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NAS8-32667

Quarterly Progress Report

for a

Continuation of a Research Study Entitled
Advanced X-ray Astrophysics Facility (AXAF)

1.0 PERIOD OF PERFORMANCE: May, 1982 through March, 1984

2.0 SUMMARY OF MILESTONES/PROGRESS DURING REPORTING PERIOD.

- o Initiated design of common TMA Mount hardware, August, 1982
- o Supported First Design Review at TMA Contractors's Facilities, October, 1982
- o Conducted Preliminary Design Review for TMA Mount at SAO, October, 1982
- o Completed ROM cost estimate for X-ray Telescope Assembly systems for the FY82 Phase A' Reference Concept, July, 1982
- o Presented briefings on results of Phase A' Reference Concept July through December, 1982
- o Conducted TMA Mount Critical Design Review at MSFC for TMA optical houses and potential Phase B prime contractors, April, 1983
- o Completed inputs for final update of Phase B RFP requirements document for X-ray systems
- o Completed Phase A' study with documentation inputs to MSFC/SAO Report, AXAF-003
- o Prepared and presented numerous papers and technical reports; listing is given in Section 3.0
- o Supported AO briefing to experimenters, October, 1983
- o Completed fabrication of all flange and aperture plate components for first set of TMA mount hardware.
- o Completed all major procurements for X-ray test facility modifications and support equipment. Majority of design completed and all fabrication underway with completion scheduled for July, 1984 for shipment to MSFC.



3.0 SUMMARY OF TECHNICAL PROGRESS

SAO is preparing a final report which will be available late in 1984. The report will cover the in-house and subcontracted technology activities conducted during the pre-Phase B period that includes FY80-FY84. The pertinent areas of the Extended Phase A study, the TMA program and supporting technology will be detailed in this report. The progress during this reporting period has been presented in MSFC/SAO reports, SAO reports and published papers, and in a number of formal status and technical briefings. A listing of the documentation and formal briefings is given below.

3.1 Documentation

3.1.1 MSFC/SAO REPORTS

AXAF Phase A Reference Concept, MSFC/SAO, November 1980. AXAF Reference Design Concepts, MSFC/SAO AXAF-003 January 1983

An extension of Phase-A studies by Program Development and the Smithsonian Astrophysical Observatory.

An AXAF Technology Program: The Optical Flats Test, William, A.C., Harper, J.D., Reilly, J.C., Weisskopf, M.C., Wyman, C.L., and Zmbeck, M.V., NASA TM-82570, January 1984.

Summary description of techniques and results of X-ray and optical measurements on optical test flats.

3.1.2 SAO REPORTS

AXAF X-ray Scattering Measurements, the Max-Planck Institute for Extraterrestrial Physics, SAO-AXAF-82-010, September 1982.

Description, results, and interpretation of scattering measurements made on AXAF test flats at the Max-Planck Institute for Extraterrestrial Physics.

Stylus Measurements of AXAF Test Flats, SAO-AXAF-82-011, September 1982.

Results and interpretation of National Bureau of Standards (NBS) Talystep measurements on AXAF test flats.

AXAF Test Flat Measurements with the HRI, SAO-AXAF-82-012, September 1982.

Description and results of high resolution X-ray scattering measurements made on AXAF test flats at MSFC.

Low-Temperature Cooling Facility for AXAF-Preliminary Design Study, SAO-AXAF-82-013, September 1982.

Preliminary design study of a low-temperature cooling facility for AXAF.

The Off-Axis Behavior of the High Resolution Mirror Assembly, SAO-AXAF-83-014, May 1983.

Results of off-axis resolution and focal surface curvature studies for the AXAF baseline HRMA.

AXAF Effective Area Studies, SAO-AXAF-83-015, January 1983.

Results of studies of single-layer and double-layer coatings for enhancing the effective area of AXAF.

Optical Constants and Reflectivities of Nickel, Gold, and Platinum in the X-ray Region of the Spectrum, SAO-AXAF-83-016, March 1983.

Presents state-of-the-art optical constants in the 0.1 to 10 keV range.

Counting Rates for Representative AXAF Imaging Instruments, SAO-AXAF-83-017, March 1983.

Results of count rate calculation for representative AXAF instruments and source spectra.

AXAF Strawman Instrument Complement Sizing Studies, SAO-AXAF-83-018A, September 1983.

An update of SAO-AXAF-80-004.

AXAF Thermal Design: The Legacy of HEAO-2, SAO-AXAF-83-019, May 1983.

Results of a study of the applicability of the HEAO-B thermal design to AXAF.

3.1.3 PUBLISHED PAPERS

High Resolution X-ray Scattering Measurements for the Advanced X-ray Astrophysics Facility (AXAF), Zombeck, M.V., Wyman, C.C. Weisskopf, M.C., Opt. Eng. 21, 63, Jan/Feb 1982.

High Resolution X-ray Scattering Measurements, Zombeck, M.V., Braenninger, H., Ondrusch, A., and Predehl, P., SPIE Proc. 316, 174, 1982.

Stellar X-ray Astronomy with the Advanced X-ray Astrophysics Facility, Zombeck, M.V., 2nd Cambridge Workshop, Cool Stars, Stellar Systems, and the Sun, SAO Special Report 392, Vol. II, 237.

A Conceptual Support Design of the High Resolution Mirror Assembly for the Advanced X-ray Astrophysics Facility (AXAF), Cohen, L.M., SPIE Proc. 330, 1982.

The Effects of Epoxy Shrinkage on the Advanced X-Ray Astrophysics Facility Technology Mirror Assembly, Cohen, L.M., SPIE Proc. 450, 1983.

3.2 Listing of Formal Briefings

Phase A Mid-Study Review for Dr. G. Newton at MSFC, August 4, 1982

TMA Mount Design Preliminary Design Review at SAO, October 21, 1982

Program Review to Program Development (PA) Management at MSFC, October 25, 1982

Phase A Study Final Review for W.R. Marshall at MSFC, October 28, 1982

Industry Briefing at MSFC, November 9, 1982

Phase A Study Results; Science Sub-Systems, for Science Working Group at MIT, November 16, 1982

Phase A Study Final Presentation for OSSA, November 17, 1982

Predevelopment Review for Project Review Board at MSFC, December 13, 1982

Program Review for Dr. G. Newton at MSFC. April 21, 1983

TMA Critical Design Review at MSFC, April 22, 1983

Program Review for Dr. C. Pellerin at MSFC, June 7, 1983

Briefing on X-ray Detector Array Assembly (XDAA) Data Acquisition and Control Computer for Test Facility at MSFC, June 17, 1983

TMA Program Status for Dr. G. Newton at MSFC, September 19, 1983

AO Experimenters Briefings at MSFC, October 3, 1983

AXAF Briefing, House Appropriations Committee at MSFC, Oct. 17-18, 1983

TMA Assembly/Alignment Fixture Briefing at E-K, November 3, 1983

TMA Mount Design/Error Budget Briefing at P-E, December 15, 1983

TMA Program - Briefing for D. Winter. TRW at SAO, February 22, 1984