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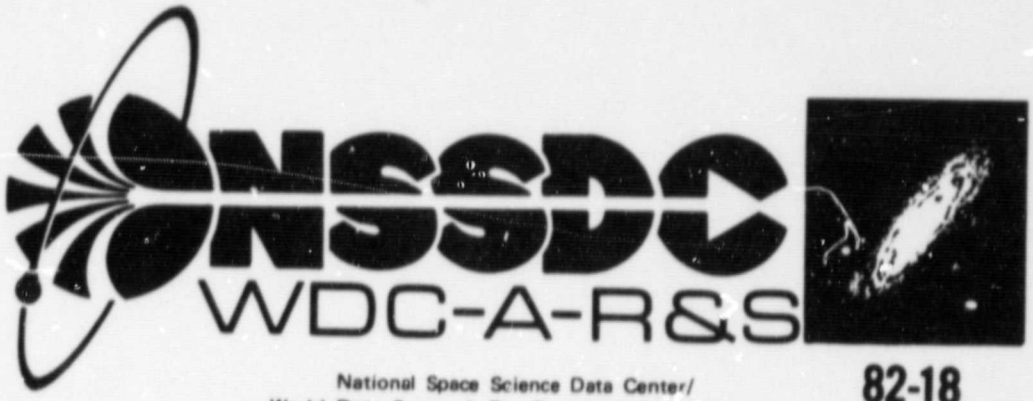

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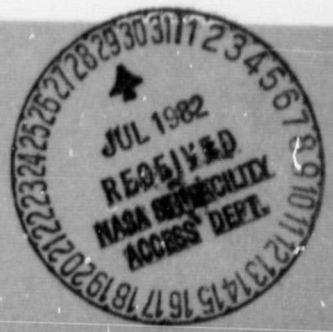
82-18



Documentation for the Machine-Readable Version of the BRIGHT STAR CATALOGUE, 4th Edition

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DOCUMENTATION FOR THE MACHINE-READABLE VERSION

OF THE

BRIGHT STAR CATALOGUE, 4TH EDITION

Wayne H. Warren Jr.

May 1982

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

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SECTION 1 - INTRODUCTION

The fourth edition of *The BRIGHT STAR CATALOGUE* (Hoffleit 1982) is an updated and improved version of the previous edition published in 1964 by the same author. In addition to the large number of newly determined fundamental data, such as photoelectric magnitudes, MK spectral types, parallaxes, and radial velocities, the new version contains new data and information not included in the third edition. Valuable information, such as the identification of IR sources, *U-B* and *R-I* colors, radial velocity comments (indication and identification of spectroscopic and occultation binaries), and projected rotational velocities, is included for the first time in the fourth addition, while the equatorial coordinates for equinoxes 1900 and 2000 are recorded to greater precision (0^s1 in right ascension, 1" in declination). The remarks section of the catalogue has been expanded and improved to contain many details concerning variability, spectral characteristics, duplicity, and group membership, and the remarks have been segregated by category to improve information retrieval and readability. The catalogue in general contains data compiled through 1979; however, some information and variable-star designations found through 1981 are included in the remarks and many variable-star names have subsequently been transferred to the data file (see Section 4).

This document describes the machine-readable version of *The BRIGHT STAR CATALOGUE*, 4th edition, as distributed by the Astronomical Data Center. It is intended to enable users to read and process the data without the common problems and guesswork often associated with such a task. For further details on the compilation of the data and statistics of the catalogue, the source reference should be consulted. This document should be distributed with any machine-readable version of the catalogue.

SOURCE REFERENCE

Hoffleit, D. (with the collaboration of Jaschek, C.) 1982, *The BRIGHT STAR CATALOGUE*, 4th revised edition (New Haven: Yale University Observatory).

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the contents of the machine-readable *BRIGHT STAR CATALOGUE*, 4th Edition is given in Table 1, while Tables 3 and 4 describe the files associated with the remarks. A suggested FORTRAN format specification for reading each datum is given in Table 1 and can be modified depending upon usage; however, caution is advised when substituting format specifications, since some data fields contain character data and others are blank when data are absent. Particular care is required for color-index data, which can have valid 0.00 values, but whose fields are blank when data are absent. It is safest to read such fields with A (character) format specifications or to buffer entire records in and check for blank fields before proceeding with internal conversion to binary numbers. Alternate format specifications are given in parentheses.

Table 1. Tape Contents. *The BRIGHT STAR CATALOGUE*, 4th Edition, Data File

Byte(s)	Units	Suggested Format	Description
1- 4	---	I4	BS = HR number.
5- 14	---	A10 (10A1)	Name, generally the Bayer and/or Flamsteed designation taken from the 3rd edition (Hoffleit 1964). This data field is divided uniformly, however, so that certain designations can be processed individually by computer. An itemized description of the name field follows:
5- 7	---	I3	Flamsteed number if one exists; otherwise blank.
8- 9	---	I2	Coded Bayer designation (01 = α, 02 = β, ..., 24 = ω); otherwise blank.
10- 11	---	I2	Superscript number for Bayer designation Example: HR 5845 22 τ^7 SER is coded: 2219 7SER Note: There are exceptions to the uniformly coded Name field which occur for blank records in the file. See Table 2 for a list of the records and their Name field contents.
12- 14	---	A3	Constellation abbreviation.
15	---	1X	Blank

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
16- 23	---	A8	Durchmusterung (DM) number (BD north of -23°, CD from -23° to -52°, CPD south of -52°).
16	---	A1	Sign of DM number.
17- 18	---	A2 (I2)	DM zone.
19- 23	---	A5 (I5)	DM number.
24	---	1X	Blank
25- 30	---	I6	*Henry Draper Catalogue* number.
31	---	1X	Blank
32	---	A1	Infrared source flag (I if IR source; otherwise blank).
33	---	A1	Reference for IR source when I is present in byte 32 (blank if from NASA Merged Infrared Catalogue, Schmitz *et al.* 1978); ' if from Engels *et al.* 1982). Colon (:) if uncertain identification.
34- 39	---	A6 (6A1)	Double or multiple stars (except spectroscopic and eclipsing): Number ADS (Aitken 1934) W Worley (1978) update of the IDS (Jeffers *et al.* 1963). Letters in bytes 40-41 following a W indicate which component(s) the HR number represents I Innes (1927) southern double stars R Rossiter (1955) C Couteau (1978) D Duplicity discovered by occultation S Duplicity discovered by speckle interferometry A Astrometric binary The field is uniform on the tape (see Section 4, remark 9) with the catalogue code in byte 34, ADS numbers in bytes 35-39 and components in bytes 40-41. Additional remarks on duplicity may be found if an asterisk occurs in the notes column (byte 212).

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
40- 41	---	A2	Multiple-star components for systems for which HR number represents only certain components of the system.
42	---	1X	Blank
43- 51	---	A9 (9A1)	Variable star designations: (*a*) constellation designations from the *General Catalogue of Variable Stars* (Kukarkin *et al.* 1969-70), the Supplements 1-3 (Kukarkin *et al.* 1971, 1974, 1976), and the 62nd through 66th Namelists (Kukarkin *et al.* 1976; Kholopov *et al.* 1978, 1979, 1981); (*b*) Numbers (alone) from the *Catalogue of Stars Suspected of Variability* Kurkarkin *et al.* 1951, 1965); (*c*) VAR and VAR? for unnamed variables as of June 1981 and suspected unconfirmed variables not included in the general catalogues. Can apply to the HR number and/or a close companion.
52	---	1X	Blank
53- 54	hours	I2	Right ascension (α) for 1900.
55	---	1X	Blank
56- 57	min	I2	α
58	---	1X	Blank
59- 62	sec	F4.1	α
63	---	1X	Blank
64	---	A1	Sign of declination (δ) for 1900.
65- 66	°	I2	δ
67	---	1X	Blank
68- 69	'	I2	δ
70	---	1X	Blank
71- 72	"	I2	δ
73	---	1X	Blank
74- 75	hours	I2	Right ascension (α) for 2000.
76	---	1X	Blank
77- 78	min	I2	α
79	---	1X	Blank
80- 83	sec	F4.1	α
84	---	1X	Blank

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
85	---	A1	Sign of declination (δ) for 2000.
86- 87	°	I2	δ
88	---	1X	Blank
89- 90	'	I2	δ
91	---	1X	Blank
92- 93	"	I2	δ
94	---	1X	Blank
95-100	°	F6.2	Galactic longitude ^{II}.
101	---	1X	Blank
102-107	°	F6.2	Galactic longitude ^{II}.
108	---	1X	Blank
109-113	mag	F5.2	Visual magnitude (see byte 114). Some magnitudes of variables and double stars are reported to 0.1 mag only, in which case byte 113 is blank.
114	---	A1	Visual magnitude code: blank = *V* on *UBV* (Johnson) system; R = HR magnitudes reduced to the *UBV* system; H = original HR magnitude.
115	---	1X	Blank
116-120	mag	F5.2	*B-V* on Johnson system; otherwise blank.
121	---	1X	Blank
122-126	mag	F5.2	*U-B* on Johnson system; otherwise blank.
127	---	1X	Blank
128-132	mag	F5.2	*R-I* on system indicated by the code in byte 133; otherwise blank.
133	---	A1	Code for *R-I* system; blank - on Johnson system; E - mainly from Eggen, on Kron system; C - from Cousins; close to Kron system (the Johnson and Kron filters have different λ_{eff} and may not be used interchangeably).
134	---	1X	Blank

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
135-154	---	20A1 (5A4)	Spectral type. If the complete modern determination is too long for the data field, it is given in the remarks file and the last character in the spectral-type field is an asterisk (*). Mt. Wilson luminosity classes are given in lower case letters in bytes 135-136. The "W" in Wolf-Rayet types is in byte 137, but in general the temperature class (O, B, A, ... S, C) is in byte 137 and can be selected using only that byte. Characters normally appearing as lower case in standard notation (e.g. p, e, Si, Mn, Hg, Iab) are coded in lower case on the tape. Where Greek letters appear in a spectral type, the coding used in the Name field (see bytes 8-7) is employed, but the number is surrounded by <>, e.g. δ Del = <04>Del.
155	---	1X	Blank
156-161	"	F6.3	Annual proper motion, μ_α, in right ascension. Sign always in byte 156.
162	---	1X	Blank
163-168	"	F6.3	Annual proper motion, μ_δ, in declination. Sign always in byte 163.
169	---	A1	"D" if following parallax is dynamical rather than trigonometric; otherwise blank.
170-174	"	F5.3	Trigonometric parallax unless a "D" is coded in byte 169. Sign always in byte 170 for π_{trig}, and for π_{dyn}. Blank for no data.
175	---	1X	Blank
176-179	km s^{-1}	I4	Radial velocity or blank (see codes in following field).

Table 1. (concluded)

Byte(s)	Units	Suggested Format	Description
180-183	---	A4 (4A1)	Radial-velocity comments: V, V? - variable or suspected variable radial velocity; SB, SB1, SB2 - spectroscopic binaries, single or double lined spectra; O - orbital data available.
184	---	1X	Blank
185	---	A1	Projected rotational velocity ($v \sin i$) descriptive character. "<" - less than; "≤" - less than or equal to (hexidecimal character code 8C).
186-188	km s^{-1}	I3	$v \sin i$
189	---	A1	Colon (:) for uncertain $v \sin i$.
190	---	1X	Blank
191-194	mag	F4.1	Δm; magnitude difference between two components of a double, or between the two brightest components of a multiple system.
195	---	1X	Reserved for colon (:) to indicate Δm uncertainty (none occurs, however).
196-201	"	F6.1	Separation of the same two components referred to in bytes 191-194.
202	---	1X	Blank
203-206	---	4A1 (A4)	Identification of the components represented in bytes 191-194 and 197-201. An "O" in byte 204 indicates an occultation binary.
207-208	---	I2 (A2)	Numbers of components assigned to a multiple system.
209-211	---	3X	Blank
212	---	A1	An asterisk (*) indicates a note in the remarks file. Otherwise blank.

There are fourteen records in the data file which are blank except for HR number, Name, and sometimes variable-star designations. These records represent objects included in the first edition of the catalogue and omitted in subsequent editions. (The records are retained in order to preserve the numbering of the first catalogue.) They are listed below so that the programmer can see what their fields contain, since they must be considered if one is attempting to decode the Flamsteed and Bayer designations. The names below begin in byte 6.

Table 2. Tape Contents. *The BRIGHT STAR CATALOGUE*, 4th Edition, Data File, Blank Records

HR	Name	Variable Designation
92	NOVA 1572	B CAS
95	47 TUC	
182	M 31 AND	
1057	NOVA 1901	GK PER
1841	NOVA 1891	T AUR
2472	NOVA 1903	DM GEM
2496	NGC 2281	
3515	M 67	
3671	NGC 2808	
6309	NOVA 1848	V 841 OPH
6515	NOVA 1604	V 843 OPH
7189	NOVA 1899	V1016 SGR
7539	NOVA 1670	CK VUL
8296	NOVA 1876	Q CYG

The second file of the catalogue contains a description of the remarks file, including the notation and abbreviations employed.

Table 3. Tape Contents. *The BRIGHT STAR CATALOGUE*, 4th Edition, Remarks Description File.

Bytes	Description
1-80	Free text in upper and lower case characters.

Table 4. Tape Contents. *The BRIGHT STAR CATALOGUE*, 4th Edition. Remarks File.

Byte(s)	Suggested Format	Description
1- 5	I5	BS = HR number.
6- 7	2X	Blank
8- 11	A4	Remark category abbreviation [upper case character(s) starting in byte 8]: N - Star names; C - Colors; S - Spectra; VAR - Variability; SB - Spectroscopic binaries; RV - Radial and/or rotational velocities; D - Double and multiple stars; DYN - Dynamical parallaxes; R - Stellar radii or diameters; P - Polarization; G - Group membership; M - Miscellaneous. The category abbreviation is always followed by a colon (:).
12	1X	Blank
13-132	30A4	Remarks in free text form.

For printing only, the note can, of course, be read with a format specification of 132A1 or 33A4. Note that the remarks are in upper and lower case characters, so the use of an extended chain printer is recommended. If an extended chain printer is available, it may be desirable to decode the Greek letters, subscripts and superscripts, in which case the Remarks Description File (2) should be consulted for decoding information.

SECTION 3 - TAPE CHARACTERISTICS

The information in Table 5 is sufficient for a user to describe the indigenous characteristics of *The BRIGHT STAR CATALOGUE*, 4th edition, to a computer. Not included is information easily varied from installation to installation, such as block size (physical record length), blocking factor (number of logical records per physical record), total number of blocks, tape density, number of tracks, and internal coding (EBCDIC, ASCII, etc.). These parameters should always be transmitted if secondary copies of the catalogue are supplied to other users or installations. Parameters for the three files are separated by commas.

Table 5. Tape Characteristics. *The BRIGHT STAR CATALOGUE*, 4th Edition

NUMBER OF FILES	3
LOGICAL RECORD LENGTH (BYTES)	212, 80, 132
RECORD FORMAT	FB*
TOTAL NUMBER OF LOGICAL RECORDS	9110, 56, 7959

* Fixed block length (last block may be short)

SECTION 4 - REMARKS, MODIFICATIONS, ACKNOWLEDGMENTS AND REFERENCES

A magnetic tape of *The BRIGHT STAR CATALOGUE*, 4th edition data file was received from Dr. E. Dorrit Hoffleit of Yale University Observatory on 10 March 1982. An additional magnetic tape containing four files (tape description, remarks file description, remarks file, and supplementary remarks file) was requested and received on 22 April 1982. As received, the data were contained on 18 tape files comprising left- and right-hand pages for groups of 1000 stars. The following modifications were made to the data and remarks files.

1. The 18 files on the original tape were processed through a program to combine them into a single data file of 9110 logical records. Redundant HR numbers of the right-hand-page files were removed.

2. The character "D", signifying a dynamical parallax, occurred in byte 170 (within the parallax data field). Since this would cause problems for a numerical format specification, these characters were moved to byte 169 (originally not used) and a "+" sign was placed into byte 170 to match the trigonometric values normally in the data field.

3. The descriptive character "<" for projected rotational velocity (byte 185), available on printers but not on terminals, was present as a colon (:) in the original records (the < sign occurred in its correct form, however). The colon was changed to hexidecimal character 8C, which will print as a < sign on extended chain printers. Installations not having the < character will need to detect the 8C code and convert it to another character if it is to be printed.

4. A full spectral type of 21 characters was present for HR 8667. Since the allowed data field could not accommodate the type, it was shifted to the left, thereby misaligning the temperature class. The spectral type was therefore shortened, an asterisk (*) was appended in the normal fashion, and the full type was moved to the remarks file.

5. Also, the component separation for HR 1175 (1480") did not fit into the allotted field in the original format, so it was present in bytes 198-201 as a shifted number having no decimal point. Since byte 196 was never used, the number was rewritten as 1480. in bytes 196-201, which is now the designated field for separation data.

6. Since the tape description file for the remarks applied only to the original tape, it has been omitted from the catalogue.

7. As received, the remarks records had a problem whenever byte 132 (the last byte of a logical record) contained a non-blank character, in that an indeterminate character had been inserted into byte 1 of the following record and all successive bytes of that record were shifted to the right.

Since this was apparently done by the DEC computer at Yale when the tape was prepared, every occurrence of the indeterminate character was removed and the records shifted to align with the remaining remarks records.

8. The supplementary remarks file on the original tape had been prepared because additions and corrections were found after the remarks file had gone to press. For brevity and ease of processing, the supplementary remarks were merged into the main remarks file by performing the corrections noted and adding additional remarks to their appropriate locations in the main remarks file.

9. The double-star fields (bytes 35-41) were not uniform in all cases: (*a*) numbers and letters occupied the same bytes; (*b*) the letter codes for catalogue sources and components were not always in the same positions; and (*c*) some numbers were shifted in the data field. The double-star field was reviewed for all catalogue entries and edited to make the data uniform. The catalogue code (W, A, S, etc.) was moved to byte 34 (originally blank) so that no number/letter overlap now occurs.

10. Following a suggestion by Dr. Hoffleit, variable-star designations which had been added to the supplementary remarks after the data file had been completed were transferred to the variable-star fields of the main catalogue and removed from the remarks.

ACKNOWLEDGMENTS

Appreciation is expressed to Dr. E. Dorrit Hoffleit and Mr. A. Partan for preparing and sending the magnetic tapes of the data and remarks file, and to Dr. Hoffleit for communicating additional corrections to the data file and for reviewing this document.

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SECTION 5 - SAMPLE LISTING

The sample listings given on the following pages present logical data records from each file just as they are recorded on the tape. Groups of records from the beginning and end of each file are illustrated. The beginning of each record and bytes within the record are indicated by the column heading across the top of each page (digits read vertically). Since files 1 and 3 contain more than 115 bytes per record, the remaining bytes (116-212 in file 1, 116-132 in file 3) are printed in a second row.

ORIGINAL PAGE IS OF POOR QUALITY

```
L I S T I N G   O F   R E C O R D S   F R O M   T A P E   F I L E

          TAPE FILE NAME: BRIGHT STAR CAT. 4TH ED.
                 RECORDS       1 TO      15
               TAPE FILE       6
           RECORD LENGTH     212 BYTES
            INPUT VOLSER   ADC005

C O L U M N                                                                                                              1111111111111111
H E A D I N G            11111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111
I N D E X       12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD     1     1           +44 4550     3        46           0  0  1.1 +44 40 22  0  5  9.8 +45 13 45 114.44 -16.88  6.70
                                   A1Vn               -0.014 -0.013        - 18      195   4.2   21.6 AC   3
RECORD     2     2           - 1 4525     6                     23 59 56.2 - 1  3 30  0  5  3.7 - 0 30 12  98.33 -61.14  6.29
              +1.10 +1.02          gG9                +0.042 -0.055        + 14
RECORD     3     3 33    PSC - 6 6357    28 I D         VAR?    0  0 13.0 - 6 16  1  0  5 20.1 - 5 42 27  93.75 -65.93  4.61
              +1.04 +0.89 +0.54    K1III              -0.012 +0.094 +.014 -  6SB10 < 17   2.5    0.0  0   3   *
RECORD     4     4 86    PEG +12 5063    87                     0  0 33.8 +12 50 23  0  5 41.9 +13 23 47 106.19 -47.98  5.51
              +0.90                G5III              +0.045 +0.005        -  2
RECORD     5     5           +57 2865    123       61           0  1  1.8 +57 52 45  0  6 15.9 +58 26 12 117.03 - 3.92  5.96
              +0.67 +0.20          G5V                +0.262 +0.036 +.047 - 12            0.8    1.4           *
RECORD     6     6           -4914337    142   W                0  1  8.4 -49 37 51  0  6 19.0 -49  4 31 321.61 -66.38  5.70
              +0.52 +0.05          G1IV               +0.565 -0.032 +.050 +  3SB          5.7    5.4           *
RECORD     7     7 10    CAS +63 2107    144                    0  1 14.4 +63 38 22  0  6 26.5 +64 11 47 118.06   1.75  5.59
              -0.03 -0.19          B9IIIe             +0.009 +0.005        -  0V     153                       *
RECORD     8     8           +28 4704    166       69   VAR?    0  1 25.2 +28 28 11  0  6 36.7 +29  1 17 111.26 -32.83  6.13
              +0.75 +0.33          K0V                +0.380 -0.177 +.067 -  8            2.6  158.6 AB   4
RECORD     9     9           -23   4     203                    0  1 43.0 -23 39 47  0  6 50.0 -23  6 27  52.21 -79.14  6.18
              +0.38 +0.95          A7V                +0.099 -0.038        +  3V
RECORD    10    10           -18 6428    256                    0  2 11.8 -17 56 39  0  7 18.1 -17 23 11  74.36 -75.90  6.19
              +0.14 +0.10          A6Vn               -0.021 +0.040                  195                       *
RECORD    11    11           - 3   2     315                    0  2 36.7 - 3  6 20  0  7 44.0 - 2 32 55  98.02 -63.29  6.43
              -0.14 -0.57          B8IIIpSi           +0.024 +0.003        + 13                                *
RECORD    12    12           -23  13     319       89   102308  0  2 40.3 -23  3 52  0  7 46.7 -22 30 32  55.56 -79.07  5.94
              +0.14 +0.06          A3V                +0.051 -0.040        - 13V              5.1    1.9           *
RECORD    13    13           -34  17     344                    0  2 58.6 -34  5 10  0  8  3.4 -33 31 46 355.91 -78.67  5.68
              +1.12                K1III              -0.039 +0.005        +  7
RECORD    14    14           - 3   3     352 I D                0  3  4.8 - 3  0 15  0  8 12.0 - 2 26 52  98.34 -63.24  6.07
              +1.38 +1.14          K2III              +0.006 -0.004        +  1SB0        2.0    0.0           *
RECORD    15    15 2101  AND +28   4     358 I     94   01 AND  0  3 13.0 +28 32 18  0  8 23.2 +29  5 26 111.73 -32.84  2.06
              -0.11 -0.46 -0.10    B8IVpMnHg          +0.137 -0.158 +.032 - 12SB0     56    8.5   81.5           *
```

```
L I S T I N G   O F   R E C O R D S   F R O M   T A P E   F I L E

          TAPE FILE NAME: BRIGHT STAR CAT. 4TH ED.
                 RECORDS    9096 TO    9110
               TAPE FILE       6
           RECORD LENGTH     212 BYTES
            INPUT VOLSER    ADC005

C O L U M N                                                                                                                       1111111111111111
H E A D I N G             111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111
I N D E X        12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123 45

RECORD   9096  9096           -2417960 225069                        23 58  0.2 -24 42  8  0  3  7.6 -24  8 43  45.57 -78.72  6.44
               +1.18                G5              +0.038 +0.004
RECORD   9097  9097           +62 2356 225094          VAR           23 58 17.4 +63  5  1  0  3 25.6 +63 38 23 117.63   3.26  6.24
               +0.33 -0.54 +0.23    B3Iae           -0.008 +0.063      - 43V?                                 *
RECORD   9098  9098  2   CET  -18 6417 225132                        23 58 37.0 -17 53 33  0  3 44.3 -17 20 10  72.10 -75.26  4.55
               -0.05 -0.12 -0.04    B9.5Vn          +0.024 -0.004 +.007 -  5V     186
RECORD   9099  9099           +65 1993 225136 I                      23 58 42.4 +66  9 20  0  3 51.8 +66 42 44 118.25   4.27  6.29
               +1.67                M4III           +0.020 -0.002      + 15
RECORD   9100  9100  9   CAS  +51 2586 225180    W                   23 59  4.5 +61 43 51  0  4 13.5 +62 17 17 117.47 - 0.08  5.88
               +0.30 +0.29          A1III           -0.005 +0.012      - 18V          4.0  246.0
RECORD   9101  9101           -17 6868 225197                        23 59 12.4 -17  5  3  0  4 19.6 -16 31 45  74.70 -74.79  5.78
               +1.10 +1.05          K2III           +0.036 -0.055      - 27
RECORD   9102  9102           -2918950 225200                        23 59 13.2 -29 49 33  0  4 20.2 -29 16  7  18.53 -79.41  6.40
               +0.00 -0.05          A0V             +0.030 +0.019      + 28
RECORD   9103  9103  3   CET  -11 6194 225212 I      102299          23 59 23.0 -11  3 58  0  4 30.0 -10 30 35  87.07 -70.04  4.94
               +1.63 +1.92          K3Ibv           -0.009 -0.007 +.016 - 42V    < 17
RECORD   9104  9104           +66 1679 225216                        23 59 30.1 +66 36 32  0  4 41.9 +67 10  0 118.41   4.71  5.67
               +1.07 +0.93          K1III           +0.092 +0.037 +.013 - 27
RECORD   9105  9105           +41 4933 225218 I      30              23 59 28.2 +41 32 10  0  4 36.6 +42  5 32 113.72 -19.94  6.012
                                    B9III           +0.003 -0.017      -  8SB         3.7    5.4              *
RECORD   9106  9106           -73 2346 225233                        23 59 26.8 -73 27 12  0  4 30.7 -72 53 52 307.68 -43.80  7.31
               +0.44 +0.01          F2V             +0.018 -0.051
RECORD   9107  9107           +33 4828 225239                        23 59 39.2 +34  6  2  0  4 53.6 +34 39 36 112.17 -27.24  6.12
               +0.62 +0.09          G2V             +0.758 +0.105 +.035 +  4V
RECORD   9108  9108           -72 2800 225253                        23 59 37.0 -71 59 36  0  4 41.4 -71 26 13 308.18 -45.21  5.59
               -0.12 -0.42          B8IV-V          +0.037 -0.012      -  3V                                  *
RECORD   9109  9109           +25 5068 225276 I      42              23 59 47.1 +26  5 33  0  4 55.9 +26 38 56 110.22 -35.07  6.25
               +1.40 +1.59          K4IIIb          +0.110 -0.006      -  5           4.5   17.5
RECORD   9110  9110           +60 2667 225289          V567 CAS      23 59 55.9 +60 45 26  0  5  6.1 +61 18 51 117.40 - 1.06  5.80
               -0.09 -0.32          B8pHgMn         +0.914 +0.011      + 14V     50                           *
```


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L I S T I N G   O F   R E C O R D S   F R O M   T A P E   F I L E

                  TAPE FILE NAME: YBS4 REMARKS CONTENTS
                         RECORDS      1 TO     28
                       TAPE FILE      7
                   RECORD LENGTH     80 BYTES
                    INPUT VOLSER   ADC005

C O L U M N                                                                                                                    1111111111111111
H E A D I N G           111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111
I N D E X      1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD     1  The fields in the REMARKS and SUPPLEMENTARY REMARKS:
RECORD     2  column 1: A blank.
RECORD     3  columns 2-5: A 1-4 digit HR number of the star (right justified) OR 4 blanks.
RECORD     4  columns 6&7: 2 blanks.
RECORD     5  columns 8-11: A 1-3 letter category followed by a colon (left justified) OR 4
RECORD     6          blanks.
RECORD     7  column 12: A blank.
RECORD     8  columns 13-132: The remark for this star & category.
RECORD     9
RECORD    10  Cases:
RECORD    11  1) Non-blank Star field:  The start of a remark for a new star.
RECORD    12  2) Blank Star field and non-blank Category field:  The start of a remark for the
RECORD    13          previous star in a new category.
RECORD    14  3) Blank Star & Category fields:  A continuation of the remark for the previous
RECORD    15          star and category.
RECORD    16
RECORD    17  Codes for non-ASCII characters.
RECORD    18  The at-sign (@) is an escape symbol signifying that something that can not be
RECORD    19  represented as ASCII is following.  The general format is:
RECORD    20          @command[argument]
RECORD    21  The following are found in the remarks:
RECORD    22          @+[stuff]        Means that stuff is to be superscripted.
RECORD    23                           ie: a@+[1] means a-superscript-1.
RECORD    24          @-[stuff]        Means that stuff is to be subscripted.
RECORD    25                           ie: a@-[1] means a-subscript-1.
RECORD    26          @Greek(letter)   Means that the letter is a greek letter.
RECORD    27                           ie: @Greek(a) is an alpha.
RECORD    28                           See the following table for ASCII-greek correspondence.
```

L I S T I N G O F R E C O R D S F R O M T A P E F I L E

TAPE FILE NAME: YBS4 REMARKS CONTENTS
RECORDS 29 TO 56
TAPE FILE 7
RECORD LENGTH 80 BYTES
INPUT VOLSER ADC005

```
COLUMN                  1111111111222222222233333333334444444444555555555566666666677777777778888888889999999990000000001111111
HEADING         12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
INDEX
```

RECORD	29		
RECORD	30	Greek	ASCII
RECORD	31	letter	equivalent
RECORD	32		
RECORD	33	Alpha	a
RECORD	34	Beta	b
RECORD	35	Gamma	g
RECORD	36	Delta	d
RECORD	37	Epsilon	e
RECORD	38	Zeta	z
RECORD	39	Eta	h
RECORD	40	Theta	q
RECORD	41	Iota	i
RECORD	42	Kappa	k
RECORD	43	Lambda	l
RECORD	44	Mu	m
RECORD	45	Nu	n
RECORD	46	Xi	j
RECORD	47	Omicron	o
RECORD	48	Pi	p
RECORD	49	Rho	r
RECORD	50	Sigma	s
RECORD	51	Tau	t
RECORD	52	Upsilon	u
RECORD	53	Phi	f
RECORD	54	Chi	x
RECORD	55	Psi	y
RECORD	56	Omega	w

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LISTING OF RECORDS FROM TAPE FILE

```
        TAPE FILE NAME: YBS4 REMARKS
               RECORDS       1 TO      15
             TAPE FILE       8
         RECORD LENGTH     132 BYTES
          INPUT VOLSER     ADC005

COLUMN                111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111
HEADING                                                                                                   1111111111111111111111111111
INDEX      123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD      1      3 VAR: Amp. 0.05V.
RECORD      2        SB:  72.93d, K 16.4k/s, Va-[0] -6.6k/s, asini 15.8.
RECORD      3        D:   Occultation triple 5.0, 7.5v, 0.00003", third component 7.5v at 0.002".
RECORD      4      5 D:   6.43 dG4, 7.19 dG8, 106.83y, a = 1.432".  Component B has possible invisible companion, period 6.9y.
RECORD      5        DYN: ".051.
RECORD      6      6 D:   CPM.
RECORD      7        G:   61 Cyg group.
RECORD      8      7 S:   Also classified B8IV-Ve.
RECORD      9     10 S:   Shell star.
RECORD     10     11 N:   4 Cet in Psc.
RECORD     11     12 VAR: ADS 89B, 11 - [14v.
RECORD     12        D:   CPM.
RECORD     13     14 N:   5 Cet in Psc.
RECORD     14        SB:  96.41d, K 23.8k/s, Va-[0] +1.1k/s, asini 31.3.
RECORD     15        D:   Blue companion? Sep. 0.002".
```

L I S T I N G O F R E C O R D S F R O M T A P E F I L E

TAPE FILE NAME: YBS4 REMARKS

RECORDS 7945 TO 7959

TAPE FILE 8

RECORD LENGTH 132 BYTES

INPUT VOLSER AD-005

```
COLUMN                                                                                                       111111111111111111111111111111111
HEADING           11111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111111222222222233333
INDEX    123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
```

RECORD 7945 DYN: *.081.

RECORD 7946 G: Sco-Cen assoc.

RECORD 7947 9089 S: Ultraviolet FeII emission.

RECORD 7948 VAR: Lb? 4.35 - 4.41V.

RECORD 7949 9090 C: Colors correspond to about minimum light.

RECORD 7950 VAR: M 7.1 - 14.8v, 351.33d.

RECORD 7951 9091 S: Member of high latitude, young metal-deficient cluster, aGreek(z) Scl; Sco-Cen assoc.

RECORD 7952 9094 D: ADS 1B, 7.47V, +0.08(B-V), +0.05(U-B), A2Vn, vsini 275k/s, may be shell star. AB binary. C, 10.8m at 9
9" optical.

RECORD 7953 9097 VAR: I? Amp. 0.?B.

RECORD 7954 G: Cas OB5.

RECORD 7955 9105 S: Primary discordant classifications, B9III or A3Vs.

RECORD 7956 SB: ADS 30B, 9.5 F5.

RECORD 7957 D: Binary.

RECORD 7958 9108 G: Sco-Cen assoc.

RECORD 7959 9110 VAR: Amp. 0.02:V, 6.4322d.

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