#134

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

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

REQ AGENT	RAND NO.	ACQ. SCIENTIST
SAR	V0279	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

D#	#FILES	TIME SPAN
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

	D#	#FILES	TIME SPAN
	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

PHA VOL DEN=4	FILE NO	XRA VOL DEN=4	FILE NO	START DAY	START MSE	STOP DAY	STOP MSEC
→ XR0050	0	→ XR0049	0	226	7211177	226	50742057
	1		1	226	5161149[illegible]	227	7034453
	2		2	227	7236453	227	5029445[illegible]
	3		3	227	50409294	228	7190135
	4		4	228	7221095	228	50351025[illegible]
	5		5	228	50433896	229	4594207
	6		6	229	10523497	229	5017277[illegible]
	7		7	229	50418538	230	7190350
	8		8	230	7231339	230	50321253
	9		9	230	50403120	231	7195030
	10		10	231	7215990	231	5033[illegible]851
	11		11	231	50428791	232	7190463
	12		12	232	7200622	232	50321507
	13		13	232	50413423	233	7190430
	14		14	233	7309144	233	50357101
	15		15	233	50439024	234	7190905
	16		16	234	7210865	234	50341714
	17		17	234	50423666	235	7195502
	18		18	235	7236467	235	50326788
	19		19	235	50408308	236	7190150
	20		20	236	7221109	236	50321982
	21		21	236	50802549	237	7191730
	22		22	237	7205750	237	50336631
	23		23	237	50418551	238	7190332
	24		24	238	7231352	238	50321273
	25		25	238	50403103	239	7195033
	26		26	239	7215993	239	50346874
	27		27	239	50462754	240	7190670
	28		28	240	7200635	240	50321814
	29		29	240	50413436	241	7062302
	30		30	241	7225237	241	50357117
	31		31	241	50439037	242	7190918
	32		32	242	7210878	242	50341750
	33		33	242	50423676	243	7195520
	34		34	243	7236480	243	50326801
	35		35	243	50408321	244	7190181
	36		36	244	7221121	244	50321009
	37		37	244	50433922	245	7168807
	38		38	245	7205753	245	50336681
	39		39	245	50418564	246	7190401
XR0052 ✓	0	XR0051 ✓	0	246	7231354	246	50321285
	1		1	246	50403205	247	3120006
	2		2	247	12786566	247	50346887
	3		3	247	50429807	248	7190488
	4		4	248	7200648	248	50321824
	5		5	248	50413448	249	7195280
	6		6	249	7226246	249	50357130
	7		7	249	50439050	250	7190071
	8		8	250	7210891	250	50341771
	9		9	250	50423691	251	7195532
	10		10	251	7236492	251	50326413
	11		11	251	50408333	252	7190171
	12		12	252	7221134	252	50321014
	13		13	252	50433934	253	7168815
	14		14	253	7205775	253	50336456
	15		15	253	50418576	254	7190417
	16		16	254	7231377	254	50321297
	17		17	254	50403217	255	7195059
	18		18	255	7216018	255	50346903
	19		19	255	50428810	256	7190700
	20		20	256	7200650	256	50331840
	21		21	256	50413460	257	7021461
	22		22	257	7226261	257	50357182
	23		23	257	50439062	258	7190943
	24		24	258	7210903	258	50341787
	25		25	258	50423703	259	7195581
	26		26	259	7236504	259	50326425
	27		27	259	50408345	260	7190186
	28		28	260	7221146	260	50321024
	29		29	260	50433946	261	7168827
	30		30	261	7205787	261	50336468
	31		31	261	50418588	262	7190468
	32		32	262	7231390	262	50321297

44-075A-0214, I
(13 pp.)

	15		15	345	7226389	345	50357260
	16		16	345	50439189	346	7170070
	17		17	346	7211030	346	50341910
	18		18	346	50423830	347	7195671
	19		19	347	7236631	347	50324592
	20		20	347	50408472	348	7180312
	21		21	348	7221272	348	50352153
	22		22	348	50434073	349	3355674
	23		23	349	7205914	349	50295834
	24		24	349	50419714	350	7190555
	25		25	350	7313435	350	50321436
	26		26	350	50403356	351	7175196
	27		27	351	7216156	351	50347097
	28		28	351	50428957	352	7159878
	29		29	352	7200798	352	50331679
	30		30	352	50413598	353	7185439
	31		31	353	7226390	353	50357280
	32		32	353	50439200	354	7129120
	33		33	354	7211040	354	50219041
	34		34	354	50423841	355	7154722
	35		35	355	7359922	355	45165602
	36		36	355	54596402	355	85142563
	37		37	356	9572963	356	50352164
	38		38	356	50434084	357	7164964
	39		39	357	7205924	357	50336805
XR0254	40	XR0253	40	357	50418725	358	7190555
	1		1	358	7231526	358	50321446
	2		2	358	50403366	359	7175207
	3		3	359	7216167	359	50347048
	4		4	359	50428968	360	7159848
	5		5	360	7200808	360	50331689
	6		6	360	50413609	361	7185450
	7		7	361	7226410	361	50357290
	8		8	361	50439210	362	7170091
	9		9	362	7211051	362	50341932
	10		10	362	50423852	363	7154732
	11		11	363	7236652	363	50326573
	12		12	363	50408493	364	7180334
	13		13	364	7221294	364	47894574
	14		14	364	50884654	365	7042095
	15		15	365	7205935	365	50336816
	16		16	365	50418736	365	85890096
	17		17	366	7230536	366	50320457
	18		18	366	50402377	367	7174218
	19		19	367	7215178	367	50346058
	20		20	367	50427978	368	7158852
	21		21	368	7199819	368	50330700
	22		22	368	50412620	369	7184450
	23		23	369	7225420	369	50356301
	24		24	369	50438221	370	7128142
	25		25	370	7210062	370	50340942
	26		26	370	50422862	371	7194707
	27		27	371	7235663	371	50325584
	28		28	371	50407504	372	7138391
	29		29	372	7261264	372	50351185
	30		30	372	50433105	373	7163986
	31		31	373	7204946	373	50335826
	32		32	373	50417746	374	7148627
	33		33	374	7230547	374	50320459
	34		34	374	50402388	375	7133268
	35		35	375	7215188	375	50346069
	36		36	375	50427989	376	7117910
	37		37	376	7199830	376	50330710
	38		38	376	50412630	377	7184471
	39		39	377	7225431	377	50356312
XR0256	40	XR0255	40	377	50438232	378	7169112
	1		1	378	7210072	378	50340953
	2		2	378	50545753	379	7194714
	3		3	379	7235674	379	50325594
	4		4	379	50407514	380	6974555
	5		5	380	7220315	380	50351196
	6		6	380	50433116	381	7123037
	7		7	381	7204957	381	50335838
	8		8	381	50417758	382	7189599
	9		9	382	7394399	382	50320480
	10		10	382	50402400	383	7133291
	11		11	383	7215201	383	50346081
	12		12	383	50428001	384	7158882
	13		13	384	7199842	384	50330723
	14		14	384	50412643	385	7184483
	15		15	385	7225443	385	50356324
	16		16	385	50438244	386	7169125
	17		17	386	[illegible]		

XR0258

10	386	50422885	387	7184	
10	387	7275646	387	50325607	
20	387	50407527	388	7138407	
21	388	7220327	388	50351209	
22	388	50433128	389	7164009	
23	389	7204959	389	50335810	
24	389	50417769	390	7189650	
25	390	7230570	390	50320491	
26	390	50402411	391	7174251	
27	391	7215211	391	50346093	
28	391	50428012	392	7158803	
29	392	7199853	392	50330737	
30	392	50412653	393	7183634	
31	393	7225458	393	50354336	
32	393	50438255	394	7169135	
33	394	7210095	394	50340975	
34	394	50422896	395	7194736	
35	395	7235696	395	50325617	
36	395	50407537	396	7078578	
37	396	7220338	396	50351218	
38	396	50433138	397	7144010	
39	397	7204979	397	50335850	
40	397	50581620	398	7189620	
0	398	7230580	398	50320501	
1	398	50402421	399	7174243	
2	399	7215222	399	50346102	
3	399	50428022	400	7117043	
4	400	7855223	400	50330784	
5	400	50412664	401	7184504	
6	401	7225464	401	50354336	
7	401	50543065	402	7128182	
8	402	7210106	402	50340986	
9	402	50422906	403	7194747	
10	403	7235707	403	50325627	
11	403	50407547	404	7138428	
12	404	7220348	404	50351223	
13	404	50433140	405	7164020	
14	405	7204989	405	50335870	
15	405	50417790	406	7189671	
16	406	7230591	406	50320511	
17	406	50402431	407	7133312	
18	407	7215232	407	50346113	
19	407	50428033	408	7158813	
20	408	7199873	408	50330753	
21	408	50412674	409	7143556	
22	409	7225475	409	50354356	
23	409	50438275	410	7128136	
24	410	7210116	410	50340996	
25	410	50422916	411	7071877	
26	411	7235717	411	50325638	
27	411	50407558	412	7139438	
28	412	7220358	412	50351239	
29	412	50433159	413	7123080	
30	413	7205000	413	50335890	
31	413	50417800	414	7189641	
32	414	7230601	414	50320522	
33	414	50402442	415	7133322	
34	415	7215242	415	50346123	
35	415	50428043	416	7158823	
36	416	7199884	416	50330764	
37	416	50412684	417	7184525	
38	417	7225485	417	50354365	
39	417	50438285	418	7129204	
40	418	7210126	418	50341007	
0	418	50422927	419	7153807	
1	419	7235727	419	50325648	
2	419	50407568	420	7139440	
3	420	7220359	420	50351249	
4	420	50433169	421	7123020	
5	421	7205010	421	50335890	
6	421	50417810	422	7189651	
7	422	7230611	422	50320532	
8	422	50402452	423	7010453	
9	423	7215252	423	50346133	
10	423	50428053	424	7158931	
11	424	7199894	424	50330774	
12	424	50412694	425	7184535	
13	425	7430295	425	50356376	
14	425	50438296	426	7129216	
15	426	7210136	426	50341017	
16	426	50422937	427	7104777	
17	427	7235737	427	50325658	
18	427	50530458	428	7179419	

XR0259

XR0225

	27	511	7215360	511	5034	
	28	511	50428161	512	71190	
	29	512	7200002	512	50330992	
	30	512	50412802	513	7184643	
	31	513	7225603	513	5033	
	32	513	50438403	514	7160294	
	33	514	7210244	514	50341125	
	34	514	50423045	515	7164865	
	35	515	7235845	515	50325766	
	36	515	50407686	516	7056646	
	37	516	7220486	516	50351367	
	38	516	50556167	517	7164158	
	39	517	7205128	517	5033	
XP0238	40	517	50417928	518	5182729	
	1	518	7230729	518	50320610	
XP0239	2	518	50402569	518	7174410	
	3	519	7215370	519	50346351	
	4	519	50551051	520	7159051	
	5	520	7322891	520	50330892	
	6	520	50412812	521	7184643	
	7	521	7225613	521	5015	
	8	521	50438413	522	7160294	
	9	522	7210254	522	50341134	
	10	522	50423054	523	7164865	
	11	523	7235855	523	50325776	
	12	523	50407696	524	6442256	
	13	524	7220496	524	50351377	
	14	524	50433297	525	7164177	
	15	525	7205137	525	5033	
	16	525	50417938	526	7190779	
	17	526	7230739	526	50320659	
	18	526	50402579	527	7174420	
	19	527	90585590	527	5034	
	20	527	50428180	528	7159051	
	21	528	7200021	528	50330901	
	22	528	50412821	529	7184643	
	23	529	7225622	529	5033	
	24	529	50438423	530	7160303	
	25	530	7210263	530	50341144	
	26	530	50423064	531	7164903	
	27	531	7235864	531	50325795	
	28	531	50407705	532	7179516	
	29	532	7220506	532	50351385	
	30	532	50433306	533	7164187	
	31	533	7205147	533	5033	
	32	533	50417947	534	7190789	
	33	534	7230748	534	50320650	
	34	534	50402589	535	7174820	
	35	535	7215390	535	50346270	
	36	535	50428190	536	7159070	
	37	536	7200030	536	50330911	
	38	536	50412831	537	5038912	
	39	537	7225632	537	5035	
XP0241	40	537	50438432	538	7160313	
	1	538	7210273	538	50341153	
XP0240	2	538	50423073	539	7164913	
	3	539	7235874	539	50325795	
	4	539	50407715	540	7179555	
	5	540	7220515	540	5035	
	6	540	50433316	541	7164197	
	7	541	7205157	541	5033	
	8	541	50417957	542	7189797	
	9	542	7230757	542	50320679	
	10	542	50402598	543	7174838	
	11	543	7215398	543	50346279	
	12	543	50428199	544	7159080	
	13	544	7200040	544	5033	
	14	544	50491760	545	7184691	
	15	545	7225641	545	5035	
	16	545	50438442	546	7160323	
	17	546	7210283	546	50341154	
	18	546	50423084	547	7164923	
	19	547	7235885	547	50325805	
	20	547	50407726	548	7179567	
	21	548	80397277	548	5035	
	22	548	50433328	549	5935409	
	23	549	7402960	549	5032	
	24	549	50417970	550	7188851	
	25	550	7230771	550	50320692	
	26	550	50502612	551	7174838	
	27	551	7215414	551	50346295	
	28	551	50428215	552	7159094	
	29	552	7200056	552	50330937	

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	32		32	553	50438459	554	7129380	
	33		33	554	7251260	554	50341182	
	34		34	554	50423102	555	7194963	
	35		35	555	7235903	555	49752389	
	36		36	555	50430664	556	7179588	
	37		37	556	7220545	556	50351825	
	38		38	556	50433346	557	7164227	
	39		39	557	7205187	557	50335058	
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	4		4	559	50428233	560	7150114	
	5		5	560	8183114	560	50330955	
	6		6	560	50412875	561	7184714	
	7		7	561	7225676	561	50356558	
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	9		9	562	7210319	562	50341200	
	10		10	562	50423120	563	7104061	
	11		11	563	7235921	563	50325882	
	12		12	563	50407762	564	7179603	
	13		13	564	7220563	564	50351888	
	14		14	564	50433364	565	7164244	
	15		15	565	7205206	565	50335087	
	16		16	565	50418007	566	7189888	
	17		17	564	7230808	566	50320720	
	18		18	566	50402640	567	7174430	
	19		19	567	7215450	567	50346331	
	20		20	567	50428251	568	7150132	
	21		21	568	7200022	568	50330974	
	22		22	568	50412894	569	7184735	
	23		23	569	7225695	569	50356574	
	24		24	569	50438426	570	7160377	
	25		25	570	7210337	570	50341218	
	26		26	570	50423138	571	7104020	
	27		27	571	7275899	571	50121060	
	28		28	571	50407780	572	7179622	
	29		29	572	7220582	572	50351469	
	30		30	572	50433383	573	4788584	
	31		31	573	10031464	573	50336105	
	32		32	573	50418025	574	7189966	
	33		33	574	7230826	574	50320747	
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	37		37	576	7200111	576	50330902	
	0		0	576	50412912	577	7061873	
	38		38	577	7225713	577	50356594	
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	3		3	579	7399797	579	50030158	
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	18		18	586	50423174	587	7195015	
	19		19	587	7235975	587	50325897	
	20		20	587	50407817	588	7179659	
	21		21	588	7220619	588	50351499	
	22		22	588	50433419	589	7164300	
	23		23	589	7205260	589	50336141	
	24		24	589	50418061	590	4322702	
	25		25	590	8746382	590	50320783	
	26		26	590	50402703	591	7174844	
	27		27	591	7215504	591	50384385	
	28		28	591	50428306	592	7150197	
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	31		31	593	50438550	594	7160431	

	36			636	50407921	636	7170		
	37			636	7220722	636	50351603		
	38			636	50433523	637	7164404		
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	2		2	638	50402807	639	7174649		
	3		3	638	7215608	639	50345189		
	4		4	639	50428409	640	7183200		
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	15		15	645	7205381	645	50336262		
	16		16	645	50418182	646	7190023		
	17		17	646	7230983	646	50320984		
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	19		19	647	7215625	647	50346506		
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	21		21	648	7200267	648	50331188		
	22		22	648	50413068	649	7184009		
	23		23	649	7225869	649	50356751		
	24		24	649	50438671	650	7160552		
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	31		31	653	50418199	654	5142040		
	32		32	654	7231000	654	50320921		
	33		33	654	50402841	655	7174682		
	34		34	655	7215642	655	50345523		
	35		35	655	50428443	656	7183324		
	36		36	656	7200284	656	50331158		
	37		37	656	50413085	657	7184927		
	38		38	657	7266847	657	50356768		
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	8		8	661	50418216	662	7190057		
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	11		11	663	7215659	663	50345840		
	12		12	663	50428460	664	7183341		
	13		13	664	7200301	664	50331183		
	14		14	664	50413103	665	6115664		
	15		15	665	7225904	665	50356795		
	16		16	665	50438705	666	7160586		
	17		17	666	7210546	666	50341427		
	18		18	666	50423347	667	7195188		
	19		19	667	7236148	667	50326069		
	20		20	667	50407989	668	7179830		
	21		21	668	7220790	668	50351671		
	22		22	668	50433591	669	7184892		
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	24		24	669	50418233	670	7190114		
	25		25	670	7231034	670	50320955		
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	28		28	671	50428477	672	6954558		
	29		29	672	7200318	672	50331199		
	30		30	672	50617920	673	7184851		
	31		31	673	7225921	673	50356903		
	32		32	673	50438722	674	7160603		
	33		33	674	7210563	674	50341444		
	34		34	674	50423364	675	7195205		
	35		35	675	7236165	675	50326095		
	36		36	675	50408006	676	7179917		
	37		37	676	7220807	676	50351688		
	38		38	676	50433608	677	7184489		

				677	7205440	677	[illegible]
			40	677	50418250	678	7190091
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		XR0251	2	678	50402892	679	7174737
				679	7215823	679	[illegible]
				679	50428494	680	7159375
				680	7200335	680	50331216
				680	50413136	681	7184078
				681	7225938	681	50356810
				681	50438730	682	7169620
				682	7210590	682	50341451
			10	682	50423391	683	7195222
			11	683	7236102	683	50326103
			12	683	50408023	684	7179851
			13	684	7220924	684	50351705
			14	684	50433628	685	7184504
			15	685	9867866	685	50335387
			16	685	50418267	686	7190108
			17	686	7231068	686	50320989
			18	686	50402909	687	7178750
			19	687	7215710	687	[illegible]
			20	687	50428511	688	7159392
			21	688	7200352	688	50331233
			22	688	50413153	689	7184884
			23	689	7225954	689	50356835
			24	689	50438755	690	7169637
			25	690	7210597	690	50341478
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			27	691	7230199	691	50326160
			28	691	50408040	692	7179891
			29	692	7220841	692	50351722
			30	692	50433642	693	7184523
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			32	693	50418284	694	5920355
			33	694	7231085	694	50321006
			34	694	50402926	695	7171757
			35	695	7215727	695	[illegible]
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			37	696	7200369	696	50331250
			38	696	50413170	697	7185011
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		XR0048	1	698	7210613	698	50341494
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			6	700	50433659	701	7184540
			7	701	7205500	701	50335391
			8	701	50418301	702	7190142
			9	702	7231102	702	50321023
			10	702	50402943	703	7174791
			11	703	7216744	703	[illegible]
			12	703	50428545	704	7159426
			13	704	7200386	704	50331257
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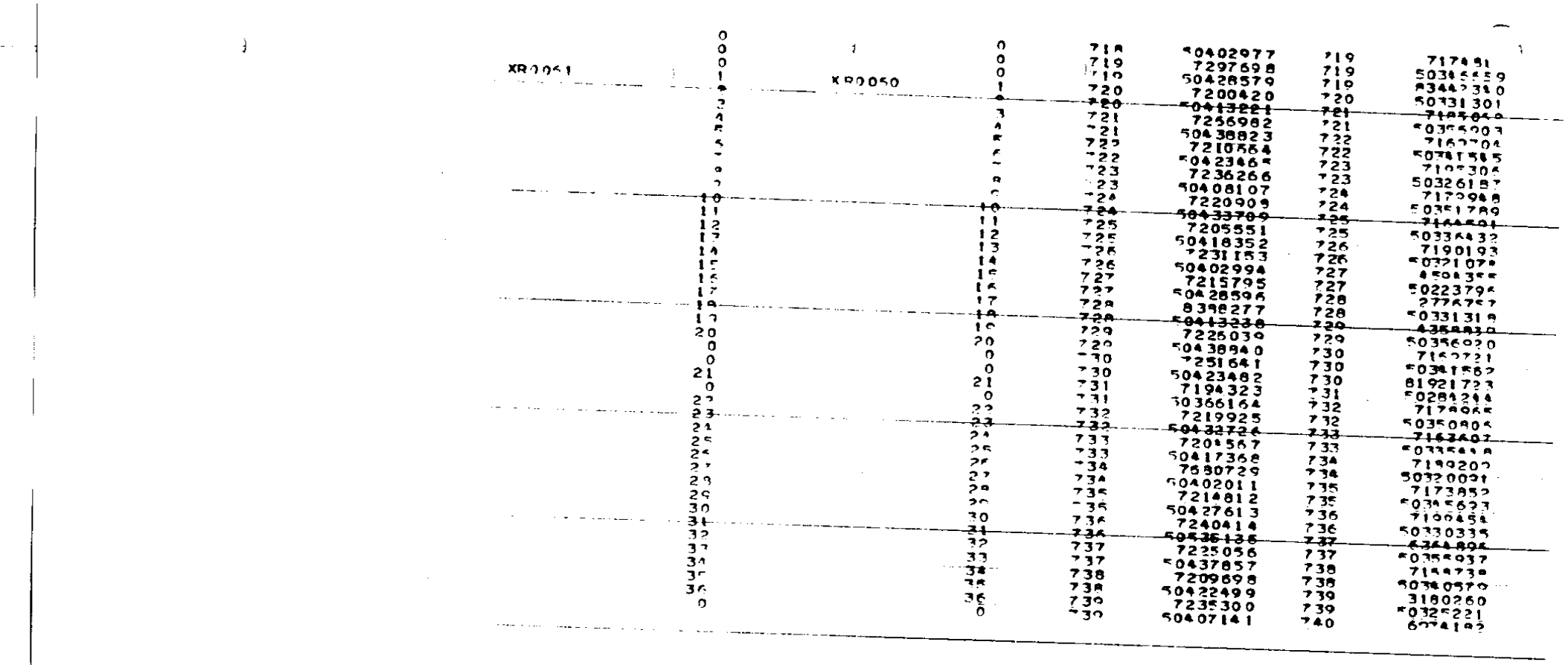
			15	705	7225988	705	50356850
			16	705	50438789	706	7169670
			17	706	7231590	706	50341511
			18	706	50423431	707	7195272
			19	707	7236232	707	50326183
			20	707	50408073	708	7179915
			21	708	7220875	708	50351756
			22	708	50433676	709	7184557
			23	709	7205517	709	50336398
			24	709	50418318	710	7190159
			25	710	7272079	710	50321040
			26	710	50402960	711	7174801
			27	711	7256721	711	50346612
			28	711	50428562	712	7159443
			29	712	7405203	712	50331284
			30	712	50413204	713	7184574
			31	713	7226005	713	50356885
			32	713	50438806	714	7169687
			33	714	7210647	714	50341528
			34	714	50423448	715	7195299
			35	715	7236249	715	50326170
			36	715	50408090	716	7179932
			37	716	7220892	716	50351773
			38	716	50433693	717	7184574
			39	717	7205534	717	50336415
			40	717	50418335	718	7190176
			1	718	7231136	718	50321057



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1 of 3

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 Ø.1 keV to 6Ø 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 scalers), standard coincidence counting rates (discovery scalers), 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. Theyare 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 occulatation 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 scalers.

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

Marshall, F.E. 1979, et al., Ap.J.Suppl. 40, 657.

Marshall, F.E. 1980, et al., Ap.J. 235, 4.

Rothschild, R.E. 1977, "HEAO A-2 Cosmic X-Ray Experiment Technical Manual," GSFC Code 661 internal report.

Rothschild, R.E., et al., 1979, Sp.Sci.Inst., 4, 269.

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APPENDIX A - FLAG CALCULATIONS

A1. 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 scalers for the ith detector, and

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

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

b_i = constants dependent on detector

$b_1 = .80$

$b_2 = 1.51$

$b_3 = 1.42$

$b_4 = .86$

$c_i = c^1_i \, e^{(d_i - d)/1422}$

where c^1_i = 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 ther 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 scalers. 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.,

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

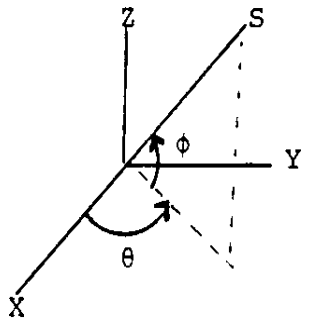
and that the source is within 20° of either the first or last y-axis, i.e., for at least one $\vec{y}$:

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

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

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

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 angle_2 is generated by incorporating the positions in minor frames 32. If

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

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 = LED1

2**3, 2**2 = 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 Sclaer 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

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

Definition	Member		Required Value of Each Point
Layer 2 PHA window definition	QSTATD(4,ID)	bits 4-5	0
Discovery Scalers 7 and 8 definition	QSTATD(6,ID)	bit 3	1
Discovery Scalers 5 and 6 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:

Variable	Type	Description
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 superclean limit=600 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

Variable	Type	Description
		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.

Variable	Type	Description
		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

Variable	Type	Description
		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

Variable	Type	Description
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	

Variable	Type	Description
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
QSTATA(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)

Variables	Type	Description
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 is 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:

Variable	Type	Description
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 superclean limit=600
		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 within two frames of turn on

Variable	Type	Description
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. bit=0=not superclean bit=1=superclean

Variable	Type	Description
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.

Variable	Type	Description
		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

Variable	Type	Description
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	

Variable	Type	Description
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
QSTATA(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 scalers (10 scalers, 6 detectors)
HDISC(40,8,6)	I*2	Discovery scalers (40 LSBs and sums; i.e., 8 readouts per major frame of 5 discovery scalers: four 1.28-seconds one 5.12-seconds 8 scalers, 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

D-605023 PHA DATABASE.

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TAPESCAN 4.3  -  GSFC TAPE ANALYSIS AND COPYING PROGRAM    02/25/85   10:47:10.8   INPUT VOL=XR0050   (LAST MOD-07/25/84)   PAGE   1
OPTIONS IN EFFECT: LIST=002,COPY,NOVOLSER

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

   T P,V*  #A$ A B   D D     A  AO?S 8R3 F F B  AS5< 8(W  M2D!YHA&0H $P@ '-B O _DG"7DQ* E¬DD    B K!S DDDD  'Q&.P1 .+HU            H
000E05E61C0301000000000000000000C1264FD70000000042F047CE425B41A041B0C1574328418Z487BC59A458C0000051620000007D18170848200400000000000
000307B5C00B1B0102000404000001001 6F2089306060200125C08D60A424A8810080B7C0D02060D47F748CA5F440000202A2A444400D80B710BE840000000000080

   T Q.V*  #A$ A C   D D      9"AP'0 @.(     B  AS?7 C¬" WMQD!V%A&,+ MV)  QB NL7D8!@DZHGE¬#%    C DDDD<<<<  'Q&.P1 :O¬            H
000E05861C0301000000000000000033C1F74F8400000000426B481F421941A641A0C1A5441041534797C60C457E0000000000444400 7D18170B1D40040000000000
000308B5C00B1B0103000404000000 9F17D00CBD0000020012F703FF06484A5C10BE045D0082053748AC49875FBC0000304444CCCC00D80B710A6F00000000000080

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#A@M="4¬ZD!L,A&&="X ◊ C66"V.FD#-¬D#<CE;K9    ¬ UUUU%%%%  'Q&.P1 AL 9            H
000E08061F0301000100000000000000C1A3412C000000000411B4313B3DE419641D73AA0C4BB3640C3A14708451700001066662222007D181708D4F0040000000000
000308B5C00B1C010F000404000200661 78F1ED700000000146B1C4EF4F94A3B100EF7AA0366F5B64B0F4BC35E290000F04444CCCC00D80B710130900000000000080

   T I.V*  #A* A /   D D   B A IA$2=A) 6        ANB#A'Q¬";,_D!O*A&Y_=R_Y D'7"G'RDQ20D◊>?E;,R    / NN))VV__  'Q&.P1 !.L2            H
000E08461C0301000200000000000000C13F412B000000004147435135224 19D41EAB12EC47F34F9C13F48E64529000020115522660007D18170945700400000000000
000309B5C00B1C0101000404000201091B2E1DA600000000152B1D8FFEBD4A6C108DE9D804D7F7D948204AEF5EB900001055DD55DD00D80B710AB320000000000080

TAPEMARK NO 0002                      BLOCK LENGTHS:  MIN=05952  MAX=05952  AVG=05952    NUMBER OF BLOCKS=000412

   TCA,W&  #A) A U   D D 0   AF|A0X> QA,        AU¬FA563 1.AD!W=AJG  ?*V &53 00-CWV-EJ%_E;C3    U ++++++++  'Q&.P1 2/4'           H
000E00261C0301000200000003000000C3264D060000000042DC43B3438C41A7414242DE41B7433ACEAEC16E454F000020000000000007D18170FE330040000000000
000331B6000B1D0104000404000001 6F107E081B0000000014F6156301B14A6E117A0FC500530000365051CD5E33000040EEEEEEEE00D80B710214D0000000000080

   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
000E00C61C0301000200000000000000C3A64D5F000000004267435342744 1A3413D43453B4B4215C277C108454F000020000000000007D18170DD4B004000000000
000331B6C00B1D0105000404000000001 1F90B340000000145E16D60D364A6B11B702BCF39B0F434B2951B65E36000050EEEEEEEE00D80B7104CD300000000000080

TAPEMARK NO 0003                      BLOCK LENGTHS:  MIN=05952  MAX=05952  AVG=05952    NUMBER OF BLOCKS=000511

   U ??XL0 |A; A V   0 0      ""A1X+AKR+        A¬7AA<A2 07FD!P'AP=> 6CA :F= _%NEM #D:S-E$L>    V ++++++++  'Q&.P1 3!W(            H
000E06661F0001000200030300000033C3A041D40000000041B4440345BC4197413AC3C8C3C342AD41A34BA2459200002000000000007D18170B9E800400000000000
00040FF7300F1E0105000000000000FF117E129E000000001F711C1206764A7D17EE06310A6E0DC554AB4A205B3E000050EEEEEEEE00D80B7103A6D0000000000080

   U 0|XL0 .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
000E07061F0001000200030300000033438841230000000424A44BE4526419441C2C3DDC3E143B5413E48DA45990000201111111 1007D18170CCA900400000000000
000400F7300B1E0106000404000001FF11B412D700000000 10B61C8D09284A7B178708F704FF03D856EA4C955B75000060666666666 00D80B710D3B300000000000080

TAPEMARK NO 0004                      BLOCK LENGTHS:  MIN=05952  MAX=05952  AVG=05952    NUMBER OF BLOCKS=000421

   UCI|YL  #A¬ A >   D D   B A  A1 IATBB          I1 K9T M4!D!L(AK,N ?#="92¬ %:@D4$HE-#ZE00F    > GGGG||||  'Q&.P1  K=O            H
000E00061C0301000200000000000000432842C4000000004E83457AC1B541944121C2BF3FF542FF4718423245340000200000044440 07D181708D390040000000000
000439F8300B1F010E000404000201001 1A913220000000000A910293044A4A3D12B50FBEF92F0CAC44B850B956060000E07777FFFF00D80B71002E600000000000080

   UCI?YL  .A¬ A ?   4 4   B    A?9IAT;W         343 *X! &%0D!K7AJ2V 1OT MA! ZEID1JSE;%REO.Y    ? PPPP¬¬¬¬  'Q&.P1 NMA#            H
000E00A61C0001000200030300000000042F8421E000000004F3745A1C12B419341FAC35A41C942C44BD241E5454200002055551111007D181709D030040000000000
000439F8300B1F010F000404000200001F9913E6000000000 3430C7A00C04A2711250163041A095941125EC956B80000F07777FFFF00D80B710541B0000000000080

TAPEMARK NO 0005                      BLOCK LENGTHS:  MIN=05952  MAX=05952  AVG=05952    NUMBER OF BLOCKS=000357

   V /LZL3 |A- A L   0 0     A""A% 2A&PS      ◊ A/R=A◊K7 S?◊D!PZAQ6+ ¬XN D¬2 :,JE$+:E/.QELKD    L WWWWWWWW  'QM.P1 J&Z!  &         H
000E0AD61F0002000100030300000033C28F41DA0000000A429F44DB46EC419E4138C1E5C49B43A5414B420D4554000010222222222007D18170D5A50050000000000
00050139330F1001030000000000001FF1C021072000000AA119E1A2702FA4A79186E0F7504F20AB15BEA51B8532400003066666666600D84B710109AQ000000000080
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TAPESCAN 4.3  -  GSFC TAPE ANALYSIS AND COPYING PROGRAM    02/25/85   10:47:10.8   INPUT VOL=XR0050   (LAST MOD-07/25/84)   PAGE   7

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

   4 0?A C  A@ A _    9          FAN>OAKJ4 F F    A¬¬8AI-7=0;LD!LSAJO% ;@% @*>" D0E@.5D¬:>EI'      _ >>>>>>>>  'Q&NP1H9$55A &    ◊   H
000F07A800000300020003000000000C1E941D700000000419B4463B759419E41924132C3DA388B4387CDB6C43C0000206666666007D1D170F3F70050000000000
000400F103001C010D0009000000000615E61214060600001FF81907E0E34A32116C0ECC0CCEF0405CB54FAE59D00000D0EEEEEEEE00D8057189B551000000A00080

   4 1|A    A@ A >   " =        AQW!AK1M        A-M|A◊ 1"|/=D!K AJMJ MZ" "1'"DG_E:4KE0.UEH=:    > GGGG|||| 'Q&NP1H/C;XA &    ◊   H
000F07480000030002000303000000C12941710000000425C4403B4AF419441954167C3FF388E4339C142C4FF0000200000444007D1D1702C560050000000000
000401F100001C010E000F0E00000000186A12140000000104F1A01FF1E4A201141049F0F1DF47D5A4256B458EA0000E07777FFFF00D80571813E71000000A00080

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,         @X A*◊P /RHD!)?AM>N /B; U/V :2=D#*QEE◊|ED&@    Y ;;;;;;;;  'Q&NP1HB>-0A &    ◊   H
000F00881C000300020003030000033C1B9428A0000000043E2454D4654419A4169C201C266C3B34795C404C41F0000205555555007D1D1700AA30050000000000
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&NP1HXRP:A &    ◊   H
000F00281C000300020003030000003C14F4246000000043B4450F46B44192412BC2E6C2BCC3D0C174C44EC44500002055555555007D1D170E91F0050000000000
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$=<$RE◊.ZEN'UE# 6    & ;;;;;;;;  'Q&NP1H*0JGA<&    ◊ F H
000F093800000300010003010000000C184415900000005413244B1412C419D4143410AC3A1B45D44CEC13AC36B000010555555555007D1D17093900050000000000
00050C3300001E0100040B020002000163B1853060600551A7510D403BF4A1C11460F870E2BECB95AB955D45BA6000000EEEEEEEE00D805718C0171C00000A06080

   5 *LC    A= . J   " ?   B    AQ JAPA)        A!>RAA¬Q" -9D!K8AJ8! L-A B|R=;4XEGBEE¬< E#.$    JC;;;;;;;;  'Q&NP1H=.3◊A<&    ◊ F H
000F09D800000300010003020000000C1E5418900000000041E5445D3E27419341394128C4C13DF24408C140C3890000105555555555007D1D170F0F00050000000000
00050C3300001E0B01000F0F0002000018A1171D000000001AE911F8FA094A28118A030102F9EE4757255FC05BBB000013EEEEEEEE00D805718EB3A1C00000A06080

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

   5CALD¬3  A" . V   " =     A""A1X% 5$◊        A,+8ATW; N1>D!M1ANM_ @L)"Y97 NFBD!Q0EK+>E3¬>    VCE(NC.L$T  'Q&NP1HGP7EA<&    ◊ F H
000F00581F000300020003030000033436247D8000000042074229C536419F415AC3D13EFBC5444513C502C3520000204014015200 7D1D1700DB00050000000000
00053134F3001F0B05000F0E000001FF117C05BA000000001BE8136E051E4A41154D0C3DF89705624A8052EE53FE0000535D53B3B300D80571877751C00000A06080

   5CA3D¬3  A" . W   " =     FFA>.M 0?5        A,W-AT); PEWD!Q?ANPQ 9I3 MFC P$VDMEZEK.-E3.%    WC,C.L$T,F  'Q&NP1H /PVA<&    ◊ F H
000F00F81F000300020003030000000042CD47EB0000000042AE42D5C5C24196419DC3434180C516C5CAC50EC34E000020640152640 07D1D170829600500000000000
00053134F3001F0B06000F0E000000661EB400F5000000001B6013DE07564A8F15780993046307B5445952B053BC000063B3B3B3B600D80571801751C00000A06080

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
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TAPESCAN 4.3  -  GSFC TAPE ANALYSIS AND COPYING PROGRAM    03/18/85   11:32:58.4   INPUT VOL=XR0049   (LAST MOD-07/25/84)   PAGE   7

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

   4 0?A C  A@ A    9          FAN>OAKJ4 F F    A¬-8AI-7=0;LD!LSAJO% ;@% @*>" D0E@.5D¬:>EI' 7777_ >>>>>>>>  'Q&NP1H9#55A &    ◊   H
000F07A800003000Z0003000000000C1E941D700000000419B4463B759419E41924132C3DA388B4387CDB6C43C7777Z066666666007D1D170F3F70050000000000
000400F103001C010D000900000000615E61214060600001FF81907E0E34A32116C0ECC0CCEF0405CB54FAE59D07777D0EEEEEEEE00D8057189B551000000A00080

   4 1|A    A@ A >   " =        AQW!AK1M        A-M|A◊ 1"|/=D!K AJMJ MZ" "1'"DG_E:4KEO.UEH=:7777> GGGG||||  'Q&NP1H/C;XA &    ◊   H
000F074800000300020003030000000C12941710000000425C4403B4AF419441954167C3FF388E4339C142C4FF77772000004444007D1D1702C560050000000000
000401F100001C010E000F0E00000000186A12140000000104F1A01FF1E4A201141049F0F1DF47D5A4256B458EA7777E07777FFFF00D80571813E71000000A00080

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,         @X A*◊P /RHD!)?AM>N /B; U/V :2=D#*QEE◊|ED&@7777Y ;;;;;;;;  'Q&NP1HB>-0A &    ◊   H
000F00881C000300020003030000033C1B9428A0000000043E2454D4654419A4169C201C266C3B34795C404C41F77772055555555007D1D1700AA30050000000000
^00431F203001D0108000F00000200FF118E1E7B000000000C7A1CA701984ADF14E5012E04150A2E4BC855AF540C777780EEEEEEEE00D8057182E001000000A00080

   4CB?B&C  A' A Z   " 4   B A|"APF4A>HX         "#DA)G7 S5(D!;/AMZ: UTW S=| 8N.DK6 EE<-ED.R7777Z ;;;;;;;;  'Q&NP1HXRP:A &    ◊   H
000F00281C000300020003030000003C14F42460000000043B4450F46B44192412BC2E6C2BCC3D0C174C44EC4457777205555555007D1D170E91F0050000000000
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$=<$RE◊.ZEN'UE# 67777& ;;;;;;;;  'Q&NP1H*0JGA<&    ◊ F H
000F093800000300010003010000000C184415900000005413244B1412C419D4143410AC3A1B45D44CEC13AC36B777710555555555007D1D17093900050000000000
00050C3300001E0100040B020002000016 3B1853060600551A7510D403BF4A1C11460F870E2BECB95AB955D45BA6777700EEEEEEEE00D805718C0171C00000A06080

   5 *LC    A= . J   " ?   B    AQ JAPA)        A!>RAA¬Q" ~9D!K8AJ8! L-A B|R=;4XEGBEE¬< E#.$7777JC;;;;;;;;  'Q&NP1H=.3◊A<&    ◊ F H
000F09D800000300010003020000000C1E5418900000000041E5445D3E27419341394128C4C13DF24408C140C3897777105555555007D1D170F0F00050000000000
00050C3300001E0B01000F0F0002000018A1171D000000001AE911F8FA094A28118A030102F9EE4757255FC05BBB777713EEEEEEEE00D805718EB3A1C00000A06080

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

   5CALD¬3  A" . V   " =     A""A1X% 5$◊        A,+8ATW; N1>D!M1ANM_ @L)"Y97 NFBD!Q0EK+>E3¬>7777VCE(NC.L$T  'Q&NP1HGP7EA<&    ◊ F H
000F00581F000300020003030000003343624 7D800000000420742 29C536419F415AC3D13EFBC5444513C502C3527777204014015 2007D1D1700DB00050000000000
00053134F3001F0B05000F0E000001FF117C05BA000000001BE8136E051E4A41154D0C3DF89705624A8052EE53FE7777535D53B3B300D8057187775 1C00000A06080

   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<&    ◊ F H
000F00F81F000300020003030000000042CD47EB0000000042AE42D5C5C24196419DC3434180C516C5CAC50EC34E777720640152640 07D1D1708296005000000000
00053134F3001F0B06000F0E000000661EB400F5000000001B6013DE07564A8F1578099304630 7B5445952B053BC777763B3B3B3B600D80571801751C00000A06080

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
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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

D-60049 XTRATES DATABASE

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TAPESCAN 4.3  -  GSFC TAPE ANALYSIS AND COPYING PROGRAM    03/18/85   11:32:58.4   INPUT VOL=XR0049   (LAST MOD-07/25/84)   PAGE   1
OPTIONS IN EFFECT: LIST=002,COPY,NOVOLSER

FIRST OUTPUT FILE ON JJ0037 IS 0001 -- LABEL=(0001,BLP)

  T P,V*  #A$ A B   D D     A  AO?S 8R3 F F B  AS5< 8(W  M2D!YHA&0H $P@ '-B O _DG"7DQ* E¬DD7777B K!S DDDD  'Q&.P1 .+HU          H
000E05E61C03010000000000000000000C1264FD70000000042F047CE425B41A041B0C157432841824B7BC59A458C777700516200000007D18170848200400000000000
000307B5C00B1B0102000404000001001 6F2089306060200125C08D60A424A8810080B7C0D02060D47F748CA5F447777202A2A444400D80B710BE840000000000080

  T Q.V*  #A$ A C   D D     9"AP'0 @.(     B  AS?7 C¬" WMQD!V%A&,+ MV)  QB NL7D8!@DZHGE¬#%7777C DDDD<<<<  'Q&.P1 :O¬          H
000E05861C03010000000000000000033C1F74F8400000000426B481F421941A641A0C1A5441041534797C60C457E777700000044440007D18170B1D400400000000000
000308B5C00B1B0103000404000000 9F17D00CBD0000020012F703FF06484A5C10BE045D0082053748AC49875FBC7777304444CCCC00D80B710A6F000000000000080

TAPEMARK NO 0001                        BLOCK LENGTHS:  MIN=05048  MAX=05048  AVG=05048    NUMBER OF BLOCKS=000031

  T H.V*0 #A* A ¬   D D   B  FFAPY"A;_G        AMO*A@M="4¬ZD!L,A&&="X ◊ C66"V.FD#-¬D#<CE;K97777¬ UUUU%%%%  'Q&.P1 AL 9          H
000E08061F03010001000000000000C1A3412C000000000411B4313B3DE419641D73AA0C4BB3640C3A14708451777771066662222007D181708D4F004000000000000
000308B5C00B1C010F000404000020066178F1ED700000000146B1C4EF4F94A3B100EF7AA0366F5B64B0F4BC35E297777F04444CCCC00D80B710130900000000000080

  T I.V*  #A* A /   D D   B A IA$2=A) 6        ANB*A'Q¬";_D!O*A&Y_=R_Y D'7"G'RDQ20D◊>?E;,R7777/ NN))VV__  'Q&.P1 !.L2          H
000E08461C03010002000000000000C13F412B000000004147435135224 19D41EAB12EC47F34F9C13F48E64529777720115522660 07D181709457004000000000000
000309B5C00B1C0101000404000201091B2E1DA600000000152B1D8FFEBD4A6C108DE9D804D7F7D948204AEF5EB977771055DD55DD00D80B710AB320000000000080

TAPEMARK NO 0002                        BLOCK LENGTHS:  MIN=05048  MAX=05048  AVG=05048    NUMBER OF BLOCKS=000412

  TCA,W&  #A) A U   D D 0   AF|A0X> QA,        AU¬FA563 1.AD!W=AJG  ?*V &53 00-CWV-EJ%_E;C37777U ++++++++  'Q&.P1 2/4'          H
000E00261C03010002000000030000 0C3264D060000000042DC43B3438C41A7414242DE41B7433ACEAEC16E454F777720000000007D18170FE330040000000000
000331B6000B1D0104000404000001 6F107E081B0000000014F6156301B14A6E117A0FC500530000365051CD5E33777740EEEEEEEE00D80B710214D0000000000080

  TCA.W*  #A) A V   D D       A1?Z $.4        AUV=A6)6 _3FD!W#AJ#P 2.*"3I# ?MLD,29EJ.FE;C67777V ++++++++  'Q&.P1 M*(3          H
000E00C61C03010002000000000000C3A64D5F00000000426F435342 7441A3413D43453B4B4215C277C108454F777720000000000007D18170DD4B004000000000000
000331B6C00B1D0105000404000000000 11F90B3400000000145E16D60D364A6B11B702BCF39B0F434B2951B65E36777750EEEEEEEE00D80B7104CD30000000000080

TAPEMARK NO 0003                        BLOCK LENGTHS:  MIN=05048  MAX=05048  AVG=05048    NUMBER OF BLOCKS=000511

  U ??XL0 |A; A V   0 0      ""A1X+AKR+        A¬7AA<A2 07FD!P'AP=> 6CA :F= _%NEM #D:S-E$L>7777V ++++++++  'Q&.P1 3!W(          H
000E06661F00010002000303000000033C3A041D400000000041B4440345BC4197413AC3C8C3C342AD41A34BA2459277772000000000007D18170B9E80040000000000
 0040FF7300F1E0105000000000000 0FF117E129E000000001F711C1206764A7D17EE06310A6E0DC554AB4A205B3E777750EEEEEEEE00D80B7103A6D0000000000080

  U 0|XL0 .A; A W   4 4     A""A1.DAK_7       A¬.WA<8_ RSYD!P.APHX 8¬P 4?¬ 3'QEO= D<RVE$PN7777W 00000000  'Q&.P1 (C,L          H
000E07061F00010002000303000000334388412300000000424A44BE4526419441C2C3DDC3E143B5413E48DA4599777720111111111007D18170CCA900400000000000
000400F7300B1E0106000404000001FF11B412D700000000010B61C8D09284A7B178708F704FF03D856EA4C955B757777606666666600D80B710D3B30000000000080

TAPEMARK NO 0004                        BLOCK LENGTHS:  MIN=05048  MAX=05048  AVG=05048    NUMBER OF BLOCKS=000421

  UCI|YL  #A¬ A >   D D   B A  A1 IATBB          I1 K9T M4!D!L(AK,N ?#="92¬ %:@D4$HE-#ZE00F7777> GGGG||||  'Q&.P1  K=0          H
000E00061C03010002000000000000432842C4000000004E83457AC1B541944121C2BF3FF542FF4718423245347777720000044440007D181708D390040000000000
000439F8300B1F010E000404000201001 1A9132200000000A910293044A4A3D12B50FBEF92F0CAC44B850B956067777E07777FFFF00D80B71002E600000000000080

  UCI?YL  .A¬ A ?   4 4   B    A?9IAT;W         343 *X! &%0D!K7AJ2V 10T MA! ZEID1JSE;%REO.Y7777? PPPP¬¬¬¬  'Q&.P1 NMA#          H
000E00A61C00010002000303000000 0042F8421E000000004F3745A1C12B419341FAC35A41C942C44BD241E5454277772055551111007D181709D030040000000000
000439F8300B1F010F000404000200001F9913E60000000003430C7A00C04A2711250163041A095941125EC956B87777F07777FFFF00D80B710541B0000000000080

TAPEMARK NO 0005                        BLOCK LENGTHS:  MIN=05048  MAX=05048  AVG=05048    NUMBER OF BLOCKS=000357

  V /LZL3 |A¬ A L   0 0     A""A% 2A&PS      ◊ A/R=A◊K7 S?◊D!PZAQ6+ -XN D¬2 :,JE$+:E/.QELKD7777L WWWWWWWW  'QM.P1 J&Z!  &        H
000E0AD61F00020001000303000000033C28F41DA0000000A429F44DB46EC419E4138C1E5C49B43A5414B420D455477771022222222007D18170D5A50050000000000
000050139330F1001030000000000001FF1C021072000000AA119E1A2702FA4A79186E0F7504F20AB15BEA51B8532477773066666666600D84B710109A0000000000080
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