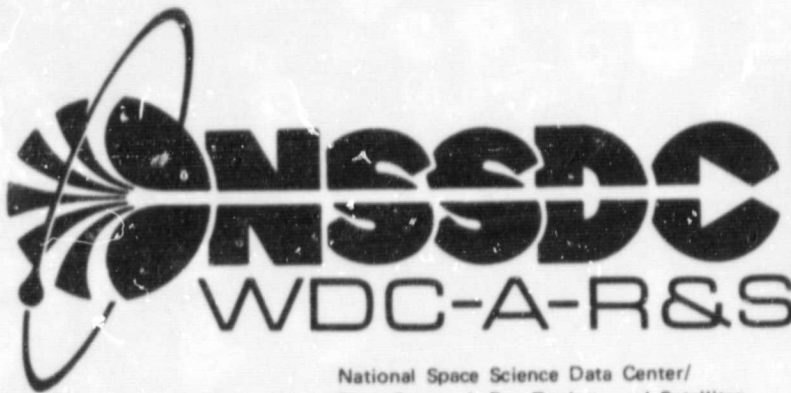


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83-05

(NASA-TM-85419) DOCUMENTATION FOR THE
MACHINE-READABLE VERSION OF THE LOWELL
PROPER MOTION SURVEY, NORTHERN HEMISPHERE,
THE G NUMBERED STARS (NASA) 21 p
HC A02/MF A01

N83-35962

Unclas
42120

CSCL 03A G3/89

DOCUMENTATION FOR THE MACHINE-READABLE VERSION OF THE
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JUNE 1987

DOCUMENTATION FOR THE MACHINE-READABLE VERSION

OF THE

LOWELL PROPER MOTION SURVEY

Northern Hemisphere

THE G NUMBERED STARS

Wayne H. Warren Jr.

June 1983

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

This *Lowell Proper Motion Survey* catalog contains a summary of many individual papers published in the *Lowell Observatory Bulletins* in the years 1958 to 1970. The data in the machine-readable version include observed positions, proper motions, estimated photographic magnitudes and colors, and references to identifications in other catalogs. Photoelectric data on the *UBV* system are included for many stars, but no attempt was made to find all existing photometry. The machine version contains all data of the published catalog, except the Lowell Bulletin numbers where finding charts can be found. A separate file contains the notes published in the original catalog.

This document describes the machine-readable catalog available from the Astronomical Data Center. It is intended to enable users to read and process the data without problems and guesswork. For additional details concerning the observing program the source reference and original Lowell Bulletins should be consulted. This document should be distributed with any machine-readable copy of the catalog.

SOURCE REFERENCE

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

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the contents of the *Lowell Proper Motion Survey* catalog is given in Table 1. The suggested format specifications apply to FORTRAN formatted reads and can be modified depending upon individual programming and processing requirements. Since data fields are blank where values are missing, care must be exercised when processing data which have valid zero values, e.g. color indices. It is suggested that these fields be read initially with character (A) format specifications and checked for blanks if they are to be used for calculations or search purposes. Although decimal points are omitted from the data records for many real numbers, real format specifications are given in the table to indicate the locations of the decimal points. Alternate format specifications are given in parentheses.

Table 1. Tape Contents. *Lowell Proper Motion Survey, Northern Hemisphere.*
Data File

Byte(s)	Units	Suggested Format	Description
1- 8	---	A8	Original G number assigned to the star on the plate region where it was first found. Stars which were subsequently found on later plates were assigned new G numbers; however, in this catalog all duplicate observations have been combined and averaged with the original G numbers retained. Byte 1 of the field always contains a "G" and byte 5 always contains a "-". The number in bytes 2-4 is the plate number, while that in bytes 6-8 is the star number on the plate.
9-10	hours	I2	Right ascension, α , equinox 1950. Epochs are given for plate regions in the original Lowell Bulletin numbers reported in the CHT column of the published catalog. These references are not included in the machine-readable version.
11-12	min	I2	α
13-14	sec	I2	α
15-17	°	I3 (A1,I2)	Declination, δ , equinox 1950.
18-20	'	F3.1	δ
21-24	"	F4.2	Annual proper motion μ .

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
25-27	°	I3	The position angle of μ , measured in the normal way from North through East.
28-30	mag	F3.1	m_{pg} , the estimated photographic magnitude.
31-32	---	I2	Estimated color class on a scale of -1 (bluest) to +4 (reddest). Almost all stars having color class -1 have subsequently been classified as white dwarfs. An approximate relationship between estimated color and <i>UBV</i> colors is given in the published catalog.
33-34	---	I2	Number of observations from different plate regions contained in the mean. A value of unity denotes a single observation from one plate pair. Actually, there are never as many as ten observations, so byte 33 is always blank.
35	---	1X	Blank
36-70	---	35A1	or equivalent. References for other sources containing information and/or data about the star. References are separated by blank characters and consist mainly of designations in other catalogs. A symbol "+" following the last reference indicates additional references in the notes to the catalog. The reference key is given in Table 2.
71	---	1X	Blank
72	---	A1	An asterisk (*) indicates that there is a note in the published catalog which gives additional information about the star. See Table 5 for a description of the machine-readable notes.
73	---	A1	A code indicating if the star is on the parallax program of some observatory, thus denoting the possibility that a trigonometric parallax may eventually be available. The following codes are employed: A (Allegheny Obs.), L (Lick), M (Leander McCormick), N (U.S. Naval),

Table 1. (continued)

Byte(s)	Units	Suggested Format	Description
			S (Sproul), V (Van Vleck), Y (Yerkes). A digit $n > 2$ ($= n$) indicates the star to be on the working lists of n observatories. The codes for the n observatories are listed in Table 3.
74	---	1X	Blank
75-79	mag	F5.2	Photoelectric V magnitude obtained from the source given in bytes 95-97. UBV data are given for reference purposes only and no attempt for completeness has been made. Blank if no data reported.
80	---	1X	Blank
81-85	mag	F5.2	$B-V$ color (blank if no data). Sign always in byte 81, except for 0.00 values.
86	---	1X	Blank
87-91	mag	F5.2	$U-B$ color (blank if no data). Sign always in byte 87, except for 0.00 values.
92-94	---	3X	Blank
95-97	---	A3	Reference code for the magnitude source. The reference key is given in Table 4. A digit > 2 denotes multiple references (given in the notes). Note: the appended minus signs on some codes are not explained in the published catalog.
98	---	1X	Blank

Table 2. Lowell Proper Motion Survey, Northern Hemisphere.
Key to Reference Abbreviations.

AVK	Alden, H L. and van de Kamp, P. 1924, <i>Astron. J.</i> <u>35</u> , 165.
BD	number with asterisk, <i>Bergedorf Eigenbewegungs-Lexicon</i> 1936, Hamburger Sternwarte in Bergedorf or the continuation (Heidi, V. J. 1950, <i>Astron. Nach.</i> <u>279</u> , 273).
BD	number with (L). Luyten, W. J. 1942, <i>Publ. Astron. Obs., Univ. of Minnesota</i> <u>II</u> , No. 12; 1944, <u>III</u> , No. 4.
BPM	Luyten, W. J. 1963, <i>Bruce Proper Motion Survey: The General Catalogue</i> , Vols. <u>I</u> and <u>II</u> (Minneapolis: Univ. of Minnesota).
CI	Porter, J. G., Yowell, E. I. and Smith, E. 1915, <i>Publ. Cincinnati Obs.</i> <u>18</u> ; 1930, <u>30</u> .
E	Ebbighausen, E. G. 1938, <i>Astron. J.</i> <u>47</u> , 112.
FI, FII, FIII	Furuhjelm, R. 1916, <i>Acta. Soc. Sci. Fennicae</i> <u>48</u> , No. 1; 1926, <u>50</u> , No. 7; 1947, Ser. A, <u>3</u> , No. 12.
GL	Gliese, W. 1969, <i>Catalogue of Nearby Stars</i> , Veröff. Astron. Rechen-Inst. Heidelberg, No. 22.
GOYAL	Goyal, A. N. 1962, <i>Astron. Nach.</i> <u>286</u> , 196.
GRN	Van Rhijn, P. J. and Plaut, L. 1955, <i>Publ. Kapteyn Astron. Lab., Groningen</i> , No. 56.
H	Hertzsprung, E. 1918, <i>Astron. Nach.</i> <u>207</u> , 171.
HL	Haro, G. and Luyten, W. J. 1960, <i>Bull. Tonantzintla y Tacubaya</i> , No. 19, 16.
HUB	Hubble, E. P. 1916, <i>Astron. J.</i> <u>29</u> , 168.
HYD	Contained in one of the lists published by the Hyderabad observers in <i>Astron. Nach.</i> , <i>Mon. Not.</i> , or <i>Astron. Nach. B.Z.</i>
JO	Contained in one of the many lists of proper motion stars in the Astrographic zones published in <i>J. des Observateurs</i> , principally by the Nizamiah and Bordeaux Observatories.
K1	Karpov, B. G. 1937, <i>Publ. Astron. Soc. Pacific</i> <u>49</u> , 146.
K2	Karpov, B. G. 1937, <i>Astron. J.</i> <u>46</u> , 201.
KONIG	König, A. 1953, <i>Astron. Nach.</i> <u>281</u> , 107.

Table 2. (continued)

KOPAL	Kopal, Z. 1939, <i>Harvard Bull.</i> No. 911, p. 28.
L	Luyten, W. J. 1942, <i>Publ. Astron. Obs., Univ. of Minnesota</i> <u>II</u> , No. 12; 1944, <u>III</u> , No. 4.
LE	Luyten, W. J. and Ebhlgghausen, E. G. 1937, <i>Astron. J.</i> <u>45</u> , 188.
LFT	Luyten, W. J. 1955, <i>A Catalogue of 1849 Stars With Proper Motions Exceeding 0".5 Annually</i> (Minneapolis: Lund Press.)
LP	Luyten, W. J. 1961-1967, <i>Publ. Astron. Obs. Univ. Minnesota</i> <u>III</u> , Nos. 8, 10, 11, 13-18, 20; 1963-1970, <i>Proper Motion Survey with the Forty-eight Inch Schmidt Telescope</i> (Minneapolis: University of Minnesota).
LPM	Luyten, W. J. 1941, <i>Publ. Astron. Obs., Univ. of Minnesota</i> <u>III</u> , No. 1.
LTT	Luyten, W. J. 1957, <i>A Catalogue of 9867 Stars in the Southern Hemisphere with Proper Motions Exceeding 0".2 Annually</i> (Minneapolis: Lund Press). Luyten, W. J. 1961, <i>A Catalogue of 7127 Stars in the Northern Hemisphere with Proper Motions Exceeding 0".2 Annually</i> (LTT 10001-17027) (Minneapolis: Lund Press). Luyten, W. J. 1962, <i>First Supplement to the LTT Catalogues</i> (LTT 17028-18635) (Minneapolis: Lund Press).
MC	1937, <i>Publ. Leander McCormick Obs., Univ. of Virginia</i> <u>VII</u> .
ML	McLead, N. W. 1939, <i>Pop. Astronomy</i> <u>47</u> , 455.
OST	Oosterhoff, P. Th. 1936, <i>Astrophys. J.</i> <u>83</u> , 340.
PUL	Deutsch, A. N. 1940, <i>Publ. de l'Obs. Central a Poulkovo, Serie II</i> , <u>LV</u> .
R	Ross, F. E. 1925-1939, <i>Astron. J.</i> <u>36-48</u> .
RAD	1934, <i>Radcliffe Catalogue of Proper Motions in the Selected Areas 1 to 115</i> (London).
S	Strand, K. Aa., Lenham, A. and Owen, T. 1958, <i>Astron. J.</i> <u>63</u> , 337.
T	1955, <i>Ann. de l'Obs. Astron. Toulouse</i> <u>XXIII</u> .
VM	Van Maanen, A. 1915, <i>Astrophys. J.</i> <u>41</u> , 187.

Table 2. (continued)

VM1	Van Maanen, A. 1938, <i>Astrophys. J.</i> <u>88</u> , 27 (Table 1).
VM2	Van Maanen, A. 1938, <i>Astrophys. J.</i> <u>88</u> , 27 (Table 2).
VMW	Van Maanen, A. and Willis, H. C. 1930, <i>Contrib. Mt. Wilson Obs.</i> , No. 412.
W	Wolf, M. 1919, <i>Veröff Sternwarte zu Heidelberg</i> <u>7</u> , No. 10; 1919-1929, <i>Astron. Nach.</i> <u>209-236</u> .
Y	Schlesinger, F. and Barney, I. 1939-1959, <i>Yale Zone Catalogues</i> , <i>Trans. Astron. Obs., Yale Univ.</i> <u>11-14</u> , <u>16-27</u> .

Table 3. Lowell Proper Motion Survey Northern Hemisphere.
Supplementary Parallax Codes

G001-027	L,S	G063-052	S,A	G141-004	N,Y,S
G003-033	L,S,Y	G063-053	S,A	G142-052	L,N,Y
G005-028	L,Y	G066-032	L,A	G144-025	N,Y
G006-030	L,A	G067-037	S,A	G146-058	L,A,N
G006-042	S,A	G068-024	S,A	G149-081	L,Y
G007-017	L,Y,N	G069-047	Y,N,L	G150-041	S,A
G008-008	N,A	G074-007	A,Y	G164-064	S,A
G008-055	Y,S	G077-031	L,N	G164-065	S,A
G010-050	S,A	G087-007	N,A,L,S	G164-071	S,A
G012-021	L,A	G087-008	Y,L	G166-053	S,A
G012-043	S,A	G087-012	S,A	G170-012	Y,A
G013-026	L,A	G087-028	N,L	G170-055	S,A
G013-035	L,A	G087-029	N,L	G171-010	L,A,S
G018-016	S,A	G087-043	S,A	G171-019	S,A
G019-020	L,A	G089-019	S,A	G171-040	S,A
G019-024	S,A	G093-048	N,A	G171-048	S,A
G021-015	L,N	G095-059	L,Y	G173-053	S,A
G022-018	S,A	G097-005	N,A	G175-034	Y,A
G022-022	S,A	G097-042	S,A	G176-011	S,A
G024-010	L,N	G097-047	S,L	G182-036	L,Y
G024-023	S,A	G099-010	Y,N	G185-018	L,Y
G025-022	N,A	G099-017	L,A	G185-037	L,S,A
G026-009	Y,A	G099-033	L,N,Y	G186-031	L,S
G026-010	Y,A,L,N	G099-047	L,A	G191-051	S,A
G028-043	A,N	G102-022	S,A	G195-017	S,A
G029-038	L,N,S	G104-037	S,A	G195-018	S,A
G033-049	A,N	G104-049	S,A	G195-019	L,A
G034-015	Y,N,L	G105-023	N,Y	G200-016	S,A
G035-029	L,N	G107-070	L,Y	G202-045	S,A
G036-031	S,A	G116-052	L,N	G203-051	S,A
G044-040	S,A	G119-052	A,S	G204-027	S,A
G045-020	S,A	G120-045	L,A,N	G205-030	S,A
G046-001	S,A	G120-068	S,A	G210-048	S,A
G049-033	L,A	G121-027	N,A	G216-016	S,A
G050-004	S,A	G125-029	S,A	G217-007	S,A
G051-015	L,Y	G126-004	S,A	G221-005	Y,A
G054-023	S,A	G126-027	N,A	G225-067	A,Y,L
G055-024	S,A	G128-007	Y,A	G230-026	S,A
G057-029	L,A	G130-005	S,A	G231-019	S,A
G060-032	S,A	G130-006	S,A	G231-043	L,A
G060-054	L,Y	G130-043	Y,N	G235-036	S,A
G061-021	L,N	G136-103	N,S	G235-049	S,A
G062-015	L,Y	G137-078	S,A,N,L	G238-044	L,A
G062-053	L,N,S,A	G138-025	Y,N	G259-021	Y,L,N
G063-034	S,A	G139-039	Y,N		
G063-036	S,A	G140-024	S,A		

Table 4. Lowell Proper Motion Survey, Northern Hemisphere.
Magnitude Source Reference Key

E1	Eggen, O. J. 1963, <i>Astron. J.</i> <u>68</u> , 483.
E2	Eggen, O. J. 1966, <i>Royal Obs. Bull.</i> No. 120.
E3	Eggen, O. J. 1968, <i>Astrophys. J. Suppl.</i> <u>16</u> , 97 (No. 143).
E4	Eggen, O. J. 1969, <i>Astrophys. J. Suppl.</i> <u>19</u> , 31 (No. 168).
E5	Eggen, O. J. 1968, <i>Astrophys. J.</i> <u>153</u> , 195.
EG1	Eggen, O. J. and Greenstein, J. L. 1965, <i>Astrophys. J.</i> <u>141</u> , 83.
EG2	Eggen, O. J. and Greenstein, J. L. 1965, <i>Astrophys. J.</i> <u>142</u> , 925.
EG3	Eggen, O. J. and Greenstein, J. L. 1967, <i>Astrophys. J.</i> <u>150</u> , 927.
ES	Eggen, O. J. and Sandage, A. 1967, <i>Astrophys. J.</i> <u>148</u> , 911.
G1	Greenstein, J. L. 1969, <i>Astrophys. J.</i> <u>158</u> , 281.
S1	Sandage, A. 1964, <i>Astrophys. J.</i> <u>139</u> , 442.
S2	Sandage, A. 1969, <i>Astrophys. J.</i> <u>158</u> , 1115.
SK	Sandage, A. and Kowal, C. 1962, private communications.
WG	Gliese W. 1969, <i>Catalogue of Nearby Stars</i> , Veröff. Astron. Rechen-Inst. Heidelberg, No. 22.
WA	Wanner, J. F. 1964, Ph.D. Thesis, Harvard University.

Table 5. Tape Contents. Lowell Proper Motion Survey, Northern Hemisphere Notes File

Byte(s)	Description
1-10	Star number as described for bytes 1-8 in Table 1. If more than one consecutive G number is referred to, a slash (/) appears in byte 9 and the final digit of the second G number is given in byte 10. If more than two consecutive G numbers are included, a hyphen appears in byte 9 and the final digit of the last number in byte 10. A comma is given in byte 9 if two non-consecutive G numbers are referenced. Bytes 9 and 10 may also contain component identifications for double stars having the same G number, e.g. "AB".
11-12	Integer used to sequentially number remarks for the same star(s). Can be used as a secondary sort field to reorder the notes properly if they become disorganized.
13-80	Remarks in upper and lower case characters.

SECTION 3 - TAPE CHARACTERISTICS

The information contained in Table 5 is sufficient for a user to describe the indigenous characteristics of the machine-readable *Lowell Proper Motion Survey* file 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, tape density, number of tracks, and internal coding (EBCDIC, ASCII, etc.) is not included. This information should always be supplied if secondary copies are transmitted to other users or installations. Parameters relating to the two files of the catalog are separated by commas.

Table 6. Tape Characteristics. *Lowell Proper Motion Survey, Northern Hemisphere.*

NUMBER OF FILES	2
LOGICAL RECORD LENGTH (BYTES)	98, 80
RECORD FORMAT	FB*
TOTAL NUMBER OF LOGICAL RECORDS	8989, 2429

* Fixed block length (last block may be short)

SECTION 4 - REMARKS, MODIFICATIONS AND REFERENCES

The machine-readable version of the *Lowell Proper Motion Survey, Northern Hemisphere* was received on magnetic tape from the Centre de Donnees Stellaires, Strasbourg. As received, the catalog consisted of 80-byte logical records with multiple records for stars having photoelectric data. The following modifications were made to assure easier data processing and greater uniformity with other computerized catalogs:

1. The first record, containing only the word "MUCAT", was deleted.
2. Multiple 80-byte records were combined while deleting a test digit in byte 80 indicating an additional record, and redundant G numbers on multiple records were removed. The restructuring resulted in the current 98-byte record.
3. The machine-readable catalog contains 8989 records. A count of the stars in the published catalog (113 full pages with 75 stars per page and 68 stars on last page) gives 8993; however, stars are missing on pages 28, 29 and 42, resulting in 8989 stars total.
4. Preceding zeroes were added to the G numbers to match the published catalog.
5. There was no distinction between blank and 0.00 color indices. Initially, all zeroes were converted to blanks for *B-V* and *U-B*, then the published catalog was scanned for valid 0.00 values and the values were added for the appropriate stars.
6. Plus signs were added to the declinations (byte 15), the color class positive values, and to all positive color indices.
7. The following miscellaneous corrections to the published catalog were made to the machine file:

G066-036	photoelectric data deleted as per published version
G213-017	δ° corrected from +39 to +37
G128-032	added BD+32 4584-5

8. The notes file was prepared by keying the published remarks directly to disk and adding to the catalog as a second file.

REFERENCES

Giclas, H. L. 1958, *Lowell Obs. Bull.* 4, 1 (No. 89).

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- Giclas, H. L., Slaughter, C. D. and Burnham, R. Jr 1959, *Lowell Obs. Bull.* 4, 136 (No. 102).

SECTION 5 - SAMPLE LISTING

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

