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

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DOCUMENTATION FOR THE MACHINE-READABLE VERSION

OF

THE REVISED AFGL INFRARED SKY SURVEY CATALOG

(PRICE AND MURDOCK 1983)

MAY 1984

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Wayne H. Warren Jr.

May 1984

National Space Science Data Center (NSSDC)/
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ABSTRACT

A detailed description of the machine-readable catalog as it is currently being distributed from the Astronomical Data Center is given. The catalog contains a main data file of 2970 sources and a supplemental file of 3176 sources measured at wavelengths of 4.2, 11, 20 and 27 μm.

TABLE OF CONTENTS

Section 1 - INTRODUCTION AND SOURCE REFERENCE 1-1
Section 2 - TAPE CONTENTS 2-1
Section 3 - TAPE CHARACTERISTICS 3-1
Section 4 - REMARKS, MODIFICATIONS, ACKNOWLEDGMENT AND REFERENCES 4-1
Section 5 - SAMPLE LISTING 5-1

LIST OF TABLES

Table

1 Tape Contents 2-1
2 References and Accuracies for Source Positions 2-6
3 Tape Characteristics 3-1

SECTION 1 - INTRODUCTION AND SOURCE REFERENCE

The Revised AFGL Infrared Sky Survey Catalog (RAFGL, Price and Murdock 1983) contains the results of extensive verification and photometric studies of AFGL sources performed since the publication of *The AFGL Four Color Infrared Sky Survey: Catalog of Observations at 4.2, 11.0, 9.8, and 27.4 μm* (AFGL, Price and Walker 1976) as well as recent survey measurements with larger instruments. A significant ground-based effort has been made to verify the AFGL sources not previously associated with known cataloged objects and to analyze the contents of certain other catalogs (see the source reference for bibliography). Improved positions and more extensive photometry have been provided by the ground-based searches for the RAFGL objects, and questions about unconfirmed sources from early investigations of the *AFCRL Infrared Sky Survey Volume I. Catalog of Observations at 4, 11 and 20 μm* (AFCRL, Walker and Price 1975) have, for the most part, been resolved. Many of the spurious sources were eliminated from the AFGL catalog in the reanalysis by including a rescan confirmation criterion in addition to the signal-to-noise gate used for the AFCRL catalog. Several real sources were also removed from the AFGL but retained in a supplemental catalog (Price 1977). The RAFGL is a revision of AFGL to include more accurate information and to provide identifications and improved positions for unidentified AFGL sources. Associations of known objects with survey sources are upgraded to identifications based upon subjective judgment of the photometric agreement between the survey magnitudes and those listed in either the *Catalog of Infrared Observations* (CIO, Gezari *et al.* 1982) or the list of Grasdalen *et al.* 1983. If a source is considered "identified" then the best available position is substituted for the survey value. Photometry from the ground-based studies and the CIO is included, where possible, if no survey measurement had been obtained at the wavelength in question or if the survey observation is deemed spurious; however, the major revision in the present catalog is the inclusion of data from two more sensitive surveys flown in 1982.

This document describes the machine-readable version of the RAFGL catalog, which contains primary and supplemental data files. The document is intended to enable users to process the magnetic tape files and their data without problems and guesswork. For more detailed information on the preparation of the catalog, the new survey measurements, data reduction, source distribution, and references to other surveys, the source reference should be consulted. This document should be distributed with any secondary copies of the machine version originally obtained from the Astronomical Data Center.

SOURCE REFERENCE

Price, S. D. and Murdock, T. L. 1983, *The Revised AFGL Infrared Sky Survey Catalog*, AFGL-TR-83-0161 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

SECTION 2 - TAPE CONTENTS

A byte-by-byte description of the contents of the machine-readable RAFGL files is given in Table 1. The data contents and formats of the main and supplemental files are identical. The suggested format specifications are for FORTRAN formatted read statements and can be modified depending upon individual programming and processing requirements. Default values are always blanks for data fields where the primary suggested format is character (A; FORTRAN 77-type character formats are used here), but where real (F) specifications are given the default values report the null representations: caution should be exercised when processing real and integer data, especially for magnitudes, where valid zero values can occur and default values are blanks. If a default value is not given for real and integer data, then the data field has been found to always contain a valid numerical data value. Alternate format specifications are given in parentheses.

Table 1. Tape Contents. *RAFGL Catalog*. Primary and Supplemental Data Files.

Byte(s)	Units	Suggested Format	Default Value	Description
1- 2	hours	I2	---	Right ascension, α, for 1950. References and positional accuracies, as taken from the source reference, are given in Table 2.
3	---	1X	---	Blank
4- 5	min	I2	---	α
6	---	1X	---	Blank
7- 10	sec	F4.1	---	α
11	---	1X	---	Blank
12	---	A1	---	Sign of declination, δ, for 1950.
13- 14	°	I2	---	δ
15	---	1X	---	Blank
16- 17	'	I2	---	δ
18	---	1X	---	Blank
19- 20	"	I2	---	δ

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
21	---	1X	---	Blank
22- 24	---	A3	---	Reference code for the position. See Table 2 for references and their positional accuracies.
25	---	1X	---	Blank
26	---	A1	---	Descriptive character for bytes 27-30. A "<" character is present if the 4.2-μm magnitude is an upper limit.
27- 30	mag	F4.1	blank	Magnitude at 4.2 μm.
31	---	1X	---	Blank
32- 33	mag	A2	---	Estimated error of 4.2-μm magnitude. The data field may contain codes to indicate that a magnitude is derived from another source: C CIO (Gezari *et al.* 1982) W Grasdalen *et al.* 1983 M Ney and Merrill 1980
34	---	1X	---	Blank
35	---	A1	---	Descriptive (<) character for bytes 36-39.
36- 39	mag	F4.1	blank	Magnitude at 11 μm.
40	---	1X	---	Blank
41- 42	mag	A2	---	Estimated error of 11-μm magnitude (see bytes 32-33).
43	---	1X	---	Blank
44	---	A1	---	Descriptive (<) character for bytes 45-48.
45- 48	mag	F4.1	blank	Magnitude at 20 μm.

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
49	---	1X	---	Blank
50- 51	mag	A2	---	Estimated error of 20-μm magnitude (see bytes 32-33).
52	---	1X	---	Blank
53	---	A1	---	Descriptive character (<) for bytes 54-57.
54- 57	mag	F4.1	blank	Magnitude at 27 μm.
58	---	1X	---	Blank
59- 60	mag	A2	---	Estimated error of 27-μm magnitude (see bytes 32-33).
61- 62	---	2X	---	Blank
63- 72	---	A10	---	Spectral type, mostly from association of the survey source with an object in the 2-μ Sky Survey (TMSS, Neugebauer and Leighton 1969). Spectral types were also taken from Bidelman (1980*a*,*b*), Buscombe (1981), Kukarkin *et al.* (1969-1970, 1971, 1974, 1976) and Kleinmann *et al.* (1981).
73	---	1X	---	Blank
74- 78	---	A5 (I4,A1)	---	AFGL number. Numbers < 3200 identify sources in the AFCRL and AFGL catalogs. Sources originally in the supplemental catalog (Price 1977) are identified by an S in byte 78. The 624 detections from the SPICE and FIRSSE flights are given by right ascension beginning at 5001, while new entries in the "revised" supplemental catalog (file 2) start at 6001S.
79	---	1X	---	Blank

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
80- 86	---	A7	---	Identification of the source in the TMSS (Neugebauer and Leighton 1969) or its extension (Neugebauer 1971) as indicated by an "E" in byte 86.
87	---	1X	---	Blank
88- 91	---	A4	---	Identification of the source in *The Catalogue of Bright Stars* (Hoffleit 1964).
92	---	1X	---	Blank
93-102	---	A10	---	Other designations for the source, such as Bayer, Flamsteed or variable-star identifications (Kukarkin references) if they exist, or Dearborn number (Lee *et al.* 1943, 1944, 1947), RNGC number (Sulentic and Tifft 1972) for NGC objects, Sharpless (1959) for H II regions, IC number from the *Index Catalogue* (Dreyer 1888, 1895, 1908). Other identifications were obtained from the CIO (Gezari *et al.* 1982).
103	---	1X	---	Blank
104-116	---	A13	---	Comments on source identification. The class of object is given if the association is with an NGC source, or a galaxy type may be given. Sources measured to be extended $\geq$5 arcminutes are designated by "EO", while sources of marginal extent are indicated by "E?".
117	---	1X	---	Blank
118-120	---	A3 (3A1)	"-"	Observation log. A three-byte code outlining the observational record for the entry. The three bytes have the following meanings:

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
				1 Pertains only to previous AFGL sources. A "C" designates that the source was detected in a common color on a SPICE or FIRSSE flight. If this is not the case, the maximum number of times the source was seen in a common color as listed in the AFGL catalog is given. 2 Describes observation within a SPICE or FIRSSE flight. A "2" means that the source was seen twice in a common color on the same flight; an "0" denotes no common color confirmation. If the object was rescanned but not confirmed, as asterisk (*) designates that the rescan region contained optical contamination or has a calculated S/N < 3. A question mark (?) means that the calculated S/N was between 3 and 5 on rescan or the confirming detector was at the end of the array. An S or F means that the source was only scanned once on a SPICE of FIRSSE flight, respectively. 3 Denotes flight-to-flight observations. The asterisk and question mark have the same meanings as for the second byte. A number means that the entry is a combination of a FIRSSE and SPICE measurement: "2" a common color with values within 60 percent "3" a common color with values > 60 percent of each other "4" no common color
121	---	1X	---	Blank

Table 1 (continued)

Byte(s)	Units	Suggested Format	Default Value	Description
122-126	°	F5.1	---	Galactic longitude.
127	---	1X	---	Blank
128-132	°	F5.1	---	Galactic latitude.

References and positional accuracies designated by the codes in bytes 22-24 are given in Table 2.

Table 2. References and Accuracies for Position Sources.

Code	Reference	Accuracy
AFGL	Price and Walker 1976; Price 1977	1:3
FIR/SPC	FIRSSE and SPICE derived postions	0:8
GVS	Kukarkin *et al.* 1969-70, 1971, 1974	0:8
IRC	Neugebauer and Leighton 1969; Neugebauer 1971	0:5
LKV	Low *et al.* 1976	30"
LKR	Lebofsky *et al.* 1976	15-30"
LSK	Lebofsky *et al.* 1978	1-30"
UCS	Gosnell, Hudson and Puetter 1979	10"
GH	Gehrz and Hackwell 1976	5"
JCG	Joyce *et al.* 1977	<5"
KLM	Kleinmann *et al.* 1983	<5"
WYO	Grasdalen *et al.* 1983	<5"
EIC	Sweeney *et al.* 1978*a*,*b*	<5"
CIO	Gezari, Schmitz and Mead 1982	<1"
SAO	Smithsonian Astrophysical Obs. Staff 1966	<1"

SECTION 3 - TAPE CHARACTERISTICS

The information in Table 3 is sufficient for a user to describe the indigenous characteristics of the RAFGL catalog files 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. These parameters should always be transmitted if secondary copies of the catalog are supplied to other users or installations. Parameters relating to the two files are separated by commas.

Table 3. Tape Characteristics. *The Revised AFGL Infrared Sky Survey Catalog.*

NUMBER OF FILES	2
LOGICAL RECORD LENGTH (BYTES)	132, 132
RECORD FORMAT	FB*
TOTAL NUMBER OF LOGICAL RECORDS	2970, 3176

* Fixed block length (last block may be short)

SECTION 4 - REMARKS, MODIFICATIONS, ACKNOWLEDGMENTS AND REFERENCES

The Revised AFGL Infrared Sky Survey Catalog was received on magnetic tape (7-track BCD coded at 800 bpi) from Dr. S. D. Price on 15 November 1983. The following modifications were made to both files of the catalog in order to conserve storage space and to archive the files in a standard character code:

1. The BCD (026 punch) coding was converted to EBCDIC, a standard 9-track code which is readily transformed to ASCII if desired.

2. The infrared magnitudes were inhomogeneous in format. Minus signs were moved and preceding zeros added so that all numbers are identical in their respective fields.

3. As received, the main catalog file contained 3000 records and the supplemental file 3180 records to blank fill their last blocks. Records 2971 to 3000 and 3177 to 3180 were deleted, respectively, to remove the blank records. The logical record length of each file was 140 bytes, with bytes 1 and 134 to 140 always blank. These bytes were removed to create the 132-byte/record files, an advantage for printing one line per source on a standard line printer.

ACKNOWLEDGMENTS

Appreciation is expressed to Dr. Stephan D. Price for supplying the RAFGL catalog on magnetic tape with a brief format description and a copy of the printed catalog. Dr. Price also kindly reviewed a preliminary copy of this document.

REFERENCES

Bidelman. W. P. 1980*a*, Spectral Clasification for the Stars of the Caltech Two Micron Survey, *Publ. Warner and Swasey Obs.* 2, No. 5.

Bidelman, W. P. 1980*b*, private communication.

Buscombe, W. 1981, Suggested Identifications for Infrared Sources, *Variable Stars Suppl.* 4, 19, 85 (Akad. Sciences USSR).

Dreyer, J. L. E. 1888, *New General Catalogue of Nebulae and Clusters of Stars, Mem. Royal Astron. Soc.* 49, Part I (reprinted 1962, London: Royal Astronomical Society).

Dreyer, J. L. E. 1895, *Index Catalogue of Nebulae Found in the Years 1888 to 1894, With Notes and Corrections to the New General Catalogue, Mem. Royal Astron. Soc.* 51, 185.

Dreyer, J. L. E. 1908, *Second Index Catalogue of Nebulae and Clusters of Stars Found in the Years 1895 to 1907, With Notes and Corrections to the New General Catalogue and to the Index Catalogue for 1888 to 1894, Mem. Royal Astron. Soc.* 59, Part 2, 105.

REFERENCES (continued)

Gehrz, R. D. and Hackwell, J. A. 1976, *Astrophys. J.* 206, L161.

Gezari, D. Y., Schmitz, M. and Mead, J. M. 1982, *Catalog of Infrared Observations* (CIO), NASA TM 83819, NASA Goddard Space Flight Center.

Gosnell, T. R., Hudson, H. and Puetter, R. C. 1979, *Astron. J.* 84, 538.

Grasdalen, G. L., Gehrz, R. D., Hackwell, J. A., Castelaz, M. and Gullixson, C. 1983, *Astrophys. J. Suppl.* 53, 413.

Hoffleit, D. 1964, *The Catalogue of Bright Stars*, 3rd Revised Edition (New Haven: Yale University Observatory).

Joyce, R. R., Capps, R. W., Gillett, F. C., Grasdalen, G., Kleinmann, S. G. and Sargent, D. G. 1977, *Astrophys. J.* 213, L125.

Kleinmann, S. G., Gillett, F. C. and Joyce, R. R. 1981, *Annu. Rev. Astron. Astrophys.* 19, 411.

Kleinmann, S. G., Joyce, R. R., Sargent, D. G., Gillett, F. C. and Telesco, C. M. 1979, *Astrophys. J.* 227, 126.

Kukarkin, B. V., Kholopov, P. N., Efremov, Yu. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., Pskovsky, Yu. P., Fedorovich, V. P. and Frolov, M. S. 1971, *First Supplement to the Third Edition of the General Catalogue of Variable Stars* (Moscow: Publishing House of the Academy of Sciences of the U.S.S.R.).

Kukarkin, B. V., Kholopov, P. N., Efremov, Yu. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., Pskovsky, Yu. P., Fedorovich, V. P. and Frolov, M. S. 1974, *Second Supplement to the Third Edition of the General Catalogue of Variable Stars* (Moscow: Publishing House of the Academy of Sciences of the U.S.S.R.).

Kukarkin, B. V., Kholopov, P. N., Kukarkina, N. P. Kurochkin, N. E., Medvedeva, G. I., Perova. N. B., Pskovsky, Yu. P., Fedorovich, V. P. and Frolov, M. S. 1976, *Third Supplement to the Third Edition of the General Catalogue of Variable Stars* (Moscow: Publishing House of the Academy of Sciences of the U.S.S.R.).

Kukarkin, B. V., Kholopov, P. N., Pskovsky, Yu. P., Efremov, Yu. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., Fedorovich, V. P. and Frolov, M. S. 1969-70, *General Catalogue of Variable Stars*, 3rd edition (Moscow: Publishing House of the Academy of Sciences of the U.S.S.R.).

Lebofsky, M. J., Kleinmann, S. G., Rieke, G. H. and Low, F. J. 1976, *Astrophys. J.* 206, L157.

Lebofsky, M. J., Sargent, D. G., Kleinmann, S. G. and Rieke, G. H. 1978, *Astrophys. J.* 219, 487.

REFERENCES (continued)

Lee, O. J., Baldwin, R. L. and Hamlin, D. W. 1943, *Dearborn Catalog of Faint Red Stars, Titanium Oxide Stars in Zones -4°5 to +13°5, Ann. Dearborn Obs.*, Northwestern Univ. V, Part 1A.

Lee, O. J. and Bartlett, T. J. 1944, *Dearborn Catalog of Faint Red Stars, Titanium Oxide Stars in Zones +13°5 to +40°5, Ann. Dearborn Obs.*, Northwestern Univ. V, Part 1B.

Lee, O. J., Gore, G. D. and Bartlett, T. J. 1947, *Dearborn Catalog of Faint Red Stars, Titanium Oxide Stars in Zones +40°5 to +90°, Ann. Dearborn Obs.*, Northwestern Univ. V, Part 1C.

Low, F. J., Kurtz, R. F., Vrba, F. J. and Rieke, G. H. 1976, *Astrophys. J.* 206, L153.

Neugebauer, G. 1971, *Two micron sky survey zones -47° to -40° and -40° to -33°*, private communication.

Neugebauer, G. and Leighton, R. D. 1969, *Two Micron Sky Survey - A Preliminary Catalog*, NASA SP-3047.

Ney, E. P. and Merrill, K. M. 1980, *Study of Sources in the AFGL Rocket Infrared Survey*, AFGL-TR-80-0050, AD A084098 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

Price, S. D. 1977, *The AFGL Four Color Infrared Sky Survey: Supplemental Catalog*, AFGL-TR-77-0100, AD A048048 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

Price, S. D. and Murdock, T. L. 1983, *The Revised AFGL Infrared Sky Survey Catalog*, AFGL-TR-83-0161 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

Price, S. D. and Walker, R. G. 1976, *The AFGL Four Color Infrared Sky Survey: Catalog of Observations at 4.2, 11.0, 19.8, and 27.4 μm* (AFGL), AFGL-TR-76-0208 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

Price, S. D. and Walker, R. G. 1978, Calibration of the HI STAR Sensors, AFGL-TR-78-0172, AD A061020 (Hanscom AFB, MA: Air Force Geophysics Laboratory, Air Force Systems Command, USAF).

Sharpless, S. 1959, *A Catalogue of H II Regions*, *Astrophys. J. Suppl.* 4, 257.

Smithsonian Astrophysical Observatory Staff 1966, *Star Catalog. Positions and Proper Motions of 258,997 Stars for the Epoch and Equinox of 1950.0*, Pub. of the Smithsonian Institution of Washington, D.C. No. 4652 (Washington: Carnegie Institution of Washington).

REFERENCES (continued)

Sulentic, J. W. and Tifft, W. G. 1972, *The Revised New General Catalogue of Nonstellar Astronomical Objects* (Tucson: University of Arizona).

Sweeney, L. H., Heinsheimer, T. F., Yates, F. F., Maran, S. P., Lesh, J. R. and Nagy, T. A. 1978*a*, *Interim Equatorial Infrared Catalog*, Number 1, Aerospace Report TR-0078 (3409-20) - 1.

Sweeney, L. H., Heinsheimer, T. F., Yates, F. F., Maran, S. P., Lesh, J. R. and Nagy, T. A. 1978*b*, *Interim Equatorial Infrared Catalog*, Number 2, preprint.

Walker, R. G. and Price, S. D. 1975, *AFCRL Infrared Sky Survey Volume I. Catalog of Observations at 4, 11 and 20* μm (AFCRL), AFCRL-TR-75-0373, AD A016397, Air Force Cambridge Research Laboratories.

SECTION 5 - SAMPLE LISTING

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

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

            TAPE FILE NAME: AFGRL Catalog (1983)
                   RECORDS        1 TO      15
                 TAPE FILE      71
             RECORD LENGTH    132 BYTES
              INPUT VOLSER   ADC002

C O L U M N                                                                                                                       1111111111111111
H E A D I N G              11111111112222222222333333333344444444445555555555666666666677777777778888888888999999999900000000001111111
I N D E X         123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD        1  0  0 44.0 +55 24 24 IRC   0.1 .3  -1.4 .3  -2.0  C          M7E          5   60001          Y CAS
                 3-- 116.1  -6.6
RECORD        2  0  1 16.1 +66 26  2 SAO   1.0 .3                            M4 G         7   70002  9099   DO 44038
                 3-- 118.2   4.3
RECORD        3  0  1 45.6 +39 49 53 CIO   1.5 .3                            M5.5         8   40001          SV AND
                 2-- 113.2 -21.9
RECORD        4  0  1 56.0 +41 50 42 IRC   1.2 .3                            M5           9   40002  9105   DO 44062
                 2-- 113.7 -19.9
RECORD        5  0  2 26.9 - 1 51 25 SPC           -1.5 .2  -3.9 .2                    5001                               E
               0 -S-  97.4 -62.1
RECORD        6  0  2 35.5 - 2  8 32 SPC           -0.6 .2  -3.2 .2  -2.3 .3           5002                               E
               0 -S-  97.3 -62.4
RECORD        7  0  3 34.0 +69 46 36 IRC   1.1 .3  -0.2 .2                   C           12   70003          OR CEP
                 3-- 119.1   7.5
RECORD        8  0  3 53.0 +26 48 42 IRC   1.4 .3                            M6E G       13   30002          TT PEG
                 2-- 110.7 -34.7
RECORD        9  0  4 17.0 +42 47 54 IRC   0.3 .3  -2.5 .3  -3.2 .4          M10         14   40004          KU AND
                 2-- 114.3 -19.1
RECORD       10  0  4 21.4 +66 53 25 SPC            0.1 .2                             5003                  MR CEP
                -2- 118.6    4.7
RECORD       11  0  4 49.8 - 2 11  9 SPC           -1.6 .2  -3.1 .2                    5004                               K
               0 -S-  98.4 -62.7
RECORD       12  0  5  1.0 -25 46 30 IRC   1.3 .4                            M6E         17  -30002          SY SCL
                 2--  39.9 -80.0
RECORD       13  0  6   .3 -17 51 20 SAO   1.4 .3                            M1 III      18  -20001    18    GC 129
                 2--  74.7 -76.2
RECORD       14  0  6 29.7 +58 52 27 SAO   0.9 .3   0.4  C                   F2 III      21   60004    21   BET CAS
                 3-- 117.5  -3.3
RECORD       15  0  6 47.8 +63 40 33 SAO   0.9 .3  -0.4 .2                   M3EP        22   60005         DO 22804
                 C-- 118.3   1.5
```

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

          TAPE FILE NAME: AFGRL Catalog (1983)
                 RECORDS    2956 TO    2970
               TAPE FILE     71
           RECORD LENGTH    132 BYTES
            INPUT VOLSER   ADC002

C O L U M N                                                                                                         1111111111111111
H E A D I N G           111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111
I N D E X      123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD    2956 23 54 38.2 +67  2 38 SPC             0.3 .2  -3.1 .2  -2.8 .3             5624
                -S- 117.7   5.0
RECORD    2957 23 55  7.0 +23 45 18 AGL   1.8 .3                                         3185                 SVS 5813
                1-- 107.5 -37.2
RECORD    2958 23 55 12.4 +24 51 49 SAO  -0.1 .3  -0.5 .4                      M3 III    3186   20557  9064    PSI PEG
                2-- 107.9 -36.2
RECORD    2959 23 55 26.0 +56 12 36 IRC   0.9 .3  -0.8 .3                      SE        3187   60431           WY CAS
                2-- 115.6  -5.6
RECORD    2960 23 55 51.7 +51  6 36 SAO  -2.6 .3  -4.2 .3  -4.8 .4             M7E       3188   50484  9066      R CAS
                3-- 114.6 -10.6
RECORD    2961 23 56  4.0 -39 43  6 IRC  -0.7 .3  -2.6 .2  -3.7 .2  -2.5 .3    M         3189  -30501E          RR PHE
                C2- 341.3 -73.5
RECORD    2962 23 56 53.8 -29 45 48 SAO   1.3 .3                               K5        3190  -30472  9073    GC 33266
                1--  18.2 -78.3
RECORD    2963 23 57  9.5 +67  5 36 AGL           -1.6 .2  -2.1 .5  -3.6 .3              3193                                     E
              0 C-- 118.0   5.0
RECORD    2964 23 57 18.0 -51 47 12 AGL           -1.7 .4  -2.9 .5                       4304
                1-- 321.2 -63.7
RECORD    2965 23 57 32.8 +25 37 42 CIO   0.7 .3  -0.3 .4  -3.4 .6             M7E III   3194   30522            Z PEG
                2-- 108.7 -35.5
RECORD    2966 23 57 37.5 + 1 35  6 SPC                    -3.1 .2  -2.5 .3              5625
                -S-  97.8 -58.5
RECORD    2967 23 58 41.9 +60  4 37 SAO   0.1 .3  -0.8 .2                      C9,2      3196   60433           WZ CAS
                C-- 116.8  -1.9
RECORD    2968 23 59  9.7 +67  6 44 AGL           -1.0 .4  -4.1 .2  -5.3 .3              4305
                C-- 118.2   5.0
RECORD    2969 23 59 23.7 - 6 17 31 SAO  -1.0 .4  -0.9 .2                      M3 III    3197  -10608  9089     30 PSC     YY PSC
                C--  91.6 -65.8
RECORD    2970 23 59 53.0 +56 46 12 AGL   1.4 .3                               M7        4306
                1-- 116.3  -5.2
```

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

TAPE FILE NAME: AFGRL Supplement (1983)
RECORDS 1 TO 15
TAPE FILE 72
RECORD LENGTH 132 BYTES
INPUT VOLSER ADC002

```
COLUMN HEADING INDEX                  1111111111222222222233333333334444444444555555555566666666667777777777888888888899999999990000000000111111
                          1234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
RECORD      1  0  0  1.0 +73 45  6 IRC   1.6 .4   0.0 .2                    M5          2S  70001        DO 44003
               2-- 119.5  11.5
RECORD      2  0  0 15.0 +24 37 12 AGL          -0.9 .4  -3.4 .5                        3S
               2-- 109.2 -36.7
RECORD      3  0  0 20.0 +58 17 30 AGL   1.7 .3                                       4S
               2-- 116.6  -3.7
RECORD      4  0  0 31.0 +59 27 36 AGL   1.3 .3                                    4002S
               1-- 116.9  -2.6
RECORD      5  0  1 40.2 +64 52 30 SAO   1.7 .4                          M2       4003S  60002        DO 44055
               1-- 118.0   2.7
RECORD      6  0  1 59.0 - 1 46 40 SPC                 -3.3 .2                    6001S                          E
             0 -?-  97.3 -62.0
RECORD      7  0  2  8.7 - 2  9 10 SPC                 -3.3 .2                    6002S                          E
             0 -S-  97.1 -62.4
RECORD      8  0  2 10.0 - 1 43 32 SPC                            -3.2 .3         6003S                          E
             0 -?-  97.4 -62.0
RECORD      9  0  2 58.3 - 2  7 50 SPC                            -3.7 .3         6004S                          E
             0 -S-  97.5 -62.4
RECORD     10  0  3  2.2 -43 15 44 SPC          -0.1 .2                    M3       6005S -40001E          GC 67
               -S- 330.4 -71.6
RECORD     11  0  3 30.0 +56  3 24 AGL   1.7 .4          -3.2 .4             M      4005S                  FG CAS
               1-- 116.6  -6.0
RECORD     12  0  3 47.5 - 1 53 55 SPC                            -3.2 .3         6006S                          E
             ? -S-  98.1 -62.3
RECORD     13  0  4  1.0 -32 52 30 IRC   0.8 .4                    -2.6 .3  M6 III  4006S -30001          XY SCL
               C*-     .9 -78.8
RECORD     14  0  4  8.8 - 2 13 13 SPC                            -3.3 .3         6007S                          E
             0 -S-  98.0 -62.6
RECORD     15  0  4 35.2 + 9 24 11 SPC                 -2.9 .2                    6008S
               -S- 105.2 -51.7
```

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

```
          TAPE FILE NAME: AFGRL Supplement (1983)
                 RECORDS    3162 TO    3176
               TAPE FILE     72
           RECORD LENGTH    132 BYTES
            INPUT VOLSER   ADC002

C O L U M N                                                                                                  1111111111111111
H E A D I N G          111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111
I N D E X     123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345

RECORD    3162 23 54  9.0 +26  4 36 AGL          -2.0 .4                                 5796S
                2-- 107.9 -34.9
RECORD    3163 23 54 31.4 - 9  8 48 SPC          -0.4 .2                                 7242S
                -S-  85.3 -67.7
RECORD    3164 23 54 38.9 + 2 12 15 SPC                   -2.9 .2                        7243S
                -S-  97.0 -57.6
RECORD    3165 23 54 47.9 +60 44 53 SAO   1.6 .3                              M2 G       3184S  60430        GC 33217
                2-- 116.4  -1.2
RECORD    3166 23 55  8.0 +49 39 54 AGL   1.3 .3                                         5797S
                1-- 114.1 -12.0
RECORD    3167 23 55 54.1 + 1 42 31 SPC                   -2.6 .2                        7244S
                -S-  97.2 -58.2
RECORD    3168 23 56 15.3 - 6 23 11 SPC                   -2.1 .2                        7245S
                -?-  89.8 -65.5
RECORD    3169 23 57 34.0 +19 58  0 IRC   2.0 .4                              M7         5798S  20558          EP PEG          E
              0 1-- 106.9 -41.0
RECORD    3170 23 57 39.8 +60  3  2 SPC          -0.1 .2                      M4         7246S  60432        D, 43937
                -S- 116.6  -1.9
RECORD    3171 23 57 41.0 +14 44 30 AGL   1.6 .3                                         3195S
                1-- 105.0 -46.1
RECORD    3172 23 58 27.0 +38 13 30 IRC   1.4 .4                              MO         5799S  40548        DO 22623
                1-- 112.2 -23.3
RECORD    3173 23 58 28.4 + 1 10 16 SPC                   -2.8 .2                        7247S
                -S-  97.9 -59.0
RECORD    3174 23 59  3.0 -51 40 18 AGL          -1.8 .4                                 5800S
                1-- 320.8 -64.0
RECORD    3175 23 59 43.0 -21 17  6 AGL   1.5 .4                                         3198S
                1--  58.9 -77.2
RECORD    3176 23 59 43.4 +60 25 30 SAO   1.3 .3                              M2 G       4001S  60434        DO 43998
                1-- 117.0  -1.6
```