MAGNETIC TAPE FORMATS FOR EXPERIMENT #8 ON OGO II AND IV

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Goddard Space Flight Center provides two types of 7 track tapes to the experimenter. The first is an experimenter data tape which contains information derived from or pertaining to the particular experiment involved (in this case, experiment #8). The second is an orbital tape. This tape provides position, spacecraft orientation, and geomagnetic field data, as well as other data relevant to the entire spacecraft.

The first step in processing the information from experiment #8 is a construction at Cal Tech of an "abstract" tape. Abstract tapes are obtained from the orbital housekeeping and experimental data tapes by insertion of O/H information at the proper time in the time stream of experiment data. However, not all the information in each orbital logical record is inserted, nor is all the data available on the experimenter tape retained. Furthermore, the abstract tape may be either a seven track or a nine track tape. Tapes processed at Cal Tech after January 1, 1969 are nine track. Before that all tapes were seven track.

The largest logical unit of data is the acquisition. It is defined by Goddard, and appears on the GSFC experimenter tape as a file. An acquisition is terminated if (1) the bit rate changes, (2) a ground station recording tape is filled, or (3) transmission of data from the spacecraft to that station is terminated. The data within a file is therefore always monotonically increasing in time. However, the set of files comprising a data tape are not necessarily time ordered; if they are, they will often contain

overlapping data coverage.

Acquisition boundaries are not constrained to fall on physical record boundaries of the abstract tape. However, one orbit record always precedes the first good (i.e., non-fill) data record of the acquisition and one orbit record always follows the last good data record. In this trailing orbit record an end of acquisition flag is also set. An end-of-file following the last record terminates the abstract tape. On OGO II dummy orbit data of all zeroes was inserted at the correct position

Since it is possible that some but not necessarily all the data words in a given frame will be filled, an entire frame of data will be deleted from the abstract tape if and only if all four s/c words 17, 18, 81, and 32 are filled. When frames are deleted due to fill, a flag bit in the previous data frame will be set, distinguishing this deletion from the case in which frames are deleted due to redundant data.

Data frames found to be redundant will be deleted from the abstract tape. In the case that filled frames followed the redundant frame, the redundant frame will be recorded and the fill bit set.

A data frame is defined to be redundant if and only if all the following bits in the frame are set the same as those in the previous good frame.

Status Flag group	F-1, bits 6-11
Status Flag group	F-3 bits 1-5
	Bit #5 of main com word 65
	S/C word 17
	Analyzer flags (in s/c word 18)
	$V_1\bar{V}_3$ rate
	H rate, $V_1V_2\bar{V}_3$ rate, $V_2\bar{V}_3$ rate (s/c word 81)
	Analog rate meter (s/c word 32)

The remainder of this report is composed entirely of figures and tables giving the formats of the three types of tapes used by Cal Tech in analyzing the data from experiment #8. These are:

Orbit, Housekeeping Tape ..... Tables 1,2

Experimenter Tape ..... Tables 3,4
Figure 1

Cal Tech Abstract Tape ..... Tables 5-10
Figures 2-7

TABLE 1

GSFC ORBITAL TAPE

LABEL RECORD*

Word No.	Symbol	Function	Units
1		Identification	
2		Date	Year
3			Month
4			Day
5	t_{E1}	Start Time of Eclipse	Day Count
6			Milliseconds of Day
7	t_{E2}	End of Time of Eclipse	Day Count
8			Milliseconds of Day
9	t_a	Start Time of Orbit	Day Count
10		(Time of Ascending Node)	Milliseconds of Day
11	t_{a+1}	End Time of Orbit	Day Count
12		(Time of Next Ascending Node)	Milliseconds of Day
13	t_n	Time of Predicted	Day Count
14		Noon Turn	Milliseconds of Day
15	τ	Epoch	Day Count
16			Milliseconds of Day
17	$\Delta\tau$	Sampling Rate	Milliseconds
18		Orbit Numer	
19	a	Semi-Major Axis	Earth Radii
20	ε	Eccentricity	Ratio
21	ι	Inclination	Degrees
22	Ω	Longitude	Degrees
23	$\dot{\Omega}$	Rate of Chane of Longitude	Degrees/Day
24	ω	Argument of Perigee	Degrees
25	$\dot{\omega}$	Rate of Change of ω	Degrees/Day

TABLE 1
GSFC ORBITAL TAPE
(continued)

Word No.	Symbol	Function	Units
26	T	Period	Minutes
27	$\dot{T}$	Rate of Change of Period	Minutes/Day
28-250		Spares	

All Data is Represented in Floating Point Format

Bits 0 to 8 = Characteristic
Bits 9 to 35 = Mantissa

* One per file.

TABLE 2

GSFC ORBITAL TAPE DATA RECORD

Word No.	Symbol	Function	Units
1	T_1	Time	Day Count
2			Milliseconds of Day
3	T_L	Local Time (of Sub-Satellite Point)	Hours
4			Minutes
5			Tenth of Minutes
6	α	Right Ascension of Satellite	Degrees
7	δ	Declination of Satellite	Degrees
8	P_x	Position Vector	Kilometers
9	P_y		
10	P_z		
11	V_x	Velocity Vector	Kilometers/sec
12	V_y		
13	V_z		
14	S_x	Solar Vector	Kilometers
15	S_y		
16	S_z		
17	Ø	Latitude	Degrees, North = + South = -
18	λ	Longitude	Degrees, East = + West = -
19	h	Height Above Spheroid	Kilometers
20	v	True Anomaly	Degrees
21	Φ	Sun Earth Satellite Angle	Degrees
22	X_{BXI}	Ideal Main Body Roll Axis	Unit Vector
23	X_{BYI}		
24	X_{BZI}		
25	Y_{BXI}	Ideal Main Body Pitch Axis	Unit Vector
26	Y_{BYI}		
27	Y_{BZI}		

Word No.	Symbol	Function	Units
28	Z_{BXI}		
29	Z_{BYI}	Ideal Main Body Yaw Axis	Unit Vector
30	Z_{BZI}		
31	X_{PXI}		
32	X_{PYI}	Ideal Paddle Roll Axis	Unit Vector
33	X_{PZI}		
34	Y_{PXI}		
35	Y_{PYI}	Ideal Paddle Pitch Axis	Unit Vector
36	Y_{PZI}		
37	Z_{PXI}		
38	Z_{PYI}	Ideal Paddle Yaw Axis	Unit Vector
39	Z_{PZI}		
40	X_{EXI}		
41	X_{EYI}	OPEP Ideal Roll Axis	Unit Vector
42	X_{EZI}		
43	Y_{EXI}		
44	Y_{EYI}	OPEP Ideal Pitch Axis	Unit Vector
45	Y_{EZI}		
46	Z_{EXI}		
47	Z_{EYI}	OPEP Ideal Yaw Axis	Unit Vector
48	Z_{EZI}		
49	X_{BX}		
50	X_{BY}	Actual Main Body Roll Axis	Unit Vector
51	X_{BZ}		
52	Y_{BX}		
53	Y_{BY}	Actual Main Body Pitch Axis	Unit Vector
54	Y_{BZ}		

Word No.	Symbol	Function	Units
55	Z_{BX}		
56	Z_{BY}	Actual Main Body Yaw Axis	Unit Vector
57	Z_{BZ}		
58	X_{PX}		
59	X_{PY}	Actual Paddle Roll Axis	Unit Vector
60	X_{PZ}		
61	Y_{PX}		
62	Y_{PY}	Actual Paddle Pitch Axis	Unit Vector
63	Y_{PZ}		
64	Z_{PX}		
65	Z_{PY}	Actual Paddle Yaw Axis	Unit Vector
66	Z_{PZ}		
67	X_{EX}		
68	X_{EY}	OPEP Actual Roll Axis	Unit Vector
69	X_{EZ}		
70	Y_{EX}		
71	Y_{EY}	OPEP Actual Pitch Axis	Unit Vector
72	Y_{EZ}		
73	Z_{EX}		
74	Z_{EY}	OPEP Actual Yaw Axis	Unit Vector
75	Z_{EZ}		

Geomagnetic Coordinates of Satellite Real Field Coordinates

76	R_0	Range	Earth Radii
77	ϕ_M	Latitude	Degrees
78	L	McIlwain Parameter	Earth Radii
79	B	Field Strength	Gamma

Word No.	Symbol	Function	Units
80	B/B_0		Ratio
81	$\emptyset_E$	Latitude of Intersection of Field Line and Earth Ingress	Degrees
82	λ_E	Longitude of Intersection of Field Line and Earth Ingress	Degrees
83	$\emptyset_{E1}$	Latitude of Intersection of Field Line and Earth Egress	Degrees
84	λ_{E1}	Longitude of Intersection of Field Line and Earth Egrees	Degrees
85	B_X		
86	B_Y	Components of B Vector	Unit Vector
87	B_Z		
88	B_{XB}	Local Field (Roll Axis) Vector Expressed in Terms of the Body System	Unit Vector
89	B_{YB}	Local Field (Pitch Axis) Vector Expressed in Terms of the Body System	Unit Vector
90	B_{ZB}	Local Field (Yaw Axis) Vector Expressed in Terms of the Body System	Unit Vector
91	B_{XP}	Local Field (Roll Axis) Vector Expressed in Terms of the Paddle System	Unit Vector
92	B_{YP}	Local Field (Pitch Axis) Vector Expressed in Terms of the Paddle System	Unit Vector
93	B_{ZP}	Local Field (Yaw Axis) Vector Expressed in Terms of the Paddle System	Unit Vector

Word No.	Symbol	Function	Units
94	B_{XE}	Local Field (Roll Axis) Vector Expressed in Terms of the OPEP System	Unit Vector
95	B_{YE}	Local Field (Pitch Axis) Vector Expressed in Terms of the OPEP System	Unit Vector
96	B_{ZE}	Local Field (Yaw Axis) Vector Expressed in Terms of the OPEP System	Unit Vector
B Vector Components			
97	BE	Directed Towards the East	Gamma
98	BN	Directed Towards the North	Gamma
99	BV	Zenith of Observer (Down)	Gamma
100	SEC(1,1)	Solar Ecliptic Coordinates Transformation Matrix	
101	SEC(1,2)		
102	SEC(1,3)		
103	SEC(2,1)		
104	SEC(2,2)		
105	SEC(2,3)		
106	SEC(3,1)		
107	SEC(3,2)		
108	SEC(3,3)		
109-122		Spares	
123		Attitude Data Flag (This Flag will be Assigned the value -1.0 if any housekeeping discrepancies are detected)	
124		No Housekeeping Data Flag (A bit or any combination of bits in the Housekeeping Data Flag signifies that the ideal value for the flagged function(s) was used in the computation of the actual attitude)	Roll = 2^0 Pitch = 2^1 Yaw = 2^2 ψ_e = 2^3 ϕ_p = 2^4

Word No.	Symbol	
125	Suspect Housekeeping Data Flag (The same flagging method as the Housekeeping Data Flag, except it signifies that the particular housekeeping function is of a suspect nature)	Roll = 2^0 Pitch = 2^1 Yaw = 2^2 $\psi_e = 2^3$ $\phi_p = 2^4$
126-250	Same data as words 1 to 125 at times T_2 where $T_2 = T_1 + \Delta t$	

All data is represented in floating point format

Bits 0 to 8 = characteristic

Bits 9 to 35 = Mantissa

End of data is indicated as follows

E 0 F	(1) Record of F P nines (99,999,999)	E 0 F

All data flags are represented in floating point notation. Interpretation of the data flag consists of converting the floating point number to its binary equivalent and associating the resultant binary configuration with the Housekeeping Data Flag list as described by the data flag, e.g.

Housekeeping Data Flag = $12_{(10)}$
This means that the computation of the actual attitude was performed using ideal values of yaw and ψ_e OPEP angles

Word No.	Symbol	Function	Units

$12_{(10)} = 0\ 1\ 1\ 0\ 0$

$2\ 2\ 2\ 2\ 2$

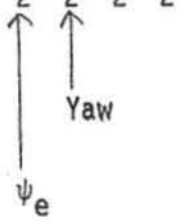


TABLE 3

GSFC Experimenter Tape File Header Record Format (120 Characters)

This is the first record of each file of experimental data. All subsequent records in the file are quarter sub-com data records.

Character	
1-6	BCD text (Satellite identification number)
7-8	BCD characters <YEAR> (data taken)
9	BCD space
10-12	BCD characters <STATION NUMBER> (telemetry receiving station for this file, see Appendix for code)
13	BCD space
14-15	BCD characters <ANALOG FILE NUMBER> (Goddard file number of tape of telemetered signal before digitizing)
16	BCD space
17-20	BCD characters <ANALOG TAPE NUMBER> (Goddard number of tape of telemetered signal before digitizing)
21	BCD space
22-23	BCD characters <BUFFER FILE NUMBER> (Goddard file number on tape resulting from A to D conversion of telemetered signal)
24	BCD space
25-28	BCD characters <BUFFER TAPE NUMBER> (Goddard number of tape resulting from A to D conversion of telemetered signal)
29	BCD space
30-32	BCD characters <DATE OF DIGITIZATION> (day of year of A-D conversion of telemetered data)
33	BCD space
34-66	Will be identical to characters 1-33 unless an error was found in these characters. If that is the case, then this portion of the record will contain the corrected values.

Character	
67	BCD character <TYPE OF DATA> 0- 1 kilobit real time 1- 8 kilobit real time 2- 64 kilobit real time 3- storage playback (recorded at 1 kilobit)
68	BCD space
69-71	BCD characters <DAY OF YEAR>
72	BCD space
73-77	BCD characters <SECOND OF THE DAY> for start time of data
78	BCD space
70-90	Spares
91-94	BCD characters <MASTER BINARY TAPE> (tape number of Goddard master binary tape containing this acquisition)
95	BCD space
96-97	BCD characters <MASTER BINARY FILE> (file number on Goddard master binary tape of this acquisition)
98-120	Blanks

TABLE 4

POGO EXPERIMENTAL DATA TAPE FORMAT

Records: [illegible] information on POGO-A, B.

Data Records: (Four records for one sub-com sequence).

Character	From	Description			
01-02		Day Count			
03-04	D(97,96)				
05-06	D(97,100)	Experiment Subcom			
07-08		Spares			
09-10	D(99,36)	Temperature module			
11-12	D(98,47)	Load Bus Voltage			
13-14	D(98,82)	F25	F33		
15-16	D(99,81)	F26	F34		
17-18	D(98,83)	F27	F35		In Flight
19-20	D(99,82)	F28 EG-1	F36	EG-2	Calibration
21-22	D(98,84)	F29	F37		
23-24	D(99,83)	F30	F38		
25-26	D(99,85)	F31	F39		
27-28	D(98,111)	Bit Rate			
29-36		Spares			
37-42+30N		GMT Time			
43-44+30N		F1 flag			
45-46+30N		F2 flag			
47-48+30N		F3 flag			
49-50+30N	D(33,j)				
51-52+30N	D(34,j)	Spacecraft Accumulated Time			
53-54+30N	D(35,j)				
55-56+30N	D(65,j)	Data Identification Word			
57-58+30N	D(17,j)				
59-60+30N	D(18,j)	Digital Data			
61-62+30N	D(81,j)				
63-64+30N	D(32,j)	Analog data			
65-66+30N		Spares			

N = 0,1,2,...31
j = 1,2,3,...128

Total characters per record - 996

Four records per subcom sequence.

End of files will appear at the end of an acquisition, rate change, etc. Double end-of-file at end of tape.

Orbital information format outlined in available NASA publication for either normal or spinning configuration.

EQUIPMENT GROUPS 1 AND 2

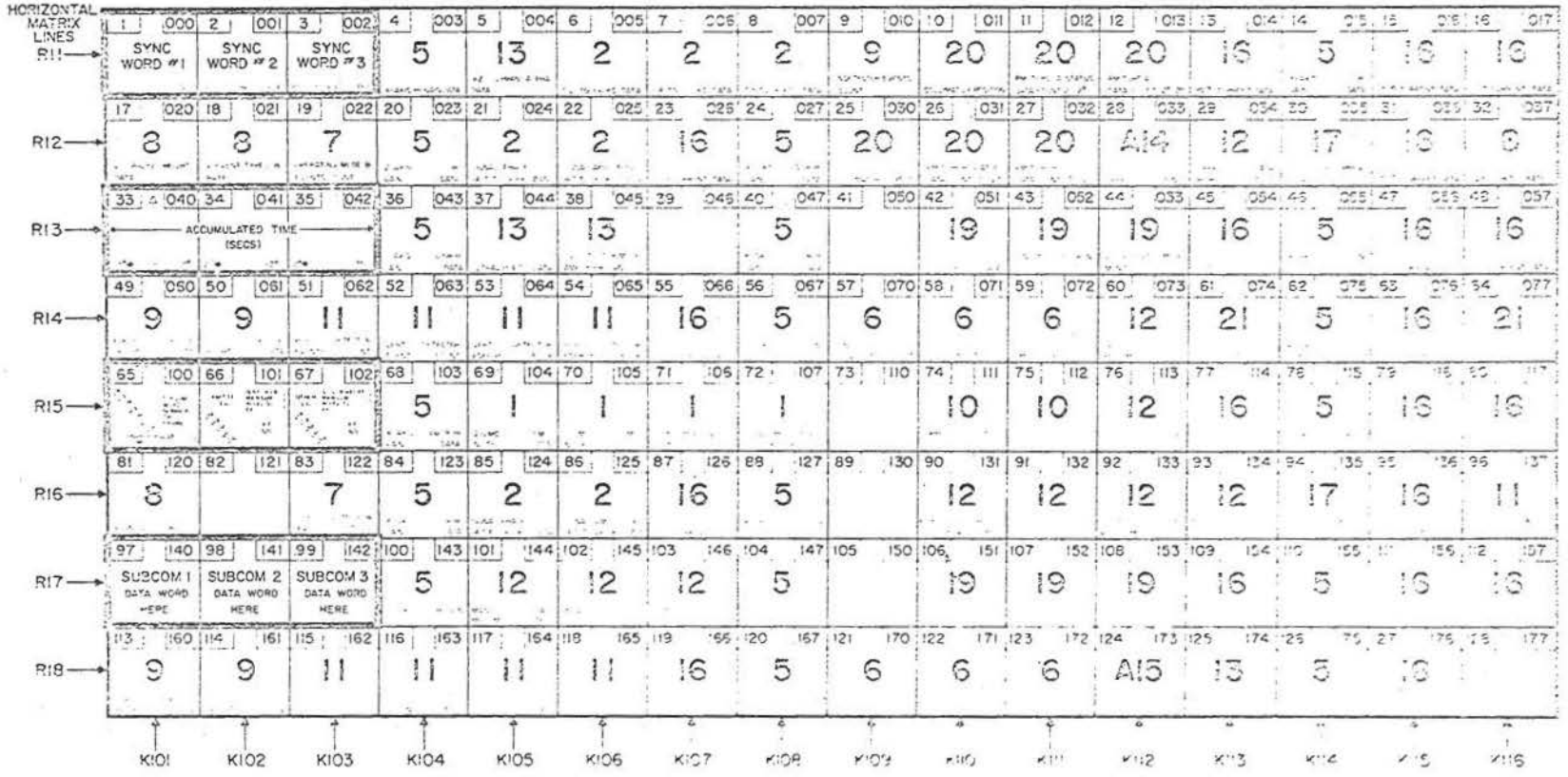
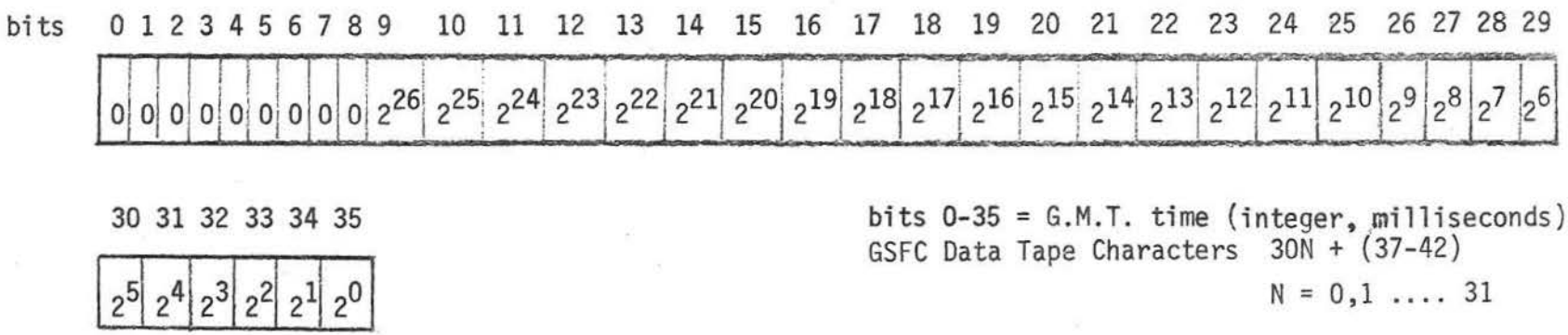


Figure 8-OGO-C Main Telemetry Format

7 Track Data Subrecord (556 bpi)

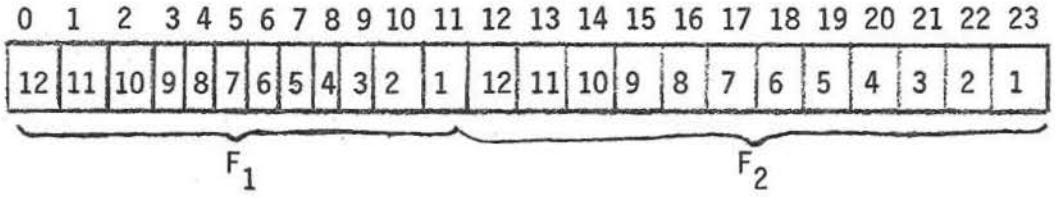
Word 1



bits 0-35 = G.M.T. time (integer, milliseconds)
GSFC Data Tape Characters 30N + (37-42)
N = 0,1 31

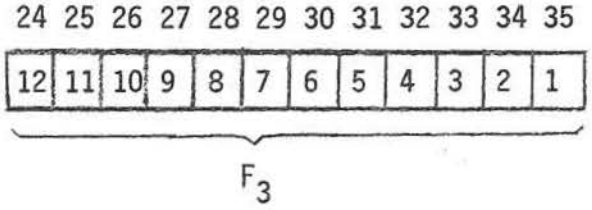
-19- 18

Word 2



(Quality Control Status) (Time Status)

GSFC Data Tape Characters
30N + (43-48)
N = 0, 1 31

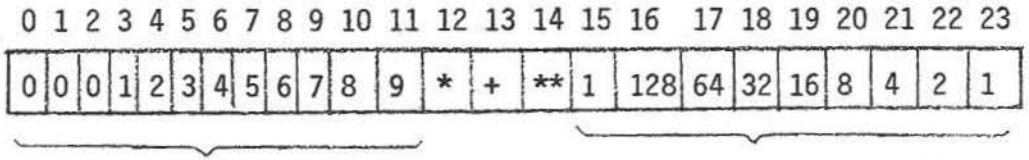


(Data Status)

FIGURE 2

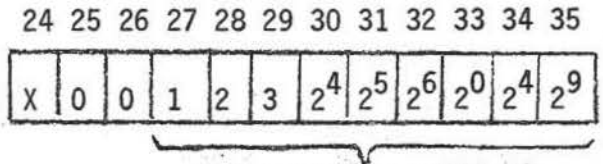
FIGURE 2
(continued)

Word 3



Data shown on this page derived from GSFC data tape characters 30N + (55-66)

N = 0,1 31



(Range, new event, mode, V_3 Rate, $V_1\overline{V_3}$ Rate, p. 19)

X bit 24 = 1 if S/C 18 is fill

= 0 otherwise

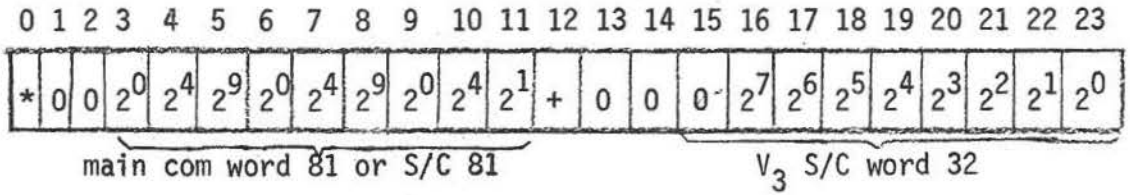
* bit 12 = 1 if S/C 17 is fill

= 0 otherwise

\+ bit 13 = 1 if following data frames on original tape were fill (completely)

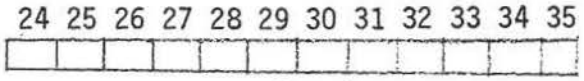
** bit 14 = 1 experimenter data (=0 signifies orbit data)

Word 4



(H_1 Rate, $V_1V_2\overline{V_3}$ Rate, $V_2\overline{V_3}$ Rate

(digitization of Analog rate meter)



* bit = 1 if S/C 81 is fill

= 0 otherwise

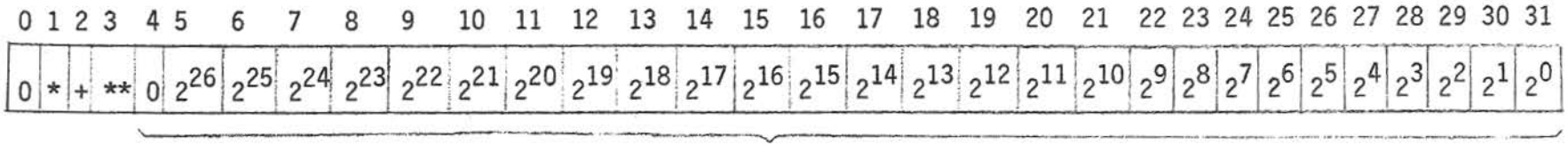
\+ bit 12 = 1 if S/C 32 (Analog rate meter) is fill

= 0 otherwise

9 Track Data Subrecord (800 bpi)

(See Page 25)

Word 1



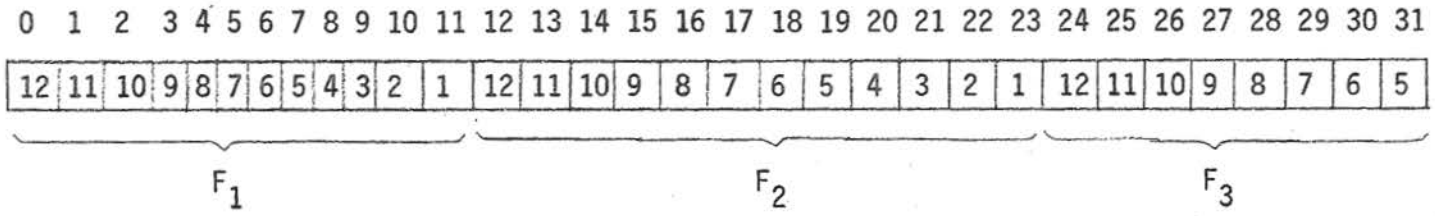
bits 4-31 = G.M.T. time (integer, milliseconds), GSFC data tape characters 30N + (37-42)
N = 0,1 31

* bit 1 = 1 if s/c word 17 is fill or End of Acquisition if bit 3 = 0
= 0 otherwise

\+ bit 2 = 1 if following data frames on original tape were completely fill
= 0 otherwise

** bit 3 = 1 experimenter data
= 0 orbit data

Word 2

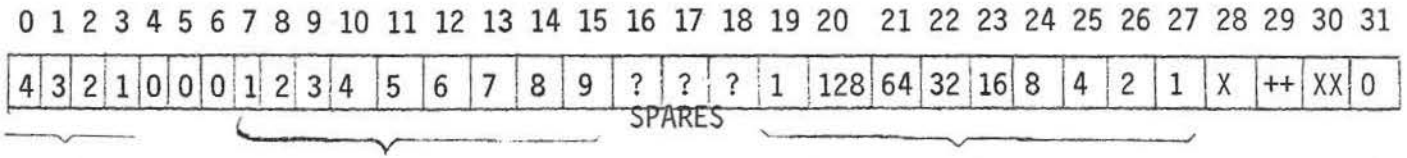


(Quality Control Status) (Time Status) (Data Status)

GSFC Data Tape Characters 30N + (43-48)
N = 0,1 31

FIGURE 3

Word 3



F_3 main com word 65 or s/c 65 (Subsystem data handling subcommutator position)

main com word 17 or s/c 17 (HTC status and channel)

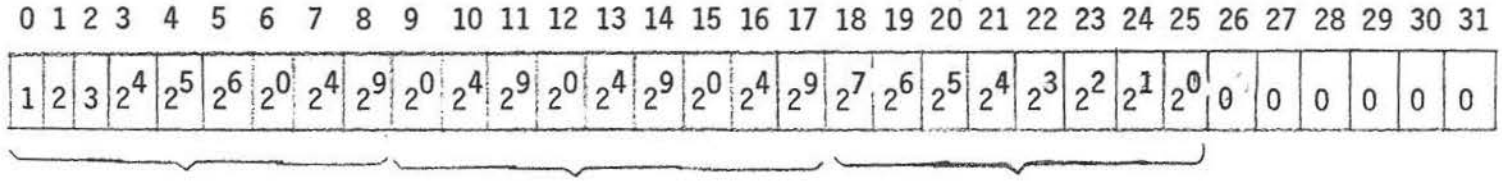
Last portion of Status Control Flag F3 obtained from GSFC data tape character 30N + 48. All other data on this page obtained from characters 30N + (55-66)
N = 0,1 31

X bit 28 = 1 if s/c 18 is fill
= 0 otherwise

++ bit 29 = 1 if s/c 81 is fill
= 0 otherwise

XX bit 30 = 1 if s/c 32 (analog rate meter) is fill
= otherwise

Word 4



main com word 18 or s/c 18

(Range, new event, mode, V_3 Rate, $V_1\overline{V_3}$ Rate)

main com word 81 or s/c 81

(H_1 Rate, $V_1V_2\overline{V_3}$ Rate, $V_2\overline{V_3}$ Rate)

V_3 s/c word 32 (digitization of analog rate meter, high order bit suppressed since it carried no information)

FIGURE 3
(continued)

TABLE 5

Bit	State	Representation for F1, Quality Control Status*
1-6		Total bit errors in the 27 bit frame sync word
7	1	This frame is fill data (all "nines")
8	1	This frame is the beginning of a subcomm sequence
9 10	0 0	This frame contains 4 kilobit real time data
9 10	0 1	This frame contains 16 kilobit real time data
9 10	0 1	This frame contains 64 kilobit real time data
9 10	1 1	This frame contains command storage playback data
11	1	This frame contains suspect data. This flag will appear when the bit errors in the frame sync word are > 3.
12	1	This frame contains corrected time (real time only)

*Computer determined

TABLE 6

Bit	State	Representation for F2, Time Status*
1	1	BCD decoded time agrees with the accumulating register
2	1	BCD decoded time disagrees with the accumulating register
1&10	1	BCD decoded time agrees with both the accumulating register and Serial Decimal decoded time. The experimenter can have good confidence in time when these flags appear
1&9	1	BCD decoded time agrees with the accumulating register but disagrees with SD decoded time
2&3	1	BCD decoded time disagrees with the accumulating register but agrees with SD decoded time. The experimenter should not have confidence in this time
2&4	1	BCD decoded time disagrees with both the accumulating register and SD decoded time. The experimenter should not have confidence in this time
5	1	SD decoded time agrees with accumulating register
6	1	SD decoded time disagrees with accumulating register
5&7	1	SD decoded time agrees with accumulating register but not with BCD decoded time
5&8	1	SD decoded time agrees with both the accumulating register and BCD decoded time. Again, the experimenter can have good confidence in time when these flags appear
6&7	1	SD decoded time disagrees with both the accumulating register and BCD decoded time. The experimenter should not have confidence in this time
6&8	1	SD decoded time disagrees with the accumulating reigster but agrees with BCD decoded time

Bit	State	Representation for F2, Time Status*
11		BCD to Binary converter circuit is in error. The experimenter should not have confidence in this time
12	0 or 1	Not used at present

*Time status flags are a hardware function rather than computer determined.

TABLE 7

Bit	State	Representation for F3, Data Status*
1-7		Subcomm count; 0-127
8	1	Lock mode; in frame sync
8	0	Flywell mode; still in lock but errors in frame sync exceed tolerance
9	1	In subcomm sync
9	0	Not in subcomm sync
10-12		Number of bit errors in frame sync word

*Data status flags are a hardware function rather than computer determined.

FIGURE 4

OGO SPACECRAFT INSTRUMENTATION LIST

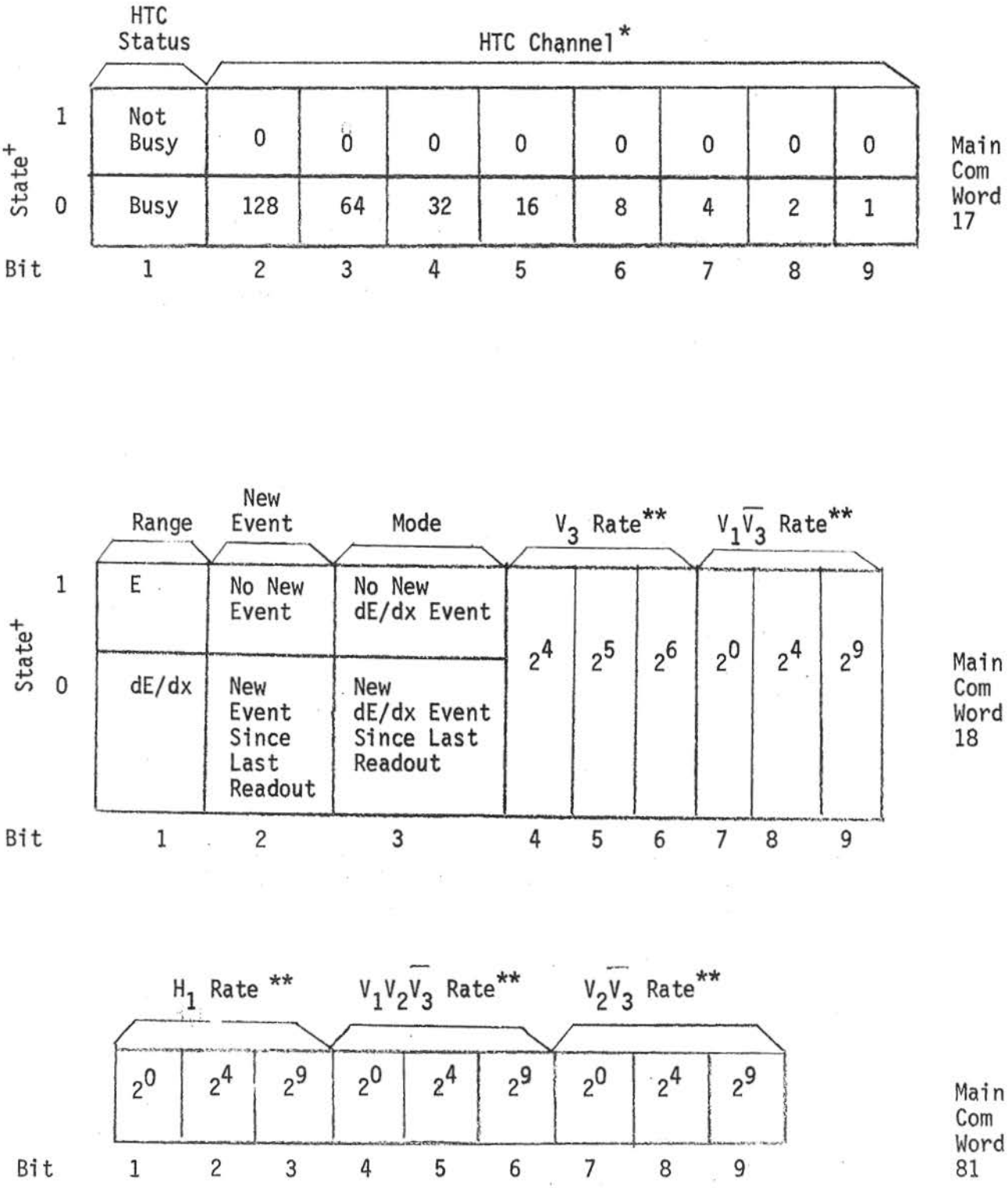
SUBSYSTEM DATA HANDLING

SUBCOMMUTATOR POSITION MAIN COM WORD 065 SELECT OCTAL WORD 100

SUB-COM POSITION

	1	2	3	4	5	6	7	8	9	
Octal Weight	One	Four	Two	One	Four	Two	One	Command Execute in Process*	EG-1 Real Time	1
Decimal Weight +1	64	32	16	8	4	2	1			
								No Command Execute in Process	EG-2 Real Time	0

*Remains Level 1 for 3 Frames Following Receipt of Command.



Notes

* HTC Channel is obtained by taking the two's complement of Bits 2 through 9 of Main Com Word 17.

FIGURE 5

Examples:

	Bit								
Apparent Channel	2	3	4	5	6	7	8	9	Actual Channel
255	0	0	0	0	0	0	0	0	0
0	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	0	2

↖— Called the "2's complement"

** All rates are specified in counts/transition

\+ Bit state = 1 when +5 volts appears on exp 5008 interface

FIGURE 6

TABLE 8

Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by	Digital Output	V3 Rate (counts/sec) OGO II	To Obtain OGO IV Data Multiply by
1	1		31	191	
2	4		32	200	1.25
3	10		33	208	
4	16		34	217	
5	22		35	227	
6	28		36	237	
7	34		37	247	
8	40		38	257	
9	47		39	267	
10	53		40	278	
11	59		41	288	
12	65		42	299	
13	71		43	311	
14	77		44	323	
15	83		45	335	
16	89		46	348	
17	95		47	362	
18	101	.85	48	376	
19	107		49	390	
20	113		50	405	1.45
21	119		51	425	
22	125		52	446	
23	131		53	468	
24	138		54	491	
25	145		55	515	
26	153		56	540	
27	161		57	567	
28	169		58	595	
29	176		59	624	
30	183		60	655	

TABLE 8
(continued)

Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by	Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by
61	691		91	3450	
62	729		92	3620	
63	769		93	3780	
64	811		94	3960	1.35
65	856		95	4140	
66	702		96	4330	
67	953		97	4520	
68	1005	1.40	98	4720	
69	1070		99	4930	
70	1140		100	5150	
71	1210		101	5370	
72	1280		102	5600	
73	1360		103	5830	
74	1440		104	6080	
75	1520		105	6330	
76	1610		106	6590	
77	1700		107	6850	
78	1800		108	7130	
79	1900		109	7410	
80	2000	1.35	110	7700	
81	2110		111	8000	
82	2220		112	8320	
83	2340		113	8640	
84	2460		114	8960	
85	2590		115	9300	
86	2720		116	9650	
87	2853		117	10000	1.20
88	3000		118	10300	
89	3140		119	10700	
90	3290		120	11000	

TABLE 8
(continued)

Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by	Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by
121	11400		151	24800	
122	11800		152	25300	
123	12200		153	25900	
124	12500		154	26400	
125	12900		155	27000	
126	13400		156	27600	
127	13800		157	28200	
128	14200		158	28800	
129	14600		159	29400	
130	15100		160	30000	
131	15500		161	30600	
132	16000		162	31200	
133	16400		163	31800	
134	16800		164	32500	
135	17200		165	33100	
136	17600		166	33800	
137	18100		167	34400	
138	18500		168	35100	
139	18900		169	35800	
140	19400		170	36500	
141	19800	1.05	171	37200	
142	20300		172	37900	
143	20800		173	38600	
144	21300		174	39400	
145	21700		175	40100	1.12
146	22200		176	40900	
147	22700		177	41600	
148	23200		178	42400	
149	23800		179	43200	
150	24300		180	44000	

TABLE 8

(continued)

Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by	Digital Output	V3 Rate(counts/sec) OGO II	To Obtain OGO IV Data Multiply by
181	44800		211	80000	
182	45600		212	82100	
183	46400		213	84500	
184	47200		214	87400	
185	48100		215	90600	
186	48900		216	96000	
187	50000		217	102000	.95
188	50700				
189	51600				
190	52400				
191	53400				
192	54300				
193	55200				
194	56100				
195	57100				
196	58000				
197	59000				
198	60000				
199	61000				
200	62000				
201	64000				
202	65600				
203	66800				
204	68000				
205	69700				
206	71000				
207	72800				
208	74300				
209	76000				
210	78000				

Table 9

ORBITAL/HOUSEKEEPING SUBRECORD FORMAT
FOR 7-TRACK CAL TECH ABSTRACT TAPES

Abstract Tape Word	Abstract Tape Character	Description	GSFC Data Tape Character	
1	01-02	Day Count	01-02	
1	03-06	Temperature (#1 & #2)	03-06	#1 Temperature of Horizontal Telescope
2	07-10	Temperature (#3 & #4)	07-10	#2 of Vertical Telescope
2	11-12	Bus Voltage	11-12	
3	13-18	Analog Calibration #1	13-18	#3 of Top 1/3 - X Surface
4	19-24	Analog Calibration #2	19-24	
5	25-26	Analog Calibration #3	25-26	#4 of Top 1/3 - Z Door
5	27-28	Bit Rate	27-28	
5	29-30	Spares	29-30	
6	31-34	Spares	31-34	
6	35-36	Orbit No (for OGO-IV) Spares (for OGO-II)	35-36	

		GSFC Orbital Tape Word	
7	Time (Day)	1	+125k
8	Milliseconds of day	2	+125k
9	Latitude	17	+125k
10	Longitude	18	+125k
11	Height	19	+125k
12	Anomaly	20	+125k
13	Sun-Earth-Satellite Angle	21	+125k
14-22	Actual Main Body Attitude	49-57	+125k
23-37	Geomagnetic Coord.	76-90	+125k
38-40	Magnetic Field	97-99	+125k
41-49	Solar-Ecliptic Coord.	100-108	+125k
50-52	Data Quality	123-125	+125k
			k=0,1

The information in abstract words 1-6 is derived from the GSFC Experiment Data immediately preceding (in GMT) the time of this orbital data.

TABLE 10

ORBITAL/HOUSEKEEPING SUBRECORD FORMAT

FOR 9-TRACK CAL TECH ABSTRACT TAPES

Abstract Tape

Word 1	Character	Bits		
	1	0	=	0
		1	=	End of Acquisition when Bit 3 = 0 which it always is for an Orbit/Housekeeping Record
			=	0 otherwise
		2	=	1 if following data frames are completely fill
			=	0 otherwise
		3	=	1 if this logical record is exp data
			=	0 if this logical record is orbit data
	2-4	4-15		Day Count (GSFC data tape character 1-2
	5-6	16-23		T_1 (temperature) (GSFC data tape character 3-4)
	7-8	24-31		T_2 (temperature) (GSFC data tape character 5-6)
Word 2	1-2	0-7		T_3 (temperature) (GSFC data tape character 7-8)
	3-4	8-15		T_4 (temperature) (GSFC data tape character 9-10)
	5-7	16-27		Bus Voltage (GSFC character 11-12)
	8	28-31		#1 Analog Calibration (GSFC data tape character 13 (1st four bits))
Word 3	1-8	1-31		#1 Analog Calibration (GSFC data tape character 13 (last 2 bits) - character 18)

Abstract Tape

	Character	Bits	
Word 4	1-8	1-31	#2 Analog Calibration (GSFC data tape character 19 - 24 (1st 2 bits)
Word 5	1	0-3	#2 Analog Calibration (GSFC data tape character 24 (last 4 bits)
	2-4	4-15	#3 Analog Calibration (GSFC data tape character 25-26)
	5-7	16-27	Bit Rate (GSFC data tape character 27-28)
	8	28-31	Spares
Word 6	1-5	0-9	Spares
	6-8	20-31	Orbit No.

The information in abstract words 1-6 is derived from the GSFC Experiment Data immediately preceding the time (in GMT) of this orbital data.

Abstract tape words 7-52 (the rest of the orbital data) are stored in the same order as in Table ~~1~~ 9 for 7-track tapes (page ~~23~~ 34) except they are stored double precision (360-type double words). Data comes from GSFC Orbital Tape.

Schematic of POGO Abstract Tape

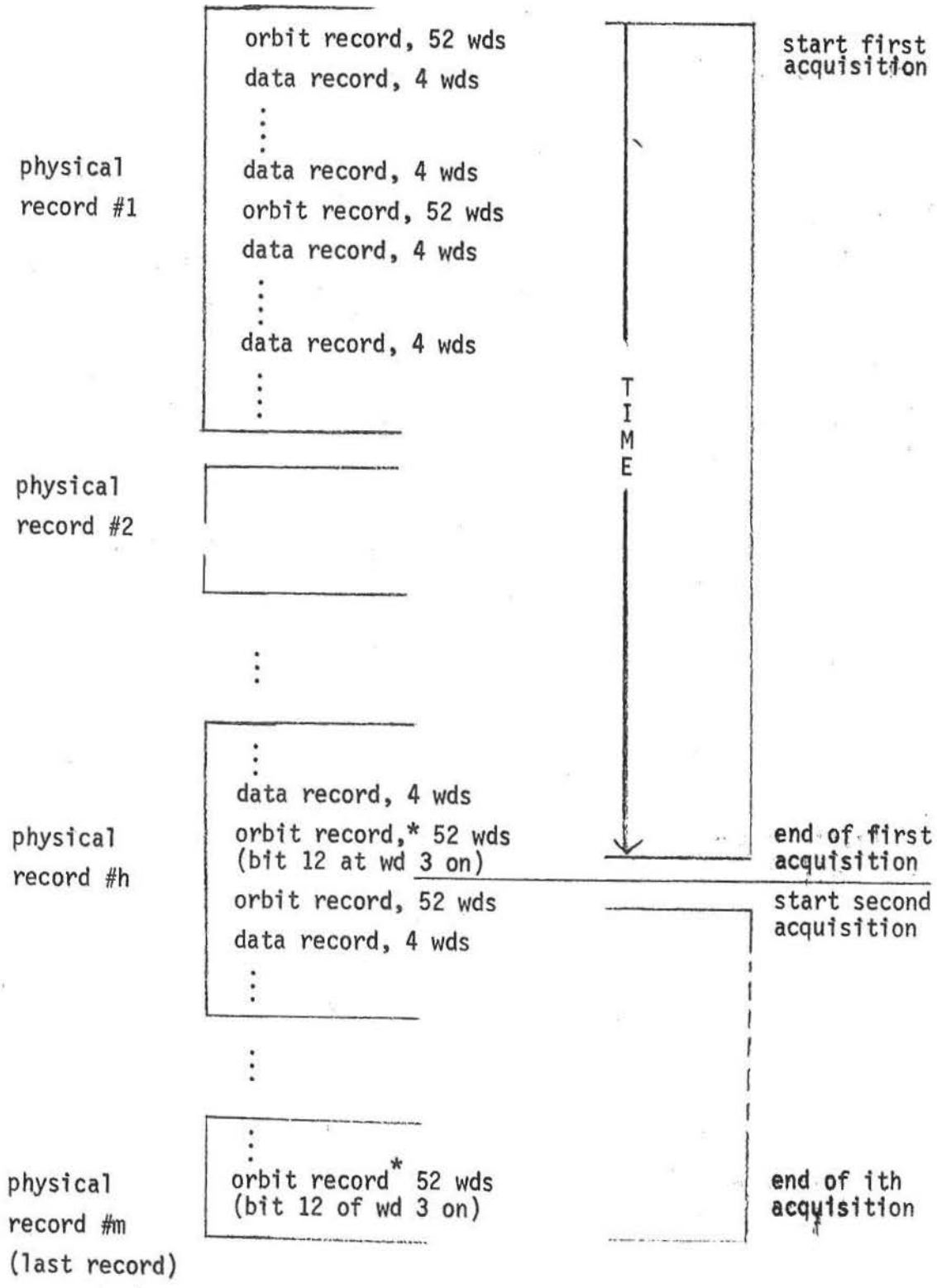


FIGURE 7