Catalogue of Be Stars

(Jaschek and Egret 1982)

Documentation for the Computer-Readable Version

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Abstract

This document describes the computer-readable version of the *Catalogue of Be Stars* (Jaschek and Egret 1982) distributed by the Astronomical Data Center, NASA Goddard Space Flight Center. This catalog is a compilation of observational data concerning 1,159 stars of type Be and is part of a larger effort to produce the *Catalogue of Stellar Groups*, a list of stars grouped according to spectral peculiarities. Listed for each star are identifications, position, V, U-B, B-V, radial velocity, MK spectral classification with the dispersion used, rotational velocity, and several flags indicating miscellaneous information.

The catalog is in two files: the first lists the identifications, coordinates, photometry, radial velocity, and MK spectral type; the second includes additional identifications, rotational velocity, and miscellaneous flags.

The present document describes the overall file structure and the individual data fields.

1 Introduction

A copy of this document should be distributed with every copy of the computer-readable catalog.

1.1 Description

The *Catalogue of Be Stars* (CBeS; Jaschek and Egret 1982) is a compilation of data concerning stars of type Be. For the purposes of this compilation, a Be star is defined as "a non-supergiant B star which showed emission in one Balmer line at least once" (Jaschek and Egret 1982). Stars without published MK spectral types have been excluded except for 132 stars from Bidelman and MacConnell (1973), who used the above definition but included no spectral types. 1,159 stars are included in this list.

The catalog is in two files. The first file lists the following information for each star:

- Identifications: DM number or CSI key, Be star number, and HD number
- Equatorial and galactic coordinates
- V, U-B, B-V, and associated quality indices
- Radial velocity and quality index
- MK spectral type with dispersion used or quality index

The second file repeats the identifications and MK spectral types of the first file in addition to the following information:

- Rotational velocity and probable error
- Two flags indicating whether the star is a visual or spectroscopic binary
- Three flags indicating in what other photometric system(s) the star has been measured
- Star name and variable star name

1.2 Reference

Jaschek, M. and Egret, D. 1982, *IAU Symposium No. 98, "Be Stars"*, eds. M. Jaschek and H. G. Groth, p. 261.

2 Structure

2.1 Each File as a Whole

The CBeS consists of two files. Table **??** gives the machine-independent tape-file attributes. All records are of fixed length. The first file lists the main catalog data (Table **??**), and the second file lists the additional information (Table **??**). Detailed descriptions of each file are given below.

Quotations in any of the following descriptions come from Catalogue of Be Stars unless otherwise noted.

Catalogue of Be Stars (Jaschek and Egret 1982)				
File	Contents	Record Format	Record Length	Number of Records
1	Catalog	Fixed	126	1,159
2	Additional Info.	Fixed	96	1,159

Table 1: Summary Description of Catalog Files

2.2 Catalog (File 1 of 2)

This file lists the main catalog data.

DM/CSI number Durchmusterung numbers are indicated by 'BD", "CD", or "CP" in bytes 1-2, followed by the DM number in the form ±ZZNNNNN, where ZZ is the declination zone and NNNNN is the sequential number of the star within the zone. Numbers from the *Catalogue of Stellar Identifications* (CSI; Ochsenbein *et al.* 1981) are indicated by blanks in bytes 1-2, followed by the CSI number in the form ±ZZ−NNNNN, where ZZ is the declination zone and NNNNN is the sequential number of the star within the zone.

Be star number Star number from one of the following catalogs:

MWC Merrill, P. W. and Burwell, C. G. 1933, *Astrophys. J.*, **78**, 87.
Merrill, P. W. and Burwell, C. G. 1943, *Astrophys. J.*, **98**, 153.
Merrill, P. W. and Burwell, C. G. 1949, *Astrophys. J.*, **110**, 387.

AS Merrill, P. W. and Burwell, C. G. 1950, *Astrophys. J.*, **122**, 72.
Miller, W. C. and Merrill, P. W. 1951, *Astrophys. J.*, **113**, 624.

Henize Henize, K. G. 1976, *Astrophys. J. Suppl. Ser.*, **30**, 491.

HD number Number from the *Henry Draper Catalogue* (Cannon and Pickering 1918-1924). The suffix is a single-character code. "A" indicates the first component of a multiple system; "/" indicates that the HD number is the first

Bytes	Units	Suggested Format	Data
1-11		A11	DM/CSI number
12		1X	Blank
13-21		A9	Be star number
22-28		I7	HD number
29		A1	HD suffix
30-32	hr	I3	Right ascension
33-35	min	I3	
36-40	sec	F5.1	
41		A1	Coordinate flag
42		A1	Declination sign
43-44	deg	I2	Declination
45-47	arcmin	I3	
48-50	arcsec	I3	
51-52		2X	Blank
53-58	deg	F6.2	Galactic longitude
59		1X	Blank
60		A1	Galactic latitude sign
61-65	deg	F5.2	Galactic latitude
66-71	mag	F6.2	V
72		A1	V uncertainty
73		A1	V flag
74		A1	V source
75		A1	V quality
76-77		2X	Blank
78-82	mag	F5.2	B-V
83-84		2X	Blank
85		A1	B-V quality
86-87		2X	Blank
88-92	mag	F5.2	U-B
93-94		2X	Blank
95		A1	U-B quality
96-102	km/s	F7.1	Radial velocity
103		1X	Blank
104		A1	Radial velocity quality
105		1X	Blank
106-108		A3	Dispersion
109		1X	Blank
110-126		A17	MK spectral type

Table 2: Catalog Record Format

of two consecutive HD numbers for a multiple system in which only one spectrum is observable.

Equatorial coord. Equinox 1950.0. The **coordinate flag** is ":" to indicate uncertainty in the coordinates.

V uncertainty ":" if the magnitude in bytes 66-71 is uncertain. D. Egret (1987) notes that in general this "flags a magnitude not given in the standard *UBV* system."

V flag "V" indicates the star is variable; "D" indicates that the magnitude in bytes 66-71 is the integrated value for both components of a binary system.

V source "*" if *V* is from the CSI; otherwise, the value is from Nicolet (1978).

V quality In all but one case, a single-digit integer indicating the quality of the *V* magnitude. The numbers range from 1 (poor) to 4 (very good). Record number 82 has the undefined character "E" in this field.

B-V quality In all but one case, a single-digit integer in the range 1 (poor) to 4 (very good). Record number 82 has the undefined character "E" in this field.

U-B quality In all but one case, a single-digit integer in the range 1 (poor) to 4 (very good). Record number 82 has the undefined character "E" in this field.

Radial velocity These values are taken from Wilson (1953) and Evans (1967), or from Abt and Biggs (1972) or Barbier (1975) if no quality follows.

Rad. vel. quality Single character in the range A-F, as listed in Evans (1967). "A" represents the best quality.

Dispersion Dispersion used to determine the **MK spectral type**, or a quality for the spectral type. When byte 108 contains "/", the **MK spectral type** comes from Jaschek (1978) and bytes 106-107 indicate the dispersion used:

- **P** Prism
- **OP** Objective prism
- **G** Grating

When this field contains a quality number, the **spectral type** is from the *Michigan Spectral Survey* (MSS; Houk and Cowley 1975, Houk 1978) and this field contains the spectral type quality, using the following codes:

- **1..4** Quality in the range 1 (very good) to 4 (poor)
- **+** The **MK spectral type** was found in the literature and not derived by N. Houk for the MSS.

X Overlap

When this field is blank, the **MK spectral type** came from a source other than Jaschek (1978), Kennedy (1980), or the MSS. These sources include the following:

Andersen, J. and Nordström, B. 1977, *Astron. Astrophys. Suppl. Ser.*, **29**, 309.

Andersen, J. and Nordström, B. 1979, *Inf. Bull. CDS*, **15**, 39.

Graham, J. A. 1970, *Astron. J.*, **75**, 703.

Henize, K. 1976, *Astrophys. J. Suppl. Ser.*, **30**, 490.

Jaschek, M., Hubert-Delplace, A.-M., Hubert, H., and Jaschek, C. 1980, *Astron. Astrophys. Suppl. Ser.*, **42**, 103.

Lesh, J. R. 1968, *Astrpohys. J. Suppl. Ser.*, **17**, 371.

Uesugi, A. 1976, *A Revised Catalogue of Stellar Rotational Velocities*, preliminary edition, preprint.

2.3 Additional Information (File 2 of 2)

This file repeats the identification and MK spectral type information of the first file and adds the rotational velocity data and a number of flags indicating miscellaneous information about each object.

DM/CSI number See the description in Section **??**.

Be star number Star number in the MWC, AS, or Henize catalogs (see Section **??**).

HD number See the description in Section **??**.

Dispersion See the description in Section **??**.

Rotational velocity The sources for this value and the associated error are Bernacca and Perinotto (1973), Uesugi and Fukuda (1970), and Uesugi (1976, preliminary version).

Rot. vel. prob. error Probable error in the **rotational velocity** in bytes 52-54, in km/s and enclosed in parentheses, "()".

Visual binary flag "*" if the object is a visual binary from the ADS (1932) or IDS (1963).

Spectroscopic binary "*" if the object is a spectroscopic binary with a known orbit (Batten 1967).

uvby photometry flag "*" if the object appears in Hauck and Mermilliod (1975, edition of 1976).

Bytes	Units	Suggested Format	Data
1-11		A11	DM/CSI number
12		1X	Blank
13-21		A9	Be star number
22-28		I7	HD number
29		A1	HD suffix
30		1X	Blank
31-33		A3	Dispersion
34		1X	Blank
35-50		A16	MK spectral type
51		1X	Blank
52-54	km/s	I3	Rotational velocity
55		1X	Blank
56		A1	"(" or blank
57-58	km/s	I2	Rot. vel. prob. error
59		A1	")" or blank
60		1X	Blank
61		A1	Visual binary flag
62		1X	Blank
63		A1	Spectroscopic binary
64		1X	Blank
65		A1	*uvby* photometry flag
66		1X	Blank
67		A1	*UBVRIJKLMN* flag
68		1X	Blank
69		A1	UV measurement flag
70		1X	Blank
71-85		A15	Star name
86		1X	Blank
87-96		A10	Variable star name

Table 3: Additional Information Record Format

UBVRIJKLMN flag "*" if the object appears in Morel and Magnenat (1978).

UV measurement flag "*" if the object was observed by Celescope (Davis *et al.* 1973).

Star name Beyer-Flamsteed designation.

Variable star name Star name from Kukarkin *et al.* (1969).

3 History

3.1 Remarks and Modifications

The *Catalogue of Be Stars* (CBeS) was received by the Astronomical Data Center (ADC), NASA Goddard Space Flight Center, from the Centre de Données Astronomiques, Strasbourg (CDS), in November 1982.

The original tape consisted of two text files in a format similar to that described above. Eight bytes containing the file identifier were removed from the beginning of every record in both files, and leading and trailing blanks were trimmed to reduce the record size from 140 bytes in both files to 126 bytes in the first file and 96 bytes in the second file.

In the first file, the V magnitudes were shifted one byte to the left to allow the V **uncertainty** flag to be separated from the numeric field. In the second file, the left parenthesis sometimes occurring within the **rotational velocity probable error** field was moved outside that field to enable the error field to be read with the indicated FORTRAN format.

A FORTRAN program was run to check the validity of each field according to its data type and value. As a result, several non-numeric values were discovered in numeric fields of records in the first file. The character ":" found in the V **quality** field of records number 568, 753, and 827 was moved to the V **uncertainty** field. Record number 82 had the undefined character "E" in all three **quality** fields (V, B-V, and U-B). This record was left unchanged.

3.2 References for the Documentation

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Barbier, M. 1975, *Bull. Inform. CDS*, **8**, 12.

Batten, A. H. 1967, *Publ. Dominion Astrophys. Obs.*, **13**, 119.

Bernacca, P. L. and Perinotto, M. 1973, *Contrib. Oss. Astrofis. Univ. Padova*, **239**, **250**, **294**.

Bidelman, W. P. and MacConnell, D. J. 1973, *Astron. J.*, **78**, 687.

Cannon, A. J. and Pickering, E. C. 1918-1924, *The Henry Draper Catalogue*, *Ann. Astron. Obs. Harvard College* **91-99**.

Davis, R. J., Deutschman, W. A., and Haramundanis, K. L. 1973, *Celescope Catalog of Ultraviolet Stellar Observations*, *SAO Special Report* **350** (on magnetic tape; Washington, D.C.: Smithsonian Institution).

Egret, D. 1987, private communication.

Evans, D. S. 1967, *I.A.U. Symp.* **30**, 57, ed. A. H. Batten and J. F. Heard.

Hauck, B. and Mermilliod, M. 1975, *Astron. Astrophys. Suppl. Ser.*, **22**, 235.

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Houk, N. 1978, *Michigan Catalogue of 2-dimensional Spcetral Types for HD Stars, Vol.*, **II** (MSS; University of Michigan).

Jaschek, M. 1978, *Bull. Inform. CDS*, **15**, 121.

Jaschek, M. and Egret, D. 1982, *IAU Symposium No. 98, "Be Stars"*, eds. M. Jashek and H. G. Groth, 261.

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Kennedy, P. M. 1980, *MK Classification Extension* (Mt. Stromlo Obs.).

Kukarkin, B. V., Kholopov, P. N., Efremov, Yu. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., Fedorovich, V. P., and Frolov, M. S. 1969, *General Catalogue of Variable Stars* (3rd edition; Moscow: Publishing House of the Academy of Sciences of the U.S.S.R.).

Morel, M. and Magnenat, P. 1978, *Astron. Astrophys. Suppl. Ser.*, **34**, 477.

Nicolet, B 1978, *Astron. Astrophys. Suppl. Ser.*, **34**, 1.

Ochsenbein, F., Bischoff, M., and Egret, D. 1981, *Astron. Astrophys. Suppl. Ser.*, **43**, 259 (CSI).

Uesugi, A. and Fukuda, I. 1970, *Contrib. Inst. Astrophys. Kwasan Obs. Kyoto*, **189**.

Uesugi, A. 1976, *A Revised Catalogue of Stellar Rotational Velocities*, preliminary edition, preprint.

Wilson, R. F. 1953, *General Catalogue of Stellar Radial Velocities*, *Carnegie Institute of Washington Publ.* 601.