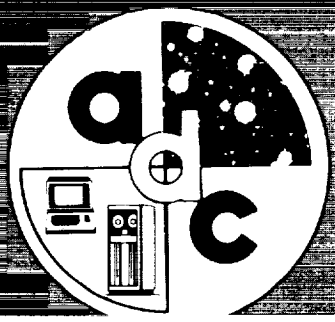
National Space Science Data Center/
World Data Center A For Rockets and Satellites

89-05

BONNER DURCHMUSTERUNG

(Argelander 1859-62)

Documentation for the Machine-Readable Version



April 1989

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(Argelander 1859-62)

Documentation for the Machine-Readable Version

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Abstract

The machine-readable version of the catalog, as it is currently being distributed from the Astronomical Data Center, is described. The entire *Bonner Durchmusterung* (BD) was computerized through the collaborative efforts of the Centre de Données Astronomiques de Strasbourg, l'Observatoire de Nice, and the Astronomical Data Center at the NASA/Goddard Space Flight Center. All corrigenda published in the original BD volumes have been incorporated into the machine file, along with changes published by Küstner and Sticker following the 1903 edition. In addition, stars indicated to be "missing" in published lists and verified by various techniques are flagged so that they can be omitted from computer plotted charts if desired. Stars deleted in the various errata lists have been similarly flagged, while those with revised data are flagged and listed in a separate table. This catalog covers the zones $+89°$ to $-01°$; zones $-02°$ to $-23°$ of the BD (known as the *Southern Durchmusterung*) are included in a separate catalog available in machine-readable form.

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1.0 Introduction

1.1 Description

The *Bonner Durchmusterung* (BD, Argelander 1859-62, Küstner 1903, Becker 1951, Schmidt 1968) is a visual survey of stars in the declination zones +89° to −01°. The survey, completed by Argelander and his assistants in the years 1852-1861, was performed and the stars cataloged by allowing the telescope to drift along the mean declination of each zone and recording the positions and magnitudes of stars crosssing the transit line of each field. The goal of the survey was to obtain a position and estimated visual magnitude for every star visible with the 78-mm Bonn telescope. Actual magnitude estimates were made and reported to $0^m.1$ for all stars down to $9^m.5$, with fainter stars being assigned to 9.5. Thus, the BD actually contains a rather large number of stars fainter than $10^m.0$. Positions are given to the nearest $0^s.1$ in right ascension and 0'.1 in declination.

This documentation is intended to fully describe the machine-readable version of the BD. It includes detailed descriptions of the format and the procedure by which the computer file was created. Lists of all corrections made to the original data as a result of published corrigenda, stars deleted according to overstriking in the printed catalogs or their inclusion in lists of "missing" stars, and stars inserted in later editions are given in separate tables. Zone statistics for the catalog are also given in a table. No other corrections or changes have been incorporated into the original data, *e.g.*, from more modern positions and magnitudes or from comparison with other catalogs. The document is intended to enable users to process the data without problems, guesswork, or further literature consultation. For more detailed descriptions of how the observations were made and for additional statistics of star counts and distributions within each zone, the source references should be consulted. The reader can also find additional information on the compilation and scale of the BD, published in English, in papers by Pickering (1885, see pages 361 and 478; 1892; 1913). **A copy of this document should accompany any machine version of the catalog originating from the Astronomical Data Center or from the Center de Données Astronomiques de Strasbourg.**

1.2 Source References

Argelander, F. W. A. 1859-1862, *Bonner Sternverzeichniss*, erste bis dritte Sektion, *Astronomischen Beobachtungen auf der Sternwarte des Königlichen Rhein.*, Friedrich-Wilhelms-Universität zu Bonn, Bände **3-5**.

Becker, F. 1951, *Bonner Durchmusterung*, Nördlicher Teil, Deklinations-Zonen −1° bis +89° Sternverzeichnis, dritte, berichtigte Auflage (Bonn: Ferd. Dümmlers Verlag).

Küstner, F. 1903, *Bonner Durchmusterung des Nördlichen Himmels*, zweite berichtigte Auflage, Bonn Universitäts Sternwarte (Bonn: A. Marcus und E. Weber's Verlag).

Schmidt, H. 1968, *Bonner Durchmusterung*, Nördlicher Teil, Deklinations-Zonen −1° bis +89° Sternverzeichnis, vierte Auflage (Bonn: Ferd. Dümmlers Verlag).

2.0 Structure

2.1 File Summary

The machine version of the *Bonner Durchmusterung* consists of a single file. Table 1 gives the machine-independent file attributes. All logical records are of fixed length; if the catalog is received on magnetic tape, it will contain blocks of fixed length (as noted below) except that the last block of each file may be short.

Bonner Durchmusterung (Argelander 1859-62)				
File	Contents	Record Format	Logical Record Length	Total Number of Logical Records
1	Data	FB	32	325037

Table 1. Summary Description of Catalog Files: FB = Fixed length blocks (last may be short)

The information contained in the above table is sufficient for a user to describe the indigenous characteristics of the machine-readable version of the *Bonner Durchmusterung* to a computer. 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, density, number of tracks, and character coding (ASCII, EBCDIC) for tapes, is not included but should always accompany secondary copies if any are supplied to other users or installations.

2.2 *Catalog (File 1 of 1)*

Table 2 gives a byte-by-byte description of the contents of the data file. A suggested Fortran format specification for reading each data field is included and can be modified depending upon individual programming and processing requirements (Fortran 77 character string-type formats are used); however, caution is advised when substituting format specifications, since some of the data fields contain character data. Default (null) values are always blanks in data fields for which primary suggested formats are given as A. Null values are also not specified for numerical fields that always contain valid data.

Byte(s)	Units	Suggested Format	Default Value	Data
1-2	---	A2	---	Catalog prefix (BD)
3-5	---	I3	---	Zone
6-10	---	I5	---	Star number
11	---	A1	---	Code
12-15	mag	F4.1	---	Visual magnitude
16-17	hours	I2	---	Right ascension, α
18-19	min	I2	---	α
20-23	sec	F4.1	---	α
24	---	A1	---	Sign of declination, δ
25-26	°	I2	---	δ
27-32	′	F6.3	---	δ

Table 2. Data File Record Format

Catalog prefix — The letters "BD" are included in each record in order to distinguish the BD from all other machine-readable Durchmusterungen. Thus, all of the DM catalogs can conceivably be combined into a single file, and the individual source catalogs will still be identifiable.

Zone — The δ zone part of the BD number. The sign is always in byte 3, with preceding zeros on single-di 't zones where appropriate.

Star number — Sequentially increasing star number within the specified zone.

Code — Upper and lower case codes. All lower case letters represent supplemental (footnoted) stars added to the catalog in the 1903 or later editions. Upper case letters and other characters are flags that indicate changes to the original data or to the status of a star in the catalog. They have the following meanings:

- * Data have been corrected as a result of corrigenda, or there are special notes associated with the star. All changes are given in "Corrigenda Stars", Table 10 on page 15, with appropriate notes.
- ? Existence of star was questioned by Küstner in the 1903 edition or in one of his or Sticker's corrigenda lists. Many of these stars contain the "M" flag instead of the "?" because they were later investigated as a result of other lists (see "M" below). A list of these stars is given in "Stars of Questionable Existence", Table 8 on page 13.

D The star has been deleted in a later edition of the catalog. This was done by overstriking entries with horizontal lines. All such stars are listed in "Deleted Stars", Table 7 on page 12.

M The star was noted as "missing" in lists published by Chandler (1896) or by Pickering (1907). These entries were verified by R. A. Downes and at the ADC, and they are listed in "Missing Stars", Table 9 on page 14, where the work by Dr. Downes is discussed in more detail.

Visual magnitude

Magnitude as estimated by the observer or magnitude code to denote non-numerical entries in the published catalogs. The following codes are used:

20.0 *neb* (denoting a nebula);

30.0 *var* (denoting variability);

40.0 *nova* or nova?;

50.0 *cum* (denoting the cumulative [integrated] magnitude estimate for a cluster of stars).

Equatorial coordinates

Equinox 1855. For δ^m in the BD, only bytes 27-30 are used, so the data can be read with format F4.1. Bytes 31-32 were reserved to maintain a uniform format for all DM catalogs, since they are used in the southern zones of the *Cape Photographic Durchmusterung*.

3.0 History

3.1 Remarks

The data in the machine-readable *Bonner Durchmusterung* were keypunched directly from the published catalogs through the collaborative efforts of personnel at l'Observatoire de Nice, the Centre de Données Astronomiques de Strasbourg, the National Space Science Data Center at the NASA/Goddard Space Flight Center, and with the help of B. N. Rappaport, then at the NASA Jet Propulsion Laboratory. Progress reports on the keypunching of the BD have been published over the years in the *Bulletin d'Information du Centre de Données Stellaires* (Couteau *et al.* 1983; Wagner 1984, 1986; Warren 1987). The distribution of the work is given in Table 3.

Zones	Location
+ 89° to + 60°	Centre de Données Astronomiques de Strasbourg (CDS)
+ 59° to + 26°	L'Observatoire de Nice
+ 25° to + 24°	National Space Science Data Center (also CDS)
+ 23° to + 20°	B. N. Rappaport (+ 23° also done at CDS)
+ 19° to − 01°	National Space Science Data Center (+ 14° also done at Nice)

Table 3. Distribution of Computerization Work for BD Data

Zones + 89° to + 60° were also verified at the CDS and zones + 59° to + 26° were proofread there, while the remaining zones were proofread at the Astronomical Data Center. Redundant zones were compared by computer and appropriate corrections were made. All zones were carefully examined, checked for sequencing and record counts, reformatted, and merged in the correct order at the ADC, where the final catalog was assembled. The supplemental entries were incorporated into the ADC/NSSDC and Rappaport zones from an earlier catalog prepared by Warren and Kress (1980) or used to check existing supplemental entries in the Nice and CDS zones. The published corrigenda lists were cross checked extensively against the reprinted editions of the catalog for preparation of the tables in the appendix of this document. Apparent discrepancies were checked on the BD charts and on the prints of the Vehrenberg *Atlas Stellarum.* The final catalog was run through a verification program that checked numerical sequencing of the BD numbers, monotonic increase in right ascension, and allowed data ranges. All cases where stars are out of RA order were checked in the original data to verify that their positions are as in the original catalog.

The final file is ordered north to south strictly by BD number, *i.e.*, in the zone order + 89°, + 88°, ···, − 01°. Users should note, however, that all stars are not strictly in right ascension order within each zone. This is because individual stars are occasionally out of RA order in the original catalog and because of corrections inserted from the corrigenda. Thus, if the machine catalog is sorted by increasing RA, *e.g.*, for search purposes, some BD numbers will become disordered.

4.0 Acknowledgments and References

4.1 Acknowledgments

This immense project was successfully completed only through the combined efforts of the institutes and individuals listed in Table 3 on page 7 and the work of many persons within those institutes. The initial work at the Astronomical Data Center/NSSDC was begun and supervised by Drs. J. M. Mead, T. A. Nagy, and the author, but the punching could never have been begun, nor the project completed without the support of the former NSSDC Director, Dr. James I. Vette. This support has continued under the present Director, Dr. James L. Green, and the Head of NSSDC's Central Data Services Facility, Dr. Joseph H. King. The NSSDC zones (+19° to −01°) were punched by Beth Alexander, Carol Bergstrom, and Margy Goodwin, while monitoring software for data transfer was written by Frank Barnes and migration to magnetic tape was done by Charleen Perry under the supervision of Ralph Post. ADC software for the formatting of binary data and for the exact reproduction of published pages for proofreading was written by the first author (WHW), but the actual proofing was accomplished by summer students Paula Feldman and Kimberly Kniffen, who also assisted greatly with error checking, recording, and data corrections. Zones +24° and +25° were keyed directly to disk, printed, and proofread by WHW, while B. N. Rappaport arranged for the keypunching of zones +23° to +20° by Syntronix, Incorporated, of Sherman Oaks, California, checked the data with his own computer programs and financed the work himself.

The punching of zones +59° to +26° was accomplished at l'Observatoire de Nice by M. Fulconis, under the direction of P. Couteau, and their proofreading was done at the CDS by M. J. Wagner and W. Maslo.

Zones +80° to +60° were keyed directly to disk at the CDS by M. J. Wagner, W. Maslo, and R. Bonnet, with preprocessing software written and implemented by F. Ochsenbein. Zones +25° and +24° were also computerized at the CDS and used to check the data prepared at the Astronomical Data Center.

Finally, we thank Dr. R. A. Downes of Applied Research Corporation for bringing the "missing" stars to our attention, for supplying a complete list of the stars, and for rechecking certain questionable cases.

4.2 References

Argelander, F. W. A. 1859-1862, *Bonner Sternverzeichniss*, erste bis dritte Sektion, *Astronomischen Beobachtungen auf der Sternwarte des Königlichen Rhein.*, Friedrich-Wilhelms-Universität zu Bonn, Bände 3-5.

Becker, F. 1951, *Bonner Durchmusterung*, Nördlicher Teil, Deklinations-Zonen −1° bis +89° Sternverzeichnis, dritte, berichtigte Auflage (Bonn: Ferd. Dümmlers Verlag).

Chandler, S. C. 1896, *Astron. J.* **16**, 145.

Couteau, P., Fulconis, M., Ochsenbein, F., Wagner, M. J., and Maslo, W. 1983, *Inf. Bull. CDS* No. 25, p. 83.

Giclas, H. L., Burnham, R. Jr., and Thomas, N. G. 1971, *Lowell Proper Motion Survey, Northern Hemisphere, The G Numbered Stars* (Flagstaff: Lowell Observatory).

Küstner, F. 1903, *Bonner Durchmusterung des Nördlichen Himmels*, zweite berichtigte Auflage, Bonn Universitäts Sternwarte (Bonn: A. Marcus und E. Weber's Verlag).

Küstner, F. 1908, *Astron. Nach.* **178**, 33 (Nr. 4251).

Küstner, F. 1918, *Astron. Nach.* **206**, 69 (Nr. 4929).

Küstner, F. 1925, *Astron. Nach.* **223**, 309 (Nr. 5347).

Luyten, W. J. 1979, 1980, *New Luyten Catalogue of Stars with Proper Motions Larger than Two Tenths of an Arcsecond* (Minneapolis: University of Minnesota).

Luyten, W. J. and Hughes, H. S. 1980, *Proper Motion Survey with the Forty-Eight Inch Schmidt Telescope. LV. First Supplement to the NLTT Catalogue* (Minneapolis: University of Minnesota).

Pickering, E. C. 1885, *Harv. Ann.* **14**.

Pickering, E. C. 1892, *Harv. Ann.* **23**.

Pickering, E. C. 1907, *Astron. Nach.* **175**, 139.

Pickering, E. C. 1913, *Harv. Ann.* **72**.

Schmidt, H. 1968, *Bonner Durchmusterung*, Nördlicher Teil, Deklinations-Zonen $-1°$ bis $+89°$ Sternverzeichnis, vierte Auflage (Bonn: Ferd. Dümmlers Verlag).

Sticker, B. 1935, *Astron. Nach.* **256**, 341 (Nr. 6139).

Sticker, B. 1936, *Astron. Nach.* **259**, 187 (Nr. 6203).

Sticker, B. 1938, *Astron. Nach.* **265**, 127 (Nr. 6344).

Upgren, A. R., Grossenbacher, R., Penhallow, W. S., MacConnell, D. J., and Frye, R. L. 1972, *Astron. J.* **77**, 486.

Wagner, M. J. 1984, *Inf. Bull. CDS* No. 26, p. 87.

Wagner, M. J. 1986, *Inf. Bull. CDS* No. 30, p. 117.

Warren, W. H. Jr. 1987, *Inf. Bull. CDS* No. 32, p. 67.

Warren, W. H. Jr. and Kress, K. 1980, *Astron. Data Center Bull.* 1, 19.

Appendix A. Deletions and Addenda

As mentioned previously in this document, the data for many BD stars have been changed since the publication of the original catalog by Argelander. These changes occurred through the corrigenda published in the 1903 edition and in separate lists by Küstner (1908, 1918, 1925) and Sticker (1935, 1936, 1938). The incorporation of changes to the data is indicated by the flagging of individual records in byte 11 of the machine version. However, quite a few supplemental stars were either added outright in the corrigenda, or were deleted or modified there. All changes listed in the various papers were checked in the 1968 microedition. This was done in the edition available at the ADC by scanning the entire catalog with a magnifying glass to locate handwritten changes and added supplemental stars.

A.1 Supplemental Stars from the Corrigenda

Tables 4-6 list supplemental stars that were either added, deleted, or had their designations changed via published lists of corrigenda. These lists enable the user to resolve differences between the present machine-readable version and the 1903 edition of the published catalog, which is the most widely available edition. Three stars (+36° 4154a, +34° 2119a, and +04° 3561a [Barnard's Star]) were not published in any of the corrigenda cited above and were only found during review of the 1968 microedition.

+78 314a	+48 1783a	+45 3141a	+42 4100a	+33 21a	+21 2355a
+70 68a	+48 1986a	+44 312a	+42 4611a	+33 1429a	+19 339a
+70 68b	+48 2827a	+44 1308a	+41 312a	+33 4238a	+18 368a
+67 1076a	+48 3799a	+44 2480a	+41 1607a	+32 4341a	+18 3421a
+58 1096a	+47 630a	+44 2721a	+41 1608a	+32 4668a	+17 2116a
+57 2864a	+47 1278a	+44 3419a	+41 2269a	+31 366a	+16 4370a
+56 606a	+47 3074a	+43 1164a	+41 2680b	+31 2042a	+15 4266a
+56 2616a	+47 3202a	+43 1784a	+41 3640a	+30 420a	+12 206a
+50 242a	+46 489a	+43 2563a	+40 260a	+30 4456a	+05 462a
+50 1907a	+46 499a	+43 3248a	+40 2004a	+29 3503a	+04 2289a
+49 80a	+46 2755a	+43 3913a	+40 2006a	+29 4240a	+04 3561a
+49 937a	+46 2844a	+43 4086a	+40 3209a	+29 4470a	+03 1727a
+49 1405a	+46 2886a	+43 4119a	+40 4729a	+28 258a	+01 4513a
+49 1571a	+46 2912a	+43 4388a	+39 4869a	+28 1280a	+00 4718a
+49 2117a	+46 3116a	+42 376a	+37 3418b	+28 4536a	−00 2281a
+49 3452a	+46 3934a	+42 401a	+36 4154a	+26 71a	−00 3110a
+49 3546a	+45 513a	+42 1084a	+35 180a	+26 1414a	−00 4212a
+49 4309a	+45 1068a	+42 1798a	+34 527a	+26 2056a	
+48 1302a	+45 1073a	+42 2954a	+34 666a	+26 2059a	
+48 1391a	+45 1215a	+42 3093a	+34 2119a	+23 1503a	
+48 1538a	+45 3139a	+42 3785a	+34 4595a	+21 1842a	

Table 4. Supplemental BD Stars Added in Reprinted Edition

+46 1767a	+15 612a	+13 5168a	+02 4515a

Table 5. Supplemental BD Stars Deleted from Original Edition

+67 424a changed to +67 423a
+48 1302a changed to +48 1302b, +48 1302a added
+43 3579a changed to +43 3576a
+40 4729a changed to +40 4729b, +40 4729a added
+34 2117a changed to +34 2119a
+33 3581a changed to +33 3582a

Table 6. Modifications of Original Supplemental Numbers

A.2 Deleted Stars

The reprinted editions of the BD do not explicitly list stars deleted from the catalog because they could not be found at a later date. These deletions are only indicated in the published corrigenda of Küstner and Sticker, but stars were overstruck with horizontal lines in both the 1903 and the 1951 and 1968 microeditions. There are even cases where stars were overstruck in the 1903 edition then reactivated in the published corrigenda -- these are noted in the table of changes in a later section of this appendix. One serious difficulty with the 1903 edition is that no separate table of overstruck stars is given there and the deleted entries could only be found by reviewing the entire catalog manually. Table 7 lists all stars having a "D" in byte 11 of the catalog. The original data for these stars remain intact in the catalog, but it is clearly not desirable to plot them on charts if they really are "missing" in the sky. Obviously, many of these objects are "missing" either because of errors in the recording of their positions (thus placing them in the wrong locations in the catalog) or because they are variables that were brighter at the time of original observation than they were at later times when verification was attempted. Although we do not have specific information as to these effects, the situation can be seen clearly in the work of R. A. Downes, whose verification of the "missing" stars in the lists of Chandler (1896) and Pickering (1907) was attempted. Thus, many of the stars in the table may exist at different locations in the sky and are today considered as non-BD stars because they were originally miscataloged. One would also expect that a certain number of slow-moving solar system objects might have been cataloged that were later (and are still being) discovered as "missing".

+70 68	+36 4816	+18 1853	+13 2624	+07 3076	−00 2436
+57 488	+36 4820	+18 3926	+13 5055	+07 4790	−00 3952
+56 2292	+35 3909	+17 4256	+13 5168a	+07 5054	−00 4490
+53 3099	+34 1527	+17 4475	+12 2354	+06 511	−00 4554
+49 4032	+34 3731	+17 4848	+12 5031	+05 2652	−01 1044
+48 2347	+33 2212	+16 394	+11 1367	+05 3828	−01 1503
+47 2024	+32 1975	+16 574	+10 600	+04 612	−01 1655
+47 2795	+30 583	+15 376	+10 4830	+04 1934	−01 1856
+47 4317	+24 1166	+15 585	+09 143	+02 467	−01 3546
+46 1767a	+23 697	+15 612a	+08 614	+02 823	−01 3664
+46 2469	+23 1599	+15 862	+08 1997	+02 2555	−01 3771
+45 1858	+23 1878	+15 4077	+08 4778	+02 4515a	−01 4187
+41 1939	+22 1812	+15 4615	+08 4807	+01 1878	−01 4199
+41 3166	+19 2280	+14 719	+08 5154	+01 2188	−01 4333
+36 2876	+18 703	+14 3031	+08 5160	−00 317	

Table 7. Stars Deleted by Overstriking

A.3 Stars of Questionable Existence

Stars of questionable existence are indicated by the presence of "?" in the right-most column of the 1903 edition of the BD. They were also indicated in later lists published by Küstner and by Sticker with the remark "? hinzufügen." It was initially intended to place asterisks into byte 11 of the affected records for this machine version and to include them in the corrigenda table, but, upon additional thought about the matter of plotting star fields, we came to the conclusion that these stars should be assigned a separate code so that the user can either omit or include them based upon individual preference. Thus, we have flagged the objects with a "?" and have not included them elsewhere in this document (except for some stars that are flagged as missing also). As mentioned in the format description in Section 2.2, some of these stars were also included in the lists of Chandler (1896) and Pickering (1907) and, therefore, were investigated by R. A. Downes. In such cases, the "M" flag was retained in place of the "?" to indicate that further investigation did reveal the stars not to be present at their nominal postions. For reference purposes, the "?" stars are listed in Table 8. As with the "D" flag for deleted supplemental stars, supplemental stars of questionable existence have had the "a" replaced with the "?" code. Also included in the table are stars having "?" in the 1903 edition that was later deleted in the published corrigenda with the remark "? in 2. Auflage tilgen." These stars are flagged with daggers (†) and are not coded with a "?" in the catalog. Finally, there are two stars with "?" in the 1903 edition that were later deleted entirely in the published corrigenda lists. These are flagged with double daggers in Table 8 and will also be found in Table 7 on page 12.

+63 1620	+32 1636	+28 1484†	+19 1347†	+14 2543	+07 797
+59 1701	+32 2745	+28 1561	+19 2764	+13 226	+07 2277
+56 2612†	+32 3363	+28 2594	+19 2773	+13 700	+07 4982
+44 1727	+31 1725	+26 483	+19 4079	+13 703	+07 4986
+43 3749	+30 1923	+25 2301	+18 2300	+12 449	+07 5103
+39 298	+29 578	+24 531	+17 283	+11 673	+04 3955
+37 855	+29 844	+24 572	+17 344	+09 454	+02 1042
+37 903	+29 1928	+24 677	+17 355	+09 1975	+02 4515a
+36 2287	+29 2069	+23 882	+17 973	+08 33	+01 551
+35 2385	+29 2092	+23 1889	+17 2115	+08 115†	+01 579
+34 447	+29 4985	+22 1579†	+15 379	+08 215	+00 53
+34 551	+28 518†	+21 634	+15 587	+08 558	+00 2737
+34 893	+28 647	+21 2390	+1[illegible] 862‡	+08 4229	−00 3110
+34 2384	+28 1407	+20 235	+1[illegible] 1648	+08 5001	−00 3535
+33 460	+28 1466	+20 2405	+15 3854	+08 5059	−00 4554‡
+32 646	+28 1477	+20 5408	+14 2239	+08 5076	

Table 8. Questionable Stars Flagged with "?"

A.4 Missing Stars

Lists of "missing" stars were published by Chandler (1896) and Pickering (1907). The former list clearly pertains to the original published catalog, while the latter may also apply to the 1903 edition. None of these stars had yet been overstruck in the latest (1968) edition of the published catalog. All stars in these lists were checked on the *Palomar Observatory Sky Survey* (POSS) prints by R. A. Downes of Applied Research Corporation, who also checked the literature rather thoroughly (but not necessarily conclusively) for papers that might have solved their "missing" nature. Dr. Downes states that confirmation indicates that there is no bright non-BD star within 2′ of a nominal position, although some stars (noted in the following table) have bright non-BD stars within 10′ of their nominal positions, and, therefore, are possible small coordinate errors in the BD.

The original list of Dr. Downes had nine unconfirmed cases and eight other stars were found either to have been referred to in the literature or to have alternate identifications in other catalogs. This was discovered by querying the **SIMBAD** data bank for all stars on the original list. These 17 special cases were checked on charts of the Vehrenberg *Atlas Stellarum*. Four stars were removed from the list as a result of this check and one star, which also has HDE and AGK3 identifications, was found to contain an error in the BD declination. The error was corrected and the star (+23° 4157) is now listed in Table 10 on page 15. The NLTT (Luyten 1979, 1980; Luyten and Hughes 1980) and *Lowell Proper Motion Survey* (Giclas, Burnham, and Thomas 1971) catalogs were also checked for possible high proper-motion stars: none was found.

+48 869†	+30 1880	+24 531[9]	+20 812	+13 2141	+08 558[9]
+42 1196†	+30 1882	+24 684	+20 2472	+12 449[9]	+07 483
+42 3891	+30 4511	+24 2048	+19 5013	+12 595[6]	+07 2277†[9]
+41 1489	+29 1920	+24 2056	+18 108†	+12 3353	+07 3353
+40 2522	+29 2732	+24 2732[5]	+18 2487	+12 4929	+06 2500
+38 2227†	+28 647[2]	+23 406	+17 1590	+11 1846	+05 2300
+35 2345†	+28 1123	+23 612	+17 2385	+11 2697	+04 1771
+35 2385[2]	+28 1466†[9]	+23 1849†	+16 1516	+11 4888†	+03 1552[4]
+33 770[1]	+28 1477†[9]	+22 2011	+16 4493	+10 2694[5]	−00 3110
+33 1266†	+28 1484†[8]	+22 2441[5]	+15 379†	+10 4193	
+33 1613	+28 1561[9]	+21 2129†	+15 4337	+09 34	
+32 1636†[9]	+26 4331	+21 2134	+14 385	+09 2711	
+31 2005†	+25 3033	+21 2390[2]	+14 838	+08 33†[7]	
+30 1588	+25 4711	+20 235[9]	+13 703[9]	+08 215[9]	

Table 9. Stars Detected as "Missing" and Flagged with "M"

Notes to Table

† Non-BD star within 10′ of nominal BD position.

1 Star of approximately 13^m at nominal position.

2 There is a "?" in the 1903 edition. No star could be found on the POSS prints or on the Vehrenberg *Atlas Stellarum* chart.

3 Star of approximately 12^m at nominal position.

4 Candidate in field, but it is 3′ north of the BD position. Star listed by Upgren *et al.* (1972) at right ascension an hour away from the BD position.

5 Faint star(s) in field, but "M" flag retained in record.

6 Possible variability noted by Küstner (1918).

7 Existence also questioned by Küstner (1908).

8 There is a "?" in the 1903 edition that was later removed by Küstner (1918).

9 There is a "?" in the 1903 edition of the BD (see Table 8).

A.5 Corrigenda Stars

A list of corrigenda to the original catalog was published by Küstner in Volume 1 of the 1903 edition, but changes were not actually made in the catalog proper. However, there are other cases where changes to data were made in the catalog and are not listed in the corrigenda. These changes were detected during the course of working with the catalog and are indicated by a remark "Changed in 1903 edition." Numerous changes were made in the published corrigenda of Küstner (1908, 1918, 1925) and Sticker (1935, 1936, 1938), and these were incorporated into the 1951 and 1968 microeditions. The handmade changes in the 1903 edition were happened upon by chance as the work proceeded (no systematic search was made). Therefore, it is possible that there are more of these in the 1903 edition, and some might have been missed in the 1968 edition (if not included in published lists).

Other changes discovered during the course of the work were also made. In order to preserve a record of the miscellaneous changes not included in the tables of specific types of modifications (inserted, deleted, questionable, "missing") given in the previous tables, Table 10 lists all such changes, with brief notes to explain anomalies. Since changes to data for supplemental stars could not be indicated with codes without deleting the supplemental letter designations, these are given in the table with explanatory notes.

Star	Datum	For	Read	Remarks
+88 11?	m_v	30.0	8.7	
+84 ?4	δ	55.8	44.8	
+80 25	δ	57.8	54.7	
+80 193	δ	11.7	21.7	
+79 674	α^m	31	32	32 omitted in published version; chart consulted.
+73 533	m_v	9.5	30.0	
+72 840	α^s	48.	40.	Puts out of order with 839.
+72 918	δ	49.6	19.6	
+71 148	α^s	23.	7.	
+70 68				Replaced by +70 68a, +70 68b (Sticker 1938).
+69 588	α^s	52.	42.	
+69 979	m_v	9.3	9.5	
+67 424a	DM	424a	423a	Changed by Küstner (1908).
+67 424a	m_v	8.5	9.0	
+67 424a	α^m	6	5	
+67 562	δ	5.8	7.0	
+66 792	δ	56.4	58.4	
+65 1469	δ	16.2	18.2	
+64 1513	m_v	9.3	9.5	
+61 293	δ	34.5	33.5	
+61 1008	α^m	42	41	Puts out of order with 1007.
+61 1250	δ	54.7	52.7	
+60 982	α^s	18.6	20.1	
+60 982	δ	39.0	37.8	
+57 1534	α^m	42	43	
+57 2861	m_v	8.5	9.0	
+57 2861	α^s	12.5	18.5	Puts out of sequence with 2862-3.
+57 2861	δ	22.3	23.4	

Star	Datum	For	Read	Remarks
+56 1400	m_v	7.5	30.0	
+55 2135	α^s	17.5	23.0	
+55 2886	α^s	17.5	12.5	
+54 1068	α^s	34.3	33.3	
+54 1736	δ	25.9	24.9	
+52 86	α^s	6.3	7.3	
+52 1172	α^m	56	57	
+51 123	α^s	37.5	27.5	Puts out of order with 122.
+51 594	δ	9.9	19.9	
+50 290	δ	11.6	6.2	
+50 557	m_v	9.0	30.0	Var.; overstruck in 1903 edition, reactivated (Küstner 1908).
+50 678				Two faint stars, separation 0.″5.
+50 871	α^s	2.4	3.4	
+50 2999	m_v	9.0	9.1	
+49 1001	δ	44.0	43.0	
+49 3520	δ	12.7	11.7	
+49 3847	α^s	55.2	56.4	
+48 2421a	α^s	56.0	53.3	Corrected by Sticker (1935). Not flagged with *.
+48 2421a	δ	37.4	35.0	
+47 1318	δ			Catalog value uncertain (Küstner 1918).
+47 3057	α^s	37.9	40.5	
+47 3057	δ	3.5	4.6	
+46 1670	δ	33.8	32.8	
+46 1767a				Deleted by Sticker (1935). "D" in place of "a".
+46 2005a	α^s	30.5	22.6	Corrected by Sticker (1935). Not flagged with *.
+46 2005a	δ	10.0	9.4	Corrected by Sticker (1935). Not flagged with *.
+46 2740				Cluster NGC 6811.
+46 4039	α^m	17	18	Puts out of order with 4040.
+46 4039	α^s	54.3	4.3	
+44 1299	α^s	36.1	36.9	
+44 1299	δ	41.3	42.0	
+44 1301	α^s	41.0	41.8	
+44 1301	δ	46.5	47.2	
+43 3579a	DM	3579a	3576a	Küstner (1918). Not flagged with *.
+43 3576a	α^s	42.0	22.0	Küstner (1918).
+42 376	α^s	22.7	21.7	
+42 376	δ	34.1	32.9	
+42 4228	δ	35.9	39.4	
+41 1582	α^s	12.4	17.4	Puts out of order with 1583.
+41 1608	α^s	34.5	32.1	
+41 1608	δ	9.7	11.0	
+41 1869				2 stars: $\Delta\alpha$ 6.″8, $\Delta\delta$ 6.″1 (Küstner 1908).
+41 3348	α^s	4.9	0.4	
+41 3348	δ	34.0	33.2	
+40 4753	α^s	24.6	25.6	
+39 530	α^s	49.7	39.8	
+39 1986	δ	55.8	55.2	
+39 2567	δ	54.4	55.5	
+37 569	m_v	9.1	9.0	
+37 3418a	m_v	30.0	9.5	Changed from *var* to 9.5 (Küstner 1925).
+36 204				2 stars 9^m, separation 1′ (Küstner 1925).

Star	Datum	For	Read	Remarks
+35 438	α^s		39.6	Change in 1903 edition puts out of order with 435-7.
+34 176	δ	0.7	1.6	
+34 245	α^s	26.2	20.5	Puts out of order with 244.
+34 245	δ	17.5	18.8	
+34 269	δ	32.8	39.8	
+34 324	α^s	24.7	22.8	
+34 422	α^s	16.5	11.8	Puts out of order with 421.
+34 489	m_v	8.8	9.5	
+34 489	α^s	40.4	45.1	
+34 531	α^s	40.5	39.5	
+34 531	δ	0.6	1.6	
+34 666	m_v	9.2	9.3	
+34 666	α^s	17.0	14.9	
+34 748	δ	41.2	42.2	
+34 902	α^s	54.0	56.6	
+34 902	δ	52.7	52.1	
+34 1525	m_v	9.5	9.1	Changed in 1903 edition.
+34 1525	δ	20.7	18.8	Changed in 1903 edition.
+34 1540	α^s	59.8	51.2	Changed in 1903 edition. Puts out of order with 1538-9.
+34 1540	δ	47.9	47.6	Changed in 1903 edition.
+34 1641	α^s	12.5	6.0	
+34 2117a	DM	2117a	2119a	Not flagged with *.
+34 2117a	α^s	20.7	41.2	
+34 2117a	δ	53.7	52.4	
+34 2119	α^s	41.8	33.0	
+34 2937	δ	1.0	5.0	
+33 162	δ	0.6	1.6	
+33 967	α^s	45.4	39.1	
+33 967	δ	26.9	28.1	
+33 968	α^s	46.8	47.0	
+33 968	δ	24.7	24.2	
+33 1455	α^s	11.4	9.5	
+33 1455	δ	18.6	24.5	
+33 1488	α^s	59.8	39.8	
+33 1865	α^s	41.4	40.6	
+33 1865	δ	55.2	53.0	
+33 2018	α^s	24.4	19.0	
+33 2041	α^s	50.7	45.2	Puts out of order with 2040.
+33 2041	δ	15.0	16.1	
+33 3237	δ	44.2	36.7	
+33 3581a	DM	3581a	3582a	Not flagged with *.
+33 3582	α^s	4.6	2.9	
+33 4238	m_v	9.1	9.3	
+33 4238	α^s	39.4	37.1	
+33 4239	m_v	9.3	9.5	
+33 4603	α^s	7.7	1.9	Puts out of order with 4602.
+33 4685	α^s	6.0	11.0	
+33 4726	α^s	58.0	58.8	

Star	Datum	For	Read	Remarks
+32 117	α^s	54.8	44.8	
+32 162	δ	16.7	17.2	
+32 548	α^s	55.8	58.3	
+32 589	α^s	8.0	11.3	
+32 707	α^m	53	52	
+32 707	α^s	5.5	55.5	
+32 923	α^s	4.8	5.8	
+32 1092	α^s	19.4	16.4	
+32 1902	α^s	35.0	41.6	
+32 2026	α^s	54.4	56.4	
+32 2039	m_v	9.3	9.5	
+32 2164	α^s	42.7	45.4	
+32 2201	α^s	37.9	35.2	
+32 2237	α^s	49.3	33.3	
+32 2695	α^s	15.3	16.7	
+32 4669	m_v	9.3	9.5	
+32 4669	α^s	40.4	39.9	
+32 4669	δ	42.5	43.6	
+31 206	δ	24.7	21.0	
+31 1768	δ	7.1	6.1	
+31 1771	δ	1.5	0.5	
+31 2042	α^s	46.0	40.7	
+31 2042	δ	51.5	50.1	
+31 2079	δ	0.8	8.2	
+31 2598	δ	+31	+32	Change zone.
+31 2598	δ	57.8	1.3	
+31 2817	α^s	6.1	9.2	
+31 2890	α^s	29.8	35.3	
+31 2890	δ	33.0	34.1	
+31 2901	α^s	26.4	28.1	
+31 2926	α^s	45.0	48.4	
+31 3096	α^m	41	42	Puts out of order with 3097, which remains at 41′.
+31 3147	α^s	19.7	15.9	
+31 3175	δ	42.6	44.8	
+31 3308	δ	52.4	56.4	
+31 4375	δ	34.6	37.6	
+31 4378	δ	37.6	34.6	
+31 4837	α^s	17.8	20.5	
+31 4914	m_v	9.3	9.5	
+31 4914	α^s	6.6	8.4	
+31 4914	δ	55.6	55.4	
+31 4916	α^s	14.8	11.6	
+30 585	α^s	13.9	14.5	
+30 4456	m_v	9.3	9.2	
+30 4456	α^m	24	23	
+30 4456	α^s	1.4	57.0	
+30 4456	δ	51.1	50.1	
+29 405	δ	6.5	8.5	
+29 1423	α^s	35.6	45.6	
+29 2585	α^s	57.1	55.6	
+29 2632	α^m	3	4	
+29 2633	α^m	3	4	
+29 4231	m_v	9.5	30.0	
+29 4470	δ	16.9	13.7	

Star	Datum	For	Read	Remarks
+28 258	m_v	9.1	9.0	
+28 258	α^s	42.5	41.8	
+28 258	δ	51.0	50.2	
+28 1298	δ	50.2	52.3	
+28 1458	δ	2.5	6.3	
+28 1563	δ	4.9	6.9	
+27 620	α^s	1.4	2.4	
+27 620	δ	47.2	52.7	
+27 1760	m_v	3	9.3	Indicated as 9.3 on chart.
+27 1861	α^s	35.1	37.4	
+27 1861	δ	2.1	1.4	
+27 2136	δ	56.3	58.3	
+27 2510	δ	42.1	41.1	
+27 2529	δ	33.8	23.8	Sticker (1936).
+27 3018	α^s	31.1	41.1	
+27 3027	α^s	25.4	35.4	
+27 4133	α^s	47.9	51.8	Puts out of order with 4134-6.
+26 2057	α^m	4	5	Puts out of sequence with 2058-9, which remain 4.
+26 2648	α^m		59	Minutes missing in published catalog.
+25 391	δ	10.2	10.8	
+25 2961	δ	18.2	16.9	
+25 2964	δ	25.2	24.2	
+25 4374	α^s	32.8	22.8	
+25 5047	δ	32.0	30.0	
+25 5048	δ	34.2	32.2	
+24 3447	δ	2.4	1.4	
+24 3449	δ	3.2	2.2	
+24 4462	m_v	9.3	30.0	
+24 4535	δ	52.5	58.7	
+23 425	m_v	3.6	8.6	Sources SAO, Yale catalogs.
+23 1814	α^m	40	39	
+23 1814	α^s	4.9	52.9	
+23 4157	δ	30.6	29.0	Error discovered at ADC.
+22 1423	δ	25.1	35.1	
+22 3095	m_v	5.5	9.5	Correction to inverted 5.
+21 2359	δ	13.2	12.1	
+20 184	δ	20.7	40.7	
+20 2636	m_v	9.0	9.1	
+19 2041	α^s	59.0	54.5	
+19 2856	δ	16.6	14.6	
+19 3508	α^m	57	56	
+19 3508	α^s	0.6	57.9	
+19 3508	δ	35.3	36.8	
+19 4908	δ	51.5	42.6	
+18 2679	δ	30.2	20.2	
+17 88	α^s	1.5	5.3	
+17 4368	α^s	8.9	16.9	Puts out of order with 4369.

Star	Datum	For	Read	Remarks
+16 394	δ	66.1	6.1	+16 66.1 to +17 6.1; same star as +17 501a. Deleted.
+16 409	α^m	6	7	Changed by Küstner (1918). Puts out of order with 410-1.
+16 588	δ	5.8	42.4	Source Astrographic Catalogue.
+16 4193	δ	32.4	29.4	
+16 4290	m_v	9.3	30.0	
+16 4458	δ	26.4	46.4	
+16 4921	α^s	21.3	19.5	
+16 4921	δ	51.0	56.9	
+15 612a				Deleted by Küstner (1925). "D" in place of "a".
+15 613	δ	41.1	21.1	Deleted by Küstner (1925). Found and reactivated.
+15 622	δ	29.2	20.2	HDE chart shows star at 20.2, none at 29.2.
+15 4392	α^s	44.8	46.8	
+15 4395	α			RA may be 13 57.6 (Küstner 1918).
+14 2543	δ	33.7	45.4	
+14 2850	α^s		59.8	Blank in 1903 edition.
+14 3726	α^s	6.8	26.8	
+14 3727	α^s	34.3	39.0	
+13 700	α^s	14.3	9.2	
+13 700	δ	37.1	27.1	
+13 4688	m_v	9.3	9.5	
+13 4688	δ	42.5	40.5	
+13 5168	α^s	19.8	22.8	
+13 5168a				Deleted by Küstner (1918). "D" in place of "a".
+12 2542	α^m	55	54	Puts out of sequence with 2539-41.
+12 3382	α^s	56.0	58.0	
+10 402	α^m	52	53	
+10 2494	δ	56.7	47.4	
+10 3787	m_v	30.0	5.2	
+10 4967				δ^m may be 34.4.
+09 852	m_v	9.0	9.5	
+09 852	α^s	46.3	46.7	
+09 852	δ	8.7	10.9	
+09 856	m_v	9.3	8.9	
+09 4813	δ	29.1	27.1	
+09 5059	δ			Catalog value doubtful (Küstner 1918).
+08 211a	α^s	1.0	21.0	Not flagged with *.
+08 492	δ	53.1	48.7	
+08 1414	α^s	0.9	1.9	
+08 1417	α^s	16.2	17.2	
+08 2631	α^s	28.0	29.5	Puts out of order with 2632.
+08 2631	δ	8.3	11.7	
+08 2632	α^s	28.0	26.3	Puts out of order with 2631.
+08 2632	δ	9.3	9.9	
+08 3411	α^s	31.7	32.4	
+07 3199	m_v	9.5	30.0	
+07 3209	m_v	30.0	8.0	
+05 3883	δ	19.9	22.5	
+05 3897	α^s	47.0	40.0	Puts out of order with 3895-6.

Star	Datum	For	Read	Remarks
+04 2061	δ	0.5	5.1	
+04 2290	m_v	9.3	9.5	
+04 2290	α^s	46.9	49.4	
+04 2290	δ	32.1	31.8	
+04 4993	α^s	26.0	24.3	Puts out of order with 4992.
+04 4993	δ	22.5	23.8	
+03 53	α^m	22	21	Puts out of order with 51-2.
+03 1471	δ	29.2	31.7	SAO, Yale, various charts show star at 31.7.
+03 1726	m_v	9.2	9.4	
+03 1726	δ	44.0	43.5	
+03 3085	δ	56.9	36.9	
+02 2556	δ	33.7	32.0	
+02 4448	α^s	40.5	38.3	Puts out of order with 4447.
+02 4448	δ	3.9	5.8	
+02 4515a				Deleted by Küstner (1925). "D" in place of "a".
+01 1564	α^s	41.0	43.1	
+01 2129	δ	19.4	15.9	
+00 1010	α^s	53.9	55.9	Puts out of order with 1011.
+00 1010	δ	13.3	12.9	
+00 1236	δ	6.3	16.3	
−00 3946	δ	27.5	14.1	
−01 92	δ	58.6	56.5	
−01 164	δ	15.4	13.4	
−01 280	m_v	9.0	9.5	
−01 524	α^m	36	37	
−01 524	α^s	44.7	4.3	
−01 801	δ	6.0	4.0	
−01 802	δ	7.0	5.0	
−01 804	δ	8.5	5.5	
−01 813	m_v	8.8	9.1	
−01 1137	m_v	3.3	8.3	
−01 1841	α^s	27.4	32.4	
−01 2057	α^s	25.8	30.8	
−01 2593	δ	8.8	6.8	
−01 2689	δ	56.1	46.1	
−01 2870	δ	25.8	24.8	
−01 3218	m_v	5.4	9.4	Correction to inverted 5.
−01 3294	α^m	59	58	Puts out of sequence with 3291-93.
−01 3364	δ	5.0	10.2	
−01 3457	m_v	9.5	9.4	
−01 3464	α^s	48.2	47.3	
−01 3540	δ	17.7	21.3	
−01 4068	α^s	41.0	31.0	Changed in 1903 edition.
−01 4068	δ	47.3	47.8	Changed in 1903 edition.
−01 4185	α^s	14.0	17.1	Changed in 1903 edition.
−01 4185	δ	19.8	20.5	Changed in 1903 edition.
−01 4186	α^s	14.0	13.0	Changed in 1903 edition.
−01 4186	δ	30.0	29.8	Changed in 1903 edition.
−01 4292	α^s	13.0	18.0	
−01 4320	m_v	9.0	9.5	
−01 4380	m_v	9.2	9.1	

Table 10. Changes Made to BD Catalog Data

A.6 Zone Statistics

The many changes that have been made to the BD since the original work of Argelander have resulted in a situation that can be very confusing to a catalog user who wishes to verify that disagreements between the published catalog and the machine version are valid. For example, one usually checks the number of logical records in a sequentially numbered catalog with the highest sequential number in order to verify that no objects are missing or that there are no duplicate records, etc. Because of the supplemental BD stars, this is not possible within any one zone of the BD or for the total.

It is also useful to be able to determine how many objects have been added, deleted, etc., without having to process the whole catalog. Therefore, we summarize the zone statistics for the BD in Table 11 for the convenience of users of this new machine version. Note that, for most zones, the highest BD number does not determine the star count, but since records for deleted stars have been flagged rather than removed, the number of deleted stars has no influence on the record count. The "Stars Added" column shows how many stars have been added to the catalog as a result of both the corrigenda and the hand entries in the 1968 reprinted edition, while the "Stars Deleted" column provides a count of the number of stars flagged with a "D" in each zone. The number of supplemental stars for each zone is the total (1903, 1951, 1968 editions), hence the highest star number added to the number of supplemental stars should produce the record count. If a supplemental star has been deleted ("a" replaced with "D"), it is still counted in the supplemental column. The number of "missing" stars gives a count of how many stars are flagged with an "M" as a result of the work of R. A. Downes. The "M" stars are still counted in the last column.

Zone	Number of Records	Highest Star Number	Stars Added	Stars Deleted	Stars Missing	Supplemental Stars	Number of "Active" Stars
+89	38	38	-	-	-	-	38
+88	143	143	-	-	-	-	143
+87	220	220	-	-	-	-	220
+86	347	347	-	-	-	-	347
+85	412	412	-	-	-	-	412
+84	547	547	-	-	-	-	547
+83	675	675	-	-	-	-	675
+82	752	751	-	-	-	1	752
+81	844	844	-	-	-	-	844
+80	794	793	-	-	-	1	794
+79	810	803	-	-	-	7	810
+78	859	855	1	-	-	4	859
+77	938	937	-	-	-	1	938
+76	951	949	-	-	-	2	951
+75	909	907	-	-	-	2	909
+74	1063	1060	-	-	-	3	1063
+73	1073	1073	-	-	-	-	1073
+72	1142	1141	-	-	-	1	1142
+71	1253	1251	-	-	-	2	1253
+70	1349	1345	2	1	-	4	1348
+69	1384	1383	-	-	-	1	1384
+68	1431	1429	-	-	-	2	1431
+67	1607	1601	1	-	-	6	1607
+66	1684	1683	-	-	-	1	1684
+65	2005	2001	-	-	-	4	2005
+64	1901	1900	-	-	-	1	1901
+63	2120	2109	-	-	-	11	2120
+62	2373	2369	-	-	-	4	2373
+61	2601	2595	-	-	-	6	2601
+60	2676	2669	-	-	-	7	2676

Zone	Number of Records	Highest Star Number	Stars Added	Stars Deleted	Stars Missing	Supplemental Stars	Number of "Active" Stars
+59	2843	2831	-	-	-	12	2843
+58	2712	2704	2	-	-	8	2712
+57	2877	2870	1	1	-	7	2876
+56	3157	3145	2	1	-	12	3156
+55	3103	3092	-	-	-	11	3103
+54	3123	3115	-	-	-	8	3123
+53	3295	3293	-	1	-	2	3294
+52	3608	3601	-	-	-	7	3608
+51	3793	3786	-	-	-	7	3793
+50	4248	4239	2	-	-	9	4248
+49	4354	4339	8	1	-	15	4353
+48	4261	4250	7	1	1	11	4260
+47	4394	4383	4	3	-	11	4391
+46	4283	4264	8	2	-	19	4281
+45	4428	4418	6	1	-	10	4427
+44	4568	4555	5	-	-	13	4568
+43	4659	4638	8	-	-	21	4659
+42	4859	4838	9	-	2	21	4859
+41	4948	4939	6	2	1	9	4946
+40	5249	5236	5	-	1	13	5249
+39	5230	5223	1	-	-	7	5230
+38	5124	5118	-	-	1	6	5124
+37	4955	4937	1	-	-	18	4955
+36	5162	5155	1	3	-	7	5159
+35	5181	5172	1	1	2	9	5180
+34	5088	5067	4	2	-	21	5086
+33	4850	4837	3	1	3	13	4849
+32	4788	4775	2	1	1	13	4787
+31	5058	5039	2	-	1	19	5058
+30	5102	5091	2	1	4	11	5101
+29	5073	5064	3	-	2	9	5073
+28	4718	4709	3	-	6	9	4718
+27	4686	4680	-	-	-	6	4686
+26	4761	4746	4	-	1	15	4761
+25	5084	5073	-	-	2	11	5084
+24	4888	4886	-	1	5	2	4887
+23	4861	4854	1	3	3	7	4858
+22	4966	4957	-	1	2	9	4965
+21	5034	5026	2	-	3	8	5034
+20	5438	5430	-	-	3	8	5438
+19	5226	5211	1	1	1	15	5225
+18	5284	5270	2	3	2	14	5281
+17	5060	5038	1	3	2	22	5057
+16	5058	5043	1	2	2	15	5056
+15	4956	4939	1	6	2	17	4950
+14	5110	5100	-	2	2	10	5108
+13	5220	5209	-	3	2	11	5217
+12	5086	5070	1	2	4	16	5084
+11	5103	5097	-	1	3	6	5102
+10	5035	5026	-	2	2	9	5033

Zone	Number of Records	Highest Star Number	Stars Added	Stars Deleted	Stars Missing	Supplemental Stars	Number of "Active" Stars
+09	5331	5323	-	1	2	8	5330
+08	5192	5172	-	6	3	20	5186
+07	5144	5129	-	3	3	15	5141
+06	5255	5243	-	1	1	12	5254
+05	5274	5263	1	2	1	11	5272
+04	5114	5092	2	2	1	22	5112
+03	4952	4935	1	-	1	17	4952
+02	4773	4754	-	4	-	24	4774
+01	4848	4833	1	2	-	15	4846
+00	5102	5087	1	-	-	15	5102
−00	4647	4620	3	5	1	27	4642
−01	4552	4530	-	10	-	22	4542
Totals	325037	324189	123	89	79	848	324948

Table 11. Zone Statistics for the BD

Appendix B. Sample Listing

The sample listing given on the following pages shows logical records exactly as they are recorded in the machine-readable version of the catalog. Groups of records from the beginning and end of the file are illustrated. The beginning of each record and the bytes within the record are indicated by the column heading index across the top of each page (digits read vertically).

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

Data File Name: Bonner Durchmusterung

Records 1 To 20

Data File 1

Record Length 32 bytes

Input VOLSER WHW017

```
COLUMN
HEADING          1111111111222222222233333333334444444444555555555566666666667777777777888888888899999999990000000000111111
INDEX      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
```

Record	1	BD+89	1	9.5	011 5.	+8936.2
Record	2	BD+89	2	9.2	11735.	+89 0.2
Record	3	BD+89	3	8.8	14936.	+8929.2
Record	4	BD+89	4	9.4	15057.	+8923.6
Record	5	BD+89	5	9.5	15158.	+8913.3
Record	6	BD+89	6	9.4	21643.	+89 0.6
Record	7	BD+89	7	9.3	31112.	+89 4.3
Record	8	BD+89	8	9.5	35349.	+89 0.5
Record	9	BD+89	9	9.1	44939.	+8927.1
Record	10	BD+89	10	9.5	54344.	+89 6.0
Record	11	BD+89	11	9.5	557 3.	+89 3.6
Record	12	BD+89	12	9.1	61738.	+8937.9
Record	13	BD+89	13	7.0	7 340.	+89 1.8
Record	14	BD+89	14	9.5	714 2.	+89 1.0
Record	15	BD+89	15	9.2	72750.	+89 1.6
Record	16	BD+89	16	9.5	85847.	+8939.4
Record	17	BD+89	17	9.0	102621.	+8932.0
Record	18	BD+89	18	8.9	11 827.	+8943.9
Record	19	BD+89	19	9.5	11 911.	+8932.9
Record	20	BD+89	20	9.5	12 023.	+8926.3

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

Data File Name: Bonner Durchmusterung

Records 325018 To 325037

Data File 1

Record Length 32 bytes

Input VOLSER WHW017

```
COLUMN
HEADING                  1111111111222222222233333333334444444444555555555566666666667777777777888888888899999999990000000000111111
INDEX          1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
```

Record 325018 BD-01 4511 9.5235121.0-0142.2

Record 325019 BD-01 4512 9.0235142.8-0123.5

Record 325020 BD-01 4513 8.5235144.6-0117.3

Record 325021 BD-01 4514 7.0235223.7-01 4.7

Record 325022 BD-01 4515 7.3235247.2-01 9.5

Record 325023 BD-01 4516 9.0235415.3-0156.6

Record 325024 BD-01 4517 8.7235418.0-01 0.3

Record 325025 BD-01 4518 9.0235449.5-0117.6

Record 325026 BD-01 4519 9.5235452.8-0110.1

Record 325027 BD-01 4520 8.0235533.3-0143.8

Record 325028 BD-01 4521 9.5235553.0-0148.3

Record 325029 BD-01 4522 9.5235640.0-01 6.6

Record 325030 BD-01 4523 9.5235644.3-0145.9

Record 325031 BD-01 4524 8.7235714.8-0152.4

Record 325032 BD-01 4525 7.0235739.8-0118.4

Record 325033 BD-01 4526 9.52358 2.8-0137.7

Record 325034 BD-01 4527 9.5235824.0-0159.0

Record 325035 BD-01 4528 9.5235852.5-0128.0

Record 325036 BD-01 4529 9.5235944.5-0110.0

Record 325037 BD-01 4530 9.5235958.1-01 9.9