LIBRARY ORGANIZATION

The library consists of encyclopedias.

Encyclopedia is organized into volumes.

Each volume is defined by a fifteen-minute interval that starts at integral fifteen-minute boundary, i.e., on the hour, fifteen minutes after the hour, thirty minutes after the hour, and forty-five minutes after the hour. The clock used for the purpose of determining time is the Universal time at the spacecraft. Each volume is assigned a unique number which is the number of fifteen-minute intervals elapsed before the volume since the start of calendar year 1977. A volume comprises of an integral number of instrument subcom sequences, and therefore may contain experiment data for a time interval which differs from the time interval of the volume by as much as one subcom sequence. A volume begins with an introduction which identifies the volume and provides information regarding volume contents. Following the introduction, there may be one or more chapters.

A chapter contains data obtained under the same instrument conditions (status, analog), and begins with an introduction. The introduction identifies the chapter and provides a general description of chapter contents, and conditions that may have led to the creation of this chapter. A chapter is terminated when either a change in experiment status occurs, or there is a gap in the data. Chapter introduction identifies the actual start-time and end-time of data included in the chapter. A number of verses follow the chapter introduction.

A verse contains all data of a specified type that was acquired within the time span covered by the chapter. Each verse begins with a preface that identifies the verse as belonging to a particular chapter of a volume and describes the type of data contained in the verse. The data follows the preface in a format appropriate to the type of data.

0.0 VOLUME INTRODUCTION

Byte	Length	Name	Description
0	1	VOCHPN	Chapter number ($\equiv 0$)
1	1	VOVERN	Verse number ($\equiv 0$)
2	1	EPV	Encyclopedia Program Version
3	1	SCID	Satellite Identification
4	4	VOVOLN	Volume number
8	6	EPDT	Encyclopedia Program Date
8	2	EPYR	(Year - 1900)
10	2	EPMN	Month of year
12	2	EPDY	Day of month
14	6	VCDT	Volume Creation Date
14	2	VCYR	(Year - 1900)
16	2	VCMN	Month of year
18	2	VCDY	Day of month
20	10	VSTRT	Time of Volume (Start Time)
20	2	VSYR	(Year - 1900)
22	2	VSMN	Month of year
24	2	VSDY	Day of month
26	2	VSHR	Hour of day
28	2	VSMN	Minute of hour
30	2		Spare
→ 32	2	NMCHP	Number of chapters in the volume (may be zero)
→ 34	52	APRMV	Twenty-six 2-byte fields, one for each of the analog parameters, that define acceptable range of variation of the parameters. Byte 0 - minimum acceptable value 1 - maximum acceptable value For parameters for which a percentage change is acceptable, byte 0 is set =255, and byte 1 contains acceptable variation, in parts per 256.

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Byte	Length	Name	Description
→ 86	8	CHSMC	Subject matter code for each of the chapters in the volume. One byte field identifies each of the chapters in the volume according to the following code:

Bit 0 - 0-nominal conditions wrt status
            1-other conditions wrt status

    1 - 0-real data
         1-calibration data

    2 - 0-analog parameters within tolerance
         1-unusual (perhaps unacceptable) values of analog parameters

    3 - 0-no time gap
         1-time gap in data

    4 - 0-no change in mode
         1-change in S/C data mode

    5-7 Spare bits

Byte	Length	Name	Description
→ 94	1	DQAON	Data quality acceptance ON mask
→ 95	1	DQAOF	Data quality acceptance OFF mask
→ 96-99	4		Spare

n.0 <u>CHAPTER INTRODUCTION</u> $n \geq 1$

Byte	Length	Name	Description
0	1	CHCHPN	Chapter Number (≥ 1)
1	1	CHVERN	Chapter Verse Number - 0
2	1		Spare
3	1	CCHSMC	Subject Matter Code
4	4	CHVOLN	Volume Number

Byte	Length	Name	Description
8	8	DTSTRT	Starting S/C time of data included
8	2	DTYR	Year - 1900
10	2	DTHR	Hour of year
12	2	DTSC	Second of hour
14	2	DTMSC	Millisecond of second
16	8	DTEND	Ending S/C time of data
16	2	ENDYR	Year - 1900
18	2	ENDHR	Hour of year
20	2	ENDSC	Second of hour
22	2	ENDMSC	Millisecond of second
24	8	FDSCTR	Start FDS Count
24	2		Spare
26	2	CTR16	2^{16} Counter
28	2	CTR60	Mod 60 Counter
30	2	CTRLIN	Line count
32	2	DMOD	Format code of data in this chapter
34	2	NMVER	Number of verses in this chapter
36	100	CHCN	Chapter Contents Table nth byte of this field points to the verse containing nth type of data
136	2	CMDF	0 - no command received 1 - command received
138	2	CMD	Command text
140	32	STAT	Status words 0-15 that define chapter contents. Low order 12 bits of each 16-bit word contain status word. The structure of high order 4 bits follows:

Byte	Length	Name	Description
			Bit 0 PN error outside BET 0 – none 1 – bit errors exceed BET
			Bit 1 Valid data flag 0 – valid 1 – no data
			Bit 2 GCF Block error 0 – no 1 – yes
			Bit 3 0 – status read out in this chapter 1 – status inferred
172	48	AMX	Analog parameters (MUX) low order byte – value high order byte 0 – value read out in this chapter 1 – value inferred 2 – value not available
220	2	TTMP	Telescope temperature (format as with AMX)
222	2	ETMP	Electronics temperature (format as with AMX)
224-227	4		Spare

n. m   __VERSE__   (n, m ⩾ 1)

__Verse Preface__ (Length = 8 bytes)

Byte	Name	Description
0	VECHPN	Chapter number
1	VEVERN	Verse number
2		Spare

Byte	Name	Description
3	VESMC	Subject matter code – Data Type (See Table 1.)
4-7	VEVOLN	Volume number
8-11		Spare
12		Verse body – Data

PREVERSE = offset of data = 12

Data Type 0 – Raw Rates Data

	Name	Description	Length (bytes)
PREVERSE+0	CMPS	Commutator position for the first set of rate readouts	1
+1	CMPS	Commutator position for the first set of rate readouts	1
+2	GAIN1	HET1 gain mode for the first set of readouts (0=low gain; 1=high gain)	1
+3	GAIN2	HET2 gain mode	1
+4	AUTO1	HET1 automatic gain switching (0=yes; 1=no)	1
+5	AUTO2	HET2 automatic gain switching	1
+6	NSEQ	Number of rate sequences in the verse	2
+8	RATE	30*NSEQ rate words in the format in Table 3	

Data Type 1 – Coincidence Condition Map   (Length = 112 bytes)

PREVERSE+0	CCM	One 16-bit word for each of the first 53 rates in Table. Each word indicates the presence of terms in coincidence condition applicable to the corresponding rate.

Data Type 1 (continued)

	Name	Description	Length (bytes)
PREVERSE+106		Spare	6

Data Type 2 – Rate Summary

	Name	Description	Length (bytes)
PREVERSE+0	RSM	135 rate summary blocks (16 bytes each) corresponding to the rates in Table 5	135x16

Data Type 3 – PHA History

	Name	Description	Length (bytes)
PREVERSE+0	NUMPHA	Number of PHA events in this chapter	4
+4		Spare	
+8	EVNTYP	One byte field for each of the 16 PHA events that preceded the first PHA event in this chapter. Each byte contains the data type of the corresponding event. In the event of data discontinuity between previous volume and the current volume, these fields are padded.	16
+24		One byte field for each event in this chapter. Byte contains data type of the event. (Padded=all bits on; Null event=all bits off) Record filled to double-word boundary.	

Data Types 4–26

	Name	Description	Length (bytes)
PREVERSE+0	PHARAT	Rate summary block for the corresponding rate	16
+16	PHAEV	Number of events corresponding to data type	4
+20		Spare	4
+24	PHA	PHA events; 8-byte entry for each event in the format in Table 6	

TABLE 1. DATA TYPES

Code	Description
0	Raw rates
1	Coincidence condition map
2	Rate Summary
3	PHA History
4	HET-I AS
5	HET-I ASZ3
6	HET-I BSZ2
7	HET-I BSP
8	HET-I BSE
9	HET-I PENL
10	HET-I PENH
11-17	HET-II corresponding to 4-10
18	LET-A Z3*
19	LET-A Z3
20	LET-B Z3*
21	LET-B Z3
22	LET-C Z3*
23	LET-C Z3
24	LET-D Z3*
25	LET-D Z3
26	TET

TABLE 2. BIT ASSIGNMENTS FOR COINCIDENCE CONDITION MAP

Bit	HET	LET	TET
0	A_1	L_1	W_1
1	A_2	L_2	W_2
2	C_1	L_3	D_{3L}
3	C_2	L_4	D_4
4	C_3	SL	$D_5 \equiv 1$
5	C_4	0	$D_6 \equiv 1$
6	B_2	0	D_7
7	B_1	0	D_8
8	SA	0	GA
9	SB	0	GB
10	G_1	0	U_T
11	G_2	0	0
12	G_3	0	0
13	0	0	0
14	0	0	0
15	0	0	0

1 in a bit position implies that corresponding term is present. Whether coincidence/anti-coincidence is determined by the rate definitions.

Bit 15 is set if the data type is disabled.

TABLE 3. RATE WORD FORMAT

Byte	Bit	Description
0	0	Fill data flag (0=no fill; 1=fill)
	1	PN error outside BET (0=none; 1=bit errors exceed BET)
	2	Valid data flag (0=valid; 1=no data)
	3	GCF Block error (0=no; 1=yes)
	4	Trend-check indicator 0 = readout follows trend 1 = readout does not follow trend
	5-7	Spare
1-3		Decompressed Rate Counts

TABLE 4. RATE SUMMARY BLOCK FORMAT

Byte	Description
0-3	Accumulated counts for this rate, excluding readouts which (a) appeared in a minor frame for which bit errors exceeded tolerance, or (b) failed trend check.
4-7	Time in seconds over which the counts above were accumulated.
8-11	Accumulated counts for this rate, excluding readouts for which data quality was unacceptable or gain mode was unavailable.
12-15	Time in seconds over which the counts in the preceding word were accumulated.

TABLE 5. LOCATION OF RATE SUMMARY BLOCKS IN RATE SUMMARY TEXT

1	AS	51	TAN	101	SLB
2	ASZ3	52	TLO	102	$LA_1 LA_2 LA_3 \overline{LA}_4$
3	BSe	53	THI	103	$LB_1 LB_2 LB_3 \overline{LB}_4$
4	BSp	54	A1H	104	LB_1
5	BSZ2	55	A2H	105	LB_2
6	PENH	56	C1H	106	LB_3
7	PENL	57	C2H	107	LB_4
8	PGH	58	B1H	108-119	LETC, LETD (cor... ponding to 96-...
9	PGL	59	SBH		
10	BS4e	60	C3H	120-135	TET singles
11	BS4p	61	C4H		
12	$BS4\overline{Z2}$	62	B2H		
13	BS4Z2	63	G1		
14	BS3e	64	A1L		
15	BS3p	65	A2L		
16	$BS3\overline{Z2}$	66	C1L		
17	BS3Z2	67	C2L		
18	BS2e	68	B1L		
19	BS2p	69	SA1		
20	$BS2\overline{Z2}$	70	SA2		
21	BS2Z2	71	SBL		
22-42	HET-II (corresponding to 1-21)	72	C3L		
		73	C4L		
43	$LA\overline{Z3}$	74	B2L		
44	LAZ3	75-95	HET-II (corresponding to 54-74)		
45	$LB\overline{Z3}$				
46	LBZ3	96	LA_1		
47	$LC\overline{Z3}$	97	LA_2		
48	LCZ3	98	LA_3		
49	$LD\overline{Z3}$	99	LA_4		
50	LDZ3	100	SLA		

TABLE 6.   PHA EVENT FORMAT

Byte	Bit	Description
0-1	0	PN error outside BET 0 = none 1 = bit errors exceed PN
	1	Valid data flag 0 = valid 1 = no data
	2	GCF Block error 0 = no 1 = yes
	3	Spare
	4-15	TAG_1
2-3	0-3	0
	4-15	PHA_3 (For TET TAG_2)
4-5	0-3	0
	4-15	PHA_2
6-7	0-3	0
	4-15	PHA_1