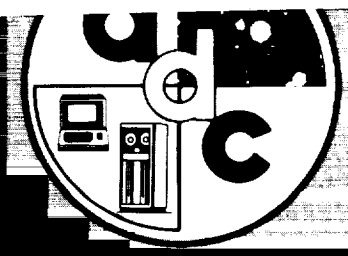
National Space Science Data Center/
World Data Center A For Rockets and Satellites

90-20

CATALOG OF SAS-2 GAMMA-RAY OBSERVATIONS

(Fichtel *et al.* 1990)

Documentation for the Machine-Readable Version



July 1990

NSSDC/WDC-A-R&S 90-20

CATALOG OF SAS-2 GAMMA-RAY OBSERVATIONS

(Fichtel *et al.* 1990)

Documentation for the Machine-Readable Version

Wayne H. Warren Jr.

July 1990

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

Abstract

The machine-readable version of the catalog, as it is currently being distributed from the Astronomical Data Center, is described. The SAS-2 γ-ray catalog contains fluxes measured with the high-energy γ-ray telescope flown aboard the second NASA *Small Astronomy Satellite*. The objects measured include various types of galaxies, quasi-stellar and BL Lacertae objects, and pulsars. The catalog contains separate files for galaxies, pulsars, other objects, notes, and references.

Table of Contents

List of Tables

1.0 Introduction

1.1 Description

The *Catalog of SAS-2 Gamma-Ray Observations* summarizes final results for high-energy γ-ray observations obtained wth the second *Small Astronomy Satellite* (SAS-2) flown in an equatorial orbit by NASA from 1972 November through 1973 June. The data from the SAS-2 γ-ray experiment cover about 60 percent of the sky and 89 percent of the galactic plane for γ rays with energies > 35 MeV.

The experiment (also see Derdeyn *et al.* 1972) was a picture-type high-energy (> 35 MeV) γ-ray telescope using a 32-level wire-grid, magnetic-core spark chamber assembly covered by an anticoincidence scintillator and triggered by any one of four independent directional scintillator Cerenkov counter telescopes in anticoincidence with the outer scintillator. Thin tungsten (W) plates, 0.03 of a radiation length thick, were interleaved between the spark-chamber modules, which had an active area of approximately 640 cm^2. The large number of W plates and spark chambers served the dual purpose of providing material for the γ rays to be converted to electron pairs that could then be clearly identified and from which their arrival directions could be determined; plus, they provided a means of ascertaining the energies of the electrons in a pair by measuring their Coulomb scattering. The full width at half-maximum field of view (FOV) was 35°, and within the FOV the average angular uncertainty for determining the arrival direction of an individual γ ray projected on one plane was about 2°.6 at 100 MeV and varied with energy approximately as $E^{-1/2}$ in the energy range 35-200 MeV. For descriptions of the instrument calibration, data analysis procedures, and in-flight performance checks, see Fichtel *et al.* (1975) and Hartman *et al.* (1979).

This document describes the machine-readable version of the *Catalog of SAS-2 Gamma-Ray Observations* as it is currently being distributed from the National Space Science Data Center (NSSDC), its Astronomical Data Center (ADC), and the international network of astronomical data centers. It is intended to enable users to read and process the computerized catalog without problems and guesswork, and it should be used only to supplement the information contained in the published papers. In addition to the primary source references given below, those papers include Lamb *et al.* (1977), Thompson *et al.* (1977*a*, 1977*b*, 1983), and Fichtel, Thompson, and Lamb (1987). Since some of the data in the machine-readable files do not correspond exactly with those in the various published tables, users of the machine version are encouraged to study the format descriptions given in the following sections of this document before using and interpreting the data. **A copy of this document should be transmitted to any recipient of the machine-readable catalog originating from the any of the international network of astronomical data centers.**

1.2 Primary Source References

Bignami, G. F., Fichtel, C. E., Hartman, R. C., and Thompson, D. J. 1979, *Astrophys. J.* **232**, 649-658.

Fichtel, C. E., Hartman, R. C., Hunter, S. D., Kniffen, D. A., Thompson, D. J., Ögelman, H. B., Tümer, T., and Özel, M. E. 1990, *Catalog of SAS-2 Gamma-Ray Observations*, Laboratory for High Energy Astrophysics, NASA Goddard Space Flight Center.

Fichtel, C. E., Hartman, R. C., Kniffen, D. A., Thompson, D. J., Bignami, G. F., Ögelman, H., Özel, M. E., and Tümer, T. 1975, *Astrophys. J.* **198**, 163-182.

Ögelman, H., Fichtel, C. E., Kniffen, D. A., and Thompson, D. J. 1976, *Astrophys. J.* **209**, 584-591.

2.0 Structure

2.1 File Summary

The machine version of the *Catalog of SAS-2 Gamma-Ray Observations* consists of five files. Table 1 gives the machine-independent file attributes. All logical records are of fixed length. (Since all files are short, each will consist of a single block of differing length if blocked data are supplied on magnetic tape.)

Catalog of SAS-2 Gamma-Ray Observations (Fichtel *et al.* 1990)				
File	Contents	Record Format	Logical Record Length	Total Number of Logical Records
1	Galaxy Data	FB	60	32
2	Pulsar Data	FB	50	113
3	Pulsar Notes	FB	76	16
4	Other Sources	FB	75	38
5	Other Notes	FB	70	15

Table 1. Summary Description of Catalog Files: FB = Fixed length blocks

The information contained in the above table is sufficient for a user to describe the indigenous characteristics of the machine-readable version of the *Catalog of SAS-2 Gamma-Ray Observations* to a computer. Information easily varied from installation to installation, such as block size (physical record length), blocking factor (number of logical records per physical record), total number of blocks, density, number of tracks and character coding (ASCII, EBCDIC) for tapes, is not included, but should always accompany secondary copies if any are supplied to other users or installations.

2.2 Galaxy Data (File 1 of 5)

This file is uniformly formatted and contains the SAS-2 observations of various types of galaxies, as published in Bignami *et al.* (1979). Some of the data and other information presented in Table 1 of the published paper are not included in the machine-readable file; hence, the former should be consulted when using the latter.

Table 2 gives a byte-by-byte description of the contents of the galaxy file. A suggested Fortran format specification for reading each data field is included and can be modified depending upon individual programming and processing requirements (Fortran 77 character string-type formats are used). Certain data fields are blank when data are absent and these are indicated by the default values in the table.

Byte(s)	Units	Suggested Format	Default Value	Data
1-13	---	A13	---	Object designation
14	---	1X	---	Blank
15	---	A1	---	Object type
16-17	---	2X	---	Blank
18-23	hours	F6.3	---	Right ascension
24-25	---	2X	---	Blank
26-30	°	F5.1	---	Declination
31-32	---	2X	---	Blank
33-40	*	E8.1	blank	35-100 MeV emission limit
41-42	---	2X	---	Blank
43-50	**	E8.1	---	> 100 MeV emission limit
51-52	---	2X	---	Blank
53-60	$ergs^{-1}$	E8.1	blank	Luminosity limit

Table 2. Galaxy File Record Format

* Units are keV cm^{-2} s^{-1} keV^{-1}

** Units are photons cm^{-2} s^{-1}

Object designation Common name or abbreviation for the observed object.

Object type A letter code that designates the following types:

S Seyfert galaxy

N N-type galaxy

B BL Lacertae object

Q Quasi-stellar object

E Sharp emission-line galaxy

O Other type of galaxy

Equatorial coordinates Decimal hours and degrees for equinox B1950.0.

Energy Upper limits in the 35-100 MeV and > 100 MeV energy ranges, as determined by using the diffuse γ-ray emission level based on the analysis of Fichtel, Simpson, and Thompson (1978). These are 95% confidence upper limits calaculated using the statistical analysis techniques of Hearn (1969), equations (12) and (13).

Luminosity limit The 95% confidence upper limit to the γ-ray luminosity for $E > 100$ MeV.

2.3 Pulsar Data (File 2 of 5)

The file is uniformly formatted and contains observations of pulsars published by Ögelman *et al.* (1976) and Thompson *et al.* (1977*a*, 1977*b*, 1983). The machine-readable file differs somewhat from the published tables in that estimated distances are given in kiloparsecs and γ-ray luminosity limits are in logarithmic form; the published χ^2 data are not present in the machine version.

Table 3 provides a description of the pulsar file. All data fields in this file contain valid data; *i.e.*, there are no blank fields and no default vales are reported.

Byte(s)	Units	Suggested Format	Default Value	Data
1-7	---	A7	---	Pulsar designation
8-9	---	2X	---	Blank
10-15	s	F6.4	---	Period
16-17	---	2X	---	Blank
18-26	10^{-15} s s^{-1}	F9.3	---	Period change
27	---	1X	---	Blank
28-32	kpc	F5.2	---	Distance
33-34	---	2X	---	Blank
35-38	*	F4.1	---	Pulsed flux limit
39-40	---	2X	---	Blank
41-45	**	F5.2	---	Luminosity limit
46-47	---	2X	---	Blank
48-50	---	A3	---	Notes and references

Table 3. Pulsar File Record Format

* Units are 10^{-6} cm^{-2} s^{-1}

** Units are photons s^{-1}

Pulsar designation Standard pulsar coordinate designation (PSR) in hours and minutes of right ascension and degrees of declination.

Period The pulsar period

Period change Derivative of the period, which is the rate of pulsar spin up or spin down, in units of 10^{-15} s s^{-1}.

Distance The approximate distance of the object, as taken from Taylor and Manchester (1975).

Pulsed flux limit The 2σ upper limit of the pulsed γ-ray flux above 35 MeV in units of 10^{-6} cm^{-2} s^{-1}. For most of the pulsars, this limit was calculated based on the highest single peak in the pulsar phase plot (see Ögelman *et al.* 1976 for details).

Luminosity limit Upper limit to the γ-ray luminosity, as determined from the upper limit to the flux and the distance estimates of Taylor and Manchester (1975). An emission solid angle of 1 steradian was assumed; the luminosity was calculated as:

$$L = 1 \cdot Fd^2,$$

where F is the observed flux and d is the distance. Note that these upper limits do not truly reflect actual upper limits in the sense that neither the distance nor the emission solid angle is accurately known for any pulsar.

Notes and references Numerical key(s) to the notes and references given in file 3 of the catalog.

2.4 *Pulsar Notes and References (File 3 of 5)*

This file is a simple text file containing notes and references concerning individual pulsars contained in file 2. The information is keyed by the numbers given in the last column of the data file (bytes 48-50).

Byte(s)	Fortran Format	Data
1-76	A76	Mixed case text

Table 4. Pulsar Notes File Record Format

2.5 *Data for Other Sources (File 4 of 5)*

This file contains data for miscellaneous other sources, such as supernova remnants, X-ray and binary X-ray, and miscellaneous sources. The data come from the papers of Fichtel *et al.* (1975), Thompson *et al.* (1977*a*), and Fichtel, Thompson, and Lamb (1987). The file has not been uniformly formatted because of the inhomogeneity of the information given; thus, it is a simple text file with column headings.

Byte(s)	Fortran Format	Data
1-75	A75	Other data in free form

Table 5. Other Data File Record Format

2.6 *Other Notes and References (File 5 of 5)*

This text file contains definitions of source types, notes, and references associated with the other sources data file. The notes and references are keyed by numbers given in the data file.

Byte(s)	Fortran Format	Data
1-70	A70	Mixed case text

Table 6. Other Notes File Record Format

3.0 History

3.1 Remarks

The machine-readable galaxies and pulsars data files of the *Catalog of SAS-2 Gamma-Ray Observations* were initially produced at the Astronomical Data Center from published papers supplied by Drs. Carl E. Fichtel and David L. Bertsch of the Laboratory for High Energy Astrophysics (LHEA) at the NASA Goddard Space Flight Center (GSFC), following a meeting with them in April 1988 that was arranged by Dr. J. M. Mead of GSFC. The newly created files were supplied to Dr. Stanley D. Hunter, also of the LHEA, who updated and added data to the existing files as well as creating the files for other sources. Further modifications were made in consultation with the above-mentioned authors.

3.2 Acknowledgments

Appreciation is expressed to Drs. Fichtel, Bertsch, and Hunter for their help with the design of the catalog and consultation during its preparation. Dr. Hunter kindly assembled and supplied reprints and photocopies of all the relevant published papers.

3.3 References

Bignami, G. F., Fichtel, C. E., Hartman, R. C., and Thompson, D. J. 1979, *Astrophys. J.* **232**, 649-658.

Derdeyn, S. M., Ehrmann, C. H., Fichtel, C. E., Kniffen, D. A., and Ross, R. W. 1972, *Nuclear Instrum. & Meth.* **98**, 557-566.

Fichtel, C. E., Hartman, R. C., Hunter, S. D., Kniffen, D. A., Thompson, D. J., Ögelman, H. B., Tümer, T., and Özel, M. E. 1990, *Catalog of SAS-2 Gamma-Ray Observations*, Laboratory for High Energy Astrophysics, NASA Goddard Space Flight Center.

Fichtel, C. E., Hartman, R. C., Kniffen, D. A., Thompson, D. J., Bignami, G. F., Ögelman, H., Özel, M. E., and Tümer, T. 1975, *Astrophys. J.* **198**, 163-182.

Fichtel, C. E., Simpson, G. A., and Thompson, D. J. 1978, *Astrophys. J.* **222**, 833-849.

Fichtel, C. E., Thompson, D. J., and Lamb, R. C. 1987, *Astrophys. J.* **319**, 362-366.

Hearn, D. 1969, *Nuclear Instrum. & Methods* **70**, 200-204.

Lamb, R. C., Fichtel, C. E., Hartman, R. C., Kniffen, D. A., and Thompson, D. J. 1977, *Astrophys. J. (Letters)* **212**, L63-L66.

Ögelman, H., Fichtel, C. E., Kniffen, D. A., and Thompson, D. J. 1976, *Astrophys. J.* **209**, 584-591.

Taylor, J. H. and Manchester, R. N. 1975, *Astron. J.* **80**, 794-806.

Thompson, D. J., Bertsch, D. L., Hartman, R. C., and Hunter, S. D. 1983, *Astron. Astrophys.* **127**, 220-223.

Thompson, D. J., Fichtel, C. E., Hartman, R. C., Kniffen, D. A., and Lamb, R. C. 1977*a*, *Astrophys. J.* **213**, 252-262.

Thompson, D. J., Fichtel, C. E., Kniffen, D. A., and Ögelman, H. B. 1977 *b*, *Astrophys. J. (Letters)* **200**, L17-L18.

Appendix A. Sample Listing

The sample listing given on the following pages shows logical records exactly as they are recorded in the machine-readable version of the catalog. Groups of records from the beginning and end of each file are illustrated, except where the files are very short, in which case an entire file may be shown. The beginning of each record and the bytes within the record are indicated by the column heading index across the top of each page (digits read vertically).

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

Data File Name: SAS-2 Galaxy Data
Records 1 to 20
Data File 226
Record Length 60 bytes
Input VOLSER ADC007

COLUMN HEADING INDEX
1111111111222222222233333333334444444444555555555566666666667777777777888888888999
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123

Record	1	Fairall 9	S	1.333	-59.1	1.8E-06	2.0E-06	6.1E+45
Record	2	3C 120	S	1.500	+ 5.3	2.4E-06	1.7E-06	2.7E+45
Record	3	Akn 120	S	5.233	- 0.2	1.8E-06	1.5E-06	2.3E+45
Record	4	MCG+08-11-011	S	5.303	+46.6	1.4E-06	1.9E-06	1.1E+45
Record	5	NGC 3227	S	10.350	+20.1	1.6E-06	8.9E-07	1.4E+43
Record	6	NGC 3783	S	11.617	-37.5	10.8E-06	3.1E-06	3.7E+44
Record	7	NGC 4051	S	12.000	+44.8	2.3E-06	1.9E-06	1.5E+43
Record	8	NGC 4151	S	12.133	+39.7	2.9E-06	7.3E-07	1.1E+43
Record	9	IC 4329 A	S	13.767	-30.0	2.1E-06	1.2E-06	3.3E+44
Record	10	MKN 279	S	13.867	+69.6	2.2E-06	1.2E-06	1.6E+44
Record	11	NGC 5548	S	14.250	+25.5	2.2E-06	1.4E-06	5.6E+44
Record	12	NGC 6814	S	19.667	-10.4	6.3E-06	1.3E-06	5.2E+43
Record	13	MKN 509	S	20.700	-10.9	3.0E-06	2.1E-06	3.8E+45
Record	14	3C 111	N	4.250	+37.9	5.4E-06	1.7E-06	5.7E+45
Record	15	3C 382	N	18.550	+30.4	7.5E-06	8.2E-07	4.0E+45
Record	16	3C 445	N	20.350	- 2.3	3.7E-06	2.0E-06	9.2E+45
Record	17	PKS 0548-322	B	5.800	-32.2	7.0E-06	2.9E-06	2.0E+46
Record	18	MKN 421	B	11.017	+38.4	3.5E-06	7.8E-07	1.1E+45
Record	19	MKN 501	B	16.867	+39.8	7.4E-06	4.1E-06	6.8E+45
Record	20	BL Lac	B	22.000	+42.0	2.3E-06	2.0E-06	1.3E+46

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: SAS-2 Galaxy Data
Records 13 to 32
Data File 226
Record Length 60 bytes
Input VOLSER ADC007

```
COLUMN
HEADING          1111111111222222222233333333334444444444555555555566666666667777777777888888888999 9
INDEX    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123
```

Record	13	MKN 509	S	20.700	-10.9	3.0E-06	2.1E-06	3.8E+45
Record	14	3C 111	N	4.250	+37.9	5.4E-06	1.7E-06	5.7E+45
Record	15	3C 382	N	18.550	+30.4	7.5E-06	8.2E-07	4.0E+45
Record	16	3C 445	N	20.350	- 2.3	3.7E-06	2.0E-06	9.2E+45
Record	17	PKS 0548-322	B	5.800	-32.2	7.0E-06	2.9E-06	2.0E+46
Record	18	MKN 421	B	11.017	+38.4	3.5E-06	7.8E-07	1.1E+45
Record	19	MKN 501	B	16.867	+39.8	7.4E-06	4.1E-06	6.8E+45
Record	20	BL Lac	B	22.000	+42.0	2.3E-06	2.0E-06	1.3E+46
Record	21	4U 0241+61	Q	2.683	+62.3	2.1E-06	3.5E-06	9.7E+45
Record	22	3C 273	Q	12.450	+ 2.2	2.8E-06	1.6E-06	5.7E+46
Record	23	NGC 2110	E	5.833	- 7.5	5.3E-06	2.2E-06	1.6E+44
Record	24	NGC 2992	E	9.717	-14.1	2.3E-06	5.3E-07	4.0E+43
Record	25	A 0945-30	E	9.750	-30.7	2.8E-06	1.4E-06	1.4E+44
Record	26	NGC 3034(M82)	E	9.983	+70.0	9.7E-06	5.0E-06	3.5E+42
Record	27	NGC 5506	E	14.167	- 2.9	2.7E-06	1.5E-06	7.2E+43
Record	28	M 31	O	0.683	+41.0		1.4E-06	
Record	29	SMC	O	0.917	-72.0		1.0E-06	
Record	30	LMC	O	5.333	-69.5		2.4E-06	
Record	31	M 87	O	12.467	+12.7	1.1E-06	6.4E-07	1.5E+43
Record	32	Cen A	O	13.367	-42.7	6.4E-06	2.0E-06	2.9E+42

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: SAS-2 Pulsar Data
Records 1 to 20
Data File 227
Record Length 50 bytes
Input VOLSER ADC007

COLUMN HEADING INDEX							
	1	2	3	4	5	6	7
	12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123						
Record 1	0105+65	1.284	12.4	1.0	1.8	37.20	1
Record 2	0136+57	0.2724	10.687	2.50	2.2	38.1	2
Record 3	0138+59	1.223	0.2	3.0	1.6	38.11	1
Record 4	0154+61	2.3517	188.990	1.60	2.6	37.8	2,3
Record 5	0450-18	0.549	5.78	2.4	0.6	37.49	1
Record 6	0525+21	3.745	40.06	1.9	1.2	37.59	2
Record 7	0531+21	0.0331	442.439	2.0	3.7	38.34	9
Record 8	0540+23	0.246	15.43	2.8	1.0	37.85	1
Record 9	0611+22	0.335	59.73	3.5	1.2	38.11	1
Record 10	0628-28	1.244	2.51	1.4	1.1	37.28	1
Record 11	0656+14	0.3849	1.600	0.40	3.6	36.7	2
Record 12	0727-18	0.5102	18.948	1.50	1.4	37.5	2
Record 13	0740-28	0.1668	16.832	1.50	1.0	37.3	2,3
Record 14	0743-53	0.2148	2.730	2.40	4.0	38.5	2
Record 15	0818-13	1.238	2.11	1.6	1.0	37.36	1
Record 16	0833-45	0.0892	124.687	0.50	29.5	37.67	10
Record 17	0834+06	1.274	6.80	0.48	1.3	36.43	1
Record 18	0919+06	0.4306	13.725	1.00	1.4	37.1	2
Record 19	0922-52	0.7463	35.477	2.70	2.5	38.2	2
Record 20	0940-55	0.6644	22.739	4.90	3.0	38.8	2

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: SAS-2 Pulsar Data
Records 94 to 113
Data File 227
Record Length 50 bytes
Input VOLSER ADC007

```
COLUMN                  1111111111222222222233333333334444444444555555555566666666667777777777888888888999
HEADING       123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123
INDEX
```

Record	94	1944+17	0.441	0.024	0.55	1.6	36.64	1
Record	95	1946+35	0.717	7.05	5.4	2.1	38.74	1
Record	96	1951+32	0.039	5.9	2.0	3.7	38.15	11
Record	97	1952+29	0.427	0.003	0.67	1.6	36.81	1
Record	98	2002+31	2.111	74.58	7.8	2.0	39.04	1
Record	99	2016+28	0.558	0.15	0.48	1.8	36.57	1
Record	100	2020+28	0.343	1.90	2.0	2.0	37.86	1
Record	101	2021+51	0.529	3.04	0.8	1.7	36.99	1
Record	102	2045-16	1.962	10.97	0.43	1.5	36.40	1
Record	103	2106+44	0.415	0.1	0.78	1.7	36.97	1
Record	104	2111+46	1.015	0.72	4.0	1.5	38.34	1
Record	105	2148+63	0.380	0.16	0.84	1.7	37.04	1
Record	106	2154+40	1.525	2.9	3.2	1.6	38.18	1
Record	107	2217+47	0.538	2.76	1.6	1.0	37.36	1
Record	108	2223+65	0.683	9.5	0.73	1.2	36.76	1
Record	109	2255+58	0.368	5.75	2.1	1.4	37.75	1
Record	110	2305+55	0.475	0.1	1.6	1.0	37.36	1
Record	111	2319+60	2.256	7.6	2.5	1.4	37.90	1
Record	112	2324+60	0.234	0.36	0.76	1.5	36.89	1
Record	113	2351+61	0.9448	16.226	2.50	1.5	38.0	2

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: SAS-2 Pulsar Notes
Records 1 to 16
Data File 228
Record Length 76 bytes
Input VOLSER ADC007

```
COLUMN
HEADING
INDEX      1111111111222222222233333333334444444444555555555566666666667777777777888888888999
      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
```

Record 1 SAS-2 Pulsars
Record 2 Notes and References
Record 3
Record 4 1. Ogelman, H.B., et al. Astrophys. J. 209, 584, (1976).
Record 5 2. Thompson, D.J, et al., Astron. Astrophys. 127, 220, (1983).
Record 6 3. Also appears on list of Ogelman et al., updated parameters.
Record 7 4. Distance uncertainty relatively large.
Record 8 5. Based on 10 bin phase plot.
Record 9 6. Upper limit based on search of periods around the nominal value.
Record 10 7. Binary pulsar.
Record 11 8. Uses parameters prior to the 1977 glitch (Manchester et al. 1978, Mon.
Record 12 Not. R. Astron. Soc. 184, 35P.
Record 13 9. Crab pulsar, positive result. Thompson et al., Astrophys. J., 213, 252
Record 14 (1977).
Record 15 10. Vela pulsar, positive result. Thompson et al., Astrophys. J., 214, L17
Record 16 (1977).

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: SAS-2 Other Data
Records 1 to 20
Data File 229
Record Length 75 bytes
Input VOLSER ADC007

```
COLUMN                  1111111111222222222233333333334444444444555555555566666666667777777777888888888999
HEADING      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
INDEX
```

Record	1						
Record	2						
Record	3	Name	Type	R.A.	Dec	>100MeV p/cm-2/s	Notes
Record	4						
Record	5						
Record	6	Lupus Loop	S	.	.	2.4E-06	1
Record	7	Monoceros Loop	S	.	.	4.4E-06	1
Record	8	Cas A	S	.	.	1.1E-06	1
Record	9	Cygnus Loop	S	.	.	1.4E-06	1
Record	10	HB 21	S	.	.	1.2E-06	1
Record	11	CTA 1	S	.	.	1.1E-06	1
Record	12	Tycho's SNR, 3C 10	S	.	.	1.1E-06	1
Record	13						
Record	14	3U 1617-15, Sco X-1	X	16.28	-15.54	0.95E-06	1
Record	15	3U 1728-24, GX 1+4	X	17.48	-24.72	4.0E-06	1
Record	16	3U 1744-26, GX 3+1	X	17.74	-26.55	2.8E-06	1
Record	17	3U 1758-25, GX 5-1	X	17.97	-25.08	2.9E-06	1
Record	18	3U 1956+31, Cyg X-1	X	19.94	+35.06	2.7E-06	1
Record	19	3U 2142+38, Cyg X-2	X	21.71	+38.09	1.2E-06	1
Record	20						

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: SAS-2 Other Data
Records 19 to 38
Data File 229
Record Length 75 bytes
Input VOLSER ADC007

```
COLUMN
HEADING          1111111111222222222233333333334444444444555555555566666666667777777778888888889999
INDEX    12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
```

Record	19	3U 2142+38, Cyg X-2	X	21.71	+38.09	1.2E-06	1
Record	20						
Record	21	Rho Oph	O	.	.	1.5E-06	1
Record	22	Corona Austrina	O	.	.	1.5E-06	1
Record	23	Jupiter	O	.	.	0.63E-06	1
Record	24	G195+5	O	.	.	4.3+/-0.9E-06	3
Record	25	A0535	O	.	.	2.0E-06	3
Record	26						
Record	27	Name	Type	R.A.	Dec	Observed periods	>100MeV p/cm-2/s	Notes
Record	28							
Record	29							
Record	30	3U 0900-40, Vela XR-1	B	.	.	3.4d	1.0E-06	2
Record	31	3U 1700-37	B	.	.	283s, 9.0d	1.0E-06	2,4
Record	32	Her X-1	B	.	.	1.2s, 1.7d 35.0d	0.5E-06	2
Record	33	SMC X-1	B	.	.	0.7s, 3.9d	0.7E-06	2
Record	34	Cen X-3	B	.	.	4.8s, 2.1d	2.5E-06	2,5
Record	35	Cyg X-1	B	.	.	5.6d	1.1E-06	2
Record	36	Sco X-1	B	.	.	0.8d	1.0E-06	1,2
Record	37	Cyg X-2	B	.	.	13.6d	1.2E-06	1,2
Record	38	Cyg X-3	B	.	.	4.8d	4.4+/-1.1E-06	2

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: SAS-2 Other Notes
Records 1 to 15
Data File 230
Record Length 70 bytes
Input VOLSER ADC007

```
COLUMN
HEADING          1111111111222222222233333333334444444444555555555566666666667777777778888888889999
INDEX      12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012
```

```
Record    1                    SAS-2 Other Sources
Record    2                    Notes and references
Record    3
Record    4 Types:
Record    5  S - Supernova Remnants
Record    6  X - X-ray Sources
Record    7  O - Other Sources
Record    8  B - Binary X-ray Sources
Record    9
Record   10  1. Fichtel, C.E., et. al., (1975).
Record   11  2. Lamb, et. al., (1976).
Record   12  3. Thompson, D.J., et. al., Atrophys. J. 213, 252 (1977).
Record   13  4. The flux limit applies to the 9.0d period.
Record   14  5. The relatively high limit is due to the source being near the edge
Record   15     of the field of view and in the galactic plane (from note 2).
```