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High-dispersion microfiche atlas of OB stars for the first 10 years of IUE*,**

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Abstract. — An atlas on microfiche is described containing nearly 7000 high-dispersion spectra of OB stars obtained during the first 10 years with the IUE satellite. The data set is nearly complete for the selected time interval. The plotted wavelength range is from 1160 to 1890 Å at the original IUE sampling intervals. The atlas is available by request.

Key words: atlases — catalogs — stars: early-type — ultraviolet: stars

1. Introduction

Quick-look tools for evaluating the low-dispersion spectra obtained with the *International Ultraviolet Explorer* (IUE) are easily accessible. The ULDA/USSP (Wamsteker et al. 1989), the Rutherford Microfiche Atlas (Giaretta 1984, 1985), and the printed atlases by Wu et al. (1983), Heck et al. (1984) and Feibelman et al. (1988) are examples of quick-look facilities to assist the researcher before a spectrum is requested from the IUE archives. An equivalent tool for high-dispersion IUE spectra, each containing more than 100 times more datapoints than a low-dispersion spectrum, does not exist, one of the main reasons being the large size of such a database. The atlas of O stars by Walborn et al. (1985), with about 100 selected spectra of O and B stars, contains less than 1% of the available high-dispersion spectra.

In the course of our ongoing research on spectral variability among early-type stars it became desirable to have available a rather complete overview of the many high-dispersion IUE spectra of hot stars. The formulation of scientific criteria for the study of specific astrophysical phenomena is much facilitated by the availability of such a overview. Additionally, the information available in the IUE Merged Log is often inadequate to judge whether a detailed analysis of a given spectrum is worthwhile. There are many objects with dozens of images, which makes a screening tool quite important. An electronic search through large amounts of data is within the reach of many astronomers, but for a quick view of a large number of spectra extending over more than 700 Å with a resolution of the order of 0.1 Å the needed capacity of the equipment is considerable, not to mention the amount of time and effort to collect the images.

The use of microfiche as transport media has other justification. With the advance of present-day information exchange technology, a large database like the IUE archives is readily accessible in many efficient ways. This is true, however, only for researchers who have access to sophisticated reading devices, which therefore excludes, at least at present, some fraction of the astronomical community. The present form of the atlas is intended to avoid the need for high-tech computers for consulting the data by the potential user.

The atlas has been produced in 200 copies and distributed to astronomical libraries around the world.

2. Contents of the atlas

The high-dispersion SWP spectra of all OB stars obtained in the first 10 years of IUE operations are presented as microfiche plots. The first entry in the atlas is SWP1164, which was obtained on 1978 March 15, whereas the most recent entry is SWP33123, obtained on 1988 March 20.

*Based on observations by the International Ultraviolet Explorer, collected at NASA Goddard Space Flight Center and Villafranca Satellite Tracking Station of the European Space Agency

**Table 4 is available in electronic form: see the Editorial in A&AS 1994, Vol. 103, No. 1

Table 1. IUE object classes, number of spectra and limiting magnitudes in the atlas

Class	Objects	Number	V_{min}	V_{max}
12	Main Sequence O	573	2.2	13.0
13	Supergiant O	509	1.7	13.3
14	Oe	216	2.2	11.5
15	Of	186	2.2	12.5
16	Sd O	211	8.3	14.9
20	B0 – B2, V – IV	1102	1.0	12.4
21	B3 – B5, V – IV	552	0.5	11.0
22	B6 – B9.5, V – IV	433	0.2	9.9
23	B0 – B2, III – I	826	0.1	13.2
24	B3 – B5, III – I	195	1.6	13.7
25	B6 – B9.5, III – I	201	0.1	11.8
26	Be	1007	0.6	10.3
27	Bp	419	1.8	13.0
28	Sd B	23	8.5	13.6
39	Composite	106	1.9	7.2
52	Irregular Variables	3	11.5	12.1
53	Regular Variables	42	2.8	8.5
59	X-ray	108	2.0	13.2
60	Shell Star	67	3.0	11.9
66	Interacting Binaries	159	2.1	9.4

Since many spectra of a given O or B star can be found in several object classes (as listed in the IUE Merged Observing Log), the included spectra are mainly classes 12-16 (O stars), 20-28 (B stars), 39 (composite), 53 (regular variables), 59 (X-ray sources), 60 (shell stars), and 66 (interacting binaries). For example the star γ Cas is found with class designations 14, 20, 21, 26 and 59. Many stars in object class 39 are listed as spectral type K or M, but in all cases the companion star is an O or a B star. A summary of properties of included stars in these categories is listed in Table 1.

The complete atlas contains 6940 spectra from a total of 1466 different objects and is organized as 26 spectra on each of 267 microfiche, arranged by right ascension. This order is accurate to a high degree, but due to the inhomogeneous coordinates listed in the current Merged Observing Log, objects may appear out of order in a few places, especially in crowded regions. Each fiche is labeled at the top by the right ascension range of the 26 spectra included and by a sequential index number into Table 4 (accessible in electronic form), as described below. Multiple spectra of the same object are sorted by SWP number.

Each fiche has 13 rows and 16 columns of plots, where the left-hand 8 columns contain the first 13 spectra and the right-hand 8 columns contain the spectra for the next 13 stars. Thus, a complete spectrum comprises 8 separate plots that are in adjacent columns across the fiche in wavelength order with a 10 Å overlap between separate plots. Specifically, the eight wavelength regions are 1160–1260, 1250–1350, 1340–1440, 1430–1530, 1520–1620, 1610–1710, 1700–1800 and 1790–1890 Å.

3. Data processing of the spectra

The spectra reproduced in this atlas were acquired from the IUE archives maintained by the NASA/GSFC Laboratory for Astronomy and Space Physics in an on-line archive (Sullivan et al. 1987). The processed version of each spectrum as it existed in the archives in March, 1988 is the version reproduced in the atlas. None of the spectra were reprocessed for the atlas. The image processing system used to reduce raw IUE data (IUESIPS) has undergone a number of changes and modifications since 1978, and the archives are thus not homogeneous. The IUESIPS modification most apparent to the user of this atlas is the implementation of the "new" software in November 1981 at GSFC and March 1982 at VILSPA. At that time, the spacing between sampling points used in the extraction of the spectral data was changed from $\sqrt{2}$ to $\sqrt{2}/2$ pixels, effectively doubling the sampling frequency. Also at that time, the explicit geometric correction of the raw science image was abandoned in favor of implicit geometric correction, eliminating some of the two-dimensional smoothing. The combination of these two changes results in a significantly noisier spectrum compared to a spectrum processed with the previous version of IUESIPS. Users of this atlas should be aware that this discernible difference in signal-to-noise characteristics between spectra acquired before and after the dates these changes were implemented do not represent a difference in the signal-to-noise ratio or quality of the raw data, but only a difference in processing technique.

Likewise the wavelength calibration for high dispersion was updated five times between July 1980 and June 1984, but not again until April 1988. Spectra acquired more than a year or two after each of these wavelength calibration updates show increasing systematic errors in the wavelength assignments. As noted above, this atlas is intended for quick-look analysis only. In-depth analysis of a specific group of spectra may require reprocessing of the group with the currently available IUESIPS system. Requests for reprocessing of spectra will be considered by Dr. D. West, IUE Observatory, NASA/GSFC, Code 684, Greenbelt, MD 20771.

The spectra included in this atlas were further processed from the archived version specifically for this project. The IUE echelle order overlap has been corrected according to Bianchi & Bohlin (1984) and a modified Barker (1984) ripple correction was used. A quadratic polynomial was fit to the raw Barker corrections and the grating constant as a function of the echelle order number from 78 to 117. If the RMS scatter of the fit was less than 200, the fit was used to correct the grating constant from order 60 to 120; the indication "USE" appears on the plot. Otherwise, "OMIT" indicates that no change is made to the ripple correction of the archival version of the spectrum. Fluxes have not been absolutely calibrated and are plotted as Flux Numbers (FNs). Plot symbols are

Table 2. Repeat observations as a function of number of stars in the atlas. For the most frequently observed stars the names are given

# Stars	# Spectra	# Stars	# Spectra	Name	HD	# Spectra	Name	HD	# Spectra
725	1	3	18	λ Lep	34816	37	θ CrB	138749	58
279	2	4	19	V1030 Ori	37479	37	τ Sco	149438	59
140	3	4	20	GP Vel	77581	37	β Cep	205021	60
67	4	4	21		149730	37		153919	61
33	5	4	22	P Cyg	193237	37	ζ Oph	149757	65
29	6	5	23	λ Cep	210839	37	19 Cep	209975	65
19	7	2	24	κ Ori	38771	40	68 Cyg	203064	66
11	8	5	25	CX Dra	174237	40	ζ Cas	3360	67
9	9	3	26	κ Cas	2905	41	α Cam	30614	79
17	10	2	27	λ Eri	33328	41	66 Oph	164284	88
14	11	2	28	β Per	19356	44	ω Ori	37490	99
9	12	3	29	FY CMa	58978	45		128220	102
9	13	1	30	σ Sco	147165	46	η Uma	120315	142
4	14	2	32	HR 2142	41335	53	ξ Per	24912	149
5	15	3	33	δ Ori	36486	55	γ Cas	5394	162
10	16	1	34	ϵ Ori	37128	55	59 Cyg	200120	170
5	17			V761 Cen	125823	57			

used to flag special cases of saturation (+), reseau (×), and extrapolation in the ITF (△).

We are aware that new processing algorithms have been developed which will be used to reprocess the entire IUE archive for the creation of the Final Archive. These new processing techniques are expected to improve the signal-to-noise of the high dispersion extracted spectral data by 50-100% (Nichols-Bohlin 1992). In addition, corrections for the interorder overlap and a global background correction will be implemented for high dispersion. Because the complete dataset presented in this atlas will not be processed for the Final Archive for several years, and because parts of our research, and hopefully also that of others, would benefit from the availability of such a facility, we have compiled all high-dispersion spectra of OB stars on microfiche. We limited the dataset to spectra obtained within the first 10 years of the spacecraft, amounting to almost 7000 spectra. However, the number of available spectra is still increasing at this writing. Between the most recent spectrum in the atlas and November 1992 the number of high-resolution spectra of O and B stars has increased with about 2100 of 420 different objects, with only a minor fraction of objects not contained in the atlas.

4. Properties of the dataset

Out of the 6940 spectra, 5249 were acquired at NASA GSFC and 1691 at VILSPA. Since the atlas contains in a statistically sense a very complete sample, it is of interest to investigate the distribution of objects and number of spectra. Table 2 gives the number of stars against repeat observations. For example, there are 725 stars for which only one spectrum can be found in the atlas, and there are five stars (59 Cyg, γ Cas, ξ Per, η Uma and HD 128220) of which there are more than 100 spectra plotted. The faintest star in the atlas has visual magnitude 14.9 (the subdwarf VZ1128, SWP21683 on fiche 149), and the longest exposure time is 898 minutes (SK 160, SWP16045 on fiche 17).

5. Limitations and peculiarities

The original master list contained 7150 entries, all of which were requested from the mass-storage facility at GSFC, but 210 spectra were not available at the time of the production.

Although great care has been taken to optimize the contents of the atlas, some unintentional peculiarities were found afterwards, mainly because the extraction procedure was highly automated. Nearly all these oddities can be classified in one of the following categories: (1) The spectrum should not have been included in the atlas. For example, a few spectra of stars of spectral type A, F, K and S and a TFLOOD lamp exposure are included. (2) The spectrum is slightly misplaced on the microfiche and does not appear together with the other spectra of the same star. (3) The spectrum is totally misplaced and appears on the wrong fiche. (4) Parts of the spectrum are missing.

A non-exhaustive list of corrections according to these four categories includes the following: (1) Inappropriately included spectra appear in Table 3, along with their location. (2) Slightly displaced spectra are on fiche numbers 50 (SWP15986 of HD269006) and 94 (SWP4819 of HD47129). (3) SWP32677 (HD58978) appears on fiche 14 instead of 109, and SWP26337 (HD200120) should be on fiche 241, rather than on 22. (4) The last fiche contains only the first wavelength frame for the last 11 spectra.

Table 3. Spectra of stars unintentionally included in the atlas

Fiche	Name (HD)	Spectrum	SWP	Class
19	MIRA B	WD	20420	66
32	BD+16516	K2 V	32659	66
57	35155	S3	22638	66
82	38090	A3 III	18820	60
84	39060	A5	11216	60
88	41511	A2	11215	60
88	42111	A1 IV	18821	60
112	62623	A3 II	25525	66
128	88195	A1 V	18819	60
139	97528	A2 IV	30367	66
139	98058	A7 IV	15504	60
140	102647	A3 V	31108	30
143	108283	F0	15506	60
146	112028	A1 IV	18822	60
202	163296	A2	8003	60
228	192518	A5 IV	15511	60
233	195325	A0 V	5950	26
233	195325	A0 V	18140	60
233	195325	A0 V	18141	60
243	TFLOOD		28493	99

Reports of additional oversights are welcomed by the authors.

6. The catalog of observations

The list of spectra included in the atlas appears in a format similar to the hardcopy of the IUE Merged Observing Log that is provided by the IUE Project. A sample page is included in Table 4 (the complete table is accessible in electronic form). The quantities in Table 4 are from the 1988 version of the Merged Observing Log that originally defined the set of spectra for the atlas. Column (1) identifies the index number of the fiche containing the spectrum. When there is no entry in Col. (1), that spectrum was not available from the IUE archives on the date of our microfiche production run. Column (2) is the object name, and the unique IUE program identification is in Col. (3). The right ascension and declination appear in Cols. (4) and (5). The V magnitude, $B-V$ color or color excess when preceded by E, and the spectral type are in Cols. (6), (7), and (8), respectively. The object class defined by the IUE Project is in Col. (9), while Col. (10) is the SWP camera image sequence number. The first character of Col. (11) indicates whether the object was in the large (L) or small (S) IUE aperture, and the second character reports the status of the large aperture cover open (O) or closed (C). The commanded exposure time in minutes and seconds is in Col. (12). Items (13) and (15) are the date of the observation and the date when the data were processed by the production IUE spectral extraction software, respectively. The ground station that recorded the spectrum is VILSPA (V) or GSFC (G) in Col. (14). The final Col. (16) contains the standard IUE comments about the exposure level of the image.

The full table is enclosed with the atlas and is also available in electronic form via an anonymous ftp copy from the Centre de Données de Strasbourg: see the editorial in A&AS, 1992, Vol. 96 (3).

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Table 4. Catalog of spectra included in the High-dispersion microfiche atlas of OB stars (first page only)

Fiche	Object ID	Program ID	RA hr mn sec	Decl deg ' "	Vis Mag	B-V E(B-V)	Spec Type	Ob Cl	SWP Number	AL	Expose Time min sc	Observation Date yrday hr mn	S	Proc Date yrday	Observer's Comments
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)		(14)	(15)
1	HD225094	NSCAD	00 00 49.9	+63 21 45	6.20	E0.05	B3 IB	24	8353	LO	065 00	80085 00 37	G	80085	C=1.3X,B=62
1	HD225094	UK350	00 00 51.0	+63 22 00	06.20			24	9415	LO	075 00	80184 00 32	V	80184	502 SAT AT 1900 A
1	HD225094	NSEJR	00 00 50.0	+63 21 46	6.2		B3 IB	24	18688	LO	060 00	82333 10 22	G	82335	C=215,B=42
1	HD225253	HWDAK	00 02 09.	-71 43 05	5.6	E-.13	B9 III	25	4413	SC	013 20	79058 15 24	G	80082	MAXDN=225
1	HD108	OSPSC	00 03 26.	63 24	7.48	E0.48		13	1589	SC	033 00	78140 16 50	G	80016	
1	HD108	MLJBH	00 03 26.	63 24	7.4	E0.5		15	2126	SC	028 00	78208 17 57	G	80066	
1	HD108	LSDKW	00 03 26.	63 24	7.4			15	2292	SC	030 00	78226 13 21	G	80038	
1	HD108	LSDKW	00 03 26.	63 24	7.4	E0.46		15	2386	SC	040 00	78236 11 21	G	80048	
1	HD108	LSDKW	00 03 26.	63 24	7.4	E0.46		15	2501	SC	040 00	78249 01 36	G	80065	
1	HD108	LSDKW	00 03 26.	63 24	7.4	E0.46		15	3137	SC	030 00	78298 10 27	G	80224	
1	HD108	LSDKW	00 03 26.	63 24	7.4	E0.46		15	3273	SC	040 00	78312 23 24	G	80101	
1	HD108	LSDKW	00 03 26.	63 24	7.4	E0.46		15	3376	SC	027 00	78322 08 46	G	79297	
1	HD108	IGBDY	00 03 26.9	+63 24 06		E0.51	O6	12	6134	SC	100 00	79222 04 19	G	79272	E=2X,B=62
1	HD108	NSCAD	00 03 25.9	+63 24 05	7.50	E0.05	O7 IB	13	8352	LO	055 00	80084 23 06	G	80085	E=236,C=1.5X,B=60
1	HD108	HSCPC	00 03 26.9	+63 24 06	7.5	E0.48	O7	15	13910	LO	025 00	81126 18 31	G	81127	E=177,C=190,B=60
1	HD144	MLDGP	00 03 49.7	+63 55 05	5.5	E0.03	B8 III	26	15936	LO	020 00	82003 06 12	G	82004	C=1.1X,B=72
1	HD144	BEFPB	00 03 49.7	+63 55 05	5.6		B8 IV	26	20433	LO	014 00	83191 15 03	G	83192	C=200,B=42
1	HD144	BEITS	00 03 49.7	+63 55 05	5.6		B8 IV	26	29402	LO	020 00	86281 08 13	G	86281	C=239,B=54
1	HD358	BPDJJ	00 05 47.8	+28 48 52	2.0		B7 III	27	14953	SO	000 50	81254 10 19	G	87154	C=2X,B=43
1	HD358	BPDJJ	00 05 47.8	+28 48 52	2.0		B7 III	27	14954	SO	000 40	81254 10 50	G	87154	C=2X,B=40
1	SB58	GA093	00 07 30.0	-26 30 00	13.01			16	23345	LO	363 00	84177 22 44	V	84178	403
1	HD593	GA153	00 07 56.3	+59 23 43	06.91			20	25175	LO	013 54	85036 06 06	V	85036	501
1	HD698	HSHRP	00 08 58.5	+57 56 01	7.1		B5 III	26	26308	LO	060 00	85180 13 35	G	85182	C=230,B=135
1	HD698	OD98K	00 08 58.5	+57 56 01	7.1		B9 III	66	30287	LO	120 00	87040 22 53	G	87043	C=1.1X,B=72
1	HD886	UK022	00 10 42.0	+14 54 00	02.80			20	2469	SC	000 25	78246 22 55	V	80007	70 GOOD FOR SW
1	HD886	SS2JJ	00 10 39.	14 54 21	2.8	-.23		20	3110	SC	000 19	78296 07 46	G	80090	
2	HD886	SS2JJ	00 10 39.	14 54 21	2.8	-.23		20	3945	SC	040 00	79019 00 25	G	80126	MAXDN=255
2	HD886	SS2JJ	00 10 39.	14 54 21	2.8	-.23		20	3946	SC	000 20	79019 01 34	G	80126	MAXDN=250
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5249	SC	000 18	79136 16 27	G	80174	C=170,B=25
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5250	SC	000 22	79136 17 03	G	80174	
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5251	SC	000 20	79136 17 38	G	80174	C=1.5X,B=40
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5252	SC	000 18	79136 18 07	G	80174	C=250,B=40
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5253	SC	000 16	79136 18 37	G	80174	C=235,B=33
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5254	SC	000 14	79136 19 06	G	80174	C=205,B=30
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5255	SC	000 14	79136 19 35	G	80174	C=205,B=33
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5256	SC	000 14	79136 20 04	G	80166	C=205,B=30
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5257	SC	000 14	79136 20 38	G	80207	C=190,B=30
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5258	SC	000 14	79136 21 06	G	85112	C=195,B=30
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5259	SC	000 14	79136 21 34	G	80207	C=195,B=30
2	HD886	BCBJL	00 10 39.4	14 54 21	2.84	E0.01	B2 IV	20	5260	SC	000 14	79136 22 08	G	80213	C=185,B=30
2	GAMPEG	DGDSL	00 10 38.9	+14 53 59	2.80		B2 IV	20	5721	SC	000 12	79186 15 45	G	79191	C=165,B=27
2	HD1279	CM2GH	00 14 29.9	+47 39 59	5.79	-.09	B7 III	25	6756	SC	014 59	79278 02 21	G	79280	C=190,B=35
2	AOCAS	MF2YK	00 15 03.	51 09 19	6.05	E0.19		13	1692	SC	006 30	78153 09 58	G	80034	
2	AOCAS	MF2YK	00 15 03.	51 09 19	6.05	E0.19		13	1712	SC	007 00	78155 08 05	G	80054	
2	AOCAS	CM2GH	00 15 02.	51 09	6.05	E0.34		13	2363	SC	012 00	78234 10 33	G	80206	
2	AOCAS	CM2GH	00 15 02.	51 09	6.05	E0.34		13	2384	SC	012 00	78236 09 34	G	80206	
2	AOCAS	MF2YK	00 15 03.	51 09 19	6.05	E0.19		13	2489	SC	009 00	78248 00 39	G	80055	
2	AOCAS	CM2GH	00 15 03.	51 09	6.05	0.03		13	3231	SC	015 00	78310 02 10	G	80111	
2	HD1337	ES2AS	00 15 03.	51 09	5.80	E0.24		53	3422	SC	008 00	78327 07 57	G	80166	
2	HD1337	CBBGM	00 15 03.3	51 09 19	6.05	E0.19	O9 III	13	4455	SC	008 00	79061 23 12	G	80190	MAXDN=185
2	HD1337	CBBGM	00 15 03.3	51 09 19	6.05	E0.19	O9 III	13	4456	SC	008 00	79061 23 50	G	80190	MAXDN=190
2	HD1337	CBBGM	00 15 03.	51 09 20	6.05	E0.19	O9 III	13	4745	SC	009 00	79083 20 31	G	80153	MAXDN=180
3	HD1337	CBBGM	00 15 03.3	51 09 20	6.05	E0.19	O9 III	13	5185	SC	008 00	79129 20 53	G	80153	C=190,B=40
3	HD1337	CBBGM	00 15 03.3	+51 09 20	6.0	0.19	O9 III	13	5477	SC	008 59	79161 14 11	G	80153	C=215,B=35
3	HD1337	CBBGM	00 15 03.3	+51 09 20	6.0	0.19	O9 III	13	5482	SC	007 00	79161 22 51	G	80153	E=228,C=220,B=35
3	HD1337	CBBGM	00 15 03.3	+51 09 19	6.05	E0.19	O9	39	7662	LO	004 29	80016 00 35	G	80017	C=216,B=35
3	HD1337	CBBGM	00 15 03.3	+51 09 19	6.05	E0.19	O9	39	7666	LO	004 29	80016 04 41	G	80017	C=230,B=36
3	HD1337	CBCRK	00 15 03.0	+51 09 24	6.1	E0.19	O9 III	12	10146	SO	008 00	80260 02 16	G	80260	C=215,B=35
3	HD1383	NSCAD	00 15 33.9	+61 26 57	7.6	E0.49	B1 II	23	8332	LO	100 00	80082 23 17	G	80084	E=246,C=230,B=62
3	FB5084	GM081	00 16 27.7	+31 11 34	11.15			20	25191	LO	401 00	85038 06 06	V	85038	403
3	HD1909	IGGCB	00 20 43.0	-31 18 47	6.5		B9 V	22	23106	LO	025 00	84146 16 16	G	84149	C=230,B=75
3	HD1976	RD016	00 21 33.0	+51 45 00	05.60			21	4905	LO	005 40	79099 10 14	V	80115	50