORNIA BERKELEY								1			2
COHEN, ROSS D.	UNIVERSITY CALIFORNIA SAN DIEGO						1	1				2
CONTI, PETER S.	UNIVERSITY OF COLORADO - JILA	1	1	1	1	1	2		1	1		9
CORDOVA, FRANCE A.	LOS ALAMOS, NEW MEXICO			1	1	1		1	1	1	1	7
COWIE, LENNOX L.	*PRINCETON UNIVERSITY			1								
COWIE, LENNOX L.	*MASSACHUSETTS INSTITUTE TECH.				1					1		3
COWLEY, ANNE P.	*UNIVERSITY OF MICHIGAN					1					2	
COWLEY, ANNE P.	*ARIZONA STATE UNIVERSITY							1	1			5
COWLEY, CHARLES R.	UNIVERSITY OF MICHIGAN						1					1
CRENSHAW, D. MICHAEL	COMPUTER SCIENCES CORPORATION									1	1	2
CZYZAK, STANLEY J.	OHIO STATE UNIVERSITY			1								1
DALGARNO, ALEXANDER	CFA - SAO		1									1
DALTABUIT, ENRIQUE	U. N. A. DE MEXICO	1										1
DAVIDSEN, ARTHUR F.	JOHNS HOPKINS UNIVERSITY		1									1
DAVIDSON, KRIS	UNIVERSITY OF MINNESOTA		1	2	1	1	1					6
DAWSON, DENNIS W.	FRANKLIN AND MARSHALL COLLEGE							1				1
DE BOER, KLAUS S.	UNIVERSITY OF WISCONSIN		1									1
DE ROBERTIS, MICHAEL	*UNIVERSITY CALIFORNIA SANTA CRUZ										1	1
DE ROBERTIS, MICHAEL	*YORK UNIVERSITY										1	1
DEAN, CHARLES A.	S M SYSTEMS, INC.				1		1					2
DELSEMME, ARMAND H.	UNIVERSITY OF TOLEDO	1										1
DOHERTY, LOWELL R.	*UNIVERSITY OF HAWAII	1										
DOHERTY, LOWELL R.	*UNIVERSITY OF WISCONSIN		1									2
DONN, BERTRAM D.	NASA - GODDARD SPACE FLIGHT CENTER	1										1

ALL EPISODES (4/78 THRU 5/87)		EPISODE: 1	2	3	4	5	6	7	8	9	OD	TOTALS
DOSCHEK, GEORGE A.	NAVAL RESEARCH LABORATORY		1				1					2
DOWNES, RONALD A.	APPLIED RESEARCH CORP.								1			1
DRAKE, STEPHEN A.	NASA - GODDARD SPACE FLIGHT CENTER									1		1
DRILLING, JOHN S.	LOUISIANA STATE UNIVERSITY			1	1	1	1	1		2		7
DUFOUR, REGINALD J.	RICE UNIVERSITY		1	1		2	1	2	2	2		11
DUNCAN, DOUGLAS K.	CALIFORNIA INSTITUTE OF TECHNOLOGY								1			1
DUPREE, ANDREA K.	*CFA - HARVARD	2										
DUPREE, ANDREA K.	*CFA - SAO		4	7	4	2	2	3	3	2	3	32
DURRANCE, SAMUEL T.	JOHNS HOPKINS UNIVERSITY							1			1	2
EATON, JOEL A.	*VANDERBILT UNIVERSITY				2	1						
EATON, JOEL A.	*INDIANA UNIVERSITY							1	3	2		9
EBBETS, DENNIS C.	SPACE TELESCOPE SCIENCE INSTITUTE							1				1
ECHEVARRIA, JUAN	U. N. A. DE MEXICO								1			1
ELVIS, MARTIN S.	CFA - SAO								1	1		2
EVANS, NANCY R.	*UNIVERSITY OF TORONTO				1							
EVANS, NANCY R.	*COMPUTER SCIENCES CORPORATION							2	2	4	5	14
FABBIANO, GIUSEPPINA	CFA - SAO		1								1	2
FABER, SANDRA M.	UNIVERSITY CALIFORNIA SANTA CRUZ							1				1
FANG, LI ZHI	CFA-S&T CHINA						1					1
FEIBELMAN, WALTER A.	NASA - GODDARD SPACE FLIGHT CENTER				1	1	1	3	2	2	3	13
FEKEL, FRANCIS C.,JR.	*NASA - GODDARD SPACE FLIGHT CENTER				1		1				2	
FEKEL, FRANCIS C.,JR.	*VANDERBILT UNIVERSITY							1	1	2		8
FELDMAN, PAUL D.	JOHNS HOPKINS UNIVERSITY		2	2	1	1	1	1	2	2	1	13
FERLAND, GARY J.	UNIVERSITY OF KENTUCKY					1	1	1	1			4
FESEN, ROBERT A.	*NASA - GODDARD SPACE FLIGHT CENTER					1	1					
FESEN, ROBERT A.	*UNIVERSITY OF COLORADO - LASP							4	2			
FESEN, ROBERT A.	*UNIVERSITY OF COLORADO - CASA									3		11
FICH, MICHEL	UNIVERSITY OF WASHINGTON								1			1
FISCHEL, DAVID	NASA - GODDARD SPACE FLIGHT CENTER	1										1
FITZPATRICK, EDWARD L.	UNIVERSITY OF COLORADO - JILA								1	2		3
FRIEND, DAVID B.	UNIVERSITY OF WISCONSIN									1		1
FRISCH, PRISCILLA C.	UNIVERSITY OF CHICAGO		1	1					1	1		4
GALLAGHER, JOHN S.III	UNIVERSITY OF ILLINOIS		1				1					2
GARMANY, CATHARINE D.	UNIVERSITY OF COLORADO						1	2	3	3		9
GARRISON, ROBERT F.	UNIVERSITY OF TORONTO	1										1
GELLER, MARGARET J.	*CFA - SAO		1	1								
GELLER, MARGARET J.	*CFA - HARVARD				1	1						4
GIAMPAPA, MARK S.	*UNIVERSITY OF ARIZONA			1								
GIAMPAPA, MARK S.	*CFA - SAO				2	1						
GIAMPAPA, MARK S.	*NOAO - NSO						1	1	2	1	1	10
GIBSON, DAVID M.	NEW MEXICO INST. OF MINING AND TECH.							1	1			2
GILRA, DAYA P.	S. M. SYSTEMS, INC.								1			1
GLASSGOLD, A. E.	NEW YORK UNIVERSITY			2	2	2	2	2	2		1	13
GOODRICH, ROBERT W.	UNIVERSITY CALIFORNIA SANTA CRUZ										1	1
GRADY, CAROL A.	COMPUTER SCIENCES CORPORATION							1	1	1	1	4
GRANDI, STEVEN A.	UNIVERSITY CALIFORNIA LOS ANGELES				1							1
GREEN, RICHARD F.	*CALIFORNIA INSTITUTE OF TECHNOLOGY		1									

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
GREEN, RICHARD F.	*UNIVERSITY OF ARIZONA			1	2	2	3				1	
GREEN, RICHARD F.	*NOAO - KPNO							1	1	2		14
GREENSTEIN, JESSE L.	CALIFORNIA INSTITUTE OF TECHNOLOGY	1	1									2
GREGORY, STEPHEN A.	BOWLING GREEN UNIVERSITY			1		1						2
GRINDLAY, JONATHAN E.	CFA - HARVARD			1								1
GUINAN, EDWARD F.	VILLANOVA UNIVERSITY				1		1	1	1	2	2	8
GULL, THEODORE R.	NASA - GODDARD SPACE FLIGHT CENTER			1	2							3
GUNN, JAMES E.	PRINCETON UNIVERSITY				1							1
GURMAN, JOSEPH B.	NASA - GODDARD SPACE FLIGHT CENTER									1		1
GURSKY, HERBERT	CFA - SAO	1	2	1								4
HACKNEY, KAREN R.H.	WESTERN KENTUCKY UNIVERSITY		1			1					2	4
HACKNEY, RICHARD L.	WESTERN KENTUCKY UNIVERSITY	1		1							1	3
HAGEN, WENDY	UNIVERSITY OF NEW MEXICO										1	1
HAISCH, BERNHARD M.	LOCKHEED CORPORATION						3	1	1		1	6
HALLAM, KENNETH L.	NASA - GODDARD SPACE FLIGHT CENTER			1	1	2	1	1		1	2	9
HALPERN, J. P.	COLUMBIA UNIVERSITY									4		4
HAPKE, BRUCE	UNIVERSITY OF PITTSBURGH		1									1
HARDORP, JOHANNES	SUNY, STONY BROOK								1			1
HARPER, DOYAL A.	UNIVERSITY OF CHICAGO							1	1			2
HARRINGTON, J. PATRICK	UNIVERSITY OF MARYLAND		2		1	1		1				5
HARTMANN, LEE W.	CFA - SAO				1	1	2	1				5
HAZARD, CYRIL	UNIVERSITY OF PITTSBURGH								1			1
HEAP, SARA R.	NASA - GODDARD SPACE FLIGHT CENTER	2		2								4
HECHT, JAMES	*NASA - GODDARD SPACE FLIGHT CENTER				1							
HECHT, JAMES	*AEROSPACE CORP.						1					2
HECKATHORN, JOY NICHOLS	*COMPUTER SCIENCES CORPORATION				1		1	1			1	
HECKATHORN, JOY NICHOLS	*SPACE TELESCOPE SCIENCE INSTITUTE								1	2		7
HELFER, H. L.	UNIVERSITY OF ROCHESTER			1	1						1	3
HENDEN, ARNE A.	SYSTEMS AND APPLIED SCIENCES CORP.				1							1
HENRY, RICHARD C.	JOHNS HOPKINS UNIVERSITY							1	1			2
HERBIG, GEORGE H.	UNIVERSITY CALIFORNIA SANTA CRUZ		1		1							2
HERCZEG, T.	UNIVERSITY OF OKLAHOMA										1	1
HESSER, JAMES D.	DOMINION ASTROPHYSICAL OBS., CANADA		1								1	2
HILL, GRAHAM	DOMINION ASTROPHYSICAL OBS., CANADA	1										1
HILL, JESSE K.	SYSTEMS AND APPLIED SCIENCES CORP.			1								1
HIRATA, RYUKO	UNIVERSITY OF KYOTO, KYOTO, JAPAN					1						1
HOBBS, LEWIS M.	CHICAGO-YERKES OBSERVATORY					1	2	1		1		5
HOBBS, ROBERT W.	NASA - GODDARD SPACE FLIGHT CENTER					1					1	2
HODGE, PAUL W.	UNIVERSITY OF WASHINGTON				1	2	2		1			6
HOLBERG, JAY B.	*UNIVERSITY OF SOUTHERN CALIFORNIA,AZ						2					
HOLBERG, JAY B.	*ARIZONA - LPL							2	1	2		7
HOLLIS, JAN M.	NASA - GODDARD SPACE FLIGHT CENTER							1	1		1	3
HOLM, ALBERT V.	COMPUTER SCIENCES CORPORATION		1	2	2	3	3		1	1	5	18
HOLT, STEPHEN S.	NASA - GODDARD SPACE FLIGHT CENTER										1	1
HONEYCUTT, R. KENT	INDIANA UNIVERSITY						1					1
HORNE, KEITH	SPACE TELESCOPE SCIENCE INSTITUTE									1		1
HU, ESTHER M.	SPACE TELESCOPE SCIENCE INSTITUTE							1				1

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
HUCHRA, JOHN P.	CFA - SAO				1	1	1	1	1	1	1	7
HUENEMOERDER, DAVID P.	PENN STATE UNIVERSITY							1		1		2
HUGGINS, PATRICK J.	NEW YORK UNIVERSITY										1	1
HUMPHREYS, ROBERTA M.	UNIVERSITY OF MINNESOTA				1						1	2
HUTCHINGS, JOHN B.	DOMINION ASTROPHYSICAL OBS., CANADA	1		2				1	1		2	7
HUTTER, DONALD J.	APPLIED RESEARCH CORPORATION									1		1
IMHOFF, CATHERINE L.	*OHIO STATE UNIVERSITY	1										
IMHOFF, CATHERINE L.	*UNIVERSITY OF ARIZONA		1	1	1							
IMHOFF, CATHERINE L.	*COMPUTER SCIENCES CORPORATION					2	2	2	1		3	14
JACKSON, W. M.	*HOWARD UNIVERSITY	1	1	1	1				3			
JACKSON, W. M.	*UNIVERSITY OF CALIFORNIA - DAVIS									2		9
JACOBY, G.	NOAO - KPNO										1	1
JANES, KENNETH	BOSTON UNIVERSITY									1		1
JENKINS, EDWARD B.	PRINCETON UNIVERSITY	1				1	1	1	1	1		6
JENSEN, K.	NASA - GODDARD SPACE FLIGHT CENTER										1	1
JOHNSON, HOLLIS R.	INDIANA UNIVERSITY				1	1	1	1	3	2	1	10
JOHNSON, HUGH M.	LOCKHEED CORPORATION	1		1	1							3
JUGAKU, JUN	TOKYO ASTRON. OBS., JAPAN	1			1	1		1	1			5
JURA, MICHAEL	UNIVERSITY CALIFORNIA LOS ANGELES		1									1
KAFATOS, MINAS	GEORGE MASON UNIVERSITY				1	1	3	1		1	4	11
KALER, JAMES B.	UNIVERSITY OF ILLINOIS				1	1	1			1	1	5
KALLMAN, TIMOTHY R.	*MASSACHUSETTS INSTITUTE TECH.				1						1	
KALLMAN, TIMOTHY R.	*NASA - GODDARD SPACE FLIGHT CENTER								2			4
KAMP, LUCAS W.	BOSTON UNIVERSITY	1										1
KEEL, WILLIAM C.	NOAO - KPNO						1					1
KENYON, SCOTT	CFA - SAO								2		1	3
KIPLINGER, ALAN L.	APPLIED RESEARCH AND SYSTEMS				1							1
KIRSHNER, ROBERT P.	*UNIVERSITY OF MICHIGAN		1			1	1	1			1	
KIRSHNER, ROBERT P.	*CFA - HARVARD									1		6
KLINGLESMITH, DANIEL	NASA - GODDARD SPACE FLIGHT CENTER	3										3
KOCH, ROBERT H.	UNIVERSITY OF PENNSYLVANIA			1							3	4
KOENIGSBERGER, GLORIA	U. N. A. DE MEXICO									1		1
KONDO, YOJI	*NASA - JOHNSON SPACE CENTER	1										
KONDO, YOJI	*NASA - GODDARD SPACE FLIGHT CENTER		1	1	1	1	1	1	1		2	10
KRISS, GERARD A.	UNIVERSITY OF MICHIGAN						1					1
KRON, RICHARD G.	UNIVERSITY OF CHICAGO								1			1
KUHI, LEONARD V.	UNIVERSITY CALIFORNIA BERKELEY			1		1						2
KURT, V. G.	SPACE RESEARCH INST., U. S. S. R.		1									1
KWOK, M. S.	HERZBERG INST. OF ASTROPHYSICS										1	1
LAMB, SUSAN A.	*UNIVERSITY OF MISSOURI - ST. LOUIS		1	1								
LAMB, SUSAN A.	*UNIVERSITY OF ILLINOIS							1			1	4
LAMBERT, DAVID L.	UNIVERSITY OF TEXAS		1	1	2	2	1		1			8
LANDSMAN, WAYNE B.	NASA - GODDARD SPACE FLIGHT CENTER									1		1
LANDSTREET, JOHN D.	*UNIVERSITY OF W. ONTARIO, CANADA			1								
LANDSTREET, JOHN D.	*UNIVERSITY OF TORONTO				1							2
LANE, ARTHUR L.	JET PROPULSION LABORATORY	1	1	2	1	1					1	7
LANG, KENNETH R.	TUFTS UNIVERSITY							1	1	1		3

ALL EPISODES (4/78 THRU 5/87)		EPISODE: 1	2	3	4	5	6	7	8	9	OD	TOTALS
LECKRONE, DAVID S.	NASA - GODDARD SPACE FLIGHT CENTER	2										2
LEIBOWITZ, ELIA	UNIVERSITY OF TEL AVIV, ISRAEL		1									1
LESH, JANET ROUNTREE	UNIVERSITY OF DENVER		1									1
LESTER, JOHN B.	UNIVERSITY OF TORONTO-ERINDALE COLL.		2			2						4
LEUNG, KAM-CHING.	UNIVERSITY OF NEBRASKA									1		1
LIEBERT, JAMES W.	UNIVERSITY OF ARIZONA				1	1	1	2	1		1	7
LIEN, DAVID J.	MICHIGAN STATE UNIVERSITY							1			1	2
LINSKY, JEFFREY L.	UNIVERSITY OF COLORADO - JILA	1	1	5	4	8	9	10	10	11	3	62
LITTLE-MARENIN, IRENE	WELLESLEY COLLEGE							1				1
LUTZ, JULIE H.	WASHINGTON STATE UNIVERSITY		1	1				1	1			4
MACALPINE, GORDON M.	UNIVERSITY OF MICHIGAN								1	1		2
MACCACARO, TOMMASO	CFA - SAO										1	1
MADORE, BARRY F.	UNIVERSITY OF TORONTO					1						1
MALKAN, MATTHEW A.	*UNIVERSITY OF ARIZONA							1				
MALKAN, MATTHEW A.	*UNIVERSITY CALIFORNIA LOS ANGELES								2	4		7
MARAN, STEPHEN P.	NASA - GODDARD SPACE FLIGHT CENTER		1		1	1	1	1	1			6
MARGON, BRUCE	UNIVERSITY OF WASHINGTON						2	1	1		1	5
MARLBOROUGH, J. MICHAEL	UNIVERSITY OF W. ONTARIO, CANADA		1	1								2
MASSA, DERCK	APPLIED RESEARCH CORPORATION									2		2
MASSEY, PHILIP L.	*DOMINION ASTROPHYSICAL OBS., CANADA				1	1	1					
MASSEY, PHILIP L.	*NOAO - KPNO							1	1	1		6
MATHIS, JOHN S.	UNIVERSITY OF WISCONSIN								1			1
MATILSKY, TERRY A.	RUTGERS UNIVERSITY			1	1							2
MATSON, DENNIS L.	JET PROPULSION LABORATORY		2	2	2	2						8
MCCLINTOCK, JEFFREY E.	*MASSACHUSETTS INSTITUTE TECH.			2								
MCCLINTOCK, JEFFREY E.	*CFA - SAO										1	3
MCCLUSKEY, GEORGE E.	LEHIGH UNIVERSITY		1	1	1	1	1	1	1		2	9
MCCRAY, RICHARD	UNIVERSITY OF COLORADO - JILA										1	1
MCNAMARA, D. HAROLD	BRIGHAM YOUNG UNIVERSITY			1								1
MEIER, DAVID L.	CALIFORNIA INSTITUTE OF TECHNOLOGY		1									1
METZGER, A.	JET PROPULSION LABORATORY										1	1
MICHALITSIANOS, ANDREW G.	NASA - GODDARD SPACE FLIGHT CENTER		1	1	1		1	1	2		2	9
MILLER, H. RICHARD	GEORGIA STATE UNIVERSITY					1	1	1		1		4
MILLER, JOSEPH S.	UNIVERSITY CALIFORNIA SANTA CRUZ						1					1
MOORE, RICHARD L.	CALIFORNIA INSTITUTE OF TECHNOLOGY						2					2
MOOS, H. WARREN	JOHNS HOPKINS UNIVERSITY	1	3	2	2	3	3	3	3	3		23
MORRISON, NANCY D.	UNIVERSITY OF TOLEDO		1	1		1	2			1	1	7
MORTON, DONALD C.	ANGLO-AUSTRALIAN OBS., AUSTRALIA	1										1
MULLAN, DERMOTT J.	UNIVERSITY OF DELAWARE		1	1	1		1		3			7
NEFF, JOHN S.	UNIVERSITY OF IOWA									1		1
NELSON, JERRY E.	UNIVERSITY CALIFORNIA BERKELEY		1									1
NELSON, ROBERT M.	JET PROPULSION LABORATORY						1	1	1		1	4
NICHOLAS, KENNETH R.	NAVAL RESEARCH LABORATORY		1									1
NOMOTO, K.	NASA - GODDARD SPACE FLIGHT CENTER										1	1
NOUSEK, JOHN A.	PENN STATE UNIVERSITY						2	1			1	4
NOYES, ROBERT W.	CFA - SAO				1	1						2
O'CONNELL, ROBERT W.	UNIVERSITY OF VIRGINIA					1						1

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
OKE, JOHN BEVERLY	*HALE OBSERVATORIES	1										
OKE, JOHN BEVERLY	*CALIFORNIA INSTITUTE OF TECHNOLOGY		2	1		1	1	1			1	8
OLIVERSEN, NANCY A.	COMPUTER SCIENCES CORPORATION						1	1	2	1	1	6
OLSON, EDWARD C.	UNIVERSITY OF ILLINOIS					1					2	3
OWEN, TOBIAS	SUNY, STONY BROOK	1										1
PAGE, THORNTON	NASA - JOHNSON SPACE CENTER	1										1
PANEK, ROBERT J.	*PENN STATE UNIVERSITY			1								
PANEK, ROBERT J.	*COMPUTER SCIENCES CORPORATION				2	1	3				2	9
PARISE, RONALD A.	COMPUTER SCIENCES CORPORATION					1						1
PARSONS, SIDNEY B.	*UNIVERSITY OF TEXAS	1		1								
PARSONS, SIDNEY B.	*NASA - GODDARD SPACE FLIGHT CENTER					1	3				2	
PARSONS, SIDNEY B.	*COMPUTER SCIENCES CORPORATION							1	1		1	11
PATTERSON, JOSEPH	*CFA - SAO					1	1					
PATTERSON, JOSEPH	*COLUMBIA UNIVERSITY									1		3
PEIMBERT, MANUEL	U. N. A. DE MEXICO		1	1								2
PEERY, BENJAMIN F. JR.	HOWARD UNIVERSITY								1			1
PENNINGTON, ROBERT L.	UNIVERSITY OF MINNESOTA								1			1
PERRY, PETER	COMPUTER SCIENCES CORPORATION		1	1								2
PETERS, GERALDINE J.	UNIVERSITY OF SOUTHERN CALIFORNIA		1	1	2			1	1	4	1	11
PETERSON, BRADLEY M.	OHIO STATE UNIVERSITY									1		1
PHILIP, A. G. DAVIS	WESLEYAN UNIVERSITY							1				1
PITTS, RONALD E.	COMPUTER SCIENCES CORPORATION								1			1
PLAVEC, MIREK J.	UNIVERSITY CALIFORNIA LOS ANGELES	1		2	1	1	1	3	1	3	1	14
POLIDAN, RONALD S.	UNIVERSITY OF SOUTHERN CALIFORNIA,AZ							2	3	1	1	7
PRAVDO, STEVEN H.	CALIFORNIA INSTITUTE OF TECHNOLOGY				1							1
PTAK, ROGER L.	BOWLING GREEN UNIVERSITY							1				1
PUETTER, RICHARD C.	UNIVERSITY CALIFORNIA SAN DIEGO				1	2						3
PURTON, CHRISTOPHER R.	YORK UNIVERSITY, CANADA		1									1
RAHE, JURGEN	NASA - GODDARD SPACE FLIGHT CENTER			1							1	2
RAKOS, KARL D.	UNIVERSITY OF VIENNA, AUSTRIA		1		1							2
RAMSEY, LAWRENCE W.	PENN STATE UNIVERSITY								1	1		2
RAYMOND, JOHN C.	CFA - SAO				3	2	5	5	5	3		23
REICHERT, GAIL A.	*NASA - GODDARD SPACE FLIGHT CENTER						1					
REICHERT, GAIL A.	*COMPUTER SCIENCES CORPORATION								1	1		3
RIEGLER, GUENTHER A.	JET PROPULSION LABORATORY								1			1
RINGUELET, ADELA	I.A.R.,ARGENTINA										1	1
ROEDER, ROBERT C.	UNIVERSITY OF TORONTO-SCARBOROUGH C.	1										1
ROMANISHIN, WILLIAM	NASA - GODDARD SPACE FLIGHT CENTER							1				1
RUDY, RICHARD J.	*UNIVERSITY OF ARIZONA						2				1	
RUDY, RICHARD J.	*AEROSPACE CORPORATION									1		4
RUMPL, WILLIAM M.	*NASA - GODDARD SPACE FLIGHT CENTER			1								
RUMPL, WILLIAM M.	*COMPUTER SCIENCES CORPORATION						1					2
SAHADE, JORGE	*I.A.F.E.,ARGENTINA	1										
SAHADE, JORGE	*I.A.R.,ARGENTINA										3	4
SANNER, F.	UNIVERSITY OF TEXAS		1									1
SAPAR, A.	STRUVE ASTRO. OBS., U.S.S.R.	1										1
SARGENT, WALLACE L.W.	CALIFORNIA INSTITUTE OF TECHNOLOGY		2	1	1	1	3					8

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
SAVAGE, BLAIR D.	UNIVERSITY OF WISCONSIN	1	2	2	3	3	6	5	4	2		28
SAVEDOFF, MALCOLM P.	UNIVERSITY OF ROCHESTER			1								1
SCHIFFER, FRANCIS H.III	COMPUTER SCIENCES CORPORATION		1								1	2
SCHILD, RUDOLPH E.	CFA - SAO	W										W
SCHMIDT, EDWARD G.	UNIVERSITY OF NEBRASKA		1	1		1				1		4
SCHMIDT, GARY D.	UNIVERSITY OF ARIZONA								1			1
SCHMIDT, MAARTEN	CALIFORNIA INSTITUTE OF TECHNOLOGY	1	1									2
SCHWARTZ, RICHARD D.	UNIVERSITY OF MISSOURI - ST. LOUIS					1	1	1				3
SHAW, J. SCOTT	UNIVERSITY OF GEORGIA					1	1	1			1	4
SHEMANSKY, DONALD E.	UNIVERSITY OF ARIZONA								1	2		3
SHIPMAN, HARRY L.	UNIVERSITY OF DELAWARE						1	1				2
SHORE, STEVEN N.	*CASE-WESTERN RESERVE UNIVERSITY				1	2	1					
SHORE, STEVEN N.	*COMPUTER SCIENCES CORPORATION								3			7
SHORE, STEVEN N.	*NEW MEXICO INST. OF MINING AND TECH.										1	1
SHULL, J. MICHAEL	*UNIVERSITY OF COLORADO		1	1	1	2						
SHULL, J. MICHAEL	*UNIVERSITY OF COLORADO - JILA						3				1	
SHULL, J. MICHAEL	*UNIVERSITY OF COLORADO - LASP							4	5			
SHULL, J. MICHAEL	*UNIVERSITY OF COLORADO - CASA									3		21
SILK, JOSEPH	UNIVERSITY CALIFORNIA BERKELEY										1	1
SIMON, THEODORE	*UNIVERSITY OF COLORADO			1								
SIMON, THEODORE	*UNIVERSITY OF HAWAII				2	5	3	4	3	3	1	22
SION, EDWARD M.	VILLANOVA UNIVERSITY		1			1	3		2	1		8
SITKO, MICHAEL L.	*UNIVERSITY OF MINNESOTA				1	2	1	2				
SITKO, MICHAEL L.	*NOAO - KPNO								1	1		8
SKINNER, THOMAS E.	UNIVERSITY OF COLORADO - LASP									1		1
SKUMANICH, ANDREW	HAO-NCAR							1				1
SLETTEBAK, ARNE	OHIO STATE UNIVERSITY			1	1		1				1	4
SMITH, ANDREW M.	NASA - GODDARD SPACE FLIGHT CENTER	1										1
SMITH, GRAEME	CFA - SAO							1				1
SMITH, HARDING E.	UNIVERSITY CALIFORNIA SAN DIEGO			1	1						1	3
SNEDEN, CHRISTOPHER	UNIVERSITY OF TEXAS				1			1				2
SNOW, THEODORE P.,JR	*UNIVERSITY OF COLORADO - LASP		1	2	3	3	4	2	3		3	
SNOW, THEODORE P.,JR	*UNIVERSITY OF COLORADO - CASA									5		26
SOBIESKI, STANLEY	NASA - GODDARD SPACE FLIGHT CENTER	1										1
SODERBLOM, DAVID R.	CFA - SAO					1	2	2				5
SOFIA, SABATINO	NASA - GODDARD SPACE FLIGHT CENTER										1	1
SOIFER, B. T.	CALIFORNIA INSTITUTE OF TECHNOLOGY			1	1							2
SOLIVELLA, GLADYS	I.A.R.,ARGENTINA										1	1
SONNEBORN, GEORGE	COMPUTER SCIENCES CORPORATION						1	2	3	1	2	9
SPINRAD, HYRON	UNIVERSITY CALIFORNIA BERKELEY		1									1
STARRFIELD, SUMNER	ARIZONA STATE UNIVERSITY			1	1	1	1	1	1	2		8
STECHER, THEODORE P.	NASA - GODDARD SPACE FLIGHT CENTER	1	1									2
STEIMAN-CAMERON, THOMAS Y.	MT. WILSON & LAS CAMPANAS OBS.							1				1
STENCEL, ROBERT E.	*NASA - GODDARD SPACE FLIGHT CENTER		1								2	
STENCEL, ROBERT E.	*UNIVERSITY OF COLORADO			2	4						2	11
STERN, ROBERT A.	JET PROPULSION LABORATORY				1							1
STOCKE, JOHN T.	UNIVERSITY OF COLORADO - CASA									1		1

ALL EPISODES (4/78 THRU 5/87)	EPISODE:	1	2	3	4	5	6	7	8	9	OD	TOTALS
STONER, RONALD E.	BOWLING GREEN UNIVERSITY						1	1		1	1	4
STROM, STEPHEN E.	UNIVERSITY OF MASSACHUSETTS								1			1
STURCH, CONRAD R.	COMPUTER SCIENCES CORPORATION						1					1
SWANK, JEAN	NASA - GODDARD SPACE FLIGHT CENTER									1	1	2
SZKODY, PAULA	UNIVERSITY OF WASHINGTON		1	1	1	2	3	1	1	3	1	14
TANAKA, YASUO	TOKYO ASTRON. OBS., JAPAN										1	1
TATUM, J. B.	UNIVERSITY OF VICTORIA, CANADA		1									1
THONNARD, NORBERT	CARNEGIE INSTITUTION, WASHINGTON,D.C.				1							1
THUAN, TRINH X.	UNIVERSITY OF VIRGINIA			1		1		2		1		5
TOMASKO, MARTIN G.	UNIVERSITY OF ARIZONA	1	1									2
TORRES-PEIMBERT, SILVIA	U. N. A. DE MEXICO						1					1
TORRES, ANA V.	UNIVERSITY OF COLORADO							1				1
TRAUGER, JOHN T.	CALIFORNIA INSTITUTE OF TECHNOLOGY			1	1	1						3
TREMAINE, SCOTT D.	MASSACHUSETTS INSTITUTE TECH.					1	1					2
TURNSHEK, DAVID A.	*UNIVERSITY OF ARIZONA				1							
TURNSHEK, DAVID A.	*UNIVERSITY OF PITTSBURGH					1	1	1				
TURNSHEK, DAVID A.	*SPACE TELESCOPE SCIENCE INSTITUTE								1			5
UNDERHILL, ANNE B.	NASA - GODDARD SPACE FLIGHT CENTER	1		2		1	1	1			6	12
URRY, C. MEGAN	*NASA - GODDARD SPACE FLIGHT CENTER										1	
URRY, C. MEGAN	*MASSACHUSETTS INSTITUTE TECH.									1	1	3
VA BUREN, DAVE	UNIVERSITY OF COLORADO - CASA									1		1
VANDEN BOUT, PAUL A.	UNIVERSITY OF TEXAS	3										3
WADE, RICHARD A.	UNIVERSITY OF ARIZONA								1	1		2
WAITE, J. H.	NASA - MARSHALL SPACE FLIGHT CENTER							1	1	1		3
WALBORN, NOLAN R.	NASA - GODDARD SPACE FLIGHT CENTER							1			1	2
WALDRON, WAYNE	*UNIVERSITY OF DELAWARE						1					
WALDRON, WAYNE	*APPLIED RESEARCH CORP.							1				2
WALKER, ARTHUR B.C.	STANFORD UNIVERSITY		1	1	1							3
WALLERSTEIN, GEORGE	UNIVERSITY OF WASHINGTON		1	1								2
WALTER, FREDERICK M.	*UNIVERSITY OF COLORADO - JILA							1				
WALTER, FREDERICK M.	*UNIVERSITY OF COLORADO - LASP								1		1	3
WALTER, FREDERICK M.	*UNIVERSITY OF COLORADO - CASA									3		6
WAMPLER, E. JOSEPH	UNIVERSITY CALIFORNIA SANTA CRUZ				2							2
WEAVER, HAROLD	UNIVERSITY CALIFORNIA BERKELEY				1							1
WEEDMAN, DANIEL W.	PENN STATE UNIVERSITY						1		1	1		3
WEGNER, GARY A.	*PENN STATE UNIVERSITY			1	1	2					1	
WEGNER, GARY A.	*DARTMOUTH COLLEGE						1	1	2	2		11
WEISS, WERNER W.	UNIVERSITY OF VIENNA, AUSTRIA					1						1
WELCH, GARY A.	ST. MARY'S UNIVERSITY, NOVA SCOTIA		1	1								2
WESEMAEL, FRANCOIS	UNIVERSITY OF MONTREAL, CANADA							2	2	1		5
WEST, DONALD K.	NASA - GODDARD SPACE FLIGHT CENTER	1										1
WILLIAMS, ROBERT E.	UNIVERSITY OF ARIZONA			1								1
WILLS, BEVERLEY J.	UNIVERSITY OF TEXAS		1			2	1		2			6
WILLSON, LEE ANNE	IOWA STATE UNIVERSITY					1			1	1		3
WILSON, ANDREW S.	UNIVERSITY OF MARYLAND			1	1							2
WING, ROBERT F.	OHIO STATE UNIVERSITY	1	1	2			1					5
WINKLER, P. FRANK	MIDDLEBURY COLLEGE									1		1

ALL EPISODES (4/78 THRU 5/87)		EPISODE: 1	2	3	4	5	6	7	8	9	OD	TOTALS
WITT, ADOLF N.	UNIVERSITY OF TOLEDO		1		2			1	1		1	6
WOLFE, ARTHUR M.	UNIVERSITY OF PITTSBURGH			1								1
WOLFF, ROBERT S.	COLUMBIA UNIVERSITY	1										1
WOOD, FRANK B.	UNIVERSITY OF FLORIDA										1	1
WOODGATE, BRUCE E.	NASA - GODDARD SPACE FLIGHT CENTER			1								1
WOODWARD, CHARLES E.	UNIVERSITY OF ROCHESTER							1				1
WOOTTEN, H. ALWYN	NRAO						1					1
WORDEN, SIMON P.	AIR FORCE SPACE DIVISION		1				1					2
WORRALL, DIANA M.	UNIVERSITY CALIFORNIA SAN DIEGO			1	1	1	1					4
WRAY, JAMES D.	NORTHWESTERN UNIVERSITY	1										1
WU, CHI-CHAO	COMPUTER SCIENCES CORPORATION		2	2	3	4	5	2	3	3	4	28
YORK, DONALD G.	*PRINCETON UNIVERSITY		1	1	2	1						
YORK, DONALD G.	*UNIVERSITY OF CHICAGO						2	3	4	2		16
ZINN, ROBERT	YALE UNIVERSITY						1					1
ZOLCINSKI, MARIE-CHRISTIN	W. CONNECTICUT STATE UNIVERSITY						1					1
ZUCKERMAN, BENJAMIN M.	UNIVERSITY CALIFORNIA LOS ANGELES								1			1

APPENDIX D - IUE SCIENCE EFFICIENCY

APPENDIX D - IUE SCIENCE EFFICIENCY

Presented herein are plots of the GSFC IUE "observational efficiency" expressed in terms of the percentage of the available GSFC IUE time each week actually used to obtain exposures. Each plotted point represents the sum of the individual GSFC exposure times for a given week, divided by the total amount of IUE time available to GSFC for the week (112 hours), and has been smoothed such that each data point is an average of the previous two weeks, the current week, and the following two weeks.

The smoothed weekly efficiencies are plotted separately for each episode. The data for the beginning of the first episode were influenced, because of the smoothing, by data from the last several weeks of the Commissioning Period (for which the data are incomplete). The ninth episode is only complete through November 15 (week 24). The amount of any parallel exposure time (overlapping exposures of two cameras) is not shown on the plots.

The following factors may affect the accuracy and interpretation of the statistics:

- There may be missing or incorrect exposure times in the accounting data base from which the information has been drawn.
- Multiple exposures may imply an exposure stop time which was too early.
- True durations of long exposures may not have been added correctly (the data base contains 999 minutes for exposures longer than or equal to 1000 minutes)

Note: The lower percentage of use around week 22 of the eighth episode was caused by the loss of a stabilizing gyro on the satellite. The plot shows that normal scientific usage was quickly regained following implementation of the two-gyro/Fine Sun Sensor control system.

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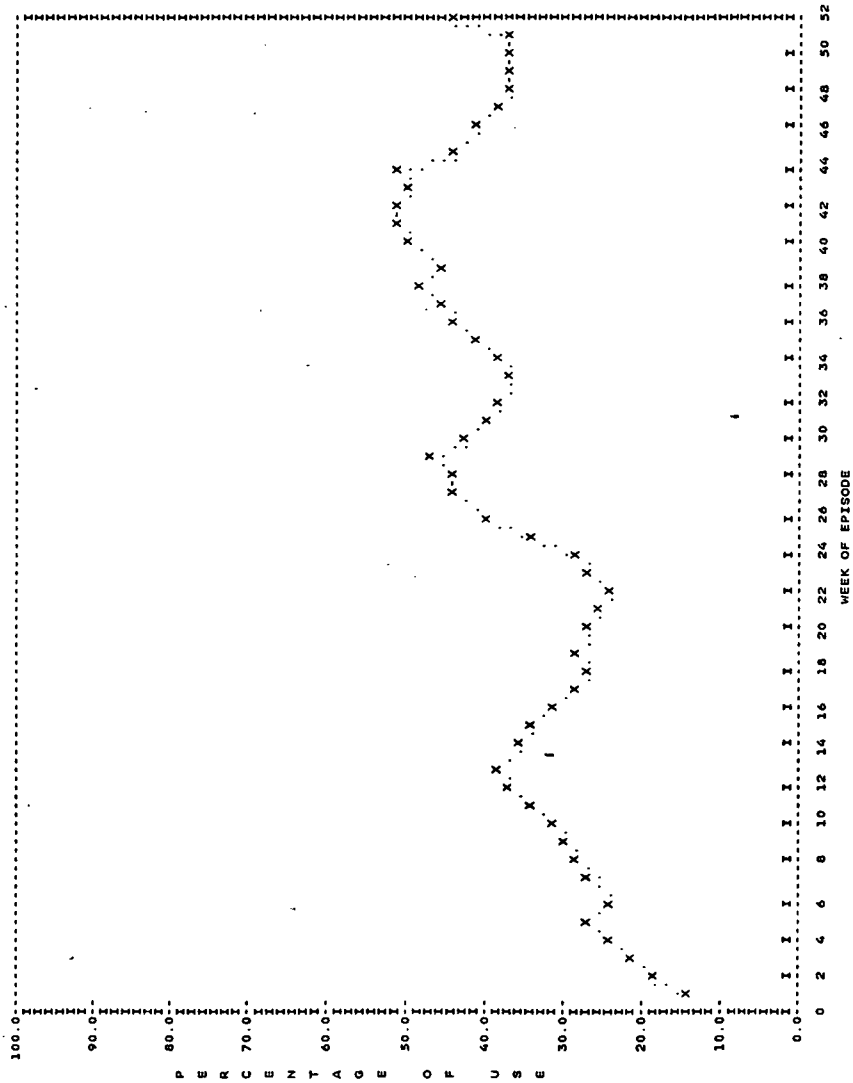
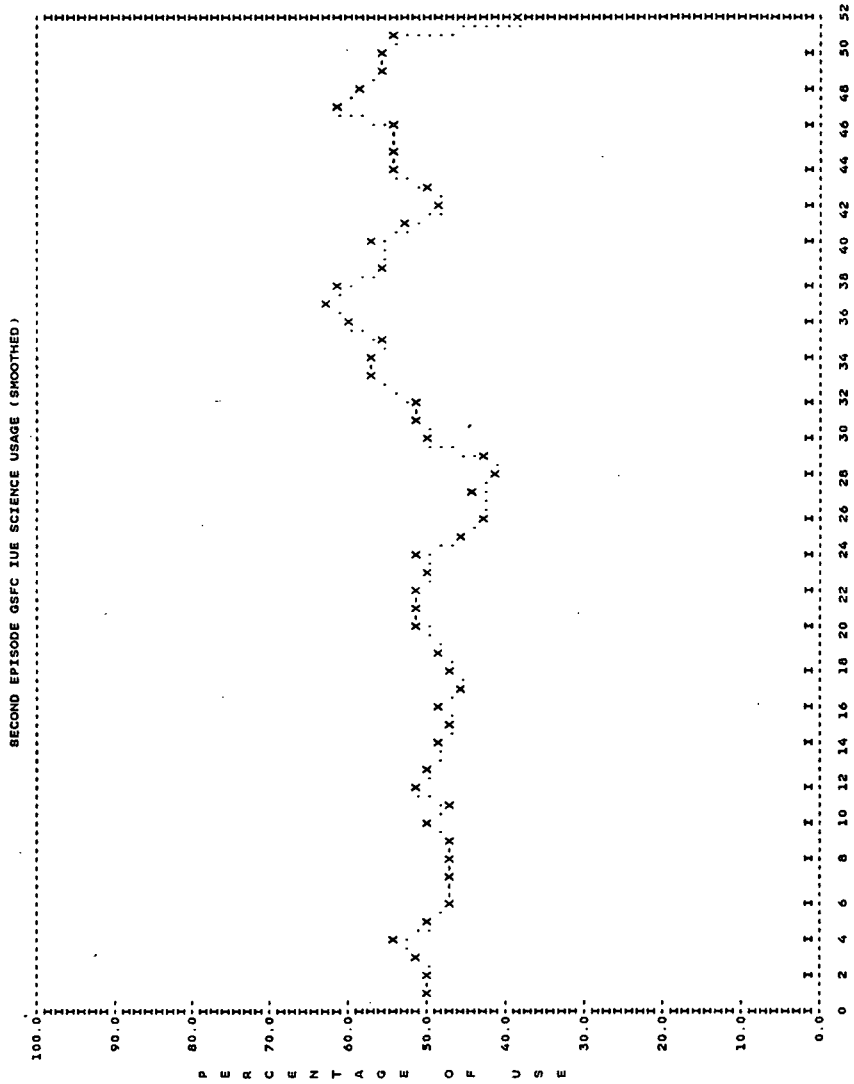
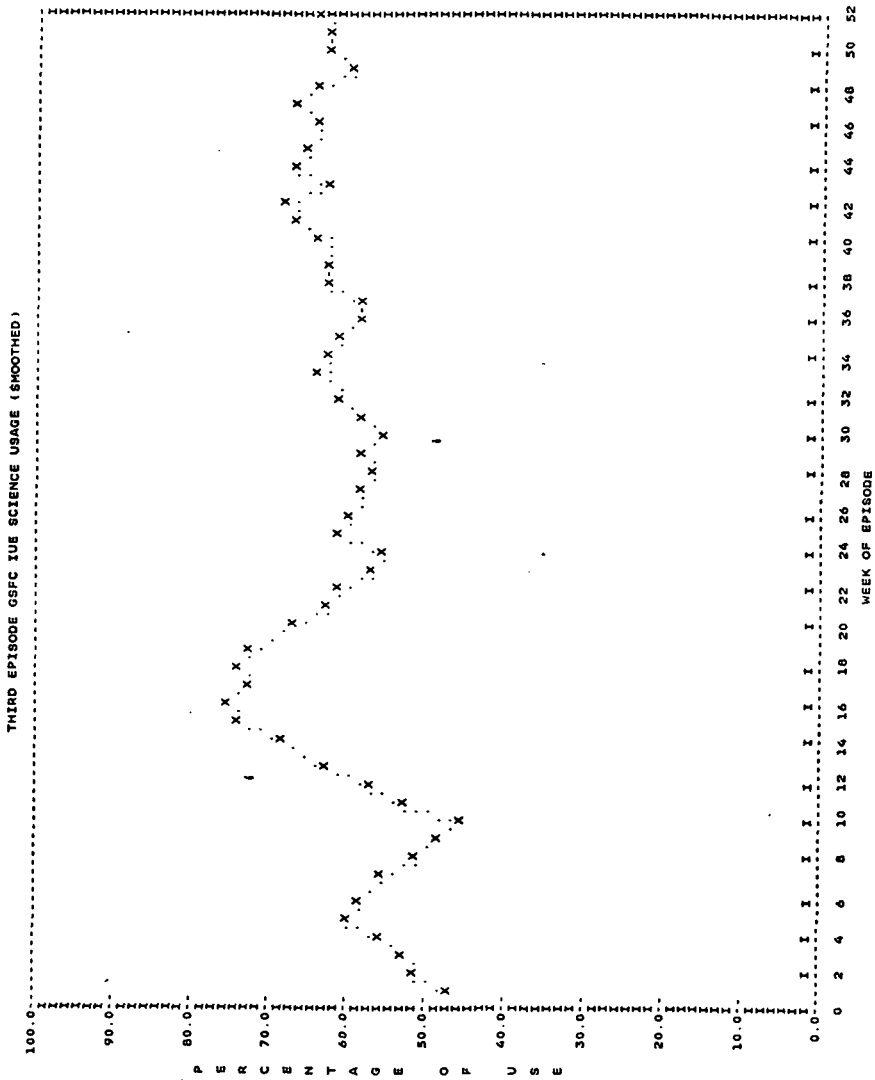
WEEK	DAYS USED	%
1	0.71643	15.35
2	0.85831	16.40
3	1.00288	21.49
4	1.16792	25.03
5	1.24316	26.65
6	1.27825	27.39
7	1.33261	28.34
8	1.38755	29.73
9	1.43979	30.85
10	1.47583	31.63
11	1.76460	37.84
12	1.79469	38.46
13	1.69464	35.46
14	1.50731	32.30
15	1.31585	28.20
16	1.27931	27.41
17	1.36637	29.28
18	1.31564	27.98
19	1.21524	26.04
20	1.16584	24.98
21	1.28681	27.57
22	1.31605	28.20
23	1.69469	35.46
24	1.64644	35.30
25	1.67201	35.85
26	1.61623	34.65
27	2.02683	43.43
28	2.17592	46.63
29	1.98616	42.56
30	1.82061	39.01
31	1.82061	39.01
32	1.74573	37.41
33	1.77593	38.06
34	1.81501	41.04
35	2.01604	43.20
36	2.13848	45.82
37	2.27412	48.73
38	2.12985	45.66
39	2.36669	50.29
40	2.38566	51.12
41	2.41603	51.77
42	2.35331	50.43
43	2.42207	51.90
44	2.07977	44.57
45	1.78661	38.28
46	1.72169	36.89
47	1.75355	37.58
48	1.73332	37.14
49	1.77332	37.99
50	2.04731	43.87
51		
52		



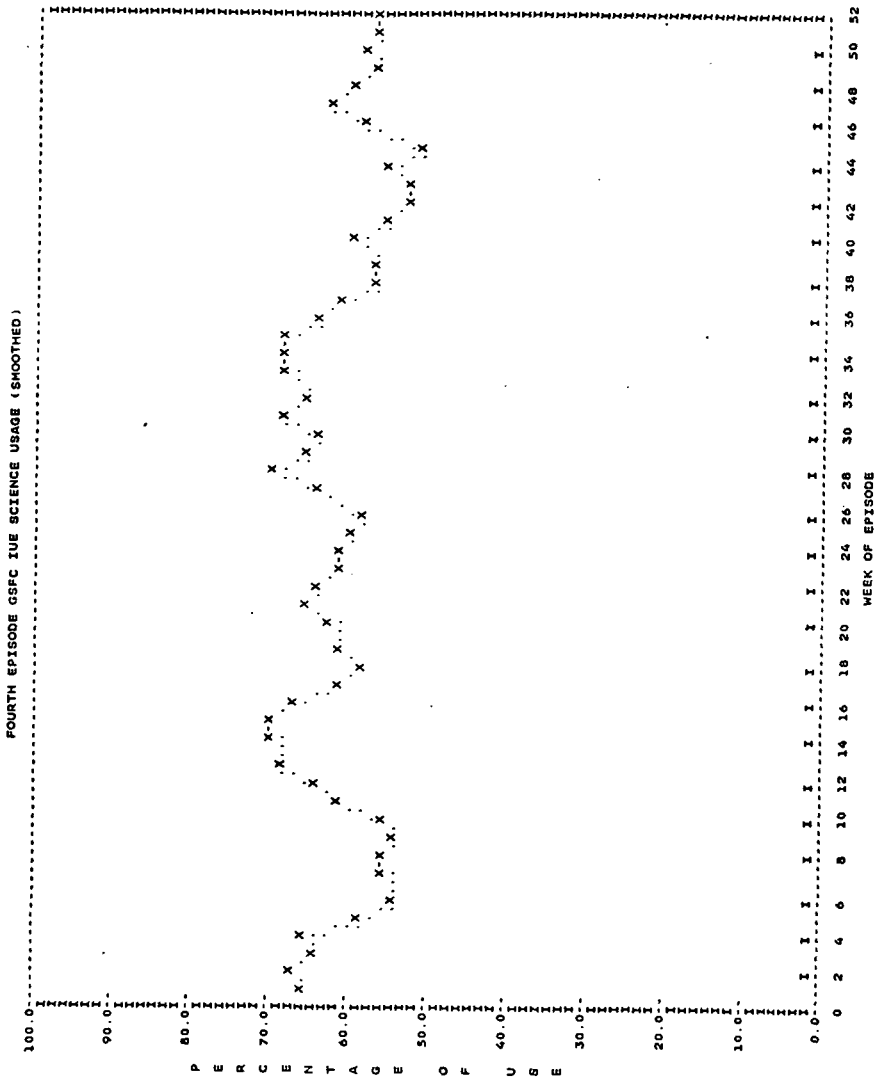
WEEK	DAYS USED	%
1	2 31633	49.64
2	2 33219	49.98
3	2 43004	52.07
4	2 39701	53.78
5	2 37437	47.59
6	2 21065	47.86
7	2 23340	47.72
8	2 23039	47.72
9	2 19933	47.13
10	2 38061	51.01
11	2 35524	50.47
12	2 20887	47.95
13	2 26035	48.44
14	2 19924	46.27
15	2 21720	47.55
16	2 23983	51.42
17	2 27732	52.01
18	2 38477	51.10
19	2 35063	50.52
20	2 35707	50.20
21	2 10960	45.21
22	2 01191	43.11
23	2 08723	44.73
24	1 92749	41.30
25	2 36587	50.78
26	2 39157	51.25
27	2 41897	51.84
28	2 63325	56.43
29	2 68693	57.85
30	2 80613	60.13
31	2 91152	62.39
32	2 87595	61.63
33	2 66693	56.08
34	2 74275	58.42
35	2 62920	56.20
36	2 55513	54.71
37	2 53963	54.38
38	2 59083	54.66
39	2 86111	61.31
40	2 73604	58.59
41	2 62112	56.17
42	2 56672	54.79
43	2 54389	54.51
44	1 78819	38.32



WEEK	DAYS USED	%
1	2.19980	47.14
2	2.41659	51.78
3	2.44491	52.39
4	2.61375	56.01
5	2.67697	57.36
6	2.73260	58.56
7	2.57536	55.19
8	2.41732	51.80
9	2.28139	48.89
10	2.43507	52.19
11	2.43571	52.19
12	2.66880	57.19
13	2.94983	63.21
14	2.97947	63.85
15	3.01833	64.68
16	3.49800	74.97
17	3.36768	72.16
18	3.41972	73.28
19	3.36121	72.02
20	2.89701	62.08
21	2.84071	60.87
22	2.65321	56.85
23	2.61370	56.01
24	2.82223	60.48
25	2.69667	57.78
26	2.68004	57.43
27	2.70275	57.92
28	2.71853	58.25
29	2.85808	61.24
30	2.98076	63.87
31	2.92308	62.64
32	2.86369	61.36
33	2.73021	58.50
34	2.69872	57.83
35	2.91564	62.48
36	2.94561	63.12
37	2.97755	63.80
38	3.12931	67.05
39	3.18880	68.33
40	3.09300	66.28
41	3.05651	65.47
42	3.09016	66.21
43	3.09201	66.26
44	3.02333	64.78
45	2.82522	60.54
46	2.93491	62.89
47	2.96434	63.52
48	3.00645	64.42



WEEK	DAYS USED	%
1	3.08285	66.06
2	3.11864	66.83
3	3.00321	64.35
4	3.02281	64.99
5	2.95525	63.54
6	2.95337	63.97
7	2.96635	64.99
8	2.95211	64.68
9	2.93116	64.25
10	2.99892	64.26
11	3.19011	68.36
12	3.25995	69.86
13	3.20332	69.23
14	3.08588	66.84
15	2.74859	58.90
16	2.82659	60.57
17	2.87329	62.05
18	3.01733	64.64
19	2.86221	61.33
20	2.84187	61.33
21	2.74292	59.74
22	2.74853	58.90
23	3.01885	64.69
24	3.05081	65.37
25	2.97479	63.75
26	3.06873	65.76
27	3.20431	68.66
28	3.17312	68.00
29	3.21971	68.99
30	3.21977	69.42
31	3.04069	65.17
32	2.69325	57.71
33	2.64748	56.73
34	2.77691	59.51
35	2.68855	57.61
36	2.45368	52.62
37	2.60104	55.74
38	2.41455	51.74
39	2.75703	59.10
40	2.80213	60.05
41	2.69917	57.83
42	2.75885	59.12
43	2.68880	57.62
44	2.69461	57.74
45		
46		
47		
48		
49		
50		
51		
52		



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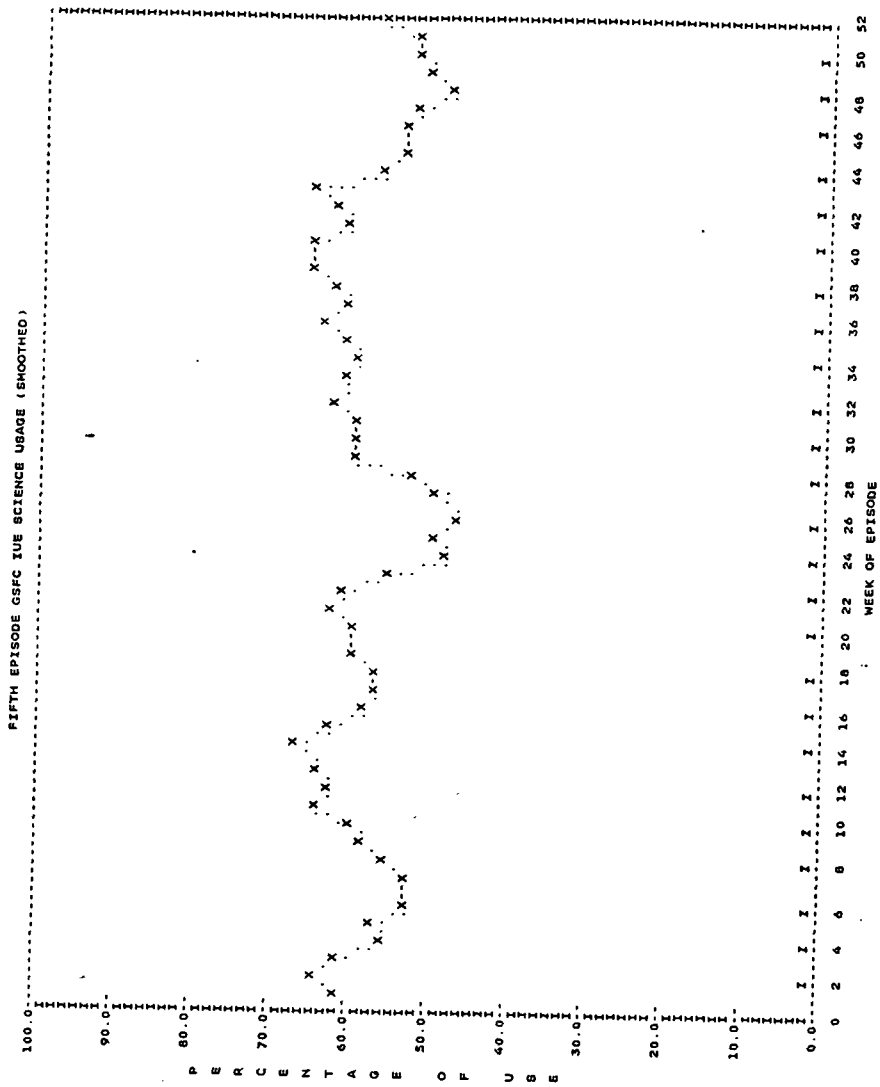
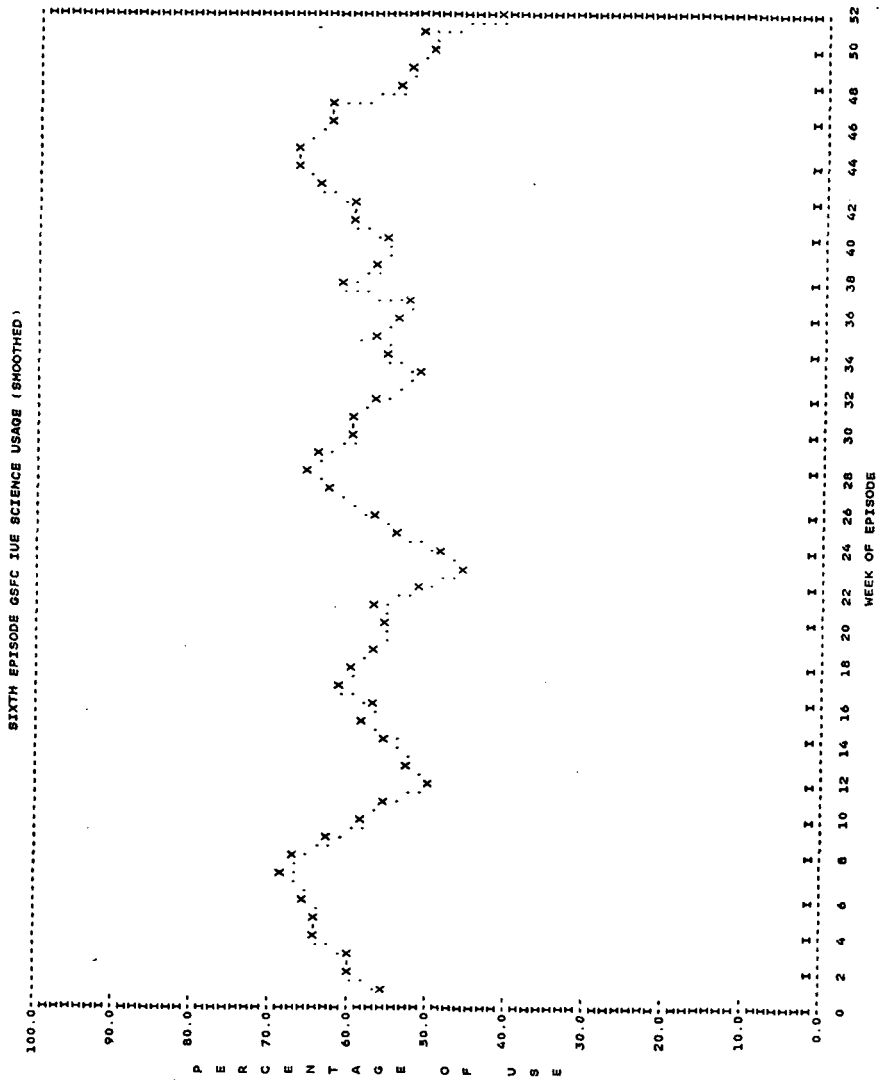
WEEK	DAYS USED	%
1	2.86359	61.36
2	3.01576	64.62
3	3.03968	65.13
4	2.67399	57.30
5	2.47199	53.00
6	2.49316	53.42
7	2.64769	56.74
8	2.61746	56.09
9	2.77131	59.39
10	2.97700	63.79
11	2.91940	62.56
12	3.01971	64.71
13	2.90899	62.34
14	2.73199	58.54
15	2.66587	57.13
16	2.66983	57.22
17	2.77875	59.54
18	2.92706	62.72
19	2.83096	60.66
20	2.81973	60.42
21	2.64743	56.74
22	2.34208	50.19
23	2.22004	47.57
24	2.36119	50.60
25	2.49508	53.47
26	2.37871	50.97
27	2.62262	56.23
28	2.76405	59.23
29	2.90757	62.31
30	2.99189	64.12
31	2.83615	60.78
32	3.02092	64.73
33	2.85116	61.10
34	2.92899	62.77
35	3.02551	64.84
36	3.01112	64.53
37	2.93912	62.98
38	3.04351	65.22
39	2.97568	63.76
40	2.95827	63.39
41	2.50827	53.75
42	2.44983	52.50
43	2.28213	48.90
44	2.48859	53.33
45	2.48603	53.27
46	2.65343	56.86



WEEK	DAYS USED	%
1	2.59872	55.69
2	2.97201	55.40
3	2.81031	60.22
4	2.98549	63.97
5	2.96779	63.60
6	3.06600	65.70
7	3.10447	66.52
8	2.92065	62.59
9	2.72827	58.46
10	2.64324	56.64
11	2.64349	56.32
12	2.43071	52.58
13	2.67333	56.30
14	2.70621	57.99
15	2.68687	56.35
16	2.80279	60.06
17	2.65150	56.82
18	2.58412	55.37
19	2.63315	56.42
20	2.66367	57.07
21	2.16707	46.44
22	2.23999	48.00
23	2.54008	54.43
24	2.64416	56.66
25	2.61152	56.66
26	2.99208	64.12
27	2.79149	59.82
28	2.77020	59.36
29	2.43120	52.10
30	2.61103	55.95
31	2.67592	57.34
32	2.55120	54.67
33	2.68040	57.42
34	2.60092	55.72
35	2.60252	55.77
36	2.78919	59.77
37	2.88597	60.20
38	2.81768	60.41
39	3.09624	66.35
40	2.93309	62.86
41	2.94351	63.08
42	2.43253	52.13
43	2.32611	49.85
44	1.91585	41.05



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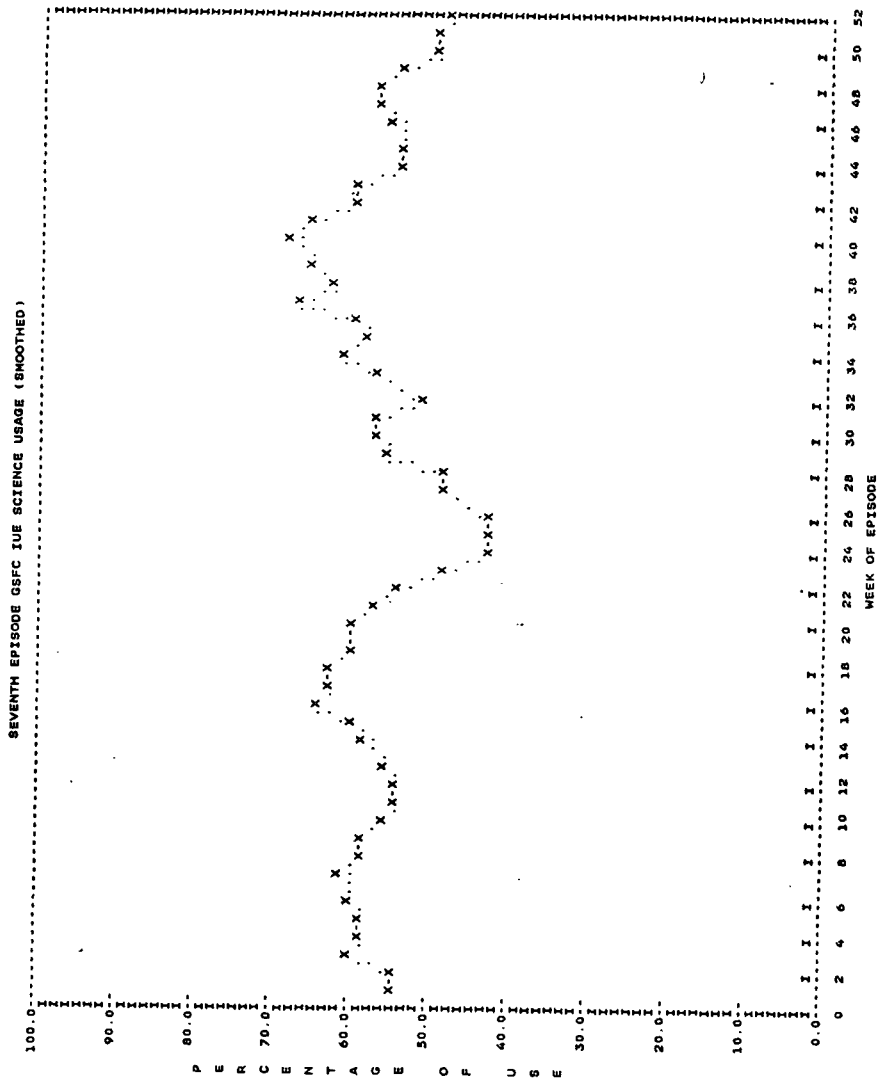
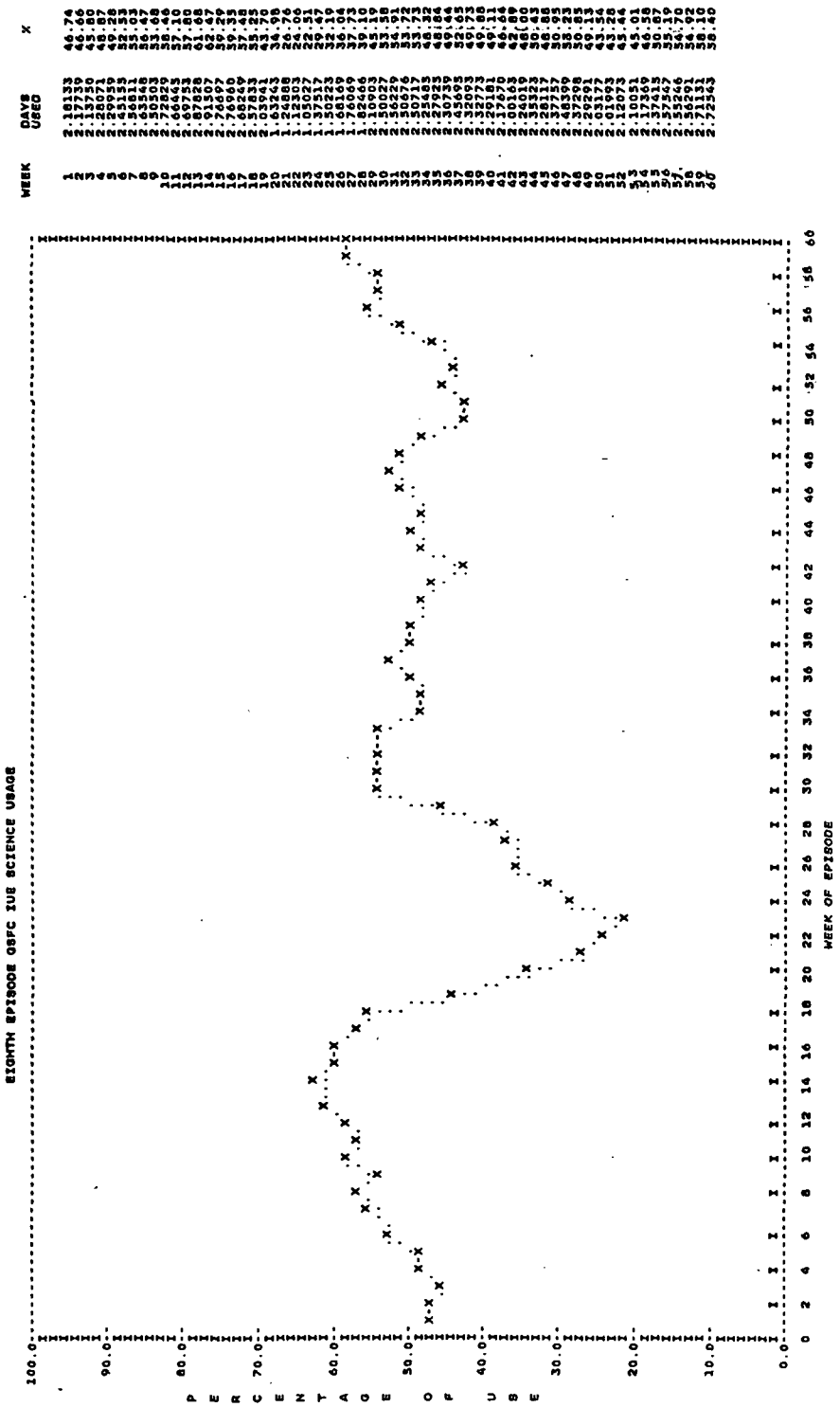
WEEK	DAYS USED	%
1	2.50437	53.67
2	2.53461	54.31
3	2.77380	59.44
4	2.73804	58.67
5	2.78601	59.70
6	2.86673	61.43
7	2.73772	58.67
8	2.72017	58.30
9	2.72017	58.30
10	2.51264	53.84
11	2.52817	54.18
12	2.62420	56.23
13	2.76923	59.34
14	2.70787	58.02
15	2.89992	62.14
16	2.95608	63.36
17	2.99089	64.11
18	2.79989	60.00
19	2.67007	57.22
20	2.53063	54.23
21	2.24887	48.19
22	2.26436	48.52
23	1.90139	40.74
24	2.03139	43.53
25	2.28707	49.03
26	2.26112	48.45
27	2.60111	55.73
28	2.68881	57.61
29	2.67821	57.39
30	2.39971	51.21
31	2.67064	57.23
32	2.91073	62.37
33	2.78832	59.75
34	3.11277	66.70
35	2.95244	63.27
36	3.07789	65.95
37	3.05316	65.42
38	2.79984	60.00
39	2.76889	59.33
40	2.51399	53.87
41	2.54650	54.57
42	2.65245	56.84
43	2.65245	56.84
44	2.55712	54.80
45	2.59705	55.65
46	2.33408	50.02
47	2.24985	48.21
48		
49		
50		
51		
52		





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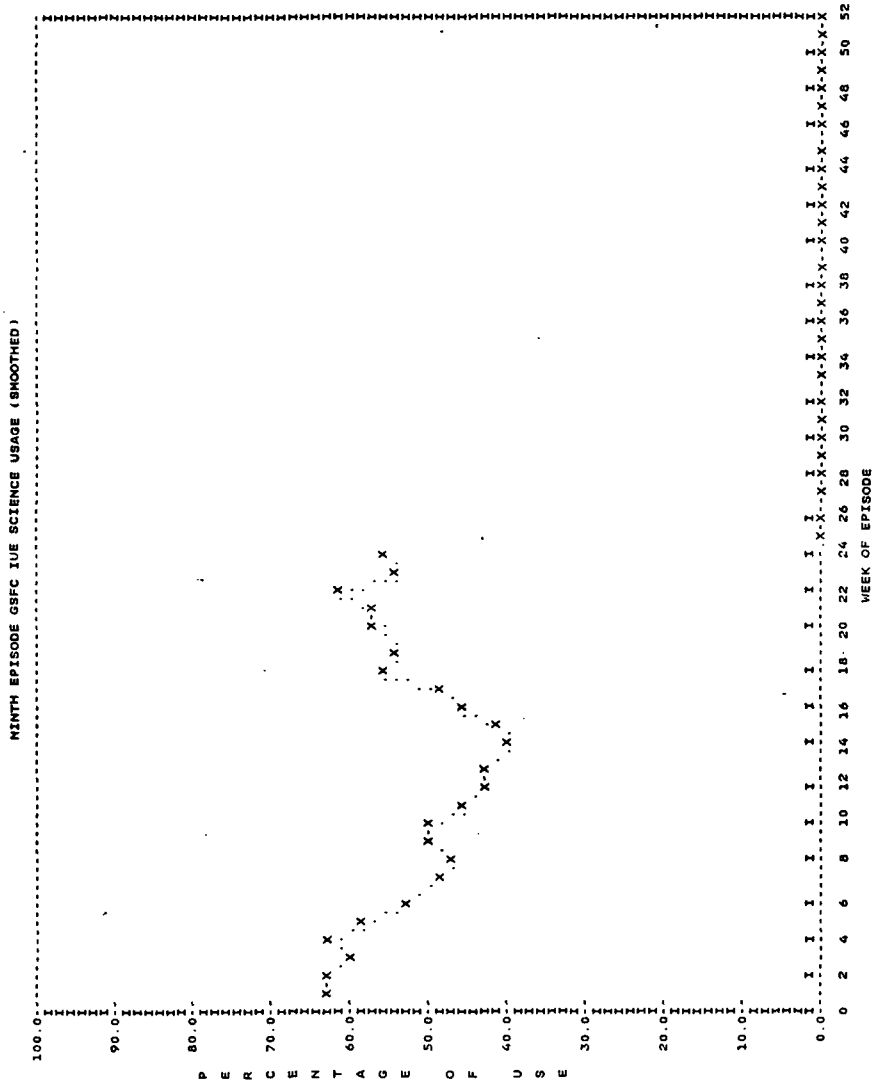
WEEK	DAYS USED	%
1	2.91548	62.47
2	2.94733	63.13
3	2.91335	62.40
4	2.90990	62.33
5	2.69615	57.77
6	2.43557	52.19
7	2.28253	48.90
8	2.33398	50.00
9	2.32732	49.87
10	2.14775	46.02
11	2.02658	43.42
12	1.87143	40.10
13	1.92039	41.15
14	2.12131	45.46
15	2.58869	55.47
16	2.52083	54.02
17	2.68645	57.57
18	2.67330	57.28
19	2.53771	54.37
20	2.53771	54.37
21	2.59584	55.63
22		
23		
24		



APPENDIX E - MONTHLY PROGRESS REPORT TRANSMITTAL LETTERS

APPENDIX E - MONTHLY PROGRESS REPORT TRANSMITTAL LETTERS

Contained herein are copies of the transmittal letters which accompanied the submission of the Monthly Progress Reports for the contract, beginning with the report for the month of November 1985. These are reproduced in order to present as a unified set the contract highlights appearing in the letters.

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION (301) 589-1545
8728 COLESVILLE ROAD · SILVER SPRING, MARYLAND 20910

December 15, 1985

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for November 1985, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. CSC personnel on Task 203 successfully produced high-quality color slides of graphics directly from the screen of an IBM 3279 color terminal.

In spite of frequent S/C oscillations about the roll axis triggered by tracking a moving target at a low beta, CSC expertise on Task 301 made it possible to obtain successful time critical observations of Comet Halley as part of the International Halley Watch. The S/C oscillations, combined with the comet's being faint and a moving target, made it especially difficult to obtain successful observations.

From daily operations, CSC has found that the S/C oscillations appear to be triggered less often at low betas if the small fixed-axis slews which are performed to move the target within the FES field are done at a rate slower than 10 arcseconds per second which is the standard slew rate contained in the procedures. Task 301 personnel are developing workarounds and changes to the current procedures to lower the slew rates and thus avoid triggering the S/C oscillations.

Task 401 personnel established a network link between the IUE Observatories at GSFC and VILSPA. The link allows computer data sets to be sent directly from one computer to the other and will greatly facilitate the exchange of data base information, observing schedules, and other operational data.

TO: D.K. West FROM: P.M. Perry DATE: 12/15/85

SUBJECT: Monthly Report PAGE: 2

On Task 501 RDAF visitors logged in a record 451 hours this month marking this as the first month in which more than 400 hours of visitor log-on time was recorded. During a one-week visit, one visitor (K. Mason) logged in more than 100 hours. Staff members developed a batch processing procedure for running IDL procedures during off-hours, implemented software to make the new LWP high dispersion inverse sensitivity function available to users, developed and implemented a new procedure called COMPRESS for rebinning high dispersion IUE spectra, and completed the updates to the DIDL testbed software on DR2.

CSC personnel on Task 601 continued a study of hardware options for a proposed new IUE data processing computer system. The scope of this system has been expanded from reprocessing the data archives to include supporting the computing requirements of the RDAF and supporting the processing of current images. A preliminary system design for the proposed new hardware configuration was prepared.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION (301) 589-1545
8728 COLESVILLE ROAD · SILVER SPRING, MARYLAND 20910

January 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for December 1985, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. Task 202 personnel presented an informal report to the Ultraviolet Imaging Telescope PI concerning the feasibility of upgrading the instrument with CCDs for future missions. The upgrading appears quite feasible. Several specific areas are being studied in more detail.

Based on data in the Atlas of Infrared Source Cross-Identifications, CSC personnel on Task 204 calculated that over 20,000 different infrared sources had been detected by various observers through 1983. About 35 percent of these are contained in two fundamental infrared surveys while the rest were obtained from the general infrared literature.

On Task 301, CSC developed new low-beta observing procedures which have dramatically reduced the impact of S/C roll oscillations on GO programs. While there was a loss of 10.8 hours of observing time in November due to S/C oscillations, there were no reports of time lost as a direct result of S/C oscillations during the current report period.

Task 301 members also continued to support IUE observations of Comet Halley as part of an international effort. Observations made this month were highly successful. A number of quality spectra were obtained which revealed faint molecular features.

TO: D.K. West FROM: P.M. Perry DATE: 1/15/86

SUBJECT: Monthly Report PAGE: 2

On Task 501, the task leader traveled to the Dominion Astrophysical Observatory in Victoria, British Columbia, and the CU RDAF in Boulder, Colorado. Ideas on data reduction techniques and plans for future hardware configurations were discussed. RDAF IDL procedures were also exchanged with the CU RDAF.

CSC personnel prepared a presentation for Task 601 which reviewed the current computer hardware configurations which support the RDAF and IUESIPS, assessed the future needs of these systems, and outlined a proposed new computer facility to meet those needs. This presentation was delivered twice, once to GSFC IUE Project personnel and again to GSFC Code 680 personnel.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION (301) 937-0760
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705

February 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for January 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 101 DMC personnel entered data for ninth-episode observing and archival proposals in the Proposer Data Base. The data have been quality checked and updates are made as needed. Reports using the data were prepared for the Project Scientist's use to select Peer Review panel members.

Despite the hardware problems which have been encountered over the last few months, CSC personnel on Task 102 continued to reduce the HCF backlog and this month produced 1297 contact prints, approximately three times the usual monthly output. On Task 201 a task member compared two techniques, derived by VILSPA personnel and A. Holm of CSC, for the correction of LWR spectra for sensitivity degradation. Both techniques correct the spectra with an accuracy of 5 percent or better. RDAF and calibration staff personnel are revising several RDAF programs to make this correction available for GO use. The ability to correct LWR spectra for sensitivity degradation is of particular importance for long-term IUE studies and for programs which require accurate absolute fluxes.

Twice during the report period, alert task members on Task 301 prevented major losses of observing time. On one occasion after beginning the read procedure on a shift-long LWP exposure a telemetry dropout was seen. Within several seconds, the

telescope operator was able to halt the procedure before it gave the final command to begin the read scan. Massive telemetry dropouts followed from a ground system problem. After the problem was corrected, the exposure was read down with no loss of data. On a second occasion while maneuvering to an area of poor signal where frequent telemetry dropouts were occurring, the telescope operator was informed that the maneuver was complete and that he could change telemetry bit rate to stop the telemetry dropouts. Since changing the telemetry rate during a maneuver can result in the loss of S/C attitude, the alert task member waited for complete telemetry confirmation of maneuver completion before initiating the change of bit rate. Subsequent telemetry indicated that the S/C was in fact still maneuvering.

In preparation for the ninth IUE episode, personnel on Task 401 used the program REQXREF and the IUEAIMS and IUEPROP data bases to generate 126 cross-reference texts of proposed targets and previous IUE observations. The program REOXREF was modified to run on the NSESCC IBM S/3081 computer instead of the Sigma-9 computer. A total of only 33 minutes of IBM CPU time was needed to generate the ninth-episode tests. For comparison, over 34 hours of Sigma-9 time were needed last year for the eighth-episode runs. The change in computers proved beneficial as a result of improvements in the IBM facility, degradation of the Sigma-5 and Sigma-9 computers, and the increasing number of targets to be compared.

On Task 402 a final version of the SIPS routine TCCAL has been created and tested. Various methods of correcting for DN level beam-pulling effects have been tried and evaluated. This final version of the routine produces a significant improvement over the currently implemented version of TCCAL.

TO: D. K. West FROM: P. M. Perry DATE: 2/15/86

SUBJECT: Monthly Report PAGE: 3

CSC responded to questions from users regarding RDAF file formats. Task 501 staff members began investigating file formats generated by FORTRAN WRITE statements, the IDL IUECOPY procedure, and the PIP utility routine, and investigated the resulting difficulties when these files are read using various operating systems. The staff also investigated hardware problems with the Sleuth call-back authenticators, standards for "4010-emulation" terminals, and the possibility of running the RDAF software on a VAX computer.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705
(301) 937-0760

March 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for February 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 101 DMC personnel updated the Proposer Data Base as necessary. Reports using the data were prepared as needed for the ninth-episode proposal Peer Review.

On Task 301 CSC has made possible the scheduling of additional IUE observations of Comet Halley, the only earth-orbiting observations available during the period of the Giotto flyby. A task member revised the March schedule to make possible observations by several different comet teams on 11 days in March. This includes observations scheduled to coincide with the Vega II and Giotto missions and also a time-critical Target of Opportunity program of a stellar occultation by the comet.

CSC personnel on Task 401 designed and coded the program IMFREQ which uses the Condensed Data Archive usage data base and the IUEAIMS data base to generate statistics concerning RDAF requests of individual images.

Also on Task 401, CSC designed and coded a program which generates statistics of unique sources observed by IUE. The results showed that approximately 10,000 unique sources have been observed by IUE.

After months of planning, the RDAF staff on Task 501 has finally acquired an additional TK 4025A terminal for visitors and local users. The fourth graphics terminal will help relieve the terminal-shortage problem which has existed for the past year and a half.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION (301) 937-0760
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705

April 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for March 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 103 CSC was able to provide timely and comprehensive meeting support for the IUE Peer Review meeting held March 12-14, 1986. Task personnel were able to complete transcription of 292 proposal evaluation forms before the beginning of the last day of the meeting, allowing panel chairpersons to finish proofreading the forms before leaving. Task personnel also coordinated the acquisition, preparation, and distribution of meeting supplies, handouts, forms, and name tags. Task personnel made arrangements for four working meals.

On Task 301 CSC continued to support IUE observations of Comet Halley as part of the International Halley Watch. Careful observation planning by task personnel, in coordination with the various GO teams and OCC management, resulted in highly successful observations of the comet. Following the cancellation of the Astro-1 mission, IUE's Halley observing schedule was expanded to provide the only earth-orbiting simultaneous observations during the historic Vega II and Giotto encounters. Time-critical observations during an occultation of a bright star by the comet were also obtained.

CSC personnel on Task 401 recommended that the present system of maintaining the IUE mailing list data base on the NSESCC IBM S/3081 be retained. This recommendation was based on a comparison of the present system with the automated facility in the GSFC mailroom.

On Task 403 CSC implemented software to compute the heliocentric light-travel time correction and write it into the scale factor record of the spectral data files.

RDAF staff members participated in key meetings on Task 501 this month which involved major enhancements to the RDAF, including access to the SPAN network and thereby the CU RDAF, access to the IUE spectra stored on the IBM mass-store device via a high speed datalink, and the eventual center-wide conversion to the ROLM Private Branch Exchange (PBX) system. In addition, two major reports were completed this month dealing with the status and needs of the RDAF.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705
(301) 937-0760

May 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for April 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 201 CSC has planned and is proceeding with the analysis required for the new LWR absolute calibration. Substantial progress has been made in studying the relative responses of optimally trailed and large-aperture point-source spectra. Extra effort has been given to this work so that it can proceed in a timely fashion. In addition, tapes containing the new LWP ITF and absolute calibration data have been shipped to VILSPA so that the VILSPA staff may proceed with their analysis on the LWP absolute calibration.

On Task 301 CSC supported successful observations of the Earth and Comet Halley during the report period. Careful planning and real-time decisions by task members helped ensure quality data for these difficult observations of moving targets with IUE. The data from the earth observations will be used in the calibration of the Hubble Space Telescope. The comet observations are part of a continuing program to provide an extended baseline of observations to complement the data obtained by the Vega II and Giotto spacecraft.

TO: D.K. West FROM: P.M. Perry DATE: 5/15/86

SUBJECT: Monthly Report PAGE: 2

Task 401 personnel, in conjunction with Long-Range Planning personnel, began detailed design requirements analyses for the archival image processing effort and the Integrated Scheduling System.

On Task 403, despite an unusually large amount of downtime CSC processed essentially all current images and accumulated only a minimal backlog in the Image Processing Center.

Task 501 staff members, working with LASP personnel, solved the last remaining problem with the new version of IDL, known as DIDL, by improving execution time by up to a factor of three. The new method used to install DIDL, along with the updated IDL.HLP file, IDL Users Guide, and the RDAF Tutorial, will make possible the implementation of DIDL at the GSFC RDAF.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION (301) 937-0760
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705

June 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for May 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 201, CSC analyzed LWP and LWR spectra of the fundamental calibration standard Eta UMa which were obtained using the new fast trailing technique. The repeatability of the fast trails was found to be 3 to 5 percent, which is comparable to the repeatability of point source and trailed spectra obtained at lower speeds. The derived flux levels for the fast trails were typically too high by 14 percent for the LWP and 5 to 15 percent for the LWR spectra. A total of 28 successful fast trails has been obtained with the two-gyro system. It was found that a second-order function of the trail rate accurately predicts the distance required to back the S/C up before starting the trail slew. This polynomial fit will be used to modify the trail procedure to greatly improve the reliability of the fast trails.

Responding quickly to a target-of-opportunity request to observe a bright supernova in outburst in a nearby galaxy, Task 301 personnel assisted a GO in obtaining a series of IUE observations as the outburst evolved. The resultant spectra are evidently the earliest ultraviolet spectra ever obained in a supernova outburst cycle, and unusual spectral features were seen by the GO.

On Task 403, evaluation by CSC of the spectral format shift corrections currently performed for the LWR camera indicate the existing time correlation coefficients do not follow the current temporal trend. Updated coefficients would provide improved correction for the format shifts of recent images.

TO: D.K. West FROM: P.M. Perry DATE: 6/15/86

SUBJECT: Monthly Report PAGE: 2

After more than a year of testing, development, and documentation, the double precision version of IDL was implemented under Task 501 at the GSFC RDAF. Although staff members discovered some minor errors with the new version, which were easily corrected, the entire implementation of both the IDL task and the new RDAF procedure libraries was completed in just a few hours. The implementation of the new version of IDL along with the new IDL procedure libraries represents one of the most significant software development efforts ever completed by the RDAF staff.

Task 601 personnel met weekly with the ATR to review the development of the new image processing system. Functional and operational requirements were discussed and new interfaces with the OCC were specified.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION

SYSTEM SCIENCES DIVISION (301) 937-0760
4600 POWDER MILL ROAD • BELTSVILLE MARYLAND 20705

July 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for June 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 301, CSC avoided considerable loss of observing time by asking a GO to reconsider his target identification. From the short length of the slew and S/C telemetry, the task member felt that the GO's initial target identification was suspect. The GO found that he had made an error. The correct target was acquired and time loss was avoided.

Also, on two occasions task members on Task 301 prevented a major loss of attitude when the S/C was unintentionally tracking an earth light. These situations arose when power failures at WPS interrupted telemetry and command support for several hours during long exposures. During the WPS down time the earth moved very close to the telescope pointing. When the on-board guidance system began tracking on scattered earthlight instead of the guide star, the S/C attitude reference was lost. CSC coordinated with the IUEOCC after telemetry support resumed and used available gyro data to quickly recover attitude and resume normal operations.

A current low dispersion image on Task 403 in which the spectrum was contaminated by a system hit on the original image, and missing minor frames on the history replayed version, was reconstructed on the Sigma 9 using the program INSECT. This is the first time such a procedure has been used in IUE production processing.

Besides assisting a record numbers of users (23), staff members on Task 501 were able to close 7 user problem reports, implement 10 procedures in the experimental library and began the software conversion work required to move the RDAF libraries to a VAX computer.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705
(301) 937-0760

August 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for July 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 201, a task member re-analyzed spectra of the standard star Eta UMa which were obtained using the new fast trailing technique. The Bohlin (1986) SWP and LWR calibrations and the revised LWR sensitivity degradation correction algorithm, derived by VILSPA personnel, were used to reduce the spectra. The LWR fluxes are accurate to about ±3 percent and are more linear than the previous analysis had indicated. The SWP fluxes remain consistent with the actual Eta UMa fluxes. The LWP fluxes are still too high by about 11 percent, which may be due to an error in the LWP absolute calibration scale. Several other GO studies also indicate a similar LWP flux scale error.

Task 301 personnel, in cooperation with the cognizant PI, developed an innovative technique to obtain phase-resolved trailed spectra of an x-ray binary system. Trailed exposures beginning at specified intervals of 282 seconds were superimposed to provide complete coverage of variations over the x-ray pulse period.

On Task 401, CSC rapidly generated statistics for IUE observational efficiency comparing the first half of 1985 with the first half of 1986 (before and after the 1985 gyro failure), the total number of exposures and durations for each IUE camera and dispersion, and the number of IUE spectra taken per object class.

TO: D. K. West FROM: P. M. Perry DATE: 08/15/85

SUBJECT: Monthly Report PAGE: 2

Task 401 management and other IUE Observatory personnel met with NSSDC management. Discussions included the monitoring of production and request backlogs, contact personnel for the new NSSDC contractor, and planning for future data storage techniques.

Staff members supported a record number of seven remote RDAF users this month and completed a large amount of the VAX software conversion work on Task 501. In addition, significant progress was made in addressing outstanding user problem reports and high priority software development work.

Task 601 personnel met weekly with the ATR to review the development of the new image processing system. The nearly completed IUE Advanced Spectral Image Processing System (ASIPS) Requirements Analysis document was reviewed with the ATR.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
8728 COLESVILLE ROAD • SILVER SPRING, MARYLAND 20910

September 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for August 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 201, CSC analyzed the relative responses of trailed and large-aperture point-source spectra. The derived trail fluxes are generally higher than the point-source fluxes, and the relative response is a strong function of wavelength. The wavelength dependence of the response function is similar for each of the nine calibration stars; however, each response function can vary about ±5 percent from star to star. Knowledge of the relative responses of the large-aperture point-source and trailed spectra is needed for the derivation of the new LWR absolute calibration.

Task 301 personnel participated in the planning and execution of a successful Delta-V station-keeping maneuver. CSC recovered attitude and resumed normal operations within 50 minutes of receiving command of the S/C after the burn.

Task 301 personnel also worked to minimize observing time lost during the eighteenth IUE shadow season which began during the report period. A new mode of attitude control, which uses less power and which required daily attitude recovery, was necessary during most of this shadow season. A technique was devised that allowed an efficient attitude recovery within 5 to 30 minutes after receiving command of the S/C.

TO: D. K. West FROM: P. M. Perry DATE: 09/15/85

SUBJECT: Monthly Report PAGE: 2

On Task 401, CSC personnel completed testing and peer review for the new IUEAIMS program VLAIMS, which will read the new VILSPA data bank, reformat the data, and update the IUEAIMS VILSPA data base.

Staff members supported a record number of 23 RDAF users this month on Task 501. Special assistance was provided on the LASP VAX for a user who needed to perform quick-look analysis of his data during his observing run when the PDP computer was down due to disk drive problems. Staff members, working with LASP personnel, were able to recover almost all of the disk files on the malfunctioning disk drive. A record number of 11 CDA requests were filled.

On Task 601, CSC arranged for a presentation of the Gould 8500 image processing system. This was the last of a series of workstation demonstrations to evaluate potential replacements for the EDS. The Gould was subsequently chosen from among the various candidate image processing display systems.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION

SYSTEM SCIENCES DIVISION (301) 937-0760
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705

October 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for September 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 101, nearly 350 Tenth-Episode IUE Proposal Instruction Packages were prepared and mailed. Each package included the proposal instruction booklet, microfiche of the Merged Observing Log, and Observation Specification sheets.

Also on Task 101, the Annual Merged Log was completed and distributed. Microfiche masters of the log were generated by the GSFC Computer Services Branch (Code 254) and quality checked by task personnel. The microfiche copies were produced and quality checked for distribution through the NASA IUE Newsletter and the Tenth-Episode Proposal Instruction Package.

Task 204 personnel delivered final tapes containing the Infrared Source Cross-Index to the Government Printing Office.

CSC personnel on Task 301 assisted a GO in obtaining the first IUE spectrum of Comet Wilson, a comet which may become brighter than the recent Comet Halley. The spectrum appeared somewhat different from those of earlier comets observed by IUE at similar distances from the sun. The timing of the read was carefully chosen by task members to avoid possible data loss in the midst of thunderstorm-related telemetry dropouts at the WPS tracking station and a declared S/C emergency.

Also on Task 301, CSC provided both critical staff (a telescope operator for each VILSLPA shift) and comprehensive plans for all aspects of 24-hour-a-day science operations when ESA IUE operations were conducted from GSFC during September 15-22. The VILSPA command antenna was undergoing major repairs during this period. The repair work is not yet completed even though VILSPA has resumed operational support of its shift. CSC personnel remain on standby to support science operations during the daily ESA shift period if required.

The International Ultraviolet Explorer Advanced Image Processing System Requirements Specification document was completed by Task 401 personnel and submitted to CSC's Technical Publications Office for duplication and binding. Final copies were delivered to the ATR and other interested parties.

On Task 601, CSC efforts resulted in several optional control modes being retained in the initial design of the one-gyro/FSS attitude control system. These modes use various combinations of the FES, FSS and gyro sensor data. Small improvements in control system performance which might be realized may significantly increase the science operations capabilities of such a system.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705
(301) 937-0760

November 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for October 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 101, the first shipment of photowrite negatives for VILSPA images was delivered to NSSDC this month. This shipment comprised film sheets for 4246 LWR and SWP images.

Task 103 personnel provided comprehensive support for the IUE Users' Committee Meeting held October 24, 1986. Task personnel collected reports and distributed them to Users' Committee members and local participants prior to and during the meeting.

On Task 201, the new SWP ITF has been created. One major enhancement of the new ITF compared to the current ITF is the use of 12, instead of 11, exposure levels. This should help to improve the linearity of images processed with the new ITF, especially at higher DN levels. Task personnel are formulating plans for quality checks and analysis of the signal-to-noise characteristics, reproducibility, and linearity of the new SWP ITF.

In cooperation with VILSPA, Task 301 personnel successfully obtained an 816-minute small-aperture collaborative exposure, in spite of the occurrence of an FES reference-point-shift anomaly. Periodic measurements between exposure segments were made by task members to determine the effective reference point. The anomaly has been known to last for up to 24 hours after the cycling of the aperture shutter mechanism.

TO: D. K. West FROM: P. M. Perry DATE: 11/15/86

SUBJECT: Monthly Report PAGE: 2

On Task 501, CSC added six procedures to the experimental library this month including new routines NOREAD and GWREAD and new versions of ANNOTATE, FEATURE, NORM, and NUNRED. In addition, staff members finished the preliminary modifications to the VAX procedure libraries and completed testing of one of the three accounts.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

COMPUTER SCIENCES CORPORATION
SYSTEM SCIENCES DIVISION
4600 POWDER MILL ROAD • BELTSVILLE, MARYLAND 20705
(301) 937-0760

December 15, 1986

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Attention: Dr. Donald K. West
Code 684.1
Building 21, Room G-61C

Subject: Contract NAS 5-28787

Dear Dr. West:

Enclosed is the monthly Progress Report for November 1986, as required by the terms of the subject contract. Please note that a glossary of acronyms is included for your convenience.

I would like to bring several task highlights to your attention. On Task 102, CSC corrected several photowrite problems in a timely manner to minimize delays in production. Evening and weekend shifts were also scheduled to prevent photowrite backlogs from increasing due to the hardware problems.

On Task 201, a task member analyzed over 175 data points to map the S-shaped distortion across the field of view of the FES. In order to place a target in the aperture when using the one-gyro/FSS control system, it will be necessary to accurately position a guide star in the FES field. If not taken into account, the geometric distortion can cause a target to be miscentered or miss an aperture altogether. A preliminary program has been written which predicts the corrected guide star position for a desired observation based on the position of the guide star for a previous IUE observation. In general, the predicted guide star position has been quite accurate provided the guide star is within about 5 to 6 arcminutes of the center of the FES.

Task 301 personnel contacted VILSPA on the IUESOC emergency phone and relayed both IUESOC and IUEOCC handover information when NASCOM was unable to provide an operations line to VILSPA at the scheduled time. All OD and VILSPA control voice communications were relayed by task members, allowing S/C handover to take place on time. CSC continued to support operations and relay voice

communications until NASCOM provided a normal operations line some 45 minutes later. During the change-over last summer to the ROLM phone system at GSFC, CSC had requested retention of a separate C&P system phone line for emergency communications with VILSPA.

Very truly yours,

Computer Sciences Corporation

Dr. Peter M. Perry
Project Manager

PMP:mrd
Enclosure

C.2

APPENDIX F - COMMENDATION LETTERS

APPENDIX F - COMMENDATION LETTERS

Reproduced herein are letters of commendation received by CSC IUE Observatory staff members during the contract period, in chronological order. Also included are a sample of IUE Data Analysis Facility Questionnaires, filled out by users, which commend the CSC staff.

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

1986 March 20

Reply to Attn of:

Mr. Clint Frum
Vice President for Service Programs
Computer Sciences Corporation
4600 Powder Mill Road
Beltsville, MD 20705

Dear Mr. Frum:

I would like to congratulate the outstanding performance of the Computer Sciences Corporation personnel who supported the recent peer-review activities of the International Ultraviolet Explorer (IUE) ninth year guest observer proposals.

Drs. George Sonneborn and Cathy Imhoff led in the challenging task of proposal feasibility evaluation, working closely with Drs. Ron Pitts and Nancy Evans and assisted by Drs. Nancy Oliversen, Mike Crenshaw, Chris Shrader and Carol Grady. A number of peer-review panelists spoke very highly of the technical ability and dedication of the Resident Astronomers in performing the feasibility study.

Dr. Cathy Imhoff coordinated the logistic support for the peer-review panelists. Karen Levay efficiently arranged accommodations for the panelists. Corrie Etchison conscientiously handled the receipt, cataloguing and distribution of all proposals. Dot Appleman, Barbara Ehlers, Stacey Hammer and Mona Drexler rendered, working late hours, expert and timely typing support so that the panelists would be able to proof-read their review comments before their departure on the final day. Marion Schmitz expeditiously transmitted the information on NASA-ESA collaborative proposals to Villafranca Ground Station.

I wish to note that Drs. Chi-Chao Wu, Al Holm and Tom Ake, who are currently assigned to the Space Telescope Science Institute, served as expert panelists, which is a recognition of their standing among their scientific peers.

A number of panelists made a point of telling me how well the meeting was run and how capably they were supported. They thought that the latest peer-review was the best-organized and best-run of all the past meetings. I agree whole-heartedly. The success owes a great to the CSC personnel, who supported the activities, and to Drs. Peter Perry and Barry Turnrose, and Dawn Stone, who provided an enlightened management that made it possible.

Very cordially,

Yoji Kondo
IUE Project Scientist

GEORGE MASON UNIVERSITY
THE STATE UNIVERSITY IN NORTHERN VIRGINIA ■ 4400 UNIVERSITY DRIVE ■ FAIRFAX ■ VIRGINIA ■ 22030

Department of Physics

May 21, 1986

Dr. Yoji Kondo
IUE Project Scientist
Code 684
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

Dear Dr. Kondo:

I was very happy to serve as chairman of the IUE review panel this year on the interstellar medium. I have served in the past as a member of review panels but the experience in serving as a chairman was unique.

I would like to congradulate you and the rest of IUE staff for organizing a very smooth, efficient and productive review process. My perception is that through the years this process has been getting better-and this is a compliment because I am convinced that the IUE review process was always one of the best in astronomy, from the very beginning of the existence of the IUE program. The members of my panel and myself would like to express our thanks to the RA's for having done a superb job in their comments on feasibility studies of the targets. Even though the panel did not always agree with the comments made, these comments were very useful in our reviewing process. We found the IUE staff eager to help and I must say that the entire process was joyful, in spite the hard work we had to put into it.

One area that my panel felt needed some clarification was the way some of the archival proposals were presented. We felt that some uniformity is needed in the way the proposals are written, particularly since we will be seeing a proportionally greater percentage of archival proposals in the future. Perhaps prospective proposers should be asked to do some preliminary archival work and include it with their archival proposals to show that their proposed research is feasible (i.e. enough useful data exist) and that they are serious enough to have already done some work. Moreover, if there are any gaps in data for specific targets, they could propose to observe these targets in separate regular proposals. Also, since the archival proposals are not competing for time but only for money, they may have to be treated in a different way, e.g. provide a different grading process for such proposals so that only archival proposals compete with each other. We found the archival proposals submitted to our panel were well prepared but this may reflect the work that had to be done to prepare them* If you decide to make specific suggestions to archival proposers, these should be mailed out to IUE users well in advance of the next deadline. I will be happy to be of further use on these suggestions.

Having served in the review process and being an IUE user myself, I have to say that the IUE project is one of the most successful and best-run NASA projects. I would only hope that future projects (like the HST) learn from the IUE project.

Sincerely yours,

Minas Kafatos,
Professor

*Our comments for archival proposals are general, not necessarily particular to our panel.

 cc. Dr. E.J. Weiler

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

NASA

Reply to Attn of 683

September 24, 1986

Ms. Dawn Stone
Computer Science Corporation
NASA/GSFC
Code 684.9
Greenbelt, MD 20771

Dear Ms. Stone:

The GAMMA RAY SPECTROMETER (GRS) Project has been preparing the documentation for the GRS Instrument Accommidation Review on 29-30 September 1986. Successful completion of this view constitutes formal acceptance of our instument onboard the Mars Observer Mission. As you might expect, as the deadline approached the work looked overwelming. I wanted you to know that one of your employees made things happen at times when even I questioned whether we could do it at all. Ms. Corrie Etchison was absolutly essencial to the GRS Project making a major milestone.

Sincerely yours,

Samuel R. Floyd

Samuel Floyd
Laboratory for Astronomy
and Solar Physics

University of Nebraska Lincoln
Physics and Astronomy

Behlen Laboratory of Physics
Lincoln, NE 68588-0111
(402) 472-2770
University Telex: UNL COMM LCN 484340

November 28, 1986

Dr. Yoji Kondo
Goddard Space Flight Center
NASA Code 685
Greenbelt, MD 20771

Dear Yoji:

I like to inform you that in both my trips to Goddard to utilize the IUE archive data I have had excellent help from the CSC staff. This is a note of appreciation to you and the Staff.

In my May trip, Dr. Carol Grady and Mr. Keith Feggans initiated me in the art of IUE softwares. Keith was extremely kind in baby-sitting me through the entire process without him I would be probably at a lost. Dr. Grady guided me through the scientific awareness and the pitfalls in using the data. Her knowledge in Be stars and space astronomy is inpressive. It was great to have such a knowlegeable staff to educate old folk like me.

In my November trip, the fact that Dr. Li was able to work with the Goddard facility which tells me that you and Mr. Randy Thompson must be spent a considerable amount of paperwork in getting him there. For this alone I am greatly indebted. Ms Rosalie Ewald was equally good nature in helping Dr. Li through the computing system and the softwares involved. I am sure Li would have much to thank her for in getting his work done. It goes without saying that Dr. Carol Grady was extremely kind in helping us with the science. She should be teaching at a University (Unfortunately, they don't pay a living wage!). Personally, my interaction with Dr. Cathy Imhoff was very profitable. She went beyond the call of duty in volunteering to look up additional information for me as well as educating me about the UV spectra of pre-main sequence objects. The similarity of the shell lines between her stars and ours are phenomemal. I have much to learn. The CSC staff as a whole made my work at Goddar very enjoyable.

Again, thank you very much for everything and hope to see soon.

Yours sincerely,

Kam-Ching Leung
Professor of Physics & Astronomy

xc

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland
20771

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name Joseph B. Gurman Date 4 November, 1985

Affiliation GSFC (Code 682)

IUE Program —

How many times have you made use of the facility? This is the first.

On this visit,

Did you combine it with an observing run? No

How many hours were scheduled? _____

How many hours did you actually use? 2

How many spectra did you reduce? 7

Did you use the facility at night (non-supervised hours)? No

What were the main things you wished to accomplish in this visit?

Examine spectra for exposure time-
region on two targets.

Were you successful (if not, why not?) Yes

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) If next episode proposal is accepted.

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) Everything was fine (for this very limited application) — assistants were very helpful.

Please return this form directly to the data analysis assistant or by mail to: IUE Observatory/RDAF, Code 685.9, Goddard Space Flight Center, Greenbelt, MD 20771

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Goddard Space Flight Center
Greenbelt, Maryland
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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name France A. Córdova Date 11/15/85

Affiliation Los Alamos Nat Lab.

IUE Program CVI+FC

How many times have you made use of the facility? 2x, incl. this visit

On this visit,

Did you combine it with an observing run? yes

How many hours were scheduled? ? (we couldn't start 'til Tues morning because of no help on long holiday weekend.)

How many hours did you actually use? ~40

How many spectra did you reduce? billions & billions

Did you use the facility at night (non-supervised hours)? yes

What were the main things you wished to accomplish in this visit?

1. Save files to take home on tape
2. Quick look at data from observing run
3. Measure line fluxes, EW, continuua of many spectra from our previous runs
4. Quick look at a lot of archival data to compare with our own data — we are taking home both our own and archival data.

Were you successful (if not, why not?)

Very successful, owing to help mainly from Keith, and also from Carol Grady. We got much more done than we could have anticipated. System is very easy to use!

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) Don't know. We are hoping we can do a lot w/ our save tapes at home institutions, and will try to use remote option.

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) Everything seems good, except that procedure to put saved data on tape compatible with systems at other institutions has not been worked through as well as it could. Basic Usr Manual is well-written - but I couldn't locate reference containing Cone-of-pain and P Cygni fitting routines

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name Michael Sitko Date 11/27/85

Affiliation NOAO

IUE Program XQHMS

How many times have you made use of the facility? 2

On this visit,

Did you combine it with an observing run? Yes

How many hours were scheduled? 32

How many hours did you actually use? 20

How many spectra did you reduce? 9

Did you use the facility at night (non-supervised hours)? NO

What were the main things you wished to accomplish in this visit?

Correct spectra for CR Hits
Measure Line and Continuum fluxes
Make publication quality plots
Coadd spectra

Were you successful (if not, why not?) Yes

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) Yes. I'm gathering more data now.

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) A switch on the plotter to keep it from beeping every time the pen moves would be VERY NICE. At present, it is distracting!

Is there an up-to-date manual on how to co-add spectra (low dispersion)?

Please return this form directly to the data analysis assistant or by mail to: IUE Observatory/RDAF, Code 685.9, Goddard Space Flight Center, Greenbelt, MD 20771

Note: Carl Grady and especially Kevin Feggans were very helpful!

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name J. Willick Date Dec. 6 1985

Affiliation SSL, UCB

IUE Program EGHCB

How many times have you made use of the facility? 1

On this visit,

Did you combine it with an observing run? Yes

How many hours were scheduled? 8

How many hours did you actually use? 7

How many spectra did you reduce? 2

Did you use the facility at night (non-supervised hours)? Yes

What were the main things you wished to accomplish in this visit?

1) Determine whether Minkowski's Object has strong UV emission lines; 2) obtain as accurate a determination as possible of the UV continuum flux from this object; 3) relate these results to a high S/N optical spectrum of Mink. obj. obtained at Lick Obs.

Were you successful (if not, why not?) Emission lines were not detected with significant S/N ratio; spectrum too noisy. An estimate of the continuum flux was obtained, but its accuracy is somewhat doubtful owing to low S/N and possible influence of "camera artifacts."

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) No — another observation would be required to make further analysis worthwhile.

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) I have no suggestions for improvement as this was my first visit + my exposure to data reduction systems is limited. The assistance was excellent, and the software is very convenient.

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name Gordon MacAlpine Date Dec. 11, 1985

Affiliation Univ. of Michigan

IUE Program EGHGM – Seyfert Galaxy Observations

How many times have you made use of the facility? Once

On this visit,

Did you combine it with an observing run? Yes

How many hours were scheduled? 8

How many hours did you actually use? 13

How many spectra did you reduce? 4

Did you use the facility at night (non-supervised hours)? Yes

What were the main things you wished to accomplish in this visit?

Extract best possible line and continuum intensity measurements and make plots.

Were you successful (if not, why not?) Yes

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) No

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) Facilities and software quite good. Assistance excellent.

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name Huib Henrichs Date 31 March 1986

Affiliation JILA, Univ. of Colorado

IUE Program MLHPC and OSHCG

How many times have you made use of the facility? 2 times before

On this visit,

Did you combine it with an observing run? yes

How many hours were scheduled? 8 days

How many hours did you actually use? 8 days

How many spectra did you reduce? 55 HIRES

Did you use the facility at night (non-supervised hours)? yes

What were the main things you wished to accomplish in this visit?

I wanted to reduce all the HIRES spectra which were taken the day before in order to make a decision on how to optimize the observing strategy for the next shifts, including the VILSPA shifts.

My program has as its prime purpose to establish the (short) timescales involved with stellar wind variability. The followed approach was essential.

Were you successful (if not, why not?)

Due to the excellent cooperation of everyone involved, I was indeed able to finish all my reduction (usually 9 HIRES images) before the US2 shift on the next day started. The mission was extremely successful.

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) No

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.)

The only (relatively small) time I lost was because I did not know that the ABE editor could not be used with one of the Tektronix terminals.

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name J. W. LIEBERT Date 5/28/86

Affiliation UNIV. ARIZONA

IUE Program XLHJL

How many times have you made use of the facility? 2

On this visit,

Did you combine it with an observing run? Yes

How many hours were scheduled? ?

How many hours did you actually use? 3 hrs

How many spectra did you reduce? 2

Did you use the facility at night (non-supervised hours)? NO

What were the main things you wished to accomplish in this visit?

1) Running WBIN program to produce energy distributions
2) Coadding of two SWP reduced scans, (COADD)
3) Making a series of hardcopy wavelength "blowups" IUEPLOT
4) Making one final publication quality plot

Were you successful (if not, why not?) Yes!

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) Not for this run

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.)

I thought that the software and support by the staff (Rosalie Keith) were generally excellent. I used only a small fraction of what is offered.

Thanks!

J Lieht

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IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name MICHAEL SHARA Date 2 June 1986

Affiliation STScI

IUE Program DWARF NOVAE IN ERUPTION

How many times have you made use of the facility? 2

On this visit,

Did you combine it with an observing run? NO

How many hours were scheduled? ~~8~~

How many hours did you actually use? 7

How many spectra did you reduce? 5

Did you use the facility at night (non-supervised hours)? NO

What were the main things you wished to accomplish in this visit?

REDUCE 5 SPECTRA TAKEN IN VILSPA + PRODUCE PLOTS

Were you successful (if not, why not?) YES, COMPLETELY; EXCELLENT SUPPORT FROM KEITH.

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) NOT NEEDED

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) A PLOTTER THAT DOESN'T BEEP.

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ORIGINAL PAGE IS
OF POOR QUALITY

IUE DATA ANALYSIS FACILITY QUESTIONNAIRE

Name Hub Henrichs Date 30 Aug 86

Affiliation JILA, Univ. of Colorado

IUE Program MLIPC, MLIDM

How many times have you made use of the facility? > 4

On this visit,

Did you combine it with an observing run? yes

How many hours were scheduled? 5 days

How many hours did you actually use? ~ 6 hours per day

How many spectra did you reduce? ~60 HIRES, 3 wavelength regions each

Did you use the facility at night (non-supervised hours)? yes

What were the main things you wished to accomplish in this visit?

to look at the acquired data as soon as possible
to establish the ~~time resolution~~ (optimal) for the (in each case) next shifts

Were you successful (if not, why not?) Very succesful, only due to the incredible support of the staff, in particular Keith. Thank you very much!

(Continued on the back)

Are you planning a return visit to complete your reductions (if so, approximately when and for how long?) _____

_____

Please give your suggestions for improvements (scheduling, layout of the facility, software development, manuals, assistance, I/O services, equipment, etc.) _____

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_____

_____

_____

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