

#134

HEAO 1
PHA DATA BASE
XRATES DATA BASE
77-075A-02H
77-075A-02I

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC
INFORMATION SYSTEM:

<http://nssdc.gsfc.nasa.gov/nmc/>

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

- a. Associated Documents To find associated documents you will need to know the document ID number and then click here.
<http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/>

- b. Core Catalog Materials

HEAO 1

PHA DATA BASE

77-075A-02H

This data set has been restored. There were originally twenty-six 9-track, 6250 BPI, multi-filed tapes written in Binary. There are twenty-six restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on an IBM 360 computer and the restored tapes were created on the IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	DD#	FILES	TIME SPAN
-----	-----	-----	-----	-----
DR-004424	DS-004424	D-065023	39	08/15/77 - 09/02/77
DR-004425	DS-004425	D-065024	40	09/03/77 - 09/22/77
DR-004426	DS-004426	D-065025	40	09/23/77 - 10/12/77
DR-004427	DS-004427	D-065026	40	10/13/77 - 11/01/77
DR-004428	DS-004428	D-065027	24	11/02/77 - 11/13/77
DR-004429	DS-004429	D-065028	40	11/14/77 - 12/03/77
DR-004430	DS-004430	D-065029	40	12/04/77 - 12/23/77
DR-004431	DS-004431	D-065030	40	12/24/77 - 01/12/78
DR-004432	DS-004432	D-065031	40	01/13/78 - 02/01/78
DR-004433	DS-004433	D-065032	40	02/02/78 - 02/21/78
DR-004434	DS-004434	D-065033	38	02/22/78 - 03/12/78
DR-004435	DS-004435	D-065034	39	03/14/78 - 04/02/78
DR-004436	DS-004436	D-065035	40	04/03/78 - 04/22/78
DR-004437	DS-004437	D-065036	40	04/23/78 - 05/12/78
DR-004438	DS-004438	D-065037	40	05/13/78 - 06/01/78
DR-004439	DS-004439	D-065038	40	06/02/78 - 06/21/78
DR-004440	DS-004440	D-065039	40	06/22/78 - 07/11/78
DR-004441	DS-004441	D-065040	39	07/12/78 - 07/31/78
DR-004442	DS-004442	D-065041	39	08/01/78 - 08/20/78
DR-004443	DS-004443	D-065042	39	08/21/78 - 09/09/78
DR-004444	DS-004444	D-065043	40	09/10/78 - 09/29/78
DR-004445	DS-004445	D-065044	39	09/30/78 - 10/19/78
DR-004446	DS-004446	D-065045	40	10/20/78 - 11/08/78
DR-004447	DS-004447	D-065046	40	11/09/78 - 11/28/78
DR-004448	DS-004448	D-065047	37	11/29/78 - 12/18/78
DR-004449	DS-004449	D-065048	36	12/21/78 - 01/09/79

HEAO 1

XRATES DATA BASE

77-075A-02I

This data set has been restored. There were originally twenty-six 9-track, 6250 BPI, multi-filed tapes written in Binary. There are twenty-six restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on an IBM 360 computer and the restored tapes were created on the IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	DD#	FILES	TIME SPAN
-----	-----	-----	-----	-----
DR-004450	DS-004450	D-065049	39	08/15/77 - 09/02/77
DR-004451	DS-004451	D-065050	40	09/03/77 - 09/22/77
DR-004452	DS-004452	D-065051	40	09/23/77 - 10/12/77
DR-004453	DS-004453	D-065052	40	10/13/77 - 11/01/77
DR-004454	DS-004454	D-065053	24	11/02/77 - 11/13/77
DR-004455	DS-004455	D-065054	40	11/14/77 - 12/03/77
DR-004456	DS-004456	D-065055	40	12/04/77 - 12/23/77
DR-004457	DS-004457	D-065056	40	12/24/77 - 01/12/78
DR-004458	DS-004458	D-065057	40	01/13/78 - 02/01/78
DR-004459	DS-004459	D-065058	40	02/02/78 - 02/21/78
DR-004460	DS-004460	D-065059	38	02/22/78 - 03/12/78
DR-004461	DS-004461	D-065060	39	03/14/78 - 04/02/78
DR-004462	DS-004462	D-065061	40	04/03/78 - 04/22/78
DR-004463	DS-004463	D-065062	40	04/23/78 - 05/12/78
DR-004464	DS-004464	D-065063	40	05/13/78 - 06/01/78
DR-004465	DS-004465	D-065064	40	06/02/78 - 06/21/78
DR-004466	DS-004466	D-065065	40	06/22/78 - 07/11/78
DR-004467	DS-004467	D-065066	39	07/12/78 - 07/31/78
DR-004468	DS-004468	D-065067	39	08/01/78 - 08/20/78
DR-004469	DS-004469	D-065068	39	08/21/78 - 09/09/78
DR-004470	DS-004470	D-065069	40	09/10/78 - 09/29/78
DR-004471	DS-004471	D-065070	39	09/30/78 - 10/19/78
DR-004472	DS-004472	D-065071	40	10/20/78 - 11/08/78
DR-004473	DS-004473	D-065072	40	11/09/78 - 11/28/78
DR-004474	DS-004474	D-065073	37	11/29/78 - 12/18/78
DR-004475	DS-004475	D-065074	36	12/21/78 - 01/09/79

REQ AGENT
SAR

RAND NO.
V0279

ACQ. SCIENTIST
SJK

HEAO 1

PHA DATA BASE

XRATES DATA BASE

77-075A-02H

77-075A-02I

This data set catalog consists of 52 tapes, 26 are PHA DATA and 26 are XRATES DATA. The tapes are 9-track, 6250 BPI, Binary and are multi-filed. The tapes were created on an IBM 360 computer. Some of the tapes have read errors; and as of 06/23/86 those tapes will not be replaced. The tapes with the errors are marked with an asterix. The D numbers along with the number of files and the time span are as follows:

77-075A-02H

<u>D#</u>	<u>#FILES</u>	<u>TIME SPAN</u>
D-65023	39	08/15/77 - 09/02/77
* D-65024	40	09/03/77 - 09/22/77
D-65025	40	09/23/77 - 10/12/77
D-65026	40	10/13/77 - 11/01/77
D-65027	24	11/02/77 - 11/13/77
D-65028	40	11/14/77 - 12/03/77
* D-65029	40	12/04/77 - 12/23/77
* D-65030	40	12/23/77 - 01/12/78
D-65031	40	01/13/78 - 02/01/78
D-65032	40	02/02/78 - 02/21/78
D-65033	38	02/22/78 - 03/12/78
D-65034	39	03/14/78 - 04/02/78
D-65035	40	04/03/78 - 04/22/78
D-65036	40	04/23/78 - 05/12/78
D-65037	40	05/13/78 - 06/01/78
D-65038	40	06/02/78 - 06/21/78
D-65039	40	06/22/78 - 07/11/78
D-65040	39	07/12/78 - 07/31/78
D-65041	39	08/01/78 - 08/20/78
D-65042	39	08/21/78 - 09/09/78
D-65043	40	09/10/78 - 09/29/78
D-65044	39	09/30/78 - 10/19/78
D-65045	40	10/20/78 - 11/08/78
* D-65046	40	11/09/78 - 11/28/79
D-65047	37	11/29/78 - 12/18/78
D-65048	36	12/21/78 - 01/09/79

77-075A-02I

<u>D#</u>	<u>#FILES</u>	<u>TIME SPAN</u>
D-65049	39	08/15/77 - 09/02/77
D-65050	40	09/03/77 - 09/22/77
D-65051	40	09/23/77 - 10/12/77
D-65052	40	10/13/77 - 11/01/77
D-65053	24	11/02/77 - 11/13/77
D-65054	40	11/14/77 - 12/03/77
D-65055	40	12/04/77 - 12/23/77
D-65056	40	12/24/77 - 01/12/78
* D-65057	40	01/13/78 - 02/01/78
D-65058	40	02/02/78 - 02/21/78
D-65059	38	02/22/78 - 03/12/78
D-65060	39	03/14/78 - 04/02/78
D-65061	40	04/03/78 - 04/22/78
D-65062	40	04/23/78 - 05/12/78
D-65063	40	05/13/78 - 06/01/78
D-65064	40	06/02/78 - 06/21/78
D-65065	40	06/22/78 - 07/11/78
D-65066	39	07/12/78 - 07/31/78
D-65067	39	08/01/78 - 08/20/78
D-65068	39	08/21/78 - 09/09/78
D-65069	40	09/10/78 - 09/29/78
* D-65070	39	09/30/78 - 10/19/78
D-65071	40	10/20/78 - 11/08/78
D-65072	40	11/09/78 - 11/28/78
D-65073	37	11/29/78 - 12/18/78
D-65074	36	12/21/78 - 01/09/79

Table 1

PHI VNL DEN=4	FILE NO	XRA VCL DEN=4	FILE NO	START DAY	START MSEC	STOP DAY	STOP MSEC
→ XR0050	0	→ XR0049	49	226	7211177	226	50742057
	1		1	226	51611492	227	7021462
	2		2	227	7236453	227	50244454
	3		3	227	50409294	228	7190137
	4		4	228	7221095	228	50751076
	5		5	228	50433896	229	4684207
	6		6	229	10523497	229	50177774
	7		7	229	50418538	230	7100370
	8		8	230	7231339	230	50721250
	9		9	230	50403170	231	7125020
	10		10	231	7215990	231	7034481
	11		11	231	50428781	232	7157462
	12		12	232	7200622	232	50721507
	13		13	232	50413423	233	714431
	14		14	233	7309144	233	50757101
	15		15	233	50439024	234	7147005
	16		16	234	7210865	234	50311714
	17		17	234	50423666	235	7105502
	18		18	235	7236467	235	50324789
	19		19	235	50408308	236	7190110
	20		20	236	7221109	236	50751082
	21		21	236	50802549	237	7147720
	22		22	237	7205750	237	50336631
	23		23	237	50418551	238	7190302
	24		24	238	7231352	238	50721273
	25		25	238	50403103	239	7125012
	26		26	239	7215993	239	50746874
	27		27	239	50462754	240	7150675
	28		28	240	7200635	240	50731814
	29		29	240	50413436	241	7062707
	30		30	241	7226237	241	50757117
	31		31	241	50439037	242	71470019
	32		32	242	7210878	242	50311750
	33		33	242	50423670	243	7105520
	34		34	243	7236480	243	50726801
	35		35	243	50408321	244	7190141
	36		36	244	7221121	244	50757002
	37		37	244	50433922	245	7146807
	38		38	245	7205753	245	50336641
	39		39	245	50418564	246	7190401
	40		40	246	7231354	246	50721285
	41		41	246	50403205	247	71250006
	42		42	247	12786566	247	50746887
	43		43	247	50429907	248	7150689
	44		44	248	7200649	248	50731829
	45		45	248	50413448	249	7195280
	46		46	249	7226240	249	50757130
	47		47	249	50439050	250	7160071
	48		48	250	7210891	250	50741771
	49		49	250	50423691	251	7105532
	50		50	251	7236492	251	50726813
	51		51	251	50408333	252	7190171
	52		52	252	7221134	252	50757014
	53		53	252	50433934	253	7146812
	54		54	253	7205775	253	50726856
	55		55	253	50418576	254	7100417
	56		56	254	7231377	254	50721297
	57		57	254	50403212	255	71770058
	58		58	255	7216018	255	50316827
	59		59	255	50428810	256	7150700
	60		60	256	7200650	256	50731840
	61		61	256	50413460	257	7021461
	62		62	257	7226261	257	50757122
	63		63	257	50439042	258	7146808
	64		64	258	7210303	258	50741787
	65		65	258	50423703	259	7125511
	66		66	259	7236504	259	50726825
	67		67	259	50408345	260	7190182
	68		68	260	7221146	260	50757024
	69		69	260	50433946	261	7147007
	70		70	261	7205787	261	50336649
	71		71	261	50418588	262	7146800

XR0050 ✓

XR0051 ✓

NY-0754-024, I

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262	7231349	262	5072170
262	50403229	263	717070
263	7216030	263	5072401
263	50428331	264	7150712
264	7200672	264	5073154
264	50413472	265	7100717
265	7390113	265	5035715
265	50430074	266	7140054
266	7210914	266	5021891
266	50423715	267	7158506
267	7236516	267	5072643
267	50408357	268	7130037
268	7221157	268	5072203
268	50433054	269	7140000
269	7205799	269	5033440
269	50418600	270	7100440
270	7231400	270	50321321
270	50403241	271	7175092
271	7216042	271	5034602
271	50428842	272	5034283
272	7200673	272	5033154
272	50413484	273	7185325
273	7226285	273	5035716
273	5043909	274	7150065
274	7210326	274	5034107
274	50423727	275	7105567
275	7235527	275	5032541
275	50408364	276	7100200
276	7221159	276	5034205
276	50433970	277	7144450
277	7205810	277	5073401
277	50746291	278	7100452
278	7231412	278	50721332
278	50403252	279	7175033
279	7216052	279	5034603
279	50428854	280	7150725
280	7200674	280	5033157
280	50413405	281	7185336
281	7226296	281	5035717
281	5043907	282	7140007
282	7210037	282	5034109
282	50423738	283	7105579
283	7236539	283	5032542
283	50408390	284	7180220
284	7221160	284	5034206
284	50433981	285	7144451
285	7205822	285	5073402
285	50418622	286	7100453
286	7231423	286	5032134
286	50403264	287	5070701
287	7216064	287	5073251
287	50462825	288	7150746
288	7200706	288	5033158
288	50413507	289	7140031
289	7226307	289	5035718
289	50439108	290	7120027
290	7210949	290	5034108
290	50423749	291	7105580
291	7236550	291	5032543
291	50408391	292	7180233
292	7221162	292	5034207
292	50433993	293	7144452
293	7205833	293	5073403
293	50418634	294	7100454
294	7231435	294	5032135
294	50403276	295	7175117
295	7215077	295	5018311
295	50428977	296	7150759
296	7200718	296	5033159
296	50413519	297	7185760
297	7226320	297	5075700
297	50439120	298	7170001
298	7210961	298	5034109
298	50423762	299	7105402
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299	503398483	300	7130224
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301	50418646	302	7180526
302	7231446	302	5021357
302	50403297	303	7134169
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209	50433277
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507	7104874
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508	7138537
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509	50335070
510	71807350
510	50320610
511	71334410

XP 0230

X P0239

XP 029.1

XPO2A0

[illegible]

XP0213

XR0242

XR0224

XR0244

30	30	552	50412857	553	71027
31	31	553	7225658	553	50356539
32	32	554	50438459	554	7129380
33	33	554	7251260	554	50341192
34	34	554	50423102	555	7194943
35	35	555	7235903	555	49752384
36	36	555	50490664	556	7170584
37	37	556	7220545	556	50351825
38	38	556	50433346	557	7141227
39	39	557	7205187	557	50335058
40	40	557	50417988	558	7184470
1	1	558	7230790	558	50320711
2	2	558	50402631	559	7174472
3	3	559	7215432	559	50344313
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5	5	560	8183114	560	50330955
6	6	561	50412875	561	7184714
7	7	561	7235676	561	50356538
8	8	562	50438478	562	7160399
9	9	562	7210319	562	50341200
10	10	563	50423120	563	7104061
11	11	563	7235921	563	50325882
12	12	564	50407762	564	7179403
13	13	564	7220563	564	50351484
14	14	564	50433364	565	7141244
15	15	565	7205206	565	50334087
16	16	565	50418007	566	7189888
17	17	566	7230802	566	50320720
18	18	566	50402640	567	7174450
19	19	567	7215450	567	50346331
20	20	567	50428251	568	7150132
21	21	568	7200072	568	50330074
22	22	568	50412894	569	7184735
23	23	569	7225695	569	50356574
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26	26	570	50423138	571	7104070
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28	28	571	50407780	572	7179622
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32	32	573	50418025	574	7180966
33	33	574	7230826	574	50320747
34	34	574	50402667	575	7174508
35	35	575	7215468	575	50346740
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38	38	576	50412912	577	7061873
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2	2	578	50423156	579	7104087
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4	4	579	50407799	580	7179640
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7	7	581	7205242	581	50336123
8	8	581	50418043	582	7180884
9	9	582	7230844	582	50156025
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11	11	583	7215486	583	50346358
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13	13	584	7404924	584	50240090
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20	20	587	50407817	588	7179658
21	21	588	7220619	588	50351499
22	22	589	50433419	589	7164700
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27	27	591	7215504	591	50346384
28	28	591	50428306	592	7150187
29	29	592	7200147	592	50249108
30	30	592	50412948	592	69787028
31	31	593	7225749	593	50356630
		593	50438550	594	7140431

XP0233

XP0234

XP0239

XP0240

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7220722	636	50351603
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50418185	638	7164404
7230966	638	50720887
50402807	639	7174648
7215608	639	50345189
50428409	640	7172200
7446010	640	50331131
50413051	641	7164404
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50438654	642	7164404
7210495	642	44447136
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7235097	643	50326014
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7220739	644	50351520
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50418182	646	7198823
7230983	646	50338094
50402824	647	7174648
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50423330	659	7105171
7235131	659	50324052
50407972	660	7015073
12791333	660	50351658
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50418216	662	7100057
7231017	662	50320038
50402858	663	7174648
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7220790	668	50351671
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7235165	675	50324095
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50433608	677	7164404

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XR0252

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7190176
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0	0	0	719	7297698	719	50385559
1	1	1	710	50428579	719	53447310
2	2	2	720	7200420	720	50331301
3	3	3	721	50413221	721	7185840
4	4	4	721	7256982	721	50355007
5	5	5	721	50438823	722	7167704
6	6	6	722	7210564	722	50781585
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8	8	8	723	7236266	723	50326187
9	9	9	723	50408107	724	7170948
10	10	10	724	7220909	724	50351789
11	11	11	725	50433789	725	7144501
12	12	12	725	7205551	725	50334432
13	13	13	726	50418352	726	7190193
14	14	14	726	7231153	726	50321079
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17	17	17	728	50428596	728	7776757
18	18	18	728	8398277	728	50331318
19	19	19	729	50413238	729	4388830
20	20	20	729	7225030	729	50356020
0	0	0	730	50438940	730	7142721
0	0	0	730	7251641	730	50341562
21	21	21	731	50423482	730	81921723
0	0	0	731	7194323	731	50281244
22	22	22	731	50366164	732	7178065
23	23	23	732	7219925	732	50350904
24	24	24	732	50432724	733	7163402
25	25	25	733	7201567	733	50335418
26	26	26	733	50417368	734	7199207
27	27	27	734	7580729	734	50320001
28	28	28	734	50402011	735	7173852
29	29	29	735	7214812	735	50345623
30	30	30	735	50427613	736	7109454
31	31	31	736	7240414	736	50330335
32	32	32	736	50436138	737	6344894
33	33	33	737	7235056	737	50355937
34	34	34	737	50437857	738	7144738
35	35	35	738	7209898	738	50340570
0	0	0	738	50422499	739	3180260
			739	7235300	739	50325221
			740	50407141	740	6074182

DESCRIPTION OF PHA AND XRATES DATA BASES

I. INTRODUCTION

This document provides a brief description of two data bases of the Medium and High Energy Detectors of the HEAO A-2 X-ray experiment. A brief description of the experiment is given in Section II. Section III indicates how the data bases were created. Detailed documentation of the format of the data bases is provided in the Appendices, which are described in Section III. An example of how these data bases might be used is given in Section IV.

II. The Experiment

The A-2 experiment on HEAO 1 consisted of 6 detectors which collectively were sensitive to x-rays from about 0.1 keV to 60 keV. The experiment was designed to provide systematics-free energy spectrum data for point and extended sources of x-rays. The detectors were mounted so as to observe the sky in a direction perpendicular to the satellite spin axis. With this orientation, each detector scanned a 3-degree-wide great circle of the sky every 35 minutes, and, as the spin axis precessed to point at the Sun, observed the full sky every 6 months.

The six detectors consisted of two Low Energy Detectors (LEDs), one Medium Energy Detector (MED), and three High Energy Detectors (HEDs). This report is concerned only with data from the MED and HEDs. Each detector observed two co-axial fields-of-view separately, one collimated to 3 degrees by 3 degrees full width at half maximum (FWHM) and the other either 3 degrees by 1.5 degrees or 3 degrees by 6 degrees. Each field-of-view was observed by a multi-wire gas proportional chamber with separate outputs for each field-of-view in two layers of anodes, and also for exterior layers of anodes which are used to discriminate against charged particles. The following types of data were output from each detector: engineering and analog parameters (analog status), digital experiment parameters (digital status), raw anode counting rates (housekeeping scalars), standard coincidence counting rates (discovery scalars), pulse height analyzed rates (PHA histograms), calibration pulse height analyzed events (calibration data), and data with a variety of counting rate versus time output modes (Delta-t computer). The document "HEAO 1 A-2 Experiment: The Configuration of the Hard X-ray Detectors," which has been submitted to the NSSDC, provides a history of the experiment modes.

More complete descriptions of the experiment can be found in Rothschild, 1977, and Rothschild, et al., 1979.

III. Data Bases

The data telemetered from the A-2 experiment were used to create the primary experiment data base called MAX. Secondary data bases, such as XRATES and PHA, were created from MAX to make scientific data analysis more convenient. These secondary data bases have several advantages compared to MAX. They are smaller since various data, such as data from the LEDs, have been omitted. They are easier to use because the digital and analog status parameters have been de-commutated. In addition, various quantities, including data quality flags, have been calculated and included in the data base. Together the XRATES and PHA data bases contain essentially all of the scientifically useful data from the MED and HEDs, and the data are in a more processed state than they are in the MAX data base.

The details of the XRATES and PHA data base formats and calculated quantities included in them are given in the appendices. Appendix A describes the calculations of the flags that have been added to the data bases. These flags are the electron contamination flag, the clean flag, the superclean flag, the (known x-ray) source in field of view flag, Earth occultation flags, pointing flag, digital status flag, nominal status flag, and moon in field of view flag. These flags are designed to provide the user with a easy way to determine if the data are of high quality. Appendix B describes how the parameter scan angle was calculated. Appendix C gives the detailed format of the PHA data base. Appendix D gives the detailed format of the XRATES data base.

IV. Typical Uses

The XRATES data base is used primarily to search for possible sources and to examine possible variability of detected sources. For example, a new source may be discovered and an observer wishes to learn if it was detected in hard x-rays during the HEAO 1 era. Knowing the position of the source, the observer can calculate the periods when the A-2 experiment was scanning over the source since the experiment always scanned great circles of the sky 90 degrees from the Sun. The counting rate from a selected detector could then be accumulated as a function of scan angle for times when high quality data were obtained. The accumulated data would give the flux from a strip of the sky convolved with the triangular detector response. Standard statistical tests could then be used to determine limits on the x-ray flux from the direction of the source of interest. A light curve for the source could be constructed using the background from an off-source region and the effective area of the detector for the source as a function of time. These data could, for example, be used to search for periodicities. Crude spectral information could be obtained by comparing fluxes in different discovery scalars.

More detailed spectral information requires the use of the PHA data base. Spectral data would be accumulated for appropriate

times when the source is in the detector's field of view. The resultant distribution would then be compared to that produced by convolving various model spectra with the spectral response function of the detector.

Other examples of the use of these data bases can be found in the scientific literature (e.g. Marshall, et al., 1979, and Marshall, et al., 1980).

V. Acknowledgements

Most of this document is taken from the "High Energy Astronomy Observatory A2 SKYMAP Program Description and Operator's Guide" prepared for Goddard Space Flight Center by Computer Sciences Corporation.

VI. References

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APPENDIX A - FLAG CALCULATIONSA1. ELECTRON CONTAMINATION FLAG (HECON)

When determining whether the HED1, HED2, MED, and HED3 detectors are electron-contaminated, the SKYMAP program sets a lower limit of -500 for the electron rate. SKYMAP also sets a special superclean electron rate limit for the MED detector which is then used in subroutine MAPTAP in deciding whether to accumulate superclean data for the MED detector.

The electron rate is calculated as follows:

For detectors HED2 and MED ($i=2$ and $i=3$ respectively)

$$n_i = h_{9_i} + t_1 h_{9_i}^2 - b_i (h_{8_i} + t_2 h_{8_i}^2 - c_i)$$

For detectors HED1 and HED3 ($i=1$ and $i=4$ respectively)

$$n_i = h_{9_i} + t_1 h_{9_i}^2 - b_i (h_{7_i}^2 + t_2 h_{7_i}^2 - c)$$

where h_{7_i} , h_{8_i} , h_{9_i} are the absolute values of the

seventh, eighth, and ninth housekeeping scalars for the i^{th} detector, and

$$t_1 = 2.7 \times 10^{-7}$$

$$t_2 = 7.3 \times 10^{-8}$$

b_i = constants dependent on detector

$$b_1 = .80$$

$$b_2 = 1.51$$

$$b_3 = 1.42$$

$$b_4 = .86$$

$$c_i = c_i^1 e^{(d_i - d)/1422}$$

where c_i^1 = constants dependent on detector

$$c_1^1 = 691.00$$

$$c_2^1 = 805.27$$

$$c_3^1 = 763.90$$

$$c_4^1 = 1093.22$$

d_i = day at which strength all of calibration sources were measured, with day 1 being January 1, 1977

$$d_1 = 70$$

$$d_2 = 70$$

$$d_3 = 70$$

$$d_4 = 70$$

d = current day based on January 1, 1977

(NOTE: The ten housekeeping scalers are listed on page 53 and defined on pages 30-52 of the HEAO-A2 Cosmic X-Ray Experiment Technical Manual.)

If the absolute value of housekeeping scaler 9 is greater than 30000, or the electron rate is less than -500 or is greater than the predetermined limit, the flag is set to "contaminated" for that detector. The limits for each detector are

HED1	:	1000
HED2	:	700
MED	:	1200
HED3	:	500
MED (superclean)	:	600

The preceding standards apply when there is no fill data in the seventh housekeeping scaler (when testing HED1, HED3) or in the eighth housekeeping scaler (when testing HED2, MED). If the absolute value of housekeeping scaler 9 is less than 30000 and the applicable seventh or eighth housekeeping scaler is fill data, the flag for the detector is set as having no electron contamination. The constants and limits for the MED and HEDs are the result of a study of experiment data by Dr. A. Rose of GSFC.

The format of the electron contamination flag is

2**1, 2**0 bits	=	LED1
2**3, 2**2 bits	=	LED2
2**5, 2**4 bits	=	HED1
2**7, 2**6 bits	=	HED2
2**9, 2**8 bits	=	MED
2**11, 2**10 bits	=	HED3
2**12 bit	=	MED superclean
bits = 00	=	no electron contamination
bits = 11	=	electron contamination

A2. CLEAN FLAG (HCL)

Clean status is determined for major frames having a ROM or RAM 1-10 memory format. The data for a detector is described as being "clean" if two sets of criteria are met. The first set relates to the major frame. It must contain no bit errors or block encoder errors (test flag HERRF). Fill data is accepted when due to a toggle (i.e., change in memory format), provided no error flags are set in data record 1 of the current and next major frame [test array QERR1(128)]. The second set of criteria applies to each detector. These requirements are that

1. The detector's field-of-view excludes the Earth plus 100-km atmosphere (test flag HEOCC2 as set by program FRAPPE).
2. The high voltage for the detector is on and not within two frames of turn on (test flag HVFLAG).
3. The detector's high voltage is stable; i.e., changing by less than 2.0 volts over the three major frames centered on the present data, and within 4.0 volts of a specified value (test flag HVST).
4. The detector's field-of-view excludes the calibration source rods [test flag QDSTAT(15)].

NOTE: This test applies only to the LED1, LED2, and MED detectors.

The format of the clean flag is

2**0 = LED1

2**1 = LED2

etc.

where: bit = 1 = clean

bit = 0 = not clean

A3. SUPERCLEAN FLAG (HSUPCL)

When a detector is described as "superclean" it satisfies the following set of criteria:

1. The detector is clean.
2. The detector's field-of-view excludes the Moon.
(Refer to Section on "Moon in field-of-view" in this appendix.)
3. Detector has no discovery scaler least significant bit (LSB) overflows. This is ascertained by summing four 1.28-second readouts and comparing them to the corresponding 5.12-second readout. If the two are equivalent, no LSB overflow have occurred. Since a major frame is 40.96 seconds in length, there are eight such sets of comparisons to be made for each major frame.
4. The detector's first four discovery scaler rates are constant, as determined in the following manner:
 - (a) For each 1.28-second sample, add the first four discovery scalars. There are 32 samples per major frame.
 - (b) Once step (a) is completed, calculate the mean, μ , and the variance, σ^2 .
 - (c) Data is constant if $\sigma^2 \leq 1.3\mu$.

The superclean flag is defined for each detector as follows:

2**0 = LED1

2**1 = LED2

etc.

where: bit = 1 = superclean

bit = 0 = not superclean

A4. SOURCE IN FIELD-OF-VIEW FLAG (HSFOV)

The source-in-field-of-view flag is calculated using routines developed to select data within a major frame, for which a given source is to be seen in a particular detector. The needed information for the determination is

1. The source unit vector in celestial coordinates ($\vec{S}$).
2. The spacecraft y- and z-axis celestial coordinates at the ends, inclusive, of the time of interest.
3. The time interval covered, in units of 1.28 seconds.

For a given source, a rough check is first made to see that the source is within 4° of the scan plane; i.e.,

$$|\vec{S} \cdot \vec{Z}| \leq 0.0697$$

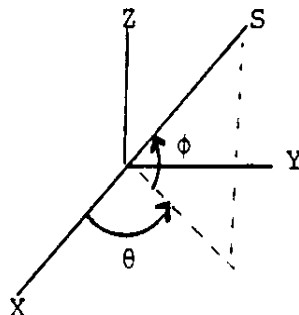
and that the source is within 20° of either the first or last y-axis, i.e., for at least one $\vec{y}$:

$$\vec{S} \cdot \vec{Y} > 0.93969$$

If either of these tests fails, the source cannot be in the field-of-view of any detector.

For sources which pass these tests, the source location (angles) in spacecraft coordinates is calculated for the two given spacecraft attitudes.

The two angles used are θ and ϕ , as seen here.



where S is the source direction, and x, y, and z are the spacecraft axes.

Using the two pairs of angles and the time interval included, the average rates of change for θ and ϕ are calculated and used to extrapolate to the actual start and end of the data accumulation interval. This is done using the fact that the first attitude data corresponds to a time 0.96 seconds after the start of a discovery scaler or PHA accumulation, while the last attitude corresponds to a time 0.32 seconds before the end of an accumulation. For a major frame calculation, the start of the major frame is 0.96 seconds before the time of the first attitude data, and the end is 0.32 seconds after the last attitude data.

For the normal scan data, these extrapolations are valid, and it should be noted that the source will move with time in the direction of decreasing θ . For each detector the following tests are made to decide if the source is observed.

1. If both values of ϕ are larger than the largest ϕ for the detector, the source is not observed.
2. If both values of ϕ are smaller than the smallest value of ϕ for the detector, the source is not observed.
3. If both values of θ are larger than allowed for the detector, the source is not observed.
4. If both values of θ are smaller than allowed for the detector, the source is not observed.

If none of these conditions are met, the source is considered to be observed. This is a conservative approach in that any data not flagged with a source observed certainly is source-free. Some data flagged for a source will have no exposure in the detector, but only a very small fraction of the time for scan mode.

The set of four tests is applied first for the large field-of-view of each detector, and if the source is observed here, the tests are repeated for the small field-of-view. Separate flags are set for each detector and each field-of-view.

The flag, HSFOV, is the logical OR of the above tests done for the set of all catalog sources within 4.3° of the nominal scan plane. The flag is a 2-byte integer with the following bit determinations.

2**2	bit = 1	if source in HED1	Large FOV
2**3	bit = 1	if source in HED2	Large FOV
2**4	bit = 1	if source in MED	Large FOV
2**5	bit = 1	if source in HED3	Large FOV
2**10	bit = 1	if source in HED1	Small FOV
2**11	bit = 1	if source in HED2	Small FOV
2**12	bit = 1	if source in MED	Small FOV
2**13	bit = 1	if source in HED3	Small FOV

A5. EARTH OCCULTATION FLAGS (HEAR1 and HEAR2)

The Earth occultation flags indicate, for each detector, whether the Earth is in the field-of-view of that detector for any part of the major frame. The first occultation flag (HEAR1) is set if any part of the Earth plus 200 km of atmosphere is in the field-of-view, while the second flag (HEAR2) is set if the Earth plus 100 km of atmosphere is in the field-of-view.

The occultation calculation is performed using the satellite altitude, satellite velocity vector, and satellite geocentric coordinates (all of which are available once per major frame), along with the spacecraft attitude data, (available 32 times per major frame). Three sample times are used in the process of setting the flags: the start time of the major frame (STOMF), STOMF plus 20.48 seconds, and STOMF plus 38.40 seconds. For each of these three times, the horizon angle from the center of the Earth as viewed from the spacecraft, is calculated for the Earth plus 200 km, and for the Earth plus 100 km. The celestial coordinates of the center of the Earth from the spacecraft are also calculated for these three times, assuming a circular spacecraft orbit and constant speed for the major frame. The Earth horizon angle is given by

$$\sin \phi = (R_o + a)/(R_o + h)$$

where ϕ is the Earth horizon angle
 R_o is the Earth radius
 a is the thickness of the atmosphere
 h is the satellite altitude

Then using the spacecraft attitude data, a calculation is made to check if any portion within the Earth horizon is in the large field-of-view of the detector at these three times. If the earth is observed for any of these

times, the data are determined to be occulted for that detector, and flag is set.

The format of the occultation flag is

HEAR1, HEAR2 = 0 no detector occulted

2**0 bit set = LED1 occulted

2**1 bit set = LED2 occulted

2**2 bit set = HED1 occulted

2**3 bit set = HED2 occulted

2**4 bit set = MED occulted

2**5 bit set = HED3 occulted

A6. POINTING FLAG (HPT)

For a given major frame, the spin axis flag indicates whether the spin period is nominal, and whether the spacecraft's spin axis is within 2° of the Sun's position at the start of the current file. The spin period is defined as nominal if the ecliptic scan angle of the spacecraft y-axis changes by 5° to 9.5° within the time period of the major frame. The ecliptic scan angle is defined by

$$\text{SCAN ANGLE} = \text{TAN}^{-1} [(\bar{Y} \cdot \bar{N}) / (\bar{Y} \cdot (\bar{N} \times \bar{Z}))]$$

where $\bar{Y}$ = actual y-axis unit vector
 $\bar{N}$ = north ecliptic pole unit vector
 $\bar{Z}$ = nominal spin axis unit vector.

The ecliptic scan angle is calculated twice in order to determine the change. For each major frame, there are 32 minor frame readouts, each containing the right ascension and declination of the spacecraft's spin axis and y-axis. SCAN ANGLE_1 is calculated using the spin axis and y-axis positions found in the first minor frame; similarly, scan angle₂ is generated by incorporating the positions in minor frames 32. If

$$5.0^\circ \leq \text{SCAN ANGLE}_2 - \text{SCAN ANGLE}_1 \leq 9.5^\circ$$

the satellite's spin period is described as nominal.

The equation for determining whether the spacecraft's spin axis is within 2° of the Sun's position at the start of the file is

$$\text{ANG} = \text{COS}^{-1} (\bar{Z} \cdot \bar{S})$$

where $\bar{Z}$ = current spin axis unit vector (derived using the spin axis position from minor frame 1)

$\bar{S}$ = unit vector from Earth to Sun

ANG = the angle between the two vectors

If ANG is less than 2° the spin axis is within 2° of the Sun.

The format of the spin-axis flag (HPT) is

bit 2^{**0} = 0 spin period is nominal

= 1 spin period is not nominal

bit 2^{**1} = 0 spin axis is within 2° of Sun

= 1 spin axis is not within 2° of Sun

When HPT = 0, the satellite is described as being in scan mode; otherwise, it is referred to as being in pointing mode.

A7. DIGITAL STATUS FLAG (HDIG)

The digital status flag is a dual-purpose flag. It indicates both the DPU and the digital status of each detector in a major frame. In order for a detector's DPU status to be "not changing", the following criteria must be met:

1. The next major frame must have the same memory format as the current major frame.
2. The detector's DPU status must be identical for the current and next major frames.

A discussion of what information comes under the heading of DPU status can be found in Section 2, pages 14-15 of the HEAO-A2 FRAPPE Program Description and Operator's Guide.

The criteria for setting the digital status portion of the flag is not as straightforward as it is based on both experiment and detector digital status. Each major frame contains a full cycle of experiment status information, but only a half cycle of detector digital status data. When the major frame count is even, the digital status section contains information on the LED1, LED2, and HED1 detectors. HED2, MED, and HED3 digital status information is contained in odd major frames. For purposes of the digital status flag, a detector's digital status is described as "not changing" when it satisfies the following criteria:

1. The experiment digital status must be constant for the previous, current and next major frames.
2. The detector's digital status must be constant from the preceding to the succeeding major frame. This may or may not include the current major frame, depending on the detector and the major frame count.

In order to perform the preceding tests, the SKYMAP program is designed to retain in core the experiment status of the previous major frame and the digital status readouts from the two previous major frames. This, combined with the three major frames in core at all time, provides five major frames of digital status information and four of experiment status.

Using the array QDSTAT(64) to represent the digital status information present in a major frame, the following elements are used in the process of setting the digital status flag:

1. For experiment digital status

QDSTAT(13-19)

QDSTAT(24)

QDSTAT(25) bits 2^{*4} through 2^{*7} only

2. For detector digital status

QDSTAT($26 + 13n$) through QDSTAT($38 + 13n$)

except: QDSTAT($32 + 13n$) bits $2^{*4} - 2^{*15}$

QDSTAT($33 + 13n$) bits $2^{*0} - 2^{*3}$ and
bits $2^{*8} - 2^{*15}$

where $n = 0, 1, 2$ and represents the three detectors whose digital status is in the current major frame.

There is a one-to-one correspondence between the array QDSTAT and the DSM word numbers appearing in the third column of the Digital Housekeeping Table on pages 127-145 of the HEAO-A2 Cosmic X-Ray Experiment Technical Manual. Each DSM word number is 1 less than the corresponding element in array QDSTAT. QDSTAT(11) and QDSTAT(12) contain telemetry data; hence, they are not defined in the Digital Housekeeping section of the manual; QDSTAT(37), QDSTAT(38), QDSTAT(50), QDSTAT(51), QDSTAT(63), QDSTAT(64) are spares and are also absent from the table.

The format of the digital status flag is

$2^{**1}, 2^{**0} = \text{LED1}$

$2^{**3}, 2^{**2} = \text{LED2}$

etc.

where, for the two bits for each detector,

the LSB represents the DPU status

the MSB represents the digital status

bit = 0 = no change

bit = 1 = changing

A8. NOMINAL STATUS FLAG [HNOM(2,6)]

The nominal status flag is used to define the overall experiment status for both Discovery Scaler and PHA/Temporal data. Only detectors in major frame formats, ROM1, ROM2, RAM1, RAM9, and RAM10 are eligible for nominal status. Detectors LED1 and LED2 are always set as "not nominal." The various DPU and digital status flags from the input MAX tape used in determining the status of a given detector are detailed in Table A-1. QDPU(6) contains the DPU status for a major frame for each of six detectors. QSTATE(25) and QSTATD(13,6), in that order, are used to reference array QDSTAT(64) containing the experiment and detector digital status as defined in the section concerning the digital status flag.

The nominal status of every detector is determined each major frame. If no digital status readouts for a detector are available within the current major frame, the detector's digital status readouts from the previous major frame are used.

The format of the Nominal Status flag HNOM(2,6) is

HNOM(1,ID) = 0 indicates that the detector is not
in a nominal Discovery Scaler state

= 1 indicates that it is

HNOM(2,ID) = 0 indicates that the detector is not
in a nominal PHA/Temporal state

= 1 indicates that it is

Table A-1. Criteria for Determining Nominal States

Part 1: Criteria Common to Both the Nominal Discovery Scaler State
and the Nominal PHA/Temporal State

<u>Definition</u>	<u>Member</u>	<u>Required Value of Each Bit</u>	<u>Restrictions (if any)</u>
HED1 Propane-Veto Pressure	QSTATE(18) bit 1	0	HED1 only
HED2 Propane-Veto Pressure	QSTATE(18) bit 0	1	HED2 only
MED Calibration Source Rod Analyze V2 (C28)	QSTATE(15) bit 3	0	MED only
HED3 Propane-Veto Pressure Analyze Alpha (C28)	QSTATD(3,ID) bit 7	0	MED only
High Voltage Power	QSTATE(19) bit 7	0	HED3 only
Test Pulse Generator Power	QSTATD(8,ID) bit 0	0	HEDs only
Low Voltage Detector Power	QSTATD(1,ID) bit 4	1	
Layer 1 (Right and Left) and Layer 2 (Right and Left) Thresholds	QSTATD(1,ID) bit 5	0	
Veto Layers 1 and 2 Thresholds	QSTATD(1,ID) bit 6	1	
Layer 2 Event Definition	QSTATD(2,ID) bits 0-7	0	
Layer 1 (M1) and Layer 2 (M2) Thresholds	QSTATD(3,ID) bits 0-3	0	
PHA Mode (C27)	QSTATD(3,ID) bits 4-6	0	
	QSTATD(5,ID) bits 0-3	0	
	QSTATD(5,ID) bit 4	0	

Table A-1 (continued). Criteria for Determining Nominal States

Part 2: Additional Tests for Determination of Nominal Discovery Scaler State

<u>Definition</u>	<u>Member</u>	<u>Required Value of Each Point</u>
Layer 2 PHA window definition Discovery Scalers 7 and 8	QSTATD(4,ID) bits 4-5	0
definition Discovery Scalers 5 and 6	QSTATD(6,ID) bit 3	1
definition	QSTATD(6,ID) bit 7	1
Layer 1 PHA window definition	QSTATD(8,ID) bits 4-7	0
Discovery Scaler MSB readout time	QDPU(ID) bit 3	0

Part 3: Additional Requirements for Determination of Nominal PHA/Temporal State

a) If the major frame is in ROM2:

Delta T computer mode	QDPU(ID)	bits 4-5, and 7	1
Multiscaler Rate Combination	QSTATD(9,ID)	bits 0-3	0

b) If the major frame is in ROM1, RAM10 (detectors HED1, MED, HED3), or RAM9 (detector HED2):

Layer 2 PHA window definition	QSTATD(4,ID)	bits 4-5	0
Layer 1 Event definition	QSTATD(5,ID)	bits 5-7	0
Dead Time Select	QSTATD(7,ID)	bit 1	0
Layer 1 PHA window definition	QSTATD(8,ID)	bits 4-7	0
PHA LSB/MSB readout times	QDPU(ID)	bits 1-2	0

c) If the major frame is in RAM1, RAM10 (detector HED2), or RAM9 (detectors HED1, MED, HED3):

The criteria in a) and b) with the exception that for RAM1 (all detectors) and RAM10 (detector HED2), QDPU(ID) bits 1-2 must each equal one.

A9. MOON-IN-THE-FIELD-OF-VIEW FLAG

One of the conditions for superclean data is that a given detector not be occulted by the moon during the major frame.

For each major frame, the vector from the Earth to the Moon [ODATA(13) - ODATA(15)] and the vector from the Earth to the spacecraft [ODATA(1) - ODATA(3)] are given. From these two vectors, the vector from the spacecraft to the Moon is derived. The vector is then expressed in spacecraft coordinates by using the spin-axis and y-axis readouts in minor frame 1 of the current major frame.

(The components of the resulting vector from the spacecraft to the Moon are stored in members XM, YM, and ZM on the output PHA and XRATES tapes.) If the absolute value of the angle the Moon forms with the scan plane is greater than 4° , no detector is occulted by the Moon during the major frame. Otherwise, each detector is tested to see if the Moon occults its large field-of-view. If it does, a flag is set to indicate that the detector is occulted by the Moon.

Spacecraft coordinates for the vector from the spacecraft to the Moon are recalculated and the scan angle and field-of-view tests are repeated. The spacecraft spin-axis and y-axis positions from minor frame 1 of the next major frame are used if the next major frame is not in RAM0 and if the current major frame does not contain fill data. If either of the latter two cases occur, data from minor frame 32 (for RAM0) or minor frame 31 (for fill data) are used to redefine the vector from the spacecraft to the Moon. Data from minor frame 32 are also used when processing the last major frame on a MAX volume.

APPENDIX B - SCAN ANGLE [ESCAN(32)] CALCULATIONS

Calculated for each major frame, the array ESCAN(32) contains (in degrees) the angles the detector axis forms with the ecliptic plane based on the 32 readouts per major frame of the y-axis position. Each scan angle value is derived using the following equation:

$$\text{Scan angle} = \text{TAN}^{-1} [(\bar{Y} \cdot \bar{N}) / (\bar{Y} \cdot (\bar{N} \times \bar{S}))]$$

where $\bar{Y}$ = actual y-axis unit vector
 $\bar{N}$ = north ecliptic pole unit vector
 $\bar{S}$ = unit vector from Earth to Sun (This vector represents the Sun's position at the start of the current file.)

APPENDIX C - PHA DATA BASE

INTRODUCTION

The PHA data base is a condensed version of the MAX data base containing PHA and discovery scaler data. Only major frames from MAX that are not in engineering format are included. Each PHA physical record contains data that was accumulated in one major frame (40.96 seconds) except the digital status which completes a cycle in two major frames, and the analog status which completes a cycle in eight major frames.

TAPE CHARACTERISTICS

TAPE ATTRIBUTES:

9-track, 1600 bpi when produced by program SKYMAP.
IBM S/360 system procedure TAPESCAN is then used
to condense the PHA tape to 6250 bpi.

FILE STRUCTURE:

Each production PHA file corresponds to approximately 12 hours of data. If no acceptable data exists for a 12-hour interval, no PHA file exists for the interval. Each tape contains no more than 40 files.

RECORD FORMAT:

Fixed length, blocked.

RECFM=FB,LRECL=5952, BLKSIZE=5952

DATA QUALITY

There are three checks made on the quality of data. A block encoder error indicates a transmission error from s/c to ground. A bit error indicates that 1 or more bits within a major frame have been improperly received. Fill data indicates that data for that minor frame is missing.

An overall data quality flag (HQUAL) is set to indicate if there were any block encoder errors, bit errors, or fill data anywhere in a major frame. Additionally, the data itself is made negative if there were bit errors, and the data is replaced with hexadecimal "aaaa" if there was fill data.

COMMON BLOCK DESCRIPTION

The COMMON block PHAOUT can be used to reference the PHA data base. A description of the variables follows:

<u>Variable</u>	<u>Type</u>	<u>Description</u>
LDAY	I*4	Day of major frame
LMSEC	I*4	Millisecond of major frame
HECON	I*2	Electron contamination flag 2**1, 2**0 = LED1 limit=600 2**3, 2**2 = LED2 limit=600 2**5, 2**4 = HED1 limit=1000 2**7, 2**6 = HED2 limit=700 2**9, 2**8 = MED limit=1200 2**11, 2**10 = HED3 limit=500 2**12 = MED limit=600 superclean bits=00=electron rate .le. limit bits=11=electron rate .gt. limit
HVF	I*2	High voltage flag 2**0 = LED1 2**1 = LED2 2**2 = HED1 2**3 = HED2 2**4 = MED 2**5 = HED3

<u>Variable</u>	<u>Type</u>	<u>Description</u>
		bit=0=high voltage on and not within two frames of turn on
		bit=1=high voltage off or within two frames of turn on
HSPAX	I*2	Spin axis index (1-720) Spin circle is divided into 720 half-degree bins
HFRM	I*2	Data format index If in ROM, = ROM number If in RAM, = RAM number +10
HMF	I*2	Major frame counter
HQUAL	I*2	Overall data quality flag 2**0 = block encoder error 2**1 = bit error 2**2 = fill data bit=0=no error, bit=1=error NOTE: HQUAL = -4 when there is a gap in time between the present record and the next record.
HCL	I*2	Clean flag 2**0 = LED1 2**1 = LED2 etc. bit=0=not clean, bit=1=clean
HSUPCL	I*2	Superclean flag 2**0 = LED1 2**1 = LED2 etc.

<u>Variable</u>	<u>Type</u>	<u>Description</u>
		bit=0=not superclean bit=1=superclean
HVANOM	I*2	High voltage anomaly flag 2**0 = LED1 2**1 = LED2 etc. bit=0=stable bit=1=unstable
HASUN	I*2	SAA/NPA anomaly flag - also sunlight flag 2**0 = SAA/NPA bit=0=no SAA/NPA bit=1=SAA/NPA 2**1 = sunlight bit=0=no sunlight bit=1=sunlight
HJET	I*2	Number of jet firings during major frame
HSFOV	I*2	Source in field-of-view flag 2**0 = LED1 2**1 = LED2 etc. bit=0=no source in large field- of-view bit=1=source in large field- of-view

<u>Variable</u>	<u>Type</u>	<u>Description</u>
		2**8 = LED1 2**9 = LED2 etc. bit=0=no source in small field-of-view bit=1=source in small field-of-view
THETA	R*4	Rotation angle from S/C y-axis about S/C z-axis to center of earth ($-\pi$ to $+\pi$)
PHI	R*4	Angle from S/C z-axis to center of earth (0 to π) NOTE: Together THETA and PHI define a vector from S/C to center of Earth in S/C coordinates.
HEAR1	I*2	Earth occultation flag (including 200 km atmosphere) 2**0 = LED1 2**1 = LED2 etc. bit=0=no occultation bit=1=occultation
HEAR2	I*2	Earth occultation flag (including 100 km atmosphere) 2**0 = LED1 2**1 = LED2 etc. bit=0=no occultation bit=1=occultation

<u>Variable</u>	<u>Type</u>	<u>Description</u>
HPT	I*2	Spin axis flag 2**0 bit = 0 spin period nominal = 1 spin period not nominal 2**1 bit = 0 spin axis is within 2° of Sun = 1 spin axis is not within 2° of Sun
HDIG	I*2	Digital status flag 2**1, 2**0 = LED1 2**3, 2**2 = LED2 etc. where the two bits per detector represent LSB - DPU status MSB - digital status bit=0=no change bit=1=changing
STIME	R*4	Solar time (radians)
GLON	R*4	Geodetic longitude of s/c (rad)
GLAT	R*4	Geodetic latitude of s/c (rad)
ECNTR	R*4	Distance from s/c to Earth center (km)
AMACL	R*4	McIllwain L parameter
XB	R*4	{ x,y,z components of magnetic field in s/c coordinates
YB	R*4	
ZB	R*4	

<u>Variable</u>	<u>Type</u>	<u>Description</u>
XM	R*4	{ x, y, z components of Moon position in s/c coordinates (vector from Spacecraft to Moon)
YM	R*4	
ZM	R*4	
IDUM2	I*4	Spare
QSTATE(25)	L*1	Experiment status words
QSTATD(13,6)	L*1	Digital status words for six detectors
QDUM1	L*1	Spare
QSTATATA(32,8)	L*1	Analog status words (32 words per major frame; 8 major frames to complete a cycle.)
QSTATC(6)	L*1	DPU status for each detector
HDUM1	I*2	Spare
SARA(32)	R*4	Spin axis right ascension (radians; 1950)
SADEC(32)	R*4	Spin axis declination (radians; 1950)
YARA(32)	R*4	Y axis right ascension (radians; 1950)
YADEC(32)	R*4	Y axis declination (radians; 1950)
ESCAN(32)	R*4	Scan angles based on nominal spin axis and true y-axis
IHOUS(10,6)	I*4	Housekeeping scalers (10 scalers, 6 detectors)

<u>Variables</u>	<u>Type</u>	<u>Description</u>
HDISC(8,8,4)	I*2	Discovery scalers (eight 5.12 second sums, 8 scalers, detectors 3-6)
HPLSB(128,3,4)	I*2	PHA 10.24 second readouts (128 channels, 3 10.24 second LSBs, detectors 3-6) for data formats ROM1, RAM9, RAM10. However, there are no 10.24 second LSB readouts for the HED2 detector when in data format RAM10. This array will be zero when in data formats ROM2 and RAM1 - 8.
HPSUM(128,4)	I*2	PHA 40.96 second readouts (128 channels, detectors 3 - 6) as follows: ROM1, RAM9, RAM 10: 40.96 second sums (only 40.96 second LSBs for HED2 in RAM10) ROM2: Array will be zero; there are no PHA data when in ROM2. RAM1 - 8: 40.96 second LSBs

NOTE: The criteria for setting the values of HECON, HCL, HSUPCL, HSFOV, HEAR1, HEAR2, HPT, HDIG, and ESCAN(32) are discussed in Appendices A and B.

Total Length: 5952 bytes

APPENDIX D - XRATES DATA BASE

INTRODUCTION

The XRATES data base is a condensed version of the MAX data base containing mainly discovery scaler data. Only major frames from MAX that are not in engineering format are included. Each XRATES physical record contains data that was accumulated in one major frame (40.96 seconds) except the digital status which completes a cycle in two major frames, and the analog status which completes a cycle in eight major frames.

TAPE CHARACTERISTICS

TAPE ATTRIBUTES:

9-track, 1600 bpi when produced by program SKYMAP.
IBM S/360 system procedure TAPESCAN is then used
to condense the XRATES tapes to 6250 bpi.

FILE STRUCTURE:

Each production XRATES file corresponds to approximately 12 hours of data. If no acceptable data exists for a 12-hour interval, no XRATES file exists for the interval. Each tape contains no more than 40 files.

RECORD FORMAT:

Fixed length, blocked.
RECFM=FB,LRECL=5048,BLKSIZE=5048

DATA QUALITY

There are three checks made on the quality of data. A block encoder error indicates a transmission error from s/c to ground. A bit error indicates that 1 or more bits within a minor frame have been improperly received. Fill data indicates that data for that minor frame is missing. An overall data quality flag (HQUAL) is set to indicate if there were any

block encoder errors, bit errors, or fill data anywhere in a major frame. Additionally, the data itself is made negative if there were bit errors, and the data is replaced with hexadecimal "AAAA" if there was fill data.

COMMON BLOCK DESCRIPTION

The COMMON Block TAPOUT can be used to reference the XRATES data base. A description of the variables follows:

<u>Variable</u>	<u>Type</u>	<u>Description</u>
LDAY	I*4	Day of major frame
LMSEC	I*4	Millisecond of major frame
HECON	I*2	Electron contamination flag 2**1, 2**0 = LED1 limit=600 2**3, 2**2 = LED2 limit=600 2**5, 2**4 = HED1 limit=1000 2**7, 2**6 = HED2 limit=700 2**9, 2**8 = MED limit=1200 2**11, 2**10 = HED3 limit=500 2**12 = MED limit=600 superclean bits=00=electron rate .le. limit bits=11=electron rate .gt. limit
HVF	I*2	High voltage flag 2**0 = LED1 2**1 = LED2 2**2 = HED1 2**3 = HED2 2**4 = MED 2**5 = HED3 bit=0=high voltage on and not within two frames of turn on bit=1=high voltage off or with- in two frames of turn on

<u>Variable</u>	<u>Type</u>	<u>Description</u>
HSPAX	I*2	Spin axis index (1-720) Spin circle is divided into 720 half-degree bins
HFRM	I*2	Data format index If in ROM, = ROM number If in RAM, = RAM number +10
HMF	I*2	Major frame counter
HQUAL	I*2	Overall data quality flag 2**0 = block encoder error 2**1 = bit error 2**2 = fill data bit=0=no error bit=1=error NOTE: HQUAL= -4 when there is a gap in time between the pre- sent record and the next record.
HCL	I*2	Clean flag 2**0 = LED1 2**1 = LED2 etc. bit=0=not clean bit=1=clean
HSUPCL	I*2	Superclean flag 2**0 = LED1 2**1 = LED2 etc. bit=0=not superclean bit=1=superclean

<u>Variable</u>	<u>Type</u>	<u>Description</u>
HVANOM	I*2	High voltage anomaly flag 2**0 = LED1 2**1 = LED2 etc. bit=0=stable bit=1=unstable
HASUN	I*2	SAA/NPA anomaly flag - also sunlight flag 2**0 = SAA/NPA bit=0=no SAA/NPA bit=1=SAA/NPA 2**1 = sunlight bit=0=no sunlight bit=1=sunlight
HJET	I*2	Number of jet firings during major frame
HSFOV	I*2	Source in field-of-view flag 2**0 = LED1 2**1 = LED2 etc. bit=0=no source in large field- of-view bit=1=source in large field- of-view 2**8 = LED1 2**9 = LED2 etc.

<u>Variable</u>	<u>Type</u>	<u>Description</u>
		bit=0=no source in small field-of-view
		bit=1=source in small field-of-view
THETA	R*4	Rotation angle from S/C y-axis about S/C z-axis to center of Earth ($-\pi$ to $+\pi$)
PHI	R*4	Angle from S/C z-axis to center of Earth (0 to π)
		NOTE: Together THETA and PHI define a vector from S/C to center of Earth in S/C coordinates.
HEAR1	I*2	Earth occultation flag (including 200 km atmosphere)
		2**0 = LED1
		2**1 = LED2
		etc.
		bit=0=no occultation
		bit=1=occultation
HEAR2	I*2	Earth occultation flag (including 100 km atmosphere)
		2**0 = LED1
		2**1 = LED2
		etc.
		bit=0=no occultation
		bit=1=occultation

<u>Variable</u>	<u>Type</u>	<u>Description</u>
HPT	I*2	Spin axis flag 2**0 bit = 0 spin period nominal = 1 spin period not nominal 2**1 bit = 0 spin axis is within 2° of Sun = 1 spin axis is not within 2° of Sun
HDIG	I*2	Digital status flag 2**1, 2**0 = LED1 2**3, 2**2 = LED2 etc. where the two bits per detector represent LSB - DPU status MSB - digital status bit=0=no change bit=1=changing
STIME	R*4	Solar time (radians)
GLON	R*4	Geodetic longitude of s/c (rad)
GLAT	R*4	Geodetic latitude of s/c (rad)
ECNTR	R*4	Distance from s/c to Earth center (km)
AMACL	R*4	McIllwain L parameter
XB	R*4	{ x, y, z components of magnetic field in s/c coordinates
YB	R*4	
ZB	R*4	

<u>Variable</u>	<u>Type</u>	<u>Description</u>
XM	R*4	{ x, y, z components of Moon position in s/c coordinates (is the vector from spacecraft to Moon)
YM	R*4	
ZM	R*4	
IDUM2	I*4	Spare
QSTATE(25)	L*1	Experiment status words
QSTATD(13,6)	L*1	Digital status words for six detectors
QDUM1	L*1	Spare
QSTATATA(32,8)	L*1	Analog status words (32 words per major frame; 8 major frames to complete a cycle.)
SARA(32)	R*4	Spin axis right ascension (radians; 1950)
SADEC(32)	R*4	Spin axis declination (radians; 1950)
YARA(32)	R*4	Y axis right ascension (radians; 1950)
YADEC(32)	R*4	Y axis declination (radians; 1950)
IHOUS(10,6)	I*4	Housekeeping scalars (10 scalars, 6 detectors)
HDISC(40,8,6)	I*2	Discovery scalars (40 LSBs and sums; i.e., 8 readouts per major frame of 5 discovery scalars: four 1.28-seconds one 5.12-seconds 8 scalars, 6 detectors)

NOTE: The criteria for setting the values of HECON, HCL, HSUPCL, HSFOV, HEAR1, HEAR2, HPT, and HDIG are discussed in Appendix A.

Total Length: 5048 bytes

FIRST OUTPUT FILE ON JJ0021 IS 0001 -- LABEL=(0001,BLP)

P,V* #A\$ A B D D A AO?S 8R3 F F B AS< 8(W M2D!YHA&0H \$P2 '-B O DG"7DQ* E-DD B K!S DDDD 'Q&.P1 .+HU H
000E05E61C03010000000000000000C1264FD70000000042F047CE425B41A041B0C15743284182487BC59A458C00000051620000007D1817084820040000000000
000307B5C00B1B01020004040000010016F2089306060200125C08D60A424A8810080B7C0D02060D47F748CA5F440000202A2A444400D80B710BE840000000000080
T Q,V* #A\$ A C D D 9"AP'0 a.(B AS?7 C-" WMQD!V%A8,+ MV) QB NL7D8!2DZHGE-#% C DDDD<<<< 'Q&.P1 :0- H
000E05861C0301000000000000000033C1F74F840000000426B481F421941A641A0C1A5441041534797C60C457E0000000004444007D18170B1D40040000000000
000308B5C00B1B01030004040000009F17D00CB0000020012F703FF06484A5C10BE045D0082053748AC49875FBC0000304444CCCC00D80B710A6F00000000000080
TAPEMARK NO 0001 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000031

T H,V*0 #A\$ A ~ D D B FFAPY"A; G AMO#A2M="4-ZD!L,A88="X 6 C66"V.FD*-D#<CE;K9 - UUUUXXXX 'Q&.P1 AL 9 H
000E08061F0301000100000000000000C1A3412C00000000411B4313B3DE419641D73AA0C4BB3640C3A14708451700001066662222007D181708D4F0040000000000
000308B5C00B1C010F00040400020066178F1ED700000000146B1C4EF4F94A3B100EF7AA0366F5B64B0F4BC35E290000F04444CCCC00D80B71013090000000000080
T I,V* #A\$ A / D D B A IAS2=A) 6 ANB#A'Q-"; ,D!OXA8Y =R Y D'7"G'RDQ20D4>?E; ,R / NN))VV 'Q&.P1 !.L2 H
000E08461C0301000200000000000000C13F412B00000000414743513522419D41EAB12EC47F34F9C13F48E6452900002011552266007D1817094570040000000000
000309B5C00B1C0101000404000201091B2E1DA600000000152B1D8FFEED4A6C108DE9D804D7F7D948204AEF5EB900001055DD55DD00D80B710AB320000000000080
TAPEMARK NO 0002 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000412

TCA,W8 #A) A U D D O AF!AOX> QA, AU-FA563 1.AD!W=AJG ?*V &53 00-CHV-EJ% E;C3 U ++++++ 'Q&.P1 2/4' H
000E00261C0301000200000003000000C3264D060000000042DC43B3438C41A7414242DE41B7433ACEAEC16E454F00002000000000007D18170FE330040000000000
000331B6000B1D01040004040000016F107E081B0000000014F6156301B14A6E117A0FC500530000365051CD5E33000040EEEEEEEE00D80B710214D0000000000080
TCA,W* #A) A V D D A1?Z \$L4 AUV=A6)6 3FD!W#AJ#P 2.*3I# ?MLD,29EJ.FE;C6 V ++++++ 'Q&.P1 M*(3 H
000E00C61C0301000200000000000000C3A64D5F00000000426F4353427441A3413D43453B4B4215C277C108454F00002000000000007D18170DD4E0040000000000
000331B6C00B1D01050004040000000011F90B3400000000145E16D60D364A6B11B702BCF39B0F434B2951B65E36000050EEEEEEEE00D80B7104CD30000000000080
TAPEMARK NO 0003 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000511

U ??XLO |A; A V O O "A1X+AKR+ A-7AA<A2 07FD!P'AP=> 6CA :F= %NEM #D:S-E\$L> V ++++++ 'Q&.P1 3!W(H
000E06661F0001000200030300000033C3A041D40000000041B4440345BC4197413AC38C3C342AD41A34BA2459200002000000000007D18170B9E80040000000000
00040FF7300F1E0105000000000000FF117E129E000000001F711C1206764A7D17EE06310A6E0DC554AB4A205B3E000050EEEEEEEE00D80B7103A6D0000000000080
U O!XLO .A; A W 4 4 A""A1.DAK 7 A-.WA<8 RSYD!P.APHX 8-P 4?- 3'QEO= D<RVE\$PN W 00000000 'Q&.P1 (C,L H
000E07061F00010002000303000000334388412300000000424A44BE4526419441C2C3DDC3E143B5413E48DA459900002011111111007D18170CCA90040000000000
000400F7300B1E0106000404000001FF11B412D70000000010B61C8D09284A7B178708F704FF03D856EA4C955B750000606666666600D80B710D3B3000000000080
TAPEMARK NO 0004 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000421

UCI|YL #A- A > D D B A AI IATBB I1 K9T M4!D!L(AK,N ?#="92- %:2D4\$HE-#ZE00F > GGGG| | | 'Q&.P1 K=0 H
000E00061C030100020000000000000432842C4000000004E83457AC1B541944121C2BF3FF542FF47184232453400002000004444007D181708D390040000000000
000439F8300B1F010E0004040002010011A9132200000000A910293044A4A3D12B50FBF92F0CAC44B850B956060000E07777FFFF00D80B71002E60000000000080
UCI?YL .A- A ? 4 4 B A?9IAT;W 343 *X! &XQD!K7AJ2V 10T MA! ZEID1JSE;XREO.Y ? PPPP~ ~ ~ 'Q&.P1 NMA# H
000E00A61C000100020003030000000042F8421E000000004F3745A1C12B419341FAC35A41C942C44BD241E5454200002055551111007D181709D030040000000000
000439F8300B1F010F00040400020001F9913E60000000003430C7A00C04A2711250163041A095941125EC956B80000F07777FFFF00D80B710541B0000000000080
TAPEMARK NO 0005 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000357

V /LZL3 |A- A L O O A""A% 2A&PS 6 A/R=A6K7 S?d!PZAQ6+ -XN D-2 : ,JES+:E/.QELKD L WWWWWW 'QM.P1 J&Z! & H
000E0AD61F0002000100030300000033C28F41DA0000000A429F44DB46EC419E4138C1E5C49B43A5414B420D455400001022222222007D18170D5A50050000000000
00050139330F1001030000000000001FF1C021072000000AA119E1A2702FA4A79186E0F7504F20AB15BEA51B853240000306666666600D84B710109AQ000000000080

TAPEMARK NO 0035 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000546

4 0?A C A2 A 9 FAN>OAKJ4 F F A--8AI-7=0;LD!LSAJOX ;2% 2*>" D0E2.5D-:>EI' >>>>>>> 'Q&NP1H9#55A & 4 H
000F07A8000003000200030000000000C1E941D700000000419B4463B759419E41924132C3DA388B4387CDB6C43C00002066666666007D1D170F3F70050000000000
000400F103001C010D0009000000000615E6121406060001FF81907E0E34A32116C0ECC0CCE0405CB54FAE59D00000D0EEEEEEEE00D8057189B551000000A00080

4 11A A2 A > " = AQA!AK1M A-M|A4 1"|/=D!K AJMJ MZ" "1"DG E:4KE0.UEH=: > GGGG|'|' 'Q&NP1H/C;XA & 4 H
000F0748000003000200030300000000C129417100000000425C4403B4AF419441954167C3FF388E4339C142C4FF00002000004444007D1D1702C560050000000000
000401F100001C010E000F0E00000000186A121400000000104F1A01FF1E4A201141049F0F1DF47D5A4256B458EA0000E07777FFFF00D80571813E71000000A00080

TAPEMARK NO 0036 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000194

4CA|B&C A' A Y " 0 B "AJ8;A>G, 2X A*4P /RHD!)?AM>N /B; U/V :2=D**QEE4|ED&2 Y ;;;;;;;;;; 'Q&NP1HB>-0A & 4 H
000F00881C0003000200030300000033C1B9428A0000000043E2454D4654419A4169C201C266C3B34795C404C41F00002055555555007D1D1700AA300500000000000
000431F203001D0108000F00000200FF118E1E7B000000000C7A1CA701984ADF14E5012E04150A2E4BC855AF540C000080EEEEEEEE00D8057182E001000000A00080

4CB?B&C A' A Z " 4 B A|"APF4A>HX "DA)G7 S5(D!;/AMZ: UTW S=| 8N.DK6 EE<-ED.R Z ;;;;;;;;;; 'Q&NP1HXP:A & 4 H
000F00281C0003000200030300000003C14F42460000000043B4450F46B44192412BC2E6C2BCC3D0C174C44EC44500002055555555007D1D170E91F00500000000000
000432F203001D0109000F04000201FF17641E87000000000FB41D77025D4AE1149A043602EF085B426055C054B9000090EEEEEEEE00D805718797A1000000A00080

TAPEMARK NO 0037 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000568

5 *3C A= A & D # K B AOC.AQNL F F ENA!7VA 'M L,|D!J*AJD6 -HX =S\$=<\$RE4.ZEN'UE# 6 & ;;;;;;;;;; 'Q&NP1H*0JGA<& 4 F H
000F0938000003000100030100000000C1844159000000005413244B1412C419D4143410AC3A1B45D44CEC13AC36B00001055555555007D1D170939000500000000000
00050C3300001E0100040B0200020000163B1853060600551A7510D403BF4A1C11460F870E2BECB95AB955D45BA6000000EEEEEEEE00D805718C0171C000000A06080

5 *LC A= . J " ? B AQ JAPA) A!>RAA-Q" -9D!K8AJ8! L-A B|R=:4XEGBEE-< E#. \$ JC;;;;;;;;; 'Q&NP1H=.34A<& 4 F H
000F09D8000003000100030200000000C1E541890000000041E5445D3E27419341394128C4C13DF24408C140C38900001055555555007D1D170F0F000500000000000
00050C3300001E0B01000F0F0002000018A1171D000000001AE911F8FA094A28118A030102F9EE4757255FC05BBB000013EEEEEEEE00D805718EB3A1C000000A06080

TAPEMARK NO 0038 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000413

5CALD-3 A" . V " = A""A1X% 5\$4 A,+8ATW; N1>D!M1ANM_2L)"Y97 NFB0!Q0EK+>E3-> VCE(NC.L\$T 'Q&NP1HGP7EA<& 4 F H
000F00581F0003000200030300000033436247D80000000042074229C536419F415AC3D13EFBC5444513C502C35200002040140152007D1D1700DB000500000000000
00053134F3001F0B05000F0E000001FF117C05BA000000001BE8136E051E4A41154D0C3DF89705624A8052EE53FE0000535D53B3B300D80571877751C00000A06080

5CA3D-3 A" . W " = FFA>.M 0?5 A,W-AT); PEWD!Q?ANPQ 9I3 MFC P\$VDMZEK.-E3.% WC,C.L\$T,F 'Q&NP1H /PVA<& 4 F H
000F00F81F000300020003030000000042CD47EB0000000042AE42D5C5C24196419DC3434180C516C5CAC50EC34E00002064015264007D1D170829600500000000000
00053134F3001F0B06000F0E000000661EB400F5000000001B6013DE07564A8F15780993046307B5445952B053BC000063B3B3B600D80571801751C00000A06080

TAPEMARK NO 0039 BLOCK LENGTHS: MIN=05952 MAX=05952 AVG=05952 NUMBER OF BLOCKS=000493

TAPEMARK NO 0040 -- EOV NO 001

TRUE DENSITY AT END OF PROCESSING: DEN=4

LENGTH ESTIMATE=1791 FEET 07 INCHES FOR DEN=4 AND TRTCH=STANDARD

(LENGTH ESTIMATE USUALLY ACCURATE WITHIN PLUS OR MINUS TEN PERCENT; ALMOST ALWAYS WITHIN TWENTY PERCENT)

PROCESSING OF THIS TAPE COMPLETED: TOTAL BYTES READ=0101469696 NUMBER OF DATA BLOCKS READ=017048

TAPEMARK NO 0035 BLOCK LENGTHS: MIN=05048 MAX=05048 AVG=05048 NUMBER OF BLOCKS=000546

4 0?A C A2 A 9 FAN>OAKJ4 F F A--8AI-7=0;LD!LSAJ0% ;2% 2*>" D0E2.5D-:>EI' 7777 >>>>>>> 'Q&NP1H9#55A & 0 H
000F07A8000003000200030000000000C1E941D700000000419B4463B759419E41924132C3DA388B4387CDB6C43C77772066666666007D1D170F3F70050000000000
000400F103001C010D0009000000000615E61214060600001FF81907E0E34A32116C0ECC0CCEFF0405CB54FAE59D07777D0EEEEEEEE00D8057189B551000000A00080

4 1|A A2 A > " = A QW!AK1M A-M|A 1" / =D!K AJMJ MZ" "1" DG E:4KE0.UEH=:7777> GGGG| ||| 'Q&NP1H/C;XA & 0 H
000F0748000003000200030300000000C129417100000000425C4403B4AF419441954167C3FF388E4339C142C4FF77772000004444007D1D1702C560050000000000
000401F100001C010E000F0E00000000186A121400000000104F1A01FF1E4A201141049F0F1DF47D5A4256B458EA7777E07777FFF00D80571813E71000000A00080

TAPEMARK NO 0036 BLOCK LENGTHS: MIN=05048 MAX=05048 AVG=05048 NUMBER OF BLOCKS=000194

4CA|B&C A' A Y " 0 B "AJ8;A>G, 2X A*>P /RHD!)?AM>N /B; U/V :2=D*QEE2|ED&27777Y ;;;;;;;;;; 'Q&NP1HB>-0A & 0 H
000F00881C0003000200030300000033C1B9428A0000000043E2454D4654419A4169C201C266C3B34795C404C41F77772055555555007D1D1700AA30050000000000
000431F203001D0108000F00000200FF118E1E7B000000000C7A1CA701984ADF14E5012E04150A2E4BC855AF540C777780EEEEEEEE00D8057182E001000000A00080

4CB?B&C A' A Z " 4 B A|"APF4A>HX "DA)G7 S5(D!;/AMZ: UTW S=| 8N.DK6 EE<-ED.R7777Z ;;;;;;;;;; 'Q&NP1HXP:A & 0 H
000F00281C000300020003030000003C14F42460000000043B4450F46B44192412BC2E6C2BCC3D0C174C44EC44577772055555555007D1D170E91F0050000000000
000432F203001D0109000F04000201FF17641E87000000000FB41D77025D4AE1149A043602EF085B426055C054B9777790EEEEEEEE00D805718797A1000000A00080

TAPEMARK NO 0037 BLOCK LENGTHS: MIN=05048 MAX=05048 AVG=05048 NUMBER OF BLOCKS=000568

5 *3C A= A & D # K B AOC.AQNL F F ENA!7VA 'M L,|D!J*AJD6 -HX =S\$=<\$RE2.ZEN'UE# 67777& ;;;;;;;;;; 'Q&NP1H*0JGA<8 & 0 F H
000F0938000003000100030100000000C184415900000005413244B1412C419D4143410AC3A1B45D44CEC13AC36B77771055555555007D1D17093900050000000000
00050C3300001E0100040B0200020000163B1853060600551A7510D403BF4A1C11460F870E2BECB95AB955D45BA6777700EEEEEEEE00D805718C0171C000000A06080

5 *LC A= . J " ? B AQ JAPA) A!>RAA-Q" -9D!K8AJ8! L-A B|R=;4XEGBEE-< E#. \$7777JC; ;;;;;;;;;; 'Q&NP1H=.32A<8 & 0 F H
000F09D8000003000100030200000000C1E541890000000041E5445D3E27419341394128C4C13DF24408C140C38977771055555555007D1D170F0F00050000000000
00050C3300001E0B01000F0F0002000018A1171D000000001AE911F8FA094A28118A030102F9EE4757255FC05BBB777713EEEEEEEE00D805718EB3A1C000000A06080

TAPEMARK NO 0038 BLOCK LENGTHS: MIN=05048 MAX=05048 AVG=05048 NUMBER OF BLOCKS=000413

5CALD-3 A" . V " = A""A1X% 5\$2 A,+8ATW; N1>D!MIANM_ 2L)"Y97 NFBD!Q0EK+>E3->7777VCE(NC.L\$T 'Q&NP1HGP7EA<8 & 0 F H
000F00581F0003000200030300000033436247D80000000042074229C536419F415AC3D13EFBC5444513C502C3527772040140152007D1D1700DB00050000000000
00053134F3001F0B05000F0E000001FF117C05BA000000001BE8136E051E4A41154D0C3DF89705624A8052EE53FE7777535D53B3B300D80571877751C000000A06080

5CA3D-3 A" . W " = FFA>.M 0?5 A,W-AT); PEWD!Q?ANPQ 9I3 MFC P\$VDMEZEK.-E3.%7777WC,C.L\$T,F 'Q&NP1H /PVA<8 & 0 F H
000F00F81F00030002000303000000042CD47EB0000000042AE42D5C5C24196419DC3434180C516C5CAC50EC34E77772064015264007D1D17082960050000000000
00053134F3001F0B06000F0E000000661EB400F5000000001B6013DE07564A8F15780993046307B5445952B053BC777763B3B3B3B600D80571801751C000000A06080

TAPEMARK NO 0039 BLOCK LENGTHS: MIN=05048 MAX=05048 AVG=05048 NUMBER OF BLOCKS=000493

TAPEMARK NO 0040 -- EOV NO 001

TRUE DENSITY AT END OF PROCESSING: DEN=4

LENGTH ESTIMATE=1586 FEET 01 INCHES FOR DEN=4 AND TRTCH=STANDARD

(LENGTH ESTIMATE USUALLY ACCURATE WITHIN PLUS OR MINUS TEN PERCENT; ALMOST ALWAYS WITHIN TWENTY PERCENT)

PROCESSING OF THIS TAPE COMPLETED: TOTAL BYTES READ=0086058304 NUMBER OF DATA BLOCKS READ=017048

HEAO 1

XRATES DATA BASE

77-075A-02I

This data set has been restored. There were originally twenty-six 9-track, 6250 BPI, multi-filed tapes written in Binary. There are twenty-six restored tapes. The DR tapes are 3480 cartridges and the DS tapes are 9-track, 6250 BPI. The original tapes were created on an IBM 360 computer and the restored tapes were created on the IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	DD#	FILES	TIME SPAN
-----	-----	-----	-----	-----
DR-004450	DS-004450	D-065049	39	08/15/77 - 09/02/77
DR-004451	DS-004451	D-065050	40	09/03/77 - 09/22/77
DR-004452	DS-004452	D-065051	40	09/23/77 - 10/12/77
DR-004453	DS-004453	D-065052	40	10/13/77 - 11/01/77
DR-004454	DS-004454	D-065053	24	11/02/77 - 11/13/77
DR-004455	DS-004455	D-065054	40	11/14/77 - 12/03/77
DR-004456	DS-004456	D-065055	40	12/04/77 - 12/23/77
DR-004457	DS-004457	D-065056	40	12/24/77 - 01/12/78
DR-004458	DS-004458	D-065057	40	01/13/78 - 02/01/78
DR-004459	DS-004459	D-065058	40	02/02/78 - 02/21/78
DR-004460	DS-004460	D-065059	38	02/22/78 - 03/12/78
DR-004461	DS-004461	D-065060	39	03/14/78 - 04/02/78
DR-004462	DS-004462	D-065061	40	04/03/78 - 04/22/78
DR-004463	DS-004463	D-065062	40	04/23/78 - 05/12/78
DR-004464	DS-004464	D-065063	40	05/13/78 - 06/01/78
DR-004465	DS-004465	D-065064	40	06/02/78 - 06/21/78
DR-004466	DS-004466	D-065065	40	06/22/78 - 07/11/78
DR-004467	DS-004467	D-065066	39	07/12/78 - 07/31/78
DR-004468	DS-004468	D-065067	39	08/01/78 - 08/20/78
DR-004469	DS-004469	D-065068	39	08/21/78 - 09/09/78
DR-004470	DS-004470	D-065069	40	09/10/78 - 09/29/78
DR-004471	DS-004471	D-065070	39	09/30/78 - 10/19/78
DR-004472	DS-004472	D-065071	40	10/20/78 - 11/08/78
DR-004473	DS-004473	D-065072	40	11/09/78 - 11/28/78
DR-004474	DS-004474	D-065073	37	11/29/78 - 12/18/78
DR-004475	DS-004475	D-065074	36	12/21/78 - 01/09/79

See 77-075A-02H

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V /LZL3 |A- A L 0 0 A""A% 2A&PS  A/R=A&K7 S?&D!PZAQ6+ -XN D-2 :,JES+:E/.QELKD7777L WWWWWWWW 'QM.P1 J&Z! & H
000E0AD61F000200010003030000000033C28F41DA0000000A429F44DB46EC419E4138C1E5C49B43A5414B420D45547777102222222007D18170D5A5005000000000
00050139330F100103000000000001FF1C021072000000AA119E1A2702FA4A79186E0F7504F20AB15BEA51B8532477773066666666600D84B710109A0000000000080

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