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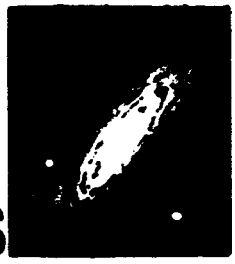

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SKYMAP CATALOG OF 248516 STARS, VERSION 3.3

DOCUMENTATION FOR THE MACHINE-READABLE VERSION

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August 1987

National Space Science Data Center (NSSDC)/
World Data Center A for Rockets and Satellites (WDC-A-R&S)
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SKYMAP CATALOG OF 248516 STARS, VERSION 3.3

DOCUMENTATION FOR THE MACHINE-READABLE VERSION

ABSTRACT

The machine-readable version of the catalog, as it is currently being distributed by the Astronomical Data Center, is described. This catalog is a compilation of astronomical data prepared primarily for purposes of satellite attitude determination and tracking applications. The original version has been improved and updated with corrections several times. The 3.3 version of the catalog incorporates known errors documented previously in SKYMAP Error Reports and includes data from the *Michigan Catalog of 2-Dimensional Spectral Types for the HD Stars*, Vol. 3 (Houk 1982).

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SECTION 1 - INTRODUCTION

The SKYMAP catalog is a compilation of astronomical data prepared primarily for purposes of satellite attitude determination and tracking applications.* The original catalog was compiled by D. M. Gottlieb of Computer Sciences Corporation (CSC) under contract to NASA. That version has been improved and updated with corrections several times. The compilation and statistics of the catalog are described by Gottlieb (1978), while the SKYMAP system description (Gottlieb 1979 *a*) describes the generation and utilization of the data base.

The 3.3 version of SKYMAP was prepared by S. F. McLaughlin of CSC, again under contract with NASA. It incorporates known errors documented previously in SKYMAP Error Reports and includes data from the *Michigan Catalogue of 2-Dimensional Spectral Types for the HD Stars*, Vol. 3 (Houk 1982). Other changes include one new flag column, modification of definition or scope of six other data, 33 new stars added to the catalog, and deletion of 141 duplicate stars. A new precession routine has been implemented in the 3.3 version of SKYMAP. It performs the precession from B1950 to J2000, but does not change the format of any data in the catalog. The original algorithm is described by Standish (1982). A new set of magnitude calculation equations has been implemented to avoid the existence of unphysical *B-V* values as small as -2.0.

This document for the SKYMAP 3.3 version has been greatly expanded from an earlier one produced for version 3.0 because the CSC publications describing the catalog are now out of print. The document is intended to fully describe the character-coded machine-readable catalog so that users can process the data without problems and guesswork; a copy should be distributed with any character-coded version of the catalog. If detailed information on the data compilation, the procedures used to compute the various quantities appearing in the catalog, or other technical information, is necessary for the work being done with the data, users should try to obtain copies of the full CSC documentation. Personnel at the Astronomical Data Center can provide additional information.

SOURCE REFERENCES

Gottlieb, D. M. 1978, *SKYMAP: A New Catalog of Stellar Data, Astrophys. J. Suppl.* 38, 287.

Gottlieb, D. M. 1979 *a*, *SKYMAP System Description: Star Catalog Data Base Generation and Utilization*, Computer Sciences Corporation CSC/SD-76/6041UD2.

* IMPORTANT NOTE: THIS CATALOG WAS NOT COMPILED TO PROVIDE THE MOST ACCURATE AND RELIABLE DATA AT THE ASTRONOMICAL RESEARCH LEVEL. THE DERIVATIONS OF TWO-DIMENSIONAL MK TYPES FROM ONE-DIMENSIONAL DATA, *UBV* VALUES FROM PHOTOVISUAL AND PHOTOGRAPHIC MAGNITUDES, AND STELLAR DISTANCES FROM MAGNITUDES AND SPECTRAL TYPES ARE EXTREMELY UNCERTAIN, SO THESE DATA SHOULD NOT BE USED WITHOUT CAREFUL SCRUTINY. THE VARIOUS FLAGS ASSOCIATED WITH CATALOG DATA SHOULD BE RETAINED WITH THE DATA AT ALL TIMES OR GROSS MISINTERPRETATIONS MAY RESULT. USERS OF THIS CATALOG SHOULD KEEP THESE FACTS IN MIND CONSTANTLY.

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the contents of the character coded version of the *SKYMAP Catalog of 248516 Stars*, Version 3.3 is given in Table 1. The suggested format can be modified depending upon usage, but care must always be exercised when changing character (A) formats to integer or real. Fortran 77-type format specifications are used throughout. Default values for character data are blanks unless stated otherwise, but note that the default value for certain numerical data is zero.

Table 1. Tape Contents. *SKYMAP Catalog of 248516 Stars*, Version 3.3.

Byte(s)	Units	Suggested format	Default value	Description
1- 6	---	I6	0	Number from *The Henry Draper Catalogue* (Cannon and Pickering 1918 -1924) and *The Henry Draper Extension* (Cannon 1925-1936, Cannon and Walton Mayall 1949).
7- 14	---	I8	---	SKYMAP number, assigned as an internal number in the form xxyyzzzz, where xx and yy are hours and minutes of right ascension for the standard equinox and epoch 2000.0 and zzzz is a running sequential index for all stars having the same xx and yy.
15- 20	---	I6	0	Number of the star in the *Smithsonian Astrophysical Observatory Star Catalog* (SAO Staff 1966).
21- 28	---	A8 (I8)	0	Number from one of the series of Durchmusterung catalogs: *Bonner Durchmusterung (DM)* (Argelander 1859-1862; Küstner 1903) in zones +89° to -1° or its southern extension (Schönfeld 1886) in zones -2° to -22° ; *Córdoba DM* (Thome 1892-1932) in zones -23° to -51°; and *Cape Photographic DM* (Gill and Kapteyn 1896-1900) in zones -52° to -89°.
29- 32	---	I4	0	Number of the star in *The Bright Star Catalogue* (Hoffleit 1982).
33- 37	---	I5	0	Number of multiple-star system in *New General Catalogue of Double Stars* (Aitken 1932).

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
38- 42	---	I5	0	A sequential record number from *The General Catalogue of Variable Stars (GCVS)* (Kukarkin *et al.* 1969-70). This number originally defined in alphabetical order of constellation and bears no relation to a star's position. It is not a useful number for external applications.
43- 54	---	A12	---	Star name (Bayer or Flamsteed designation). Greek letters are represented by three-letter abbreviations, as are constellation names.
55- 62	---	A8	---	Variable-star name (Kukarkin *et al.* 1969-70) consisting of a letter, or number (or Greek) designation followed by a constellation abbreviation, e.g., R MUS, V1840 SGR, PSI ORI.
63- 70	°	F8.4	---	Right ascension, α, for the standard equinox and epoch 2000.0.
71- 78	°	F8.4	---	Declination, δ, for the standard equinox and epoch 2000.0.
79- 84	"	F6.2	---	Error in standard epoch position, taken from the SAO when available. The error is set to 0.5" for AGK3 stars, 35" for HD(E) stars, and 100" for all others except some selected cases for which the value is 180". The reported value is the total error ε_t, where: $\varepsilon_\alpha \simeq \varepsilon_\delta \simeq \varepsilon_t / \sqrt{2}$.
85- 92	°	F8.4	---	Galactic latitude (b^{II}).
93-100	°	F8.4	---	Galactic longitude (l^{II}).
101-124	---		---	Geocentric Inertial (G.I.) unit vectors. Right ascension and declination at standard equinox and epoch were converted to a G.I. unit vector, according to equation; $(x,y,z)=(\cos\delta \cos\alpha, \cos\delta \sin\alpha, \sin\delta)$

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				where, α is right ascension, δ is declination and (x,y,z) is the unit vector.
101-108	---	F8.5	---	G.I. unit vector x, standard epoch.
109-116	---	F8.5	---	G.I. unit vector y, standard epoch.
117-124	---	F8.5	---	G.I. unit vector z, standard epoch.
125-132	°	F8.4	0.0	Right ascension, equinox and epoch 1950.0, taken, in order of preference, from the SAO, the *AGK3 Star Catalogue of Positions and Proper Motions North of -2°5 Declination* (Dieckvoss 1975), Blanco *et al.* (1968), Jaschek (1978), and Worley (1976).
133-140	°	F8.4	0.0	Declination, equinox and epoch 1950.0.
141-147	°	F7.3	0.0	Right ascension, equinox and epoch 1900.0, taken from the HD(E) and valid only for HD stars.
148-154	°	F7.3	0.0	Declination, equinox and epoch 1900.0.
155-163	° yr^{-1}	F9.7	0.0	Annual proper motion (μ_α) in right ascension.
164-172	° yr^{-1}	F9.7	0.0	Annual proper motion (μ_δ) in declination.
173-181	°	F9.4	---	Centennial precession in RA.
182-189	°	F8.4	---	Centennial precession in DEC.
190-198	°	F9.4	---	Sum of precession and proper motion in right ascension (centennial). Where there is no proper motion, this value is for precession only.
199-206	°	F8.4	---	Sum of precession and proper motion in declination (centennial).
207-212	mag	F6.3	-9.999	*U* magnitude of the *UBV* system (Johnson and Morgan 1953) best value

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				If observed values exist, they are used; if not, values are derived using the procedure described by Gottlieb (1979 *a*).
213	---	I1	---	*U* magnitude derivation flag to indicate the method by which the best value of *U* was obtained. The meaning of each value is given below: 0 : no *U* magnitude provided 1 : *U* magnitude observed 2 : *U* magnitude computed according to procedure given by Gottlieb (1979 *a*) 3 : *U-B* observed and *B* computed from photovisual and/or photographic magnitudes
214-219	mag	F6.3	-9.999	*B* magnitude, best value. See note on *V* magnitude, best value.
220-225	mag	F6.3	-9.999	*V* magnitude, best value. The best values of the *B* and *V* magnitudes were obtained whenever possible from observed magnitudes. When these were not available, they were derived from color index or photographic and/or photovisual magnitudes according to the procedure given by Gottlieb (1979 *a*).
226-227	---	I2	---	*B* and *V* magnitudes derivation flag. This flag gives the method by which the best values of the *B* and *V* magnitudes were obtained. The meaning of each value is given below: 1 : observed, taken from Nicolet (1978) or Blanco *et al.* (1968). 2 : observed, taken from the *Index Catalogue of Visual Double Stars* (Worley 1976)

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				3 : converted from the HD or SAO photographic (*ptg*) and photovisual (*ptv*) magnitudes, using eq. (3-8) given by Gottlieb (1979a)
				4 : converted from the HD or SAO, photographic (*ptg*) and photovisual (*ptv*) magnitudes, using eq. (3-9) given by Gottlieb (1979a)
				5 : converted from the HD or SAO photographic (*ptg*) and photovisual (*ptv*) magnitudes, using eq. (3-10) given by Gottlieb (1979a)
				6 : unconverted HD (*V=ptv, B=ptg*) reported because spectral class unavailable
				7 : same as above, when only *V = ptv* available
				8 : same as above, when only *B = ptg* available
				9 : *B* from the AGK3 and *V* from spectral type if available
				10 : *V* observed from Blanco *et al.* (1968) or Mermilliod & Nicolet (1977), and *B* obtained from Eq. (3-9) given by Gottlieb (1979a)
				11 : *(B-V)* color inferred from *(ptg-ptv)* and observed *V*. Estimated 1 σ error is 0.4 magnitudes in *B* and 0.2 in *V*. Affects about 600 SKYMAP stars
				12 : similar to previous value (11), *V* observed, only one of *ptv* or *ptg* available, and no spectral data. Magnitude uncertainty estimated at 0.2 in *V* and 0.3 in *B*.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
228-233	mag	F6.3	0.0	Photovisual magnitude (*ptv*).
234-239	mag	F6.3	0.0	Photographic magnitude (*ptg*). *Ptv* and *ptg* were obtained from the HD or the SAO (for non-HD stars). They correspond approximately to *V* and *B*, respectively, but no spectral response curves are available for them.
240	---	I1	---	*Ptv*, *ptg* presence flag, as defined below: 0 : neither *ptv* nor *ptg* available 1 : both *ptv* and *ptg* available from observations 2 : *ptv* available from observations and *ptg* derived from *ptv* and spectral type 3 : *ptg* available from observations and *ptv* derived from *ptg* and spectral type 4 : *ptv* available from observations; *ptg* not given 5 : *ptg* available from observations; *ptv* not given
241-246	mag	F6.3	-9.999	*V* magnitude, observed. Mean error to be expected is 0.02 magnitude.
247-252	mag	F6.3	-9.999	*B-V* color, observed. Mean error to be expected is 0.02 magnitude.
253-258	mag	F6.3	-9.999	*U-B* color, observed. Mean error to be expected is 0.03 magnitude.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
259-263	---	I5	0	Spectral class, coded, best value. The numerical code equivalents of the spectral classes are given below. The first two digits give the letter code: 00 : O 07 : R 01 : B 08 : N 02 : A 09 : C 03 : F 10 : S 04 : G 11 : WR 05 : K 12 : WC 06 : M 13 : WN The third digit is the number following the spectral type letter code; e.g., A8 becomes 02800. The fourth digit is 0 except for some O and M stars, and for stars with fractional spectral types (typically in 0.5 increments). For O and M stars with small letters following the spectral type letter or number (e.g., O8f or Ma), the coding is: 1 : a 6 : d 3 : b 7 : e 4 : c 9 : f For stars with a fractional spectral type, the fraction is encoded in the fourth digit. For example, B1.5 becomes 01150. The fifth digit implies precision of the source of the spectral type as below: 0 : precise, or not given 1 : one or less than one subclass uncertainty 2 : two subclasses of uncertainty 3 : three subclasses of uncertainty 4 : four subclasses of uncertainty

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				5 : five or more subclasses of uncertainty 6 : old style spectral class 7 : no subclass 8 : - probably earlier spectral class than shown 9 : + probably later spectral class than shown A few special codes appear, which are as follows: 00000 no spectral class available 99999 peculiar 99998 nova-like spectrum
264-266	---	I3	0	Luminosity class, coded, best value. The codes for luminosity class are given below: 5 : 0 — 30 : III 9 : Ia+ — 31 : IIb-IIIa 10 : I — 32 : IIIa 11 : Ia-0 — 34 : IIIab 12 : Ia — 35 : III-IV 13 : Ia-Iab — 38 : IIIb 14 : Iab 15 : I-II — 40 : IV 16 : Ia-Ib — 42 : IVa 17 : Iab-Ib — 44 : IVab 18 : Ib — 45 : IV-V 19 : Ib-II — 48 : IVb 20 : II — 50 : V 21 : Ib-IIa — 52 : Va 22 : IIa — 54 : Vab 23 : IIa-IIab — 55 : V-VI 24 : IIab — 58 : Vb 25 : II-III 26 : IIa-IIb — 60 : VI 27 : IIab-IIb — 70 : VII 28 : IIb 29 : IIb-III — -10 : c -30 : d -50 : g Intermediate classes are averaged; e.g., III-IV becomes 35.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
267-272	---	I6 (3I2)	0	Peculiarity code, best value. The code is a 6-digit integer of the form AABBCC. The AA group indicates general stellar peculiarities, the BB group gives chemical abundance peculiarities and the CC group gives peculiarities in characteristics of line strengths.
267-268	---	I2	0	The AA subcode consists of 0 to 2 digits as below: 1 : metallic-line star (MT)* 2 : composite spectrum for multiple star (CO) 3 : shell star (SH) 4 : variable spectrum (VR) 5 : star + nebular (NB) 6 : dwarf cepheid variable (DC) * two-letter codes in parentheses are SKYMAP abbreviations (bytes 594-601)
269-270	---	I2	0	The BB subcodes are below: 01 : Sr 02 : Sr-Eu 03 : Sr-Si 04 : Sr-Cr 05 : Sr-Si-Eu 06 : Sr-Si-Cr 07 : Sr-Si-Hg 08 : Sr-Cr-Hg 10 : Si 11 : Si-Cr 12 : Si-Cr-Fe 13 : Si-Eu 14 : Si-Mg 15 : Si-Eu-Hg 17 : Si λ 4200 18 : Si-Fe 19 : Si λ 3955 21 : Hg 22 : Hg-Mn 24 : Hg-Si 31 : Cr 32 : Cr-Eu 33 : Cr-Sr-Eu 34 : Cr-Si-Eu 35 : Cr-Si λ 4200 41 : He 42 : Eu 43 : Mn 44 : H 45 : λ 4200 46 : λ 4078 50 : Ba 51 : Ba-O 53 : Ba-II 60 : Wkl 61 : CH 70 : CN-1 71 : CN+1

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				72 : CN-2 88 : CN III 73 : CN+2 89 : CN III/IV 74 : CN-3 90 : CN IV 76 : CN1 91 : CN IV/V 81 : CNIA 92 : CN V 83 : CNIA/B 95 : CN+2, Wk1 84 : CNIB 96 : CN-1, Wk1 85 : CNIB/II 97 : CN5 86 : CN II 98 : CNI5 87 : CN II/III The symbols shown above are chemical elements whose spectral lines are anomalously intense, or individual wavelengths that are intense. Observers usually list the elements in order of abundance; however, SKYMAP ignores such ordering for the purpose of simplification. The symbol CN is followed by an index running from +3 to -3, and an MK lumonisity class. The index implies CN bands running from much stronger than normal to barely perceptible.
271-272	---	I2	0	The CC digits are displayed below: 01 : peculiar (p) 02 : rapid rotator (n) 03 : codes 01 & 02 (np) 04 : emission lines (e) 05 : codes 01 & 04 (pe) 06 : codes 02 & 04 (ne) 07 : codes 01, 02, and 04 (npe) 10 : weak lined star (WL) 11 : codes 01 & 10 (WL p) 14 : codes 04 & 10 (WL e) 20 : very rapid rotator (nn) 21 : codes 01 & 20 (nn p) 24 : codes 04 & 20 (nn e) 25 : codes 01, 04, & 20 (nn pe) 30 : strong or sharp line (st) 31 : codes 01 & 30 (st p) 33 : codes 01, 02, & 30 (st pn) 40 : very strong lines (vs) 50 : very week lines (vw)

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				08 : Wolf-Rayet subtypes (-A) 09 : special case of code 08 (-B) 18 : weak emission in O stars (f) 28 : emission in O stars ((f)) 38 : strong emission in O stars (((f))) 48 : very strong emission in O stars (f, pe) 19 : OB stars in Walborn system ((n)) 39 : OB stars in Walborn system (((n))) 96 : codes 20 & 97 (nn, K) 97 : presence of Interstellar lines (K) 98 : broad and sharp line (ns) 99 : typical peculiarities (pec) -1 : extreme shell star (eq) -2 : horizontal branch star (HB) -3 : central star of planetary nebula (PLAN) Letters in parentheses are SKYMAP abbreviations (bytes 594-597). Examples of converted Sp. types;

	Encoded	Coded
Sp. class	G9	4900
	WN6	13600
	O8.5	850
Lum. class	V	50
	I-II	15
Peculiarity	p Si Eu	1301
	CO	20000
	((n))	39

273	—	I1	—	Spectral type source flag. This variable specifies the source for the spectral class, luminosity

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				class, and peculiarity code. 0 Spectral class, luminosity class, and peculiarity code not available. 1,2,3 Spectral class, luminosity class, and peculiarity code observed in the MK system and reported by Jaschek (1978), Mermilliod (1973), or Blanco *et al.* (1968), respectively. 4 Spectral class observed in the HD system and converted to spectral class and luminosity class in the MK system; the peculiarity code was set to 0. 5 Same as 4 for SAO spectral types. 6 Same as 4 for AGK3 spectral types. 7 Spectral class, luminosity class, and peculiarity code reported by Houk & Cowley (1975), and Houk (1978,1982).
274-277	---	I4	0	HD spectral type, coded. The spectral type in the HD system as given in the HD and the SAO consists of a spectral class only. The spectral class code is 4-digit integer. The first two digits are the same as those for the *spectral class, best value* (bytes 259-263). The third digit is the number following the spectral type letter code; e.g., A8 becomes 0280. If no spectral-type number is given the third and fourth digits are 7. For example, A becomes 0277. The fourth digit is 0 except for the old style of spectral class for some O and M stars, and for stars with

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				fractional spectral types. For O and M stars with small letters following the spectral type letter or number (e.g., O8f or Ma), the coding is: 1 : a 4 : d 2 : b 6 : e 3 : c 8 : f
278-282	---	I5	0	MK spectral class, observed, coded, obtained from Jaschek (1978) or if not available there, from Blanco *et al.* (1968). The numerical codes are the same as the codes of the *spectral class, best value* (bytes 259-263).
283-285	---	I3	0	MK luminosity class, observed, coded. Numerical codes are the same as the codes of the *luminosity class, best value* (bytes 264-266).
285-291	---	I6	0	MK peculiarity code, observed. Numerical codes are the same as the *peculiarity code, best value* (bytes 267-272).
292	---	I1	---	MK spectral type source flag, as defined below: 0 : none available 1 : taken from Jaschek (1978) 2 : taken from Mermilliod (1973) 3 : taken from Blanco *et al.* (1968)
292-301	"	F9.4	-999.9988	Trigonometric parallax taken from the *General Catalogue of Trigonometric Stellar Parallaxes* (Jenkins 1952).
302-310	"	F9.4	-999.9988	Probable error in Trigonometric parallax (Jenkins 1952).
311-317	pc	F7.1	0.0	Distance calculated from trigonometric parallax.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
318-324	pc	F7.1	0.0	Trigonometric parallax distance error, derived from the probable error.
325-331	pc	F7.1	0.0	Trigonometric minimum distance, derived if the parallax is too small compared to the error in parallax.
332-339	mag	F8.3	-999.999	Absolute visual magnitude, obtained from spectral type and used in the computation of spectroscopic distance. It is defined as what the observed (apparent) visual magnitude would be if the star were at a distance of 10 parsecs with no interstellar absorption. The calibration is taken from Keenan (1963), except for supergaints, which is taken from Blaauw (1963).
340-346	pc	F7.1	0.0	Spectroscopic distance.
347-353	pc	F7.1	0.0	Spectroscopic distance error.
353-361	km/sec	F8.3	-999.999	Radial velocity. Observed radial velocities are from the *General Catalogue of Stellar Radial Velocities* (GCRV) (Wilson 1953). For stars not in the GCRV, the inverse of Sun's motion relative to the local standard of rest (LSR) in the direction of the star is taken as the radial velocity. This is statistically the most likely value.
362-369	km/sec	F8.3	-999.999	Θ component of space velocity relative to the LSR (Mihalas 1968).
370-377	km/sec	F8.3	-999.999	Π component of space velocity relative to the LSR (Mihalas 1968).
378-385	km/sec	F8.3	-999.999	Z component of space velocity relative to the LSR (Mihalas 1968).
386-392	pc	F7.1	0.0	Maximum distance based on space motion.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
393-399	pc	F7.1	0.0	Best distance. If trigonometric parallax and spectroscopic distances are both available, they are combined to yield the best distance. If only one distance is available, it is used. The detailed procedure is described by Gottlieb (1979a).
400-406	pc	F7.1	0.0	Error in best distance.
407	---	I1	---	Distance derivation flag. A flag is given which specifies how the best distance was obtained. The flag value and its meanings are given below: 0 : no distance given 1 : distance obtained from trigonometric parallax alone 2 : distance obtained from spectroscopic parallax alone 3 : distance obtained is a combination of trigonometric and spectroscopic parallaxes 4 : distance cited is a minimum distance computed from trigonometric parallax. 5 : distance cited is a maximum distance computed from space velocities.
408-413	mag	F6.3	-9.999	Interstellar absorption A_V.
414-419	mag	F6.3	---	Color excess $E(B-V)$.
420	---	I1	---	Source flag for interstellar absorption. This flag indicates which method was used to obtain interstellar absorption: 0 : no absorption given 1 : absorption derived from B and V magnitudes alone

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				2 : absorption derived from *U*, *B*, and *V* magnitudes
				3 : absorption derived from distance and direction to the star
421-423	---	I3	0	Variability type code. The numerical codes are given in Table 2.
424	---	I1	---	Questionable variability flag. If the variability of a star is considered questionable, this flag is 1; otherwise, it is 0.
425-432	mag	F8.3	-999.999	Difference between the brightest and faintest magnitudes, for each regular variable star and many well-observed irregular variables.
433	---	I1	---	Variable magnitude type flag. If this flag has a value of 1, *m* refers to *B* or *ptg;* if it is 2, the difference refers to *V*.
434-443	days	F10.3	0.0	Epoch of variation. The epoch of the variable star is the time of a reference point in its light variation function, usually the time of minimum light. It is expressed in Julian days minus 2,400,000. Kukarkin and Parenago (1963) may be consulted for more detailed information.
444-452	days	F9.3	0.0	Period of variation. The period of a regular variable star is the duration of one cycle in its light variation function. Irregular and most semiregular variables do not have meaningful periods because their variations are too unpredictable.
453-458	"	F6.2	0.0	Separation of two brightest components of a physical multiple star.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
459-464	mag	F6.3	-9.999	Brightness difference between the two brightest components of a physical multiple star.
465-468	years	I4	1000	Year of observation. The year in which the separation observation was made can be used to determine the validity of the assumption that the separation is still valid. All stars having a valid value of separation also have a valid value in year of observation.
469-475	°	F7.4	-9.999	Distance to the nearest neighbor star in the catalog. If the distance is more than 0.5 degree, it is coded as 360.0. If the nearest neighbor is a member of a physical multiple star system with this star, it is made negative (hence -0.01 means that the nearest star to this star is 0.01 degree away and is part of a multiple star system.
476-482	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 2" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
483-489	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 5" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
490-496	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 15" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
497-503	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 40" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
504-510	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 120" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
511-517	°	F7.4	-9.999	Distance to the nearest neighbor star farther than 300" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
518-524	°	F7.4	-9.999	Distance to the nearest neighbor catalog star no more than two magnitudes fainter than this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
525-531	°	F7.4	-9.999	Distance to the nearest neighbor star no more than two magnitudes fainter than this star and farther than 5" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
532-538	°	F7.4	-9.999	Distance to the nearest neighbor star no more than two magnitudes fainter than this star and farther than 40" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).
539-545	°	F7.4	-9.999	Distance to the nearest neighbor star no more than two magnitudes fainter than this star and farther than 300" from this star. See note concerning distance to the nearest neighbor star in the catalog (bytes 469-475).

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
546-547	---	I2	0	Source of position flag. This flag gives the source of the star's position: 1 *SAO Star Catalog* (SAO Staff 1966). 2 *The HD Catalogue* (Cannon and Pickering 1918-1924) and *The HD Extension* (Cannon 1925-1936, Cannon and Walton Mayall 1949). 3 *Photoelectric Catalogue* (Blanco *et al.* 1968). 4 *Catalogue of Selected Spectral Types in the Morgan-Keenan system* (Jaschek 1978). 5 *Index Catalogue of Visual Double Stars* (Worley 1976). 6 *General Catalogue of Trigonometric Stellar Parallaxes* (Jenkins 1952). 7 *General Catalogue of Stellar Radial Velocities* (Wilson 1953). 8 *AGK3 Star Catalogue of Positions and Proper Motions North of -2°5 Declination* (Dieckvoss 1975). 9 *General Catalogue of Variable Stars* (Kukarkin *et al.* 1969-1970). 10 Miscellaneous.
548-549	---	I2	0	Source of radial velocty flag. This flag gives the source of the star's radial velocity. If it is 0, the radial velocity quoted is the inverse of the Sun's motion; if it is

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				1, the redial velocity is taken from *General Catalogue of Stellar Radial Velocities* (Wilson 1953).
550-557	---	I8	0	Multiple-star flag. This flag gives the source of multiple-star data:
				0 — No multiple-star data given
				1 — *Index Catalogue of Visual Double Stars* (Worley 1976).
				2 - 23599999 — Two or more source-catalog stars within 1' of one another were combined. This gives the SKYMAP number of the secondary.
				99999999 — Two or more source-catalog stars within 1' of one another were combined. The secondary had no HD number.
558-562	"	F5.1	0	Systematic error in right ascension. See note on systematic error in declination.
563-567	"	F5.1	0	Systematic error in declination. The systematic errors in R.A. and Dec. are for HD stars in the region of the sky including this star. The correction must be added to the HD position to correct the systematic errors. These errors are valid only for stars whose positions come from the HD or HDE. Additional details can be found in Gottlieb (1977).
568-575	---	I8	0	SKYMAP number of previous SKYMAP star if merged with this star to eliminate duplicate entry (0 if not present).

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
576-579	—	A4	—	Source of position. The source of the position at the standard epoch is encoded as follows: SAO *SAO Star Catalog* (SAO Staff 1966). HD *The HD Catalogue* (Cannon and Pickering 1918-1924) and *The HD Extension* (Cannon 1925-1936, Cannon and Walton Mayall 1949). BLAN Blanco *et al.* (1968). JAS *Catalogue of Selected Spectral Types in the Morgan-Keenan System* (Jaschek 1978). MULT *Index Catalogue of Visual Double Stars* (Worley 1976). PAR *General Catalogue of Trigonometric Stellar Parallaxes* (Jenkins 1952). WIL *General Catalogue of Stellar Radial Velocities* (Wilson 1953). AGK3 *AGK3 Star Catalogue of Positions and Proper Motions North of -2.5° Declination* (Dieckvoss 1975). VAR *General Catalogue of Variable Stars* (Kukarkin *et al.* 1969-1970).
580	—	A1	—	Source of *U* magnitude, encoded as follows: Blank *U* magnitude observed on the *UBV* system or none given in *U* magnitude, best value (bytes 207-212).

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				* *U* magnitude computed as noted under *U* magnitude derivation flag.
581	---	A1	---	The source of the best *V* and *B* magnitudes is encoded as follows: Blank *V* and *B* both observed. C converted from HD or SAO magnitudes as noted in *V* and *B* magnitudes derivation flag (bytes 226-227) H unconverted from HD or SAO magnitudes * *V* observed in *UBV* system; *B* computed from *V* and the spectral type or not given in *B* magnitude, best value (bytes 214-219)
582-585	---	A4	---	Spectral class, encoded (see bytes 259-263).
586-593	---	A8	---	Luminosity class, encoded (see bytes 264-266).
594-601	---	A8	---	Peculiarity, encoded (see bytes 267-272). There is an asterisk (*) between each group. All codes are given in upper case characters.
602	---	A1	---	Source of spectral type, encoded as follows: Blank observed on the MK system or not given H converted from the HD system
603-606	---	A4	---	Source of distance. The method by which the best distance (bytes 383-389) was derived is encoded as follows: Blank no distance given

Table 1 (concluded)

Byte(s)	Units	Suggested Format	Default Value	Description
				T distance from trigonometric parallax (π_t)
				S distance from spectroscopic parallax (π_{sp})
				S,T distance from a combination of π_t and π_{sp}
				MIN distance is a minimum distance from π_t
				MAX distance is a maximum distance from space velocities
607-610	---	A4	---	Source of interstellar absorption. The source of the interstellar absorption A_V (bytes 408-413) is encoded as follows:
				Blank none given
				BV derived from *B* and *V*
				UBV derived from *U*, *B* and *V*
				* derived from distance and direction
611-618	---	A8	---	Variability type. An 8-character description of the type of variabilty is given. Table 2 provides an interpretation of these codes and a cross reference to the numerical codes of variability type (bytes 421-423).
619	---	I1	---	*Ptv* and *ptg* source flag. The values for this flag are given below:
				0 No *ptv* or *ptg* data
				1 HD catalog source
				2 SAO catalog source
				3 AGK catalog source

Table 2. Variable-Star Codes. *SKYMAP Catalog of 248516 Stars*, Version 3.3.

Numeric codes Bytes 421-423	Alphameric Type codes Bytes 611-618	Codes in the GCVS (Kukarkin 1969-70)	Number of Stars in Master Catalog	Type of Variable	Example
0	---	Blank	---	Not known to be variable	---
1	VARIABLE	Blank or V	52	Unclassified variable	---
111	DEL CEP	CD	126	Galactic plane Cepheid	β Dor
112	HALO CEP	CW	15	Halo Cepheid	α UMi
120	RR LYRAE	RR	4	RR Lyrae type	AL Vel
121	RR LYRA	RRab	22	RR Lyrae type with asymmetric light curve	RX Eri
122	RR LYRC	RRc	3	RR Lyrae type with sine curve light curve	V703 Sco
130	RV TAURI	RV	4	RV Tauri type	SS Gem
131	RV TAUA	RVa	5	Supergiant with double wave variation alternating primary and secondary maxima, and a constant mean magnitude	R Sct
132	RV TAUB	RVb	5	Same as 131 with a variable mean magnitude	U Mon
140	BETA CEP	βC	17	Beta Canis Majoris type with low amplitude variations	β Cru
150	DELT SCU	δ Sct	5	Delta Scuti type with low amplitude	ρ Pup

Table 2 (Continued)

Numeric codes Bytes 421-423	Alphameric Type codes Bytes 611-618	Codes in the GCVS (Kukarkin 1969-70)	Number of Stars in Master Catalog	Type of Variable	Example
160	ALP CNV	α CV	10	Magnetic variable	ε UMa
171	IRR LATE	Lb	109	Slow irregular variable of late* spectral type	β Peg
172	IRR SPGT	Lc	12	Irregular supergiant	RW Cep
180	MIRA	M	282	Mira-type variable of long period and large amplitude	o Cet
190	SEMIREG	SR	66	Semiregular variable	VZ Cam
191	SEMIRG A	SRa	51	Semiregular giant of late spectral type	T Cen
192	SEMIRG C	SRc	17	Semiregular supergiant near the galactic plane	α Ori
193	SEMIRG D	SRd	14	Semiregular giant or supergiant of spectral type F, G, or K	89 Her
194	RR CRB	SRb	142	Semiregular giant of late spectral type and almost regular variation	ρ Per
195	RR CRB E	SRbe	1	Same as 194 with emission lines in the spectrum	η Gem
200	ERUPTIVE	Ia	18	Irregular variable of early spectral type, subject to eruptions	μ Cen

Table 2 (concluded)

Numeric codes Bytes 421-423	Alphameric Type codes Bytes 611-618	Codes in the GCVS (Kukarkin 1969-70)	Number of Stars in Master Catalog	Type of Variable	Example
210	RW AUR	RW, RWN	22	Irregular, large amplitude	X Per
230	R CORBOR	RCB	5	Irregular, R Coronae Borealis type	R CrB
261	NOVA RAP	Na	3	Rapidly developing nova	V720 Sco
262	NOVA SLW	Nb	1	Slow developing nova	X Cir
263	NOVA REC	Nr	1	Recurrent nova	T CrB
264	P CYGNI	Nl	10	P Cygni, nova-like variable	γ Cas
270	IRR	Is	19	Rapid irregular variable	VW Dra
300	ECLIPSE	E	15	Eclipsing binary	ER Vul
310	ALGOL	EA	307	Algol-type eclipsing binary	α Vir
320	BETA LYR	EB	83	β Lyrae-type eclipsing binary	μ^1 Sco
330	CONTACT	EW	27	Contact-type eclipsing binary	i Boo
340	ELLIPSDL	Ell	6	Ellipsoidal-type eclipsing binary	π^5 Ori

* "late" spectral type refers to relatively cool stars (spectral types K,M,N,R,S,C).

SECTION 3 - TAPE CHARACTERISTICS

The information reported in Table 3 is sufficient for a user to read the machine version of the catalog. Tape characteristics which are usually varied among computer installations, such as block (physical record) size, blocking factor (logical records/physical record), total number of blocks, tape density, and coding (EBCDIC, ASCII, BCD, etc.) are not listed here, but should always be transmitted with tape copies of the catalog.

Table 3. Tape characteristics. *SKYMAP Catalog of 248516 Stars*, Version 3.3.

NUMBER OF TRACKS	9
NUMBER OF FILES	1
LOGICAL RECORD LENGTH (BYTES)	619
RECORD FORMAT	FB*
TOTAL NUMBER OF LOGICAL RECORDS	248,516

* Fixed block length (last block may be short)

SECTION 4 - REMARKS, MODIFICATIONS AND REFERENCES

The tape version of the *SKYMAP Catalog of 248516 Stars*, Version 3.3 was received from Code 554, NASA/Goddard Space Flight Center, on September 17, 1986. It contained logical records consisting of a combination of binary and EBCDIC data. To facilitate wider use of all SKYMAP data without the necessity for translating the binary data by other than IBM-compatible computer systems, a formatted (character) version was prepared at the ADC. The word numbers of 96 through 106, 119, and 120 which are redundant character data for the purpose of printing were eliminated and all binary data were converted to character form in the version of the catalog which is described in this document.

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SECTION 5 - SAMPLE LISTING

The sample listing given on the following pages shows logical records exactly as they are recorded on the tape. Full sets of records for several stars at the beginning and end of the data file are listed. The start of each record and bytes within the record are indicated by the column heading index (read vertically) across the top of each page.

Since the SKYMAP records are longer than the page width, they are folded to four lines per record. The first to fourth rows for each record contain bytes 1-190, 191-380, 381-570, and 571-619, respectively.

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: SKYMAP 3.3 248516 Stars
Records 1 To 12
Data File 1
Record Length 619 bytes
Input VOLSER YMK008

```
COLUMN
INDEX   1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

Record   1 224700      1128522+ 0 5077   0   0   0                        0.0007  1.0889  0.28-59.1912 97.1899 0.99982 0.00001 0.01900359.3601  0.8106358.725  0.533-.0000019-.0000024   1.2813  0.5565
           1.2813  0.5565 9.8982 9.879 9.399 4 9.300 9.7002-9.999-9.999-9.999 3500 50     04 350    0  0      00-999.9988-999.9988    0.0     0.0     0.0   3.400  158.4   62.5   0.141 -15.946  12.383
          1.830    0.0  158.4   62.52 0.000 0.0003  00-999.9990     0.000     0.000  0.00-9.9991000 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 0.1446 1 0       0  0.0  0.0
             0 SAO*CF5  V                 MS   *          1
Record   2 224690      2165988-20 6688   0   0   0                        0.0048-19.4994  0.33-75.9599 63.1050 0.94265 0.00008-0.33380359.3604-19.7774358.700-20.0500.0000632-.0000067   1.2891  0.5561
           1.2891  0.556111.809210.577 9.113 3 9.10010.5001-9.999-9.999-9.999 5000 30     04 500    0  0      00-999.9988-999.9988    0.0     0.0     0.0   0.200  319.2  161.7   2.453-999.999-999.999-99
          9.999   98.6   98.6   98.65 1.393 0.4641  00-999.9990     0.000     0.000  0.00-9.9991000 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 0.0920 1 0       0  0.0  0.0
             0 SAO*CK0  III              MMAX BV          1
Record   3     0       3 73663+30 5069   0   0   0                        0.0034 31.5322  0.26-30.0772110.2783 0.85235 0.00005 0.52298359.3633 31.2538  0.000  0.0000.00000650.0000006   1.2803  0.5567
           1.2803  0.5567-9.9990 9.898 8.398 6 8.398 9.8981-9.999-9.999-9.999    0  0     00   0    0  0      00-999.9988-999.9988    0.0     0.0     0.0-999.999    0.0     0.0  -3.223-999.999-999.999-99
          9.999    0.0    0.0   0.00-9.999 0.0000  00-999.9990     0.000     0.000  0.00-9.9991000 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 0.2643 1 0       0  0.0  0.0
             0 SAO H                                      2
Record   4 224707      4248095-5212237   0   0   0                        0.0076-51.8938  0.71-63.4091320.7886 0.61712 0.00008-0.78687359.3640-52.1722358.725-52.4500.0000181-.0000011   1.2874  0.5567
           1.2874  0.5567 7.9412 7.963 8.163 3 8.100 7.9001-9.999-9.999-9.999 3000 50     07 300 3000 50    07-999.9988-999.9988    0.0     0.0     0.0   2.600  129.6   41.5   5.357  -1.515 -13.279
          7.063  403.0  129.6   41.52 0.000 0.0001  00-999.9990     0.000     0.000  0.00-9.9991000 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 0.2778 1 0       0  0.0  0.0
             0 SAO*CF0  V                  S   BV         1
Record   5 224706      5231882-4610611   0   0   0                        0.0082-45.7617  0.62-68.7476328.2754 0.69764 0.00010-0.71644359.3652-46.0403358.725-46.3330.00001310.0000043   1.2861  0.5573
           1.2861  0.557311.562210.650 9.329 3 9.30010.6001-9.999-9.999-9.999 4800 40     07 500 4800 40    07-999.9988-999.9988    0.0     0.0     0.0   3.200   91.5   32.7   4.914   2.361  -0.425
          2.188    0.0   91.5   32.72 1.322 0.4411  00-999.9990     0.000     0.000  0.00-9.9991000 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 0.3598 1 0       0 -1.0  5.1
            10 SAO*CG8  IV                 S   BV         1
Record   6 224699      6 73664+38 5108  017157   0                        0.0048 38.8595  0.40-22.9323112.0951 0.77869 0.00007 0.62741359.3652 38.5811358.725 38.3000.00000110.0000026   1.2793  0.5568
           1.2793  0.5568 6.3572 6.451 6.42110 6.610 6.5902 6.600-9.999-9.999 1950 50     04 190    0  0      00-999.9988-999.9988    0.0     0.0     0.0   0.400  160.1   73.7  -3.931  -9.345   9.927  1
          4.379    0.0  160.1   73.72 0.000 0.0003  00-999.9990     0.000     0.000  6.70 4.8001933-0.0019-0.0019-0.0019 0.3342 0.3342 0.3342 0.3342 0.3342 0.3342 0.3342 0.3342 1 0       1  0.0  0.0
             0 SAO**B9.5V                 MS   *          1
Record   7 224705      7231883-41 9991   0   0   0                        0.0092-40.5908  0.68-72.8560337.8848 0.75938 0.00012-0.65065359.3674-40.8694358.725-41.150-.00000480.0000083   1.2837  0.5576
           1.2837  0.5576 9.5422 9.523 9.020 3 9.000 9.5001-9.999-9.999-9.999 4800 30     07 450 4800 30    07-999.9988-999.9988    0.0     0.0     0.0   0.300  554.6  167.5   4.496  45.120  71.912 -2
          2.404    0.0  554.6  167.52 0.000 0.0001  00-999.9990     0.000     0.000  0.00-9.9991000 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 0.1377 1 0       0 -1.0  5.1
             8 SAO*CG8  III                S   BV         1
Record   8     0       9108951+16 5025   0   0   0                        0.0114 17.4474  0.19-43.7191105.8700 0.95399 0.00019 0.29983359.3711 17.1689  0.000  0.0000.00000070.0000050   1.2808  0.5571
           1.2808  0.5571-9.9990-9.999 9.102 7 9.102-9.9994-9.999-9.999-9.999    0  0     00   0    0  0      00-999.9988-999.9988    0.0     0.0     0.0-999.999    0.0     0.0  -1.722-999.999-999.999-99
          9.999    0.0    0.0   0.00-9.999 0.0000  00-999.9990     0.000     0.000  0.00-9.9991000 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 0.3042 1 0       0  0.0  0.0
             0 SAO H                                      2
Record   9     0      11      0+22 4938   0   0   0                       0.0130 23.0722  0.50-38.2923107.8311 0.92001 0.00021 0.39189359.3726 22.7937  0.000  0.0000.00000630.0000036   1.2810  0.5570
           1.2810  0.557010.702210.68010.140 9-9.99910.6005-9.999-9.999-9.999 3800 50     05 380    0  0      00-999.9988-999.9988    0.0     0.0     0.0   4.000  169.0  100.3  -2.338   1.875   0.176  1
          8.699    0.0  169.0  100.32 0.000 0.0003  00-999.9990     0.000     0.000  0.00-9.9991000 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 0.4053 8 0       0  0.0  0.0
             0AGK3* F8  V                  S   *          3
Record  10     0      12 53557+43 4599   0   0   0                        0.0122 44.4202  0.47-17.4981113.3520 0.71423 0.00015 0.69991359.3735 44.1424  0.000  0.000-.0000117-.0000105   1.2776  0.5555
           1.2776  0.5555-9.9990 9.898 8.898 6 8.898 9.8981-9.999-9.999-9.999    0  0     00   0    0  0      00-999.9988-999.9988    0.0     0.0     0.0-999.999    0.0     0.0  -4.425-999.999-999.999-99
          9.999    0.0    0.0   0.00-9.999 0.0000  00-999.9990     0.000     0.000  0.00-9.9991000 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 0.2030 1 0       0  0.0  0.0
             0 SAO H                                      2
Record  11     0      13      0+ 6 5231   0   0   0                       0.0166  7.5137  0.50-53.1962101.3563 0.99141 0.00029 0.13076359.3755  7.2354  0.000  0.0000.0000120-.0000022   1.2825  0.5565
           1.2825  0.5565 9.9852 9.963 9.423 9-9.999 9.9005-9.999-9.999-9.999 3800 50     05 380    0  0      00-999.9988-999.9988    0.0     0.0     0.0   4.000  121.5   72.1  -0.595  -1.451 -12.881
          8.782    0.0  121.5   72.12 0.000 0.0003  00-999.9990     0.000     0.000  0.00-9.9991000 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 0.3009 8 0       0  0.0  0.0
             0AGK3* F8  V                  S   *          3
Record  12     0      14 73665+33 4813   0   0   0                        0.0170 34.1886  0.26-27.4920110.9756 0.82719 0.00025 0.56192359.3811 33.9110  0.000  0.000-.0000760-.0000140   1.2720  0.5552
           1.2720  0.5552 9.2801 9.180 8.520 1 8.297 8.8981 8.520 0.660 0.100    0  0     00   0    0  0      00-999.9988-999.9988    0.0     0.0     0.0-999.999    0.0     0.0  -3.484-999.999-999.999-99
          9.999    0.0    0.0   0.00-9.999 0.0000  00-999.9990     0.000     0.000  0.00-9.9991000 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 0.2164 1 0       0  0.0  0.0
             0 SAO                                        2
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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: SKYMAP 3.3 248516 Stars
Records 248505 To 248516
Data File 1
Record Length 619 bytes
Input VOLSER YNK008

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COLUMN:
INDEX:  12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

Record 248505 224682359015 0-65 4188   0   0   0
  1.2948  0.5548 10.0062 9.850 9.338 3 9.270 9.8001-9.999-9.999-9.999 4500 50   07 400 4500 50   07-999.9988-999.9988   0.0   0.0   0.0   5.200   67.2   18.3   6.860 -11.787   8.498
  1.235   0.0   67.2   18.32 0.000 0.0001  00-999.9990   0.000   0.000  0.00-9.9991000 0.1311 0.1311 0.1311 0.1311 0.1311 0.1311 0.1311 0.1311 0.1311 0.1311 2 0   0 -4.7   1.1
   0  ND=CG5  V                S  BV        1

Record 248506 224693235901511923 01-2319008   0   0   0
  1.2867  0.5576 8.8092 8.661 8.153 3 8.100 8.6001-9.999-9.999-9.999 4000 50   04 400   0   0   00-999.9988-999.9988   0.0   0.0   0.0   4.400   56.3   21.7   2.756  13.843 -15.649   1
  0.836   112.2   56.3   21.72 0.000 0.0001  00-999.9990   0.000   0.000  0.00-9.9991000 0.1780 0.1780 0.1780 0.1780 0.1780 0.1780 0.1780 0.1780 0.1780 0.1780 1 0   0 -4.7   1.1
   0  SAO=CG0  V                NS  BV        1

Record 248507 224686235901523556 19-66 38199076   0   0   EPS  TUC
  1.2927  0.5563 4.1401 4.420 4.500 1 4.710 4.6902 4.500-0.080-0.280 1900 40   07 190 1900 40   07-999.9988-999.9988   0.0   0.0   0.0   -0.300   91.2   17.2   11.000   -9.932 -17.088
  7.523   129.6   91.2   17.22 0.000 0.0002  00-999.9990   0.000   0.000  0.00-9.9991000 0.0821 0.0821 0.0821 0.0821 0.0821 0.0821 0.3107-0.5000-0.5000-0.5000-0.5000 1 1   0   0.0   0.0
   0  SAO  B9  IV                S  UBV       1

Record 248508 224689235901541285 21+ 5 5245   0   0   0
  1.2822  0.5552-9.9990 8.770 7.630 4 7.660 8.6602-9.999-9.999-9.999 5000 30   04 500   0   0   00-999.9988-999.9988   0.0   0.0   0.0   0.200   306.2   161.8   -0.426-999.999-999.999-99
  9.999   208.2   208.2   208.25-9.999 0.0000  00-999.9990   0.000   0.000  0.00-9.9991000-0.5000-0.5000-0.5000-0.5000-0.5000-0.5000-0.5000-0.5000-0.5000-0.5000 1 0   0   0.0   0.0
   0  SAO CK0  III                NMAX      1

Record 248509 023590155 20986+63 2088   0   0   0
  1.2731  0.5563-9.999010.797 8.898 6 8.89810.7971-9.999-9.999-9.999   0   0   00   0   0   0   00-999.9988-999.9988   0.0   0.0   0.0-999.999   0.0   0.0   -5.808-999.999-999.999-99
  9.999   0.0   0.0   0.00-9.999 0.0000  00-999.9990   0.000   0.000  0.00-9.9991000 0.0873 0.0873 0.0873 0.0873 0.0873 0.0873 0.0873 0.0873 0.0873 0.0873 1 0   0   0.0   0.0
   0  SAO H                2

Record 248510 023590156165987-13 6500   0   0   0
  1.2831  0.5568 9.5142 9.495 9.015 4 8.898-9.9994-9.999-9.999-9.999 3500 50   05 350   0   0   00-999.9988-999.9988   0.0   0.0   0.0   3.400   132.7   52.4   1.732   2.605   -6.165
  9.010   0.0   132.7   52.42 0.000 0.0003  00-999.9990   0.000   0.000  0.00-9.9991000 0.2531 0.2531 0.2531 0.2531 0.2531 0.2531 0.2531 0.2531 0.2531 0.2531 1 0   0   0.0   0.0
   0  SAO=CF5  V                S  H         2

Record 248511 023590157 20987+63 2089   0   0   0
  1.2755  0.5566-9.9990 9.797 9.102 6 9.102 9.7971-9.999-9.999-9.999   0   0   00   0   0   0   00-999.9988-999.9988   0.0   0.0   0.0-999.999   0.0   0.0   -5.815-999.999-999.999-99
  9.999   0.0   0.0   0.00-9.999 0.0000  00-999.9990   0.000   0.000  0.00-9.9991000 0.1399 0.1399 0.1399 0.1399 0.1399 0.1399 0.1399 0.1399 0.1399 0.1399 1 0   0   0.0   0.0
   0  SAO H                2

Record 248512 023590158   0   0   0   0
  1.2804  0.5564 10.816210.260 9.410 9-9.99910.2005-9.999-9.999-9.999 4500 40   05 450   0   0   00-999.9988-999.9988   0.0   0.0   0.0   3.200   174.6   138.0   -1.031 -19.547   17.507   -
  0.102   0.0   174.6   138.02 0.000 0.0003  00-999.9990   0.000   0.000  0.00-9.9991000 0.0395 0.0395 0.0395 0.0395 0.0395 0.0395 0.1147 0.0395 0.0395 0.0395 0.1147 8 0   0   0.0   0.0
   0AGK3= G5  IV                S  H         3

Record 248513 224698235901591092 5+71 1244   0   0   0
  1.2686  0.5555 10.1632 9.120 7.980 4 8.000 9.0002-9.999-9.999-9.999 5000 30   04 500   0   0   00-999.9988-999.9988   0.0   0.0   0.0   0.200   319.0   169.1   -6.218 -18.906   39.415   -5
  8.197   383.7   319.0   169.12 0.266 0.0893  00-999.9990   0.000   0.000  0.00-9.9991000 0.1144 0.1144 0.1144 0.1144 0.1144 0.1144 0.1144 0.1144 0.1144 0.1144 1 0   0   0.0   0.0
   0  SAO=CK0  III                NS  H         1

Record 248514 224694235901601923 03-2818429   0   0   0
  1.2841  0.5563 12.375210.577 8.598 3 8.60010.5001-9.999-9.999-9.999 5200 30   07 500 5200 30   07-999.9988-999.9988   0.0   0.0   0.0   -0.100   141.9   34.7   3.300 -10.471 -12.464
  6.718   0.0   141.9   34.72 2.428 0.8091  00-999.9990   0.000   0.000  0.00-9.9991000 0.2584 0.2584 0.2584 0.2584 0.2584 0.2584 0.2584 0.2584 0.2584 0.2584 1 0   0   0.0   0.0
   0  SAO=CK2  III                S  BV        1

Record 248515 224701235901611470 21- 6 6337   0   0   0
  1.2820  0.5565 10.1572 9.681 8.751 4 8.700 9.5002-9.999-9.999-9.999 4500 40   04 450   0   0   00-999.9988-999.9988   0.0   0.0   0.0   3.200   128.9   82.9   0.896 -11.048   4.149
  4.001   0.0   128.9   82.92 0.000 0.0003  00-999.9990   0.000   0.000  0.00-9.9991000 0.4066 0.4066 0.4066 0.4066 0.4066 0.4066 0.4066 0.4066 0.4066 0.4066 1 0   0   0.0   0.0
   0  SAO=CG5  IV                NS  H         1

Record 248516 023590162   0+26 4723   0   0   0
  1.2787  0.5563 10.702210.68010.140 9-9.99910.6005-9.999-9.999-9.999 3800 50   05 380   0   0   00-999.9988-999.9988   0.0   0.0   0.0   4.000   169.0   100.3   -2.780 -28.914   32.898   -
  6.174   0.0   169.0   100.32 0.000 0.0003  00-999.9990   0.000   0.000  0.00-9.9991000 0.1670 0.1670 0.1670 0.1670 0.1670 0.1670 0.1670 0.1670 0.1670 0.1670 8 0   0   0.0   0.0
   0AGK3= F8  V                S  H         3
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