COMPUTATION NOTE BOOK

KEEP

NATIONAL | 43-648 Made in U. S. A.

Course IMP-H/J Cosmic Ray Expt.

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8/1/71 –

IMP-H TAPES E01501 – E01800

8/6/71

PCM vs. PFM Frames

Although telemetry is PCM, notation uses PFM frames: 16 PFM Frames = 1 sequence
1 PFM Frame = 16 channels.

Basic unit is a sequence.

Some notation uses PCM frames:

1 PCM frame = 128 channels = $\frac{1}{128}$ of an album.

Thus 1 Album (basic unit) = 128 Frames of 128 channels.

Therefore, 8 PFM Frames = 1 PCM Frame.

8/10/71

May want to include anticoincidence rates on PHA tape.

C - anticoincidence for $A \cdot B \cdot \bar{C}$
B - " " $A \cdot \bar{B} \cdot \bar{C}$
A - may include for completeness.

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1 PFM frame = 16 channels = $\frac{1}{16}$ sequence (1 sequence = 256 channels)
1 PCM frame = 128 channels = $\frac{1}{2}$ sequence

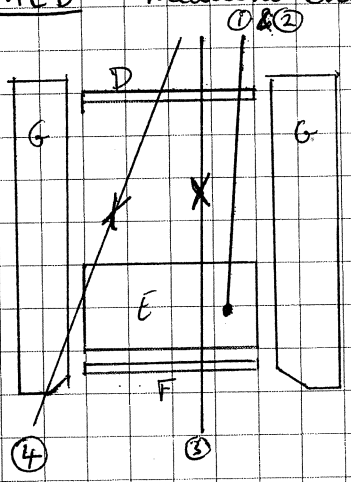
∴ 1 PCM frame = 8 PFM frames = $\frac{1}{2}$ sequence

1 Album = 128 PCM frames = 64 sequences i.e. (4 pages)

IMP-H Experiment

3 Detectors

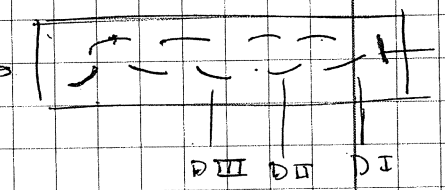
MED – Medium energy detector

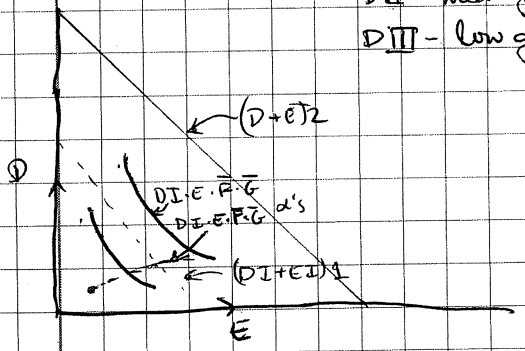


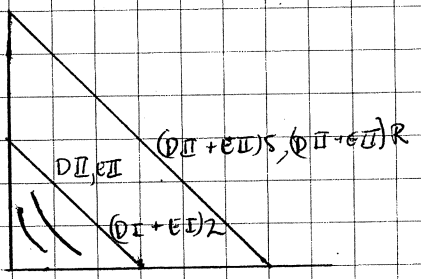
Events Analyzed
① $(D\&E)2 \cdot \bar{F} \cdot \bar{G}$
② $D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$
③ $D1 \cdot E1 \cdot F1 \cdot \bar{G}$
④ $D1 \cdot E1 \cdot G$

D1, E1 Thresholds for logic
(D&E)2 Top of range threshold detectors driven by sum of D & E outputs

PM Tube · DI – hi gain output ×1
DII – med gain " $\times \frac{1}{8}$
DIII – low gain " $\times \frac{1}{50}$





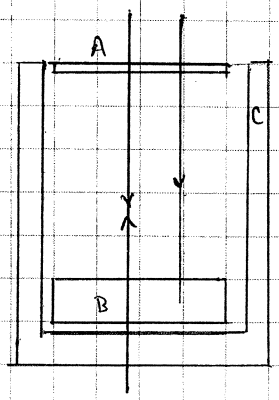


Priority Order

I	II	III	IV
$(D\&E)2 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	$D1 \cdot E1 \cdot F \cdot \bar{G}$	$D1 \cdot E1 \cdot F \cdot \bar{G}$	First
$D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	$(D\&E)2 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	$(D\&E)2 \cdot E1 \cdot F \cdot G$	Event
$D1 \cdot E1 \cdot F \cdot \bar{G}$	$D1 \cdot E1 \cdot F \cdot \bar{G}$	$D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	Occurring
$D1 \cdot E1 \cdot G$	$D1 \cdot E1 \cdot G$	$D1 \cdot E1 \cdot G$	

I – sequences 0, 3, 6
II – sequences 1, 4
III – sequences 2, 5
IV – sequences 7

LED



Events Analyzed

~~A+B~~ $(A\&B)1\cdot\bar{B}\cdot\bar{C}$

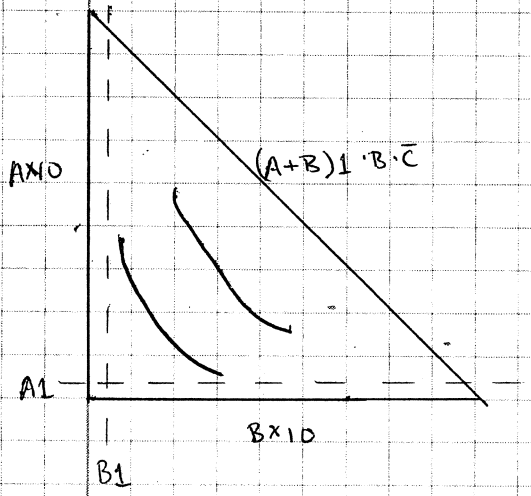
$A1\cdot B\cdot\bar{C}$

$A1\cdot\bar{B}\cdot\bar{C}$

$(A\&B)1\cdot\bar{B}\cdot\bar{C}$

Two ranges ×1

×10



A×1 B×1 ← (A+B)1

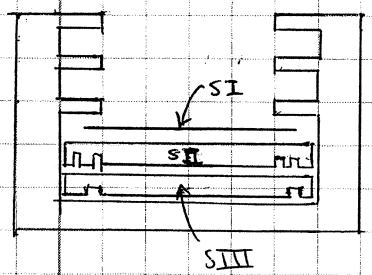
A×10 B×10

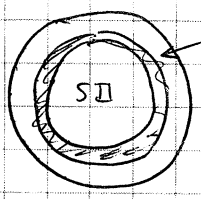
Priority Order

I	II	III
$(A+B)1\cdot B\cdot\bar{C}$	$A1\cdot B\cdot\bar{C}$	$(A+B)_1\cdot\bar{B}\cdot\bar{C}$
$A1\cdot B\cdot\bar{C}$	$(A+B)1\cdot B\cdot\bar{C}$	$A1\cdot\bar{B}\cdot\bar{C}$
$A1\cdot\bar{B}\cdot\bar{C}$	$(A+B)1\cdot\bar{B}\cdot\bar{C}$	$A1\cdot B\cdot\bar{C}$
$(A+B)_1\cdot\bar{B}\cdot\bar{C}$	$A1\cdot\bar{B}\cdot\bar{C}$	$(A+B)1\cdot B\cdot\bar{C}$

Sequence	Order
0	I
1	II
2	I
3	III

LET-II (Replaces VLED on IMP-I)





$(SI)_{1,2,3}\cdot\overline{SII}\cdot\overline{SII_a}\cdot\overline{SIII}$

$\overline{SI}\cdot SII\cdot\overline{SII_a}\cdot\overline{SIII}$

SI', SII'

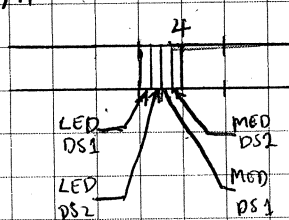
Telemetry Format

VLED = LET-II

Channels

Seq.	Fr.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	MED Sectored Data - Sequence 0 only											MED Sectored Data - seq. 0 only				
		1		2		3		4					5		6		7		8
0	3					MED LED DS						LED A	LED B		MED D		MED E	MED DS	MED F
8	4						LR 12 a_3 -1 MED R1		LR 12 a_3 -2 MED R2										
	8						LR 12 a_3 -13 MED R6					LR 12 a_3 -16 LED R2							
	10	VLED Sectored Data - seq. 0 only											VLED Sectored Data - Seq. 0 only				
		1		2		3		4					5		6		7		8
	11					LED MED DS						LED A	LED B		MED D		MED E	MED DS	MED F
	12						LR 12 a_3 -21 MED R8		LR 12 a_3 -22 LED R3										
Seq. 1	3					LED MED DS						LED & MED							
9	4						LR 12 a_3 -5 MED R3					LR 12 a_3 -8 MED R4							
	10						LR 12 a_3 -9 VLED R1												
	11					LED MED DS						LED & MED							
Seq 4 12	0						AP #36 seq. 4 pg. 183												
	3					LED MED DS						LED & MED							
	8						LR 12 a_3 -9 MED R5					LR 12 a_3 -12 LED R1							
	11					LED MED DS						LED & MED							
	12								LR 12 a_3 -26 MED R9										
Seq 5 13	3					LED MED DS						LED & MED							
	4				pp# a_3 -17 seq 5 only!		LR 12 a_3 -17 MED R7												
	10						LR 12 a_2 -9 VLED R11												
	11					LED MED DS						LED & MED							
Seq. 2 6 10 14	0					AP #6 seq 6 only													
	2						LR 12 a_2 -13 VLED R2												
	3					LED MED DS						LED & MED							
	10						LR 12 a_2 -17 VLED R3												
	11					LED MED DS						LED & MED							
Seq. 3 7 11 15	2						LR 12 a_2 -21 VLED R4												
	3					LED MED DS						LED & MED							
	10						LR 12 a_2 -25 VLED R5												
	11					LED MED DS						LED & MED							
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

Frame 3/11



											9	10	11	12	13	14	15
											LED A	LED B	MED D	MED E	MED DS	MED F	
											10 10	1 1	10 10	1 5	1 1	1 8	
															3 4 5 6		

DP a_3-17 - Seq. 5, Fr. 4, Ch. 4, bit 1
Repeated in bit 5.

All rates transmitted least significant bit 1st.

9/2/71 IPD Ground Rules for Decom Tapes

1. No tape header record.
2. Each file contains all processable data from one analog tape recorded at a ground station.
3. Each will consist of (1) a file label; (2) an undetermined number of data records, and (3) an end-of-file mark.
4. File label - identical in content to the housekeeping tape file labels on IMP-I. Label record length will be equal to the data records.
5. 8 bit telemetry channels put in 12 bit fields, right justified with zero fill. Order on basis of requested channels.
6. Formats based on a page. Ground time once/page.
7. Ground time refers to channel 0 of frame 0 of a page. Fill data within pages, but no complete pages of fill data. Can be time discontinuity between pages but not within pages.
8. No blocking according to page numbers.
9. All housekeeping channels provided.
10. No other forms of data merged in.
11. Orbit tapes - will lag data tapes by 1-3 weeks. Will have record lengths compatible with users computer. All coordinate transformations + attitude & orbit position once/minute.

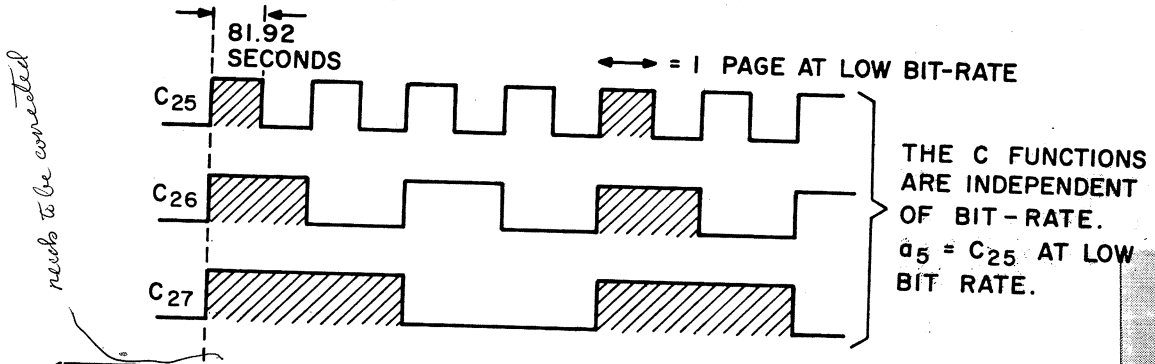
Model Data Tape - 1278 words/record = 7668 characters = 46,008 b
6 pages/record

46 008 bits = 5751 bytes = 1437 3/4 32-bit words.

11-15-71

IMP-I Sectored Rate Correction

STATES OF C_{25}, C_{26}, C_{27} AT SAMPLE TIME FOR VARIOUS RATES:



ENCODER INPUTS

VLED SECTOR RATES	$A\,B\,\bar{C}$ (LED)	$(S2)_5$	$(S2)_3$	$(S2)_1$	$(A+B)\cdot B\cdot\bar{C}$ (LED)	$(SI)_5$	$(SI)_3$	$(SI)_1$
ANALOG VOLTAGES PP28	S1	T2	T1	AT1	S2	B	AS1	A
VLED SECTOR RATE NO.	0	1	2	3	4	5	6	7

← VLED SECTOR RATE NUMBER AT SAMPLE TIME; $\equiv \bar{C}_{27}\,\bar{C}_{26}\,\bar{C}_{25}$.

MED SECTOR RATE	$DI\cdot\bar{D}2\cdot E\cdot\bar{F}\cdot\bar{G}$	$(DI+EI)\cdot E\cdot\bar{F}\cdot\bar{G}$	$\overline{DI\cdot(DI+EI)}\cdot E\cdot\bar{F}\cdot\bar{G}$	$DI\cdot E\cdot F\cdot\bar{G}$
MED SECTOR RATE NUMBER	0	1	2	3

← MED SECTOR RATE NUMBER AT SAMPLE TIME; $\equiv \bar{C}_{26}\,\bar{C}_{25}$

need to be corrected

FOR OA MODE = REAL, SECTOR DATA ACCUMULATED OVER ONE HALF-CYCLE OF C_{25} IS READ OUT DURING THE NEXT HALF CYCLE.

FOR OA MODE = FAIL, EACH SECTOR = 1/8 SNAPSHOT AND IS ACCUMULATED AND READ OUT DURING A SINGLE HALF-CYCLE OF C_{25}.

PP 28 IS ALWAYS SAMPLED AND READ OUT IN A SINGLE HALF-CYCLE OF C_{25}.

LED & MED Readout Inhibit (ROI) also inhibits sectored rate accumulation.

ROI occurs during channels 8-15 of frames 3 and 11.

	400	1600
Channel	20 ms	5 ms
Frame	320 ms	80 ms
Sequence	5.12 sec	1.28 sec
Snapshot	20.48 sec	5.12 sec
Page	81.92 sec	20.48 sec
Album	5.46 min	81.92 sec

8 channels = $\frac{1}{2}$ frame = { 160 ms at 400 IBPS; 40 ms at 1600 IBPS

Sectored rates - Pulses accumulated and sectored over 5 spins - result readout once/page

Normal operation (NO OA failure) - The sector that occurs at the first coherent quarter spin after the encoder generated dc_{24}/dt pulse will be the start of the 5 complete spins.

At 1600 IBPS, the same number is repeated 4 times.

OA Fail - TM sync mode - Data transfer occurs at the beginning of each snapshot & each sector represents 1/8 of a snapshot (2.56 @ 400, 0.64 sec @ 1600 IBPS)

Sectors not summed.

Sum time = time from start of last {page / album} to sum pulse at {400 / 1600} IBPS.

Need to know where RΦI occurs in relation to sectors.

Ch 8 Fr 3 ~~starts~~ at $3 \times 320 + 160 = 1120$ ms from start of sequence at 400
" " " " $3 \times 80 + 40 = 280$ ms " " " " 1600

Ch 8 Fr 11 starts at $10 \times 320 + 160 = 3360$ ms from start of sequence at 400
" " " " $10 \times 80 + 40 = 840$ ms " " " " 1600

400 IBPS

RΦI pulse starts at times

$t_{ij} = i \times 5.12 \text{ sec} + (j)^{(1-j)} \times 1120 + j \times 3360 \text{ ms}$

$= i \times 5.12 + (j)^{(1-j)} \times 1.12 + j \times 3.36$ sec from start of page

for $i = 0, \ldots, 15$
$j = 0, 1$
and lasts for 0.160 sec $= \tau_{ROI}$.

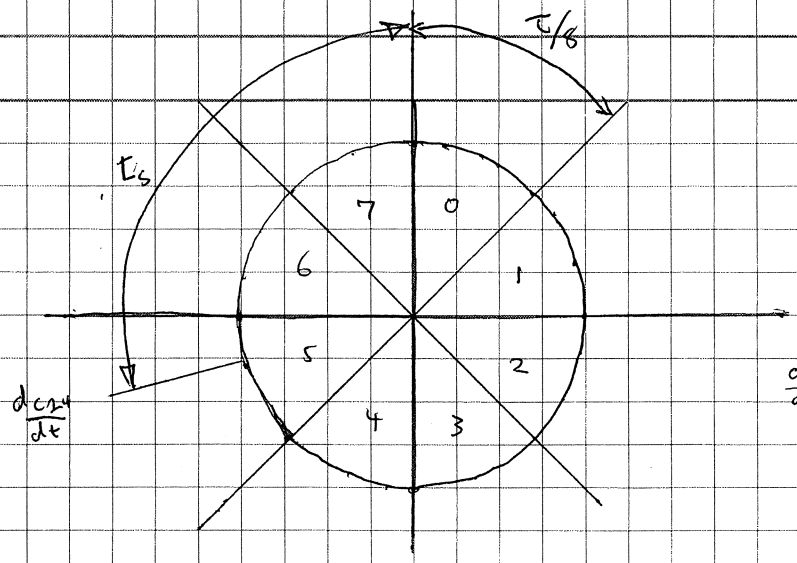
1600 IBPS

RΦI pulse starts at times

$t_{ij} = i \times 1.28 \text{ sec} + (j)^{(1-j)} \times 280 + j \times 840 \text{ ms}$

$= i \times 1.28 + (j)^{(1-j)} \times 0.28 + j \times 0.84$ sec from start of album.

for $i = 0, \ldots, 63$
$j = 0, 1$
and lasts for 0.040 sec $= \tau_{ROI}$.



t_s = sun time

τ = spin period

$\frac{dc_{24}}{dt}$ = {start of last page @ 40°
" " " album @ 160°

Let $t=0$ be time of $\frac{dc_{24}}{dt}$ pulse.

The $\frac{dc_{24}}{dt}$ pulse occurs in sector $\left\lfloor \frac{\tau - t_s}{(\tau/8)} \right\rfloor = s_{c_{24}}$.

and the sector in which the accumulation begins, s_a, is given by the following table:

$s_{c_{24}}$	s_a
0	2
1	2
2	4
3	4
4	6
5	6
6	0
7	0

s_a may also be computed:

$$s_a = \left[s_{c_{24}} + (2 - s_{c_{24}} \bmod 2) \right] \bmod 8$$

This sector (s_a) begins at time $t_s \bmod (\tau/4)$.

The accumulation ends after 5 spins $\Rightarrow$ at $t = t_s \bmod (\tau/4) + 5\tau$.

Thus, for each i,j as given on page 9;

if $\quad t_s \bmod (\tau/4) \le t_{ij} < t_s \bmod (\tau/4) + 5\tau$

then ~~sector~~ ROI occurs during sector

$$s_{int} = \left\lfloor \frac{t_{ij} + (\tau - t_s)}{\tau/8} \right\rfloor \bmod 8$$

~~is accumulated during~~

for a period

$$\tau_{s_{int}} = \min\left(\left(\frac{\tau}{8} - (t_{ij} + (\tau - t_s)) \bmod \left(\frac{\tau}{8}\right) \right), \tau_{ROI} \right)$$

and during sector s_{i+1} for a period

$$\tau_{s_{int+1}} = \tau_{ROI} - \tau_{s_{int}} = \begin{cases} \tau_{ROI} - \left(\frac{\tau}{8} - (t_{ij} + \tau - t_s) \bmod \left(\frac{\tau}{8}\right) \right) & \text{if } \tau_{ROI} > \frac{\tau}{8} - (t_{ij} + \tau - t) \bmod \frac{\tau}{8} \\ \text{or } \tau_{ROI} = \left(\frac{\tau}{8} - (t_{ij} + \tau - t_s) \bmod \frac{\tau}{8} \right) & \end{cases}$$

$\Rightarrow$ Given a sector number s, for what values of t_{ij} is

$$t_s \bmod (\tau/4) \le t_{ij} < t_s \bmod \left(\frac{\tau}{4}\right) + 5\tau$$

and

$$s_{int} = \left\lfloor \frac{t_{ij} + \tau - t_s}{\tau/8} \right\rfloor \bmod 8 = s \quad ?$$

$$\Rightarrow s \le \frac{t_{ij} + \tau - t_s}{\tau/8} < s+1$$

$$\Rightarrow (\tau/8) \times s \le t_{ij} + \tau - t_s < (s+1)\tau/8$$

$$\Rightarrow (\tau/8) \times s + t_s - \tau \le t_{ij} <$$

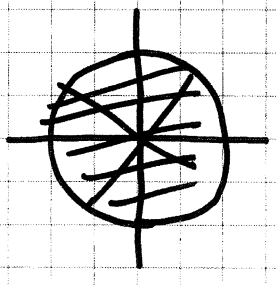
The formulas on the previous pages determine when the ROI pulses occur, but do not consider when they are actually interfering

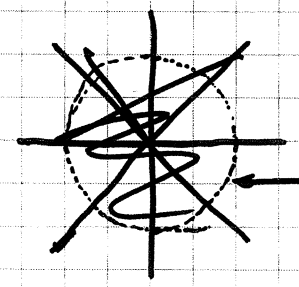
IMP-I Anisotropy Plots

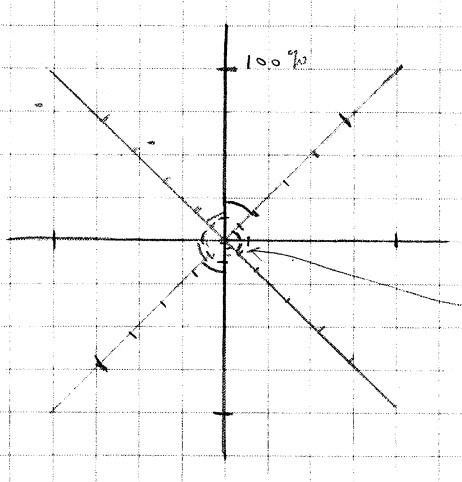
Cam Plots (Polar Histograms) } Separate 4060 Tapes
Rate Plots

Cam Plots - possible future option - to merge in magnetic field data.

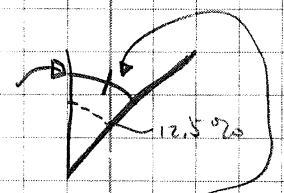
12 Plots - either 3 x 4 on one frame or 2 x 3 on 2 frames.







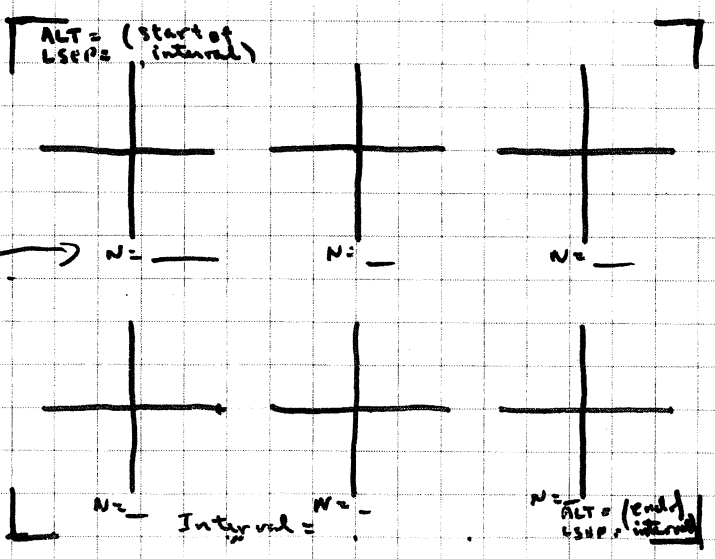
$\frac{n}{N}$



Error bar - corresponds to

$$\frac{n \pm \sqrt{n}}{N} \times 100\ \%$$

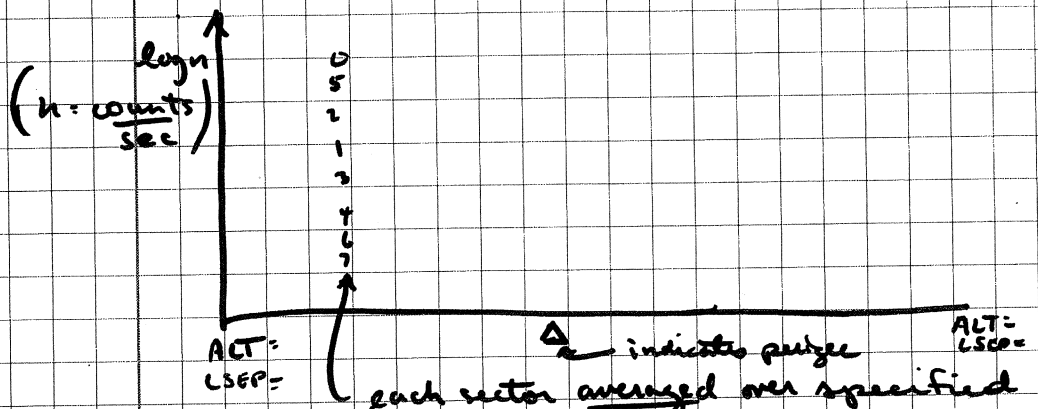
n = # counts in sector
N = total counts



Total number of counts for this interval under each cam

Select time intervals for summing & processing

Rate Plots Option to suppress.



each vector averaged over specified interval

Specify time interval for each frame.

[redacted]

RØI correction

Options:

1) None

2) 400 IBPS only

3) ALL.

COUNTS TAPES - Relevant words in Logical record.

1 - Universal Time at start of album (tenths of seconds of year)

2 - S/C clock at start of album - bits $C_{40} - A_0$
(Low order 7 bits 0 @ 1600 BPS, low order 9 bits 0 @ 400 BPS

3 - Pseudo seq. count, negative at 400 BPS, position @ 1600

4 - Halfword 1 Day of Year
- Halfword 2 Orbit # (Negative, if last record of orbit)

5 - milliseconds of Day.

10 - R_0 (earth radii) (C.U.L.) ?

11 - Radial distance from center of earth (km.)

27 - L_{sep} (degrees)

25 - Halfword 1 Data Quality Flag P

$P = (\sum_{1}^{256} F^2)/10$ P ranges from 0-100 & represents a probability of error.

F = 0 $< 10^{-6}$ error
1 $< 10^{-5}$ error
2 full data

D.Q. Flags
1/quarter sequence
= 4/seq.
= 64/page
= 256/album

Halfword 2 Time Quality & S/C clock reconstruction flags
Byte 1 = -64 Quicklook data
0 - 64 denotes degree of time bias
(0 = no bias)

Byte 2 = no. of sequences where clocks didn't match.

286 MED sectored Data Info.
H1 = F1 - ΦA mode 0 - real, 1 - fail

H2 = F2 = (S/C mod 4), if 1600
= 4 if 400
= 5 if OA mode changed in album.

287-294 MED Sectors 1-8, Page 1
295-302 " " " 2
303-310 " " " 3
311-318 " " " 4

319 LED sector data info

H1 = F1 - OA mode 0 - real, 1 - fail

H2: F2 = (S/C mod 8), if 1600
= 8 + S/C ÷ 4 mod 2) if 400
= 10, if OA mode changed.

MED RATE

IN01

3	*	DI · E · F · $\overline{G}$
0	*	DI · $\overline{D2}$ · E · F · $\overline{G}$
1	*	(DI & EI)1 · E · $\overline{F}$ · $\overline{G}$
2	*	DI · $\overline{(DI \& EI)1}$ · E · $\overline{F}$ · $\overline{G}$

OA Real				OA Fail			
400		1600		400		1600	
Page	F2	Page	F2	Page	F2	Page	F2
1	4	1-4	0	4	4	1-4	3
2	4	1-4	1	1	4	1-4	0
3	4	1-4	2	2	4	1-4	1
4	4	1-4	3	3	4	1-4	2

LED - VLED Rate

IN02

7		(S1)1 · $\overline{AS1}$	
0	*	A · B · $\overline{C}$	(LED)
1		(S2)5 · $\overline{AS2}$	
2		(S2)3 · $\overline{AS2}$	
3		(S2)1 · $\overline{AS2}$	
4		(A&B)1 · B · $\overline{C}$	(LED)
5		(S1)5 · $\overline{AS1}$	
6		(S1)3 · $\overline{AS1}$	

OA Real				OA Fail			
400		1600		400		1600	
Page	F2	Page	F2	Page	F2	Page	F2
1	8	1-4	0	4	9	1-4	7
2	8	1-4	1	1	8	1-4	0
3	8	1-4	2	2	8	1-4	1
4	8	1-4	3	3	8	1-4	2
1	9	1-4	4	4	8	1-4	3
2	9	1-4	5	1	9	1-4	4
3	9	1-4	6	2	9	1-4	5
4	9	1-4	7	3	9	1-4	6

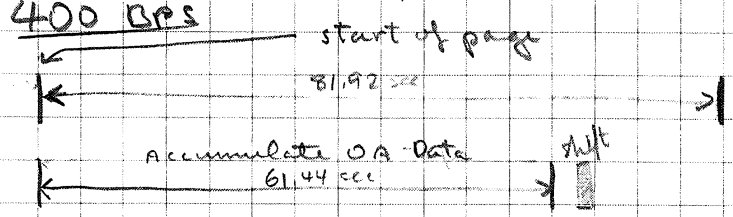
* = needs correcting

320 - 327 VLED sector 1-8 Page 1
328 - 335 VLED sector 1-8 " 2
336 - 343 LED-VLED " " 1-8 " 3
344 - 351 " " " 1-8 " 4

358-361 Sun Time, Earth Width, Earth Time, Spin Period Page 1
362-365 " 2
366-369 3
370-373 4

Q: What corrections should be made if in OA fail mode?
How to indicate OA fail mode in on plots?
Data Quality check?
Time Quality check?

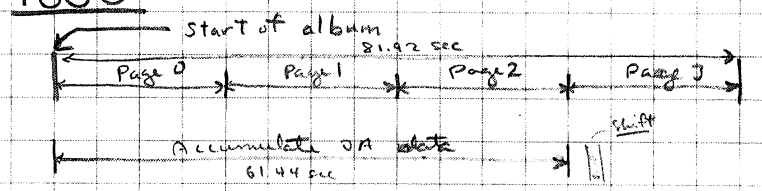
400 BPS



If readout occurs before shift?, OA readout corresponds to data accumulated during previous page (as do sectored rates)

If readout occurs after shift?, OA readout probably corresponds to data accumulated during page in which it was read out.

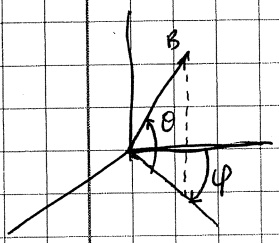
1600

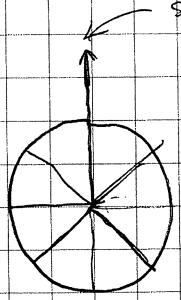


OA data accumulated during Pages 0-2 of an album is read out in Page 3 of that album and Pages 0-2 of the next album. (Repeated 4 times.)

Mag Field Data

Curve Plots





Plot direction of mag field ~~as~~ in payload coordinates as two lines: ~~one in direction of φ, one in~~

line 1: in direction of φ

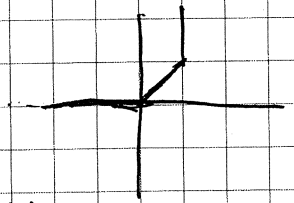
line 2: parallel to 0° line of plot
one end at end of line 1
other end above or below line 1 depending on whether θ is + or −.

Want ~~sum~~ resultant of lines 1 and 2 to be unit vector in direction of B.

$$|\text{line 1}| = K\cos\theta$$

$$|\text{line 2}| = K\sin\theta$$

Example: $\varphi = 45°$, $\theta = 45°$



Problem: φ = anything, $\theta = 90°$ and $\varphi = 0°$, $\theta = 0°$ will be same

Make intensity of line 1 twice that of line 2.

Mag fld data is averaged over 15.36 sec.

Sector data accumulated over 61.44 sec = 4 × 15.36 sec

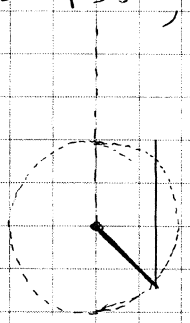
– Take start time of each set as the start time of the page(4 sec) or album(1600) in which it was accumulated.

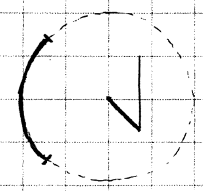
Given start time of sector data, take averages for B-field data over the next 4 B samples.

Earth position –

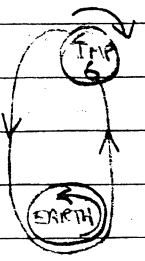
The earth's position should be plotted as a solid arc at the 12.5% radius whose start and end points are determined by the earth time and earth width.

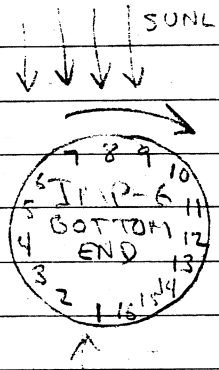
Eg. $\phi = 135°$, $\theta = 60°$, ~~to~~ EI $= \frac{5}{8} \times SP$ $EW = \frac{1}{4} \times SP$





ECLIPTIC PLANE VIEWED FROM NORTH ECLIPTIC POLE — SEE BOTTOM END OF SPACECRAFT (I.E. THE END WHICH WAS ATTACHED TO THE ROCKET)

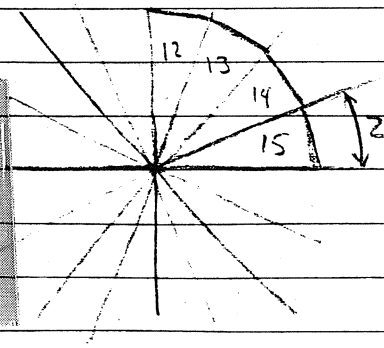




FACETS ARE ILLUMINATED IN DESCENDING ORDER

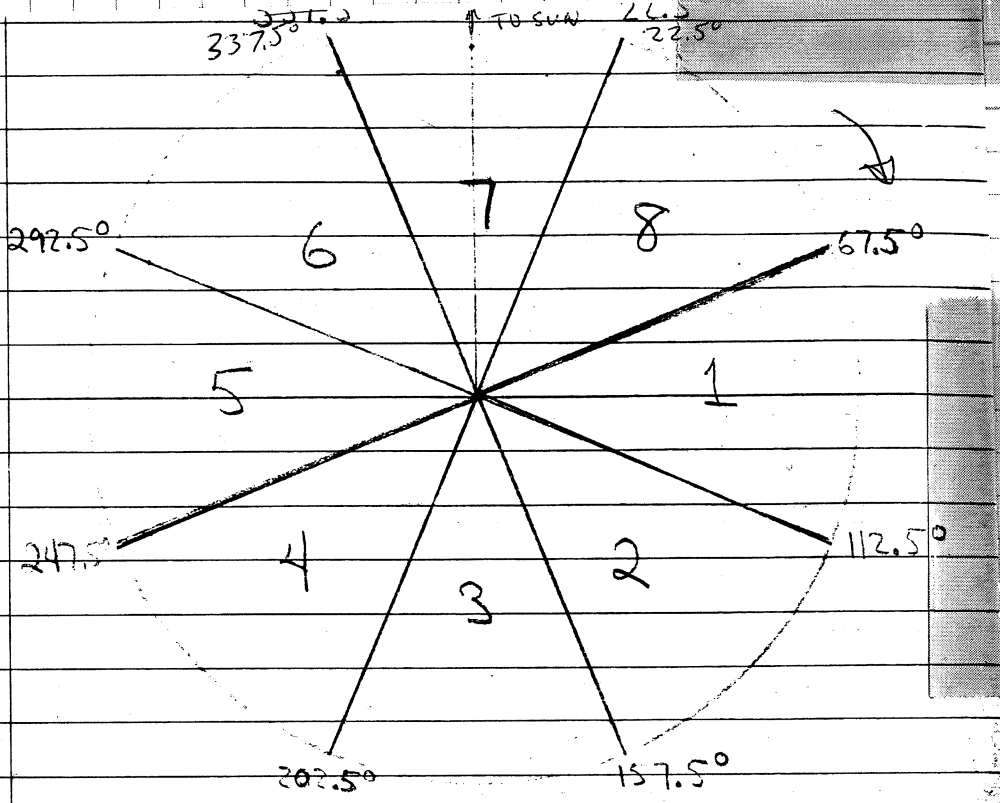
ROTATION AND FACET NUMBERING BOTH FOLLOW A POSITIVE ROTATION (RIGHT HAND RULE)

SIDE VLED & LED ARE IN FACET 15.
OA SENSOR IS IN FACET 12.



FACET 15 SEES NORMALLY INCIDENT SUNLIGHT 67.5° EARLIER THAN FACET 12

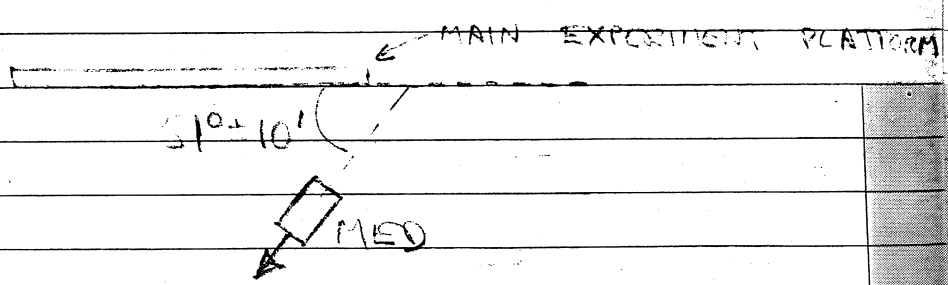
SECTOR 1 STARTS AT THE TIME A CENTERED SUN PULSE OCCURS, i.e. WHEN FACET 15 FACES 67.5° WEST OF THE EARTH-SUN LINE. SECTOR 1 ENDS WHEN FACET 15 FACES 67.5° + 45° = 112.5° WEST OF THE EARTH-SUN LINE.

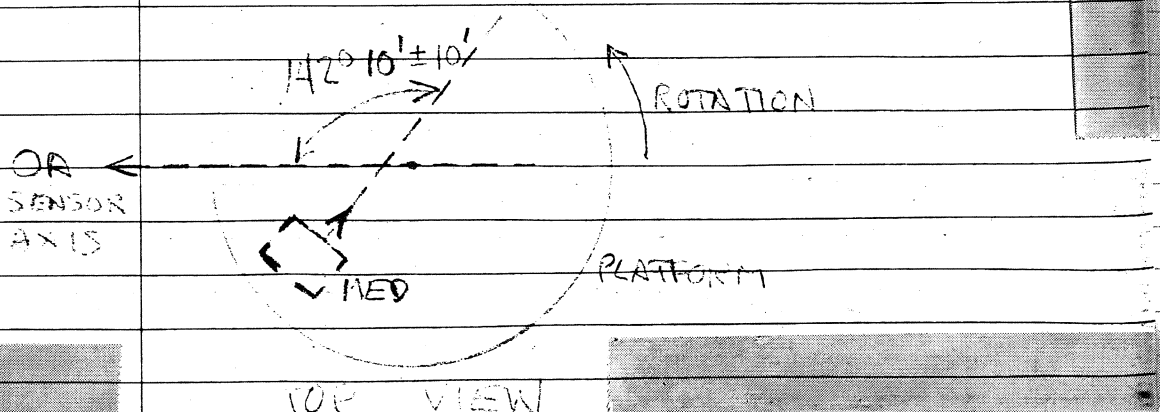


If start at 0°, section 1 is add 67.5° mod 360°.

LED, VLED SECTORS

Consider main MED sector:

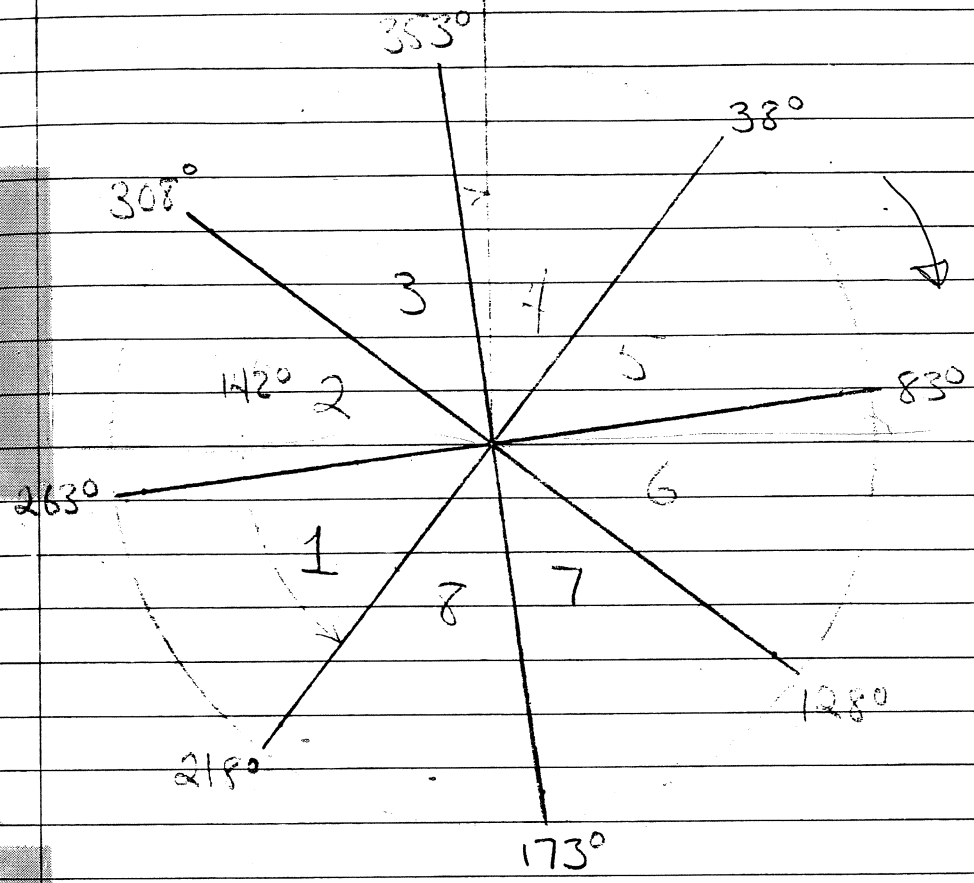




22

ATO SUN

West limb 17



MED SECTORS

If ~~start of~~ Sector 1 is 0°, add 218° mod 360°.

Computation of note numbers IND1 and IND2 on page 16.

IND1:

F1=0:

400: (IPG+3) mod 4

1600: (F2+3) mod 4

F1=1:

400: IPG

1600: F2

IND2:

F1=0:

400: [(F2-8)*4 +IPG+7] mod 8

1600: F2+7 mod 8

F1=1:

400: (F2-8) *4 +IPG

1600: F2

1st Approach

Accumulate data and produce cum plots while reading counts tape. Write data for rate plots (if desired) on disk.

Produce rate plots when finished with counts tape.

When writing rate plot data, ~~if~~ separate into up to 12 files (one for each plot desired).

While reading counts tape, must accumulate sum ~~of~~ for each sector of each rate for each plot ($8 \times 12 \times 2 = 192$).

If averaging interval & start and stop times always the same for both cum & rate plots, need only accumulate once for each sector of each rate.

Also need ~~2 × 12 = 24~~ counters for counting number of readouts for each rate ~~for each plot type.~~ of each plot type ~~for rate plots.~~ (to compute average counts/sec).

- Need to determine Time of perigee. Plot arrow at time corresponding to minimum value of word 11.
  ~~Same 1st pkt. (word 11)~~

2-15-71

When not using plot Package

After A(1) = 0.

CALL MODESG ( )

CALL SETSMG (Z, 90, 0.0)

Z ← mode array

Every Time a new page is called for

CALL PAGEG (Z, 1, !, New frame / same frame)

1 ← Calls for Forms flash

Job Form

Write: Forms flash requires "Kodak blip"

Associating Times with data points.

Rates: since Time on counts tape is the time of start of page in which rates are read out, 81.92 seconds should be subtracted from this to get the start Time of the sampling interval.

DISPLR = −81.92 ?

Mag fld: Early Time tapes: Time 80 msec after end of 15.36 sec averaging Time, subtract 15.44 sec.

DISPLM = −15.44 ?

Later tapes: Time will be at end of 15.36 sec averaging Time.

DISPLM = −15.36 ?

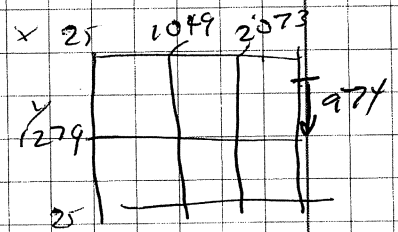
2-25-72

Mag field averages

15,36 sec averages on tape:

3/30/72 COSINE FCN FIT

Curves { Heading at x+202, y+1126
"Total cnts/sec" at x+78, y+1075



mag plt.
φ at (3328, 1536) to (3840, 2048)
θ at (3328, 768) to (3840, 1280)

1279 − 1075 = 204
1126 − 1279 = −153
2405 − 2048 = 357
2048 − 1843 = 205
$5.7

Move mag fld plts up 204.

768 + 204 = 972

Leaves 972 vertical rasters
~~1842~~
1048 horizontal rasters

Should leave 25 at each border ⇒
922 vertical
998 horizontal

Character height 51
" width 31

18
51 | 922
51
412
408
4

18 rows

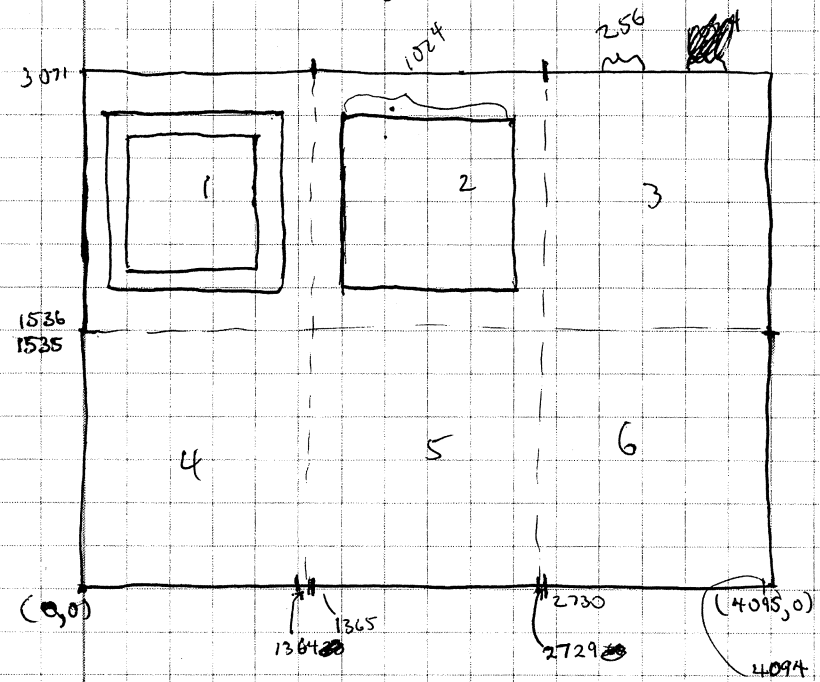
32
31 | 998
93
68
62
6

32 columns

X = 3047+25 to 4095−25
= 3072 to 4070
Y = 25 to 972−25
= 25 to 947

TO PAGE 28

4060 Display



Each subject space for polar plots should be square ⇒ ~~1500×1500~~ ~1200×1200

Each 6th is ~~1366×1536~~ 1365 (x) × 1536 (y)

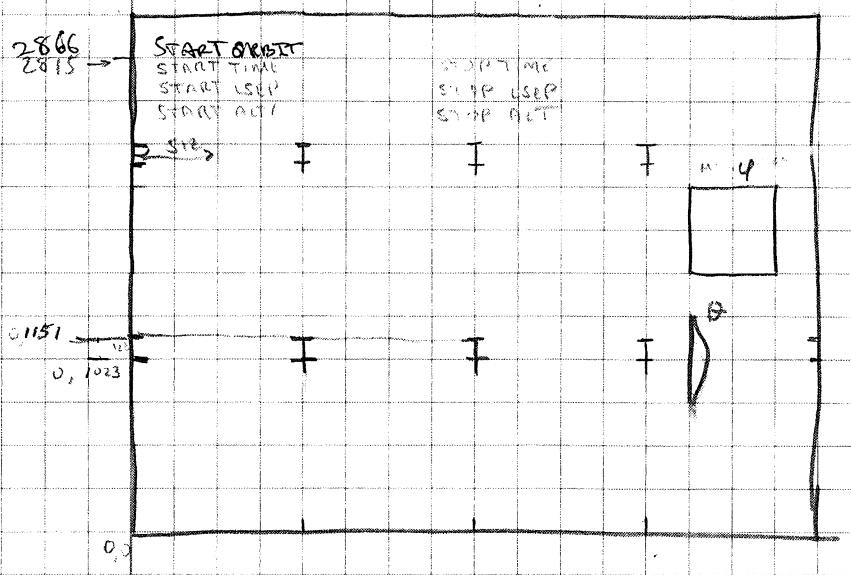
⇒ $\frac{165}{1200}$ margin ⇒ $\frac{82.5}{1200}$

~~margin on each~~ left and right sides.

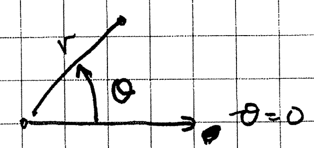
~~1300×1300 squares ⇒ 65 margin~~

~~a~~ $\frac{82.5}{1200}$ ~~each side~~

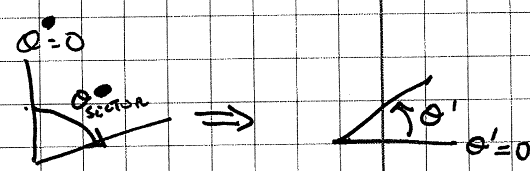
1250 × 1250 squares ⇒ 115 margin ⇒ 57.5 . ~5% on each side



IGS Polar Plots



To plot in a ~~[illegible]~~ system:



$\theta' = (360 - \theta + 90) \bmod 360$

$= (450 - \theta) \bmod 360$

Rotate MED sectors: $\theta_{MED} = (\theta_{sector} + 218°) \bmod 360°$

$\theta' = (450 - \theta_{MED}) \bmod 360°$

Rotate LED/VLED sectors: $\theta_{LED} = (\theta_{sector} + 67.5°) \bmod 360°$

$\theta' = (450 - \theta_{LED}) \bmod 360°$

3/30/73 Cosine fit

x: 3072 to 4070 32 columns

y: 25 to 947 18 rows

5 4 8 17 6 24 27

A/NO THETA(A) CHI**2

F5.1 F5.1 F7.2

A/NO(%) ** PHI(A) ^^ CHI**2 ** C

F5.1 F5.1 F7.2 I2

28

3072 3103 3382. 3599

Catalog — 6 3060 byte records — each 51 - 60 byte subrecords

1 Counter subrecord

Word	
1	# Ency Types in record
2	# PHA " " "
3	# Counts " " "
4	# Summary " "
5	# Blank
6	# Low Count
7	# Merged Summary
8-15	Spare

Record 1

14 # Decom Files Processed to date

15 # Decom recs to date

50 Type subrecords

1	Type No. H1 2 alpha chars H2 binary type no.
2	Type Types 'ENCY', 'PHAS', 'CNTS', 'MATR', BLNK' 'LOWC', 'MERG'
3	Date created YYJJJ
4	Reel seq no.
5	# records
6	First orb.
7	First year
8	First time (Tenths of sec)
9	First s/c clock
10	Last orbit
11	Last year
12	Last time
13	Last s/c clock
14-15	Contents flag.

IMP-I Anisotropy & Display Program

Rate Plot Files - ~~Logical~~ 1 file per rate → 12 files.

Logical Record Length 10 words (40 bytes)

Header Record - Before start of each frame

Word	Half	Contents	Fmt
1	*	Start year of frame	I
	*	Start day of year	I
2		Start time - milliseconds of day	I
3		Start altitude	F
4		Start Lsep Angle	F
5	*	Stop year, ~~day~~	I
	*	Stop day	I
6		Stop milliseconds of day	I
7		Start orbit number	I
8		~~Spare~~ Bit Rate	
9		Spare	
10		~~Data Record~~	

Data Record

Word	Half	Contents	Fmt
1	*	~~Year~~ } Time of record	I
	*	Day of Year } (center of data)	I
2		~~Avg counts/sec for section 1~~ Millsec of day	I
3		Avg counts/sec for section 1	F
4		" 2	
5		" 3	
6		" 4	
7		" 5	
8		" 6	
9		" 7	
10		" 8	F

Trailer Record - At end of data for each frame.

Word	Half	Contents		Fmt
1	*	Stop year	Negative if last frame	I
	*	Stop day of year		I
2		Milliseconds of day - negative to indicate trailer.		I
3		Stop Alt.		F
4		Stop Lsep		F
5	*	~~Minimum~~ Year	Time of minimum Altitude	I
	*	Day of Year		I
6		~~Minimum~~ MS		
7		Minimum Alt.		
8		~~Spare~~ Bit Rate		
9		~~Spare~~ SPARE		
10		-1.0 To indicate Trailer.		

Note: if 0 will not show up.

9 = rhid
= how
NO. of readouts rejected in TM slave mode.

Orbit Change Record - Written when orbit number on count tape changes - written after data record during which orbit change occurred.

Word	Half	Contents		Fmt
1	*	Year	Time of orbit change	I
	*	Day of Year		I
2		MS of Day		I
3		New Orbit number of last record		I
4		-1.0 ~~Spare Orbit number of current record~~		~~F~~
5		Spares		
6		"		
7		"		
8		"		
9		"		
10		"		

Word 4 = -1.0 To signal orbit change record.

Rate Plot

Given: start time of frame
Format (hour, day, month) AFR
Maximum number of points / frame NPF NFRAMS

1st Frame

a) Set new start time of frame to 1st integral unit of format time before current start time.
b) Set stop time of frame to start time + NPF * AVGR
~~c) Set new stop time of frame to stop time of old frame.~~
c) Set new stop time of frame to 1st integral unit of format time before stop time.

Successive Frames

a) set start time of new frame to stop time of old frame.
b) set stop time as in (b) and (c) above.

Time Label

Hour Format

Times in fractional hours since start of ~~Jan 1, 1971~~ 1st day of plot.

Label each x-axis mark with hour of day

Check start and stop days d_1 & d_2

If $d_1 = d_2$, write (month, day, year) in center

If $d_2 = d_1 + 1$,
If (m_1, d_1, y) of d_1 fits between start of frame & start of d_2, write (m_1, d_1, y_1) in that space.
If (m_2, d_2, y) of d_2 fits between start of d_2 & end of frame, write (m_2, d_2, y_2) in that space.

If $d_2 > d_1 + 1$, center (m, d, y) under each full day.

Alternatively, write "year" at left and right margins. Write (m, d) instead of (m, d, y).

Day Format

Times in fractional days since start of ~~Jan 1, 1971~~ frame / ~~1st year in plot~~.

Label each x-axis mark with day of month.

Check start & stop months m_1 & m_2

If $m_1 = m_2$, write (month, year) in center

If $m_2 = m_1 + 1$,

If ~~one~~ (m_1, y_1) of m_1 fits between start of frame and start of m_2, write (m_1, y_1) in that space.

If (m_2, y_2) of m_2 fits between start of m_2 and end of frame, write (m_2, y_2) in that space.

If $m_2 > m_1 + 1$, center (m, y) under each full month

Alternatively, write "year" at left and right margins. Write "month" instead of (m, y)

Month Format

Times in fractional ~~months~~ days (1 mon. = 30.42 days) since start of ~~Jan 1, 1971~~ frame / ~~1st year in frame~~.

Label each x-axis mark with month.

Check start and stop years y_1 & y_2.

If $y_1 = y_2$, write ℓ (year) in center.

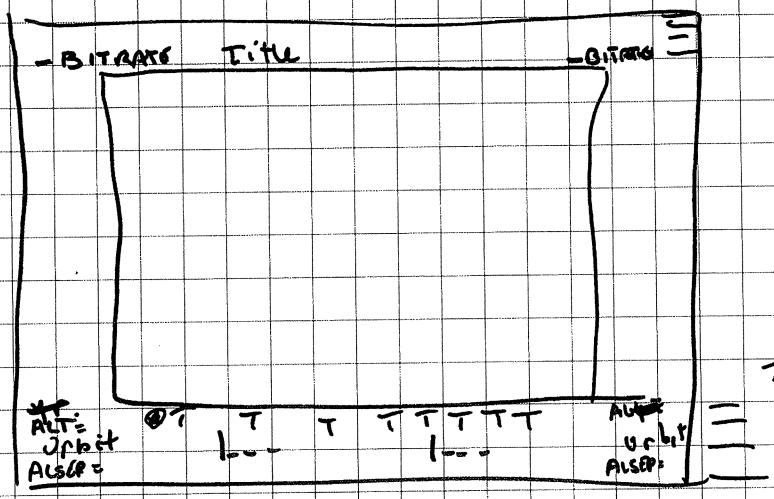
If $y_2 = y_1 + 1$, If (y_1) fits between start of frame & start of y_2, write (y_1) in that space.

If (y_2) fits between start of y_2 & end of frame, write (y_2) in that space.

If $y_2 > y_1 + 1$, center (y) under each full year.

Orbit Change Label:

Write start orbit at left.
Plot vertical bar (|) at Times of orbit change
Write stop orbit at right.



To compute y plot position of letters & numbers for x-axis labeling

$$y_p = 10^{\log y_b - (\log y_T - \log y_b)/n_r}$$

To print 1 row below graph

y_b = y coordinate of bottom of graph
y_T = y coordinate of top of graph
n_r = # of rows (characters) between top & bottom of graph
= z(24) − z(23) + 1.

To print n^{th} row below bottom:

$$y_p = 10^{\log y_b - n(\log y_T - \log y_b)/n_r}$$

To print n^{th} row above top:

$$y_p = 10^{\log y_T + n(\log y_T - \log y_b)/n_r}$$

Column # I = z(12) * x + z(35)
To print in column I, x = (I − z(35))/z(12)

Rate Plot Filer Bytes / data record (without keys)

$$101 + \frac{2137\ (DL)}{2048}$$

5/31/72

IMP-H ~~Data~~ Experimenter Tape Format Notes

Times provided for start of each page. If a page contains all fill data, the time for that page will be fill.

Pseudo-sequence Counter is provided for sequence 0 of each page. If sequence 0 is missing, the pseudo-sequence counter will be missing.

If the bit rate changes in a file, that file will be completed with fill data and a new file started at the new bit rate with fill at the beginning.

~~Words 1 - 20 of~~

File Header

Word	Description	Type
1	Satellite I.D.	Integer
2	Station I.D.	"
3	Analog Tape No.	"
4	Analog File No.	"
5	Year, Start of File (one digit)	"
6	Day of year, Start of File (Jan 1 = 1)	"
7	Msec of day, " " "	"
8	Year, End of File (one digit)	"
9	Day of year, End of File (Jan 1 = 1)	"
10	Msec of day, " "	"
11	Data Type	"
12	Data Rate (0 = Low, 1 = High)	"
13	Edit Tape No.	"
14	Edit File No.	"
15	Avg. Sequence Time for File	Floating Pt.
16	Production Flag (1 = Production)	Integer
17	Perigee Count	"
18	Day of Next Perigee	"
19	Msec of day of next perigee	"
20	Experiment I.D.	"

IMP-6 DECOM TAPES

After orbit 15, OA/TM Slave Flag is pad 1st three pages, correct 4th page

Orbits 1-15, OA/TM Slave Flag incorrect.

NRL Calibration June, 1972

LED Runs 1-36
MED Runs 37-50

Analog Tape Digitization

First 3 tapes put on Y549. Runs 19 & 20 combined in file 19. – Last 2 runs on tape 3 (37, 38) not digitized - sync not maintained.

```
/b d=sysnsg.aijtdtm3
%]
 CRB2371 FT06F001 ON M2SCR5 NAMED CB.AIJTDTM3.FT06F001
%b d=cb.-
?p *
/b d=cb.aijtdtm3.ft06f001,v=m2scr5
%]
 NRL FILE TIMES
  FILE    START    STOP
     1      878     926
     2      958    1006
     3     1024    1059
     4     1073    1096
     5     1251    1292
     6     1319    1357
     7     1406    1440
     8     1494    1508
     9     1588    1623
    10     1677    1720
    11     1733    1761
    12     3333    1815
    13     1889    1927
    14     1947    1953
    15     1959    1991
    16     2027    2057
    17     4052    2095
    18     2113    2132
    19     3765    2288
    20     2570    2590
    21     2725    2762
    22     2797    2841
    23     2870    2890
    24     2911    2948
    25     2972    2990
    26     3111    3140
    27     3154    3175
    28      501    3218
    29     3232    3244
    30     3288    3323
    31      921     943
    32      973    1010
    33     1031    1063
    34     1126    1143
    35     1204    1231
    36     1137    1143
    37     1204    1231
    38     1224    1231
*** END OF DATA
?p *
?subm gse,001001
PUT (360/91).
?=subngse
?y549
?s21    led  tttf
?s24    led  tttf
?endinput
JOSE SUBMITTED.
?stat gse
NOT FOUND
?stat gse
NOT FOUND
?stat gse
PRTY=09,POS=018,JOBQA
?signoff
ROCESSED 72.164 AT 10:28:49.
```

Y549

889-926

Analog Tape 1

1780 - 1815

Analog Tape 2 ~~may have~~ has 2 runs

2068-2095

2213-2222 (19) ; 2256-2288 (20)

21 : 2569-2590

22

23

24

25

26

27

28

29 : 3189-3218

30

31

32

33

34

35

36

switch over to m

Trying to pick up last 2 runs.

37: 796-834

38: 854-875

39: 887-915

40: 938-968

41: 977-1008

42: 1016-1020

43: 1024-1031

44: 1086-1143

45: 805-844

46: 855-882

47: 891-931

48: 944-981

49: ?—1021

50: 1026-1050

```
calc 4****1/2)
RESULT =  2.
calc 1/2
RESULT =  5.E-01
stat tm4
SELECTED
stat tm4
SELECTED
stat tm4
SELECTED
stat tm4
SELECTED
stat tm4
SELECTED
stat tm4
SELECTED
stat tm4
NOT FOUND
 164/1257: JOB AIJTDTM4 READY
b d=sysmsg.aijtdtm4
)1
CRB2371 FT06F001 ON M2SCR9 NAMED CB.AIJTDTM4.FT06F001
)p *
b d=cb.aijtdtm4.ft06f001,v=m2scr9
)1
NRL FILE TIMES
FILE    START    STOP
020DF000    292 ,AIJTDTM4,  Y659  ,0C4,TA,FT10F001,GET   ,WRNG.LEN.RECORD,0000001
,QSAM           04000000 00040000 410E1D40 0C4002DC
   1      985    1010
   2     1031    1063
   3     1126    1143
   4     1204    1231
   5      807     834
   6     3241    2985?
   7      891     915
   8      939     968
   9      979    1008
  10     1020    1031
  11     2497    1143
  12      806     844
  13      855     882
  14      892     931
  15      944     981
  16      992    1021
  17     1027    1050
  18     1227    1231
  19      797     834
  20      854     875
*** END OF DATA

)p *
signoff
ROCESSED 72.164 AT 13:03:38.
```

Y659

Run 37 796-834

Run 39 887-915
40 938-968
41 977-1008
42 – missing 1016-1020
43 – 1024-1031
44 – 1086-1143
45 – 805-844
46 – 855-882
47 891-931
48
49

Run 37 796-834
Run 38 854-875

Y660 — CLOCKS

```
%1
) FILE  17                                    START
)  4052  4055  4093  4093  4093  2068  2068  2068  2068  2068  2068  2068  2068  2
2 068  2068  2068  2068  2068  2068  2068
)  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2
2 068  2068  2068  2068  2068  2068  2068
)  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2068  2
2 068  2068  2068  2068  2068  2068  2068
)  2068  2068  2068  2068
) FILE  19                                    START
)  3765  2213  2213  2213  2213  2213  2213  2213  2213  2213  2213  2213  2213  2
2 213  2213  2213  2213  2213  2213  2213
)  2213  2213  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1
2 279  1279  1279  1279  1279  1279  1279
)  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1
2 279  1279  1279  1279  1279  1279  1279
)  1279  1279  1279  1279
) FILE  19 ——————————— LAST RECORD
)  2217  2217  2217  2217  2217  2217  2217  2217  2217  2217  2217  2217  2217  2
2 217  2217  2217  2217  2217  2217  2217
)  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1279  1

2 279  1279  1279  1279  1279  1279  1279
)  1279  1279  1279  1279  1279  2032  2032  2032     0     0     0     0     0
2    0     0     0     0     0     0     0
)     0     0     0     0
) FILE  20 ——————————— START
)       0     0     0     0     0     0     0     0     0     0     0     0     0
2    0     0     0     0     0     0     0
)       0     0     0     0     0     0     0     0     0     0     0     0     0
2    0     0     0     0    -0     0     0
)       0     0     0     0     0     0     0     0  4080  4079  4079  4079  4079  4
2 079  4079  4079  4079  4079  4079  4079
)  4079  4079  4079  4079
%p *
/msgr,my deld
/msgr my,dele
GES PRESENT.
/signoff
PROCESSED 72.167 AT 16:44:28.
```

6/16/72 CLOCK Dump Routine: Y660

File 12 Record 1 garbage clocks

File 17 Record 1 First 5 frames ~~have~~ have bad clocks

File 19 Record 1 First frame has bad clock.
Last 42 frames have bad clocks. 1279

~~File~~ Record 5 Last 35 frames have bad clocks 1279

Record 12 Last 44 frames have bad clocks 1279

Record 13 ~~Last~~ frames 21-45 have bad clocks 1279
frames 46-48 ~~Last~~ " " 2032
" 49-64 have bad clocks 0

File 20 Record 1 - First 48 clocks 0 } Skip
Last 16 clocks bad }
Records 2–19 ~~2~~ first 29 frames of record 20 belong in file 19 (merge routine fouled up by bad clock).
Frame 30 of record 20 bad

File 42 Record 4 - Last 54 frames bad
Record 5 - All zeroes - should be deleted.

File 43 Good

File 44 Record 1 Bad

File 12 Skip 1st record

17 Zero first 5 frames of 1st record.

NRL FILE TIMES

NRL #2 EDIT TAPE
6/28/72

FILE	START	STOP
1	878	926
2	958	1006
3	1024	1059
4	1073	1096
5	1251	1292
6	1319	1357
7	1406	1440
8	1494	1508
9	1588	1623
10	1677	1720
11	1733	1761
12	1780	1815
13	1889	1927
14	1947	1953
15	1959	1991
16	2027	2057
17	0	2095
18	2113	2132
19	0	0
20	0	2288
21	2570	2590
22	2725	2762
23	2797	2841
24	2870	2890
25	2911	2948
26	2972	2990
27	3114	3140
28	3154	3175
29	901	3218
30	3232	3244
31	3288	3323
32	921	943
33	973	1010
34	1031	1063
35	1126	1143
36	1204	1231
37	807	834
38	854	875
39	891	915
40	939	968
41	979	1008
42	1020	0
43	1026	1031
44	1088	1143
45	806	844
46	855	882
47	892	931
48	944	981
49	992	1021
50	1027	1050

*** END OF DATA

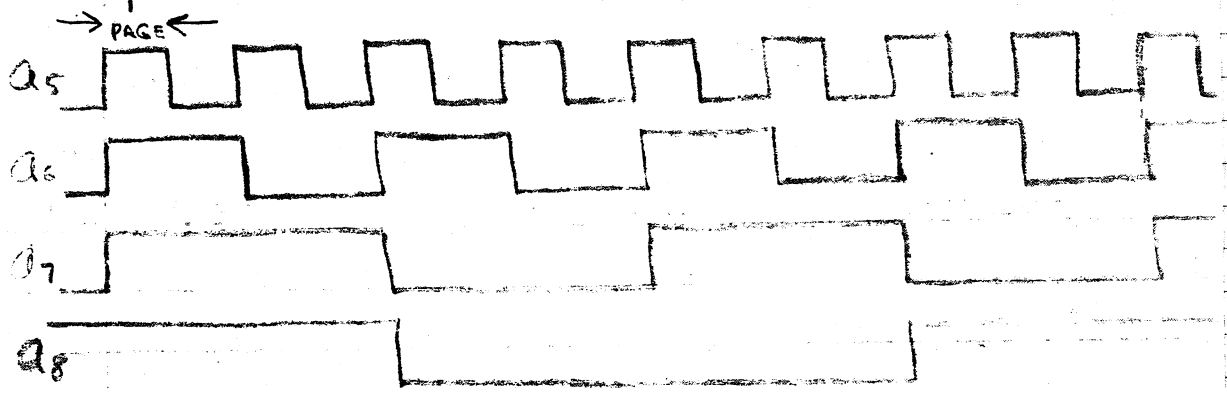
Decom Tapes 7/27

Normal Run 4 Days = 96 Hours = 48-50 files
(½ hour overlap)

~40 files tape ⇒ 2 reels.

36 ~~350 word~~ 32-bit word file headers.

LET-II SECTOR RATES — IMP H



RATE	a_5	a_6	a_7	a_8	SECTOR RATE # (EQUALS $\bar{a}_8\bar{a}_7\bar{a}_6\bar{a}_5$ EVALUATED ON RO PAGE)	Page	DPa$_{2-17}$	a_4
A1·B·$\bar{C}$ (LEO)	1	1	1	1	1	1	0	0
$\overline{SI}'\cdot SII'_7\cdot \overline{SII}'_3\cdot \overline{SIII}'$	0	1	1	1	2	2	0	0
$\overline{SI}'\cdot SII'_6\cdot \overline{SII}'_3\cdot \overline{SIII}'$	1	0	1	1	3	3	0	0
$\overline{SI}'\cdot SII'_5\cdot \overline{SII}'_3\cdot \overline{SIII}'$	0	0	1	1	12	0	1	1
A1·B·$\bar{C}$ (LEO)	1	1	0	0	13	1	1	1
$SI_7\cdot \overline{SII}\cdot \overline{SII}_3\cdot \overline{SIII}$	0	1	0	0	14	2	1	1
$SI_6\cdot \overline{SII}\cdot \overline{SII}_3\cdot \overline{SIII}$	1	0	0	0	15	3	1	1
$SI_5\cdot \overline{SII}\cdot \overline{SII}_3\cdot \overline{SIII}$	0	0	0	0	8	0	1	0
A1·$\bar{B}$·$\bar{C}$ (LEO)	1	1	1	0	9	1	1	0
$\overline{SI}\cdot SII_7\cdot \overline{SII}_3\cdot \overline{SIII}$	0	1	1	0	10	2	1	0
$\overline{SI}\cdot SII_6\cdot \overline{SII}_3\cdot \overline{SIII}$	1	0	1	0	11	3	1	0
$\overline{SI}\cdot SII_5\cdot \overline{SII}_3\cdot \overline{SIII}$	0	0	1	0	4	0	0	1
A1·B·$\bar{C}$ (LEO)	1	1	0	1	5	1	0	1
$SI'_7\cdot \overline{SII}'\cdot \overline{SII}'_3\cdot \overline{SIII}'$	0	1	0	1	6	2	0	1
$SI'_6\cdot \overline{SII}'\cdot \overline{SII}'_3\cdot \overline{SIII}'$	1	0	0	1	7	3	0	1
$SI'_5\cdot \overline{SII}'\cdot \overline{SII}'_3\cdot \overline{SIII}'$	0	0	0	1	0	0	0	0

READ OUT (RO) PAGE IS PAGE FOLLOWING THE ACCUMULATION PAGE. HERE EACH RATE IS TABULATED WITH VALUES OF a_5, a_6, a_7, a_8 WHICH ARE REQUIRED TO ACCUMULATE THAT RATE. RATES

READ OUT (RO) PAGE IS PAGE FOLLOWING THE ACCUMULATION PAGE. HERE EACH RATE IS TABULATED WITH VALUES OF a_5, a_6, a_7, a_8 WHICH ARE REQUIRED TO ACCUMULATE THAT RATE. RATES ARE ORDERED AS THEY WILL BE IN TELEMETRY. NOTE THAT, DUE TO a_8 BEING OUT OF PHASE WITH OTHER a'S, IN GENERAL SECTOR RATE # $\neq \bar{a}_8 \bar{a}_7 \bar{a}_6 \bar{a}_5$

a_2 HIGH = OPP OF 1 IN TELEMETRY +1

Last 7 bits of s/c clock are page SS sect $\bar{a}_7 \bar{a}_6 \bar{a}_5 \bar{a}_4 \bar{a}_3 \bar{a}_2 \bar{a}_1$ on deem tape.

"a" functions dependent on bit rate - "c" functions independent of bit rate. Therefore, while on IMP-6, the sectored rates where readout every 81.92 sec. (= 1 page at 400, 1 Album at 1600) and therefore were repeated for 4 pages at 1600; on IMP-H, sectored rates will change every page.

Note: Sectored rates are summed over 14 spins. Since the spin rate will be ~45 rpm, this corresponds to ~18.4 secs. of accumulation before readout on page change. 1 page = 20.48 sec at 1600 or 81.92 sec at 400. Therefore, this scheme is inefficient at low bit rate.

IMP-6 EXTRCT routine shifts 1600 BPS clock left 16 bit
" 400 BPS " " 3 bits.
This was done to produce c functions which were independent of bit rate.

IMP-H - Modify EXTRCT so that clock is not shifted at either bit rate.

⇒ Modify TIMFIX, etc. so that they are aware of this.

UNPACK SUBROUTINE

* = Done in main program

	Decom word	Decom Half	→ ENCY Word	ENCY Half	Comments
*	Universal Time		1		
	9		2		S/C clock } may have to extrapolate (TIMFIX?)
	8		3		PS counts }
*	Year		4	1	
	1	2	4	2	Day of year
*	Month		5	1	
*	Day of Month		5	2	
	2		6		Msec of day
*	Decom Run Number		7	1	
*	Analog Tape file Number		7	2	
*	Decom File Number		8	1	
*	Absolute File Number		8	2	
*	Perigee Count		9	1	
*	Transmission Rate		9	2	
*	Day of next perigee		10		} Not on IMP-6
*	Msec of day, next perigee		11		
*	STATION NUMBER		12	1	
*	ANALOG TAPE NUMBER		12	2	
	Reel SEQUENCE NUMBER		13		SET BY OVERLAP
	803		14		}
	804		15		
	805		16		
	806		17		ORBIT/ATTITUDE DATA
	807		18		
	808		19		
	809-811		20-22		
	812-814		23-25		
	824-826		26-28		
	854		29		
	855		30		
	857		31		
*	PRODUCTION FLAG		32		Replaces Q.L. Flag
	Bits 4, 8, 12, 16 of wd 51		33	BYTE # 1	Pg 0 } DP a_3-17 (bits number left-to-right 1-32)
	" " " 251		33	" 2	1
	" " " 451			3	2
	" " " 651			4	Pg 3

DECOM WORD	DECOM HALF		ENCY WORD	ENCY HALF	
26	byte 3		34	byte 1	APP 6
226	" "		"	" 2	
426	" "		"	" 3	
626	" "		"	" 4	
226	byte 1		35	byte 1	APP 36
626	" "		"	" 2	
				3	Blank
				4	
page × 200 + 3			page × 166 + 36		TIME QUALITY FLAGS
" "	4-7		" "	37-40	DATA QUALITY FLAGS
" "	59-74		" "	41-48	LED (DS) - Take low order 6 bits of each halfword and compress into consecutive bytes
" "	139-154		" "	49-56	MED(DS) - Same as LED (DS)
" "	75-138		" "	57-120	LED (A) - MED (E)
" "	155-170		" "	121-136	MED (F)
" "	171-192		" "	137-180	Non-sectored rates Decompress each halfword (12 bits left justified) into fullword.
" "	193-200		" "	181-196	~~Der~~ Sectored Rates Decompress each halfword (10 bits left justified) into fullword.
" "	55-58		" "	197-200	Optical Aspect
		SS 0 SS 1			
" "	33	Bits 1,5,9,13	201	Byte 1	ANALOG XMTR ON/OFF SS 0, 1 Optics
" "	33	Bits 17,21,25,29	"	Byte 2	SS 2,3
" "	51	Bits 2,6	"	Byte 3	OA/TM SLAVE SS 1 DPA's
" "	51	Bits 10,14	"	Byte 4	SS 3

8/18/72

Encyclopedia Tapes

WILL PROBABLY FIT ONE ORBIT PER TAPE. HOWEVER, SHOULD BE PREPARED TO MODIFY PROGRAMS TO FIT $\frac{2}{5}$ ORBIT PER TAPE IN CASE ONE ORBIT DOESN'T FIT.

COUNTS AND PHA TAPES

IMP-6 HAS 5 ORBITS PER TAPE
(ORBIT = ~ 4.25 DAYS)
∴ 21.25 DAYS/TAPE

IMP-H HAS ~11.9 DAY ORBIT PERIOD

2 ORBITS ≈ 23.8 DAYS.
PROBABLY WILL NOT BE ABLE TO FIT 2 ORBITS PER TAPE.

∴ FIT $1\frac{2}{5}$ ORBIT/TAPE (≈ 20 DAYS)

BY BASING DATA ON FRACTIONAL ORBITS INSTEAD OF DAYS, THE DATA BASE GENERATOR WILL NOT HAVE TO OPERATE MUCH DIFFERENTLY FROM THAT ON IMP-6. THAT IS, THE ENCY TAPES THAT MUST BE MOUNTED TO GENERATE SPECIFIED COUNTS AND PHA TAPES WILL BE EASILY DETERMINED FROM THE CATALOG.

REEL SEQUENCE NOS. FOR COUNTS + PHA TAPES
(NO. AFTER DECIMAL IS THIRD ORBIT)

ORBIT	NO.
1.1 – 2.2	1
2.3 – 4.1	2
4.2 – 6.3	3

N_O = ORBIT NO.
N_T = THIRD ORBIT NO $\in \{1, 2, 3\}$
N = REEL SEQUENCE NO

$$N = \frac{3 * N_O + N_T - 4}{5} + 1$$

N_O	N_T	N
1	1	1
1	2	1
1	3	1
2	1	1
2	2	1
2	3	2
3	1	2
3	2	2
3	3	2
4	1	2
4	2	3
4	3	3

8/23/72

DAY OF YEAR, MS OF DAY, S/C CLOCK

IMP-6 - PSEUDO SEQUENCE COUNT, EVERY SEQUENCE DAY OF YEAR, MS OF DAY.

IMP-14 - PSEUDO SEQUENCE COUNT, PROVIDED EVERY PAGE. IF SEQ 0 FILL, EXTRAPOLATED. - MAY OVERLAP WITH PREVIOUS PSEUDO SEQUENCE COUNT. IF PAGE MISSING, PSC 0.

— DETERMINE IMPLICATIONS FOR EXTRACT AND TIMFIX & MAIN

TIME FOR START OF PAGE IS FOR SEQ 0. IF SEQ 0. FILL, TIME IS EXTRAPOLATED.

NOTE: TEST TAPE 1 HAS TIME THAT HAS NOT BEEN CORRECTED. CORRESPONDS TO FIRST NON-FILL SEQUENCE.

MAIN

REQUIRES ITIM(1), ISCLK(1), IPSC(1), AND WDAY(1) TO CONTAIN MILLISECONDS OF DAY, S/C CLOCK, PSEUDO-SEQUENCE CLOCK, AND DAY OF YEAR AT START OF ALBUM.

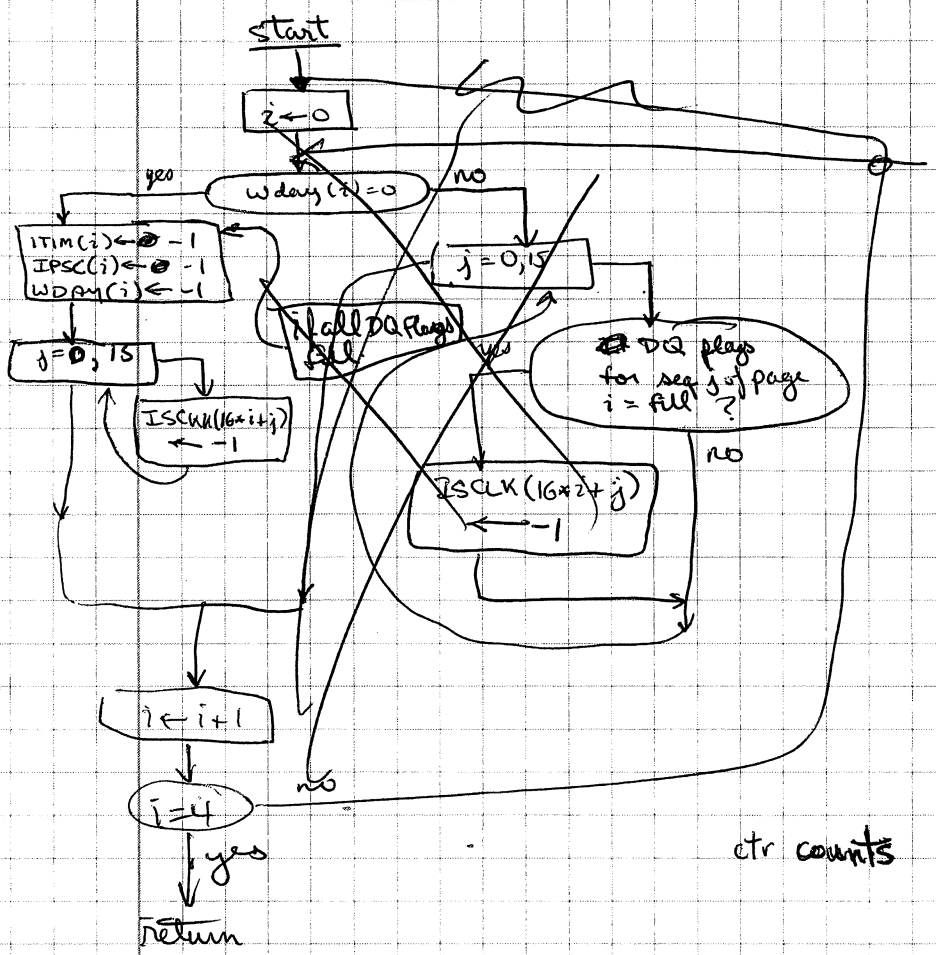
EXTRACT

COMMON /TIMREC/ ITIM(4), ISCLK(64), IPSC(4), WDAY(4)

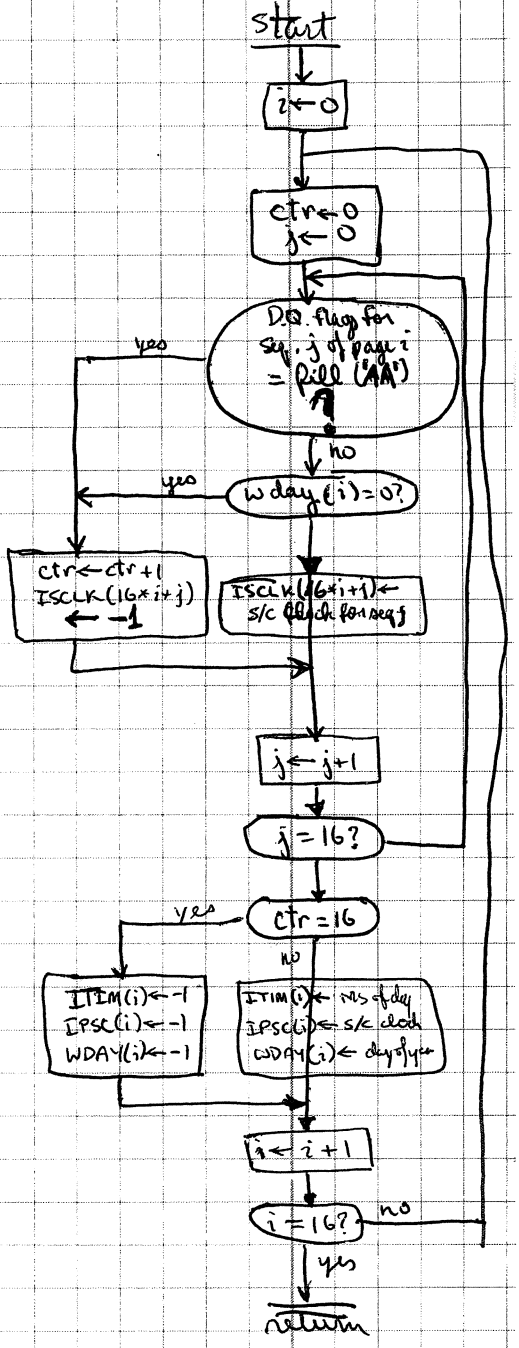
ITIM contains start time of each page in ms of day.
ISCLK " s/c for each sequence
IPSC contains pseudo-sequence counter for seq 0 of each page.
WDAY contains day of year for seq 0 of each page

a) For each page - if day of year = 0, pad ITIM, IPSC, WDAY and all ISCLK for that page. Then pad ~~day~~ 0's

~~b) Go to~~


start
i←0
wday(i)=0
yes
no
ITIM(i)←-1
IPSC(i)←-1
WDAY(i)←-1
j=0,15
ISCLK(16*i+j) ←-1
all DQ flags full
yes
DQ flags for seq j of page i = full ?
no
ISCLK(16*2+j) ←-1
i←i+1
i=4
no
yes
return

ctr counts


start
i←0
ctr←0
j←0
DQ flag for seq. j of page i = full ('AA')
yes
no
wday(i)=0?
yes
ctr←ctr+1
ISCLK(16*i+j) ←-1
ISCLK(16*i+j)← s/c clock for seq j
j←j+1
j=16?
ctr=16
yes
no
ITIM(i)←-1
IPSC(i)←-1
WDAY(i)←-1
ITIM(i)← ms of day
IPSC(i)← s/c clock
WDAY(i)← day of yr
i←i+1
i=16?
no
yes
return

COMPUTATION OF INTERVAL NUMBER

Define one Interval or Pseudo-orbit as 4 days, with Interval 1 beginning at 0000 hours on Sept. 23, 1972 (Day 267 of 1972).

Compute Interval Number as follows:

$$INT = \begin{cases} \dfrac{(Day - 267)}{4} + 1 & \text{if year} = 1972 \\ \dfrac{Day + 99 + (Year - 1973) \times 365 + (\text{No. of leap years since } 1973)}{4} + 1 & \text{if year} > 1972 \end{cases}$$

Let ID = day of year, IYR = year.

Number of leap years since 1973 = (IYR − 1973)/4

~~INT = ID~~

$$INT = \frac{(ID - 267)}{4} + 1 \quad \text{if year} = 1972$$

$$INT = \frac{ID + 99 + (IYR - 1973) \times 365 + \left(\frac{IYR - 1973}{4}\right)}{4} + 1$$

if year > 1972

IMP-6

~~DPS~~

Data Processing System

Eliminating overlap

Computes $\sum_{i=1}^{64} (DQ_i)^9$ where $DQ_i =$

2 bit ~~data~~ quality flag for sequence i of record. Better quality record has smaller sum.

If both sums are equal, computes $\sum_{i=1}^{64} (F_i)$ where $F_i = 0$ if

$$F_i = \begin{cases} 0 \text{ if s/c clock reconstruction flag for sequence } i = 0 \text{ (both readings match)} \\ 1 \text{ if s/c clock reconstr flag} \neq 0 \text{ (no match)} \end{cases}$$

IMP-7

$\sum_i (DQ_i)^9$ same, except flags are packed 1 sequence / byte instead of 4 seq./byte

No s/c reconstruction flags ⇒ no subroutine SATQ.

TREND CHECK

Consider for a particular rate that one finds N_1 counts in m readouts followed by N_2 counts in n readouts. Let $N_1' = 1$ if $N_1 = 0$ and $N_1' = N_1$ otherwise.

If $\max\left(\frac{N_1'}{m} - k\underbrace{\frac{\sqrt{N_1'}}{m}}_{\sigma}, 0\right) < \frac{N_2'}{n} < \frac{N_1'}{m} + \frac{k\sqrt{N_1'}}{m}$,

N_2 is considered acceptable and no trend flag is set. Here $k = 20$ for $\sigma > 3$ and $k = 10$ for $\sigma \leq 3$.

Always use very first data point for checking next but do not use it otherwise. Use a count of 1 for next trend check even if the count N was rejected by the preceding trend check.

COUNTS TAPES - INSERT 2-BIT FLAG IN 1ST BYTE - @ RATE IN 3 BYTES OF WORD

PHA TAPES - 1-BIT FLAG FOR EACH RATE SUM INDICATING IF ANY COUNTS WERE NOT ACCUMULATED DUE TO TREND CHECK (DON'T ACCUM. UNDETERMINED)

LET-II ON/OFF

a_8 changes only when album number goes from even to odd.

Check: If $(\text{album}_2 - \text{album}_1) = 2^{*6^4}$ then

If $(a_8)_2 = (a_8)_1$ Then LET-II = OFF
otherwise LET-II = ON

If $(\text{album}_2 - \text{album}_1) = 1^{*6^4}$ and mod $(\text{album}_2, 2) = 1$ then

If $(a_8)_2 = (a_8)_1$, then LET-II = OFF
otherwise LET-II = ON

Otherwise LET-II = undetermined.

For each readout of DP a_3-17, check for readout sequence padded. If not padded, increment count for that value of DP a_3-17. Return number of counts for non-padded readouts of DP a_3-17 = 0 and DP a_3-17 = 1.

If one not zero (all readouts not the same, print the Tape no, time, 5/c clock D.Q. Flags, DP a_3-17 values, and values of both counters. Set LET-II ON/OFF and LOD trend check to 1 to "undetermined", and F2 according to DP a_3-17 value readout most.

rel seq. no — year day msc/day (printer count)
** DP A3-17 BITS DISAGREE ---------- ... YYYY DDD mmmmmmmmm ____ ____
____ 0's ____ 1's (5/c clock)

PHA TAPES

LED (DS) bits on ENCY Type = (0,0,0,0,0,0,R,L1) (reverse of IMP-6)

LED

		0	5 7	15
Halfword	1	G	AAAAAAAAAA	←
"	2		BBBBBBBBBPP	←

A, B have 10 bits each 9 on IMP-6

G = { 0 for high gain, 1 " low " } = L1

sequence	halfseq	PCM Fr	Priority Order	PP
0	1	0	1	00
	2	1	3	10
1	1	2	1	00
	2	3	2	01
2	1	4	1	00
	2	5	3	10
3	1	6	1	00
	2	7	2	01

MED (DS) Bits on ency Type = (0, 0, DE1, DE2, F1, F2, E1, E2)
(reverse from IMP-6)

MED

		0	4 5 6	15	
Halfword	1	GM	TTDDDDDDDDDD	←	D, E have 10 bits each 9 on IMP-6
"	2		EEEEEEEEEE	←	
"	3	GM	FFFFFFFFPP	←	F has 8 bits - 9 on IMP-6

MED DE G,M = $\overline{DE1}, \overline{DE2}$

~~LED~~ F G,M = $\overline{F1}, \overline{F1}$

G = 0 for high gain
1 for low gain

IF G = 1 M = 0 for mult. factor of 10
1 " " " " 50

TT	event	E1E2
00	$D1 \cdot E1 \cdot F \cdot G$	00
01	$D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	10
10	$D1 \cdot E1 \cdot F \cdot \bar{G}$	01
11	$(D0 \cdot E)2 \cdot E1 \cdot \bar{F} \cdot \bar{G}$	11

$TT = E2\bar{E}1$

Sequence	half seq	PCM Frame	Priority Order
0	1	0	1
	2	1	4
1	1	2	1
	2	3	3
2	1	4	2
	2	5	1
3	1	6	3
	2	7	2

GENPHA

Reg 2 = address of 1st LED(DS) byte ~~of page~~ of page = ~~initially~~ IENCY + ~~page~~ 160 + pg × 664

Reg 3 = ~~byte~~ address of LED(DS) point. At start of page, ~~set~~ to IENCY + 160 + pg * 664 (=R2). Incremented by 1 for each point.

Reg 4 = halfword displacement for points in page (0 to 63 by 2)

Reg 5 = address of 1st halfword of PHA point in IPHA — initially IPHA+204 — incremented by 10 bytes

Reg 6 = Page counter 4 – 1

Reg 7 = ~~point count~~ PCM frame counter (0 – 31) for page
Reg 7 mod 8 ~~page~~ used to index tables of LED and MED priority orders

1/16/73

IMP-H LOW GAIN TAPE FORMAT

CHANGES FROM IMP-I FORMAT (p. 5-25)

- DATA FROM 1 4-DAY INTERVAL CONTAINED IN 1 FILE.
- CHANGE 1ST HALFWORD OF WORD 1 FROM ORBIT NUMBER TO 4-DAY INTERVAL NUMBER.
- ADD FOLLOWING TO END OF RECORD:

WORD	CONTENT
60	1ST HALFWORD – PERIGEE COUNT CORRESPONDING TO FIRST DATA POINT OF RECORD.
	2ND HALFWORD – PERIGEE COUNT CORRESPONDING TO SECOND DATA POINT OF RECORD
61–67	Sum (real) of counts data over n albums for event A1, B, C, D1, E, F, G
68–74	NUMBER OF COUNTS DATA READOUTS USED IN EACH OF THE ABOVE SUMS, RESPECTIVELY
75–82	Trend check for events $A1 \cdot \bar{B} \cdot \bar{C}$; $(A\&B)1 \cdot \bar{B} \cdot \bar{C}$; $A1 \cdot B \cdot \bar{C}$; $(A\&B)1 \cdot B \cdot \bar{C}$; $D1 \cdot E1 \cdot F$; $D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$; $D1 \cdot E1 \cdot F \cdot \bar{G}$; $(D\&E)2 \cdot E1 \cdot \bar{F} \cdot \bar{G}$; A1, B, C

D1
E
F
G

One Trend Check Flag per ~~byte~~ halfword (last ~~byte~~ halfword of word [redacted] 82 not used.

~~TREND CHECK FLAG = 0 IF ALL RATE READOUTS SATISFIED TREND CHECK~~

TREND CHECK [redacted] = NUMBER OF RATE READOUTS THAT WERE REJECTED BY TREND CHECK.
$= \sum_{\text{ALBUMS IN INTERVAL}}$ (TREND CHECK BYTE FROM ALBUM)

PHA DATA POINT – ~~HALFWORD 1~~

Format same as on IMP-H PHA Tape:

			0	A 5	7	15
LED	1	G		A A A A A A A A A A		
	2			B B B B B B B B B B P P		
MED	1	GM		T T D D D D D D D D D D		
	2			E E E E E E E E E E		
	3	GM		F F F F F F F F F P P		

SINCE BIT 4 IS USED IN HALFWORD 1 OF THE MED DATA POINT,

BIT 3 IN HALFWORD 1 = 0 FOR LED
= 1 FOR MED

1/17/73

IMP-H SUMMARY TAPE FORMAT

CHANGES FROM IMP-I FORMAT (p. 5-28)

- EACH FILE CONTAINS DATA FROM 1 4-DAY INTERVAL.

HEADER RECORD

- CHANGE 1ST WORD FROM ORBIT NUMBER TO 4-DAY INTERVAL NUMBER.

- WORD 6 HALFWORD 1 - PERIGEE COUNT AT START OF SUMMARY PERIOD.
  HALFWORD 2 - PERIGEE COUNT AT END OF SUMMARY PERIOD.

ADD FOLLOWING WORDS

WORD	CONTENT
35-~~38~~ 41	Sum (real) of counts data satisfying trend check (not rejected, not undetermined) for events A1 B C ~~respectively~~ D1 E F G respectively
~~39-40~~	
~~49~~	
42-48	Numbers of counts data readouts used in the sum for each event above (Base 1600 BPS).

WORD	CONTENT
~~49-56~~ 49-52 49-56	TREND CHECK FLAGS FOR EVENTS

$A1 \cdot \overline{B} \cdot \overline{C}$
$(A \& B)1 \cdot \overline{B} \cdot \overline{C}$
$A1 \cdot B \cdot \overline{C}$
$(A \& B)1 \cdot B \cdot \overline{C}$
$D1 \cdot E1 \cdot F$
$D1 \cdot E1 \cdot \overline{F} \cdot \overline{G}$
$D1 \cdot E1 \cdot F \cdot \overline{G}$
$(D \& E)2 \cdot E1 \cdot \overline{F} \cdot \overline{G}$
A1
B
C
D1
E
F
G

HALFWORD

ONE TREND CHECK FLAG PER ~~BYTE~~ (LAST ~~BYTE~~ OF WORD ~~56~~ NOT USED.)

56

~~SUM OF TREND CHECKS~~

EACH TREND CHECK HALFWORD CONTAINS THE SUM OF THE TREND CHECK BYTES ~~FOR~~ (FOR THE PARTICULAR RATE) IN ALL ALBUMS INCLUDED IN THE TIME PERIOD.

1/17/~~68~~73

~~CA~~

IMP-H TAPE CATALOG

SAME AS IMP-I CATALOG ~~WHERE~~ WITH FOLLOWING CHANGES:

SINCE PROCESSING IS DONE ON BASIS OF 4-DAY INTERVALS, REEL SEQUENCE NUMBERS WILL BE COMPUTED ~~BY~~ FROM 4-DAY INTERVAL NUMBERS INSTEAD OF ORBIT NUMBERS. SIMILARLY, THE CONTENTS FLAG (WORDS ~~13~~ 14-15 OF CATALOG ENTRY FOR ALL ~~IMP~~ TAPES EXCEPT ~~ENCY~~ ENCY AND ~~SPECIAL~~ SPECIAL RUN TAPES) WILL CONTAIN A STRING OF BITS INDICATING WHICH OF PRESPECIFIED 4-DAY INTERVALS ARE ACTUALLY ON THE TAPE.

WORDS 6 AND 10, HOWEVER, WILL ~~NOT~~ CONTAIN THE FIRST AND LAST PERIGEE COUNTS ON TAPE.

ENCYCLOPEDIA TAPES - WORDS 14 AND 15 WILL CONTAIN THE ~~START AND END~~ FIRST AND LAST 4-DAY INTERVAL NUMBERS, RESPECTIVELY.

HGPLOT PROGRAM

COMMON AREA: HEADER ~~60~~ WORDS

WORD	
1	Halfword 1 - first interval or 0 Halfword 2 - second interval or first interval
2	1 - year 2 - day of year } Start time of summary period
3	Milliseconds of day
4-5	Same as 2-3 Stop Time of summary period
~~6~~ 6	Halfword 1 - ~~Per~~ Perigee count: start " 2 - " " Stop
7-9	Spare
10-34	Same as IMP-6
35-41	Sum (real) of counts data satisfying trend check for events A1, B, C, D1, E, F, G respectively.
42-48	# of counts data readouts used in sum for each event above (Base 1600 BPS)
49-56	- Trend check - # of counts data readouts rejected by trend check for events A1·$\bar{B}$·$\bar{C}$, . . ., G (see p. 61). One per halfword
57	Total LED events, B=0 in ~~512×512~~ 1024×1024 matrix or Total MED events in ~~512×512~~ 1024×1024 matrix.
58	Total LED events, B≠0 in ~~512×512~~ 1024×1024 matrix. or blank.
~~59~~	
59	Total LED events, B=0, ~~exceeding~~ outside 512×512 matrix or Total MED events outside 512×512 matrix, ~~or~~
60	Total LED events, B≠0, ~~in~~ outside 512×512 matrix or blank.

Common Area BUFFER, 82 words
ILOW (82) — Low coin data record

Common Area ONOFF, 53 words
LCT (8) — same as JMP6 * see pg 67

RRATE (15) real

WORD	DESCRIPTION
1	$A1 \cdot \overline{B} \cdot \overline{C}$
2	$(A\&B)1 \cdot \overline{B} \cdot \overline{C}$
3	$A1 \cdot B \cdot \overline{C}$
4	$(A\&B)1 \cdot B \cdot \overline{C}$
5	$D1 \cdot E1 \cdot F$
6	$D1 \cdot E1 \cdot \overline{F} \cdot \overline{G}$
7	$D1 \cdot E1 \cdot F \cdot \overline{G}$
8	$(D\&E)2 \cdot E1 \cdot \overline{F} \cdot \overline{G}$
9	A1
10	B
11	C
12	D1
13	E
14	F
15	G

NRATE (15) — integer word — # counts data readouts used in each of sums in RRATE

HTRND (15) — integer halfword — number of counts data readouts rejected by trend check in each of sums in RRATE.

LOW GAIN TAPES

82 words = 328 bytes (LRECL)

~~15 × 82 = 1230~~ " = ~~15 × 328~~ " = ~~4920~~ bytes (BLKSIZE)

4920

~~984~~ / 1600 = ~~.615~~ 3.075 in/block + 0.6" = ~~1.215~~ 3.675 in/block

~~0.225~~ 1.125 hours

3.675 / ~~1.215~~ in/block = ~~225~~ 1.125 hr./block = ~~5.4~~ 3.267 in/hr. = ~~129.6~~ 78.4 in/day = ~~518.4~~ 313.6 in/4 day int.

~~518.4~~ 313.6 / 12 = ~~43.2~~ 26.13 feet/interval

~ ~~50~~ 61 intervals / 2200 feet of tape

~~EXTENDED TAPE~~

old

$$\begin{array}{r} 59 \\ \times\ 3 \\ \hline 177 \\ 4 \\ \hline 708 \end{array}$$

$$\begin{array}{r} .4425 \\ \times\ .6 \\ \hline 1.0425 \end{array}$$

$$1600 \overline{)\,708.0000}\quad .4425$$

6400
6600
6400
4000
3200
8000

$$.615 \overline{)\,1.4425}\quad 2.19$$

1230
1200
615
5850
5535
315

43.20

~~1.215 / 1.0425~~

$$\frac{1.0425}{1.215} \times 60 = .858 \times 60 = 51.48$$

32 PHA readouts/seq × 2 (MED + LOD) = 64 PHA RO/seq

= 1024 PHA RO/Album

≈ 10.24 Low Gain events/album

≈ 1 low gain Logical rec./album

1 " " Phys rec/15 albums

$$\frac{4 \text{ days}}{81.92 \text{ sec/album}} = 4218.75 \text{ albums/interval}$$

281.25 Phys. rec/interval = ~~5400~~ 11037 = 86.42

PHA SUMMARIZER

COMMON AREAS

IMP-I

(361) 59

COMMON /BUFFER/ IPHA(376), ILOW(82)

IPHA ↑ PHA tape record array

ILOW ↑ Low Gain Tape record array

Same as IMP-I — COMMON /SWITCH/ IORBIT, IMATSW, ILOWSW, IUN, ICATI(15), ICATO(15), IFRST

IORBIT ↑ Interval number

COMMON /SUMUNT/ IUNIT(2), NUMREC(2), IMATHD(6), RMATCT(40), IMATLP(5)

IMATHD(6) — H1 - Start Register Count; H2 - Stop Register Count

RMATCT (All others - same as IMP-I)

Same as IMP-I

WORD	
1-4	Sum of all counts data satisfying trend check for events $A1\cdot\bar{B}\cdot\bar{C}$, $(A\&B)1\cdot\bar{B}\cdot\bar{C}$, $A1\cdot B\cdot\bar{C}$, $(A\&B)1\cdot B\cdot\bar{C}$
5-8	Sum of all counts data satisfying trend check for events $D1\cdot E\cdot F$, $D1\cdot E\cdot\bar{F}\cdot\bar{G}$, $D1\cdot E\cdot F\cdot\bar{G}$, and $(D1\&E1)2\cdot\bar{E}\cdot\bar{F}\cdot\bar{G}$
9-16	Number of counts data readouts used in the sum for each event above (Base 1600 BPS)
17	Total # LED PHA data points accepted (Base 1600)
18	Total # MCD " " " " " "
19-25	Sum of all counts data satisfying Trend check for events A1, B, C, D1, E, F, G
26-32	Number of counts data readouts used in the sum for each event (words 19-25) (Base 1600)
33-40	Trend check flags for words 1-8, 19-25 (15 Total) - 1 per halfword (last halfword of word 40 not used). Each flag = Σ of trend check bytes from PHA tape.

COMMON area WORK - SAME AS IMP-I.

LOW GAIN PLOT PROGRAM

COMMON AREAS

HEADER - See HGPLOT - page 63

PLOTAY - no change

/BUFFER/ ILOW(82) - Low Gain data record

ONOFF

LCT(8) - same, except contains total number of events in 1024 x 1024 matrix.

LCT1(8) - Total number of events outside 512 x 512 matrix - Index correspondance to events same as for LCT

RRATE(15) - Real - Sum of data counts for time period covered by plot

Word	Description
1	$A1 \cdot \bar{B} \cdot \bar{C}$
2	$(A \& B)1 \cdot \bar{B} \cdot \bar{C}$
3	$A1 \cdot B \cdot \bar{C}$
4	$(A \& B)1 \cdot B \cdot \bar{C}$
5	$D1 \cdot E1 \cdot F$
6	$D1 \cdot E1 \cdot \bar{F} \cdot \bar{G}$
7	$D1 \cdot E1 \cdot F \cdot \bar{G}$
8	$(D \& E)2 \cdot E1 \cdot \bar{F} \cdot \bar{G}$
9	A1
10	B
11	C
12	D1
13	E1
14	F
15	G

NRATE(15) - Sum of counts data readouts used in each of sums in RRATE.

CONSTANTS FOR ANALIMP 7

(FROM DR. TEGGARDEN 5/21/73)

HIGAIN MED PROTONS ⟹ Atomic Weight = 1, Atomic NO. = 1 ⇒ X = 1, Y = 1

FCN

C(1) = 6.013641 E03

C(2) = 6.33102 E-03

C(3) = 5.25839 E01

C(4) = 1.23828 E00

C(5) = −1.18220 E01
−1.28220 E01

ENERGY

B(1) = −6.25363064 E00

B(2) = 2.75514160 E02

B(3) = 8.92753661 E-01

B(4) = 1.63833046 E00

B(5) = 1.65018845 E00

IMP-7 DEUTERONS

ANALIMP 7 CONSTANTS 6/28/73

HI GAIN MED DEUTERONS

ATOMIC WEIGHT = 2 → X = 2
ATOMIC NO. = 1 → Y = 1

FCN

C(1) = 5.73641016 E 03

C(2) = -7.19127058 E-07

C(3) = 3.96779938 E 01

C(4) = 1.13487339 E 00

C(5) = 7.71566677 E 00

ENERGY

C(1) = -2.41464539 E01

C(2) = 6.91491699 E02

C(3) = 9.08434689 E-01

C(4) = 5.98247707 E-01

C(5) = 1.62827492 E 00

DCHAN (Y)	CHAN (X)	ENERGY
115.0	10	33.0
101.5	15	34.5
90.3	20	36.2
73.5	30	41.0
61.9	40	47.0
53.1	50	53.0
47.6	60	59.5
43.2	70	66.4
39.4	80	74.0
36.0	90	81.5
32.8	100	89.4
30.5	110	97.2
29.0	120	105.5

70
6/30/73

TREND CHECK COMPARISON

~~OLD~~

GIVEN TWO CONSECUTIVE READOUTS N_1 & N_2 (N_2 FOLLOWS N_1),

OLD: ACCEPT N_2 IF

$$\text{MAX}(N_1' - \sigma'(N_1), 0) < N_2' < N_1' + \sigma'(N_1)$$

WHERE

$$\sigma'(N_1) = 20\sqrt{N_1} \quad \text{if } N_1 > 9$$

$$= 10\sqrt{N_1} \quad \text{if } N_1 \leq 9$$

NOW: ACCEPT N_2 IF

$$\frac{1}{15} < \frac{N_2'}{N_1'} < 15$$

WHERE $N_{1(2)}' = \text{Max}(N_{1(2)}, 1)$.

~~RATIO IN~~

RATE INDICES FOR DATA BASE GENERATOR TREND

CHECK SUMMARY

HTREND INDICES	RATE INDEX	RATE
1-8 (8)	1	$DI \cdot E \cdot \overline{F} \cdot \overline{G}$
9-16 (8)	2	$DI \cdot E \cdot F \cdot \overline{G}$
17-20 (4)	3	$DI \cdot \overline{D2} \cdot E \cdot F \cdot \overline{G}$
21-24 (4)	4	$DI \cdot (\overline{DI+EI})1 \cdot E \cdot \overline{F} \cdot \overline{G}$
25-28 (4)	5	$ID1$
29-32 (4)	6	$ID2$
33-36 (4)	7	$DI \cdot (DII+EII)R \cdot E \cdot \overline{F} \cdot \overline{G}$
37-40 (4)	8	$DI \cdot E \cdot F$
41-44 (4)	9	$DI \cdot (DI+EI)2 \cdot (\overline{DII+EII})R \cdot E \cdot F \cdot \overline{G}$
45-48 (4)	10	$DI \cdot (DII+EII)R \cdot E \cdot F \cdot \overline{G}$
49-52 (4)	11	DI
53-56 (4)	12	E
57-60 (4)	13	F
61-64 (4)	14	G
65-68 (4)	15	$DI \cdot (DI+EI)1 \cdot E \cdot \overline{F} \cdot \overline{G}$
69-72 (4)	16	$(DI+EI)2 \cdot E \cdot \overline{F} \cdot \overline{G}$
73-80 (8)	17	$(A+B)\underline{1} \cdot B \cdot \overline{C}$
81-88 (8)	18	$A \cdot B \cdot \overline{C}$
89	19	$A1$
90	20	$(A+B)1 \cdot \overline{B} \cdot \overline{C}$
91	21	B
92	22	$IA2$
93	23	$IA1$
94	24	$A1 \cdot B$
95	25	$A1 \cdot \overline{B} \cdot \overline{C}$
96	26	C
97-100 (4)	27	$SI_1 \cdot \overline{SII} \cdot \overline{SII_a} \cdot \overline{SIII}$
101-104 (4)	28	$SI_2 \cdot$ " " "
105-108 (4)	29	$SI_3 \cdot$ " " "
109-112 (4)	30	$SI_4 \cdot$ " " "
113-116 (4)	31	$SI_1' \cdot \overline{SII'} \cdot \overline{SII_a'} \cdot \overline{SIII'}$
117-120 (4)	32	$SI_2' \cdot$ " " "
121-124 (4)	33	$SI_3' \cdot$ " " "
125-128 (4)	34	$SI_4' \cdot$ " " "

HTREND INDICES	RATE INDEX	RATE	
129-132 (4)	35	$SI \cdot SII_1 \cdot \overline{SII}_a \cdot \overline{SIII}$	
133-136 (4)	36	$SI \cdot SII_2 \cdot$ " "	
137-140 (4)	37	$SI \cdot SII_3 \cdot$ " "	
141-144 (4)	38	$SI \cdot SII_4 \cdot$ " "	
145-148 (4)	39	$SI' \cdot SII'_1 \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
149-152 (4)	40	$SI' \cdot SII'_2 \cdot$ " "	
153-156 (4)	41	$SI' \cdot SII'_3 \cdot$ " "	
157-160 (4)	42	$SI' \cdot SII'_4 \cdot$ " "	
161-162 (2)	43	SI	
163-164 (2)	44	SI'	
165-166 (2)	45	SII	
167-168 (2)	46	$SIII'$	
169-170 (2)	47	SII_a	
171-172 (2)	48	SII'_a	
173-174 (2)	49	$SIII$	
175-176 (2)	50	$SIII'$	
177	51	$DI \cdot E \cdot F \cdot \overline{G}$	MBD SECTORED RATE
178	52	$DI \cdot \overline{D2} \cdot E \cdot \overline{F} \cdot \overline{G}$	
179	53	$(DI+\overline{GI})1 \cdot E \cdot \overline{F} \cdot \overline{G}$	
180	54	$DI \cdot (\overline{DI+GI})1 \cdot E \cdot \overline{F} \cdot \overline{G}$	
181 (F2=0)	55	$SI'_5 \cdot \overline{SII}' \cdot \overline{SII}'_a \cdot \overline{SIII}'$	LED/LOT-II SECTORED RATE
" (F2=1)	56	$\overline{SI} \cdot SII_5 \cdot \overline{SII}_a \cdot \overline{SIII}$	
" (F2=2)	57	$SI_5 \cdot \overline{SII} \cdot \overline{SII}_a \cdot \overline{SIII}$	
" (F2=3)	58	$\overline{SI}' \cdot SII'_5 \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
182 (F2=0,2)	59	$A1 \cdot \overline{B} \cdot \overline{C}$	
" (F2=1,3)	60	$A1 \cdot B \cdot \overline{C}$	
183 (F2=0)	61	$\overline{SI}' \cdot SII'_7 \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
" (F2=1)	62	$SI'_7 \cdot \overline{SII}' \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
" (F2=2)	63	$\overline{SI} \cdot SII_7 \cdot \overline{SII}_a \cdot \overline{SIII}$	
" (F2=3)	64	$SI_7 \cdot \overline{SII} \cdot \overline{SIII}_a \cdot \overline{SIII}$	
184 (F2=0)	65	$\overline{SI}' \cdot SII'_6 \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
" (F2=1)	66	$SI'_6 \cdot \overline{SII}' \cdot \overline{SII}'_a \cdot \overline{SIII}'$	
" (F2=2)	67	$\overline{SI} \cdot SII_6 \cdot \overline{SII}_a \cdot \overline{SIII}$	
" (F2=3)	68	$SI_6 \cdot \overline{SII} \cdot \overline{SII}_a \cdot \overline{SIII}$	

TREND CHECK COMPARISON

RED NUMBERS INDICATE REJECTIONS WHEN ANALOG XMTR OFF. ONLY WRITTEN IN WHEN NON-ZERO OR DIFFERS.

INDEX	INTERVAL 4 OLD	INTERVAL 4 NEW	INTERVAL 10 OLD	INTERVAL 10 NEW	INTERVAL 26 OLD	INTERVAL 26 NEW
1	2 (2)	2 (2)	0	0	0	0
2	2 (2)	0	0	0	0	0
3	1 (0)	1 (0)	0	0	0	0
4	1 (0)	1 (0)	2 (2)	0	0	0
5	0	1 (0)	0	0	0	0
6	1 (1)	1 (1)	1 (1)	0	8 (7)	2 (2)
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	2 (2)	3 (3)	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	36 (32)	36 (32)	20 (18)	20 (18)	0	0
14	35 (35)	35 (35)	13 (13)	13 (13)	0	0
15	3 (3)	4 (4)	9 (8)	12 (10)	0	0
16	8 (8)	8 (8)	10 (10)	18 (18)	0	0
17	0	0	0	0	0	0
18	2 (2)	2 (2)	0	0	0	0
19	5 (5)	3 (3)	38 (34)	2 (2)	0	0
20	0	0	0	0	0	0
21	6 (6)	5 (5)	3 (3)	4 (4)	0	0
22	6 (6)	7 (7)	1 (1)	1 (1)	0	0
23	0	0	13 (12)	4 (4)	0	0
24	1 (1)	2 (2)	1 (1)	3 (3)	0	0
25	5 (5)	6 (6)	32 (29)	4 (4)	0	0
26	6 (6)	6 (6)	3 (3)	3 (3)	0	0
27	0	0	2 (2)	0	1	2 (0)
28	0	0	4 (4)	1 (1)	0	0
29	0	0	2 (2)	0	0	0
30	0	0	1 (1)	0	0	0
31	375 (0)	186 (0)	47 (1)	29 (0)	0	0
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	0	0	1 (1)	1 (1)	0	0
35	0	0	0	0	0	0
36	0	0	2 (2)	0	0	0
37	0	0	0	0	0	0
38	0	0	0	0	0	0
39	0	0	2 (2)	0	0	0
40	0	0	0	0	0	0

INDEX	INTERVAL 4 OLD	INTERVAL 4 NOW	INTERVAL 10 OLD	INTERVAL 10 NOW	INTERVAL 26 OLD	INTERVAL 26 NOW	
41	0	0	0	0	0	0	
42	0	0	0	0	0	0	
43	0	0	3 (3)	0	0	0	
44	192 (0)	30 (0)	132 (1)	23 (0)	173 (0)	52	(0)
45	0	0	1 (1)	0	0	0	
46	0	0	0	0	2 (2)	2	(2)
47	1 (1)	0 (1)	1 (1)	0	1 (1)	0	
48	0	0	0	0	0	0	
49	0	0	0	0	0	0	
50	0	0	0	0	0	0	
51	0	0	0	0	0	0	
52	0	0	0	0	0	0	
53	0	0	0	0	0	0	
54	0	0	0	0	0	0	
55	50 (6)	18 (10)	47 (18)	12 (7)	60 (0)	26	(12)
56	0	0	0	0	2 (2)	0	
57	50 (1)	38 (8)	46 (24)	16 (2)	52 (7)	57	(18)
58	1 (1)	0	0	0	3 (3)	1	(1)
59	0	0	75 (68)	0	0	0	
60	0	0	0	0	0	0	
61	0	0	0	0	0	0	
62	0	0	1 (1)	0	0	0	
63	0	0	0	0	0	0	
64	0	0	1 (1)	0	0	0	
65	0	0	0	0	0	0	
66	0	0	3 (3)	0	0	0	
67	0	0	0	0	0	0	
68	0	0	3 (3)	0	0	0	
CPU	2.39	1.84	2.69	2.05	2.67	1.68	
I/O	3.81	3.81	4.05	4.05	.98	.96	

INT. 4 - QUIET PERIOD
INT. 10 - FLARE (10/31/72)
INT. 26 - 85 FT. DISH (1/1/73 - 1/4/73) COVERAGE

ANALIMP-7 8/6/73

HI-GAIN MED ALPHAS (BONNARD)
Z=2 A=4

FCN

C(1) = 0.70543 D 05

C(2) = -0.73601 D -03

C(3) = 0.19928 D 03

C(4) = 0.10423 D 01

C(5) = 0.19528 D 02

ENERGY

B(1) = -0.5218 D 00

B(2) = 0.28924 D 03

B(3) = 0.21495 D 00

B(4) = 0.0

B(5) = 0.17757 D 01

IMP-7 PERIGEE COUNTS

Perigee counts on IMP-7 decom tape file headers appear to only change ~~at~~ with new decom runs. They do not change when predicted by ~~roots~~ the time of next perigee in the file headers.

Decom Run	Perigee Count
0	1
1	0
2	1
3	2
4	1
5	2
6	2
7	2
8	3
9	3
10	3
11	3
12	4
13	4
14	4
15	5
16	5
17	5
18	6
19	6
20	6
21	7
22	7
23	8
24	8
25	8
26	9
27	9
28	9
29	10
30	10

ANALIMP-7 LED He^4 9/10/73

Z = 2 A = 4

A CHAN (Y)	B CHAN (X)	E
135.3	4.6	4.2
105.2	14.7	4.8
78.6	28.6	6.0
60.1	43.8	7.6
51.3	58.7	9.4
44.7	73.1	11.2
38.9	88.8	13.2
34.8	102.8	15.0
31.3	118.0	17.0
28.7	131.7	18.8
26.5	146.7	20.8
24.0	166.1	23.4

ENERGY

C(1) = 1.72304921 D -02

C(2) = 1.40511131 D 01

C(3) = 1.36006534 D -01

C(4) = -3.16772282 D -01

C(5) = 1.88513565 D 00

MAX REL ERROR

5.25176525 E -3

AT X = 14.7

E_e = 4.79999924

E_c = 4.77479076

FCN

C(1) = 6.00144531 D 03

C(2) = -1.59574265 D -05

C(3) = 4.12902679 D 01

C(4) = 1.11972618 D 00

C(5) = 7.26436710 D 00

MAX REL ERROR

2.67376676 E -02

AT X = 4.37999878 E01

Y = 6.00999908 E01

Y_c = 6.17069244 E01

1/4/74

CHANGES TO IMP-H SYSTEM FOR IMP-J

DATA PROCESSING SYSTEM

DP a_3-17 (read out every other snapshot on IMP-H) replaced by DP a_2-17 (read out every snapshot). Thus word 33 of the IMP-J encyclopedia tape record will be as follows:

Byte 1

$D_0 D_0 D_1 D_1 D_2 D_2 D_3 D_3$

for page 0; where $D_i D_i$ = 2 redundant readouts of DP a_2-17 for snapshot i.

Bytes 2-4 will correspond to pages 1-3.

Offset corrections will be made to the VLET DI, DII, and E pulse heights (readout in LET-II - R1, R2, and R3) for non-null events (DI > 0).

DI - subtract 1.
DII - subtract 2.
E - subtract 1.

If any of the corrected values is negative, a message will be printed.

DPa2 - 17

Page	Snapshot	Decimal Word	Byte (1-4) Bits (numbered 1-8)
0	0	36	1 4, 8
	1		2
	2		3
	3		4
1		236	
2		436	
3		636	

VLET

R1

ENCY RECORD WORD

VLET -

Page	Snap	R1	R2	R3
0	0-3	161-164	165-168	169-172
1	0-3	327-330	331-334	335-338
2	0-3	493-496	497-500	501-504
3	0-3	659-662	663-666	667-670

IMP-H System Bugs (Continued on Page 93)

DBGEN – Subroutine ~~REPOR~~ REPORT reinitializes MED & LED off counters before printing – summary always shows 0 MED & LED off albums. Program OFFSTAT run to determine these counts.
Fixed 3/11/74.

PHA Summarizer – main program ~~PROG~~ SUMMN processed last album of each 4 day interval twice. All PHA readouts in these albums summarized twice. All interval processed thru PHA summarizer after 3/27/74 are correct.

PHA tape has last record of each interval signified by a negative interval number. PHA summarizer main program was reading a record, processing it, then check if ~~this~~ ABS(interval no. in tape) = interval number being processed. ~~This resulted in~~ If equal, the next record was processed. For the last interval on a PHA tape, an end-of-file was encountered & and the correct amount of data was processed. For other intervals, the first record of the following interval was read and summarized. This record is summarized again when the next interval is processed. On Low gain Tapes, this may result in ~~data~~ the interval number of the last record ~~appearing~~ being one greater than the interval number of the file.

DBGEN – PHA TAPES – IF LED CONTAINS NULL EVENT, PRIORITY ~~&~~ VALUES FOR MED EVENT SET TO ZERO.
COUNTS TAPES – ~~&~~ MED SECTORED RATES. – IF EITHER CURRENT OR LAST VALUE ZERO, TREND CHECK SET TO 1.
BOTH OF THE ABOVE PROBLEMS EXIST THROUGH INTERVAL 150.
CORRECTED 9/25/74.

PHA SUMMARIZER – LOW GAIN TAPES – STOP PORIGEE COUNT (WORD 60 - HALFWORD 2) SET AFTER RECORD WRITTEN – SHOWS UP IN NEXT RECORD. PROBLEM EXISTS ON INTERVALS 1-153 & 156-173. CORRECTED 11/8/74.

IMP-J PHA TAPES

8/19/74

LED PHA ~~event types~~ data points

Changed

	Bit 0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HALFWORD 1:	G	—	—	T_1	T_2	T_3	A	A	A	A	A	A	A	A	A	A
HALFWORD 2:	—	—	—	—	—	—	B	B	B	B	B	B	B	B	P	P

G = 0 FOR HIGH GAIN
= 1 FOR LOW GAIN
} = $\overline{R}$

T_1 = a_6 bit at accumulation time ($\frac{1}{2}$ sequence before readout)

= 1 [(A&B)2 · A · B · $\overline{C}$ or (A&B)2 · A · $\overline{B}$ · $\overline{C}$ events] during 2nd thru last readouts on page 0, all readouts on page 1, and first readout on page 2.

= 0 [A · B · $\overline{C}$ or A · $\overline{B}$ · $\overline{C}$ events] during 2nd thru last readouts on page 2, all readouts on page 3, and 1st readout on page 0.

Changed

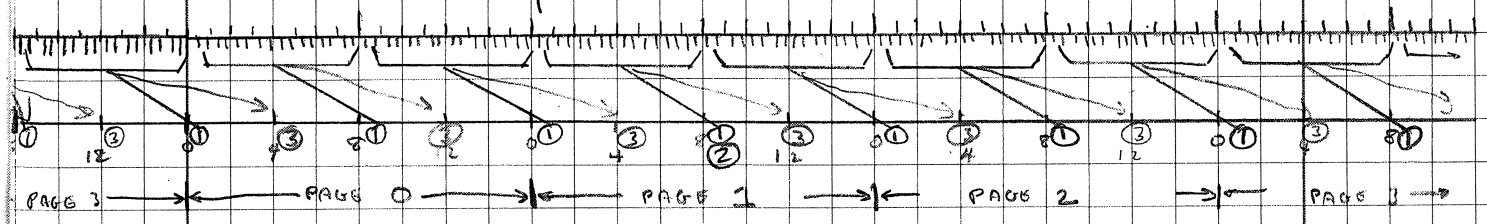
T_2 = 1 if B pulse height > 0 and the corresponding B rate (A · B · $\overline{C}$ or (A&B)2 · A · B · $\overline{C}$) = 0.
= 0 otherwise.

T_3 = 1 if L1 = R and L1 has not been forced = R due to LED being off.
= 0 otherwise.

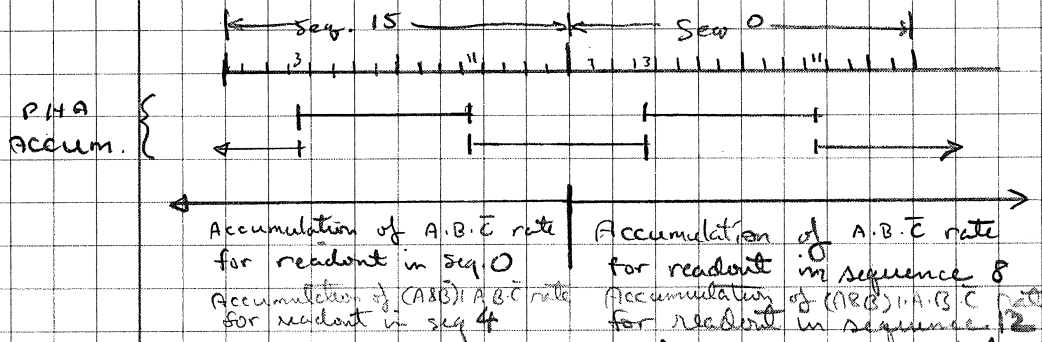
Rate readouts:
(A&B)1 · A · B · $\overline{C}$ rate LED R1 (LR12 a_3–12) Read out in seq. 4 & 12 of each pg (ENCY WDS 155, 156, 321, 322, 487, 653)
A · B · $\overline{C}$ rate LED R2 (LR12 a_3–16) Read out in sequences 0 & 8 of each page (channels 9 & 10, Fr. 8) (ENCY WORDS 157, 158, 323, 324, 489, 490, 655, 656)
(A&B)2 · A · B · $\overline{C}$ LED R3 (level 6 of LR12 a_3–22) Read out in sequence 8 of page 1 (ENCY WRD 326)
LR12 a_3–22 is read out in sequences 0 & 8 of each page (channels 6 & 7, Frame 12)

Transfer begins at the beginning of each even snapshot

LED PHA readout ~~start~~ starts at middle of channel 9 and ends at end of channel 15 of frames 3 and 11 in each sequence.



① = Readout of $A \cdot B \cdot \bar{C}$ rate
② = Readout of $(A\&B)2 \cdot A \cdot B \cdot \bar{C}$ ~~Rate~~
③ = Readout of $(A\&B)1 \cdot A \cdot B \cdot \bar{C}$ Rate

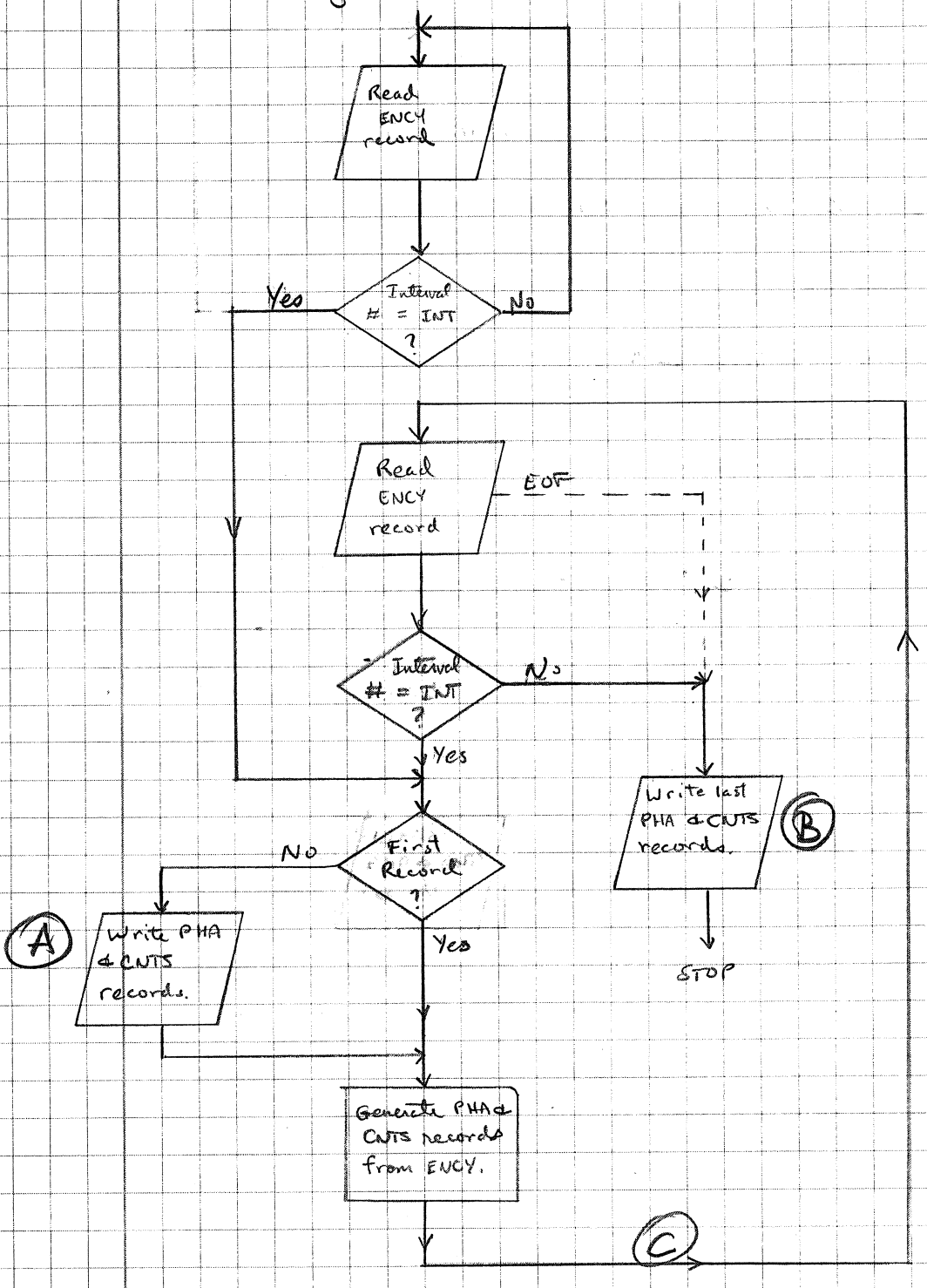


The first PHA readout of each even snapshot is partially accumulated during the time of accumulation for the $A \cdot B \cdot \bar{C}$ rate read out in Seq. 0. of that snapshot and partially during the time of accumulation for the $A \cdot B \cdot \bar{C}$ rate readout in Seq. 0 of the following even snapshot.

For first PHA readout in sequence $\left\{\begin{matrix}0\\8\end{matrix}\right\}$, use sum of $A \cdot B \cdot \bar{C}$ rate from sequence $\left\{\begin{matrix}0\\8\end{matrix}\right\}$ and $A \cdot B \cdot \bar{C}$ rate from following sequence $\left\{\begin{matrix}8\\0^{*}\end{matrix}\right\}$.

* next album if processing page 3.

CURRENT DATA BASE GENERATOR OPERATION



At points A & B, the PHA and CNTS records have been generated and the next album is available (unless B was arrived at by means of the EOF exit). If the $A \cdot B \cdot \bar{C}$ readouts from the previous ENCY record are saved (at point C), they can be used along with the first readout from the new ENCY record to set the T_2 bits of LED PHA readouts in sequences 0 - 15 of page 3 of the PHA record just generated.

LED T2 BIT GENERATION

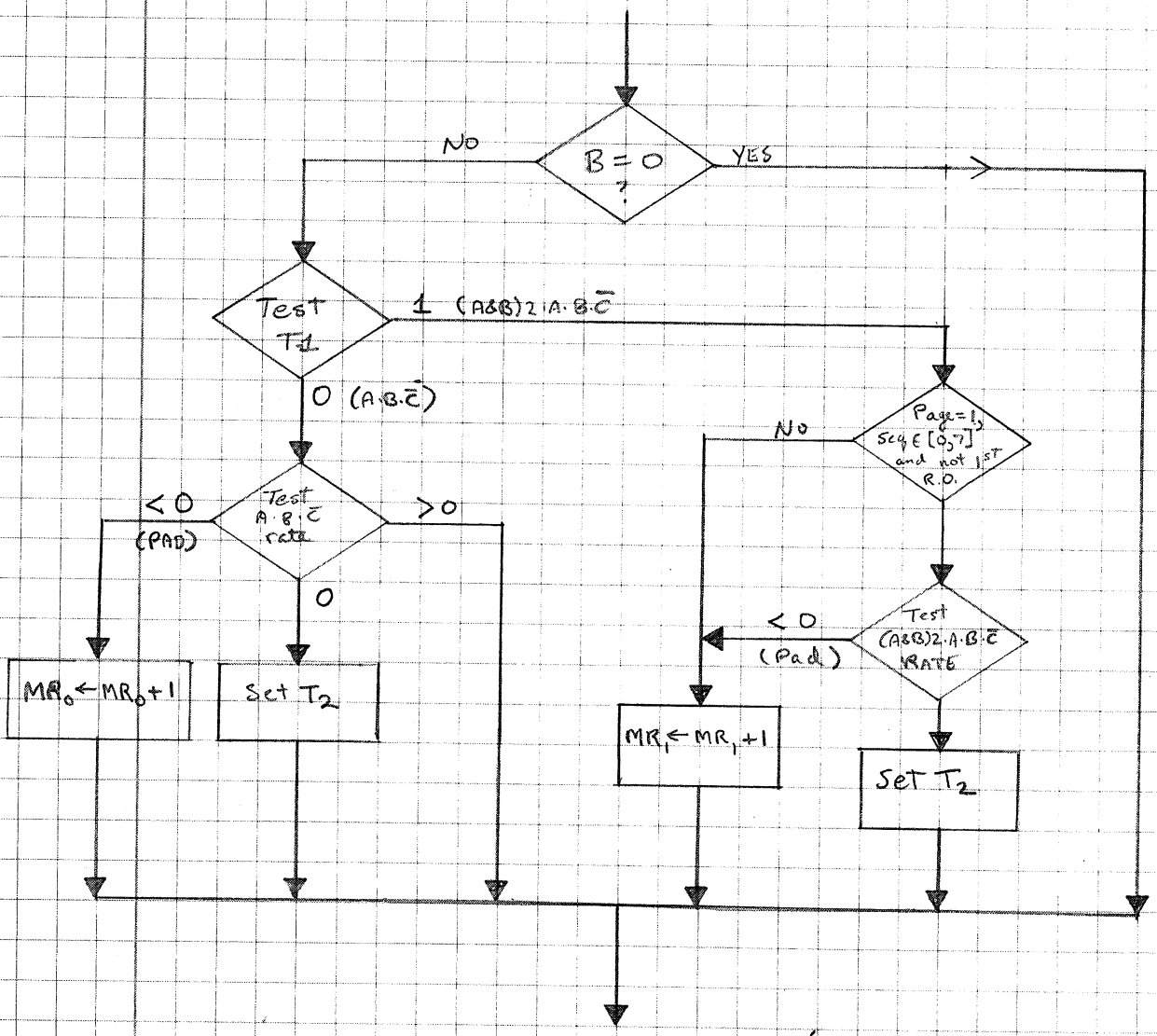
B = LED (B) Pulse Height

T_1 = 0 FOR $A \cdot B \cdot \bar{C}$ event
1 FOR $(A \& B)2 \cdot A \cdot B \cdot \bar{C}$ } B > 0

MR_0 = Number of $A \cdot B \cdot \bar{C}$ events for which the corresponding $A \cdot B \cdot \bar{C}$ rate is missing

MR_1 = Number of $(A \& B)2 \cdot A \cdot B \cdot \bar{C}$ events for which the corresponding $(A \& B)2 \cdot A \cdot B \cdot \bar{C}$ rate is missing.

TEST EACH EVENT AS FOLLOWS:



DETERMINATION OF RATE READOUTS CORRESPONDING TO LED READOUTS

PAGE	SEQUENCE	READOUT	ENCYCLOPEDIA RECORD ENTRY FULLWORD INDEX (BYTE DISPLACEMENT) A·B·C̄ RATE	(A&B)2·A·B·C̄ RATE
0	0	1	157 & 158 (624 & 628)	———
	0	2	158 (628)	———
	1-7	1 & 2		
	8	1	158 & 323 (628 & 1288)	———
	8	2	323 (1288)	———
	9-15	1 & 2		
1	0	1	323 & 324 (1288 & 1292)	———
	0	2	324 (1292)	326 (1300)
	1-7	1 & 2		
	8	1	324 & 489 (1292 & 1952)	———
	8	2	489 (1952)	———
	9-15	1 & 2		
2	0	1	489 & 490 (1952 & 1956)	———
	0	2	490 (1956)	———
	1-7	1 & 2		
	8	1	490 & 655 (1956 & 2616)	———
	8	2	655 (2616)	———
	9-15	1 & 2		
3	0	1	655 & 656 (2616 & 2620)	———
	0	2	656 (2620)	———
	1-7	1 & 2		
	8	1	656 & 157 (of next album)	———
	8	2	157 (of next album)	———
	9-15	1 & 2		

FOR LED EVENT READOUTS FOR WHICH THERE ARE 2 CORRESPONDING RATE READOUTS, BOTH READOUTS MUST BE NON-PAD. IF EITHER OR BOTH IS PADDED, THE CORRESPONDING RATE IS CONSIDERED MISSING. IF BOTH ARE NON-PAD, THE SUM IS USED AS THE CORRESPONDING RATE.

Imp-J LOW & HIGH GAIN EVENTS

LED

$A \cdot \bar{B} \cdot \bar{C}$ & $A \cdot B \cdot \bar{C}$ HIGH GAIN ONLY

$(A\&B)2 \cdot A \cdot \bar{B} \cdot \bar{C}$ & $(A\&B)2 \cdot A \cdot B \cdot \bar{C}$ HIGH GAIN ONLY

$(A\&B)1 \cdot A \cdot \bar{B} \cdot \bar{C}$ & $(A\&B)1 \cdot A \cdot B \cdot \bar{C}$ LOW GAIN ONLY

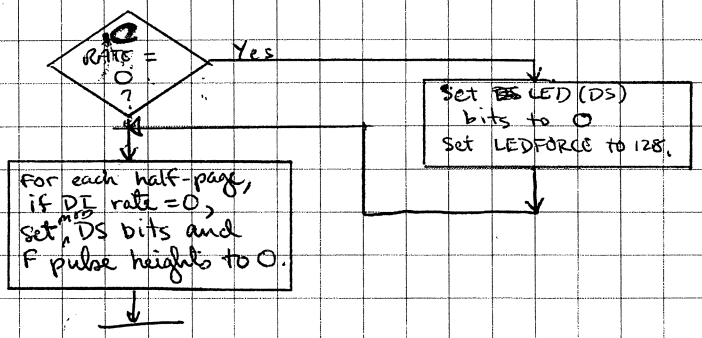
If Low Gain event, a G_0 bit is irrelevant. (T_1)

MED

001	$D \cdot E \cdot \bar{F} \cdot \bar{G}$	HIGH GAIN ONLY	These event types should be checked
101	$(D\&E)1 \cdot E \cdot \bar{F} \cdot \bar{G}$	HIGH GAIN ONLY	
011	$(D\&E)2 \cdot E \cdot \bar{F} \cdot \bar{G}$	LOW GAIN ONLY	
010	$D \cdot E \cdot F \cdot \bar{G}$	HIGH, MED, OR LOW	
000	$D \cdot E \cdot F \cdot G$	" " " "	

GENPHA -- IMP-H DATA BASE GENERATOR

FOR EACH ALBUM

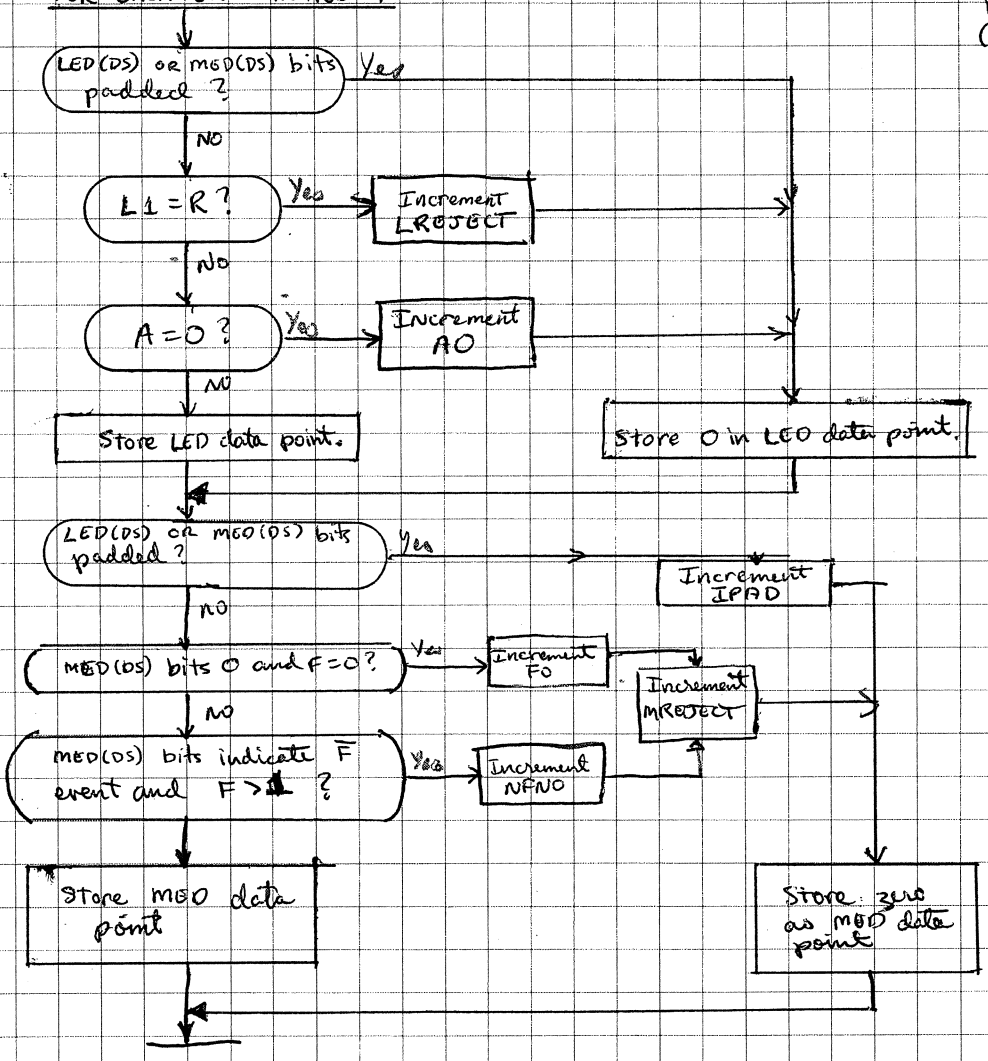


LREJECT = counter of # of LED events rejected because L1 = R. (Word 55, halfword 1 of PHA record)

MREJECT = counter of # of MED events reject because event type was F and F = 0 (also results from MED off) or because event type was F and F > 1. (Word 55, halfword 2 of PHA record).

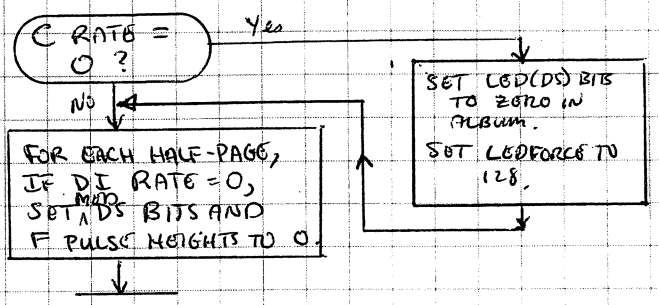
IPAD = number of events padded. (Word 54 of PHA record).

FOR EACH EVENT IN ALBUM:



GENPHA — IMP-J DATA BASE GENERATOR

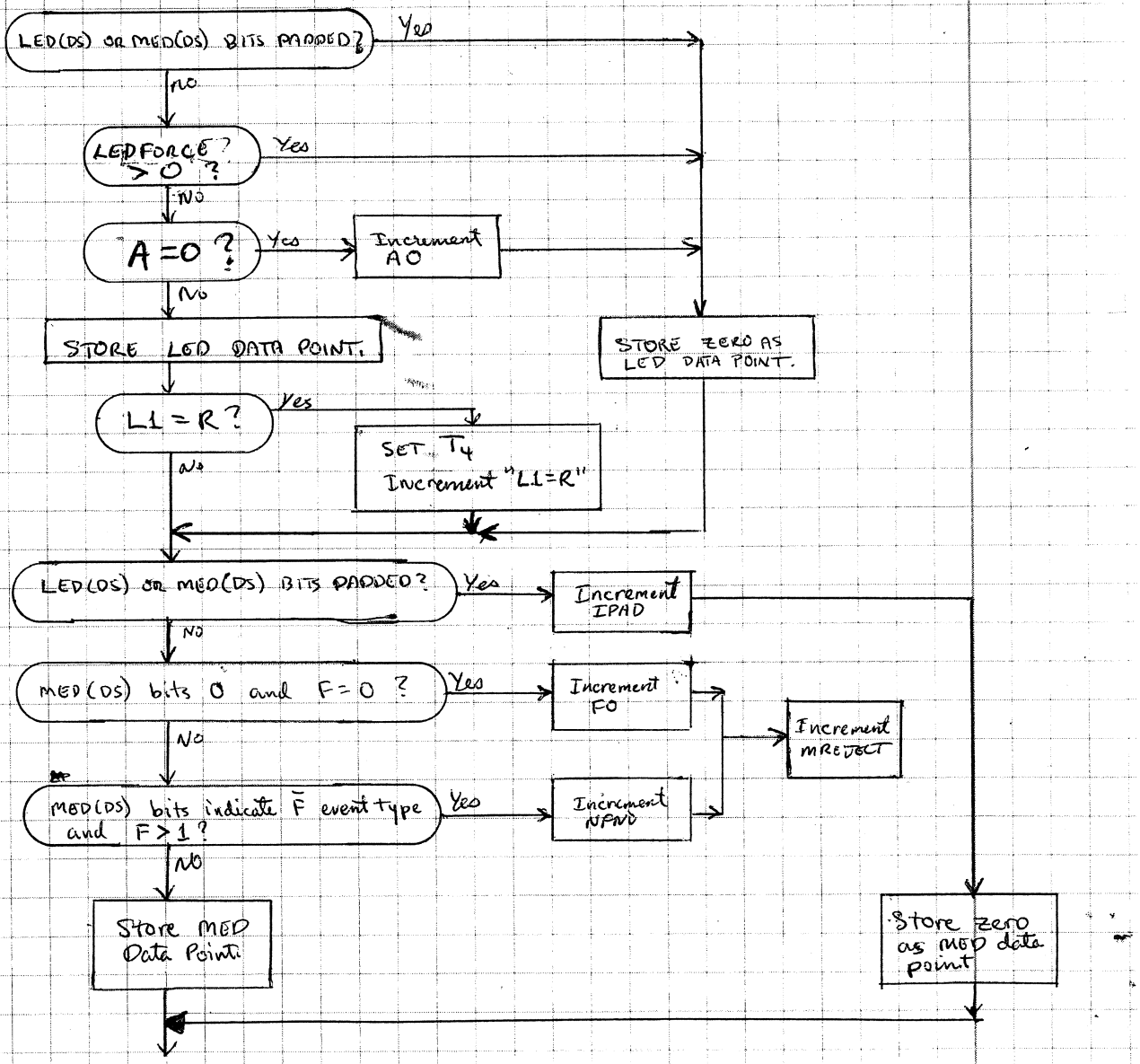
FOR EACH ALBUM



"L1=R" = counter of L1=R LED events. Replaces LREJECT on IMP-H (Word 59, halfword 1 of PHA record)

MREJECT, IPAD same as IMP-H except in word 59, halfword 2 and word 58, respectively.

FOR EACH EVENT IN ALBUM



Number of points accepted ~~(Meteor (high-gain) tape tom~~

(Summary tape header record)

IMP-H

LED: # points accepted in album = 128 − IPAD − ~~ILOSS~~ LREJECT.

MED: # points accepted in album = 128 − IPAD − MREJECT.

IMP-J:

LED: Since L1 = R events are no longer rejected, events with L1 forced equal to R due to the C rate being 0 are no longer counted as rejected.

Therefore

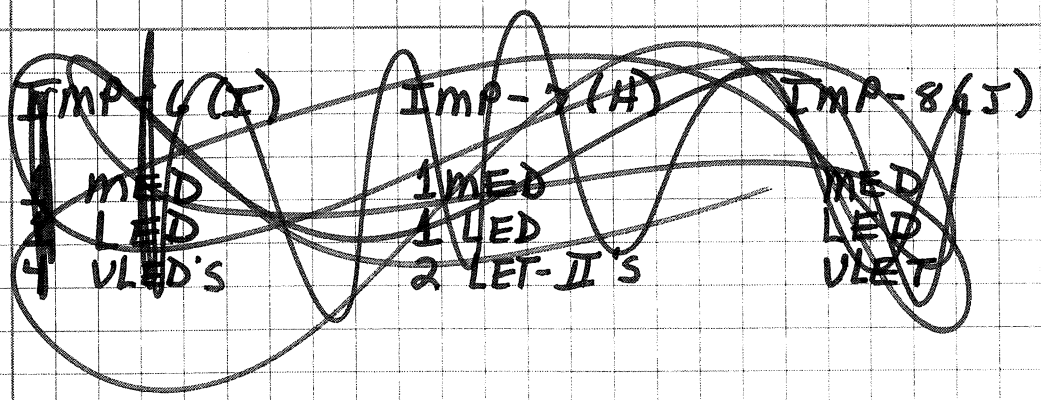
$$\#\text{ points accepted in album} = \begin{cases} 128 - \text{IPAD} & \text{if LEDFORCE} = 0 \\ 0 & \text{if LEDFORCE} = 128 \end{cases}$$

MED: # points accepted in album = 128 − IPAD − MREJECT

Imp-H System Bugs (continued from page 81)

LOW GAIN PLOT - DVSF - line 1640 should be
HTRND(I) = HTRND(I) + HWL(I+148)
Results in incorrect # of trend check rejections
of singles rates on DVSF Plots.

7/31/75 ANISOTROPIC IMP-8



SOLAR WIND = 400 KM/SEC

MAG. BELTS - 10_{RE}

BOW SHOCK - 15_{RE}

Tyco's Lecture

	IMP-6	IMP-7	IMP-8
	MED LED 4 ULED (2 Top, 2 side)	MED LED 2 LET-II (2 side)	MED LED ULET (PHA on CNTS TAPE)
LIFE	MARCH 13, 1971 OCT 2, 1974	SEPT 22, 1972	OCT 25, 1973 (FLIPPED DEC 4, 1973)
oeb.t	4.2 DAYS	12.2 DAYS	11.9 DAYS
SPIN	~5 RPM	~45 RPM	~23 RPM

EVENTS

DEFG (STOPPING PARTICLES) 25-80 MEV/N

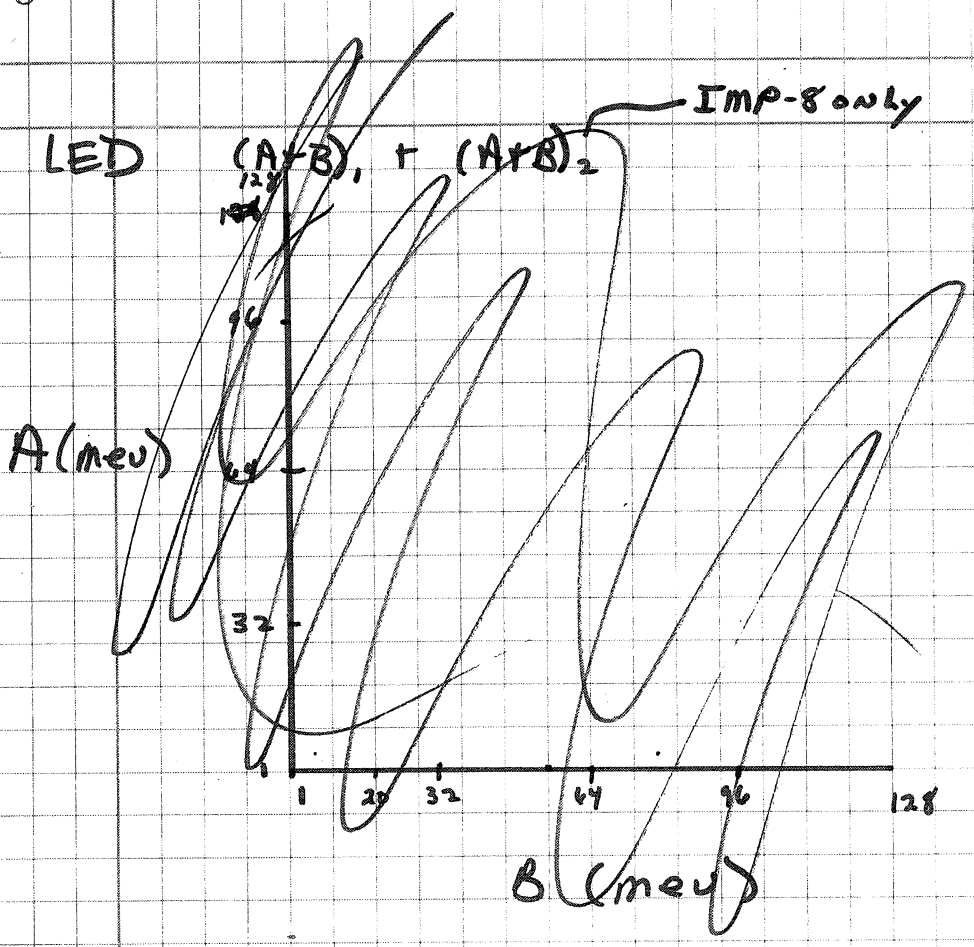
He $2 \leq He \leq 10$, MEV/N

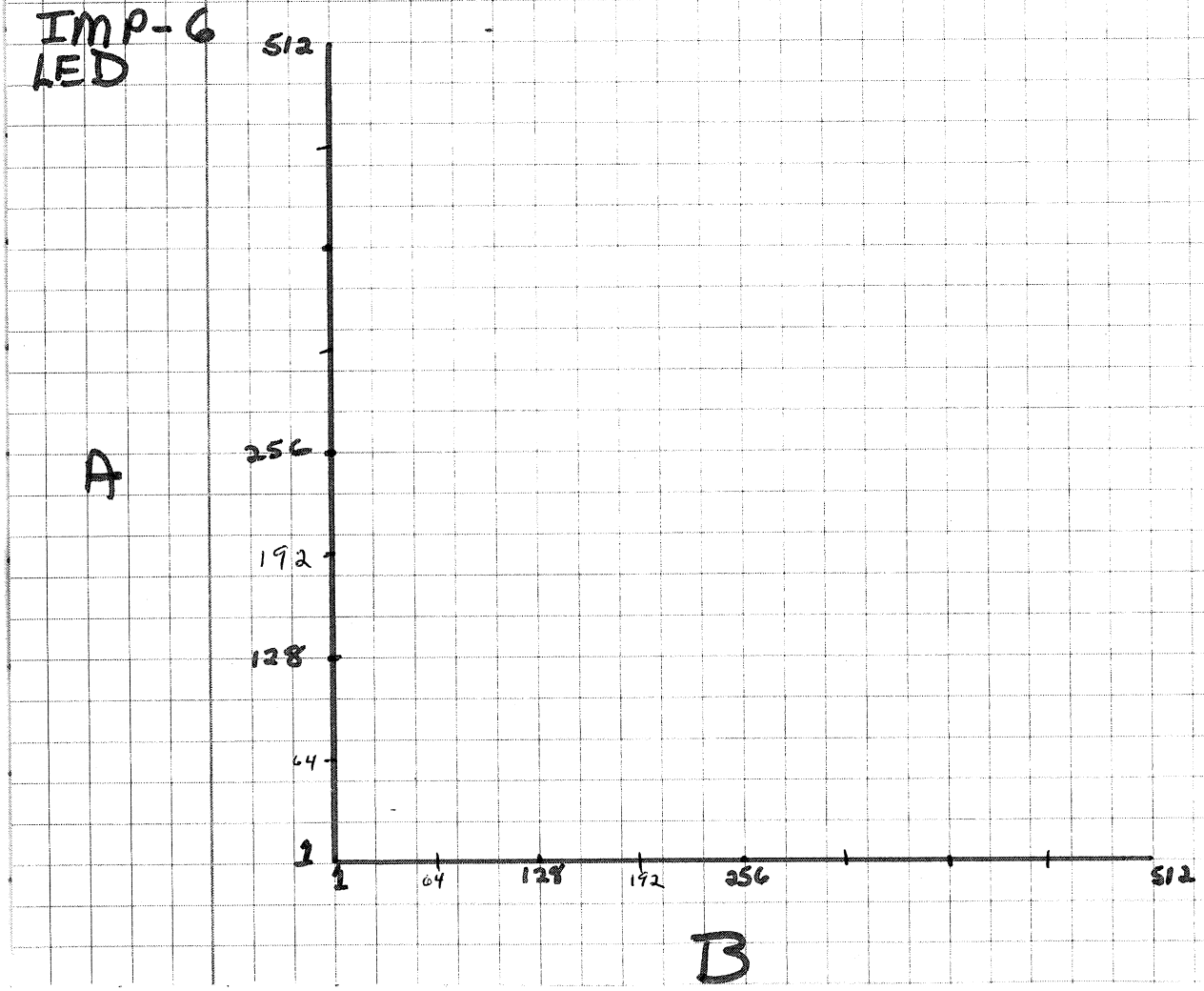
$1 \leq Z \leq 26$

PHA ON MED, LED ; NO PHA ON ULED, LET-II

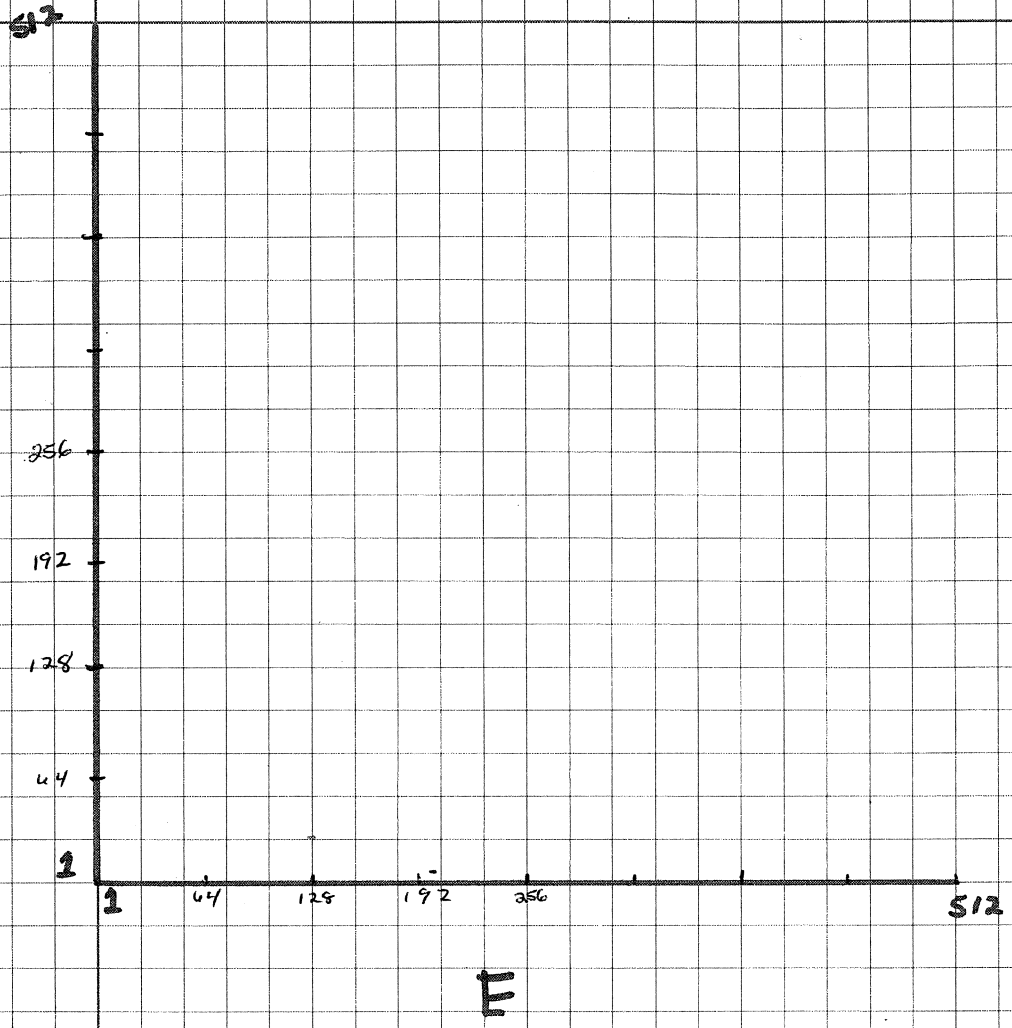
HIGH GAIN ≡ PROTONS + ALPHAS

EVERYTHING ELSE IS LOW GAIN


LED (A+B)1 + (A+B)2
Imp-8 only
A (meu)
128
96
64
32
1
2
32
64
96
128
B (meu)


Imp-6
LED
512
256
192
128
64
1
A
1
64
128
192
256
512
B

IMP-6 MED



8/29/75 What is optical aspect (OA)?

IMP-H SYSTEM

CHANGES

4/12/73 TIMFIX modified to use Avg. sequence time in checking times. Was throwing out files due to time errors. Decom runs 1 – 18 Processed under old version. Decom run 14 redone.

4/26/73 DPS MAIN (EX32) – COMPUTATION OF INTEGRAL NUMBER FOR YEARS > 1972 WAS IN ERROR. ADDITION OF 1 REQUIRED. ALL DECOM RUNS AFTER 22 AFFECTED – RERUN. NO DBGEN RUNS AFFECTED.

5/23/73 OVERLP – IF DECOM TAPES ARE NOT INPUT IN ORDER OF ASCENDING TIMES, OVERLP FAILS TO OUTPUT RECORDS TO THE PROPER ~~DECOM~~ ONLY TAPES IN THE PROPER ORDER. ADD TEST TO MAIN PROGRAM TO REJECT ANY TAPE FOR WHICH THE START TIME IS NOT GREATER THAN ~~ANY~~ THE PREVIOUS TAPE IN THE RUN.

4/10/73

John, I would appreciate your submitting the anisotropy display program for the following time periods (one hour averages):

March 31 '71 Day 90 12:00 – end of 4/5 Day 95

MARCH 5 Day 65 '72 12:00 – end of 3/8 Day 68

APRIL 17 Day 108 '72 18:00 – end of 4/23 Day 114

MAY 15–16 Day 136-137 '72

	Day HHMMSS	To	DAY HHMMSS
Orbit 5	89 082511		93 104513
" 6	93 121231		97 144045
Orbit 87	64 114855		68 141829
" 88	68 151950		72 191924
Orbit 97	106 013623		110 023436
" 98	110 045502		114 092720
" 99	114 102841		118 094844
Orbit 104	135 020039		139 050419

JOB	MAB TAPES	PLOT TAPE	TIME	ORBITS
SD1	FP4709 FP2156	10120	9,6	5,6
SD2	FP4800 FP4801	10130	7,5	87,88
SD3	FP4785 FP4787 FP4536	10312	10,7	97,98,99
SD4	FP5795	10385	7,5	104

1/ OFTFT2FP4709 ^^ FP2156

IMP-6 SECTOR DISPLAY

PHASE 2 MAGNETIC FIELD TAPES

ORBIT	FROM	TO	REEL NO.	
5	3/30/71 825	4/3/71 1045	FP 4709	
6	4/3/71 1212	4/7/71 1440	FP 2156	
7	4/7/71 1507	4/11/71 1826	FP 4673	
10	4/20/71 0321	4/24/71 0510	FP 4674	
11	4/24/71 0706	4/28/71 852	FP 4675	
87	3/4/72 1148	3/8/72 1418	FP 4800	
88	3/8/72 1599	3/12/72 1919	FP 4801	
97	4/15/72 136	4/19/72 234	FP 4785	
98	4/19/72 455	4/23/72 927	FP 4787	
99	4/23/72 1028	4/27/72 948	FP 4536	
104	5/14/72 200	5/18/72 504	FP 5795	
123	7/31/72 2204	8/5/72 130	FP 7339	(Includes 8/3 & 8/4/72)
105	5/18/72 605	5/22/72 816	FP4721	
111	6/12/72 223	6/16/72 538	FP 4824	
112	6/16/72 658	6/20/72 1003	FP 4831	
113	6/20/72 1105	6/24/72 1233	FP 4833	
124	8/5/72 0251	8/9/72 0350	FP 6410	

TAPE LOG

SLOT	CONTENTS	DATE	LOCATION Bldg 1	LOCATION Bldg 2
Y549	BLIMP GM OUTPUT - PPA		X	
	IMP-H MODEL DATA	8-20-71		X
	BLIMP Cleandata - Flt 1, Tape 2	10-15-71		X
Y659	BLIMP Clean data - PPA		X	
	BLIMP Clean data Tape (Flt 1, Tape 1 & Urban. City)	10-6-71		X
Y660	BLIMP FLT 1 MERGE TAPE		X	
	BLIMP GM OUTPUT (Flt 1, Tape 2)	8-2-71		X
	BLIMP GM OUTPUT (Flt. 1, Tape 2 & Urban. City)	10-4-71		X

Slot	Contents	Date	Location
Z1016	IMP-H Thermal Vac Test Tape T.V. 1 x32	5/31/72	Bldg. 1 Bl
Z820	Electron Telescope		
Z835	Electron Telescope		
Z879			
Z1141	CRBE Backup 360/75 AIJTD		

1972

hourly average anisotropies

MARCH 5th 00 hrs — end of MARCH 10th

MAY 14th 2000 hrs — end of MAY 20th

JUNE 16th 1600 hr — end of June 21st

IMP 6 Sectored Rate Plots

30 min accumulation time

1972 June 16 16:00 — June 21 24:00

81.92 sec accumulation time

1971 April 23 06:00 — April 23 12:00

IMP 6 Sector Display Rates

½ hr accumulation time

1972 March 5 12:00 — March 6 23:00

1 hr accumulation time

1971 March 31 12:00 — April 5 24:00
1971 April 6 09:00 — April 9 24:00
1972 May 15 00:00 — May 16 24:00
1972 April 17 18:00 — April 23 24:00
1972 June 16 16:00 — June 21 24:00

81.92 sec accumulation time

1971 April 6 11:00 — April 6 13:00
1971 April 22 09:00 — April 22 11:00
April 22 14:00 — April 22 15:00
April 22 18:00 — April 22 20:00
April 22 21:00 — April 22 23:00
1971 April 23 06:00 — April 23 12:00
April 23 07:00 — April 23 08:00
1971 April 20 22:00 — April 21 04:00