

MINOR FRAME NO.	WORD 8										WORD 9										WORD 10										WORD 11									
	7	6	5	4	3	2	1	0			7	6	5	4	3	2	1	0			7	6	5	4	3	2	1	0			7	6	5	4	3	2	1	0		
	R122	R121	R120	R119	R118	R117	R116	R115			T12	T11	T10	T9	T8	T7	T6	T5			T4	T3	T2	T1	(MSB)	(LSB)					PHA ADDRESS 3									
0	R14	R13	R12	R11	R10	R9	R8	R7																																
1	R14	R13	R12	R11	R10	R9	R8	R7																																
2	R14	R13	R12	R11	R10	R9	R8	R7																																
3	R220	R219	R218	R217	R216	R215	R214	R213																																
4	R212	R211	R210	R209	R208	R207	R206	R205																																
5	R24	R23	R22	R21	R20	R19	R18	R17																																
6	R318	R317	R316	R315	R314	R313	R312	R311																																
7	R310	R309	R308	R307	R306	R305	R304	R303																																
8	R32	R31	R422	R421	R420	R419	R418	R417																																
9	R416	R415	R414	R413	R412	R411	R410	R409																																
10	R48	R47	R46	R45	R44	R43	R42	R41																																
11	R522	R521	R520	R519	R518	R517	R516	R515																																
21																																								
22	R922	R921	R920	R919	R918	R917	R916	R915																																
32																																								
33	R1322	R1321	R1320	R1319	R1318	R1317	R1316	R1315																																
43																																								
44																																								
45	SR(1)20	SR(1)19	SR(1)18	SR(1)17	SR(1)16	SR(1)15	SR(1)14	SR(1)13																																
46	SR(1)12	SR(1)11	SR(1)10	SR(1)9	SR(1)8	SR(1)7	SR(1)6	SR(1)5																																
47	SR(1)4	SR(1)3	SR(1)2	SR(1)1	SR(1)0	SR(2)20	SR(2)19	SR(2)18																																
48	SR(2)16	SR(2)15	SR(2)14	SR(2)13	SR(2)12	SR(2)11	SR(2)10	SR(2)9																																
49	SR(2)8	SR(2)7	SR(2)6	SR(2)5	SR(2)4	SR(2)3	SR(2)2	SR(2)1																																
50	SR(3)20	SR(3)19	SR(3)18	SR(3)17	SR(3)16	SR(3)15	SR(3)14	SR(3)13																																
51	SR(3)4	SR(3)3	SR(3)2	SR(3)1	SR(4)20	SR(4)19	SR(4)18	SR(4)17																																
52																																								
53																																								
54	SR(5)20	SR(5)19	SR(5)18	SR(5)17	SR(5)16	SR(5)15	SR(5)14	SR(5)13																																
55	SR(5)4	SR(5)3	SR(5)2	SR(5)1	SR(6)20	SR(6)19	SR(6)18	SR(6)17																																
56																																								
57																																								
58																																								
59	SR(7)20	SR(7)19	SR(7)18	SR(7)17	SR(7)16	SR(7)15	SR(7)14	SR(7)13																																
60																																								
61																																								
62																																								
63																																								

"C"	C1	C3	C2+C4
0	0	0	0
1	1	0	0
2	1	0	1
3	1	1	0
4	0	0	1
5	0	1	0
6	0	1	1
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0
33	0	0	0
34	0	0	0
35	0	0	0
36	0	0	0
37	0	0	0
38	0	0	0
39	0	0	0
40	0	0	0
41	0	0	0
42	0	0	0
43	0	0	0
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	0	0	0
49	0	0	0
50	0	0	0
51	0	0	0
52	0	0	0
53	0	0	0
54	0	0	0
55	0	0	0
56	0	0	0
57	0	0	0
58	0	0	0
59	0	0	0
60	0	0	0
61	0	0	0
62	0	0	0
63	0	0	0

"G"	G2	G1	G3
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	0	0	0
9	0	0	0
10	0	0	0
11	0	0	0
12	0	0	0
13	0	0	0
14	0	0	0
15	0	0	0
16	0	0	0
17	0	0	0
18	0	0	0
19	0	0	0
20	0	0	0
21	0	0	0
22	0	0	0
23	0	0	0
24	0	0	0
25	0	0	0
26	0	0	0
27	0	0	0
28	0	0	0
29	0	0	0
30	0	0	0
31	0	0	0
32	0	0	0
33	0	0	0
34	0	0	0
35	0	0	0
36	0	0	0
37	0	0	0
38	0	0	0
39	0	0	0
40	0	0	0
41	0	0	0
42	0	0	0
43	0	0	0
44	0	0	0
45	0	0	0
46	0	0	0
47	0	0	0
48	0	0	0
49	0	0	0
50	0	0	0
51	0	0	0
52	0	0	0
53	0	0	0
54	0	0	0
55	0	0	0
56	0	0	0
57	0	0	0
58	0	0	0
59	0	0	0
60	0	0	0
61	0	0	0
62	0	0	0
63	0	0	0

TAGS	PHA 1	PHA 2	PHA 3
AST:	SCTR 1	SCTR 2	SCTR 3
	EVENT ID	EVENT ID	EVENT ID
	SCTR 1	SCTR 2	SCTR 3
	TEL ID	TEL ID	TEL ID
	HG	HG	HG
	G1	G1	G1
	G2	G2	G2
	G3	G3	G3</

ISSE HET RATE TABLE

COUNTER	RATE	HG I	HG II	S1	S2	S3	S4	DET.
R1	$A_1(A_2)(\bar{C}_4)(\bar{G}_1)\bar{G}_2$		1					
R2	$A_1(A_2)SA(\bar{C}_4)\bar{G}_3$	0						
	$B_1(B_2)SB(\bar{C}_1)(\bar{G}_1)\bar{G}_2$			3/4 S*				
	$B_1(B_2)(C_4)SB(\bar{C}_1)\bar{G}_1$	1		1/4 *				
	$B_1(B_2)SB(\bar{C}_1)\bar{G}_3$	0						
R3	$B_1(B_2)(C_1)$	-						
R4	$B_1(B_2)(C_1)\bar{G}_1$	-						
R5	$B_1(B_2)(C_4)(\bar{C}_3)SB\bar{G}_1$	-	0					
	$B_1(B_2)(C_4)(\bar{C}_3)SB\bar{G}_1$	-	1					HET-II
R6	$B_1(B_2)(C_4)(C_3)\bar{C}_2SB\bar{G}_1$	-	0					
	$B_1(B_2)(C_4)(C_3)\bar{C}_2SB\bar{G}_1$	-	1					
R7	$B_1(B_2)(C_4)(C_3)\bar{C}_2(\bar{C}_1)SB\bar{G}_1$	-	0					
	$B_1(B_2)(C_4)(C_3)\bar{C}_2(\bar{C}_1)SB\bar{G}_1$	-	1					
R8	A_1	-	0	0	0	0	0	
	A_2	-	1	0	0	0	0	
	C_1	-	0	1	0	0	0	
	C_2	-	1	1	0	0	0	
	B_1	-	0	0	1	0	0	
	SA_1	-	1	0	1	0	0	
	SA_2	-	0	1	1	0	0	
	SB	-	1	1	1	1	0	
	C_3	-	0	0	0	0	1	
	C_4	-	1	0	0	1	0	
	B_2	-	0	1	0	1	0	
	G_1	-	1	1	0	1	0	
	B_1	-	0	0	1	1	1	
	SA_1 } REPEAT BLOCK	-	0	1	0	1	1	
	SA_2	-	0	1	1	1	1	
	SB	-	1	1	1	1	1	
R9-R16	IDENTICAL TO R1-R8	-	-	-	-	-	-	HET-I
SR	$a A_1(A_2)(\bar{C}_4)(\bar{G}_1)\bar{G}_2$	1	0	0	0	0	0	HET-II
	$b B_1(B_2)SB(\bar{C}_1)(\bar{G}_1)\bar{G}_2$	1	0	1	0	0	0	
	$c B_1(B_2)(C_4)SB(\bar{C}_1)(\bar{G}_1)\bar{G}_2$	1	0	0	1	0	0	
	$d B_1(B_2)(C_4)(\bar{C}_1)SB(\bar{G}_1)\bar{G}_2$	1	0	1	1	0	0	
	REPEAT a, b, c, d FOR HET-I	1	1	1	1	1	1	HET-I
	$e A_1(A_2)SA(\bar{C}_4)\bar{G}_3$	0	0	0	0	0	0	HET-II
	$f A_1(A_2)SA(\bar{C}_4)\bar{G}_3$	0	1	0	0	0	0	HET-I
	$f B_1(B_2)SB(\bar{C}_1)\bar{G}_2$	0	0	0	0	0	0	HET-II
	REPEAT f FOR HET-II	0	1	1	0	0	0	HET-I

NOTES:

R1, R9 RATES CORRESPOND TO THE A-STOPPING EVENT TYPE FOR HETS I AND II.

* R2, R10 RATES CORRESPOND TO THE B-STOPPING EVENT TYPE FOR HETS I AND II (IN HIGH GAIN THE B-STOPPING EVENT TYPE DEFINITION IS TIME MULTIPLEXED FOR 3/4 AND 1/4 OF THE TIME BETWEEN TWO DEFINING CONDITIONS; $1/4 \equiv S_1 = S_2 = 1$)
R3, R11 = PEN

$SA = SA_1 \cdot SA_2$

(~) = DENOTES TERMS WHICH MAY BE DELETED FROM LOGICAL EXPRESSIONS BY COMMAND.

HG = 0 $\Rightarrow$ LOW GAIN; HG I $\Rightarrow$ HET I; HG II $\Rightarrow$ HET II
HET I AND HET II GAINS ARE THE SAME WHEN IN AUTOMATIC GAIN CHANGING MODE BUT EACH MAY BE COMMANDED TO A FIXED GAIN INDEPENDENTLY.

NOTE REPEAT BLOCK FOR SINGLES RATES; E.G. IN ONE FULL SUBCOM CYCLE THE BI SAMPLE TIME IS TWICE THAT FOR, SAY, B2.

NOTE: NO () AROUND $\bar{G}_3$, UNLIKE MJS.

ALL RATE EQUATIONS CONTAIN A STROBE TERM TO ESTABLISH A COINCIDENCE APERTURE OF $\sim 3 \mu$ SEC. THE STROBE OCCURS 5.5μ SEC AFTER THE FIRST OF THE FOLLOWING BECOMES TRUE: $A_1, B_1, (B_2), (C_1), (C_4)$

BIT STATES : BLANK $\Rightarrow$ NOT RELEVANT
- $\Rightarrow$ 0 OR 1

BITS HG I, HG II, S1, S2, S3, S4 ARE QUOTED HERE FOR ACCUMULATE TIME; RATES ARE ACCUMULATED DURING ONE 64 MINOR FRAME BLOCK AND READ OUT IN THE NEXT 64 MINOR FRAME BLOCK; THE STATES OF BITS HG I, HG II, S1, S2, S3, S4 READ OUT IN A 64 MINOR FRAME BLOCK CORRESPOND TO THE RATES IN THE FOLLOWING 64 MINOR FRAME BLOCK.

DELETION OF (C_1) IS CONTROLLED BY THE SAME COMMAND BIT AS FOR DELETION OF $(\bar{C}_1)$ AND SIMILARLY FOR (C_4) AND $(\bar{C}_4)$. A SINGLE COMMAND BIT CONTROLS DELETION OF $(\bar{G}_1)$ TERMS IN R1 AND HET-II SECTOR RATES; A SEPARATE COMMAND BIT CONTROLS DELETION OF $(\bar{G}_1)$ TERM IN R2; SIMILARLY FOR HET-I.

1SEE flares

IBSP + IPENH outputs

1978/8/14 on

Sept 8 - 10	1978	IBSP	79 Jun 6 - 13 BSP
23 - 29		both Pen	6 - 9 pen
23 - Oct 20		BSP	Jun 25 - 28 BSP
Nov 10 - 14		IBSP	July 5 - 15 BSP
✓ - Dec 11 - 16		IBSP	6 - 9 pen
✓ - Dec 30 - Jan 1, 1979		IBSP	Aug 3 - Sept 3 BSP
⊗ Jan 5 - 8		IBSP	Aug 3 - 10 pen
✓ - Jan 21 - 23		IBSP	Aug 19 - 29 pen
Feb 16 - 21		pen	Sept 8 - 28 pen
16 - 24		BSP	8 - 4 Oct Bsp
Mar 1 - 20		IBSP	Nov 5 - 25 BSP
Apr 3 - 17		both	Nov 15 - 16 pen
Apr 13 - 14		BSP	

then Dec 79 ok

Het I no IAS after ~ Aug 78

Hets have saturation problems

Het II turned off ~ July 1978, back on ~ 7 mths later

12/13

ISSE-C

Bit rates:

2048 IBPS (nominal)

 $\frac{64 \text{ mf.}}{32 \text{ sec.}}$

1024 IBPS

64 sec.

512 IBPS

128 sec.

Spin period: Nominal spin is 3 sec.

Sectoring is initiated with a sun spike, accumulated for 8 spins at nominal bit rate (2048 IBPS).

<u>bit rate</u>	<u># spins accumulated</u>	<u>≈ total time</u>
2048	8	24 sec.
1024	16	48 sec.
512	32	96 sec.

VLET: (complete subcom cycle = 512 mf.)

Nonsectored rates — (24 bits ea.)

For each telescope, 9 rates:

~~D~~ ($D \equiv D_I D_{II} \bar{F}$)

$D \Sigma_1$	8	readouts / 512 mf.	$8 \times 64 \text{ mf.}$ (4 min.)
$D \Sigma_2$	8	"	
$D \Sigma_1 E_1$	4	"	
$D \Sigma_2 E_2$	4	"	
D	4	"	
D_I	1	"	
D_{II}	1	"	
E	1	"	
F	1	"	

8 rate readouts per 64 mf., identified by subcom position sample from previous 64-mf. data block.

Sectored rates — (24 bits ea.)

For each telescope, 2 sectored rates ($\times 8$ sectors each)

$D \Sigma_1$	2 readouts / 512 mf.
D	"

1 complete sectored rate (8 readouts) per 64 mf., identified by previous subcom.

missing: spin period

VLBT (cont'd)

PHA data — frequency = 1 event / 2 m.f.

each PHA event consists of:

DI	-	11 bits	(null if DI=0)
DII	-	11 bits	
E	-	10 bits	
P ₀	-	1 bit	(event type)
P ₁	-	1 bit	(telescope #)

Other tag info: ~~events~~

CAL ALLOW	-	1 bit	once once per 16 m.f.)
CAL START	-	1 bit	(once per 4 m.f.)
TEL 1 PHA EN	-	1 bit	"
TEL 2 PHA EN	-	1 bit	"
VLBT SUBCOM	-	3 bits	(once per 16 16 m.f.)

Housekeeping Data

		reads/512 m.f.	
VLBTs thermistor	8	WD 122 step 19	
VLBTs power monitor	8	WD 58, step 53	
+12 V	1	WD 58, step 51, ^{subsec} 0	
+6 V	1	"	1
thermistor 3	1	"	2
thermistor 4	1	"	3
spare 1	1	"	4
spare 2	1	"	5
-6 V	1	"	6
-12 V	1	"	7

$$\begin{pmatrix} A_1 & A_2 & C_1 & C_2 & C_3 & C_4 & B_2 & B_1 \\ & & & & & & & \end{pmatrix}$$

4

16 x 64 uf.

HET: (complete subsec cycle = 1024 uf.)

Nonsectored rates — (22 sites ea.)

For each telescope, we have the following 45 rates (for high gain and low gain):

	High Gain		Low Gain	
AST	$A_1 A_2 \bar{C}_4 \bar{G}_1 \bar{G}_2$	1	$A_1 A_2 S A \bar{C}_4 \bar{G}_3$	AST
BST	$B_1 B_2 S B \bar{C}_1 \bar{G}_1 \bar{G}_2$	12	$\left. \begin{matrix} B_1 B_2 S B \bar{C}_1 \bar{G}_3 \\ B_1 B_2 S B \bar{C}_2 \bar{G}_3 \end{matrix} \right\}$	BST
BST	$B_1 B_2 C_4 \bar{S} B \bar{C}_1 \bar{G}_1$	4		
P	$B_1 B_2 C_1$	16	$\longleftrightarrow$	
P	$B_1 B_2 C_1 \bar{G}_1$	16	$\longleftarrow$	
BST	$B_1 B_2 C_4 \bar{C}_3 \bar{S} B \bar{G}_1$		$\longleftarrow$	
BST	$B_1 B_2 C_4 \bar{C}_3 \bar{S} B \bar{G}_1$		"	
BST	$B_1 B_2 C_4 C_3 \bar{C}_2 \bar{S} B \bar{G}_1$		"	
BST	$B_1 B_2 C_4 C_3 \bar{C}_2 \bar{S} B \bar{G}_1$		"	
BST	$B_1 B_2 C_4 C_3 C_2 \bar{C}_1 \bar{S} B \bar{G}_1$		"	
BST	$B_1 B_2 C_4 C_3 C_2 \bar{C}_1 \bar{S} B \bar{G}_1$		"	
	A_1	1		
	A_2	1		
	B_1	1		
	B_2	1		
	C_1	1		
	C_2	1		
	C_3	1		
	C_4	1		
	$S A_1$	2		
	$S A_2$	2		
	$S B$	2		
	G_1	1		

511525

(25) different

23

22

16 rate readouts per 64 uf., identified by current gain sites and subsec from previous 64. uf. block.

Sector rates - (20 Sits each)

For each telescope, we have 5 sector rates
(x 8 sectors each)

High Gain

Low Gain

AST	$A_1, A_2, \bar{C}_4, \bar{G}_1, \bar{G}_2$	2	$B_1, B_2, SB, \bar{C}_1, \bar{G}_2$	8	BST
BST	$B_1, B_2, SB, \bar{C}_1, \bar{G}_2$	2			
BST	$B_1, B_2, C_4, SB, \bar{C}_1, \bar{G}_2$	2			
BST	$B_1, B_2, C_4, \bar{C}_1, SB, \bar{G}_1, \bar{G}_2$	2			

1 complete sector rate (8 redundant)
per 64 int., identified by current gain
bits and previous subcom.

$A_1, A_2, C_1, C_2, C_3, C_4, B_1, B_2$
|| || || || || || || ||

PHA Data - frequency - 1 event/2 int.

each PHA event consists of:

	AST	BST	Pen
PHA1	A_1	B_1	B_1
PHA2	A_2	B_2	C_1
PHA3	C_{123}	C_{234}	C_{234}
TAGS	- 12 Sits :		

	TAG Sit	item
(1-12)	1-3	$C_2 \oplus C_4, C_3, C_1$
	4	SA
	5, 6	$G_1, G_2, \bar{G}_3$
	7	tel id,
	8	HG
	9, 10, 12	sector id
	11	event id,

Housekeeping :

COMMANDS

STATUS	- 48 Sits
SUBCOM	- 5 Sits
GAINS	- 2 Sits
CAL	- 1 Sit

HETS therm. - 8 Sits
HETS Pwr mon - 8 Sits

(wd. 122, step 17)
(wd 58, step 52)

MJS-15RT data base:

Volume = 15 min (interval # subcom sequences) ^{64 int.}
chapter — continuous data under same conditions
verse — data of special type

Volume Intro — (95 Syts)

How many analog pairs? (MJS = 26)

What are ~~the~~ acceptable ranges?

How many chapters? (8 potential?)

Chapter Intro — (108 Syts)

time, command, analog pairs (24)

Verse Preface

gain for 145 ~~set~~ set, auto switching

$$50 \times (22 \text{ Syts})$$

$$10 \times 8 \times (20 \text{ Syts})$$

$$18 \times (24 \text{ Syts})$$

$$4 \times 8 \times (24 \text{ Syts})$$

25 Het-I, 25-Het-II

5(x8) Het-I second, 5(x8) Het-II

9 VIRT-I, 9 VIRT-II

2(x8) VIRT-I second 2(x8) VIRT-II

$$\begin{aligned} \# \text{ full words} &= 50 + 10 \times 8 + 18 + 4 \times 8 \\ &= 50 + 80 + 18 + 32 \\ &= \underline{\underline{180 \text{ RATE words}}} \end{aligned}$$

(68 min-second)

(14x8 = 112 second)

If Hg of L.G., 100 HRT

=> 230 rate words