#244

GRS-A

COUNT RATES

69-097A-02A, 04A

GRS-A

PARTICLE COUNT RATES, TAPE

69-097A-02A,04A

THIS DATA SET HAS BEEN RESTORED. THE ORIGINAL DATA SET CONTAINED 14 TAPES AT 9-TRACK, 800 BPI WITH TWO FILES OF DATA EACH. THE RESTORED TAPES ARE 9-TRACK, 6250 BPI WITH 14 FILES EACH. THE TAPES WERE CREATED ON AN IBM 360 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND THE TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR02745	DS02745	D12103	1-2	11/16/89 - 11/25/69
		D12104	3-4	11/25/69 - 12/03/69
		D12105	5-6	12/03/69 - 12/11/69
		D12106	7-8	12/12/69 - 12/20/69
		D12107	9-10	12/20/69 - 12/28/69
		D12108	11-12	12/28/69 - 01/06/70
		D12109	13-14	01/06/70 - 01/14/70
DR02746	DS02746	D12110	1-2	01/14/70 - 01/23/70
		D12111	3-4	01/23/70 - 01/31/70
		D12113	5-6	01/31/70 - 02/09/70
		D12114	7-8	02/09/70 - 02/17/70
		D12112	9-10	02/17/70 - 02/26/70
		D12115	11-12	02/26/70 - 03/06/70
		D12116	13-14	03/06/70 - 03/15/70

REQ. AGENT
WTJ

RASH NO.
RB4220

ACQ. AGENT
JJB

GRS-A

COUNT RATES

69-097A-02A ,04A

This data set consists of 14 800 BPI, binary data tapes that were produced on an IBM/360. The 'D' tapes are 9 track and the 'C' tapes 7 track. Each tape contains 1 identification file followed by 1 data file.

D#	C#	START	STOP
D-12103	C-09667	11/16/69	11/25/69
D-12104	C-09668	11/25/69	12/03/69
D-12105	C-09669	12/03/69	12/11/69
D-12106	C-09670	12/12/69	12/20/69
D-12107	C-09671	12/20/69	12/28/69
D-12108	C-09672	12/28/69	1/06/70
D-12109	C-09673	1/06/70	1/14/70
D-12110	C-09674	1/14/70	1/23/70
D-12111	C-09675	1/23/70	1/31/70
D-12112	C-09676	2/17/70	2/26/70
D-12113	C-09677	1/31/70	2/09/70
D-12114	C-09678	2/09/70	2/17/70
D-12115	C-09679	2/26/70	3/06/70
D-12116	C-09680	3/06/70	3/15/70

69-097A-02A 04A

Data Formats for Library Magnetic Tapes from the MPE Charged Particle Experiments on the Satellite GRS-A/AZUR

D. Hovestadt and M. Scholer

Max-Planck-Institut für Physik und Astrophysik
Institut für extraterrestrische Physik
8046 Garching bei München, Germany

14 tapes covering orbits 100-1499
expect ~19 more tapes
100 orbits/tape

February 1973

1. INTRODUCTION

We are submitting to the NSSDC the final processed data obtained from the MPE experiments EI 88 and EI 93 on the polar orbiting satellite GRS-A/AZUR. AZUR data coverage is from the launch date of Nov. 8, 1969 until the end of the satellite life time on June 28, 1970. These data are presented on magnetic tapes. The present report gives a short description of the instruments, the formats of the data and the physical parameters the instruments were recording. A reference list of scientific publications by the MPE group based on the AZUR data is attached.

2. SATELLITE AND INSTRUMENTATION

The satellite was launched on Nov. 8, 1969 at 0152 UT from Western Test Range, California, into a dawn-dusk polar orbiting satellite with inclination 102.94°, perigee 383.8 km, apogee 3145.4 km and period 122.1 min. Tape telemetry data were recorded after launch until failure of the on board tape recorder on December 8, 1969. Then only real time data are obtained. The last data were recorded on June 18, 1970 2319 UT, after 2752 passes, by the station Santiago. The satellite is magnetically stabilized. Two identical proton alpha particle telescopes (88/1 and 88/2) are oriented one perpendicular (88/1) and one at an angle of 45° (88/2) with respect to the local geomagnetic field vector. In the northern hemisphere telescope 88/2 points upwards. In each system are employed seven fully depleted silicon detectors, which are surrounded by a plastic anti-coincidence scintillator and a heavy shielding (only protons > 75 MeV are able to penetrate). Table Ia shows the energy

ranges and the logical condition of the different channels K1-K7 during normal mode. The geometrical factors of the instruments are $5{\cdot}80 \times 10^{-2} cm^2$ ster (88/1) and $5{\cdot}95 \times 10^{-2} cm^2$ ster (88/2) respectively.

Table Ia Response of the telescopes 88/1 and 88/2 of the satellite AZUR

A-G = Silicon detectors, S = Anti-coincidence scintillator

Channel	Logic	Particle	Energy
K1	$A\ B\ \overline{C}\ \overline{S}$	protons	1·5 - 2·7 MeV
K2	$A\ B\ \overline{D}\ \overline{S}$	alpha	6 - 19 MeV
K3	$B\ C\ \overline{D}\ \overline{S}$	protons	2·7 - 5·2 MeV
K4	$C\ D\ \overline{E}\ \overline{S}$	protons	5·2 - 10·4 MeV
K5	$D\ E\ \overline{F}\ \overline{S}$	protons	10·4 - 22 MeV
K6	$E\ F\ \overline{G}\ \overline{S}$	protons	22 - 49 MeV
K7	$F\ G\ \overline{S}$	protons	49 - 104 MeV

Geometrical factor: $5{\cdot}80 \times 10^{-2} cm^2$ster (telescope 88/1; 90°)
$5{\cdot}95 \times 10^{-2} cm^2$ster (telescope 88/2; 45°)

The configuration of the detector cage is given in Table Ib

Table Ib Configuration of detector cage

Detector	Absorber	Thickness (μ)	Electronic threshold keV
	Ni	1	
A		20	300, 900
B		50	500, 2300
C		100	600
	Al	30	
D		300	900
	Al	200	
E		400	700
	Cu	565	
	Al	30	
F		400	400
	Ta	1750	
G		400	400
	Ta	7050	

In addition, two omnidirectional proton-electron detectors (93/1 and 93/2) are employed, consisting of cubical lithium-drifted silicon detectors, heavily shileded on one side and covered by a hemispherical shield over a 2 π solid angle on the other side. Electrons and protons are separated by the electrical threshold (300 keV for the electron channels and 5·0 MeV for the proton channels). Table II shows the

relevant parameters of the devices. The geometrical factor for electrons was determined by calibration measurements.

Table II Response of the omnidirectional particle counters of satellite AZUR

Channel	Shielding	Threshold	Particles	Energy	Geometrical factor
K1	0·53g/cm^{2}Al	0·3 MeV	e^-	> 1·5 MeV	energy dependent
	0·53g/cm^{2}Al	0·3 MeV	p	> 20 MeV	2·7x10^{-2}cm^2
K2	0·53g/cm^{2}Al	5·0 MeV	p	20-45MeV	1·95x10^{-2}cm^2
K3	2·34g/cm^{2}Cu	0·3 MeV	e^-	> 4 MeV	energy dependent
	2·34g/cm^{2}Cu	0·3 MeV	p	> 40 MeV	4·7x10^{-2}cm^2
K4	2·34g/cm^{2}Cu	5·0 MeV	p	40-72MeV	3·4x10^{-2}cm^2

A detailed description of the experiments and an analysis of the calibration measurements are published in Achtermann et al., 1970.

A cross section of the instrument EI 88 is shown in Figure 1. Figure 2 shows energy-loss vs. incident proton energy-curves.

3. DATA FORMAT OF THE MAGNETIC TAPES

The tapes are 9 track, 800 bpi tapes, no label,
DSNAME in file 1 is AZUR001A
DSNAME in file 2 is AZUR002A.
DCB parameter: RECFM = VBS
BLKSIZE = 9844.

The tapes contain the data in chronological order, redundancies are eliminated and our own quality flags are generated.

Each tape begins with a tape identification record (format), which contains 81 words and which is followed by an end of file mark. The tape identification record contains in

word 1 : 1
word 2 : Satellite Id. Nr. 6909701
word 3 : Experiment Id. Nr. 889293
word 4 : Tape Nr.
words 5-81: Spares

The tape identification record is followed by the passes (or contacts). Each pass begins with a pass header record, followed by the normal data records in chronological order. Each record, the pass header record as well as the data records consists of 81 words. Content of word Nr 1 specifies the record type:

0 = normal data record
1 = contact identification or pass header record.

The content of the pass header record is specified in Table III, the content of the data record is specified in Table VI. The name of the station in the pass header record is abbreviated by a letter according to Table V.

Table III

Word Nr.	Content		Representation integer	Representation float
1	Type of record		x	
2	year	begin of pass	x	
3	day		x	
4	sec		x	
5	year	end of pass	x	
6	day		x	
7	sec			
8	orbit Nr at begin of pass			
9	station name			alphanumeric
10				
11				
12				
13				
14	Kp			alphanumeric
15-81	Spares			

Table IV

Word Nr.	Content	Representation integer	Representation float.
1	Type of record	x	
2	Quality	x	
3	UT year	x	
4	UT day	x	
5	UT msec	x	
6	LT hour	x	
7	LT min	x	
8	MLT hour	x	
9	MLT min	x	
10	Orbit Nr	x	
11	Spare		
12	geogr. lat.		x
13	geogr. long.		x
14	geogr. dist.		x
15	right ascension		x
16	Declination		x
17	magn. lat.		x
18	magn. long.		x
19	L		x
20	B (gauss)		x
21	Λ (inv. lat.)		x
22	R (earth radii)		x
23	Angle between satellite axis and B		x
24	azimuth with respect to B		x
25	Aspect angle (sun)		x
26	azimuth with respect to sun		x

Word Nr.	Content	Representation integer	Representation float.
27	γ_1 spin axis (geocentric)		
28	γ_2		
29	γ_3		
30	B_x magn. field (geocentric)	x	
31	B_y	x	
32	B_z		
33	spare		
34	spare		
35	spare		
36	station	(alphanumeric)	
37	orbit counter	x	
38	record counter	x	
39	corrected orb. counter	x	
40	corrected rec. counter	x	
41	Exp. 88/1 Channel 1	x	
42	" " 2	x	
43	" " 3	x	
44	" " 4	x	
45	" " 5	x	
46	" " 6	x	
47	" " 7	x	
48	" " 8	x	
49	Exp. 88/2 Channel 1	x	
50	" " 2	x	
51	" " 3	x	
52	" " 4	x	
53	" " 5	x	
54	" " 6	x	
55	" " 7	x	
56	" " 8	x	
57	Exp. EI 93 Channel 1	x	
58	" " 2	x	

Word Nr.	Content	Representation integer	Representation float
59	Exp. EI 93 Channel 3	x	
60	" " 4	x	
61	Exp. 92 Channel 1	x	
62	" " 2	x	
63	" " 3	x	
64	" " 4	x	
65	" " 5	x	
66	" " 6	x	
67	88/1 Det. current	x	
68	88/1 logic	x	
69	88/2 Det. current	x	
70	88/2 logic	x	
71	93 Det. current	x	
72	92 Det. current	x	
73	light in 92	x	
74	calibration mode	x	
75	88/1 temperature	x	
76	88/1 photomultiplier	x	
77	88/2 temperature	x	
78	88/2 photomultiplier	x	
79	93 temperature	x	
80	92 temperature	x	
81	16 V voltage	x	

Table V Station Identifications

A	=	MADGAR
B	=	REDURE
C	=	FTCHUR
D	=	SAOJOS
E	=	WNKFLD
F	=	FBANKS
G	=	STIAGO
H	=	KAUAIH
J	=	JOBURG
K	=	KEVO
L	=	LIMA
M	=	FALKLD
N	=	ROSMAN
O	=	ORORAL
P	=	LPALMS
Q	=	QUITO
R	=	REYKJA
S	=	SPITSB
U	=	ALASKA
V	=	KOUROU
W	=	Z-DBS
Y	=	FTMYRS
Z	=	BRAZZV

Word 2 of the data record identifies the data quality:

0 = good
1 = average
2 = bad

Words 3 to 40 contain auxiliary data. Words 41 to 66 contain the counting rates of the scientific data channels. The scientific data channels contain the counting rates during one measuring cycle of 10 seconds plus 1, i.e. 1 means zero counts. Words 67 to 81 contain housekeeping data of the experiments and the logical condition.

Word 74 = { 0 normal mode; 1 calibration mode }

Words 63 and 70 contain the mode of operation of 88/1 and 88/2, respectively.

Word 63 = { 0 data channels of 88/1 contain coincidence rates as outlined in Table I; 1 channels contain single rates of the detectors A to G }

The same holds for word 70 with respect to experiment 88/2.

The modes of operation alternate in a fixed sequence of a period of 16 formats (10 sec each), 14 formats designated with "0" are followed by two formats designated "1". The first format having a "1" and the first format having an "0" are a mixture of coincidence and single rates, therefore cannot be used.

REFERENCES

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Reidel Publ., Dordrecht-Holland, 1972.

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Reconnection of the geomagnetic tail deduced from solar particle observations, J. Geophys. Res., 77, 1972.

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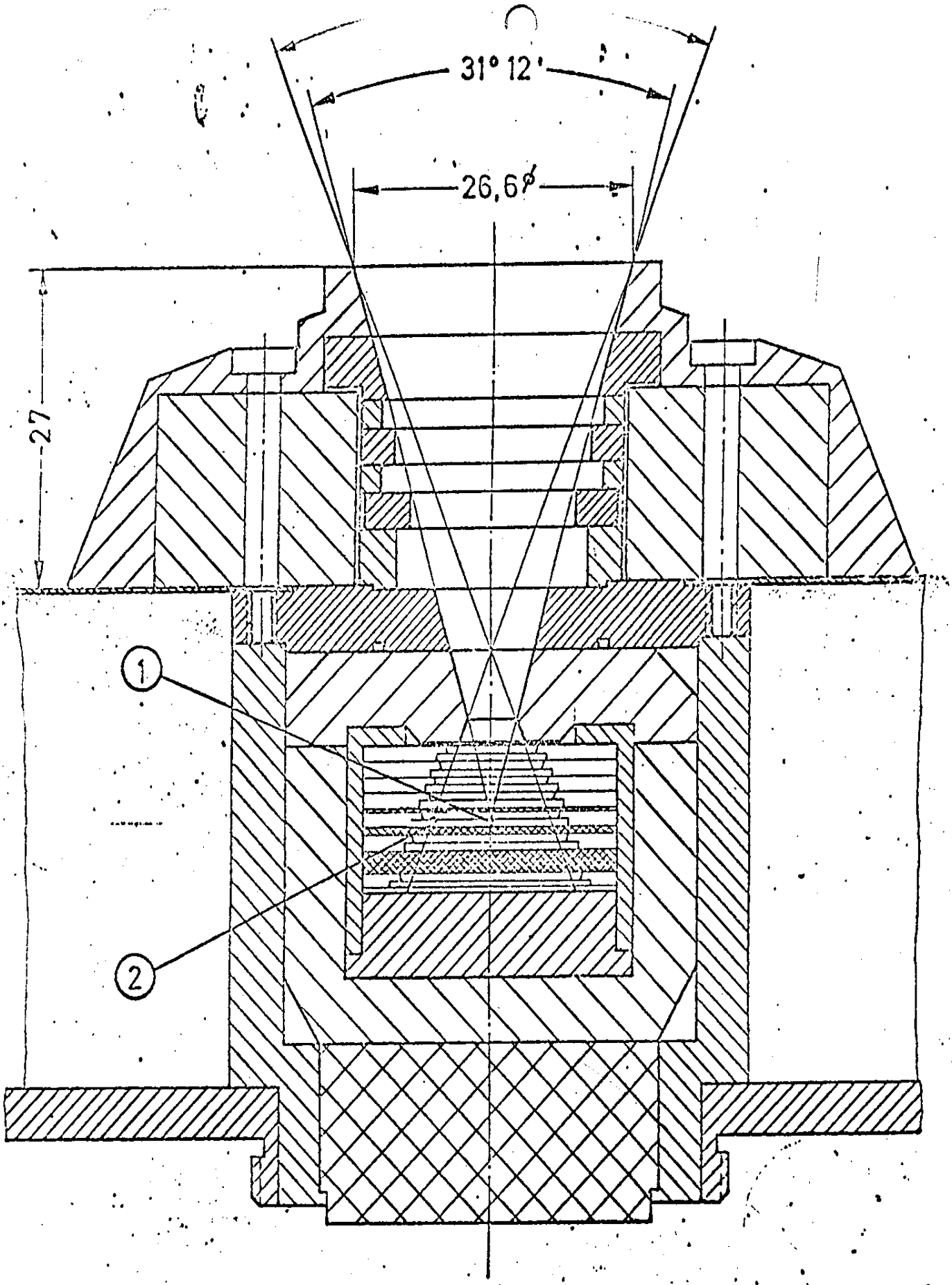

Figure 1

EI 88

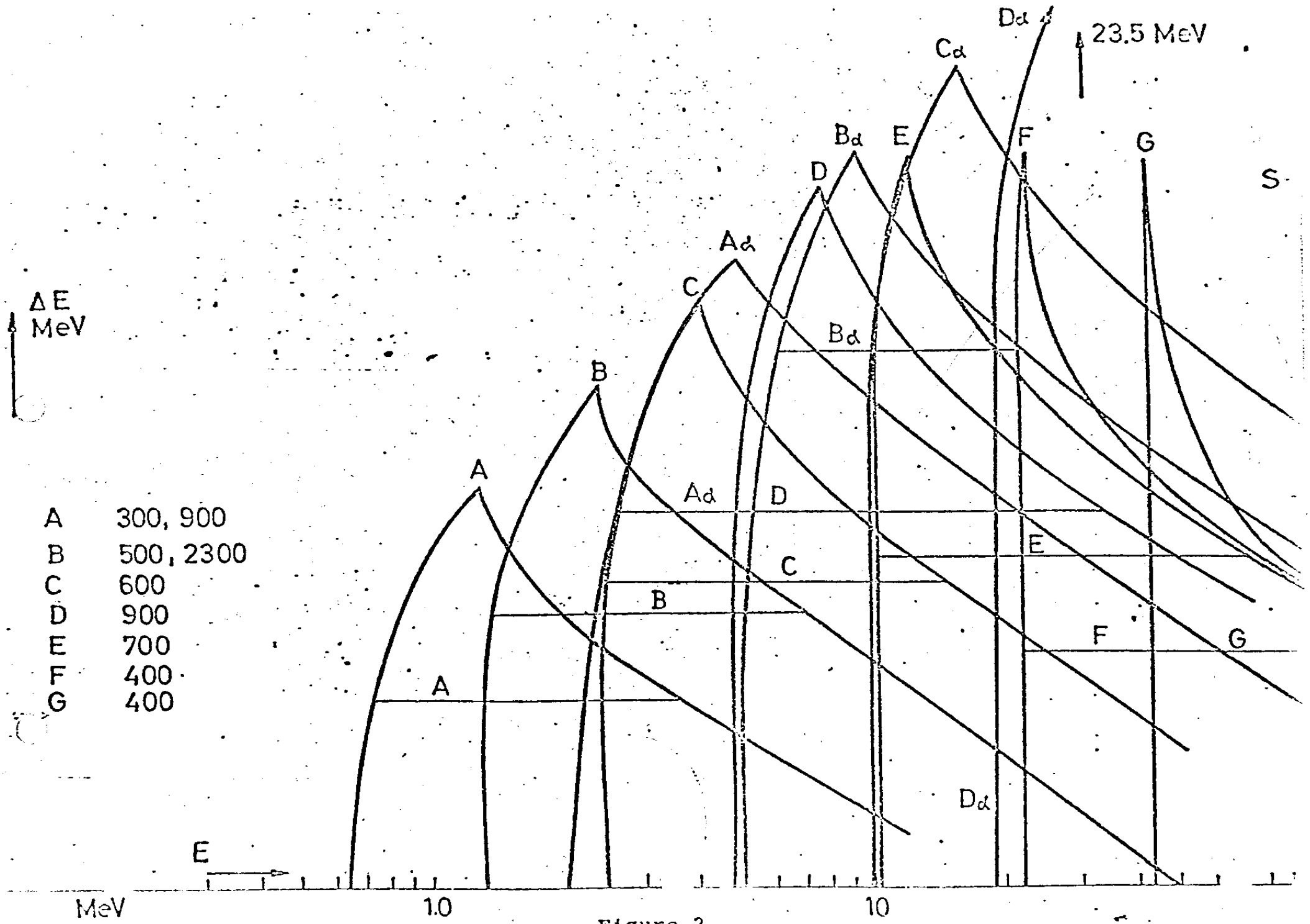
ΔE
MeV
A 300, 900
B 500, 2300
C 600
D 900
E 700
F 400
G 400
E
MeV
1.0
10
23.5 MeV
S
A
B
C
D
E
F
G
Aα
Bα
Cα
Dα

Figure 2

RECORD 1 OF FILE 1

```
014C0000 01480000 00000001 00696F05 000D91CD 00000032 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000
```

DUPE OF D-1203
START 11/16/69
STOP 11/25/69

ORBITS
100 - 200

1 RECORD IN FILE 1 OF TAPE

RECORD 1262 OF FILE 2

05240000	01480000	00000000	00000001	00000781	00000149	00004385	00000004	00000026	00000004
00000027	000000C8	00000017	4225F6F6	424572B2	41141EAC	428547DD	4225D100	421CD668	428FE6EE
411AAB12	403DC308	42273BCD	41134661	41EF0CBF	425828E5	426E55F0	42C00119	4311A645	4282CDB4
4314AFF3	40249567	3E741540	40317538	00000000	00000000	00000000	404040E6	0000000A	0000018E
00000000	00000000	00000001	00000001	00000001	00000002	00000003	00000003	00000005	000006A0
00000041	00000004	00000002	00000001	00000005	00000001	00000001	000007A0	00000019	00000002
0000003E	0000001A	00000020	00000018	00000008	00000002	00000002	0000C001	0000007F	00000000
0000007F	00000000	00000003	00000000	00000000	00000000	00000027	00000037	00000024	00000034
00000025	00000024	00000038	01480000	00000000	00000002	00000781	00000149	00006A96	00000004
00000025	00000004	00000027	000000C8	0000000F	42267255	42453977	411416EC	42851954	42264C28
421D56E4	428FC8E1	411AF001	403E59CE	42279579	41134168	411A84F8	43134BCC	426C0746	42C7AE41
4316EC49	4291C24F	43140721	40246969	3E837D06	40324F1E	00000000	00000000	00000000	404040E6
0000000A	0000018F	00000000	00000000	00000041	00000001	00000021	00000001	00000042	00000006
00000005	00000560	00000001	00000001	00000001	00000001	00000001	00000001	00000001	00000690
00000012	00000004	00000022	0000000F	00000003	00000014	00000004	00000001	00000001	00000001
0000007F	00000000	0000007F	00000000	00000003	00000000	00000000	00000000	00000027	00000037
00000024	00000034	00000025	00000024	00000038	01480000	00000000	00000001	00000781	00000149
000091A6	00000004	00000024	00000004	00000026	000000C8	0000001F	4226EDF9	4244FF79	41140F2A
4284EA09	4226C798	421DD7BD	428FAA9B	411B377C	403EF10E	4227F05E	41133C84	414C0F95	4311C311
426B1A9F	42CEC857	4310A303	4294ACFC	43136C8B	40243BDC	3E930ED5	403328A3	00000000	00000000
00000000	404040E6	0000000A	00000190	00000000	00000000	00000001	00000001	00000001	00000001
00000001	00000003	00000005	00000540	00000001	00000001	00000001	00000001	00000001	00000001
00000001	000005C0	00000008	00000002	00000028	0000000E	00000004	00000005	00000004	00000001
00000001	00000001	0000007F	00000000	0000007F	00000000	00000003	00000000	00000002	00000000
00000026	00000037	00000024	00000034	00000025	00000024	00000038	01480000	00000000	00000001
00000781	00000149	00008886	00000004	00000023	00000004	00000026	000000C8	0000001F	422769E7
4244C481	41140767	428489F3	42274355	421E58F7	428F8C18	411881C7	403F88BC	42284CAD	411337BA
41473554	4312296B	426B868E	42D5CE50	4316A83D	4294FDE6	4313046E	40240CC3	3EA2C95F	403401C2
00000000	00000000	00000000	404040E6	0000000A	00000191	00000000	00000000	00000001	00000208
00000001	00000001	00000002	00000001	00000006	000004C0	00000001	00000001	00000001	00000001
00000001	00000001	00000001	00000540	00000008	00000002	0000001E	0000000E	00000004	00000004
00000002	00000002	00000002	00000001	0000007F	00000000	0000007F	00000000	00000003	00000000
00000000	00000000	00000027	00000037	00000024	00000034	00000025	00000024	00000038	

1262 RECORDS IN FILE 2 OF TAPE

FILE NO. 1, REC. NO. 1 333 BYTES (LAST FEW DIGITS MAY BE ZERO FILL.)

1	014C0000	01480000	00000001	00696F05	000D91CD	0000000F	00000000	00000000	00000000	00000000
11	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
21	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
31	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
41	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
51	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
61	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
71	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
81	00000000	00000000	00000000	00						

DUPE OF D-12116
START 3/06/70
STOP 3/15/70

ORBITS
1401 - 1496

```
*********************************
     SUMMARY FOR TAPE D12116

*********************************


THE NUMBER OF FEET OF TAPE READ = 1309


THE NUMBER OF FILES READ =   2

THERE WERE     1 RECORDS IN FILE NUMBER  1
THERE WERE   915 RECORDS IN FILE NUMBER  2


THERE WERE  0 ERRORS IN READING THE TAPE
```