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NASA CR- 160035

**OBSERVATIONS AND ANALYSIS OF X-RAY BINARY STARS
UNDER THE IUE GUEST OBSERVER PROGRAM**

CONTRACT NAS 5-24332

Final Report

1 October 1977 to 30 April 1979

Dr. Herbert Gursky

Principal Investigator

June 1979

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

**Smithsonian Institution
Astrophysical Observatory
Cambridge, Massachusetts 02138**

**The Smithsonian Astrophysical Observatory
and the Harvard College Observatory
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Principal Investigator: Dr. Herbert Gursky

1. The principal activities during the final 4 months of this contract (not reported previously in the Quarterly Reports) were:
 - a. Dr. John Black's participation in a meeting in London, England, in April 1979: Scientific Results from the IUE Satellite.
 - b. Our preparation of one of the international collaborative papers on X-ray binaries for publication: "Ultraviolet Observations of Vela X-1," by H. Gursky et al.
 - c. Our participation in the writing and critical review, as co-authors, of three additional international collaborative papers on X-ray binaries: One each on HZ Herculis, Cygnus X-1, and Scorpio X-1.
2. Two papers have been submitted for publication under the auspices of this contract, both of them to the Astrophysical Journal:
 - a. "Ultraviolet Spectroscopic Measurements of Globular Clusters," by A. K. Dupree et al.
 - b. "Ultraviolet Observations of Vela X-1," by H. Gursky et al.
3. We presented and discussed IUE results from this contract at the following meetings:
 - a. 152nd meeting of the American Astronomical Society, Madison, Wisconsin, 25-28 June 1978.
 - b. 4th meeting of the European Collaboration on X-ray sources, Brussels, Belgium, 23-24 November 1978.
 - c. The 1st year of IUE: An International Symposium, London England, 4-6 April 1979.
4. We participated in the collection and analysis of IUE data for X-ray binaries during the Commissioning Phase (Feb-Mar 1978); the Commissioning Team's results were published in Nature, vol. 275, pp. 371-415, 5 October 1978. The X-ray binary paper appears as pages 400-403 of that report.

5. We were assigned 14 shifts of IUE observing time, equally split between the periods 28 April - 15 May 1978 and 9 July - 24 July 1978. The U.S. shifts during these periods were exclusively devoted to observations of X-ray binaries by the four U.S. programs of the international collaboration: SX2HG (this contract); XSAKD (A. K. Dupree--Harvard College Observatory/Center for Astrophysics); XBPVB (P. Vanden Bout--University of Texas); and EODCM (D. Morton--Mt. Stromlo Observatory). During the first half of each observing period, the European shift was also exclusively devoted to observations of X-ray binaries by the European programs of the international collaboration.

Because of the collaborative nature of these programs, it is not possible to separate completely the observing statistics for this particular contract. Together, the two Center for Astrophysics programs (SX2HG + XSAKD), assigned 28 observing shifts, collected 144 IUE images of 27 different objects. 143 of these images were deemed to be worth processing. We have as yet obtained no magnetic tape for SWP 1973, and have received only the raw images (no processed spectra) for SWP 1508, 1517, 1513, and for LWR 1454, 1464, 1475. We have received processed spectra on magnetic tape for all the rest. In addition, we have received magnetic tapes from our collaborators in Texas and in Europe containing data for 42 additional IUE images as part of the collaborative program. Our observational data included adequate phase coverage for 6 X-ray binaries, and partial phase coverage for 3 others.