DOCUMENTATION FOR THE
MACHINE-READABLE VERSION OF THE
LICK SATURN-VOYAGER REFERENCE STAR CATALOGUE

JANUARY 1982
DOCUMENTATION FOR THE MACHINE-READABLE VERSION
OF THE LICK SATURN-Voyager Reference Star Catalogue

Wayne H. Warren Jr.

January 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
TABLE OF CONTENTS

Section 1 - INTRODUCTION ................................................... 1-1
Section 2 - TAPE CONTENTS .................................................. 2-1
Section 3 - TAPE CHARACTERISTICS ....................................... 3-1
Section 4 - REMARKS, MODIFICATIONS, ACKNOWLEDGMENTS AND REFERENCES .. 4-1
Section 5 - SAMPLE LISTING .................................................. 5-1

LIST OF TABLES

TABLE

1 Tape Contents ............................................................... 2-1
2 Tape Characteristics ....................................................... 3-1
The Lick Saturn-Voyager Reference Star Catalogue (Klemola, Taraji and Ocampo 1979) was prepared for purposes of determining up-to-date, reasonably accurate, equatorial coordinates for reference stars in a band of sky against which cameras of the Voyager spacecraft were aligned for observations in the region of Saturn during the flyby. The requirements were a surface density of about 3 reference stars per observation frame of 24 arcmin$^2$ of the cameras -- somewhat greater than the SAO (Smithsonian Astrophysical Observatory 1966) and AGK3 (Dieckvoss, et al. 1975) densities -- and a positional accuracy $\sim$0.5 arcsec. Visual magnitudes were also required. The completed catalogue contains 4555 stars in the right ascension range 12h 40m to 14h 12m, declination zones $+2^\circ$ to $-9^\circ$. Mean errors of the positions, as derived from least squares solutions against the Perth 70 Catalogue (Høg and von der Heide 1976), are about 0$''$25; however, individual residuals for some bright and excessively faint stars are as high as 0$''$5 to 1$''$0. Apparent photographic and visual magnitudes were derived from iris photometer measurements, $m_V$ being approximated from a derived color-index relation using UBV stars selected from USNO photoelectric catalogue (Blanco et al. 1968) and extended with Perth 70 stars. The resulting magnitudes appear to have mean errors of at least 0$''$2 -- 0$''$3 for the brighter stars ($m_V < 10^m$) and uncertainties can be as much as 0$''$5 for the fainter stars. The magnitudes are considered to be only approximate, especially on the faint end, because of a lack of photoelectric standards there.

This document is intended to describe the machine-readable version of the Lick Saturn-Voyager Reference Star Catalogue in sufficient detail for users to avoid the common difficulties, uncertainties and guesswork frequently encountered when processing a computerized catalogue. The original publication (available from A. R. Klemola) should be consulted for additional details regarding the observations and reductions. A copy of this paper should be supplied with any secondary copies of the machine version distributed to other individuals and installations.

REFERENCE

A byte-by-byte description of the contents of the machine-readable catalogue is given in Table 1. The suggested format specifications are given primarily for locating decimal points for real numbers and can be modified depending upon usage. Care must be exercised when processing the magnitude and proper-motion data since fields missing data are blank and will be read as zeroes unless initially buffered in or processed with an A (character) format and tested. Unless indicated otherwise, a given field always has a data value in it.

Table 1. Tape Contents. *Lick Saturn-Voyager Reference Star Catalogue*

<table>
<thead>
<tr>
<th>Byte(s)</th>
<th>Units</th>
<th>Suggested Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>---</td>
<td>I4</td>
<td>Lick plate pair identification.</td>
</tr>
<tr>
<td>5-8</td>
<td>---</td>
<td>I4</td>
<td>Plate number.</td>
</tr>
<tr>
<td>9-10</td>
<td>hours</td>
<td>I2</td>
<td>Right ascension (α), epoch 1978.92, equinox 1950.0.</td>
</tr>
<tr>
<td>11-12</td>
<td>min.</td>
<td>I2</td>
<td>α</td>
</tr>
<tr>
<td>13-18</td>
<td>sec.</td>
<td>F6.3</td>
<td>α</td>
</tr>
<tr>
<td>19</td>
<td>---</td>
<td>A1</td>
<td>Sign of declination zone.</td>
</tr>
<tr>
<td>20-21</td>
<td>°</td>
<td>I2</td>
<td>Declination (δ), epoch 1978.92, equinox 1950.0.</td>
</tr>
<tr>
<td>22-23</td>
<td>°</td>
<td>I2</td>
<td>δ</td>
</tr>
<tr>
<td>24-28</td>
<td>°</td>
<td>F5.2</td>
<td>δ</td>
</tr>
<tr>
<td>29-33</td>
<td>mag</td>
<td>F5.2</td>
<td>Apparent photographic magnitude $m_B$ (blank for 20 stars).</td>
</tr>
<tr>
<td>34-38</td>
<td>mag</td>
<td>F5.2</td>
<td>Apparent visual magnitude $m_V$.</td>
</tr>
<tr>
<td>39-46</td>
<td>---</td>
<td>A8 (I8)</td>
<td>AGK3 or SAO identification number (blank if data absent). For AGK3 numbers, byte 39 contains the zone and bytes 42-46 the number. SAO numbers are contained in bytes 41-46.</td>
</tr>
<tr>
<td>Byte(s)</td>
<td>Units</td>
<td>Format</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>47-51</td>
<td>arcsec</td>
<td>F5.1</td>
<td>Centennial proper motion in right ascension, ( \mu_\alpha ), taken from AGK3 or SAO (blank for missing data).</td>
</tr>
<tr>
<td>52-56</td>
<td>arcsec</td>
<td>F5.1</td>
<td>Centennial proper motion in declination, ( \mu_\delta ), taken from AGK3 or SAO (blank for missing data).</td>
</tr>
</tbody>
</table>
SECTION 3 - TAPE CHARACTERISTICS

The information contained in Table 2 is sufficient for a user to read the machine version of the catalogue. 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 coding (EBCDIC, ASCII, BCD, etc.) is not included. These parameters should always be supplied if secondary copies of the tape are transmitted to other users or installations.

Table 2. Tape Characteristics. *Lick Saturn-Voyager Reference Star Catalogue.*

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF FILES</td>
<td>1</td>
</tr>
<tr>
<td>LOGICAL RECORD LENGTH</td>
<td>56</td>
</tr>
<tr>
<td>RECORD FORMAT</td>
<td>FB*</td>
</tr>
<tr>
<td>TOTAL NUMBER OF LOGICAL RECORDS</td>
<td>4555</td>
</tr>
</tbody>
</table>

*Fixed block length (last block may be short)
SECTION - REMARKS, MODIFICATIONS AND REFERENCES

A magnetic tape containing the catalogue, in binary format, was received from Dr. A. R. Klemola in November 1981. The data were converted to character format and written to a direct access device for editing, which consisted of adding signs to all positive declination zones, converting missing data from zeroes to blanks, and changing all AGK3 numbers to the uniform representation ±XX XXXX (SAO numbers were not modified). The catalogue was then transferred back to magnetic tape in character format with a logical record length of 56 bytes, after sorting the complete data set by increasing right ascension (the same kind of plate or measurement order).

ACKNOWLEDGMENTS

Appreciation is expressed to A. R. Klemola for providing the magnetic tape of the catalogue and for viewing the modifications made and the resulting documentation.

REFERENCES


Hog, E. and von der Heide, J. 1976, Abh. der Hamburger Sternwarte, Band IX.


Smithsonian Astrophysical Observatory. 1966, Star Catalog, Smithsonian Publ. 4652.
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 the catalogue are illustrated. The beginning of each record and bytes within the record are indicated by the column heading index (digits read vertically) across the top of each page.
<table>
<thead>
<tr>
<th>Record</th>
<th>Tape Name</th>
<th>Record Length</th>
<th>Input Volser</th>
<th>Column Heading</th>
<th>Index</th>
<th>Original Page Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SATURN- VOYAGER REF CAT.</td>
<td>56 BYTES</td>
<td>WTS014</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 1</td>
<td>5438711124019.165-11720.65</td>
<td>11.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 2</td>
<td>6218711124019.708-01535.94</td>
<td>11.28</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 3</td>
<td>5488711124019.844-1218.25</td>
<td>11.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 4</td>
<td>598711124021.292-44120.1510.56</td>
<td>9.61139926-14.5-1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 5</td>
<td>5468711124022.150-15839.4510.00</td>
<td>8.84-011688-18.43.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 6</td>
<td>6208711124022.870-02932.72</td>
<td>10.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 7</td>
<td>3118711124025.009-34626.10</td>
<td>8.417.78139928-22.9-19.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 8</td>
<td>5458711124026.283-14254.6110.10</td>
<td>9.22-0116891.6-5.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 9</td>
<td>3108711124028.213-34133.0211.2010.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 10</td>
<td>6228711124032.200-01552.7110.23</td>
<td>9.33-001750-1.2-0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 11</td>
<td>5787111124033.109-45411.4311.5110.93</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 12</td>
<td>3128711124033.711-3059.6211.8411.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 13</td>
<td>6988711124034.622+0326.4711.2010.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 14</td>
<td>6978711124036.307+01617.67</td>
<td>9.08+001598-2.5-2.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 15</td>
<td>5448711124038.126-13640.9111.2910.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 16</td>
<td>3188711124039.806-24125.43</td>
<td>9.949.00-027554.8-10.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 17</td>
<td>6968711124040.599+0732.4512.5411.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 18</td>
<td>5428711124041.845-12220.4911.4310.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 19</td>
<td>5687111124042.197-44850.3411.0210.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RECORD 20</td>
<td>6958711124043.154+049.1011.259.99+001589-2.6-2.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RECORD</td>
<td>TAPE LOCATION</td>
<td>TAPE 21</td>
<td>TAPE FILE NAME: SATURN-VOYAGER REF CAT.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>----------------</td>
<td>---------</td>
<td>----------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4536</td>
<td>6758719141156.065+ 21431.9210.7310.29+02 1736 -0.2 -4.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4537</td>
<td>7508719141158.579+ 22828.510.37 9.80+02 1737 -4.9 -5.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4538</td>
<td>37087191412 1.548- 04749.8611.7111.49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4539</td>
<td>67487191412 3.581+ 15149.03 9.70 9.18+01 1629 2.9 -5.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4540</td>
<td>4987191412 6.005+ 24344.49 9.46 8.95+02 1738 -4.6 -1.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4541</td>
<td>987191412 6.318+ 2 147.23 9.47 8.69+02 1739 -2.4 -1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4542</td>
<td>75187191412 7.140+ 23447.1610.8210.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4543</td>
<td>7087191412 9.766- 31224.5311.2711.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4544</td>
<td>2998719141211.666- 13234.1711.9011.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4545</td>
<td>3018719141216.723- 1 132.3310.7910.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4546</td>
<td>5298719141216.772+ 02911.6410.01 9.51+00 1729 -5.8 -2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4547</td>
<td>69871914220.002- 32336.51 9.46 8.57 139813-15.4 -3.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4548</td>
<td>14308719141222.854- 22627.7110.8111.10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4549</td>
<td>10871914224.097- 2 414.0510.29 9.66-02 855 -0.5 -3.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4550</td>
<td>447871914226.598- 01230.2011.2111.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4551</td>
<td>50871914226.756+ 2 744.18 9.47 9.03+02 1740 -0.2 -0.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4552</td>
<td>602871914228.465+ 12547.4910.8210.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4553</td>
<td>532871914230.613+ 05836.1710.8110.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4554</td>
<td>601871914231.029+ 11137.9210.30 9.57+01 1621 -8.5 -5.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4555</td>
<td>300871914231.802- 11118.05 9.84 9.27-01 1821 -4.4 -2.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>