NSSDC/WDC-A-R&S 90-18

ORIGINAL CONTAINS
COLOR ILLUSTRATIONS

THE HEAO A-1 X-RAY SOURCE CATALOG

(Wood *et al.* 1984)

Documentation for the Machine-Readable Version

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Abstract

The machine-readable version of the catalog, as it is currently being distributed from the Astronomical Data Center, is described. The catalog is a compilation of data for 842 sources detected with the U. S. Naval Research Laboratory Large Area Sky Survey Experiment flown aboard the *HEAO 1* satellite. The data include source identifications, positions, error boxes, mean X-ray intensities, and cross identifications to other source designations.

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1.0 Introduction

1.1 Description

The primary objective of the Naval Research Laboratory (NRL) Large Area Sky Survey Experiment (LASS) flown aboard the *HEAO 1* satellite was to conduct an all-sky survey for the brightest X-ray sources in the energy range 0.25 to 25 keV. The instrumentation consisted of an array of large proportional counter modules with collimators of varying fields of view and with sufficient sensitivity to detect sources as faint as 0.25 μJy at 5 keV, assuming a Crab-like spectrum (1.1 μJy at 5 keV = 1 UFU for a Crab-like spectrum). Full sky coverage was achieved in the first 6 months of the mission by continuously scanning great circles perpendicular to the Earth-Sun line. The *HEAO* A-1 catalog results from the 6-month survey and, thus, covers the whole sky.

This document describes the machine-readable version of *The HEAO A-1 X-Ray Source Catalog* as it is currently being distributed from the Astronomical Data Center (ADC). It is intended to enable users to read and process the computerized catalog without problems and guesswork. For additional information concerning the NRL LASS instrument, the data analysis procedures, characteristics and limitations of the source data, and a discussion of X-ray source classes, the source publication should be consulted. **A copy of this document should be transmitted to any recipient of the machine-readable catalog originating from the international network of astronomical data centers.**

1.2 Source Reference

Wood, K. S., Meekins, J. F., Yentis, D. J., Smathers, H. W., McNutt, D. P., Bleach, R. D., Byram, E. T., Chubb, T. A., Friedman, H., and Meidav, M. 1984, "The *HEAO* A-1 X-Ray Source Catalog," *Astrophys. J. Suppl.* **56**, 507-649.

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2.0 Structure

2.1 File Summary

The machine version of *The HEAO A-1 X-Ray Source Catalog* consists of a single file. Table 1 gives the machine-independent file attributes. All logical records are of fixed length, and, if the catalog is received on magnetic tape, it will contain blocks of fixed length (as noted below), except that the last block may be short.

The HEAO A-1 X-Ray Source Catalog (Wood *et al.* 1984)				
File	Contents	Record Format	Logical Record Length	Total Number of Logical Records
1	Catalog	FB	303	842

Table 1. Summary Description of Catalog Files: FB = Fixed length blocks (last may be short)

The information contained in the above table is sufficient for a user to describe the indigenous characteristics of the machine-readable version of *The HEAO A-1 X-Ray Source Catalog* 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.

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2.2 *Catalog (File 1 of 1)*

Table 2 gives a byte-by-byte description of the contents of the data 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); however, caution is advised when substituting format specifications, since certain fields contain character data. Default (null) values are always blanks in data fields for which primary suggested formats are given as A. Where no default values are given for numerical fields, there are always valid data present. Each data field in the catalog is separated by a blank byte; for brevity, these are omitted from the table.

Byte(s)	Units	Suggested Format	Default Value	Data
1-10	---	A10	---	Source designation (1H)
12-17	°	F6.2	---	Right ascension, α
19-20	hours	I2	---	α
22-23	min	I2	---	α
25-26	sec	I2	---	α
28-33	°	F6.2	---	Declination, δ
35-37	°	I3	---	δ
39-40	′	I2	---	δ
42-43	″	I2	---	δ
45-50	°	F6.2	---	Galactic longitude, ℓ^{II}
52-57	°	F6.2	---	Galactic latitude, b^{II}
59-64	°	F6.2	---	Ecliptic longitude, λ
66-71	°	F6.2	---	Ecliptic latitude, φ
73-78	°	F6.2	---	α_1
80-85	°	F6.2	---	δ_1
87-92	°	F6.2	---	α_2
94-99	°	F6.2	---	δ_2
101-106	°	F6.2	---	α_3
108-113	°	F6.2	---	δ_3
115-120	°	F6.2	---	α_4
122-127	°	F6.2	---	δ_4
129-133	□	F5.3	---	Area
135-141	c cm^{-2} s^{-1}	F7.4	---	Flux
143-148	c cm^{-2} s^{-1}	F6.4	---	Flux error
150-161	---	A12	---	Alternate designation (X-ray)
163-174	---	A12	---	Alternate designation (X-ray)
176-187	---	A12	---	Alternate designation (X-ray)
189-200	---	A12	---	Alternate designation (X-ray)
202-213	---	A12	---	Alternate designation (X-ray)
215-226	---	A12	---	Alternate designation (X-ray)
228-239	---	A12	---	Alternate designation (X-ray)
241-255	---	A15	---	Alternate designation (non-X-ray)
257-271	---	A15	---	Alternate designation (non-X-ray)
273-287	---	A15	---	Alternate designation (non-X-ray)
289-303	---	A15	---	Alternate designation (non-X-ray)

Table 2. Catalog Record Format

Source designation

The 1H catalog designation is composed of the prefix "1H", followed by the right ascension in hours and minutes and the declination in degrees and tenths of a degree (equinox B1950.0).

Equatorial coordinates

The source coordinates (center of error box) are given in degrees and in sexigessimal form. The subscripted right ascensions and declinations ($\alpha_{1\text{-}4}$, $\delta_{1\text{-}4}$) give the positions of the 95 percent confidence error box surrounding each source. All positions are for equinox B1950.0.

Area

The solid angle enclosed by the error box. Units are square degrees.

Flux, Error

The apparent intensity of the source in counts cm^{-2} s^{-1} for 0.5 - 25 keV. The determination of the errors is described in Section III of the source reference (Wood *et al.* 1984). As explained in that paper, an intensity of 10^{-3} counts cm^{-2} s^{-1}, which is the limiting flux in the catalog, corresponds to 3.3×10^{-12} ergs cm^{-2} s^{-1} in 2-10 keV, both for a Crab-like spectrum, meaning that 10^{-3} counts cm^{-2} s^{-1} in *HEAO* A-1 is equivalent to 0.20 UFU or to 0.22 μJy at 5.2 keV, again for a Crab-like spectrum.

Alternate identifications

The first seven fields (bytes 150-239) contain alternate designations of each source in other X-ray catalogs, while the last four fields are for non-X-ray cross identifications. Catalog identifications and references are given in Table 5 of the source paper. Cross identifications were selected according to certain criteria. For X-ray catalogs (4U, 2A, 1M, etc.), where error boxes of up to several degrees are sometimes reported, the cross reference is given whenever the other error box intersects the *HEAO* A-1 error box. Identifiers are also given in certain cases where boxes do not strictly intersect but are sufficiently close to suggest a possible relationship. The criterion used is that the separation between box centers must be less than the sum of the two largest dimensions. The designation "XRS" (not included in Table 5, but described in text) is from Amnuel, Guseinov, and Rakhamimov (1979), which summarizes much of the older X-ray literature.

Non-X-ray cross identifications were made on several bases. Whenever an identification has been firmly established, for example, by a precise position from a modulation collimator or from the *Einstein Observatory*, it is always shown, but so are many additional tentative identifications. Some of these have been suggested by earlier work (in which case the earlier literature appears either in Table 5 or Table 6 of the source reference) and the remainder have been found by searching the non-X-ray catalogs listed by the authors in their Table 5. Additional information on selection criteria will be found on page 647 of the source reference.

Whenever an "(R)" appears in the last field, additional references and comments will be found in Table 6 of the source reference. Those entries are intended primarily to provide a sketch of the basic background and current state of knowledge concerning the sources, to direct users to further literature, and to clarify ambiguities. They are not intended to be a comprehensive bibliography and many references are omitted. A special effort has been made to provide cross references to other *HEAO 1* literature wherever possible, since other *HEAO 1* observations are simultaneous with and complementary to those in the catalog.

3.0 History

3.1 Remarks and Modifications

The HEAO A-1 X-Ray Source Catalog was received on magnetic tape by the National Space Science Data Center on 20 July 1984 from Dr. Kent S. Wood of the Naval Research Laboratory. The tape was in VAX VMS BACKUP format with variable length logical and physical records, plus special control words (logical record length of each record in the first four bytes.) A program was written to convert the records to fixed length and the tape file was processed to disk storage on the IBM 3081 computer of the NASA Space and Earth Sciences Computing Center at GSFC. The format of the file was identical to Table 4 of the published catalog, meaning that there were 10 sources per group (page in the published catalog), separated by column headings and blank records, etc. All blank, text, and separator records were removed with an editor, leaving just four records per source. A format was designed that rearranged the data in logical order for a single record per source structure, and a program was written and executed to reformat the data. The advantages of the single record per source structure are that all records are entirely uniform and the catalog can be sorted and searched easily.

The original catalog contained the error box positions in both decimal and sexigessimal form. The latter data were omitted during the conversion in order to decrease the final record length, since the sexigessimal data can be reconstructed easily from the decimal positions given.

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4.0 Acknowledgments and References

4.1 Acknowledgments

Appreciation is expressed to Kent Wood for communicating about the catalog in 1986 and for supplying multiple copies of the source paper along with a color reprint of Figure 14 of the paper, which was originally published in black and white. The color print is reproduced at the end of this section. It is a display, in galactic coordinates, of all sources given in the catalog. The dot size represents source intensity, with dot radius proportional to the logarithm of the intensity reported in the catalog. I also thank Dr. Wood for reviewing and commenting on a draft version of this document.

The help of Jonathan McDowell of the Harvard-Smithsonian Center for Astrophysics is also gratefully acknowledged. Dr. McDowell requested a machine-readable copy of the catalog and made suggestions about the proposed format, including the elimination of the redundant error box positions in sexigessimal form.

4.2 References

Amnuel, P. R., Guseinox, O. H., and Rakhamimov, Sh. Yu. 1979, *Astrophys. J. Suppl.* **41**, 327.

Wood, K. S., Meekins, J. F., Yentis, D. J., Smathers, H. W., McNutt, D. P., Bleach, R. D., Byram, E. T., Chubb, T. A., Friedman, H., and Meidav, M. 1984, "The *HEAO* A-1 X-Ray Source Catalog," *Astrophys. J. Suppl.* **56**, 507-649.

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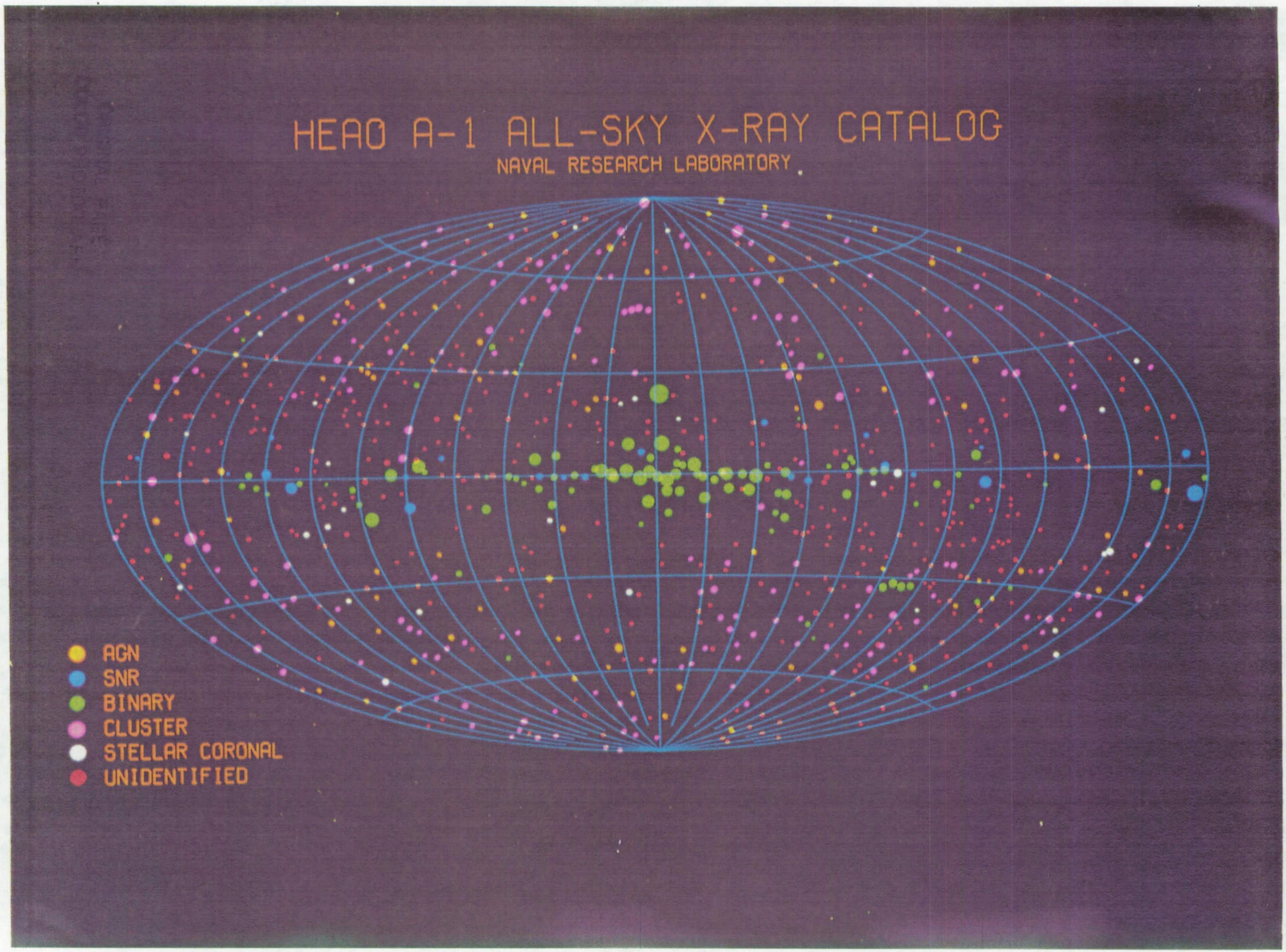
HEAO A-1 ALL-SKY X-RAY CATALOG
NAVAL RESEARCH LABORATORY
AGN
SNR
BINARY
CLUSTER
STELLAR CORONAL
UNIDENTIFIED

5.0 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 the file are illustrated. 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).

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LISTING OF RECORDS FROM DATA FILE

Data File Name: HEAO A-1 X-Ray (1984)

Records 1 to 50

Data File 225

Record Length 505 bytes

Input VOLSER ADC007

Record	1 1H0005+200	.80 00 05 12 20.01 20 00 45 108.63 -41.51 8.97 17.98 559.78 19.71 1.72 20.58 1.85 20.51 559.90 19.47 .520 .0028 .0006 4U 0005+20 HRS00058+200	Mon 535	(R)
Record	2 1H0007+751	1.91 00 07 57 75.17 75 10 11 119.97 10.81 53.40 60.96 559.79 72.59 5.75 74.05 4.22 75.95 .24 72.50 .524 .0054 .0007 4U 0000+72 HRS00000+726	CTA 1	(R)
Record	3 1H0008-746	2.21 00 08 51 -74.59 -74 53 22 506.60 -42.53 508.56 -42.69 .11 -75.28 5.25 -73.76 4.14 -75.88 1.06 -75.42 .479 .0049 .0010	STR0000-751?	
Record	4 1H0010-615	2.62 00 10 29 -61.53 -61 51 48 517.15 -64.80 558.53 -46.85 1.20 -62.02 5.81 -60.86 4.01 -61.05 1.59 -62.19 .424 .0056 .0007	STR0012-615?	(R)
Record	5 1H0011-259	2.90 00 11 55 -25.95 -25 55 46 53.50 -80.09 552.57 -22.99 1.68 -24.50 5.97 -25.50 4.11 -25.58 1.81 -24.58 .640 .0049 .0009	A14?	(R)
Record	6 1H0014-468	3.74 00 14 58 -46.81 -46 48 55 508.25 -60.24 518.95 -58.60 1.79 -47.47 5.09 -45.96 5.59 -46.12 2.51 -47.65 .532 .0019 .0004		
Record	7 1H0014+111	3.75 00 14 54 11.17 11 10 15 109.77 -60.58 7.88 8.76 2.75 10.95 4.58 11.75 4.72 11.41 2.87 10.61 .682 .0062 .0015	III Zw 2	(R)
Record	8 1H0016-257	4.16 00 16 58 -25.79 -25 47 50 45.70 -82.59 552.82 -25.16 2.92 -26.18 5.24 -25.12 5.40 -25.59 3.07 -26.46 .718 .0045 .0009	A15	(R)
Record	9 1H0017+075	4.57 00 17 28 7.56 07 21 52 109.48 -64.41 6.95 5.02 5.59 7.08 5.24 7.80 5.54 7.64 5.49 6.85 .512 .0054 .0007		
Record	10 1H0018+290	4.54 00 18 08 29.08 29 02 49 114.78 -54.06 15.95 25.80 5.45 27.78 5.47 28.64 5.65 28.51 5.61 27.44 .740 .0041 .0015	A21	(R)
Record	11 1H0018+833	4.66 00 18 55 83.51 83 18 44 122.06 20.77 75.97 65.15 7.14 83.84 5.89 82.72 2.52 82.77 5.55 83.90 .212 .0028 .0004		
Record	12 1H0022+658	5.51 00 22 02 65.86 65 51 45 120.04 1.42 42.09 53.78 5.58 65.83 5.61 65.92 5.66 65.90 5.42 65.81 .005 .1001 .0014 4U 0022+65 Ceph HR-1 HRS00224+658	Tycho SNR	(R)
Record	13 1H0024-296	6.17 00 24 41 -29.67 -29 40 11 8.54 -84.20 552.66 -29.45 5.08 -30.01 7.15 -29.10 7.26 -29.52 5.21 -30.25 .500 .0029 .0006 4U 0026-29 HRS00268-291	A33?	(R)
Record	14 1H0025+588	6.58 00 25 25 58.88 58 52 55 119.95 -3.58 57.42 49.70 4.75 58.52 7.82 59.54 8.00 59.42 4.94 58.20 .512 .0071 .0012 A 0026+59 4U 0027+59 HRS00262+595		(R)
Record	15 1H0051-197	7.78 00 51 07 -19.74 -19 44 14 95.94 -81.51 558.95 -21.15 6.75 -20.05 8.67 -19.18 8.81 -19.44 6.88 -20.29 .574 .0056 .0009		
Record	16 1H0059+408	9.96 00 59 51 40.89 40 53 21 121.14 -21.68 27.07 53.26 8.78 40.46 11.12 41.59 11.17 41.51 8.85 40.58 .168 .0085 .0006 2A 0059+411 4U 0057+59	MS1	(R)
Record	17 1H0042-095	10.50 00 42 00 -9.54 -09 20 56 117.45 -71.87 5.91 -12.74 9.56 -9.70 11.41 -8.90 11.46 -8.98 9.59 -9.79 .184 .0097 .0007 2A 0059-096 4U 0057-10	A85	(R)
Record	18 1H0043+294	10.82 00 43 17 29.41 29 24 54 121.51 -53.17 21.98 22.67 9.59 29.02 12.10 30.11 12.17 29.78 9.56 28.70 .926 .0058 .0010		
Record	19 1H0048+250	12.24 00 48 58 25.02 25 01 28 122.99 -57.58 21.86 18.16 11.50 24.04 12.89 25.40 12.99 25.21 11.59 24.64 .296 .0079 .0014	PG 0052+251?	(R)
Record	20 1H0052-015	13.22 00 52 51 -1.60 -01 55 54 125.22 -64.18 11.53 -4.69 12.70 -1.75 13.67 -1.52 13.75 -1.47 12.76 -1.57 .164 .0085 .0008 2A 0054-015 4U 0050-01 HRS00549-015	A119	(R)
Record	21 1H0053+604	13.25 00 53 00 60.49 60 29 54 125.49 -2.10 45.18 48.90 11.59 59.95 14.88 61.10 14.97 61.04 11.69 59.86 .160 .0175 .0012 2S 0053+604 4U 0054+60 1H 0053+60 HRS00537+604	Gamma Cas	(R)
Record	22 1H0054-729	13.53 00 54 07 -72.91 -72 54 59 502.47 -44.48 512.01 -64.75 11.95 -75.80 14.82 -71.99 14.98 -72.01 12.10 -73.62 .108 .0144 .0006 2S 0050-727 SMC X-5 CS300050-727 HRS00505-727		(R)
Record	23 1H0058+763	15.04 00 58 21 75.52 75 19 29 125.41 12.73 60.82 59.70 17.05 76.01 11.75 74.45 10.92 74.60 16.19 76.20 .582 .0050 .0006		
Record	24 1H0056-150	14.14 00 56 53 -15.01 -15 00 19 151.44 -77.48 6.91 -19.55 15.14 -15.50 15.05 -14.48 15.13 -14.71 15.24 -15.53 .504 .0029 .0006	A1517	(R)
Record	25 1H0057-670	14.47 00 57 53 -67.06 -67 05 41 501.64 -60.52 525.71 -62.08 12.81 -67.74 15.53 -66.25 16.04 -66.57 15.54 -67.89 .462 .0056 .0007 4U 0052-68 HRS00520-687	STR0056-670	
Record	26 1H0101-459	15.55 01 01 25 -45.99 -45 59 19 295.26 -75.22 551.67 -46.47 15.78 -44.48 16.65 -45.19 16.09 -45.48 14.05 -44.77 .852 .0056 .0009		
Record	27 1H0101-241	15.45 01 01 45 -24.19 -24 11 24 146.45 -85.70 5.88 -28.20 14.58 -24.51 16.55 -25.64 16.47 -25.86 14.50 -24.75 .500 .0021 .0004 2A 0102-242	A140	(R)
Record	28 1H0101-221	15.36 01 01 25 -22.15 -22 08 53 151.92 -84.04 4.80 -26.53 14.53 -22.48 16.28 -21.65 16.58 -21.81 14.42 -22.66 .596 .0057 .0006 2A 0102-222 4U 0105-21	A153	(R)
Record	29 1H0102-469	15.53 01 02 06 -46.91 -46 54 52 296.54 -70.52 549.45 -47.97 14.18 -47.40 16.65 -46.21 16.85 -46.40 14.58 -47.60 .496 .0050 .0008	STR0105-473?	
Record	30 1H0102-400	15.66 01 02 57 -40.07 -40 03 53 291.52 -77.02 534.85 -42.27 14.47 -40.50 16.70 -39.46 16.85 -39.62 14.59 -40.66 .534 .0058 .0006		
Record	31 1H0102+017	15.66 01 02 57 1.78 01 46 49 129.95 -60.64 15.11 -4.52 14.68 1.52 16.53 2.29 16.63 2.04 14.78 1.27 .536 .0052 .0007	A1477 IC1615?	(R)
Record	32 1H0105-762	15.76 01 05 02 -76.29 -76 17 51 501.90 -41.08 504.85 -46.48 14.09 -76.69 15.95 -75.84 16.58 -75.89 15.55 -76.74 .142 .0105 .0011		
Record	33 1H0106+534	16.71 01 06 51 52.42 52 25 28 127.55 -50.05 29.54 25.29 15.60 52.07 17.76 52.90 17.85 52.77 15.67 51.94 .280 .0055 .0007 2A 0122+538	SC51 A1567	(R)
Record	34 1H0107-115	16.87 01 07 28 -11.57 -11 22 12 159.06 -75.59 11.01 -17.10 15.88 -11.66 17.75 -10.86 17.85 -11.08 15.98 -11.88 .484 .0052 .0007	A146	
Record	35 1H0110-151	17.46 01 10 59 -15.16 -15 09 42 145.64 -74.99 11.01 -19.05 16.69 -15.49 18.57 -12.68 18.64 -12.84 16.76 -15.64 .532 .0044 .0006 4U 0154-11		
Record	36 1H0112+141	18.19 01 12 44 14.20 14 06 01 151.64 -48.10 22.15 5.92 17.17 15.86 19.08 14.62 19.20 14.53 17.30 15.57 .628 .0024 .0006	A175?	
Record	37 1H0115-148	18.46 01 15 47 -14.88 -14 52 48 148.97 -76.22 11.01 -20.95 17.47 -15.21 19.26 -14.41 19.42 -14.54 17.53 -15.55 .292 .0061 .0007 H 0111-149	A159?	(R)
Record	38 1H0115-608	18.85 01 15 18 -60.80 -60 48 05 292.72 -46.07 540.54 -62.58 15.42 -62.17 21.64 -49.05 22.05 -49.54 15.80 -62.48 1.961 .0052 .0012		
Record	39 1H0115+634	18.99 01 15 58 63.56 63 33 25 126.00 1.11 49.28 49.80 17.17 62.99 20.82 64.15 20.89 64.11 17.24 62.94 .112 .0512 .0018 4U 0115+63 CXS0115+634 HRS01152+634		(R)
Record	40 1H0120-308	20.12 01 20 29 -30.83 -30 49 41 241.58 -82.52 4.76 -55.99 19.05 -31.20 21.10 -30.28 21.20 -30.44 19.15 -31.57 .572 .0056 .0008		
Record	41 1H0121-553	20.26 01 21 05 -55.59 -55 25 16 264.45 -79.49 2.14 -40.06 19.47 -55.64 20.95 -54.98 21.05 -55.15 19.57 -55.79 .242 .0072 .0010 2A 0120-553 4U 0115-56 HRS01209-553	NGC526A	(R)
Record	42 1H0123-590	20.50 01 23 01 -59.05 -59 02 54 298.05 -67.04 539.94 -69.15 19.41 -59.51 21.52 -58.46 21.57 -58.58 19.66 -59.65 .247 .0071 .0008 2A 0120-591	Fairall 9	(R)
Record	43 1H0123-281	20.70 01 23 46 -28.14 -28 08 58 220.64 -82.49 6.79 -55.85 19.64 -28.52 21.67 -27.62 21.74 -27.76 19.72 -28.66 .504 .0048 .0006		
Record	44 1H0125+075	20.81 01 25 15 7.56 07 53 52 157.57 -64.07 22.06 -1.12 19.87 7.22 21.74 7.96 21.76 7.90 19.89 7.16 .128 .0127 .0006	MDR387	(R)
Record	45 1H0129-159	22.15 01 29 55 -15.98 -15 58 45 159.50 -75.71 14.92 -21.54 21.15 -14.27 25.05 -15.47 25.14 -15.69 21.25 -14.48 .468 .0055 .0007	A209	(R)
Record	46 1H0129+505	22.49 01 29 57 50.40 50 25 54 153.55 -61.58 52.51 19.46 21.57 50.12 25.51 50.90 25.62 50.67 21.48 29.89 .496 .0052 .0006	MS3	(R)
Record	47 1H0130+475	22.75 01 30 54 47.54 47 20 14 150.52 -14.67 40.44 54.78 21.56 46.96 24.00 47.86 24.12 47.70 21.48 46.80 .556 .0061 .0009		
Record	48 1H0132-086	23.02 01 32 05 -8.65 -08 37 46 153.60 -68.64 17.97 -16.95 22.00 -8.79 25.06 -8.05 24.05 -8.46 22.18 -9.25 .952 .0047 .0019 4U 0129-097	A217	
Record	49 1H0132+607	23.11 01 32 27 60.74 60 44 13 128.29 -1.42 49.52 46.59 21.56 60.25 24.84 61.29 24.92 61.22 21.46 60.16 .152 .0188 .0012 4U 0142+61		(R)
Record	50 1H0135-546	23.77 01 35 04 -54.64 -54 38 24 253.15 -77.77 5.92 -40.80 22.62 -55.00 24.75 -54.04 24.91 -54.27 22.77 -55.25 .520 .0054 .0007		

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LISTING OF RECORDS FROM DATA FILE

Data File Name: HEAO A-1 X-Ray (1984)

Records 795 to 842

Data File 225

Record Length 505 bytes

Input VOLSER ADC007

```
COLUMN
HEADING
INDEX
Record  795 1H2252+405 S58.09 22 52 22  40.54  40 52 53  96.78 -15.02 S59.88  45.17 S57.05  40.22 S58.96  41.09 S59.14  40.86 S57.24  59.99  .453  .0066  .0015
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Record  802 1H2245-600 S41.43 22 45 42 -60.00 -60 00 11 S27.15 -61.24 S14.00 -46.99 S59.15 -60.52 S43.28 -59.17 S45.65 -59.45 S59.48 -60.81  .850  .0040  .0009                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  803 1H2251-710 S42.85 22 51 25 -71.04 -71 02 25 S15.67 -45.56 S05.77 -66.05 S59.58 -71.79 S48.06 -69.99 S45.87 -70.24 S40.59 -72.06  .958  .0046  .0015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  804 1H2251-179 S42.92 22 51 41 -17.97 -17 57 56  46.05 -61.45 S57.57  -9.90 S41.60 -10.52 S44.11 -17.51 S44.24 -17.60 S41.75 -18.61  .817  .0055  .0012 2A 2251-179  HRS22514-178                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  805 1H2251-055 S42.99 22 51 57  -5.59 -05 33 59  68.27 -63.51 S42.94   5.56 S42.52  -5.76 S45.68  -5.24 S45.66  -5.43 S42.40  -5.95  .280  .0080  .0014 H 2252-055                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  806 1H2251+167 S42.97 22 51 53  16.80  16 47 59  86.85 -57.47 S51.17  22.15 S42.40  16.64 S43.48  17.11 S45.58  16.96 S42.47  16.49  .186  .0075  .0009 4U 2259+16   HRS22591+161                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  807 1H2251+450 S42.91 22 51 58  45.07  45 04 17 102.22 -12.75   7.70  47.06 S41.99  44.73 S45.70  45.66 S45.84  45.41 S42.14  44.58  .260  .0076  .0009                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  808 1H2252+621 S43.16 22 52 59  62.17  62 10 28 109.87   2.57  27.02  59.90 S41.78  61.56 S44.24  62.95 S44.61  62.78 S42.15  61.41  .404  .0049  .0009                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  809 1H2253-810 S43.43 22 53 43 -81.01 -81 00 51 S08.28 -55.17 S89.04 -62.68 S57.97 -81.87 S46.42 -79.94 S47.92 -80.09 S59.66 -82.06  .702  .0026  .0007                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  810 1H2254+087 S44.15 22 54 29   5.78  05 45 11  79.42 -47.15 S47.65  11.53 S42.99   5.43 S45.15   6.53 S45.26   6.07 S45.10   5.18  .442  .0049  .0010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  811 1H2258+585 S44.71 22 58 50  58.52  58 51 28 109.05  -1.06  22.95  56.86 S43.34  57.85 S46.07  59.24 S46.13  59.20 S45.40  57.80  .092  .0177  .0007 H 2509+59   HRS25086+597                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  812 1H2301+086 S45.53 23 01 23   0.68  08 40 47  83.53 -45.50 S49.96  13.76 S44.77   0.52 S45.86   0.98 S45.95   0.84 S44.85   0.38  .185  .0098  .0010 2A 2259+085  4U 2300+08   HRS22595+085                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  813 1H2305-089 S45.78 23 05 00  -0.94 -08 57 24  64.36 -68.95 S43.43  -2.64 S44.79  -9.28 S46.46  -8.50 S46.71  -8.64 S44.85  -9.41  .288  .0061  .0007 2A 2302-088  4U 2305-07   HRS23022-088                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  814 1H2305+059 S48.86 23 05 27   5.94  05 56 17  79.81 -49.63 S48.54   9.20 S44.79   5.65 S46.82   4.51 S46.94   4.23 S44.91   5.57  .670  .0054  .0011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  815 1H2307-222 S46.90 23 07 53 -22.22 -22 13 20  40.08 -66.46 S59.17 -15.28 S45.78 -22.36 S47.76 -21.56 S48.01 -22.08 S46.05 -22.88 1.144  .0015  .0007                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  816 1H2308-809 S47.00 23 08 00 -50.91 -50 54 51  17.86 -67.72 S35.47 -23.24 S45.84 -51.14 S47.95 -50.50 S48.16 -50.68 S46.05 -51.53  .856  .0017  .0006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  817 1H2315+785 S48.54 23 15 21  78.34  78 20 59 118.10  16.66  60.68  66.17 S49.53  78.80 S47.97  77.85 S47.24  77.88 S48.75  78.85  .163  .0058  .0004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  818 1H2314+285 S48.51 23 14 01  28.56  28 53 19  99.00 -29.69   1.97  50.54 S47.29  28.16 S49.58  29.19 S49.75  28.94 S47.44  27.91  .640  .0049  .0011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  819 1H2315-425 S48.97 23 15 61 -42.59 -42 25 53 S48.53 -65.06 S31.24 -54.22 S47.73 -42.82 S50.12 -41.87 S50.18 -41.96 S47.79 -42.90  .192  .0094  .0008 2A 2315-428  HRS23155-428                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  820 1H2316+257 S48.79 23 16 10  25.70  25 42 16  97.89 -52.29    .77  27.88 S46.94  25.06 S50.47  26.68 S50.67  26.52 S47.14  24.71 1.405  .0055  .0010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  821 1H2318+417 S49.58 23 18 18  41.76  41 45 25 105.45 -17.74  10.89  41.66 S48.58  41.50 S50.67  42.35 S50.79  42.20 S48.50  41.16  .344  .0058  .0005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  822 1H2319-682 S49.80 23 19 12 -68.24 -68 14 07 S25.74 -55.41 S20.72 -47.98 S47.07 -68.96 S51.94 -67.12 S52.42 -67.45 S47.53 -69.51 1.525  .0027  .0008                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                
Record  823 1H2319+188 S50.00 23 19 59  18.87  18 52 21  98.56 -58.95 S58.64  21.23 S49.42  18.71 S50.50  19.19 S50.58  19.04 S49.49  18.56  .188  .0071  .0008                                                                                                                                                                                                                                                                                                                                                                                                
Record  824 1H2320+084 S50.11 23 20 27   8.47  08 27 53  88.99 -48.22 S54.50  11.69 S49.21   8.22 S50.92   8.95 S51.02   8.71 S49.51   7.98  .485  .0050  .0011                                                                                                                                                
Record  825 1H2320+146 S50.02 23 20 05  14.60  14 36 17  95.07 -42.78 S56.78  17.54 S49.01  14.53 S50.90  15.15 S51.02  14.88 S49.14  14.06  .604  .0025  .0006                                                                                                                                                
Record  826 1H2321+585 S50.51 23 21 13  58.86  58 33 46 111.75  -2.11  26.73  54.86 S50.25  58.63 S50.53  58.59 S50.56  58.58 S50.27  58.54  .001  .5214  .0028 4U 2321+58   HRS23212+585                                                                                                                                                
Record  827 1H2322-269 S50.61 23 22 26 -26.96 -26 57 44  39.50 -70.77 S40.36 -20.98 S48.67 -27.49 S52.28 -25.95 S52.54 -26.41 S48.91 -27.96 1.854  .0050  .0026                                                                                                                                                
Record  828 1H2325+166 S50.85 23 25 23  16.55  16 53 04  98.21 -41.40 S58.40  18.78 S50.18  16.58 S51.43  16.92 S51.52  16.72 S50.28  16.18  .280  .0060  .0009 2A 2322+166  4U 2315+15   HRS23221+166                                                                                                                                
Record  829 1H2327-170 S51.92 23 27 39 -17.02 -17 01 20  57.68 -48.53 S45.78 -12.42 S50.52 -17.52 S53.37 -16.25 S53.50 -16.51 S50.45 -17.80  .976  .0053  .0011                                                                                                                                
Record  830 1H2334-864 S54.15 23 34 56 -86.41 -86 24 37 S04.50 -50.81 278.79 -45.94 S44.94 -87.21 S55.45 -85.53 S58.71 -85.58 S52.05 -87.29  .458  .0058  .0008                                                                                                                                
Record  831 1H2334+442 S54.07 23 34 15  46.26  46 15 34 110.12 -14.52  17.88  45.73 S52.96  45.86 S55.05  46.82 S55.19  46.65 S53.12  45.70  .340  .0085  .0015                                                                                                                                
Record  832 1H2337+701 S54.44 23 37 45  70.18  70 10 44 116.98   8.41  46.66  61.18 S52.67  69.64 S55.60  70.95 S56.41  70.70 S53.36  69.45  .575  .0077  .0018                                                                                                                                
Record  833 1H2345+090 S58.87 23 45 23   9.04  09 02 58  97.18 -50.25 S59.84   9.95 S54.90   8.72 S56.76   9.53 S56.83   9.56 S54.98   8.56  .568  .0056  .0010 4U 2344+08   HRS23440+086                                                                                                                                
Record  834 1H2348-281 S57.08 23 48 19 -28.15 -28 08 56  26.27 -76.57 S45.43 -24.52 S56.02 -28.51 S58.06 -27.64 S58.14 -27.78 S56.09 -28.65  .508  .0048  .0006 2A 2344-285  4U 2344-27   HRS23448-285                                                                                                                                
Record  835 1H2351-515 S57.95 23 51 42 -51.59 -51 35 10  10.99 -76.86 S44.46 -27.92 S56.79 -51.89 S58.88 -50.99 S59.06 -51.27 S56.96 -52.18  .644  .0024  .0006 4U 0009-53                                                                                                                                
Record  836 1H2352+109 S58.07 23 52 17  10.98  10 54 57 101.58 -49.26   2.64  10.80 S57.09  10.66 S58.96  11.46 S59.05  11.24 S57.19  10.43  .484  .0051  .0006                                                                                                                                
Record  837 1H2353-177 S58.57 23 53 23 -17.75 -17 46 02  67.12 -75.98 S51.27 -15.60 S57.48 -17.99 S59.16 -17.25 S59.28 -17.51 S57.57 -18.25  .512  .0060  .0015                                                                                                                                
Record  838 1H2353+471 S58.44 23 53 46  47.14  47 08 52 115.53 -14.42  22.00  42.85 S57.15  46.67 S59.62  47.75 S59.76  47.60 S57.29  46.52  .552  .0055  .0005                                                                                                                                
Record  839 1H2354+285 S58.70 23 54 49  28.56  28 33 28 108.87 -52.56  11.08  26.52 S57.66  28.16 S59.70  29.05 S59.76  28.94 S57.72  28.05  .248  .0060  .0006 4U 2345+27   A 0000+28   HRS23465+275                                                                                                                                
Record  840 1H2358-550 S58.86 23 58 25 -55.05 -55 01 40 S36.00 -76.25 S45.44 -51.54 S57.73 -55.44 S59.89 -54.51 S59.96 -54.61 S57.80 -55.54  .256  .0072  .0007 4U 0009-53                                                                                                                                
Record  841 1H2357-126 S59.41 23 57 58 -12.45 -12 57 51  81.55 -70.96 S54.57 -11.53 S57.62 -13.07   .95 -11.64  1.19 -12.17 S57.86 -13.60 2.079  .0050  .0012                                                                                                                                
Record  842 1H2358+484 S59.68 23 58 45  48.48  48 28 58 114.47 -15.29  25.98  45.50 S58.58  48.00   .88  49.10  1.05  48.94 S58.51  47.86  .568  .0053  .0005
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