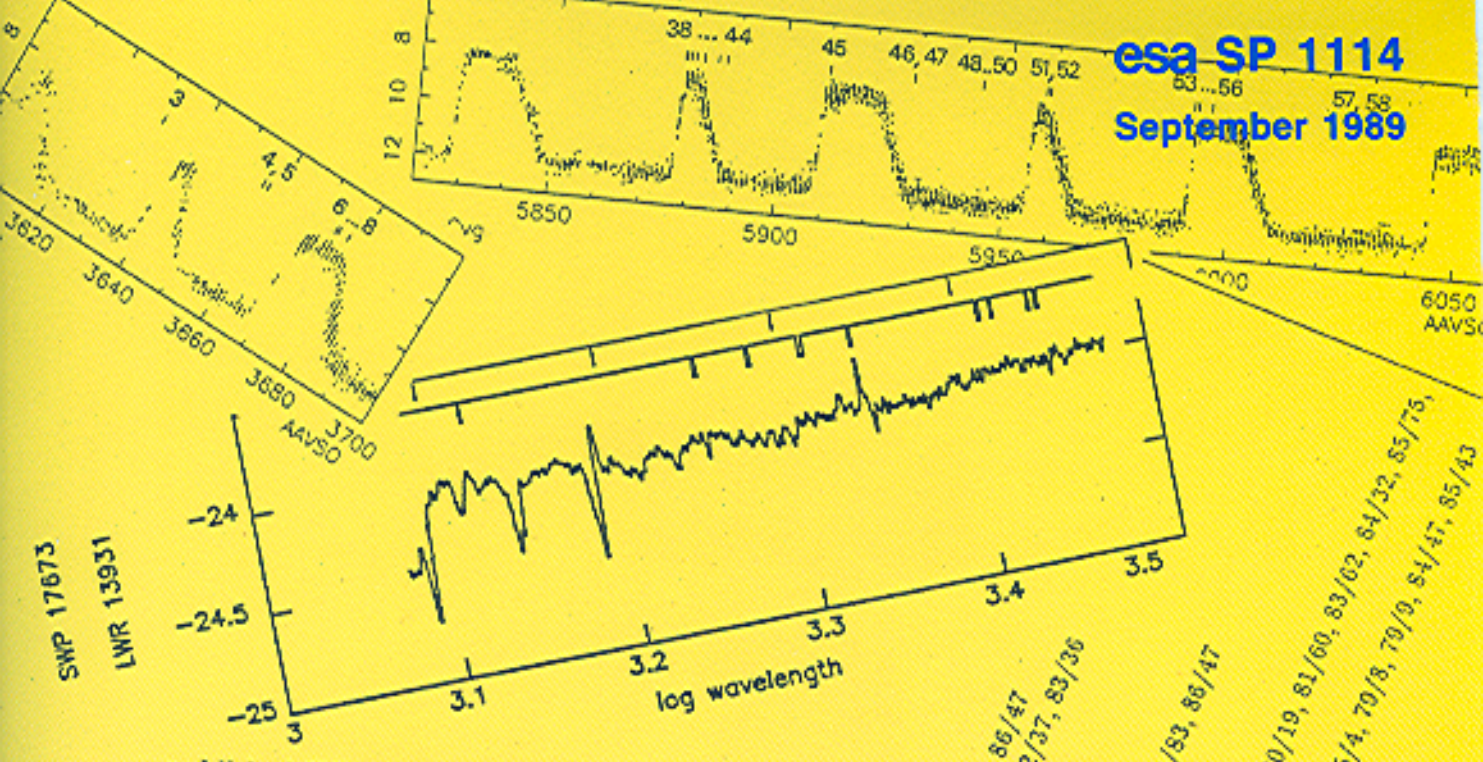
esa SP 1114
September 1989



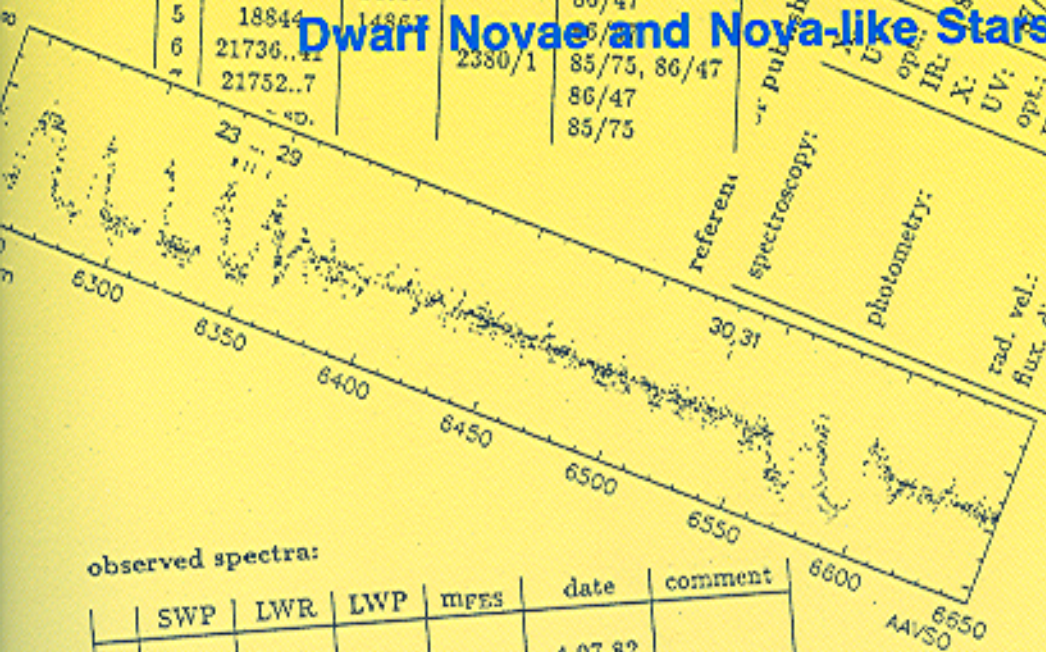
IUE — ULDA Access Guide No.1

International Ultraviolet Explorer — Uniform Low Dispersion Archive

Dwarf Novae and Nova-like Stars

published IUE observations:

	SWP	LWP	LWR	reference
1	7301	6293		81/60
2	15279	11793		82/27
3	15453	11941		86/47
4	18630	14697		86/47
5	18844	14861		86/47
6	21736..41		2380/1	85/75, 86/47
	21752..7			86/47
				85/75



observed spectra:

	SWP	LWR	LWP	mFES	date	comment
1	17356	13604			4.07.82	
2	17357				4.07.82	
3	21533		2262		13.11.83	
4	21534				13.11.83	
5	21535				13.11.83	
6	21536				13.11.83	

Gem

ernative names: AG +22 942, BD +22 1807, CDS 707, 1E 0752.1 +2208, GCRV 59196, HD 64511, PLX 1870, SBC 325, TD1 11278

ULDA tape: HD 64511

ordina[illegible]°08'03"

be:

ghtn[illegible]

tburst [illegible]

bital period: 0.176906 d

lination, eclipse: 67° ± 8°, 1

esa european space agency

esa SP 1114
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International Ultraviolet Explorer — Uniform Low Dispersion Archive

Dwarf Novae and Nova-like Stars

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Contents

IUE ULDA/USSP ACCESS GUIDES
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The *International Ultraviolet Explorer* (IUE) Satellite project is a joint effort between NASA, ESA and the SERC. The IUE Spacecraft and instruments are operated in a Guest Observer mode and are designed for Ultraviolet Spectrophotometry at a resolution of R $\approx$ 300 and R $\approx$ 10000 in the wavelength range from 1150Åto 3200Å. The IUE Spacecraft, scientific instruments, data acquisition and reduction procedures are described in *Exploring the Universe with the IUE Satellite*, Parts I, VI, and VII (*Astrophysics and Space Sciences Library* Volume 129, Y.Kondo (ed.), D. Reidel Publ. Co.) and references therein.

From the very beginning of the project it was realized that the archival value of the data obtained with IUE would be very high. As a consequence of this, the project has striven to assure easy accessibility of the archival data. Expectations in this area have been clearly fulfilled if one considers that IUE Archive retrieval has over the years already greatly exceeded the number of actual spectra taken with the instruments. The IUE *Uniform Low Dispersion Archive* (ULDA) and its *ULDA Support Software Package* (USSP) were designed to make the spectra available in a way which would not involve the project staff and thus simplify the process of consulting IUE data. The low resolution data set was chosen since it represented a data set excellently suitable for such process and also since its distribution chosen would not overload the facilities available at most of the National Host Institutes.

The subset of the IUE Spectral Archive contained in the ULDA and accessible through the USSP consists of the homogeneous low resolution data in a form directly applicable to modern Scientific Analysis techniques. Version 2.0 of the ULDA/USSP has been released recently and contains all (98.6obtained with IUE before January 1st 1987 (more than 37000 spectra). The details of the construction of the ULDA and the design of the USSP can be found in Wamsteker et al. (*Astronomy and Astrophysics* Supplement Series, to appear in 1989) and in the *ESA IUE Newsletter* **30**, which also contains a users guide. The design and software coding of the USSP has been a coordinated effort between the ST-ECF, the R.A.L., the Trieste Observatory, and the ESA IUE Observatory. The production of the ULDA and the overall coordination of the ULDA/USSP has been done at the ESA IUE Observatory at VILSPA.

Since the direct access to such large amounts of data and their optimum use in the context of scientific investigations is not necessarily very easy for scientists not familiar with many aspects of the data themselves and their applicability to specific problems, the publication of a series of ULDA/USSP access guides was considered to be beneficial for astronomers interested in using the data for specific problems. The series will consist of a number of -subject oriented- books such as this one, for which an expert in the field has been invited to take the scientific responsibility.

For this first volume, Dr. C. la Dous from the Institute of Astronomy, University of Cambridge, has compiled auxiliary information related to the IUE spectra of Dwarf Novae and Nova-like stars. Due to the large amount of work involved in such compilation and the dynamic nature of the ULDA, it was not possible to make both the existing version of the ULDA, and the auxiliary information cover exactly the same period in time. In volume I the auxiliary information extends to the end of 1987 while ULDA version 2.0 extends only to the beginning of 1987. This was, however, felt to only be a minor inconvenience since additional data always can be obtained from any of the main IUE data archives.

I would like to thank *Kluwer Publishers* for granting permission to use a subset of the original publication in *Space Science Reviews* (see Vol. **49**, p. 425, 1989) in advance of publication and thus allow for publication of the *ULDA/USSP Access Guide* Vol. **1** to coincide with the release of ULDA /USSP version 2.0.

Further volumes of the ULDA/USSP Access Guide will be published as soon as the necessary data compilation has been completed by the authors.

For details of the access to the ULDA through the National Hosts in 15 countries we refer to the details supplied regularly in the *ESA IUE Newsletters*. Any inquiries on the access to the ULDA and the use of the USSP should be directed to the National Host Managers (see *ESA IUE Newsletter* **30**) and inquiries about the specific data content of the ULDA should be directed to the ULDA Manager at the ESA IUE Observatory at VILSPA, Madrid, Spain.

Dr. Willem Wamsteker

ULDA/USSP Access Guide I: Background Information on Low Resolution IUE Spectra of Dwarf Novae and Nova-Like Stars

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Abstract: Background information is presented on all the low resolution IUE spectra of dwarf novae and nova-like stars that were taken until the end of 1987 in order to enable optimum usage of the low-resolution IUE archive. Details are given on the individual exposures, to the extent available, their position in the outburst light curves is given, physical information about each system, and a comprehensive list of references for published observations in all wavelength ranges.

1. Introduction - Dwarf Novae and Nova-Like Stars

Dwarf novae and nova-like stars are two rather similar sub-classes of cataclysmic variables. In these systems a cool main sequence star, through Roche lobe overflow loses material to its companion, a white dwarf. This material builds up an accretion disk around the white dwarf, and it is this disk which is the main source of ultraviolet (and the bulk of the optical) radiation of the entire system. At quasi-periodic intervals dwarf novae undergo brightness increases (outbursts) of several magnitudes which are understood to be due to rapid changes in the accretion disk. These outbursts are accompanied by rather spectacular changes in the spectral appearance of both the optical and the ultraviolet. Nova-like systems are more stable objects, and so are their spectra; but considerable changes can occur here too. For a review of observational properties and current theoretical understanding of these systems see, e.g., la Dous (1989).

2. Description of the Data

For over ten years dwarf novae and nova-like stars have been observed with the IUE satellite. To date the data base of IUE spectra of these objects contains on the order of 2000 mainly low resolution spectra of over 100 objects. Only a small fraction of these have appeared in publications. It is the aim of this data collection to provide in an easily accessible form all the background information necessary in order to allow for the best possible use to be made of the data base in the area of dwarf novae and nova-like stars. This background information consists of general data on the individual systems, complete lists of IUE images taken until the end of 1987, to the extent available, the AAVSO light curves are given for the time around the IUE observations, and, last not least, comprehensive lists of references of publications based on IUE data as well as on observations in any other wavelength range. In the following these sections of data will be described in more detail.

This publication is a shortened version of *A Catalogue of Low-Resolution IUE Spectra of Dwarf Novae and Nova-Like Stars* (see *Space Sciences Reviews* Vol. **49**, p. 425, 1989). The Atlas contains all the information included here together with a graphic representation of the all spectra and some additional tables containing summary information.

[1] in collaboration with Janet A. Mattei, American Association of Variable Star Observers, 25 Birch Street, Cambridge, Mass. 02138-1205, U.S.A.

3. System Parameters and The Like

The objects in this atlas are sorted by their variable names with those few objects which have not yet been assigned such names following at the end. For each object a short list of the most essential data concerning this object is given. There is a list of alternative names. These were taken mostly from SIMBAD, complemented by additional names given in Ritter (1987). The entry "ULDA Tape" gives the homogenized object identifier used in the ULDA (for details see Wamsteker et al., 1989). The object coordinates are given for 1950.0 and do not necessarily agree with those in the ULDA/USSP, which has retained the original coordinates given by the observer. This is followed by the system class (the abbreviations used are those defined in Ritter, 1987), the brightness or brightness range, in the normal state (quiescence for dwarf novae, high for nova-like objects) and, separated by comma, for the outburst or low state, respectively; magnitudes are understood to be in V light unless indicated otherwise. Then the outburst period of its range, and for SU UMa stars the superoutburst period are given, the orbital period, the angle of inclination, and the number of eclipses seen in the optical. Most of this information was taken from Ritter (1987).

4. List of Observed Spectra

The list contains the numbers of the observations of that particular object it deals with. The image numbers of the long and short wavelength spectra which are taken close enough in time to be considered representative of a single epoch appear on the same line under the respective camera name. The images are given in chronological order of the short wavelength (SWP)camera.

FES magnitudes have been computed from the FES counts given in the IUE merged log using the calibration by Holm and Rice (1981) and the B-V values from Bruch (1984); in cases where he does not provide any B-V, a value of zero was adopted. Given the normally rather low brightness of cataclysmic variables, the indicated magnitudes are not highly reliable (our guess is an accuracy of 0.2 mag at best) but are meant as a rough indication of the optical flux at the time of the IUE observation. When using the FES magnitudes as photometry the sensitivity variation as determined by Barylak and Imhoff (1988) should be taken in consideration. In those cases were FES count are given for both cameras, an average of the resulting magnitudes is given; when these two values differ by more than about 0.4 mag, this is indicated by a question mark next to the average magnitude value. When no magnitude is given, mostly the flux level was too low for FES count to be obtained, which translates into a magnitude of less then 14.5. The dates indicated refer to the beginning of the exposure of the short wavelength observation (if there is one, otherwise to the beginning of the long wavelength observation). In the section 'comment' it is indicated when any of the observations was through the small aperture.

5. AAVSO Light Curves

For approximately half of the IUE observation, amateur observations of optical flux variations are available around these times. The original observations by the American Association of Variable Star Observers (AAVSO) were kindly provided to me and edited by J. Mattei, the Director of the AAVSO. Parts of the light curves are displayed so that it can be seen clearly at what phase of the outburst light curve spectra were taken; downward pointing arrows indicate upper brightness limits. Tick marks above the light curves indicate times of IUE observations, their numbers correspond to those in the list of observations. The brightness is given in magnitudes, times are in JD - 2440000.

6. Published IUE Observations

A list is given of published articles where any (parts) of the low resolution IUE spectra of that particular object are displayed in a figure. If it cannot be decided which spectrum is displayed, all possible alternatives are given, followed by a question mark. The key for the codes references is given in Appendix A (see also next section).

7. References for Published Observations

Finally for each object a comprehensive list of published observations in all wavelength ranges is given. Only literature is included in which an actual figure of the observations is shown, and which appeared before the end of 1987. The code numbers consist of two parts, the first of which gives the year of publication. Within each year the references are ordered by alphabet of the first author's name and numbered consecutively; this number is the second part of the literature code. A complete list of these references appears in Appendix A.

References are given in the shortest possible form, giving names of up to two authors, if there are more, 'et al.' stands for all but the first one. Journal are abbreviated in the conventional form; titles of books are abbreviated as well, for proceedings of IAU colloquia and symposia only their numbers are given. The keys for all abbreviations precede the list of actual references.

8. Alternative Names

Appendix B is an alphabetic list of all the star names, preceeded by the variable names or the most commonly used names, respectively, and the page number in this ULDA Guide. For each of the other names the corresponding variable and the page number are given.

Acknowledgements

The compilation of these data has taken many years, and in the course of time many friends and colleagues, through discussions, providing data, or introducing me to analysis systems, contributed to its growth; to all of them I want to express my warmest thanks. In particular my gratitude is to Dr. R. Schoembs who first introduced me to the field of cataclysmic variables and who initiated the idea of preparing this atlas. The staff at VILSPA and Rutherford Appleton Laboratory, the latter to a very large measure through the initiative of Dr. C. Blades, for several years provided me with newly released IUE spectra. The bulk of the data reduction was carried out at the RDAF at the NASA/GSFC, for whose kind hospitality and support during several stays I am very thankful. This work never could have become what it is without the invaluable, most kind, patient, and thoughtful help of Mrs. R. Ewald (RDAF) who assisted me in all practical matters. Dr. C. Grady was an inexhaustible source of scientific stimulation and ideas for improvement of the atlas. Mrs. B. Enoch and Mrs. C. Perry (NSSDC) drew far over 1000 spectra from the IUE archive; and it was through the NSSDC that I had access to the SIMBAD data bank. Mrs. E. Waagen compiled the AAVSO light curves. And finally, a very generous travel grant from the SERC enabled me to complete the project during a lengthy stay at the GSFC.

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