Badge 9957 System Sciences Division
code 604

Computation Book

NUMBER OF BOOK 1

NAME Ed Romish

Page 1 SUBJECT Helios

Task 5010
subtask 59302
~~Sponsor SD002~~ SB029
project 823B

USED FROM 1/5/78 TO

~~Page 47~~ ~~VOYAGER~~ ~~Task 5040~~
~~subtask 59303~~
~~Sponsor~~ SB020
project

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INTEROFFICE CORRESPONDENCE

to Distribution from E. Ronish date Jan. 22, 1981

subject Cosmic Ray Data Sets for Helios Utilities

Helios Data Sets

SDHEL.HFLXDBG.SOURCE

Process rates and PHA tapes onto flux tapes

SDHEL.DMPIPD.LOAD

Formatted listing of EDR tapes, JCL is in BRTC.LIB.CNTL (DMPIPD)

SDHEL.LISTCAL.SOURCE

Gamma ray burst listing routines (all in assembler)

SDHEL.TRATCLN.SOURCE

This cleans bitslips from rates tapes. RATCLN.SOURCE is an older version of the same thing.

SDHEL.PLIBGEN.SOURCE

Process EDR onto library tapes and update catalog.

SDHEL.HSXRMN.SOURCE

Sectored x-ray plots.

SDHEL.SCANLIB.SOURCE

Scan library catalogs for a certain time. CLIST in ZBEWR.LIB.CLIST does foreground scan. Formatted catalog listing.

SDHEL.GRBLIST.SOURCE

Gamma Ray Burst package for Helios B

SDHEL.EDRLIST.SOURCE

Formatted listing for library tapes.

SDHEL.FLXLST.SOURCE

Formatted listing of flux tapes.

SDHEL.FLXMNT.SOURCE

Maintain flux catalog, add tapes, formatted listing.

SDHEL.HARTPL.SOURCE

Formatted listing for rates and PHA tapes.

(continued)

SDHEL.HARDISP.SOURCE

Rates display routines.

SDHEL.CIRCLE.CNTL ; TEST ;FORT9 ; MARCH

Gamma ray display routines.

SDHEL.HELDRP1.SOURCE and SDHEL.HELDRP2.SOURCE

HELDRP routines. Process library tape onto flux tape.

SDHEL.ZEROLOG.LOAD

Zero logistics catalog and reset catalog pointers.

SDHEL.TEMPSCAN.SOURCE

Scan library tapes or rates tapes for temperature data.

SDHEL.GRBCPY.SOURCE

Older version of Gamma Ray Burst routines.

SDHEL.BITSLP.SOURCE

Scan for bit slips on rates tapes.

SDHEL.LOGISH.SOURCE

Formatted listing of logistics catalog

SDHEL.BLDDM7.SOURCE

Transfer only DM7 files from library to a single tape.

SDHEL.DRSMNT.SOURCE

Catalog listing and maintenance

ZBEWR,HEX.SOURCE

Convert hex number to integer or real

ZBEWR.VOLDATE.SOURCE

Convert volume number to date.

cc: F. McDonald
H. Domchick
G. Muckel
R. Williams (CSC)
J. Jackson (File, S.S.)
B. Simon (File, GSFC)
N. Lal (CSC)

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RATLST known DM7 with wrong end time or ~~crypt~~

77/293	7419961 - 79455966	HB0443#47 ? this file is OK
77/9		
76/313	HBL018 #393	34048949 - 34098438
		+ 34292834 - 34362585
76/133	HBL018 #35	
77/66	HBL031 #20 rec 1	looks good
	HBL031 #98	
77/129	HBL039 #55	looks good
77/131	HBL039 #69	"
76/121	HBL055 #33	"
76/122	#41	"
76/124	#56	"
"	#59	"
77/82	HBL034 #42	?

HB0489 #8

Helios frame time = 1152000/bitrate in ms

Helios B HB0442 #47 has wrong end time, the label is wrong

USER39 although label is wrong, RATLST seems to be right

HB0442 #47 was processed correctly

HB0442 #45 has a bad record

HB0442 #45 record 19 has the same time as HB0442 #47 record 6

master file 7295 file 51 record 45 77117 - 79997 sec 21:25:17 - 22:13:17

has same S/C clock as 7295 #51 record 6

the ~~C~~compressed rates are 12 bit numbers, these are left justified by Pthird and Ratepk

76/174 - 77/366 HA0727 #30 or so

1660 1249.5 = Δ S/C clock

Δt = 1660 1293.92

slope = 1.00000 2676

~~DA~~ = a plot of S/C/32 - milliseconds

ldtimeA same as ldcupya

but = Discrim in

~~1440~~ delete 1420-1450 insert DCLOCK = ICLOCK/32.DO

write (6, 30) IDATA(1,K), ~~#~~DATA(~~4~~,K), ~~#~~DATA(5,K), MSEC, DSECS

DSECS = ~~HSEDR(1)+H~~ HMOD * 8640~~0.DO~~ ~~IDATA(1,K)~~ OBUT - DCLOCK

~~DSECS = DSECS~~ +

30 format(1X, 4I10, F14.2)

delete 1490, delete 1580 - 1641, delete 1700, delete 1730 - 2090

delete 230 rename to ~~DATA FORT~~ ~~EI DISCTIME~~ DISCRMTM

Fort CUPY

delete 620, 1250, 1350, delete 1700, 1800

or in FORTHELI

or in FORTSCan down to 3700

Helios A slope each point = S/C clock - time, slope = $(S/C_1 - S/C_2)/(T_1 - T_2)$

$[S/C_1 - T_1 + T_1 - (S/C_2 - T_2 + T_2)] / (T_1 - T_2)$ slope

// EBEWLADD JOB ($$0022823B,P,SA0001,H00H00),BF=3,MSGLEVEL=1

// * IEBUPDAT CRBECNTL

// ADD NAME

Initialize

Read data

convert last to new

$a_1 = T_1 - S/C_1$ $a_2 = T_2 - S/C_2$

$$\alpha = \frac{a_2 - a_1}{T_2 - T_1} = \frac{T_2 - S/C_2 - (T_1 - S/C_1)}{T_2 - T_1} = \frac{T_2 - T_1 - (S/C_2 - S/C_1)}{T_2 - T_1} = 1 - \frac{S/C_2 - S/C_1}{T_2 - T_1}$$

$$= 1 - (1/\alpha)$$

$S/C_2 = 23,640,222$ $T_2 = 162,777,600$ slope = 1.0000025

$S/C_1 = 21,266,775$ $T_1 = 141,264,000$

$\frac{T_2 - T_1}{S/C_2 - S/C_1}$

$\frac{S/C}{32} * slope + const = T$?? $T - \frac{S/C}{32} * slope = const$

$T_2 - T_1 = S/C_2 * S - S/C_1 * S = (S/C_2 - S/C_1) * S$ slope

$slope = \frac{T_2 - T_1}{S/C_2 - S/C_1} = 1$

$S/C_2 = 45,588,670$ $T_2 = 136,080,000$ slope = 1.00000 2675
$S/C_1 = 28,395,116$ $T_1 = 118,886,400$
76/130 - 76/174
$S/C_2 = 50,427,080.9$ $T_2 = 140,918,400$ slope = 1.00000 2286
$S/C_2 = 46,971,088.8$ $T_1 = 137,462,400$

region limits

TAPCMP copies rates to new tape & compresses
FIXCATZ manual update of catalog to accept compressed tapes
FIXORS changes block of rates tapes from 76-92 → 1-24 or YV
RATEDT corrects -1 in sequence ID & overlaps in time
TIMEDT lists all problems with a rate tape
RATSQZ & OUTEDT are old version of TAPCMP

rel ~~address~~	I*4	rel address	position
0	DRSTAP IDSAT = 0,	0	1
404	MSPHAS(1) = 203	404	203
	HPHAFT(1) = 502	2008	503
	HDRATS(1) = 952	3808	953
	OBLNKR(1) = 1202	4808	1203
	NUMLOG = 1313	5252	1314
	HDTRJE(1) = 1359	5436	1360
	MYSPR2(1) = 1374	5496	1375
	MYSPR2(11) = 1384	5536	1385

total positions = 1385 total bytes = 5540

Helios A Discrm checkout HELIOS B OK

Region	
5	OK
6	OK
7	OK
8	OK
9	OK
10	OK
11	OK
12	OK
13	OK

PHAUPK

call PHAUPK(QBLOCK(M,I))

M = 21 then 27 for first 2 of 3

I = 1 to 72 = frame number

QBLOCK = IDAIA dimensioned 52 x 72

Thus on first time J=1 M=21

QBLOCK(21, I) 21st byte beginning of 1st Sci word

Load 4 Bytes into R_{11}

$B_{21} \rightarrow R_2$

$B_{22} \rightarrow R_3$

shift R_3 left 24

shift L R_2 & R_3 4

Store R_2 HPHA3

zero R_2

shift L R_2 & R_3 4

$B_{23} \rightarrow R_3$

shift L R_3 24

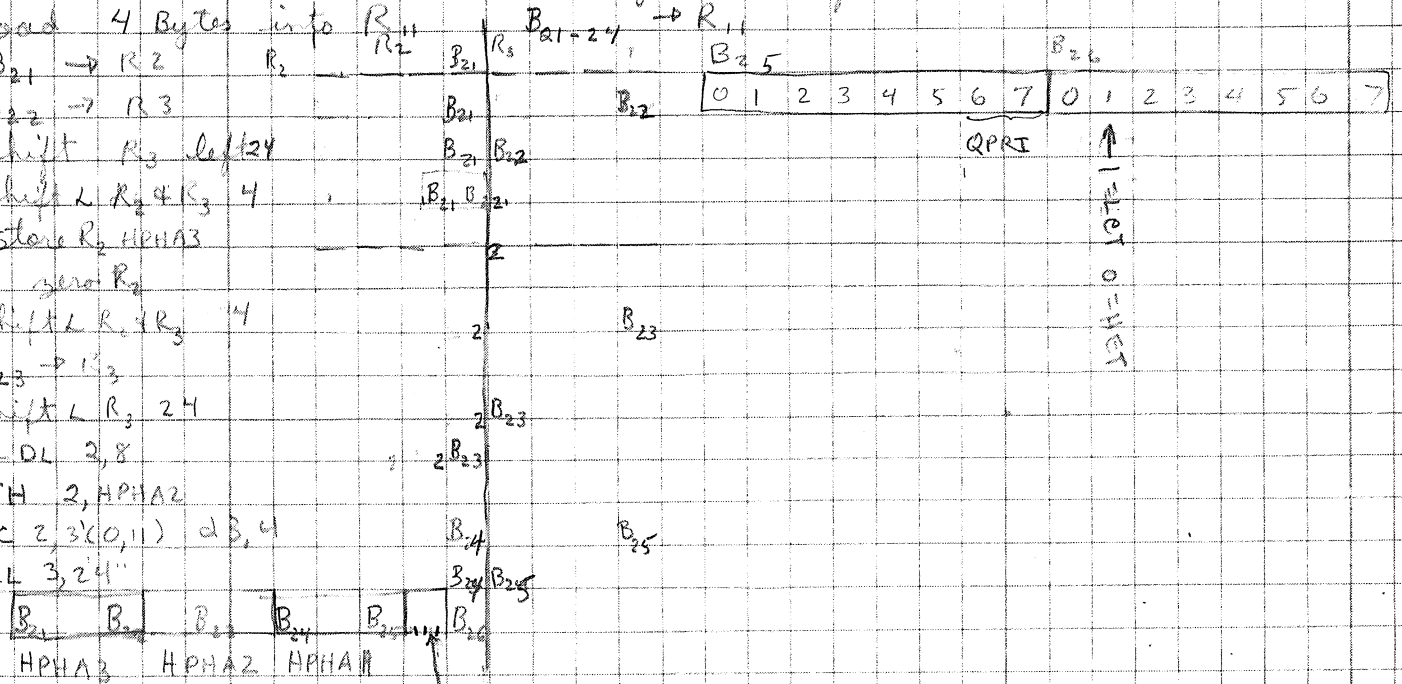
SLDL 2,8

STH 2, HPHA2

IC 2, 3'(0,11) add 3,4

SLL 3,24"

HPHA3 HPHA2 HPHA1



Set not last

zero 2

TM bit 1 of B_{26} — 1 = last

0 = not

Set block zero 2

QHELP = F

SLL 3,2 — moves bits 4,5 of B_{25}

SLDL 3,2

STC QPRI = bit 6,7 of B_{25}

zero 2, R_3 = B_{26} shift to Left

QCZR = bit 0 of B_{26} SLDL 2,2

IC 2, EVTFLIP(2) EVTFLIP + R_2 → R2

STC 2, QEVT

QAC3 = T

QEVT T yes → NOT CIII zero R_2

no SLDL 2,3 bit 3,4,5 → QSECT

QAC3 = F

Bit 1,2 of B_{26} are

00 R_2 → 00

01 R_2 → 02

02 R_2 → 01 → QEVT

03 R_2 → 03

FVT : GMT - RTLT / 2

Helios job 78/16 07:47:16 = 2208.3244

before secs, since 1972 - s/c clock = 127,789,267 . secs

PHA Dimension 2 PHA words per line

4 9 1

0000 0000 0010 0000 0000 0001 0000 0000 0000 0001 1111 0100 0000

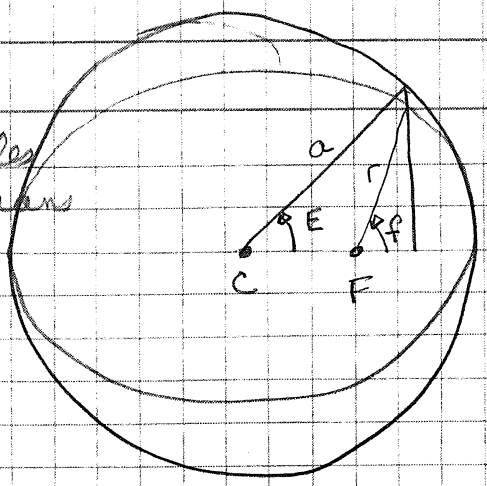
HRTIOC 5, 10, 6, 8, 2, 2048, 4096

i \ j	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	1	3	5	0
2	0	0	0	1	1	1	3	0	0	0
3	1	1	1	1	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	5	5

HRDIM

i \ j	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	32	96	160	0
2	0	0	0	32	32	32	96	0	0	0
3	32	32	32	32	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	160	160

RTLT by Kepler



$n(t-T) = E - e \sin E$ } all angles
$M = E - e \sin E$ } in radians

$n = \frac{2\pi}{P}$

$G = 6.668 \times 10^{-8}$ cgs

$r \cos f = a \cos E - ae$

$r \sin f = a \sin E \sqrt{1-e^2}$

$r = a(1 - e \cos E)$

$M = n(t-T)$

$E \simeq M + e \sin M + \frac{e^2}{2} \sin 2M + \frac{e^3}{8}(3 \sin 3M - \sin M)$ $\quad e < .2$

$e = 0 \Rightarrow$ circle

iterate

$E_0 = M$

$E_1 = M + e \sin E_0$

let $M = 62° = 1.082\,104\,136$ rad

$e = .1$

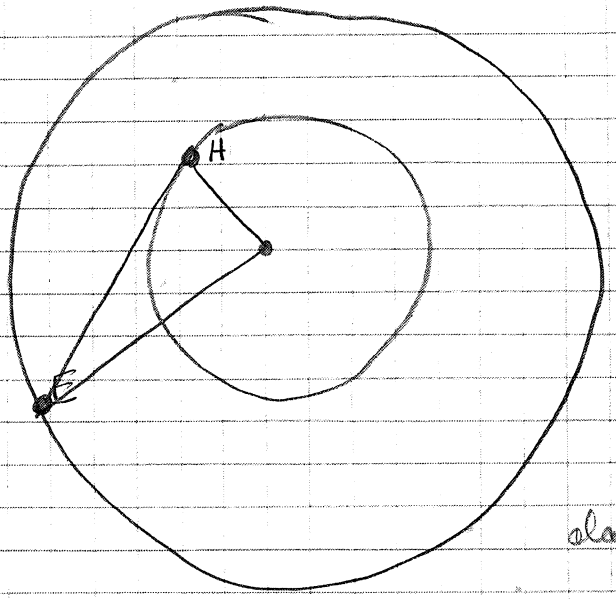
$E_\infty = 1.174\,347\,962$ rad

$= 67.285\,181\,88°$

$= 67° 17' 11.091\,272''$

$\tan f/2 = \left(\frac{1+e}{1-e}\right)^{1/2} \tan\left(\frac{E}{2}\right)$

RTLT



day = 1200 to 2500

RTLT = (FLINE + ... + FSINE + FGAUSS) FPROD

FLINE ≅ (day − 1200) .289

FPROD ≅ −(day − 1200) .000605 + 1

$$FSINE \cong 1000 \sin\left(\frac{(day - 1200 + 60) \times 2\pi}{365}\right)$$

$$FGAUSS = 130 \exp\left\{-\left[\frac{(day - GDAY_j)}{\Delta}\right]^2\right\}$$

$\Delta \cong 50$

$GDAY_j \cong (day - 1200 - 60)_{mod\ 365}$

Day change

				largest T	smallest T
Bitrate	8	frametime =	144000	86 498 396	530 396
	1024	=	1125	86399035	2412

Limit 86400000 − frametime
8 86256000
1024 86398875

from pg 73 QB/351/.M13 Kelios A orbit

date	l	b	r(A.U.)
1370.0000	309.69	.63	.37
1384.0000	342.64	.07	.55
1400.0000	353.47	−.30	.73

?

date	r	x' = r cos b cos l	y' = r cos b sin l	z' = r sin b
1370	.37	.236280 1191	−.284701 8694	.004068 2805
1384	.55	.524946 4844	−.164105 8712	.000671 9515
1400	.73	.725254 1441	−.083016 9668	−.003822 2535

$\vec{r}_1 = .236280\,1191\,\vec{i} - .284701\,8694\,\vec{j} + .004068\,2805\,\vec{k}$

$\vec{r}_2 = .524946\,4844\,\vec{i} - .164105\,8712\,\vec{j} + .000671\,9515\,\vec{k}$

$\vec{r}_3 = .725254\,1441\,\vec{i} - .083016\,9668\,\vec{j} - .003822\,2535\,\vec{k}$

$$\vec{r}_1 \times \vec{r}_2 = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ .236280\,1191 & -.284701\,8694 & .004068\,2805 \\ .524946\,4844 & -.164105\,8712 & .000671\,9515 \end{vmatrix}$$

$= \vec{i}(.000476\,3228) - \vec{j}(+.001976\,8607) + \vec{k}(.110678\,2907)$

$|\vec{r}_1 \times \vec{r}_2| = .110696\,9687$

$\vec{r}_1 \times \vec{r}_2 = \vec{i}(.003887\,1375) + \vec{j}(.016132\,6091) + \vec{k}(.993214\,6775)$

$(\vec{r}_1 \times \vec{r}_2)$

$\vec{r}_1 \times \vec{r}_2 = \vec{i}(.004302\,9434) + \vec{j}(-.017858\,3092) + \vec{k}(.999831\,2689)$

$|r_1 \times r_2|$

$i = \cos^{-1}(.9998312689) = +1.052546535°$ (negative sign needed)

$\Omega = \tan^{-1}\left(\frac{+.0043029434}{.0178583092}\right) = +13.54713956°$

$\vec{e}_1 = \cos\Omega\,\vec{i} + \sin\Omega\,\vec{j}$

$= .9721775263\,\vec{i} + .2342457293\,\vec{j}$

$\vec{e}_2 = -(\sin\Omega\cos i)\,\vec{i} + (\cos\Omega\cos i)\,\vec{j} + (\sin i)\,\vec{k}$

$= -.2342057685\,\vec{i} + .9720134898\,\vec{j} + .0183693693\,\vec{k}$

$\vec{e}_3 = \sin\Omega\sin i\,\vec{i} - \cos\Omega\sin i\,\vec{j} + \cos i\,\vec{k}$

$= +.0043029383\,\vec{i} + .0178582888\,\vec{j} + .9998312689\,\vec{k}$

$= .0043029434\,\vec{i} + .0178583092\,\vec{j} + .9998312689\,\vec{k}$

$\vec{r}_1 - \vec{r}_2 = -.2886663653\,\vec{i} - .1205959982\,\vec{j} + .0033963294\,\vec{k}$

$\vec{r}_1 - \vec{r}_3 = -.4889724025\,\vec{i} - .2016849026\,\vec{j} + .0078905344\,\vec{k}$

$(\vec{r}_1 - \vec{r}_2)\cdot\vec{e}_1 = -.2524037568 - .3089018467$

$\vec{r}_1 - \vec{r}_2 \cdot \vec{e}_2 = -.1848949533 - .0495469208$

$\vec{r}_1 - \vec{r}_3 \cdot \vec{e}_1 = -.4281222149 - .5226132972$ ok

$\vec{r}_1 - \vec{r}_3 \cdot \vec{e}_2 = +.3107059275 - .0813749645$

$-.3089018467 - .0495469208$
$-.2524037568\ e\cos\omega + -.1848949533\ e\sin\omega = .18$

$-.5226132972 - .0813749645$
$-.4281222149\ e\cos\omega + -.3107059275\ e\sin\omega = .36$

$.1603969718 - .5827093684$
$e\cos\omega + .2325364553\ e\sin\omega = -.7131431096$

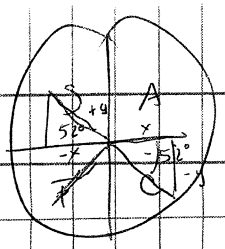
$.1557077957 - .6888458482$
$e\cos\omega + .7257413059\ e\sin\omega = -.8408815121$

$.0046891761 \quad .1061364798$
$.0067951494\ e\sin\omega = .1297384025$

$e\sin\omega = 28.79846838$? noway can it be

$e\cos\omega = 14.48370665$? > 1

TLT



$\tan\omega = -1.297904538$

$\omega = -52.38673034 + 180° =$

$= 127.6132697°$

$e =$

$-.30888839988\ e\cos\omega - .049551215\ 1\ e\sin\omega = .18$

$-.52261329 87\ e\cos\omega + .08137495 51\ e\sin\omega = .36$

$e\cos\omega + .16042014 85\ e\sin\omega = -.582\ 7430385$

$e\cos\omega + .0557077772\ e\sin\omega = -.6888458462$

$.0047123653\ e\sin\omega = .1061028077$

$e\sin\omega = 22.51582824$

$e\cos\omega = -4.194735413$

DATE	λ	b	r
1835	329.670327	-.005089	.984717
1930	48.257319	.007743	.310205
2023	143.367564	-.005938	.984097

DATE	λ	b	r
June 1	142.761111	6.9786 1111	.34200
6	166.632222	6.146 38888	.37022
11	186.9786111	4.5975	.39867

parameters from ORA 02

1977, Jan 18 21:00:00 $\lambda = 329.389029$ b = -.004845 r = .98

date	λ	b	r
1/1 1828	71.990579	-.007027	.979837
3/15 1901	139.050292	.017993	.626731
4/17 1934	278.727347	-.003659	.316860

date	x	y	z
1/1 1828	.302940	.931831	-.000120
3/15 1901	-.473358	.410759	.000197
4/17 1934	.048077	-.313191	-.000020

USER 39 HA1009#18

/50ABD/

LABEL /72940/ HFMT=2, HBTRT=256, HRECYR=78, MSER4=65,0,43,7

	@	MSRNS	MSRNE	HDRNS	HDRNE	AFN	RID	BRT	FMT	
RATNEW	77660	2884915	3022167	2257	2257	1880	0	256	2	65,0,48,5
RATOLD	73798	2853261	2887019	2257	2257	1877	5	2048	1	65,0,47,33

old = HA1009#14 95 records
caused by EXTRAT placing a wrong day on 1877.

Helios A orbit

$T = 1930.945556$

$a = .647141$

$P = 190.14111$ days ← use this one

$= 190.150$ d by Kepler's law

$e = .5217657$

$i \approx 0$

earth $e = .06 \approx 0$

$a = 1.00$

$P = 365.24$

$t = 2200$ earth ~~June 22 = 1000~~ ~~Nov 22 = 1408~~ $T = 1783$

$M = l = $ ~~197.125~~ $r = 1$ ~~$M = 2.87.807\ 8747°$~~ $M_e = 51.017°$

Helios rad $M = 8.890864898$

$E = $ ~~9.071.475798~~ $r° = $ ~~154.757°~~ 159.75727

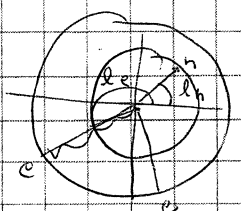
$r = $ ~~.95269~~ .96408

$f = $ ~~165.694~~ 168.574274

$\Omega = f + 257.495639° = 66.0699°$

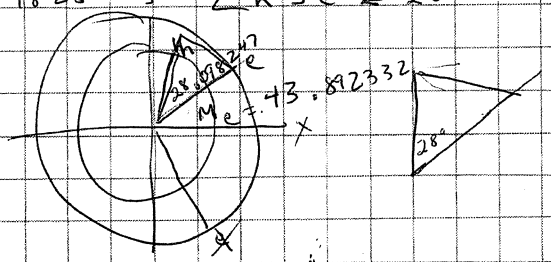
$r_{e_H} = \sqrt{r_e^2 + r_h^2 - 2 r_e r_h \cos(l_e - l_h)}$

$=$ ~~1.78769 A.U.~~ ~~1.33553069~~ .25971 A.U



TILT/2 = 350 sec

1828 ↓ ∠hse ≈ 28°



$M_e = 0$ on 1783

need an accurate earth plot

$u = \omega + f$ $\quad M = n(t - T)$ $\quad n = \frac{2\pi}{P}$ $\quad M = E - e \sin E$

$E_1 \approx M + e \sin E_0$

$\tan f/2 = \left(\frac{e+1}{e-1}\right)^{1/2} \left(\frac{1+e}{1-e}\right)^{1/2} \tan\left(\frac{E}{2}\right)$

$x' = r \cos u \cos\Omega - r \sin u \sin\Omega \cos i$

$y' = r \cos u \sin\Omega + r \sin u \cos\Omega \cos i$

$z' = r \sin u \sin i$

$r = a(1 - e \cos E)$

earth

t = year − 1800

$P = 365.24220$ $\quad e = .0167708 \; .01679207 - .0000004135t - .023 \times 10^{-10} t^2$

$\Omega = 0$? $\omega = 100° \; 21' \; 21.5''$? $\cong 100.356$

for 1978 $e = .016718$

$T \cong$ Jan 1 ? $\quad T = 1828$

on $t = 1828$ earth is at $0° + 100.356°$

Earth

	DATE	Ω	b	r
1,1,77	1828	100.088826	0	.983281
4,13,77	1930	202.571385	0	1.002770
7,12	2020	289.156416	0	1.016574

Let $\Omega = 0$ $\quad \omega = 100.356$ $\quad i = 0$

$\hat{e}_1 = \hat{i}$

$\hat{e}_2 = \hat{J}$

$\hat{e}_3 = \hat{K}$

Helios B orbit

		i	Ω
		.024910 6084	119.518434 8466
P	185.7787911		
T	1754.745593, 2312.213912037,		
e	.54376 33563		
a	.637		
ω			
~~i~~			
~~Period~~ Ω			

period P	time of perihelion T	eccentricity e	a	ω
185.7787911	1754.745593	.5437633563	.6371844036	174.3712647648
	2312.213912			

Helios feet calculation

Number of blocks on a tape determines the number of interrecord gaps. Thus data in a record does not have a record gap. It is a little hard to estimate the actual gap length that should be used but it = .651" ± number of records per block. One might count bytes until a block had been accumulated then write it.

Helios B Orbit $z' \simeq 0$

	Date	l	b	r
1/1/77	1828	100.189956	-.008245	.951402
	~~1887~~	~~143.447329~~	~~.007981~~	~~.851647~~
3/30	19161857	181.598093	.022011	.565403
4/21	1938	274.281052	.017437	.296769

PDL PKHET

called from PHAOUT

pack HHET to METTAAAAAAAAAAAA
BBBBBBBBBBBBCCCC
CCCCCCCCCRSSSQPPN

PKAET CSECT

NULL IF NULL EVENT
set A, B, C to FFF
set switch for alternate return

NOTNULL ELSE
set switch for normal return

RESET IF reset event
set A, B, C to FFF
ELSE increase A, B, C event counts by 1
FI

FI

PKEVT Load TT from QEVT into HHETC1)
Load PHA3 into A
set E to 1
Load PHA2 into B
Load PHA1 into C
Load QC2R into R
Load QSECT into SSS
Load QAC3 into Q
Load QPRI into PP

end PKEVT

NULLRET IF NULL event
set N to 1
take alternate return
ELSE normal return

end PKHET

PDL PKLET

called from PHAOUT

pack HLET with METTAAAAAAAAAAAA
BBBBBBBBBBBBCCCC
CCCCCCCRSSSQPPN

```
PKLET   CSECT
        NULL    IF NULL event
                   set A,B,C to FFF
                   Set switch for alternate return
        NOT NULL ELSE
                   set switch for normal return
        RESET      IF reset event
                      set A,B,C to FFF
                   ELSE increase A,B,C event counts by 1
                   FI
                FI
        PKEVT   Load QEVT into TT
                Load PHA3 into A
                Load PHA2 into B
                Load PHA1 into C
                Load QSECT into SSS
                Load QPRI into PP
        end PKEVT
        NULLRET IF null event
                   set N to 1
                   take alternate return
                ELSE normal return
                FI ;
end PKLET
```

PDL PTHIRD

called from EXTRCT
pack three split rates into HRATE1
call PTHIRD (QT1, QT2, QRATE1, HRATE1)
HRATE1 = QT1 QT2 QRATE1

PTHIRD CSECT
Load QT1 into HRATE1
Load QT2 into HRATE1
Load QRATE1 into HRATE1
end PTHIRD

PDL RATCLR 6 em

called from RATOUT
call RATCLRCHFMT)
pad common area RATNEW

RATCLR CSECT
MOVE -20000000 into all words of RATNEW
end RATCLR

PDL RATUPK RD

RATUPK CSECT

called from EXTRCT

call RATUPK(QBLOCK(M,I))

@ of 48 bit science data word

Store 1st 12 bits in HRATE4 left justified

Store 2nd 12 bits in HRATE3

Store 3rd 12 bits in HRATE2

Store split rate bits in QRATE1

Store sequence ID bits in QDS432

EXTRACT Line number

reverse according to table

store in Q line

extract HET priority bits

interpret according to table

0 0-0 1-2 2-1 3-3

store in QHPRI

end RATUPK

PDL REVISP 6em

called by writpha

call REVISP(MSPNS, MSPNS, MSPOS, MSPOS, NPHM, QREPLC)

REVISP CSECT
IF bit rate and formats match
IF IFOLD TIME ≥ NEW TIME
set header to new time
ELSE set header to old time
FI
set end times
call setseq to set line and sequence ID
IF format 5 set header length to 23
ELSE header length = 12
FI
set number of pages
LOOP through pages
check and set subroom data in record
Loop through rates
place rates in record
end loop
Loop through PHM
place PHA in record
end loop
end loop
ELSE abend
FI
end Revisp ;

PDL REVISR Gem

Called by wrtrat

REVISR CSECT
IF Bit rates & formats match
IF old time > new time
set header to new time
ELSE set header to old time
FI
~~extract~~ extract sequence ID
calculate number of pages
IF not format 5
Loop through pages
IF old seq ID NE new seq ID
IF old seq ID < new seq ID
copy old rates into record
Else copy new rates into record
ELSE FI copy best data to record
FI
end loop
ELSE format 5
Loop Through pages
IF old seq ID NE new seq ID
IF old seq ID < new seq ID
copy old rates into record
ELSE copy new rates into record
FI
ELSE copy best data into record
FI
end loop
FI
ELSE abend
end Revisr FI

PDL SETSEQ Gem

Called from REVISP,

SETSEQ CSECT uses MSPNS= NEW(1) MSPNE = NEW(2)
set the earlier sequence and line for starts,
and the later as end
call setseq (NEW, OLD, LAST)
NEW = same as common PHANEW.
OLD = same as common PHAOLD
Set OLD to earliest of OLD and NEW
Set NEW to ~~greatest~~ latest of old and new
end setseq

PDL TIME RD

call from EOFMSG, HELDRP, EDRCHK, SKPMSG,

TIME CSECT

DTIME get time from TIME macro
Reg1 = 00 YY DDD F
convert to binary
divide Reg 1 by 1000
store quotient YY in IYR = year
store remainder DDD in IDY = day

end DTIME

FTIME get time from TIME macro
Reg 0 = HHMMSSTH
convert to HHMMSSC
convert to binary
store in ITIME = HHMMSS

end FTIME

end TIME

PDL UPKSTA RP

called by EDRCHK

Call UPKSTA(IDATA(H,K))

@ of status word

UPKSTA CSECT

load GMT time correction flag into HGMT

load Event time status flag into HEVT

load Data Type into HTYP

load frame counter correction into QFRM

load Engineering frame number

load Full Data present into QFILL

load number of bit errors in S/C sync into HERR

load Data quality into HQUAL

load Distribution mode into QDM

end UPKSTA

PDL UPKXRY RD

called by EXTRCT

@BLOCK(M,I) @ of scie word
QXRY(1) @ of returned XRY parameters

UPKXRY CSECT
load bits 37-48 into QXRY(1)
end upkxry

QXRY(1) = X-ray commands registes

QXRY(2) = X-ray tag word

PDL ZBYTES RD

called from GRBBRT (array, length)

ZBYTES

zero array of length L)

end ZBYTES

1 = MSB 32 = LSB

M2.ZB2NL.SD002.HBCATLOG format

word	bit	description
1	1-16	offset
	17-32	number of files (up to six) in record
2-40	6 lines	

line 1

word	bit	
1	1-16	HBLxxx serial number lib-serial
	17-32	LIB file number
2	1-16	next EOR serial
	17-32	next EOR file

PDL for COPY

Called from LIBGEN

```
COPY    CSECT
~~LABEL~~  READ LABEL
           UNPACK LABEL
        IF      OUTPUT TAPE NOT FULL
           IF DM7 FILE
              CORRECT USING DISCRM
           ELSE ~~IF~~
              ~~WRITE LABEL~~ COPY INPUT TO OUTPUT TAPE
           FI
        ~~ELSE~~   RETURN CODE = 2
        ELSE
           RETURN CODE = 3
        FI

END COPY
```

PDL LIBGEN

called from LBMAIN

```
LIBGEN CSECT
GETNDX  Load NDXUNIT = index unit (39 for A ; 49 for B)
             CATUNIT = 1+NDXUNIT = catalog unit
             read index
             end get outser number
        end GETNDX
DOFILE
        NEXTIN
                get inser & inseq from index
        end nextin
        NEXTout
                get outser, outseq & feet from index
        end nextout
        call mounte to mount tape
        call copy
        DISP
            IF retcod = 1   end of input tape
                get next input volume
                PUTNDX
                        write parameters to index
                end putndx
            FI
            IF retcod = 2   normal return
                GETFIL PROC
                    FINDFILE
                        GETVOL
                            read catalog
                        end GETVOL
                        PUTNDX write index
                        GET[illegible] read catalog
                        PUTVOL write catalog
                    end FINDFILE
                end Getfile
            FI
            IF retcod = 3   end of output tape
                increase outser by 1
                call putndx - write index
            FI
            IF retcod = 4   I/O error
                GETFILE INVOKE GETFILE to get next file
                    FINDFILE
```

addfile get parameters from ds
putVOL write catalog
outlink
IF more files
invoke get vol
ELSE
invoke get file
invoke putfile
FI

PUTVOL write catalog
Putndx write index

END

PDL SERDSN

SERDSN CSECT
called from ~~GETLIB~~ & Mount
~~call~~ satid, inser, inseq, dsname
R#8

SERDSN ~~construct~~
place 'H' in byte 1 of DSNAME
place SATID in byte 2
convert Inser to zoned decimal
place in byte 3 to 6
convert Inseq to zoned decimal
place in byte 7-8
end Serdsn

PDL SERVOL
called from ~~GETLIB~~ & mount
satid, type, serial, VSN
LR1 # I R#6
Servol · CSECT
place 'H' in byte 1 of VSN
place satid in byte 2
convert serial to zoned decimal
IF TYPE is EDR volume
place serial in byte 3-5
ELSE Type is library volume
place 'L' in byte 3
place serial in byte 4-5
FI
end servol ;

PDL MountE

```
MOUNTE    CSECT      EDR volume
    ~~EDRmount~~ ~~Type=1~~
  ~~EDRmount~~ Type=1   mount EDR volume
               check remaining time to see if enough
               IF enough time remains
                    IF new volume
                         call servol to construct volume name
                         ~~call~~ mount tape
                    ELSE
                         Position to next file
                    FI
               ELSE exit
end mountE   FI
MOUNTL    ENTRY      library volume
          IF enough time remains
               ~~IF new vol~~
               call serdsn to construct data set name
               IF new volume
                    call servol to construct volume name
                    mount tape
               ELSE
                    position to next file
               FI
          FI
end mount ~~E~~, ~~mount~~
```

DDL DISCRM

```
DISCRM    CSECT
          Define slope, intercept and times of reset for clock regions
          save the label
REF       calculate time relative to 1972
READ      Block.
          Read a record
end read  IF (~~reading is false~~ and record is DM7, and file processed after
               check for frame slip                    6/17/76
               skip zero frames
               save frame time
               calculate frame time relative to 1972
               get s/c clock
               determine correct region
               predict event time from s/c clock
               check label
                    ~~allow 180 seconds~~
                    IF ~~label less~~ than 180 second off
                         correct label
                         correct event time
                    ELSE ~~write message~~ bad label
                         ~~set~~ NDM7 = 2
               FI        copy file directly
          ELSE copy corrected file
               ~~write message~~
               NDM7 = 0
          ~~FI~~        copy file directly
          FI
```

PDL LOGIN do LOGOUT first

// EXEC PGM=ZBZNLHIN,PARM='A,1016,0014'

A = satID

1016 = maximum input tape 14 = number to allocate up to #maxin

3088 max input tapes

```
LOGIN   CSECT
        IF (TM,DCBOFLGS,DCBBIT3,0)
            Get number of parameters in PARM list
            IF two/three numbers in PARM i.e. satid & maxin and count
                                             or satid & maxin
                DOCASE
                    case Helios A
                        index = 39
                    ESAC
                    case Helios B
                        index = 49
                    ESAC
                    CASE MISC
                        set error code 8
                    ESAC
                ESACOD
            ELSE number ≠ six, only sat ID.
                 set error code 12
            FI
            IF  no error code
                NOXUNIT = index
                convert #maximum input to binary
                IF ; not positive or GT 3088
                    set error code 16
                FI
            FI
            IF  no error code
                IF  TWO numbers in PARM
                    set increment
                ELSE IF only one parm set error code = 20
                    convert count (third number) to binary
                    IF third number is zero
                        set error code 24
                    FI
                FI
            FI
            IF  no error code
                read index
                mark inflag area as allocated
                write index
```

EI

write message according to error code

PDL LOGOUT

```
// exec PGM=ZB2NLHOU,PARM='A,0056,0005'
steplib  ZB2NL.LIBGEN.LOAD
 1000 max output tapes
LOGOUT   CSECT
         IF (CTM,DCBOFLGS,DCBBIT3,O)
              Get number of parameters
              IF more than two or three numbers
                   DO CASE
                        case1 Helios A
                              index = 39
                        ESAC
                        case2 Helios B
                              index = 49
                        esac
                        case 3 misc
                              set error code = 8
                        esac
                   esacod
              ELSE only one parm satID
                   set error code = 12
              FI
              IF   no error code
                   store index in NDXUNIT
                   convert tape number to binary
                   IF number not positive or GT MAXOUT 1000 tapes
                        set error code = 16
                   FI;
              FI
              IF   no error code
                   IF   PARM has two numbers
                        set increment
                   ELSE
                        IF Parm has only satID
                             set error code = 20
                        ELSE PARM has three numbers
                             convert counts to binary
                             IF counts = 0
                                  error code = 24
                             FI
                        FI
                   FI
              FI
```

IF no error code
read index
allocate output tapes
write index
F.I
write message according to error code

PHASUM (Helios)

Input/output via argument

R	MPNREC	I*4	array of pha words
R	JFDM	I*4	location of first full word of pha data in MRECP
R	JHDM	I*4	location of first half word of pha data in HPNREC
R	HPNREC	I*2	PHA data
R	QPNREC	L*1	PHA data
R	JQDM	I*4	location of first byte of pha data in QPNREC
	NCAFN	I*4	absolute file number
	via common area		span
R	ISPAGE	I*4	first page of record to process
R	IEPAGE	I*4	last page of record to process
R	HBIT	I*2	bit rate
R	HNPAGP	I*2	Next page to process
	Via common area		PHADTA
R	QBSUM1	L*1	Flag to indicate beginning of summary
R	QESUM	L*1	flag to indicate alternate return
W	NSEVNT	I*4	number of ~~good~~ events
W	TNULL	R*4	number of null events
W	TGOOD	R*4	number of good events
W	ITPHAE	I*4	accumulated time in tenths of a second
R	QCALIB	L*1	calibration flag
W	HSORT	I*2	sorted array of pha events
	Via common area		PHAREC
R	ISMSP	I*4	ms header start time
R	IEMSP	I*4	ms ~~end~~ start time of record
R	HSDYP	I*2	Header day number
R	HEDYP	I*2	dayend time of record
	NRTMP		
	NCLKP		
	HAFNP		
	HTCFP		
R	HRIOP	I*2	PHA/rates ratio
R	HBITRP	I*2	Bit rate
R	HFMTP	I*2	format
	HCTRP		
	HTYPP		
	HQULP		

Via common area Header

W	ISMSH	I*4	start ms of header
W	HSDYH	I*2	start day of header
W	HEDYH	I*2	end day of header
W	IEMSH	I*4	end MS of header
	NRECIA		
W	ITRATE	I*4	accumulated time in tenths of a second
W	NRATES	I*4	total value of rates
W	NNULLE	I*4	number of null events of each type
W	NGOODE	I*4	number of good events of each type

PHASUM (Pioneer)

Input/output

via argument

R	ISPAGE	I*4	start page to accept
R	IEPAGE	I*4	end page to accept
R	NCAFN	I*4	absolute file number

via common area PHADTA

~~NSEVN~~ same as Helios

via common area PHAREC

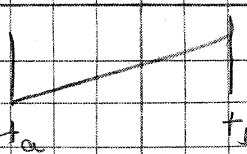
←	ISMSP		
←	IEMSP		
←	HSDYP	I*2	day number of header
←	HEDYP		
	HAFNP		
	HTCFP		
	HNPAGP		
R	HBITRP	I*2	bit rate
R	HFMTP	I*2	format
	HMODP		
	HDSSP		
	HEFCP		
R	HRATFP	I*2	subcom data
	HSPFP		
	HSPFFP		
	HRPEFP		
	RATP		
	SPP		
	RPEP		
	HSPF1P		
	HSPF2P		
	MSRATP		
	VOLTP		
	CURNTP		
	SPTEMP		
	SNRP		
R	IPAGP	I*4	pha event data

via common area Header

←	ISMSH		
←	HSDYH		
←	HEDYH		
←	IEMSH		
	NRECH		
←	IIRATE		
←	NRATES		

4	NNULLF		
2	NGOODE		
10	HRATFH	I#2	header subcom data
	HSPFH		
	HSPFFH		
	HRPEFH		
	RATH		
	SPH		
	RPEH		
	HSPF1H		
	HSPF2H		
	MSRATH		

to turn DISCRM around



$$EVT = \text{time} = \frac{S/C}{32}\ DBSAVB + DASAVB$$

want $TIMDIF = EVT - \frac{S/C}{32}$

$$\frac{S/C}{32} = \frac{(EVT - DASAVB)}{DBSAVB}$$

$$TIMDIF = EVT - \frac{EVT}{DBSAVB} + \frac{DASAVB}{DBSAVB}$$

$$= EVT\left(1 - \frac{1}{DBSAVB}\right) + \frac{DASAVB}{DBSAVB}$$

$$\therefore\ EVT = TIMDIF + \frac{S/C}{32}$$

i.e. TIMDIF on 2300

$EVT = 2300(86400)$

$$TIMDIF \text{ for Helios B} = 2300\left(1 - \frac{1}{1.000001232}\right)^{86400} + \frac{191417880}{1.000001232}$$

$$= 2300(.000001232)^{86400} + 191417644.2$$

$$= 191417889$$

IDIFF(3, 600) IDIFF(3, 3650) (I, J)

evt = J

K = (NREC − 1) * 600 + 1

Call Dread(Nunit, NRec, IDIFF(1, K), 8900)

FB lrecl = 7200, blksiz = 7200

PTLT 78 $-\frac{\pi}{2} < b < \frac{\pi}{2}$ $-90° < b < 90°$

2193

Jan 1 $x' = .458734$ $y' = .822438$ $z' = -.000190$ $r = .941723$

$\Rightarrow \sin b = -.000201757\,8$

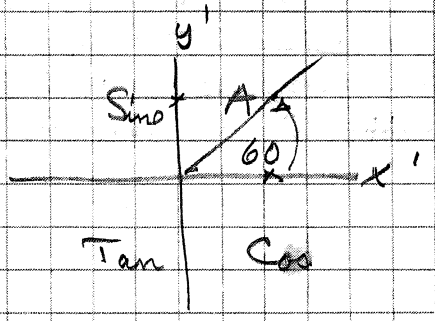
$b = -.011559\,8728$

$\cos b = 1$

$\sin l = .873333\,2413$

$l = 60.848\,324\,87$

$\cos l = .487122\,0093$

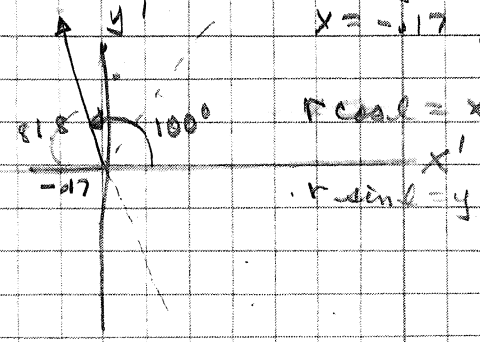


2193 $l = 60.848\,383$

for earth

$x' \simeq -.17$ $y' \simeq .97$ $z' = 0$ $r = .98$ $x^2 + y^2 = r^2$

$x = -.17$ $y = .96514$



$\sin b = 0$ $b = 0$

$\cos b = 1$

$\sin l = .989\,795\,9184$

$l = 81.8 \Rightarrow 80.1 \Rightarrow 100°$

$\cos l = -.17$

$l = 99.9° \simeq 100°$

Helios A

date	l	b	r	
2193	60.848383	-.011548	.941723	
2216	77.407588	-.005014	.984815	*
2306	221.991681	+.017816	.330599	
2311	255.671837	.005737	.309571	*
2280	136.853606	.017837	.642605	*

Helios B

date	l	b	r
2219	113.876939	-.007956	.983912
2312	292.226834	.008893	.290879
2287	169.631398	.019754	.647042

flux database

K3.ZBZNL.SB001.OPIOTEMP contains DBGPHA & DBGRAT

for pioneer they are in

M2.ZBZNL.S(?orD)B001.OPIONEER

there are six more datasets referred to by flux DBGs

K3.ZBRXD.SD002.OHELIOSA
K3.ZBZNL.SD002.OFLUXLIB
M2.ZBZNL.SD002.OGENERAL
K3.SBCID.SB001.OPIONEER
K3.SBJPH.OIMPILIB
K3.ZBZNL.SB001.OPIOFRAT

Overlap record EO3410 is most recent lapp

record 36503 MSRNs 11648356 - 13520366
day 2452 - 2452
bitrate 32
format 3
ofm 559
from HA1089 #3

Helios problem

4/6/79

Helios B

trend check: a number was trended in the middle of a string:

period 7+/23/77 56442244 to 58134244

tape HB0465 #10

problem does not appear in Quicklook:

⇒ no action

Pha/rates raliv: in bit rate 1024 ratio goes from 0 to 3 & rates are slow in following it.

period 11/23/77 5875 8699 to 5957 3190

tape HB0465 #11

problem appears in Quicklook

need an edrdmp

Helios B redo tape HBKR05

data does not appear in flux?

period 9/2/77 55000000 to 9/2/77 65000000

need a fluxlist

QNOUPD=T code does not stop update in DBG

~~EDRDMP needs asremlim~~

B/O mode times

Bit rate	fmt	lines/mf	Bitms/32 lines (1 page)	1152000/bitr
8	3	2	2304000	
16	3	2	1152000	
32	3	2	576000	
64	3	2	288000	
64	2	2	288000	
128	2	2	144000	
256	2	2	72000	
512	2	2	36000	
512	1	1	72000	
1024	1	1	36000	
2048	1	1	18000	

B/O mode does not affect sectored rate times

these times are also format independent

changed on 4/16/79

4/16/79

9/21/77 17: - 19: is present in NEWB & missing in BRED

MSPAGE in DBGRAT is still not changed for B/O mode. MSPAGE = 2*ACCUMU in B/O

ISPAGE & IEPAGE are not examined in DBGPHA

The QSS, QBO are checked in RATSUM 4/16/79

9/7/77 1: → 17: missing time

to run flux use SDAEL CRBE

= REDO BDBG } uses BRED dataset
= FINSERTB }

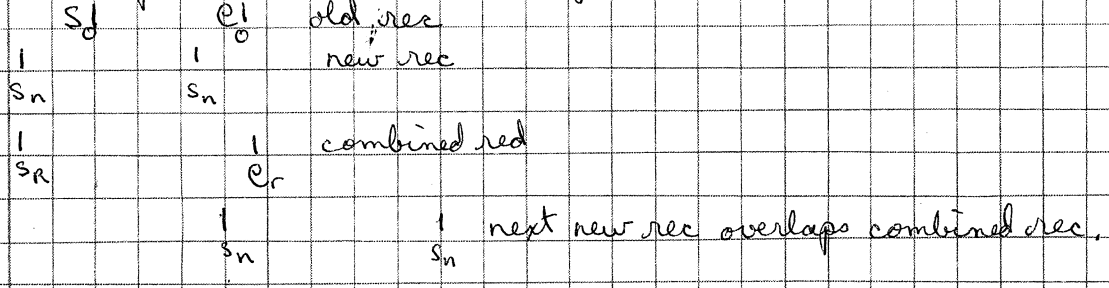
REVISR

The number of pages

revisr increments from earliest page to last page thus it is easy to add overlapping records 0, 1, 2 + 2, 3, 4, 5 and come up with more than 4 pages,

Overlaps

Coprat creates the overlaps with revisr as eg:



RTRIM0 & RTRIM5 are not needed

put check for overlap with last record written in Writer.

change revisr to copy one or the other

Revisp NPHA & JFDM

record size

number of pages = 1 + SQE/2

header = 9 words = 36 bytes

each page has subcom (12 words or 23 words)

+ 8 rate words + pha words?

JFDM

~~NPHA~~ = HRDIM (HFMT, HBIT) / 2 * 3 (8 rates + 12 subcom)

HRDIM

Hfmt \ H bit	8	16	32	64	128	256	512	1024	2048	4096
	1	2	3	4	5	6	7	8	9	10
1	0	0					32	96	160	
2	0	0		32	32	32	96			
3	32	32	32	32						
4	0	0								
5	0	0							160	160

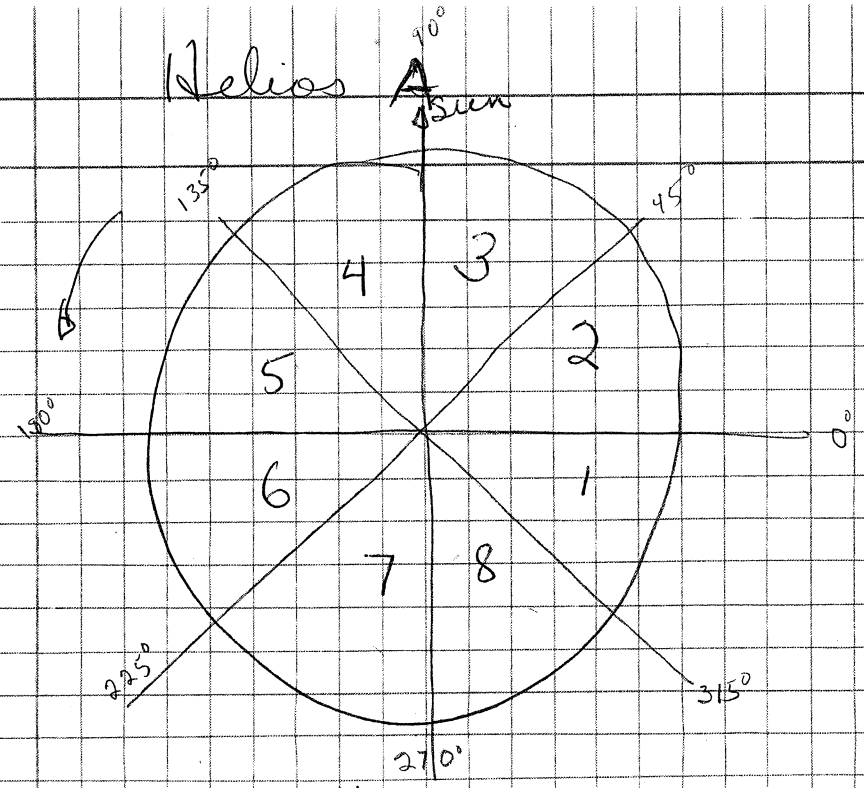
format 5 has 11 more subcom words

thus pha has header then each page has NPHA words

~~in~~ REVISP NPHA = (JFDM-20) * 2/3

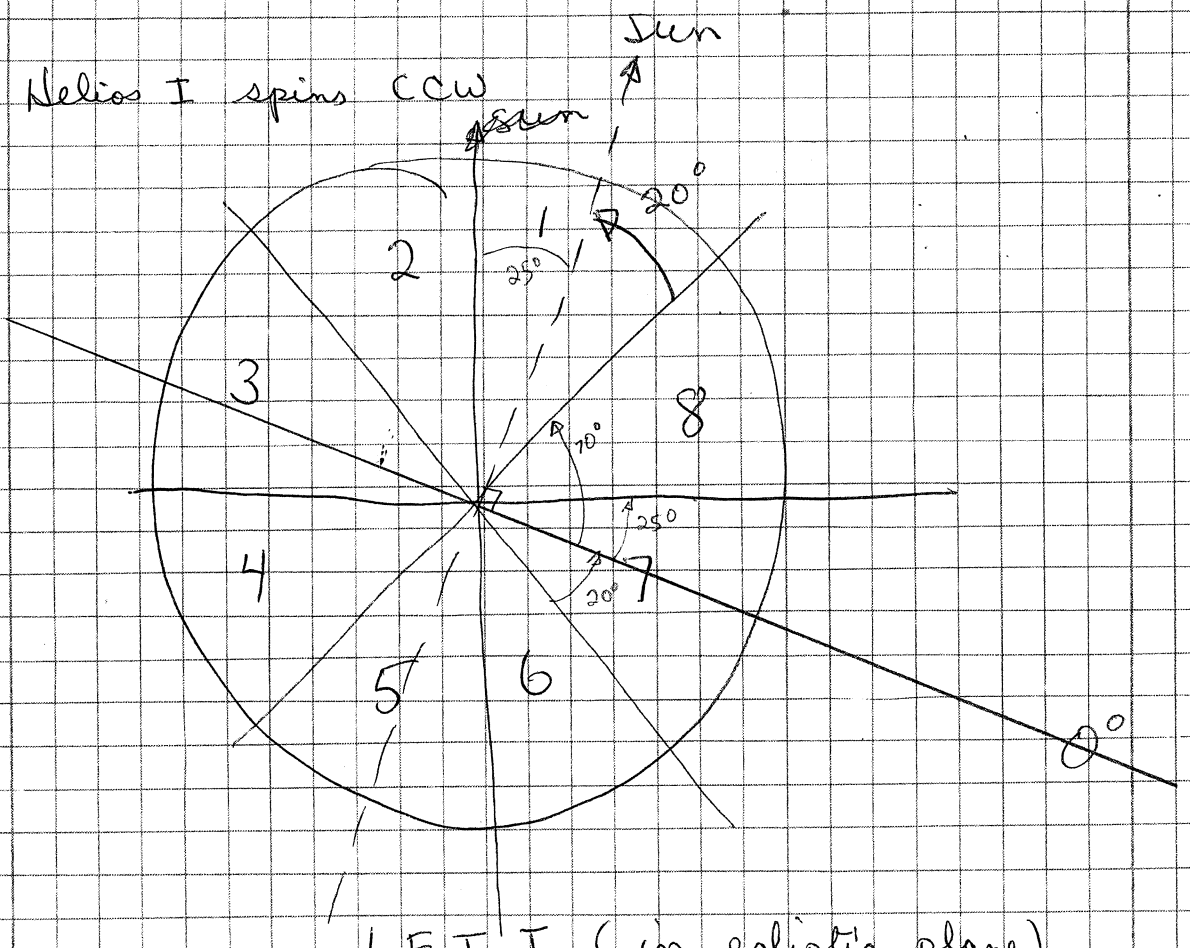
= HRDIM

Helios A



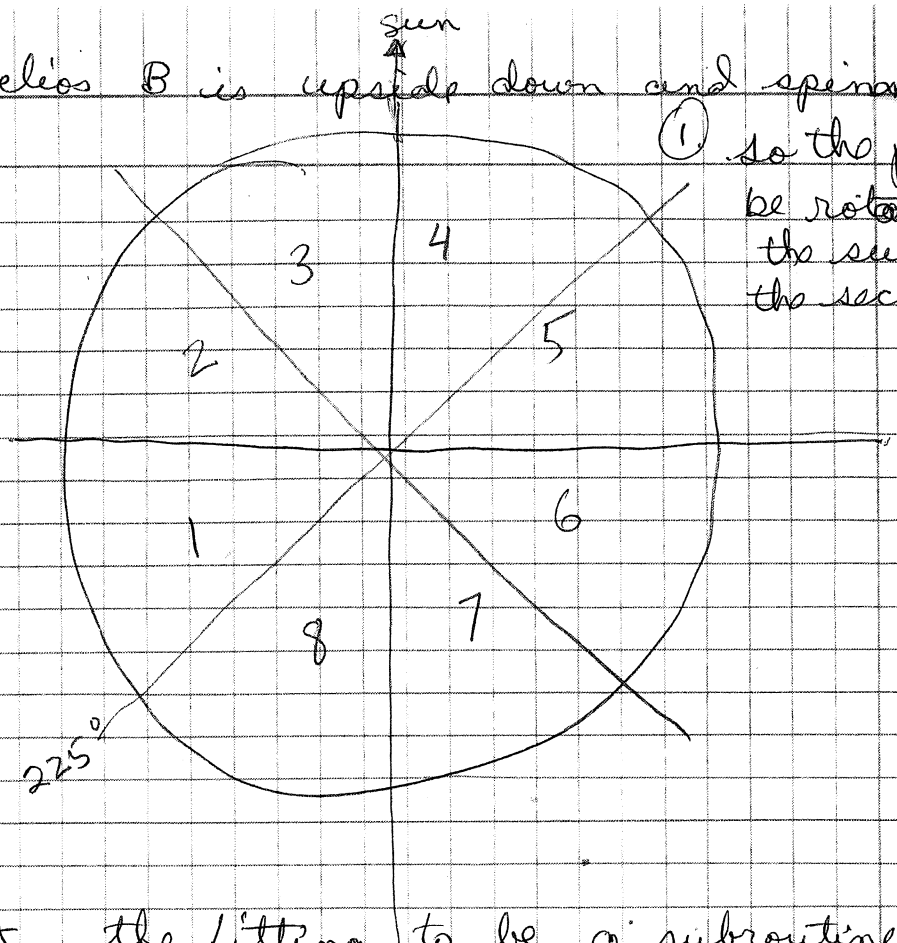
HET

Helios I spins CCW



LETI (in ecliptic plane)

Helios B is upside down and spinning CW



(1) so the plot must be rotated around the sun and the sectors labeled

(2) We want the fitting to be a subroutine which can fit any number of harmonics

(3) SR2A 1 = North VLET
SR3A = South VLET
an average might be useful

(4) SR1 A & E are the same for Helios A A − D = E − H
but SR1H is not read twice on Helios B
H = wide angle X ray

A = E
B = F
C = G
D = H
} Helios I but not Helios II

(5) There seems to be more rates than Sectored rates

(6) The times (sum) seems to be questionable

Common block Magg

DMGTAP	R*8	vol-ser of mag tape
	HASDMN(RW), MAGFLD(R)	
IYR	I*4	!
	MAGFLD(R)	
IDAY	I*4	
	MAGFLD(R)	
RP	R*4	
	BANGLS(R), MAGFLD(R)	
PLAT	R*4	
	MAGFLD(R)	
PHI2	R*4	
	BANGLS(R), MAGFLD(R)	
RE	R*4	
	BANGLS(R), MAGFLD(R)	
ELAT	R*4	
	MAGFLD(R)	
PHI1	R*4	
	BANGLS(R), MAGFLD(R)	
MAGDBG	I*4	Debug flag for mag routines
	HASDMN(RW), BANGLS(R), MAGFLD(R)	
BX	R*4	X value of mag field
	BANGLS(R), MAGFLD(W)	
BY	R*4	Y value
	BANGLS(R), MAGFLD(W)	
BZ	R*4	Z value
	BANGLS(R), MAGFLD(W)	
N	I*4	number of mag accumulations
	BANGLS(R), MAGFLD(RW)	
QMAG	L*1	flag requesting mag data
	HASDMN(RW)	

HASMDN flow chart

M2.ZBRTC.SD002.OPLOTMOD

HASMDN

14100 CNVDAT — time to MJD

14500 IPLOTS

- MODESG — 4060
- SETSMG — 4060
- OBJCTG — 4060
- LEGNDG — "
- NUMBRG — "
- PAGEG — "
- CNVMJD — MJD to Time
- CHEADP
  - LEGNDG
  - NUMBRG — header

23900 FOREA — Chi square

31200 CMPLTP

- OBJCTG
- PSUBJG
- SETSMG
- PSEGMG
- PCIRG
- PNUMG
- POLEG
- SUBJEG

14900 FRATE

- HMOUNT
  - FTIO (Helarato, 'Hcatalog')
  - ABend (1313, 1331)
- FTIO (Helarato
- 6200 INCRTP — increment time by MS millisecond

INCRTP

16700 MAGFLD

- FTIO(10)
- INCRTP
- NRTLT
- INDRCT
- CNVDAT

17400 NRATE(FRATE)

- FTIO(Helarato)
- NMOUNT

28100 BANGLS — compute θ & Φ angles of mgg field

- MAGVEC

flowchart for HASDMN

CAMOUT (IPLOTS) print cam plots
- CNVMJD
- 4060
- CHEADP
- FOREA
- CMPLTP

Simplified flowchart

HASDMN
- CNVDAT
- IPLOTS
  - 4060
  - CHEADP
    - 4060
  - FOREA
  - CMPLTP
    - 4060
- FRATE
  - HMOUNT
    - FTIO(Helarato, Hcatalog)
    - Abend(1313, 1331)
  - FTIO(Helarato)
  - INCRTP
- INCRTP
- MAGFLD
  - FTIO(10)
  - INCRTP
  - NRTLT
  - INDRCT
  - CNVDAT
- NRATE(FRATE)
  - FTIO(Helarato)
  - NMOUNT
- BANGLS
  - MAGVEC
- CAMOUT(IPLOTS)
  - CNVMJD
  - 4060
  - CHEADP
  - FOREA
  - CMPLTP

HASDMN Common block and subroutines

② BUFFER	HASDMN, FRATE
① ALL	HASDMN, IPLOTS, BLOCK DATA,
0 TAPES	HASDMN, AMOUNT
④ FIT	HASDMN, IPLOTS
⑥ MAG	HASDMN, BANGLS, MAGFLD
⑤ IGS	HASDMN, IPLOTS
③ FERMSG	FRATE

HASDMN Common block ALL

ALL common block

DHEAD R*8 rate header
HASDMN(R), IPLOTS(R), BLOCK DATA(W)

ICP I*4 rate number in input list
HASDMN(WR)

IRP I*4 rate number in block data
HASDMN(RW), IPLOTS(R)

NRATES I*4 number of rates processed
HASDMN(RW), IPLOTS(R)

SECSUM R*4 sum of rates
HASDMN(RW), IPLOTS(RW)

NRO I*4 number of each accumulation
HASDMN(W), IPLOTS(R)

ACCTIM R*4 accumulation time
HASDMN(W), IPLOTS(R)

NMM1 I*4 month start, number of month
HASDMN(RW), IPLOTS(R)

NDD1 I*4 day
HASDMN(RW), IPLOTS(R)

NYY1 I*4 year number
HASDMN(RW), IPLOTS(R)

NHH1 I*4 hour
HASDMN(RW), IPLOTS(R)

NMIN1 I*4 minute
HASDMN(RW), IPLOTS(R)

NMM2 I*4 month end
HASDMN(RW), IPLOTS(R)

NDD2 I*4 Day
HASDMN(RW), IPLOTS(R)

NYY2 I*4 year number
HASDMN(RW), IPLOTS(R)

NHH2 I*4 hour
HASDMN(RW), IPLOTS(R)

NMIN2 I*4 minute
HASDMN(RW), IPLOTS(R)

INT I*4 interval for accumulation (seconds or cycles)
HASDMN(RW), IPLOTS(R)

PCFULL R*4 scale for camplots
HASDMN(RW), IPLOTS(R)

NREJ I*4 number rejected
HASDMN(W), IPLOTS(R)

ALL common block continued

NTRNDR I*4 number that failed trend check
HASDMN(W), IPLOTS(R)

IRP1 I*4 rate number
HASDMN(RW), IPLOTS(R)

IRP2 I*4 rate number
HASDMN(RW), IPLOTS(R)

LPMS I*4 milliseconds start
HASDMN(W), IPLOTS(R)

NPMS I*4 milliseconds, next
HASDMN(RW), IPLOTS(R)

HPRMJD I*2 Julian day start & end
HASDMN(W), IPLOTS(W)

HPRMJE I*2 mod Julian day
HASDMN(RW), IPLOTS(W)

NFRMS I*4 frames plotted
HASDMN(RW), IPLOTS(RW)

APC R*4 satellite ID
HASDMN(RW), IPLOTS(R)

QCYCLE L*1 flag to accumulate in cycles (INT = cycles)
HASDMN(RW), IPLOTS(R)

QCPRT L*1 flag to print data
HASDMN(RW), IPLOTS(R)

QCPLT L*1 flag to plot data
HASDMN(RW), IPLOTS(R)

QTRNDR L*1 flag to trend data
HASDMN(RW), IPLOTS(R)

QTMREJ L*1 flag to reject or accept inhibit mode (OA mode)
HASDMN(RW), IPLOTS(R)

QRTPLT L*1
HASDMN(RW)

INT is ~~seconds~~ minutes if ≤ 120
days $120 \leq INT < 3600$

Buffer common block

IHDR	I*4	input rates data header
	HASDMN(W), FRATE(RW)	
IBUF	I*4	input rates data beyond header
	FRATE(RW)	
IREC	I*4	record number
	HASDMN(R), FRATE(RW)	
S1	R*4	S1 rate
	HASDMN(R), FRATE(W)	
S2	R*4	S2 rate
	HASDMN(R), FRATE(W)	
S3	R*4	S3 rate
	HASDMN(R), FRATE(W)	
SPR	R*4	spin rate
	HASDMN(R), FRATE(W)	
IDSEQ	I*4	sequence ID, sectored
	HASDMN(R), FRATE(RW)	
IMS1	I*4	milliseconds start of record
	HASDMN(RW), FRATE(R)	
IMS2	I*4	milisecond end of record
	HASDMN(RW), FRATE(R)	
IMSR	I*4	millisecond of data record
	HASDMN(R), FRATE(RW)	
HRMJD1	I*2	modified Julian day, start
	HASDMN(RW), FRATE(R)	
HRMJD2	I*2	modified Julian day, end
	HASDMN(RW), FRATE(R)	
HRMJDR	I*2	modified Julian day, time of ~~record~~ rates found
	HASDMN(R), FRATE(RW)	
QPAD	L*1	flag for padded data
	HASDMN(R), FRATE(W)	
QTRND	L*1	flag for trend
	HASDMN(R), FRATE(W)	
QBO	L*1	black out mode flag
	HASDMN(R), FRATE(W)	
QSS	L*1	synchronization flag
	HASDMN(R), FRATE(W)	

Common block FIT

IDEBUG I*4 debug flag
HASDMN(R)

QFIT L*1 flag for fit (cosine)
HASDMN(RW), IPLOTS(R)

IGS common Block

A R*4 4060 matrix
HASDMN(W), IPLOTS(RW)

IDEBUG doesn't do anything

Common block Magg

DMGTAP	R*8	vol-ser of mag tape
	HASDMN(RW), MAGFLD(R)	
IYR	I*4	!
	MAGFLD(R)	
IDAY	I*4	
	MAGFLD(R)	
RP	R*4	
	BANGLS(R), MAGFLD(R)	
PLAT	R*4	
	MAGFLD(R)	
PHI2	R*4	
	BANGLS(R), MAGFLD(R)	
RE	R*4	
	BANGLS(R), MAGFLD(R)	
ELAT	R*4	
	MAGFLD(R)	
PHI1	R*4	
	BANGLS(R), MAGFLD(R)	
MAGDBG	I*4	Debug flag for mag routines
	HASDMN(RW), BANGLS(R), MAGFLD(R)	
BX	R*4	X value of mag field
	BANGLS(R), MAGFLD(W)	
BY	R*4	Y value
	BANGLS(R), MAGFLD(W)	
BZ	R*4	Z value
	BANGLS(R), MAGFLD(W)	
N	I*4	number of mag accumulations
	BANGLS(R), MAGFLD(RW)	
QMAG	L*1	flag requesting mag data
	HASDMN(RW)	

TAPES common block

DINTAP R*8 input rates tapes
(ASDMNCRW), HMOUNT(R)

QTAPES L*1 flag for rates tapes
(ASDMNCRW), HMOUNT(R)

64 FRATE notes

HELARATE is the rates tape, but SCAMPLTA has a DSN of ZBRXD.RATES instead of HELRAT.

Frate calls Hmount to get the right tape. IMS1 & IMS2 must be the interval of average. I.E. MS2 = MS1 + 1 hr or whatever.

IRMJDR = MJD of record found
IMSR = start ms
IHFMT = format
HDR(14) = ~~ratio~~ bit rate

NTOL = 1152000 * ROUT(format)

~~NTOL~~ Hfmt, ~~ratio~~ bitrate, ~~ratio~~ Rout(HFMT)

384000	1	3	1
1152000	2 1	1	1
192000	3 2	3	.5
576000	4 2	1	.5
576000	5 3	1	.5
460800	5	5	2

NTOL	~~HFMT~~	bitrate	HFMT	ROUT
72000		8	3	.5
144000	36000	16	3	.5
288000	18000	32	3	.5
576000	9000	64	3	.5
576000	9000	64	2	.5
1152000	4500	128	2	.5
2304000	2250	256	2	.5
4608000	1125	512	2	.5
	2250	512	1	1
	1125	1024	1	1
	562	2048	1	1
	1125	2048	5	2
	562	4096	5	2

NTOL is the ~~fra~~ time from one rates readout to the next

notes cont.

QGAP is set when last time − sought time ≥ NTOL
or julian day has changed since last record.

This probably means a QGAP is set every time because there is no tolerance here. If NTOL were 1 MF greater then QGAP might really be true.

NPG is only true for format 1, 2, 3
for fmt 5 the length per page = 516 bytes.

QFlag is where division by 2 is set. This was to overcome the repetition of sectored rates actually the 2nd occurrence should be skipped.

IPT ≅ time per page

Since QGAP is always true, Qflag was always false
Thus DIV = 1

NMS = next multisecond

IDSEQ=IDSEQL sets QGAP and QFlag, the rate after the repeating sequence is divided by 2.

Line 840 in Hasdmm sets maxcyc to 8 and lin 1850 sets plot and accumulation at IDSEQ = 0

If it is not B/O mode and if last seq ID repeated, then the next ID is accumulating for twice as long and DIV should be 2.

NTOL
at bit rate 1024 if ratio 3 the last time to the next time is 4 mf's or 4 × 1125 ms thus NTOL should be 4 times what it is there,
or NTOL = NTOL * (HRATIO + 1) and then add one more for error's sake NTOL = NTOL * (HRATIO + 2)

flight 1 is Helios #

Helios B

Helios Flight 1 Unit - Revised - P...

347 Cal "A"	327 Cal "B"	367 Cal "A+B"	RATE INPUT	RATE	COMMUTATION A/B	SEC I	SEC II	SEC III	SEC
			R1	(A2K, +A, CI, B CII					
			R2	A, A2 BC III	0				
				A, BK2 C III					
			R3	A2 BC III					
				A2 BK2 CI					
			R4	A2 BK2 CI CII	0				
200 Kev	✓	✓		A, 4.95 mV.					
2.0 mev.	✓	✓	R5	A2 BK2 CI CII CIII	0				
				A2 49.6 mv.					
			R6	A, A2 B CI	0				
				A, A2 B CI CII					
			R7	A, A2 BCI CII CIII	0				
				A2 BK, CI					
	✓		R8	A2 BK, CI CII	0				
		✓		A2 BK, CI CII CIII					
.2 mev.	✓	✓	R10 A	DI, 10 50 mv.	0	0	0		
.4 "	✓	✓	B	DI2 15 99 "	1	0	0		
.8 "	✓	✓	C	DI3 22 196 "	0	1	0		
1.6 "	✓	✓	D	DI4 33 395 "	1	1	0		
4.0 "	✓	✓	E	DI5 92 98 "	0	0	1		
8.0 "	✓	✓	F	DI6 72 194 "	0	0	1		
10 "	✓	✓	G	DI7 102 888 "	0	1	1		
50 "	✓	✓	H	DI8 2 4.82 V.	1	1	1		
200 Kev.	✓	✓	R11	DI DII F 10 50 mv.	0				
2.0 mev.	✓	✓		DI DII E DF 600 " 400 "					
2.0 "	✓	✓	R12	DI DII E, F10 98 "	0				
8.0 "	✓	✓		DI DII E DE3 F 194 " 40 "					
10 "	✓	✓	R13	DI DII E2 F 50 95 "	0				
40 "	✓	✓		DI DII E DE4 F 99 " 200 "					
200 Kev.	✓	✓	R14 A	DI 10 50 "	0	0			
200 "	✓	✓	B	DII 10.2 50 "	1	0			
2.0 mev.	✓	✓	C	E, 10 98 "	0	1			
200 Kev.	✓	✓	D	F 100 "	1	1			
200 "	✓	✓	E	B 4.9 "	0	0	1		
1.0 mev.	✓	✓	F	CI 4.9 "	1	0	1		
1.0 "	✓	✓	G	CII 4.9 "	0	1	1		
200 Kev.	✓	✓	H	CIII 4.95 "	1	1	1		
150 Kev	✓	✓	R15 A	SI, SII SII2 SIII .44 V	0	0			
700 "	✓	✓	B	SI2 SII SII2 SIII .82 V	1	0			
1.2 mev	✓	✓	C	SI3 SII SII2 SIII 1.44 V	1	1			
2.5 "	✓	✓	D	SI4 SII SII2 SIII 5.0 V	0	1			
2.0 "	✓	✓	R16 A	SI SII, SII2 SIII 160 mv.	0	0			
5.0 "	✓	✓	B	SI SII2 SII2 SIII .8 V.	1	0			
15 "	✓	✓	C	SI SII3 SII2 SIII 2.4 V	0	1			
25 "	✓	✓	D	SI SII4 SII2 SIII 4.02 V.	1	1			
150 Kev.	✓	✓	R17 A	SI VLET-1 245 mv.	0	0	0		
50 "	✓	✓	B	SII VLET-1 8.1 "	1	0	0		
200 "	✓	✓	C	SII2 VLET-1 25 "	0	1	0		
100 "	✓	✓	D	SIII VLET-1 45 "	1	1	0		
150 "	✓	✓	E	SI VLET-2 25 "	200 "	0	1		
50 "	✓	✓	F	SII VLET-2 8.2 "	1	0	1		
200 "	✓	✓	G	SII2 VLET-2 94 "	0	1	1		
100 "	✓	✓	H	SIII VLET-2 47 "	1	1	1		
150 Kev.	✓	✓	R18 A	SI, SII SII2 SIII .405 V	0				
700 "	✓	✓	B	SI2 SII SII2 SIII .812 V	0				
1.2 mev	✓	✓	C	SI3 SII SII2 SIII 1.44 V	1				
2.5 "	✓	✓	D	SI4 SII SII2 SIII 5.0 V	1				
2.0 "	✓	✓	R19 A	SI SII, SII2 SIII 160 mv.	0				
5.0 "	✓	✓	B	SI SII2 SII2 SIII .8 V.	1				
15 "	✓	✓	C	SI SII3 SII2 SIII 2.42 V.	0				
25 "	✓	✓	D	SI SII4 SII2 SIII 4.05 V.	1				
			Sec I	E A, A2 BCI CIII					
200 Kev.	✓	✓	B	F A2 BK, CIII					
2.0 mev.	✓	✓	C	G DI DII F 10 50 mv.					
			D	H DI DII E, F 10 98 "					
				↳ SRI-H is 45° sectored wide angle X-Ray					
			R9 A	USXR - unsectored narrow "					
			" B	" " wide "					
			R20	" " " "					
50 75 Kev.	✓	✓	Sec II A	SI5 SII SII2 SIII	42.5 mV.	100 mV.			
500 "	✓	✓	B	SI6 SII SII2 SIII	21 mV.	.33 V.			
1.0 "	✓	✓	C	SI7 SII SII2 SIII	52 "	1.65 V.			
1.5 "	✓	✓	D	SI8 SII SII2 SIII	130 "	2.45 V.			
50 Kev	✓	✓	E	SI SI5 SII2 SIII	8.1 "				
350 "	✓	✓	F	SI SI6 SII2 SIII	40 "	.56 mV			
700 "	✓	✓	G	SI SI7 SII2 SIII	80 "	112 mV			
1.0 mev	✓	✓	H	SI SI8 SII2 SIII	160 "				
50 Kev.	✓	✓	Sec III A	SI5 SII SII2 SIII	42.5 "	100 mV.			
500 "	✓	✓	B	SI6 SII SII2 SIII	21 "	.33 V.			
1.0 mev.	✓	✓	C	SI7 SII SII2 SIII	52 "	1.65 V.			
1.5 "	✓	✓	D	SI8 SII SII2 SIII	130 "	2.45 V.			
50 Kev	✓	✓	E	SI SI5 SII2 SIII	8.1 "				
350 "	✓	✓	F	SI SI6 SII2 SIII	40 "				
700 "	✓	✓	G	SI SI7 SII2 SIII	80 "				

PHA Data		
Cal. A - (347)		
LET		
DI	DII	E
50	42	20
25	31	31
Cal. B - (327)		
HET		
A	B	CI
18	14	20
Cal. A+B - (367)		
HET		
A	B	CI+CII
18	14	35

LET HET VLET 1 VLET 2

Helios Flight 2 Unit — Helios A

(343) Cal. "A"	(323) Cal. "B"	(363) Cal. A+B	RATE IN/OUT	RATE	3 MUTATION BITS TO SELECT SEQ 1	SEQ 2	SEQ 3	
			R1	$A_2K_1 + A_1C_I B C_{III}$	0			DET
			R2	$A_1 A_2 B C_{III}$				
				$A_1 B K_2 C_{III}$				
			R3	$A_2 B C_{III}$	1			
				$A_2 B K_2 C_I$				
			R4	$A_2 B K_2 C_I C_{II}$	0			
200 Kev.	✓	✓		A_1 5.0 mV.	1			
			R5	$A_2 B K_2 C_I C_{II} C_{III}$	0			
2.0 mev.	✓	✓		A_2 48.5 mV.	1			
			R6	$A_1 A_2 B C_I$	0			
				$A_1 A_2 B C_I C_{II}$	1			
			R7	$A_1 A_2 B C_I C_{II} C_{III}$	0			
				$A_2 B K_1 C_I$	1			
	✓		R8	$A_2 B K_1 C_I C_{II}$	0			
		✓		$A_2 B K_1 C_I C_{II} C_{III}$	1			
.2 mev.	✓	✓	R10 A	DI_1 5.0 mV.	0	0	0	
5% .4 "	✓	✓	B	DI_2 10 "	1	0	0	
9% .8 "	✓	✓	C	DI_3 20 "	0	1	0	
17% 1.6 "	✓	✓	D	DI_4 39.5 "	1	1	0	
40% 4.0 "	✓	✓	E	DI_5 95 "	0	0	1	
8.0 "	✓	✓	F	DI_6 197 "	1	0	1	
16 "			G	DI_7 393 "	0	1	1	
50 "			H	DI_8 1.18 V.	1	1	1	
200 Kev.	✓	✓	R11	$DI\ DII\ \overline{E}$ 5.0 mV.	0			
24 mev.	✓			$DI\ DII\ E\ DF$ 600 "	1			
1.3 "	✓		R12	$DI\ DII\ E, \overline{F}$ 3.2 "	0			
5.2 "	✓			$DI\ DII\ E\ DE_3\ F$ 12.8 "	1			
10 "	✓		R13	$DI\ DII\ E_2\ \overline{F}$ 24.5 "	0			
40 "				$DI\ DII\ E\ DE_4\ F$ 95 "	1			
200 Kev.	✓	✓	R14 A	DI 5.0 "	0	0		
200 "	✓	✓	B	DII 5.0 "	1	0		
1.3 mev.	✓	✓	C	E_1 3.2 "	0	1		
200 Kev.	✓	✓	D	E 97 "	1	1		
200 "	✓	✓	E	B 5.1 "	0	0	1	
1.0 mev.	✓	✓	F	CI 4.9 "	1	0	1	
1.0 "	✓	✓	G	CII 4.9 "	0	1	1	
800 Kev.			H	CIII 4.9 "	1	1	1	
2.5 mev.	✓		R15 A	$SI_1 \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ .435 V.	0	0		
5.6 "			B	$SI_2 \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ .84 V.	1	0		
10 "			C	$SI_3 \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 1.72 V.	0	1		
30 "			D	$SI_4 \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 5.15 V.	1	1		
1.0 "		✓	R16 A	$SI\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 161 mV.	0	0		
5.0 "			B	$SI\ SII_2\ \overline{SII_2}\ \overline{SIII}$ .79 V.	1	0		
15 "			C	$SI\ SII_3\ \overline{SII_2}\ \overline{SIII}$ 2.42 V.	0	1		
25 "			D	$SI\ SII_4\ \overline{SII_2}\ \overline{SIII}$ 4.05 V.	1	1		
150 Kev.	✓	✓	R17 A	SI VLET-1 26 mV.	0	0	0	
50 "	✓	✓	B	SII VLET-1 8.5 "	1	0	0	
200 "			C	SII_2 VLET-1 92 "	0	1	0	
100 "			D	SIII VLET-1 45.5 "	1	1	0	
150 "	✓	✓	E	SI VLET-2 26.5 "	0	0	1	
50 "	✓	✓	F	SII VLET-2 8.0 "	1	0	1	
200 "			G	SII_2 VLET-2 82 "	0	1	1	
100 "			H	SIII VLET-2 46.5 "	1	1	1	
2.5 mev.	✓		R18 A	$SI\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ .44 V.	0	0		
5.0 "			B	$SI_2\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ .84 V.	1	0		
10 "			C	$SI_3\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 1.73 V.	0	1		
30 "			D	$SI_4\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 5.25 V.	1	1		
1.0 "		✓	R19 A	$SI\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 140 mV.	0	0		
5.0 "			B	$SI\ SII_2\ \overline{SII_2}\ \overline{SIII}$ .78 V.	1	0		
15 "			C	$SI\ SII_3\ \overline{SII_2}\ \overline{SIII}$ 2.4 V.	0	1		
25 "			D	$SI\ SII_4\ \overline{SII_2}\ \overline{SIII}$ 4.0 V.	1	1		
			ASE1 A	$A_1 A_2 B C_I \overline{SIII}$	0	0	0	HET
	✓	✓	B	$A_2 B K_1 C_{III}$	1	0	0	HET
200 Kev.	✓		C	$DI\ DII\ \overline{E}$ 5.0 mV.	0	1	0	HET
1.3 mev.	✓		D	$DI\ DII\ E, \overline{F}$ 3.2 mV.	1	1	0	HET
			R9	US x R	0	0	1	X-RAY
			R20	"	1	0	1	X-RAY
50 Kev.	✓	Noise	SR2 A	$SI_5\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 9.3 mV.	0	1	0	VLET 1
125 "	✓		B	$SI_6\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 22 "	1	1	0	VLET 1
320 "	✓		C	$SI_7\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 54.5 "	0	0	1	VLET 1
800 "	✓		D	$SI_8\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 133 "	1	0	1	VLET 1
50 "		✓	E	$SI\ SII_5\ \overline{SII_2}\ \overline{SIII}$ 8.5 "	0	1	1	VLET 2
250 "		✓	F	$SI\ SII_6\ \overline{SII_2}\ \overline{SIII}$ 40 "	1	1	1	VLET 2
500 "		✓	G	$SI\ SII_7\ \overline{SII_2}\ \overline{SIII}$ 78.5 "	0	0	0	VLET 2
1.0 mev.		✓	H	$SI\ SII_8\ \overline{SII_2}\ \overline{SIII}$ 161 "	1	0	0	VLET 2
50 Kev.	✓		SR3 A	$SI_5\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 9.3 "	0	1	0	VLET 1
125 "	✓		B	$SI_6\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 22.5 "	1	1	0	VLET 1
320 "	✓		C	$SI_7\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 55.5 "	0	0	1	VLET 1
800 "	✓		D	$SI_8\ \overline{SII}\ \overline{SII_2}\ \overline{SIII}$ 135 "	1	0	1	VLET 1
50 "		✓	E	$SI\ SII_5\ \overline{SII_2}\ \overline{SIII}$ 8.0 "	0	1	1	VLET 2
250 "		✓	F	$SI\ SII_6\ \overline{SII_2}\ \overline{SIII}$ 40 "	1	1	1	VLET 2
500 "		✓	G	$SI\ SII_7\ \overline{SII_2}\ \overline{SIII}$ 75 "	0	0	0	VLET 2
1.0 mev.		✓	H	$SI\ SII_8\ \overline{SII_2}\ \overline{SIII}$ 140 "	1	0	0	VLET 2

PHA Data

Cal. A – (343) Het

DI	DII	E
~~48~~	~~95~~	19

Cal. B – (323) Het

A	B	CI
15	19	25

Cal. A+B – (363) Het

A	B	CI+CII
15	19	35

Pre-amp. Out

DI = 225 mV

DII = ~~195~~ 215 "

E = 93 mV

A = 65 mV

B = 86 mV

CI = 115 mV

CII = 50 mV

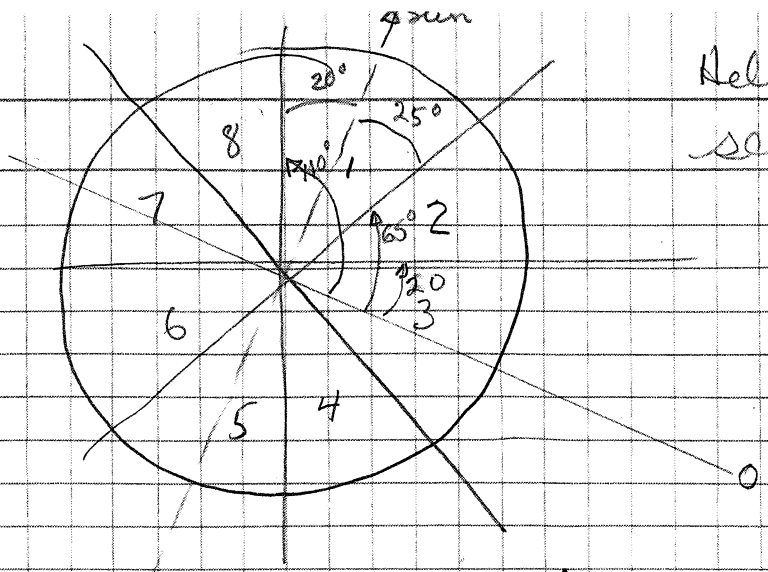
CET Isotope Activation

Sectored rates problems

1. SR1H is trended in Voldrp against SR1D now for B and shouldn't be.
2. R9A → R9B for B and shouldn't be trended against it.
3. These have to be changed in plot program also.
4. Is there a timing problem?
5. Can the repeated SSQ's be ignored?
6. is there a padded problem? in sectored?
7. Does the last SSQ have to be checked for < 0 ?
8. Helios B is upside down
9. the sectors must be numbered
10. The anisotropy must be outside / define this problem in a meeting

Helios B V-let

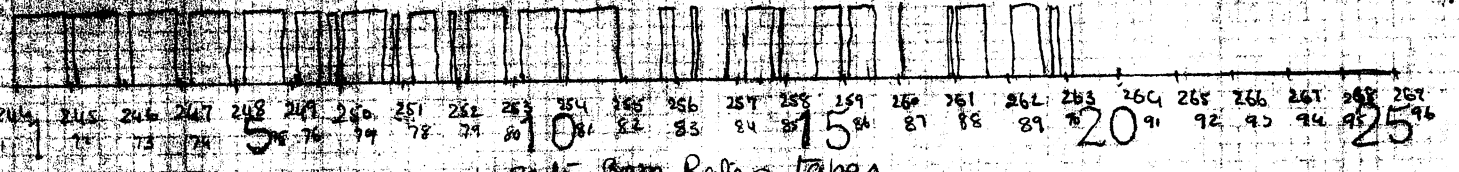
ddc 52



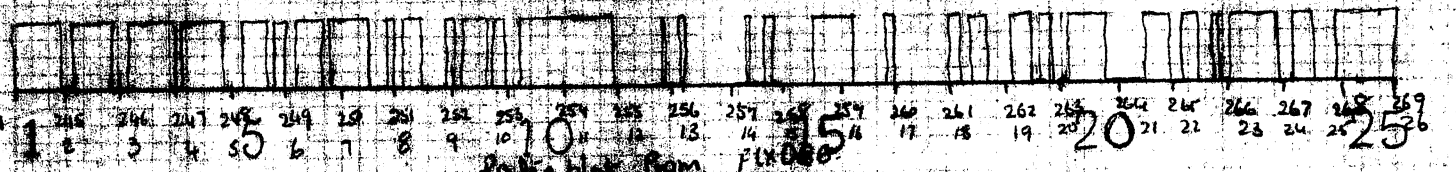
A, B, C = het

S = vlet 2 of them one above one below ecliptic

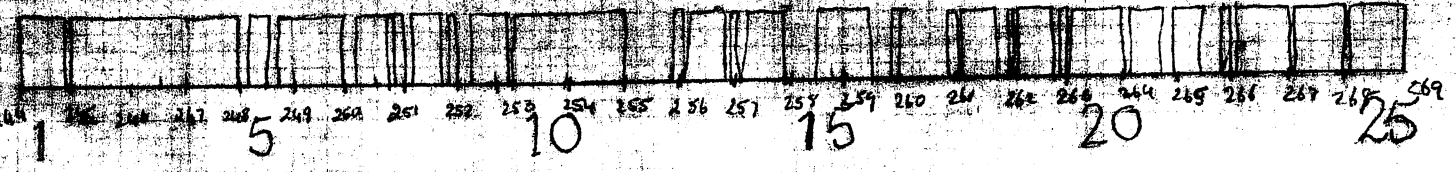
D = Let



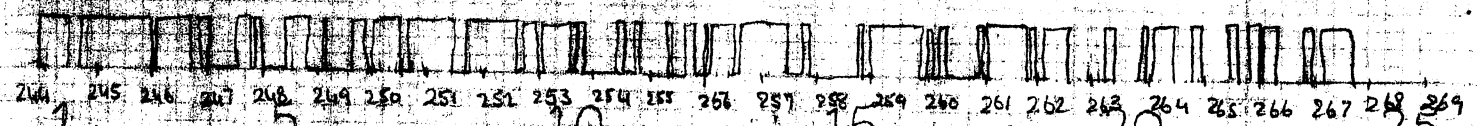
Radio from Radio tapes



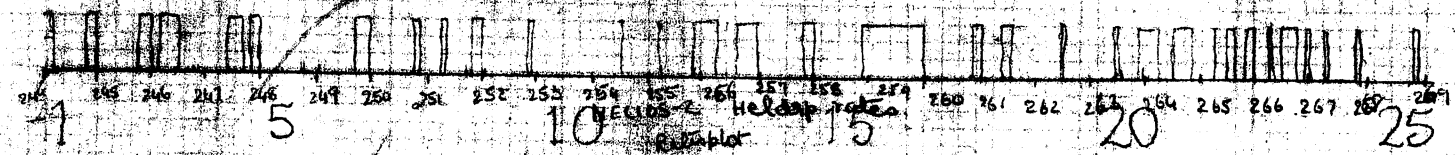
Radio plot from FIX 068

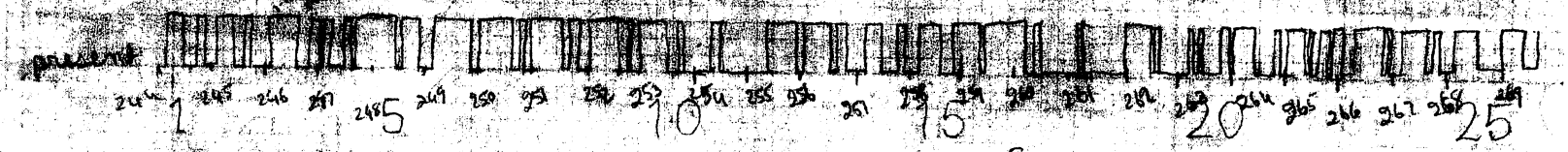


Helios-1 EDR 09



SEPTEMBER 1977
Ruleo from Rolla tape





Helio-2 EDR 109

HNDX MATRIX

N / ILINE

N	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	25	28	31	48	34	37	40	44	01	02	03	04	05	06	07	08
2	26	29	32	50	35	38	42	45	09	10	11	12	13	14	15	16
3	27	30	52	51	36	39	43	47	17	18	19	20	21	22	23	24
4	00	00	00	41	00	00	00	33	00	00	00	46	00	00	00	49
				(R9)				(R1)				(R14)				(R17)

HSUNX

LINE# 0 SXR(1) = 25, SXR(2) = 26, SXR(3) = 27

LINE# 1 SXR(4) = 28, SXR(5) = 29, SXR(6) = 30

2 SXR(7) = 31, SXR(8) = 32, R20 = 52

2 R16 = 48, R18 = 50, R19 = 51 R9 = 41

4 R2 = 34, R3 = 35 R4 = 36

5 R5 = 37 R6 = 38 R7 = 39

6 R8 = 40 R10 = 42 R11 = 43

7 R12 = 44 R13 = 45 (R15 = 47) R1 = 33

8 SR1(1) = 01 SR2(1) = 09 SR3(1) = 17

9 SR1(2) = 02 SR2(2) = 10 SR3(2) = 18

10 SR1(3) = 03 SR2(3) = 11 SR3(3) = 19

11 SR1(4) = 04 SR2(4) = 12 SR1(4) = 20 (R14 = 46)

12 SR3(5) = 05 SR2(5) = 13 SR3(5) = 21

13 SR3(6) = 06 SR2(6) = 14 SR3(6) = 22

14 SR1(7) = 07 SR2(7) = 15 SR3(7) = 23

15 SR1(8) = 08 SR2(8) = 16 SR3(8) = 24 R17 = 49

Corrected

	1	2	3	4	5	6	7	8
SR1(1)	1	53	95	126	1	53	95	126
(2)	2	54	96	127	2	54	96	127
(3)	3	55	97	128	3	55	97	128
(4)	4	56	98	129	4	56	98	129
(5)	5	57	99	130	5	57	99	130
(6)	6	58	100	131	6	58	100	131
(7)	7	59	101	132	7	59	101	132
(8)	8	60	102	133	8	60	102	133
SR2(1)	9	61	103	134	157	176	195	214
(2)	10	62	104	135	158	177	196	215
(3)	11	63	105	136	159	178	197	216
(4)	12	64	106	137	160	179	198	217
(5)	13	65	107	138	161	180	199	218
(6)	14	66	108	139	162	181	200	219
(7)	15	67	109	140	163	182	201	220
(8)	16	68	110	141	164	183	202	221
SR3(1)	17	69	111	142	165	184	203	222
(2)	18	70	112	143	166	185	204	223
(3)	19	71	113	144	167	186	205	224
(4)	20	72	114	145	168	187	206	225
(5)	21	73	115	146	169	188	207	226
(6)	22	74	116	147	170	189	208	227
(7)	23	75	117	148	171	190	209	228
(8)	24	76	118	149	172	191	210	229
SXR(1)	25	25	25	25	25	25	25	25
SXR(2)	26	26	26	26	26	26	26	26
SXR(3)	27	27	27	27	27	27	27	27
SXR(4)	28	28	28	28	28	28	28	28
SXR(5)	29	29	29	29	29	29	29	29
SXR(6)	30	30	30	30	30	30	30	30
SXR7	31	31	31	31	31	31	31	31
SXR(8)	32	32	32	32	32	32	32	32
R1	33	33	33	33	33	33	33	33
R2	34	77	34	77	34	77	34	77
R3	35	78	35	78	35	78	35	78
R4	36	79	36	79	36	79	36	79
R5	37	80	37	80	37	80	37	80
R6	38	81	38	81	38	81	38	81
R7	39	82	39	82	39	82	39	82
R8	40	83	40	83	40	83	40	83
R9	41	84	41	84	41	84	41	84
R10	42	85	119	150	173	192	211	230
R11	43	86	43	86	43	86	43	86
R12	44	87	44	87	44	87	44	87
R13	45	88	45	88	45	88	45	88
R14	46	89	120	151	174	193	212	231
R15	47	90	121	152	47	90	121	152
R16	48	91	122	153	48	91	122	153
R17	49	92	123	154	175	194	213	232
R18	50	93	124	155	50	93	124	155
R19	51	94	125	156	51	94	125	156
R20	52	52	52	52	52	52	52	52

74

EUR from F1XDBG

position	
1	R1
2	R2A
3	R3A
4	R4A
5	R5A
6	R6A
7	R7A
8	R8A
9	R9A
10	R10A
11	R11A
12	R12A
13	R13A
14	R14A
15	R15A
16	R16A
17	R17A
18	R18A
19	R19A
20	R20
21	R2B
22	R3B
23	R4B
24	R5B
25	R6B
26	R7B
27	R8B
28	R9B
29	R10B
30	R11B
31	R12B
32	R13B
33	R14B
34	R15B
35	R16B
36	R17B
37	R18B
38	R19B
39	R10C
40	R14C
41	R15C
42	R16C
43	R17C
44	R18C
45	R19C
46	R10D
47	R14D
48	R15D
49	R16D
50	R17D
51	R18D
52	R19D
53	R10E
54	R14E
55	R17E
56	R10F
57	R14F
58	R17F
59	R10G
60	R14G
61	R17G
62	R10H
63	R14H
64	R17H

HURP

rate # \ ID sequence #	0	1	2	3	4	5	6	7
1	1	1	1	1	1	1	1	1
2	2	21	2	21	2	21	2	21
3	3	22	3	22	3	22	3	22
4	4	23	4	23	4	23	4	23
5	5	24	5	24	5	24	5	24
6	6	25	6	25	6	25	6	25
7	7	26	7	26	7	26	7	26
8	8	27	8	27	8	27	8	27
9	9	28	9	28	9	28	9	28
10	10	29	39	46	53	56	59	62
11	11	30	11	30	11	30	11	30
12	12	31	12	31	12	31	12	31
13	13	32	13	32	13	32	13	32
14	14	33	40	47	54	57	60	63
15	15	34	41	48	15	34	41	48
16	16	35	42	49	16	35	42	49
17	17	36	43	50	55	58	61	64
18	18	37	44	51	18	37	44	51
19	19	38	45	52	19	38	45	52
20	20	20	20	20	20	20	20	20

ABENDS in FLXDBG

PHASRT 334

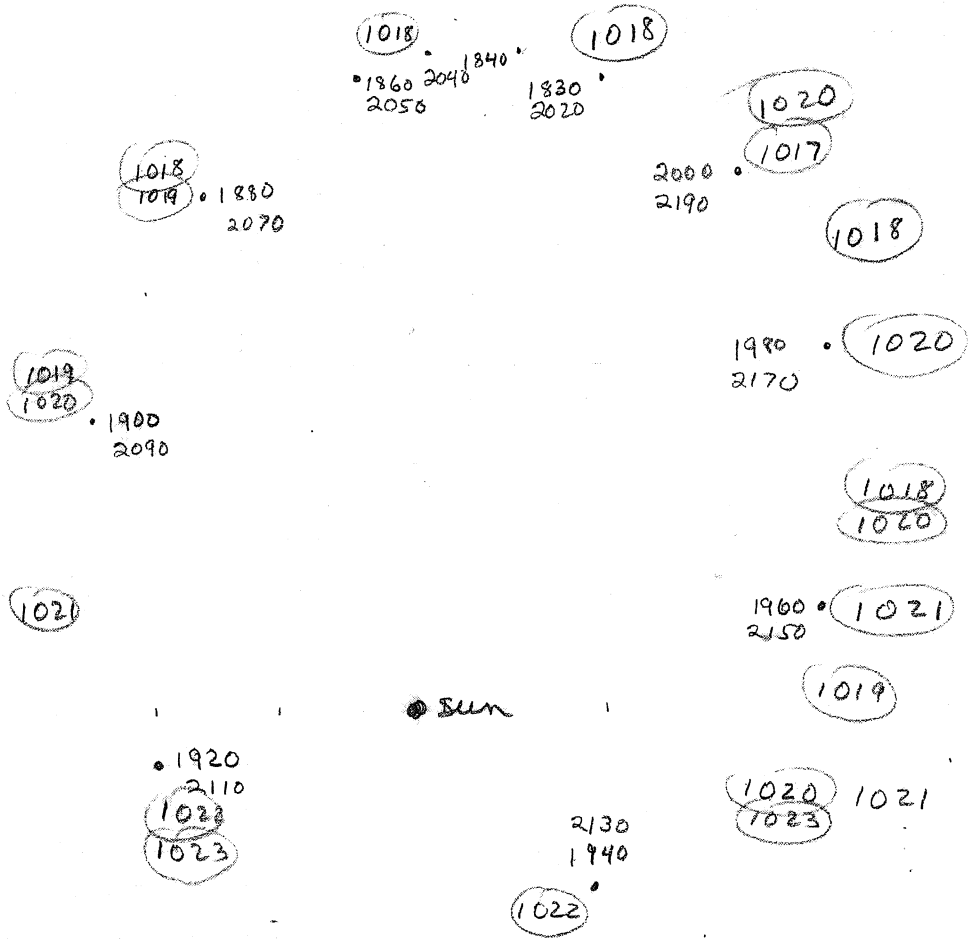
FLXDBG 9000, 9010, 9020, 9030, 9040, 9050, 9060, 9070, 9080, 9090

FSTAT 32

The abend code only has 12 bits thus $FFF_{16} = 4095_{10}$ is the largest number

i.e $9090_{10} = 2382_{16} \rightarrow 382_{16} = 898_{10}$

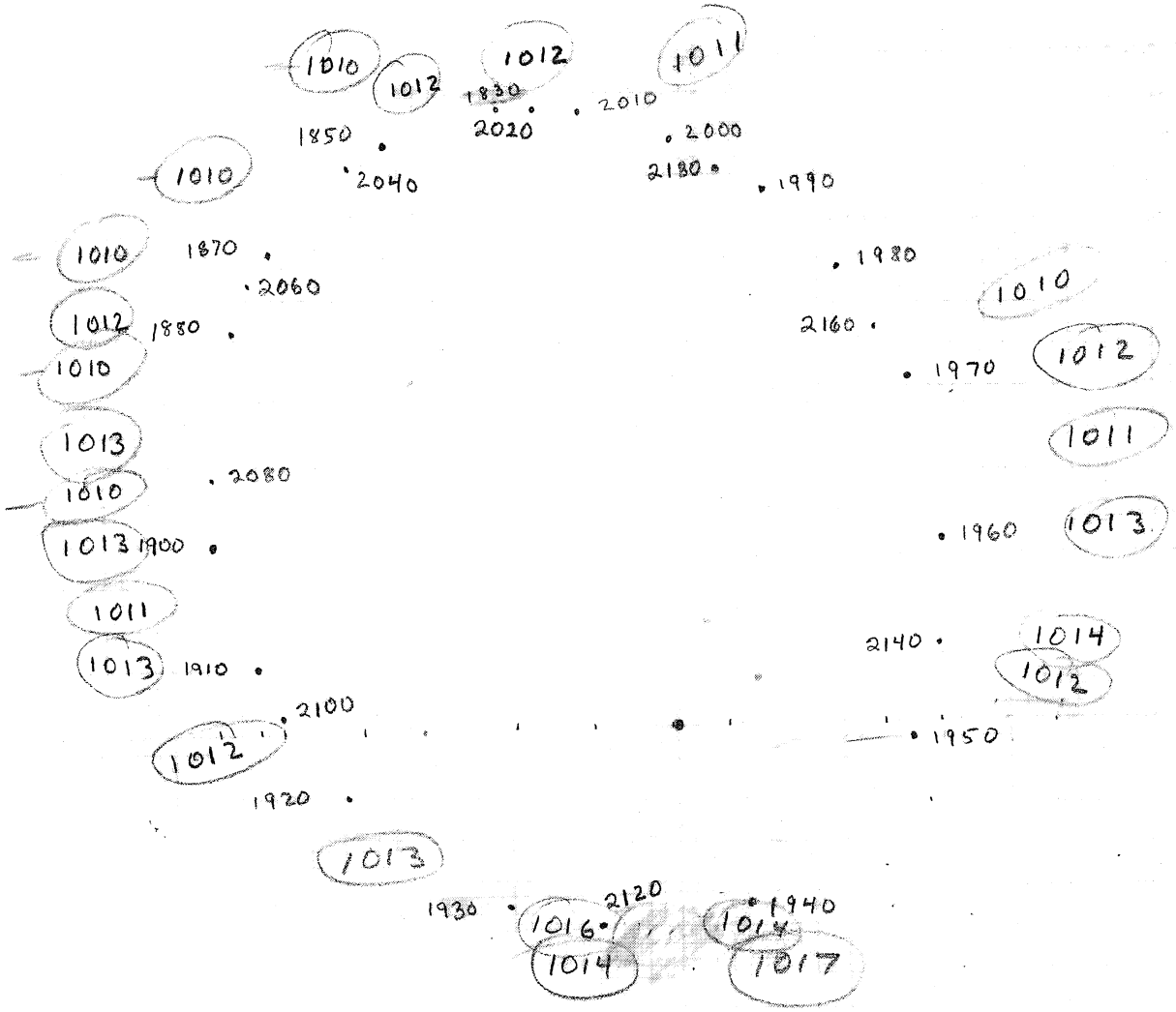
Helios A 1977



orbit rpm for 1977

average ≈ 1020

rev/sec = 1020/1024 ≈ 1 s^{-1}



This is a plot of X, Y position of Helios B vs MJD (1830 - 2180)
HRPM/16 is indicated
rev per sec = 1012/1024 ≈ 1 s^{-1}

Helios flux rates

LET

$D_I D_{II} \in F$

$D_I \not\subset D_{II} \in \bar{F}$ ← R II A

$D_I D_{II} \subset D \bar{F}$ ← R II B.

$D_I, D_{II}, \bar{E}$

D_I vs D_{II}

D_I vs $\bar{E}$

D_{II} vs $\bar{E}$.

HET

ST	A	B	$C_I + C_{II}$
P.		B	$C_I + C_{II}$ C_{III}

A vs B.

B vs $C_I + C_{II}$

A vs $C_I + C_{II}$

B vs $C_I + C_{II}$ C_{III}

B vs C_{III} $C_I + C_{II}$

~~LET~~

R1

R2A

R2B

R3.A

R

HET

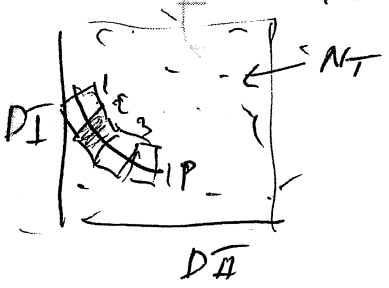
wl B vs C_{III} or B vs $C_I + C_{II}$

R II A

R II B

LET

Hel 2.



$$\frac{dJ}{dE} = \frac{R_{(II\,A)} \times N_i}{N_T \times G \times \Delta E}$$

$N_T +$

NPROC

Before 1630 generation data, IPD put out a S/C clock which was missing some bits. The bit correction times are gotten from reprocessed tapes (reprocessed after 1630 = middle of 76)

HSXRMN

ACCUMW format

bit rate	1	2	3	4	5
1	0	0	2304	0	1152
2	0	0	1152	0	0
3	0	0	576	0	0
4	0	288	288	0	0
5	0	144	0	0	0
6	0	72	0	0	0
7	72	72	0	0	0
8	72	0	0	0	0
9	54	0	0	108	0
10	0	0	0	54	0

Hbitr, 5th → 0 for all bit rate other than 8, the data is rejected

here format 5th is hindex 4 and row 5 is B/O mode

flowchart

in Heldrp ACCUMW format

bit rate	1	2	3	4	5	6	
1	0	0	2304	0	0	1152	8
2	0	0	1152	0	0	576	16
3	0	0	576	0	0	288	32
4	0	288	288	0	0	144	64
5	0	144	0	0	0	72	128
6	0	72	0	0	0	36	512
7	72	72	0	0	0	18	
8	72	0	0	0	0	18	
9	54	0	0	0	108	9	
10	0	0	0	0	54	0	

there is no format 4
format 6 = blackout mode

1	2	3	4	5	6	7	8	9	10	: HBITR
8	16	32	64	128	256	512	1024	2048	4096	: bit rate

Accumw = time per 1/2 page or it = 16 lines of rates data

LIST TEMP

STS028C
RR LROB
DE GSTS 007
18/1407Z
FM NASA GSFC GREENBELT MD
TO LR03/DR DODECK DR FRANK GFW TELEX NO 8-874433

SUBJ: CALIBRATION DATA FOR EXPERIMENT 7 ANALOG ENGINEERING WORDS
IN REPLY TO YOUR TWX OF 11 OCT 73 WE REQUIRE ONLY CALCULATIONS
SPECIFIED BELOW BE PERFORMED ON OUR ANALOG DATA BY JPL/GSOC PRIOR TO
PRINTOUT.
THESE CALCULATIONS ARE VALID FOR BOTH P1 AND F1 AND WE ANTICIPATE
THEY WILL BE VALID FOR F2.
WE DO NOT AT THIS TIME EXPECT TO SUBMIT ANY FURTHER TABLES ETC.
AS THEY CAN BE GENERATED FROM THE FORMULAE BELOW IF NEEDED.
IF THIS IS NOT SATISFACTORY OR CLARIFICATION IS NEEDED PLEASE
LET ME KNOW.

NAME	FMT-I.D.	QUANTITY MEASURED	MATHEMATICAL RELATION. (SEE BELOW)
ASE7-01	D-42	HET TEMP	A
ASE7-02	D-42	VLET2 TEMP	A
ASE7-03	D-42	DET. MTG. PL. TEMP	A
ASE7-04	D-42	X-RAY TEMP	A
ASE7-05	D-42	LET 1 COL. TEMP	A
ASE7-06	D-42	LET COL. TEMP	A
ASE7-07	D-42	ELECTRONICE TEMP	A
ASE7-08	D-42	BASE PLATE TEMP (REAR)	A
ASE7-09	D-42	PLUS12V MONITOR	B
ASE7-10	D-42	PLUS6VD MONITOR	C
ASE7-11	D-42	PLUS6VA MONITOR	C
ASE7-12	D-42	PLUS7.75V MONITOR	D
ASE7-13	D-42	PLUS4.7V MONITOR	E
ASE7-14	D-55	BASEPLATE TEMP (FRONT)	A

A-T(DEGREES C) EQUAL 50-17.5 V (OUT)
B-PLUS12V EQUAL 2.62 V (OUT)
C- 6.25V EQUAL 1.56 V (OUT)
D- 7.75V EQUAL 1.9 V (OUT)
E- 4.7V EQUAL V (OUT)
WHERE V (OUT) IS THE VOLTAGE OF THE APPROPRIATE ANALOG WORD.
REGARDS,
SGD/JAMES H. TRAINOR

18/1510Z OCT 73 GSTS

Data Quality see HGOZ-Z-Z-100 pg 4

DQ = FS (1+SNR+2 HSD)
0 = no frame sync
1 = SNR failed, GCF error
2 = GCF error
3 = SNR failed
4 = good

HGOS Z-Z-000

D-118	E7AOUT		Exp 7A lenses surface temperature	pg 24
	E7VLIT			
	E7LOWT			
D-115	E7PLAT	D-115	Exp. 7. baseplate temperature	23
D-042	HET-T		High Energy Telescope temperature E7C	34
D-043	VLET2T		Very Low Energy Telescope 2 temperature E7C	
D-044	DETMPT		Detector mounting plate temperature	
D-045	T-XDET		X-ray detector temperature	
D-046	TBSP1T		thermal blanket support plate 1 temperature	
D047	TBSP2T		" " " " 2 "	
D-048	ELEC-T		Electronics temperature	
D-049	RBAP-T		Rear base plate temperature	
~~D-055~~	FBAP-T	D-055	Front base plate temperature	
D078	E7MTUB		Exp 7 measuring tube temperature	
D079	E7TBSP		Exp 7 thermal blanket support plate temp	22

Engineering data See HGOS-2-2000 pg 13-37 see pg 103

HGOS-2-2-122 pg 21

The engineering data consists of 5 32 bit words which are unpacked by ENGDAT. There are 13 words in a MF

ENG FR	ENG WORD	Q DATA		H Q WORD		
0	11	33		18	36	Power status F-006 B-003/4 E040
0	16	34			1	spin rate RPM = $\frac{1024 \times 60 \times 16}{Z}$ D-0000/0-7 → D-0001/0+3
	17	35		1	2	(12 bits)
1	28	36	bit 0		37	X-ray window clock (E-187) Ø = 1 1 = Ø C-048
		~~37~~	1		38	~~X-ray window data (E-188) X-ray window clock (E-187)~~ Ø = on 1 = off
		~~38~~	2		39	internal calibrator A (E-189) Ø = on 1 = off
		~~39~~	3		40	internal calibrator B (E-190) Ø = on 1 = off
		~~40~~	4		41	X-ray ~~HET~~ high voltage (E-191) Ø = on 1 = off
		~~41~~	5		42	sector synchronizer (E-192) Ø = on 1 = off
		~~42~~	6		43	B/O mode (E-193) Ø = off 1 = on
		~~43~~	7		44	X ray Selector data mode (E-194) set to Ø when Sector 1 ≠ X-ray
1	43	~~44~~	39	6	12	Det mnt Plt temp (D-044)
1	43	~~45~~	40	7	14	X-Ray Det temp (D-045)
1	44	~~46~~	41	8	16	TBS Plate 1 temp (thermal blanket support) D-046
1	45	~~47~~	42	9	18	TBS Plate 2 temp D0 47
1	64	~~48~~	43	10	20	Electronics temp D-048
1	65	~~49~~	44	11	22	Base Plate temp forward D-049
1	66	~~50~~	45	12	24	+12V monitors D-050
1	67	~~51~~	46	13	26	+6V Dig monitor D-051
1	68	52	47	14	28	+6V ana monitor D-052
1	69		48	15	30	+7.75V Monitor D-053
1	88		49	16	32	+4.7V Monitor D-054
1	89		50	17	34	Base Plate temp rear D-055
			~~51~~			
			~~52~~			
		IF HENG = 1				
1	40		37	2	4	Det temp (E7A) (D-042) (HET-T) D042
1	41		38	4	8	Det 2 temp (E7B2) (D-043) D043
		IF HENG ≠ 1				Heng = 0, 2, 3 ~~D-078~~
2	40		37	3	6	Det 1 temp (E7B1) (E7VLIT) ~~D-079~~ D078
2	41		38	5	10	Det temp (E7C) (E7LOWT) D079

HENG = engineering frame number from status word = 4th word in MF

byte 2 0000 0000

Heng

= integer 5 on printout

The delay is on 6th MF at FM 2, 3 ~~on~~ on 11th MF at FM 1

the Eng word changes when HENG = 1, and does not change back until 6th & 11th when Heng = 2

TEMPSCAN in EDR

Read record
K = 0
DO until K = 72
increment K
skip blanks
extract HENG
Skip 6 mf at both boundaries of HENG = 1
extract temps
if temps ≠ last temps
write ~~neng~~ & temps
ELSE
last temps = temps
FI
OD

HA1002 #1 is first Helios A processed through Decorn

80 X 6 = 480
÷ 240

MPNREC 27 X 4

	HRDIM	JFDIM	JHDM
	32	96	160
	68	164	260
	136	328	520

see pg 51

# byte	hlfwd	word	
1	1-24	1-12	Subcom
	25-40	3-20	rate words
	41-42	21	HET-1 HET-2
		22	HET-3 LET-1
		23	LET-2 LET-3
		24	HET-1 --
			-- -

indexp = [(mod(seq,2) * 16 + ILINE) * ratio + HPHA - 1] * 3 + 1

seq = IDS432 = unsectored seq id.

e.g. seq = 4 ratio = 5
indexp = [(0 + Iline) * 5 + HPHA - 1] * 3 + 1
HPHA numbers the pha lins = 1 to ratio?
Iline = 1
indexp = (5 + HPHA - 1) * 3 + 1
= * 3 + 3·HPHA = 16, 19, 22, 25, 28
used for half word boundary
IRCVX = INDEXP + 40 = 56, 59, 62, 65, 68
Iline = 0 indexp = [HPHA - 1] * 3 + 1 = 1, 4, 7, 10, 13
IRCVX = ~~1, 4, 7, 10, 13~~ 41, 44, 47, 50, 53

Iline = 0	46	44	47	50	53
= 1	56				68
= 2	71				84

problem is that heldrp starts accepting on ILINE = 1
instead of ILINE = 0
the Iline = 0 actually goes with next seq ID
∴ if Iline = 0
~~Indexp = seq = seq + 1~~
seq is ok but line should be line 16
and line 1 should go where line 0 was.

N = (MOD(seq, 2) + line) * ratio + pha

INDEXP = (N-1) 3 + 1

Helios A

190.159

Dec 15 74 launched

	Aphelion			Perihelion		
1	75/168			75/74		
2	75/358			75/263		
3	76/183			76/88		
4	77/008			76/278		
5	77/199	00:25	190.160	77/103	22:31:00	190.159
6	78/024	04:16:00		77/294	02:20:30	
7	~~78/219~~	~~21:08:00~~		78/119	06:13:30	190.162
8	79/039	12:00:00	190.105	78/309		
9	79/229	14:31:00		79/134	12:41:00	190.156
10	80/54			79/324	16:25:00	
11	80/244			80/149		
12						
13						

Helios B Jan 15, 1976 launch

$\bar{X} = 185.82$

	Aphelion			Perihelion		
1	76/199			76/108	02	> 185.67
2	77/020	16	> 185.75	76/293	18	> 184.79
3	77/206	10	> 185.83	77/113	13	> 185.79
4	78/027	06	> 185.87	77/299	08	> 185.87
5	78/213	03	> 185.87	78/120	05	> 185.87
6	79/34		>	78/306	02	> 185.83
7	79/219	21	> 185.87	79/126	22	> 185.87
8	80/40			79/312	19	
9	80/226			80/133		

Helios A aphelion / perihelion temp

		yr	day	hr	VLET1 E7VLIT	LET E7LOWT	HETT HETT-T	VLET2 VLET2T
p	1p	75	74	09	18.0	16.5	25	19
a	1a	75	168					
	2p	75	264	13	22	20	29	23
	2a	75	358	04	-18	-18	-20	-20
	3p	76	89	16	23	21	30	23
	3a	76	183	15	20	-20 ?	49	49
	4	76	279	19	26	24	33	26
		77	08	12	16	0 ?	28	26
	5							
	6							
	7							
	8	78	309					
	9							
	10							
	11							
	12							
	13							

TEMPLT User guide

This routine is for plotting Helios temperatures
TIMFIL enters the temperatures into a data set the format is time, temperatures
time = R*4 = time in days since 1973
temps = up to 8 temperatures,
there are two files HELOSA.DAT and HELIOSB.DAT each has four temps. Vlet 1, LET, HETT and VLET 2.
TIMFIL request a record to start, set to one on first try and one less than record number timFIL returns if this is an update. TIMFIL exits and writes record one with Nrec, NO where
NREC = record number next to be written
NO = number of temps (4 in this case)

TEMMRG will merge two files together onto a third file. they should have the same number of temps but that is not necessary.

TEMLST will list the times from any record.

TEMPLT will plot on the VGI any of the data files

300 day

5/28/80 300 days missing due to WRITER?

4/9/80 E04084 inserted by Rami 1355 feet, data missing
reprocessing began

4/9/81 E04084 4/15/76 – 12/29/76 & E04006 3/2/77 & 4/18/77
→ E04025 4/15/76 – 4/6/77 & E04078 4/6/77 – 4/18/77 → reused

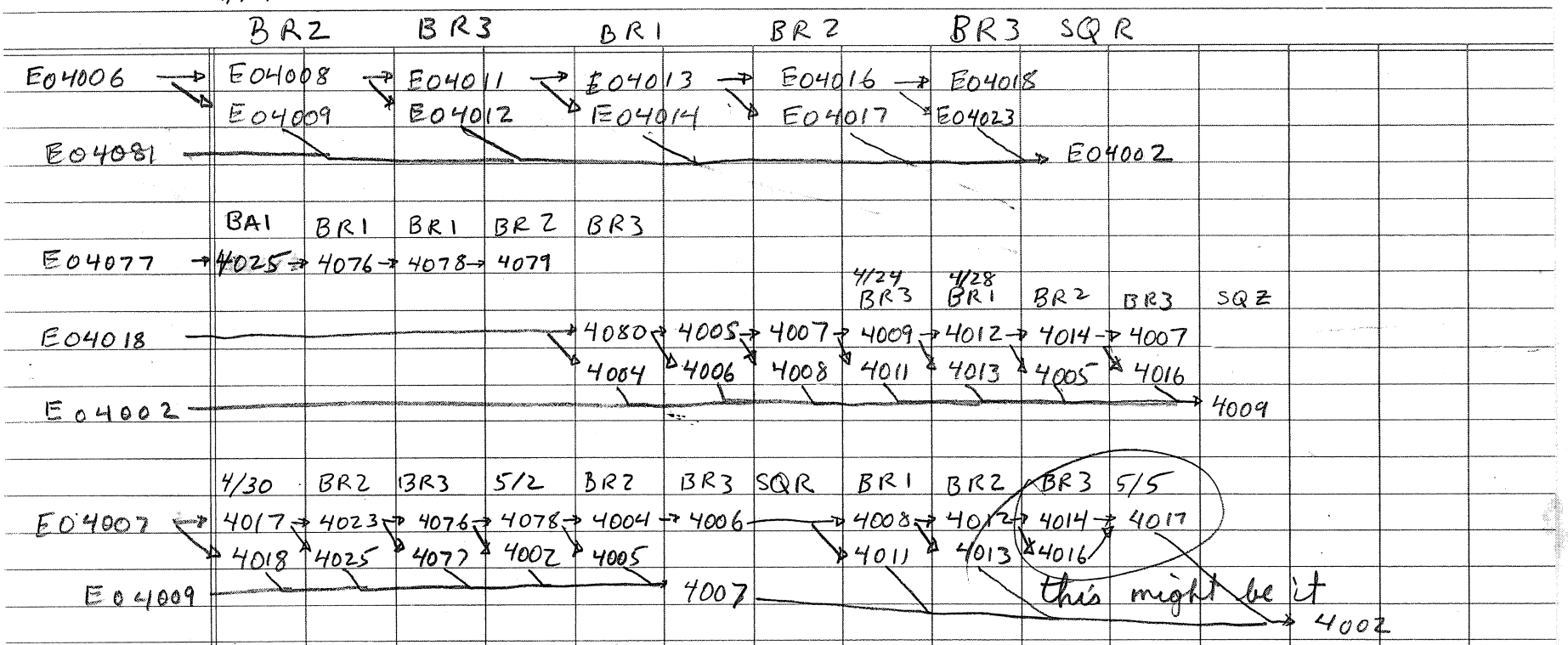
5/28/80
E04084 4/15/76 – 12/29/76
✓ E04006 = 3/2/77 – 4/18/77 reused 4/15/76 – 3/28/77 " 3/23/77
E04079 = 4/15/76 – 4/5/77 " 2/14/79 – 12/23/79
E04080 = 4/5/77 – 4/6/77 " 4/1/76 – 3/23/77
E04081 = 4/15/76 – 4/4/77 " 3/28/77 – 4/1/77
E04088 = 4/4/77 – 4/5/77
E04002 = 4/4/77 – 11/11/77 " " reused 3/30/77 – 3/31/77 3/24/77 – 4/1/77
E04089 = 4/15/76 – 4/2/77
E04004 = 4/2/77 – 4/4/77 " 4/15/76 – 3/30/77 " 3/23/77 – 3/24/77
3/19/77 – 3/20 ✓ E04005 = 4/15/76 – 4/2/77 " " 3/30/77 – 3/30/77 " 4/15/76 – 3/23/77
✓ E04014 = 4/2/77 – 4/2/77 " 3/26/77 – 3/27/77 " 4/15/76 – 77
✓ E04016 = 4/15/76 – 4/1/77 " 4/15/76 – 3/25/77 " 3/18-19/77
E04017 = 4/1/77 – 4/2/77 " 3/25/77 – 3/26/77 "
✓ E04013 = 2/14/79 – 12/23/79 " 4/15/76 – 3/26/77 " 3/20-21/77
E04018 = 2/14/79 – 12/23/79 " 4/15/76 – 3/24/77 " "
E04077 = 2/14/79 – 12/23/79 " "
E04003 = 4/1/77 – 11/11/77
E04082 = 4/15/76 – 3/31/77
E04085 = 3/31/77 – 4/1/77
E04086 = 4/15/76 – 3/30/77
✓ E04007 = 3/28/77 – 3/30/77 " 4/15/76 – 3/22/77 " 4/15/76 3/18/77

end of book I
gap is 1574 – 1889
= 76/113 – 77/62
= 4/22/76 – 3/3/77
✓ E04008 = 4/15/76 – 3/28/77 " 3/22/77 – 3/23/77
E04009 = 3/28/77 – 3/28/77 " 4/15/76 – 3/21/77 " 3/18/77 – 4/1
✓ E04011 = 4/15/76 – 3/27/77 " 3/21/77 – 3/22/77
✓ E04012 = 3/27/77 – 3/28/77 " 4/15/76 – 3/20/77
E04023 = 3/24/77 – 3/25/77 "
E04025 = 2/14/79 – 12/23/79 "
E04076 = 2/14/79 – 12/23/79 "
E04078 = 2/14/79 – 12/23/79 "

problem lies in E04014 which has 2200 feet written but only 7 actual days. It has an unexpected EOF.
but E04012 is good

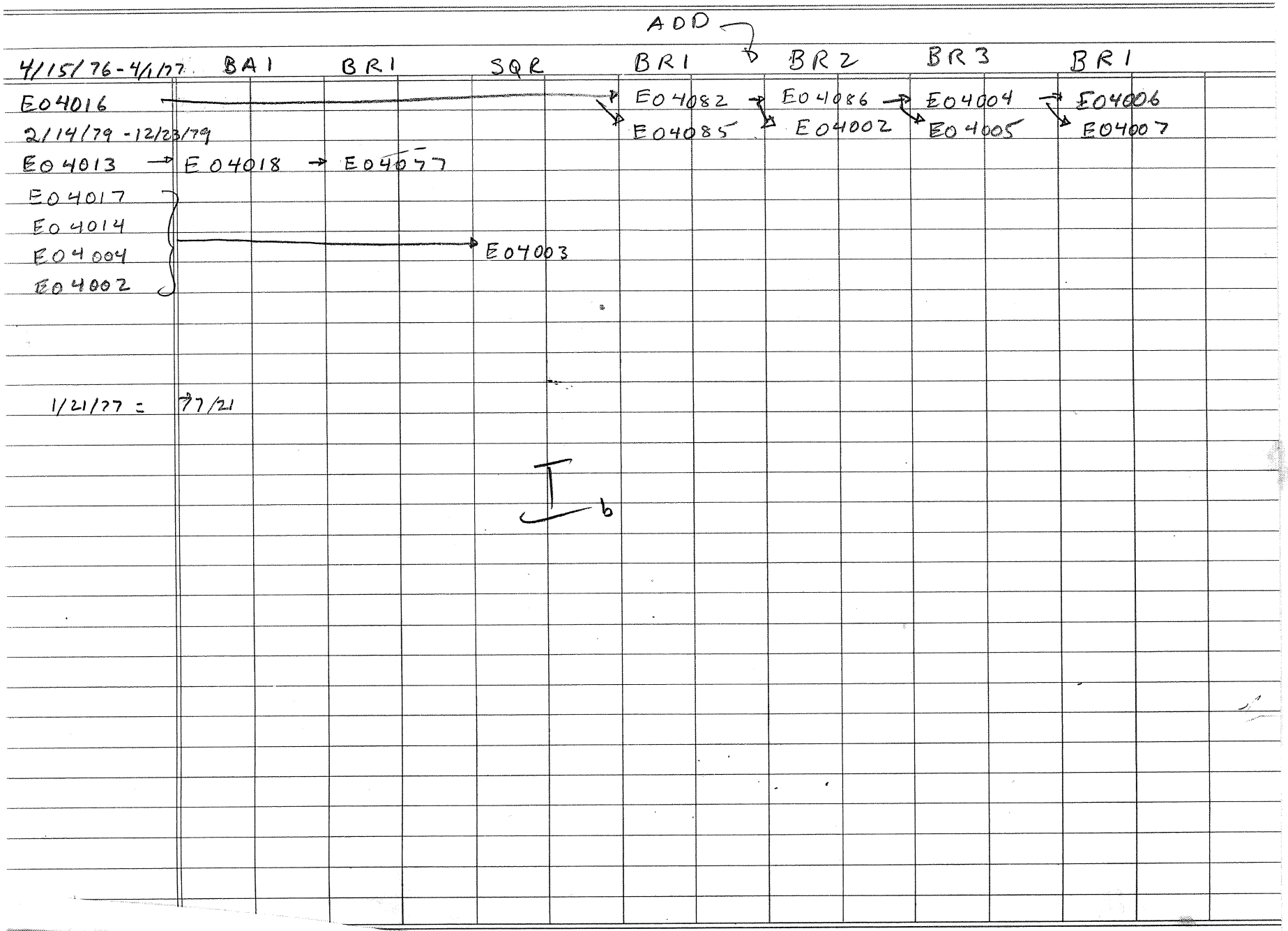
II

4/17/80

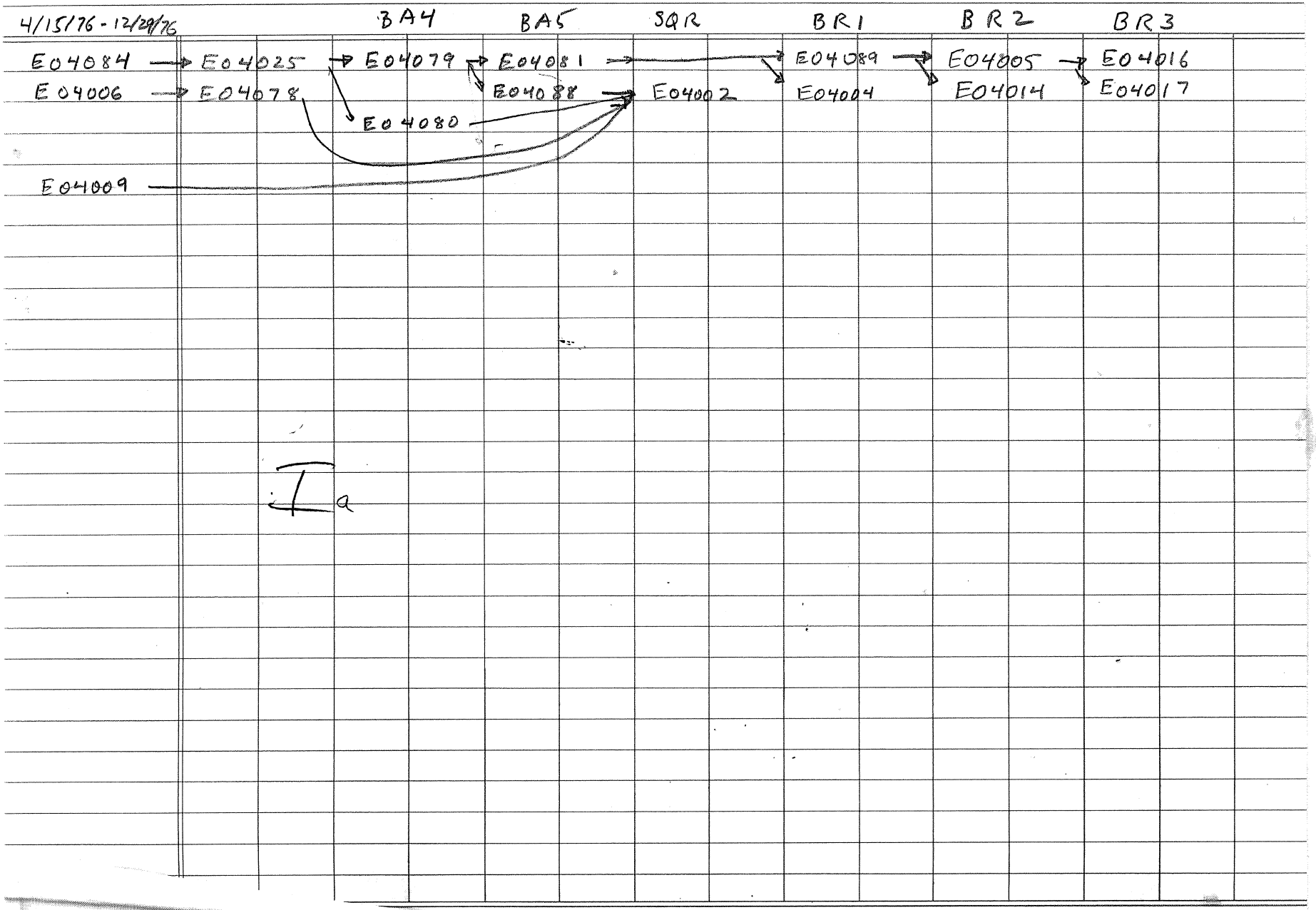


Scan E04014 4/15 - 4/22

seems to be an EOF on 4014


ADD
4/15/76 - 4/1/77
BA1
BR1
SQR
BR1
BR2
BR3
BR1
E04016
E04082
E04086
E04004
E04006
E04085
E04002
E04005
E04007
2/14/79 - 12/23/79
E04013
E04018
E04077
E04017
E04014
E04004
E04002
E04003
1/21/77 = 77/21
b

4/15/76 - 12/29/76



Ia

Helios Volume calculation

Jan 0, 1972

(MJD-1) * 96 + hr * 4 + min/15 + 1

ex: 103585 74/12/15 0:0:
280415 79/12/30 23:45:

year	74	75	76	77	78	79	80
MJD	731	1096	1461	1827	2192	2557	2922

MJD = MJD + DOY

9/1/77 0 to 4:00:00
= 77/244
MJD = 2071 VOL = 198721 198737

MJD = (Vol-1)/96 + 1

```
IEF285I    SYS1.FORTSSP                                          KEPT          DDNAME
IEF285I    VOL SER NOS= K3ITL5.
IEF285I    SYS2.COBLIB                                           KEPT          DDNAME
IEF285I    VOL SER NOS= M2SYS1.
IEF285I    SYS1.ALGLIB                                           KEPT          DDNAME
IEF285I    VOL SER NOS= K3SYS2.
IEF285I    SYS80185.T172500.RV000.ZBEWR523.LODMOD                PASSED        DDNAME
IEF285I    VOL SER NOS= K3SCR5.
IEF285I    SYS80185.T172500.SV000.ZBEWR523.R0000005              SYSOUT        DDNAME
IEF285I    VOL SER NOS= K3SCR2.
IEF285I    SYS80185.T172500.SV000.ZBEWR523.R0000006              SYSOUT        DDNAME
IEF285I    VOL SER NOS= K3SCR5.
IEF285I    SYS80185.T172500.RV000.ZBEWR523.R0000007              DELETED       DDNAME
IEF285I    VOL SER NOS= K3SCR4.
IEF285I    SYS80185.T172500.RV000.ZBEWR523.OBJMOD                DELETED       DDNA
IEF285I    VOL SER NOS= K3SCR4.
IEF285I    SYS80185.T172500.SV000.ZBEWR523.R0000008              DELETED       DDNA
IEF285I    VOL SER NOS= K3SCR2.
IEF373I STEP /LINK     / START 80185.1735
IEF374I STEP /LINK     / STOP  80185.1736 CPU    0MIN 01.34SEC MAIN 130K LCS
- STEP 02 -      RETURN CODE = 0000                                          STEP
                                          IO IN SECS. DISK=    15.72,DRUM=
- SURCHARGES=(DRIVES ALOC=000,TAPE MOUNTS=000,CORE=000,PAPER=000,PRIORITY=
      XXGO       EXEC PGM=*.LINK.SYSLMOD,COND=(4,LT),REGION=70K
      XXFT05F001 DD  DDNAME=DATA5
      XXFT06F001 DD SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE)
      IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=
      XXFT07F001 DD SYSOUT=B,DCB=(RECFM=FB,BLKSIZE=7280,LRECL=80)
      XXSYSPRINT DD SYSOUT=&OUT,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE),
      IEF653I SUBSTITUTION JCL - SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=
      XX               SPACE=(CYL,(0,1)),UNIT=(DISK,3)
      XXSYSUDUMP DD SYSOUT=A,SPACE=(CYL,(0,5))
      //GO.FT10F001 DD DSN=HA037409,UNIT=(2400-9,,DEFER),DISP=(OLD,KEEP),
      // LABEL=(,SL),VOL=SER=DUM
      //GO.FT49F001 DD DSN=SDHEL.HACATLOG.DATA,
      // DISP=SHR,DCB=(RECFM=FB,LRECL=160,BLKSIZE=7200)
      //GO.FT50F001 DD DUMMY
      *** NAMELIST &INPUT VARIABLES
      *** TPNAME NAME OF TAPE TO LIST NO DEFAULT
      *** IFILE  FILE TO START LIST   NO DEFAULT
      *** NUMFIL NUMBER OF FILES      DEFAULT = 30
      *** IDM    =7,DM7 ONLY 0=ALL    DEFAULT = 0
      *** ITREC  NUMBER OF RECORDS    DEFAULT = 100
      //GO.DATA5 DD *
IEF236I ALLOC. FOR ZBEWR523 GO
IEF237I 336    ALLOCATED TO PGM=*.DD
IEF237I 232    ALLOCATED TO FT05F001
IEF237I 336    ALLOCATED TO FT06F001
IEF237I 237    ALLOCATED TO FT07F001
IEF237I 336    ALLOCATED TO SYSPRINT
IEF237I 232    ALLOCATED TO SYSPRINT
IEF237I 235    ALLOCATED TO SYSPRINT
IEF237I 335    ALLOCATED TO SYSUDUMP
IEF237I 491    ALLOCATED TO FT10F001
IEF237I 215    ALLOCATED TO FT49F001


7409701 TLM TLM 3 0008 79 275 120251 275 124632 9280 03 800116 280 03 01
&INPUT
TPNAME= -3253859061.950199     ,IFILE=           3,IDM=           0,ITREC=
&END
TAPE HA1253    FILE    3 HAL064 FILE#  61
HA1253    FILE    3 RECORD    2
43371248 44C93970 26 923E 000020044 B0721  2944  2396   127 100010101101
                                            127   127  2816 100010111101 0000
43515252 44237970 27 E85F 000030044 B071D  2344  2512  2528 000011100011
                                           2372  2308  2440 011111110011 FC0C
43659237 44381950 28 923F 000030044 B0718  2364  2464  2520 100011101011
                                           2352  2488  2528 010011111011 FC0C
43803242 44525950 29 0C5F 000030044 B0713  2360  2552  2432 000011100111
                                           2304  2472  2472 010111110111 FC0C
43947246 44669950 30 923F 000030044 B070F  2344  2440  2504 001111101111
                                           2328  2504  2320 011011111111 FC0C
44091251 44813950 31 305F 000030044 B070A  2432  2412  2002 001111000001
                                           1629  1266  1184 100111010001 FC0C
44235246 44957940 32 923F 000030044 B0705  1591  2058   382 111011001001
                                           2880   127  3968 000111011001 FC0C
44379251 45101940 33 545F 000030044 B07C1  2276  2308  2944 001111000101
                                            127  2238  2608 010011010101 FC0C
44523245 45245930 34 923F 000030044 B06FC  2720  2880  1964 100011001101
```

B00374E7PWR D-000 SPNRPH

```
                    KEPT            DDNAME=SYSLIB  -6              0 EXCPS
                    KEPT            DDNAME=SYSLIB  -7              0 EXCPS
                    KEPT            DDNAME=SYSLIB  -8              0 EXCPS
:WR523.LODMOD       PASSED          DDNAME=SYSLMOD                39 EXCPS
:WR523.R0000005     SYSOUT          DDNAME=SYSPRINT                2 EXCPS
:WR523.R0000006     SYSOUT          DDNAME=SYSTERM                 1 EXCPS
:WR523.R0000007     DELETED         DDNAME=SYSUT1                 34 EXCPS
:WR523.OBJMOD       DELETED         DDNA                           4 EXCPS
:WR523.R0000008     DELETED         DDNA                           0 EXCPS

,1735
,1736 CPU    0MIN 01.34SEC MAIN 130K LCS                                    MINS=(CPU=      .02,IO=      .26)
                                   STEP                                    .00,CELL=      .00,CTHR=      .14
    IO IN SECS. DISK=    15.72,DRUM=                                     TOTAL STP TIME=      .28 MINS.  -
MOUNTS=000,CORE=000,PAPER=000,PRIORITY=
LMOD,COND=(4,LT),REGION=70K

 RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE)
)UT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=
:FM=FB,BLKSIZE=7280,LRECL=80)
 RECFM=VBA,LRECL=137,BLKSIZE=&BLKSIZE),
)UT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=
),UNIT=(DISK,3)
:YL,(0,5))
)NIT=(2400-9,,DEFER),DISP=(CLD,KEEP),

\TLOG.DATA,
L=160,BLKSIZE=7200)


[ NO DEFAULT
  NO DEFAULT
  DEFAULT = 30
  DEFAULT = 0
  DEFAULT = 100
```

B0034E7PWR
D-000 SPNRPM
D-001 SPNRPM
C-048 KEWOLDXRWDAT, ICAL.A, ICAL.B, XRH.V, SECSYN, FOB/OM, XRSOM
D-042 HET-T & D-078 = VLETIT
D-043 VHET2T & D071 = LET-T
D-044 DETMPT
D-045 T-XDET
D-046 +BSPIT
D-047 TBSP2T
D-048 ELEC-T
D-049 RBAP-T
D-050 +12V-M
D-051 +6V PGM
D-052 +6V ANM
D-053 +7.75V
D-054 +4.7V
D-055 FBAP-T

```
1 275 124632 9280 03 800116 280 03 01

E=            3,IOM=            0,ITREC=

  61

 B0721   2944   2396    127  100010101101
           127    127   2816  100010111101  00000000 00000000 00000000 00000000 00000113
 B071D   2344   2512   2528  000011100011
         2372   2308   2440  011111110011  FC000000 00000000 00000000 00000000 00000113
 B0718   2364   2464   2520  100011101011
         2352   2488   2528  010011111011  FC000073 00000000 00000000 00000000 00000113
 B0713   2360   2552   2432  000011100111
         2304   2472   2472  010111110111  FC000073 00000000 00000000 00000000 00000113
 B070F   2344   2440   2504  001111101111
         2328   2504   2320  011011111111  FC000073 00000000 00000000 00000000 00000113
 B070A   2432   2412   2002  001111000001
         1629   1266   1184  100111010001  FC000073 00000000 00000000 00000000 00000113
 B0705   1591   2058    382  111011001001
         2880    127   3968  000111011001  FC000073 00000000 00000000 00000000 00000113
 B07C1   2276   2308   2944  001111000101
          127   2238   2608  010011010101  FC000073 00000000 00000000 00000000 00000113
 B06FC   2720   2880   1964  100011001101
```

FILE RECORD 1

44093 see

			GROUND TIME FIELDS				S/C EVENT TIME FIELD			
INDEX	FN	FDEC	DAY	YR	MSEC	TIME OF DAY	DAY	YR	MSEC	TIME
1	050	26	275	79	44093970	12:14:53.970	275	79	43371248	12: 2:
2	060	27	275	79	44237970	12:17:17.970	275	79	43515252	12: 5:
3	061	28	275	79	44381950	12:19:41.950	275	79	43659237	12: 7:
4	062	29	275	79	44525950	12:22: 5.950	275	79	43803242	12:10:
5	063	30	275	79	44669950	12:24:29.950	275	79	43947246	12:12:
6	064	31	275	79	44813950	12:26:53.950	275	79	44091251	12:14:
7	065	32	275	79	44957940	12:29:17.940	275	79	44235246	12:17:
8	066	33	275	79	45101940	12:31:41.940	275	79	44379251	12:19:
9	067	34	275	79	45245930	12:34: 5.930	275	79	44523245	12:22:
10	070	35	275	79	45389930	12:36:29.930	275	79	44667250	12:24:
11	100	36	275	79	45533920	12:38:53.920	275	79	44811245	12:26:
12	101	37	275	79	45677920	12:41:17.920	275	79	44955249	12:29:

TELEMETRY CHANNEL DUMP

CH#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
FRAME INDEX 1																	
0.	264	354	174	300	000	000	000	000	107	166	243	370	007	122	000	000	000
30.	000	000	000	000	000	000	000	000	301	264	220	110	202	035	330	231	000	331
60.	000	000	271	017	346	152	062	065	073	067	071	011	024	064	222	176	377	377
90.	316	356	234	341	360	356	000	110	044	000	000	000	000	000	107	362	006	141
120.	362	004	040	215	266	230	027	100	063	000	000	000	243	022	276	315	045	060
FRAME INDEX 2																	
0.	264	354	174	300	000	000	000	000	155	166	057	141	377	034	000	000	000	000
30.	000	000	000	000	000	000	000	000	002	165	377	000	377	000	000	000	000	000
60.	000	000	016	010	006	062	067	066	070	013	012	366	030	063	350	137	377	377
90.	350	371	007	345	346	371	000	222	101	000	000	000	000	000	200	166	031	375
120.	161	265	014	040	201	004	040	214	000	000	000	000	360	276	300	163	221	030
FRAME INDEX 3																	
0.	264	354	174	300	000	000	000	000	154	066	137	142	167	024	000	000	000	000
30.	000	000	000	000	000	000	000	000	160	001	000	024	203	376	171	353	356	373
60.	000	000	261	017	143	152	063	071	071	071	072	007	030	264	222	176	377	377
90.	342	276	245	320	336	355	000	052	024	000	000	000	000	000	141	137	304	036
120.	010	010	011	011	011	011	010	010	106	061	063	072	112	074	325	377	000	000
FRAME INDEX 4																	
0.	264	354	174	300	000	000	000	000	154	166	007	147	377	030	000	000	000	000
30.	000	000	000	000	000	000	000	000	342	352	000	376	000	000	246	166	303	012
60.	000	000	362	005	115	063	067	067	072	035	365	017	031	063	014	137	377	377
90.	376	276	276	370	363	345	000	175	076	000	000	000	000	000	375	101	250	117
120.	305	011	337	161	324	327	034	060	335	131	142	037	201	202	000	000	073	074
FRAME INDEX 5																	
0.	264	354	174	300	000	000	000	000	155	166	167	143	174	020	000	000	000	000
30.	000	000	000	000	000	000	000	000	141	342	303	012	303	003	300	112	201	375
60.	000	000	251	017	373	152	117	065	073	066	067	036	031	264	222	176	377	377
90.	376	351	215	376	363	356	000	324	011	000	000	000	000	000	377	377	377	060
120.	302	004	020	315	252	207	222	074	001	000	001	000	000	237	252	145	000	000
FRAME INDEX 6																	
0.	264	354	174	300	000	000	000	000	147	366	223	202	334	076	000	000	000	000
30.	000	000	000	000	000	000	000	000	221	246	000	152	130	102	330	020	060	102
60.	000	000	362	360	061	065	072	074	075	366	361	361	032	063	060	137	377	377
90.	363	347	000	376	376	276	000	102	240	000	000	000	000	000	117	373	005	041
120.	161	104	010	060	302	004	020	213	126	066	055	072	060	062	327	177	000	000
FRAME INDEX 7																	

every byte$_{16}$ = 1 byte$_8$ extra zero

1409 sec

222 076$_8$ = 10010010 000 111 110

9 2 3 E

DAY	YR	S/C EVENT TIME FIELDS MSEC	TIME OF DAY	LIGHT TIME	FMT	DM/BR	T/C	S/C T	QUAL
~~275~~	~~79~~	~~43371 248~~	~~12: 2:51.248~~	~~722721~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	43515 252	12: 5:15.252	722717	003	003	000	000	004
~~275~~	~~79~~	~~43659 237~~	~~12: 7:39.237~~	~~722712~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	43803 242	12:10: 3.242	722707	003	003	000	000	004
~~275~~	~~79~~	~~43947 246~~	~~12:12:27.246~~	~~722703~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	44091 251	12:14:51.251	722698	003	003	000	000	004
~~275~~	~~79~~	~~44235 246~~	~~12:17:15.246~~	~~722693~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	44379 251	12:19:39.251	722689	003	003	000	000	004
~~275~~	~~79~~	~~44523 245~~	~~12:22: 3.245~~	~~722684~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	44667 250	12:24:27.250	722679	003	003	000	000	004
~~275~~	~~79~~	~~44811 245~~	~~12:26:51.245~~	~~722674~~	~~003~~	~~004~~	~~000~~	~~000~~	~~004~~
275	79	44955 249	12:29:15.249	722670	003	003	000	000	004

11	12	13	14	15	16	17	18	19	2	21	22	23	24	25	26	27	28	29	
~~00~~	~~007~~	~~122~~	~~006~~	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
10	202	035	310	231	000	331	173	245	040	231	000	000	000	000	000	000	000	000	eng frame 2
~~11~~	~~024~~	~~064~~	~~222~~	~~076~~	~~377~~	~~377~~	~~377~~	~~377~~	~~371~~	~~[illegible]~~	~~000~~	~~117~~	~~367~~	~~103~~	~~101~~	~~040~~	~~221~~	~~315~~	
00	000	000	107	362	006	141	137	320	025	204	177	000	000	000	000	000	000	000	
~~00~~	~~243~~	~~022~~	~~276~~	~~315~~	~~045~~	~~060~~	~~063~~	~~053~~	~~045~~	~~271~~	~~003~~	~~325~~	eng						
~~11~~	~~377~~	~~034~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	
00	377	000	000	000	000	000	377	000	000	377	000	000	000	000	000	000	000	000	eng frame 3
~~06~~	~~030~~	~~063~~	~~350~~	~~137~~	~~377~~	~~377~~	~~377~~	~~377~~	~~153~~	~~266~~	~~373~~	~~147~~	~~170~~	~~014~~	~~022~~	~~051~~	~~044~~	~~370~~	
00	000	000	200	166	031	375	001	130	147	366	004	000	000	000	000	000	000	000	
~~00~~	~~360~~	~~276~~	~~300~~	~~163~~	~~221~~	~~030~~	~~016~~	~~374~~	~~312~~	~~365~~	~~202~~	~~100~~							

↑ word 11

~~02~~	~~167~~	~~024~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	
24	203	376	171	353	356	373	304	333	004	304	000	000	000	000	000	000	000	000	
~~37~~	~~030~~	~~264~~	~~222~~	~~077~~	~~377~~	~~377~~	~~377~~	~~377~~	~~154~~	~~366~~	~~107~~	~~141~~	~~373~~	~~004~~	~~044~~	~~222~~	~~364~~	~~353~~	
00	000	000	141	137	304	036	207	177	120	152	023	000	000	000	000	000	000	000	
~~72~~	~~112~~	~~074~~	~~325~~	~~377~~	~~000~~	~~000~~	~~000~~	~~351~~	~~163~~	~~377~~	~~377~~	~~377~~							

↑ word 28

~~07~~	~~377~~	~~030~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	
76	000	000	246	166	303	012	246	166	303	012	000	000	000	000	000	000	000	000	
~~17~~	~~031~~	~~063~~	~~014~~	~~137~~	~~377~~	~~377~~	~~377~~	~~377~~	~~157~~	~~366~~	~~127~~	~~145~~	~~172~~	~~010~~	~~012~~	~~004~~	~~372~~	~~370~~	
00	000	000	375	101	250	117	375	006	241	337	377	000	000	000	000	000	000	000	
~~17~~	~~201~~	~~202~~	~~000~~	~~000~~	~~073~~	~~074~~	~~074~~	~~062~~	~~070~~	~~102~~	~~003~~	~~325~~							
~~13~~	~~174~~	~~020~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	
12	303	003	300	112	201	375	330	066	005	353	000	000	000	000	000	000	000	000	
~~56~~	~~031~~	~~264~~	~~222~~	~~077~~	~~377~~	~~377~~	~~377~~	~~377~~	~~156~~	~~166~~	~~067~~	~~156~~	~~371~~	~~000~~	~~240~~	~~117~~	~~247~~	~~364~~	
00	000	000	377	377	377	060	112	023	376	301	310	000	000	000	000	000	000	000	
~~30~~	~~000~~	~~237~~	~~252~~	~~145~~	~~000~~	~~000~~	~~000~~	~~000~~	~~005~~	~~005~~	~~060~~	~~064~~							
~~32~~	~~334~~	~~076~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	~~000~~	
52	130	102	330	020	060	102	213	111	117	107	000	000	000	000	000	000	000	000	
~~51~~	~~032~~	~~063~~	~~060~~	~~137~~	~~377~~	~~377~~	~~377~~	~~377~~	~~232~~	~~053~~	~~015~~	~~265~~	~~366~~	~~056~~	~~364~~	~~372~~	~~175~~	~~344~~	
00	000	000	117	373	005	041	337	354	034	207	177	000	000	000	000	000	000	000	
~~72~~	~~060~~	~~062~~	~~327~~	~~177~~	~~000~~	~~000~~	~~000~~	~~000~~	~~273~~	~~257~~	~~263~~	~~224~~							

Unpacking the MDR 959 file #1

Sync word 264 354 174 300 same in every frame

Science word = words 8 - 14 and words 80 to 85

Each octal byte = 9 bits, only 8 bits are used

word 8 - 14 107 366 243 370 007 122 ~~000~~

word 14 does not count

take 1's complement of 8 bits of each byte (MSB = 0)

1's c = 270 011 134 007 370 255

in hex this would be

B8 09 5C 07 F8 AD

this is the first 48 bit science word for format 3

2nd sceince word 370 017 200 117 367 102

1's comp 007 360 177 260 010 275

hex 07 F0 7F B0 08 BD

rearrange the two hex 48 bit words

B80 95C\ 07F| 8AD|

07F 07F B00 8BD

unpack bit 48 of each word. If bit 48 = 0, this is PHA or pulse height analyzed data. IF bit 48 = 1, this is rates data.

8AD = 1000 | 101 | 0 | 110 | 1 |

8BD = 1000 | 101 | 1 | 110 | 1 |

a. b. c. d.

d. ⇒ bit 48 = 1, rates

c. line 6 and 7 of rate data

b. unsectored rate sequence ID = 5

a. rate R_1 = 1000 1000 = 88_{16}

also from the rates table (hex) decimal

R_8 = B80, R_{10} = 95C, R_{11} = 07F R_8 = 2944, R_{10} = 2396, R_{11} = 127

R_{12} = 07F, R_{13} = 07F, R_{14} = B00 R_{12} = 127, R_{13} = 127, R_{14} = 2816

Spacecraft clock word 74&75 HGOS-2-2-121 pg 10a
from even numbered frame in hex this is
word 74&75 = 222 076 92 3E
from odd number frame
word 74&75 = 350 137 E8 5F

This is a 1/32 second clock and the most significant bit is always on. Thus the clock is
923E E85F as received
123E E85F ignoring msb
91F 742 after dividing by 20_{16} = 32, in seconds
= 9566018 seconds
= 110 days 17 hr 13 min 38 sec

The maximum clock is 7FFFFFFF ⇒ 67108863 seconds
or 776 days 17 hr 21 min 03 sec
The clock seldom reaches its maximum and is reset every time the spacecraft has a power problem.

ID word 73 see HGOS-2-2-121 pg 7

	064?		fmt		DM/BR	
ID =	063	00	011	0	011	BR odd frame
	264	01	011	0	100	DM even frame
	063	00	011	0	011	BR
	264	01	011	0	100	DM

bitrate is 3 ⇒ 2^3 = 8 BPS
distribution mode = 4 ⇒ real time with simultaneous memory read in.

FN frame number, word 72 HGOS-2-2-121 pg 3
and word 73 bit 1

024 064	⇒ 000 010	1000	⇒ 18+8 = frame 26
030 063	⇒ 000 011	0000	⇒ 18+9 = frame 27

bit value 32 16 8 | 8 4 2 1

```
  0.  264 354 174 300 000 000 000 000 234 207 315 350 021 066 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 301 074 360 124 302 245 000 115 000 000 000
 60.  000 000 241 017 003 151 063 062 072 067 071 013 032 264 222 077 377 377 377
 90.  362 376 215 365 360 276 000 000 131 000 000 000 000 000 334 024 205 177 334
120.  010 007 010 012 012 011 010 010 345 014 126 212 172 324 331 312 101 163 063
          FRAME INDEX  8
  0.  264 354 174 300 000 000 000 000 161 206 373 107 374 072 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 001 364 000 000 001 367 000 000 002 114 377
 60.  000 000 005 014 060 062 067 071 073 036 363 014 033 063 124 137 377 377 377
 90.  344 317 011 342 376 345 000 025 212 000 000 000 000 000 030 207 177 010 174
120.  276 351 337 165 267 325 020 060 264 000 000 000 000 000 000 000 351 324 144
          FRAME INDEX  9
  0.  264 354 174 300 000 000 000 000 125 364 277 205 067 062 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 377 000 125 344 324 340 144 265 047 002 126
 60.  000 000 231 017 004 152 063 065 071 070 073 010 033 264 222 077 377 377 377
 90.  372 363 170 370 370 372 000 130 254 000 000 000 000 000 167 377 005 041 337
120.  302 004 020 314 266 230 332 124 050 173 072 111 067 064 327 177 000 000 000
          FRAME INDEX 10
  0.  264 354 174 300 000 000 000 000 130 367 253 171 337 374 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 103 266 000 377 103 207 122 342 303 012 122
 60.  000 000 016 363 064 063 073 074 075 003 350 016 034 063 170 137 377 377 377
 90.  376 276 200 362 347 376 000 212 311 000 000 000 000 000 010 102 035 376 041
120.  261 305 014 060 202 004 020 214 063 000 000 000 243 024 271 315 100 107 124
          FRAME INDEX 11
  0.  264 354 174 300 000 000 000 000 136 370 166 267 207 364 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 351 065 103 012 240 020 160 106 000 230 053
 60.  000 000 221 017 010 151 116 067 071 067 072 036 040 064 222 077 377 377 377
 90.  376 276 200 376 374 326 000 162 371 000 000 000 000 000 301 337 342 033 005
120.  116 141 305 236 151 136 126 137 000 000 000 000 354 374 302 001 221 330 016
          FRAME INDEX 12
  0.  264 354 174 300 000 000 000 000 125 367 230 172 137 370 000 000 000 000 000
 30.  000 000 000 000 000 000 000 000 140 102 014 210 044 357 313 141 200 126 303
 60.  000 000 360 015 110 066 070 071 073 034 014 017 040 263 234 137 377 377 377
 90.  376 344 000 376 374 332 000 047 221 000 000 000 000 000 376 041 060 127 364
120.  302 372 057 155 266 131 024 100 100 077 377 000 000 040 327 377 000 370 303
                                     40  38
```

word 16 17

315 350 021 066 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
360 124 302 245 000 115 000 000 000 010 000 000 000 003 000 000 000 000 000 000 000
071 013 032 264 222 077 377 377 377 377 113 377 230 007 376 046 004 000 121 366
000 000 000 000 334 024 205 177 334 024 205 177 374 000 000 000 000 000 000 000
126 212 172 324 331 312 101 163 063 143 045 073 003 325

373 107 374 072 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
000 000 001 367 000 000 002 114 377 377 024 267 000 000 000 000 000 000 000 000 000
363 014 033 063 124 137 377 377 377 377 370 007 101 134 373 052 054 226 113 357
000 000 000 000 030 207 177 010 174 035 377 301 210 000 000 000 000 000 000 000 000
000 000 000 000 000 000 351 324 144 000 350 150 067 036

277 205 067 062 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
125 344 324 340 144 265 047 002 126 216 317 345 000 000 000 000 000 000 000 000 000
073 010 033 264 222 077 377 377 377 377 174 326 353 370 007 042 311 142 261 376
000 000 000 000 167 377 005 041 337 374 024 205 177 000 000 000 000 000 000 000 000
072 111 067 064 327 177 000 000 000 000 060 000 000 000

253 171 337 374 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
000 377 103 207 122 342 303 012 122 342 303 012 000 000 000 000 000 000 000 000 000
350 016 034 063 170 137 377 377 377 377 131 370 174 207 107 354 126 053 005 376
000 000 000 000 010 102 035 376 041 360 167 370 207 000 000 000 000 000 000 000 000
000 000 243 024 271 315 100 107 124 030 012 067 003 325

166 207 207 364 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
103 012 240 020 160 106 000 230 053 167 303 324 000 000 000 000 000 000 000 000 000
072 036 040 064 222 077 377 377 377 377 125 367 225 2 7 333 344 142 261 343 367
000 000 000 000 301 337 342 033 005 177 214 114 325 000 000 000 000 000 000 000 000
000 000 354 374 302 001 221 330 016 374 312 365 272 100

FC 1 word 11

230 172 137 370 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000
014 210 044 357 313 141 200 126 303 161 220 114 000 000 000 000 000 000 000 000 000
014 017 040 263 234 137 377 377 377 377 121 373 174 172 215 350 074 256 127 370
000 000 000 000 376 041 060 127 364 207 101 237 377 000 000 000 000 000 000 000 000
377 000 000 040 327 377 000 370 303 017 314 137 036 000

eng
0

There are five types of logical records for an EDR 7 file. Formats and blocking factors for each type are presented in the following subsections.

4.2.9.2 File Header Label

File header labels are contained in the first physical record of each telemetry file. The label record consists of 78 label characters with the remainder of the record filled with zeros. The label record is the same size as the physical data records of the file.

4.2.9.3 Format 1 Through Format 5 Data

One science minor frame of telemetry data is used to build a logical record, whether in format 1, 2, 3, or 5. Regardless of format, all logical records are the same size, the difference being made up of padding 1-bits. There are 72 logical records per physical record for a total of 3744 bytes. The logical record for format 1 is shown in the following listing.

Byte Number (9 Bits/Byte)	Description	Type
1- 4	Spacecraft event time	Binary
5- 8	Ground received time	Binary
9-10	Frame number	Binary
11-12	Spacecraft clock	Binary
13-16	Status indicators	Binary
17-20	One-way light time	Binary
21-26	Scientific data	Binary
27	Engineering data (11)[1]	Binary

[1] Engineering data words
Engineering frames 0 - 11, 16, 17
Engineering frames 1 - 11, 28, 40, 41, 42, 43, 44, 45, 64, 65, 66, 67, 68, 69, 88, 89
Engineering frames 2 - 11, 40, 41
Engineering frames 3 - 11, 28

Number its/Byte)	Description	Type
8-29	Engineering data (spin rate) (16-17)[1]	Binary
0	Engineering data (28)[1]	Binary
1-36	Engineering data (40-45)[1]	Binary
7-42	Engineering data (64-69)[1]	Binary
3-44	Engineering data (88-89)[1]	Binary
5-52	Fill ones	Binary

logical records for formats 2 and 3 are shown in the following listing.

e Number its/Byte)	Description	Type
1- 4	Spacecraft event time	Binary
5- 8	Ground received time	Binary
9-10	Frame number	Binary
11-12	Spacecraft clock	Binary
13-16	Status indicators	Binary
17-20	One-way light time	Binary
21-26	Scientific data	Binary
27-32	Scientific data	Binary
33	Engineering data[1]	Binary
34-35	Engineering data (spin rate)[1]	Binary
36	Engineering data[1]	Binary
37-42	Engineering data[1]	Binary
43-48	Engineering data[1]	Binary

ngineering data words
Engineering frames 0 - 11, 16, 17
Engineering frames 1 - 11, 28, 40, 41, 42, 43, 44, 45, 64, 65, 66, 67, 68, 69, 88, 89
Engineering frames 2 - 11, 40, 41
Engineering frames 3 - 11, 28

Byte Number (9 Bits/Byte)	Description	Type
49-50	Engineering data[1]	Binary
51-52	Fill ones	Binary

The logical record for format 5 is shown in the following listing

Byte Number (9 Bits/Byte)	Description	Type
1- 4	Spacecraft event time	Binary
5- 8	Ground received time	Binary
9-10	Frame number	Binary
11-12	Spacecraft clock	Binary
13-16	Status indicators	Binary
17-20	One-way light time	Binary
21-23	Scientific data	Binary
24	Engineering data[1]	Binary
25-26	Engineering data (spin rate)[1]	Binary
27	Engineering data[1]	Binary
28-33	Engineering data[1]	Binary
34-39	Engineering data[1]	Binary
40-41	Engineering data[1]	Binary
42-52	Fill ones	Binary

[1] Engineering data words
Engineering frames 0 - 11, 16, 17
Engineering frames 1 - 11, 28, 40, 41, 42, 43, 44, 45, 64, 65, 66, 67, 68, 69, 88, 89
Engineering frames 2 - 11, 40, 41
Engineering frames 3 - 11, 28

Unpacking Engineering data

HGOS-2-2-000 pg 8, 9 have engineering words These words are commutated throughout minor frames. There are four eng minor frames, each of 144 bytes

HGOS-2-2-000 pg 40 - 43
For format 3 on pg 42 there are 16 bytes of engineering
$144/16 = 9 \Rightarrow$ 9 minor frames are needed for one engineering minor frame. It is synchronized with frame number 0.

Eng number = $(FN/9) \bmod 4$ integer arithmetic

FDEC = frame number (pg 94)
FN = 26 $\frac{26}{9} = 2$, $\frac{27}{9} = 3$, $\frac{28}{9} = 3$ etc

frame 27 begins eng minor frame 3 and it runs to frame 35. frame 36 begins eng minor frame 0.

From pg 99 from Helios-A Data Processing System programmer's Manual CSC/SD-75/6011 pg 4-94 we see format 3 engin data at the bottom.
for frame 3 we take word 11 and 28

word 11 = $374_8 = FC_{16}$ word 28 = $163_8 = 73_{16}$
See pg 94

Pg 97 has 2nd page of MDR 959 from frame 0 we take word 11, 16, 17
wd 11 = $374_8 = FC_{16}$
wd 16 = $100_8 = 40_{16}$
wd 17 = $077_8 = 3F_{16}$

Pg 2 of HA1253 is on pg 102 and FC 40 3F 73 forms the first four bytes of eng data.

Converting words see pg 103

```
44667250 45389930 35 785F 000030044 B06F7   2098  8324   127 100011011110
                                            2672  2132  2146 000000000001
44811245 45533920 36 923F 000000044 B06F2   2656  1923  1931 100000010011
                                            2576  1929  1927 100000000101
44955249 45677920 37 9C5F 000000044 B06EE   2720  2154  1922 010000011101
                                            2720  2151  2138 000000000011
45099254 45821920 38 923F 000000044 B06E9   2784  1923  2135 001000011011
                                            2592  1925  2164 001100001111
45243259 45965920 39 C05F 000000044 B06E4   2560  1928  2150 011000011111
                                            2432  2412  2002 001111000000
45387243 46109900 40 923F 000000044 B06E0   1629  1266  1184 110111111000
                                            1591  2098   382 101011101100
45531248 46253900 41 E45F 000000044 B06DB   2944   127   127 000111111100
                                            2560  2720  1065 001111000101
45675253 46397900 42 9240 000000044 B06D6   1454  2308  2512 101011110101
                                            2816  3968   127 101011101101
45819257 46541900 43 085F 000000044 B06D2    127   127   127 100011111101
                                            2672  2132  2146 000000000011
                                            2656  1923  1931 000000010011

7409701 TLM TLM 2 0064 79 275 125106 275 131439 9280 C4 800116 280 04 01
&INPUT
TFNAME= -3253859061.952895     ,IFILE=          4,IDM=          0,ITREC=
&END
TAPE HA125300 FILE   4 HAL064 FILE#  62
HA125300 FILE    4 RECORD     2
46266182 46988810 13 501F 000000044 B06C3   1832  2944  3968 000000110101
                                             127  1876   127 111000101101
46284183 47006810 14 9240 000000004 B06C3    11    36     4 111110000100
                                             127   127  3968 101000111101
46302183 47024810 15 549F 000000004 B06C2     0     7     5 111111100010
                                            2592  2210  2212 000000100011
46320174 47042800 16 9240 000000004 B06C1   4095    60    62 110101010100
                                            2688  2208  2196 000100110011
46338174 47060800 17 591F 000000004 B06C1     0     8     5 111111101110
                                            2784  2416  2392 110000101011
46356175 47078800 18 9240 000010004 B06C0     2     5    63 110101010000
                                            2576  2424  2400 011100111011
46374175 47096800 19 5D9F 000010004 B06C0     0     1    12 111111100110
                                            2816  2400  2424 000000100111
46392176 47114800 20 9240 000010004 B06BF    31    18    31 110111000000
                                            2576  2186  2190 111100110111
46410177 47132800 21 621F 000010004 B06BE     0     9     6 111111100110
                                            2560  2196  2408 101000101111
46428177 47150800 22 9240 000010004 B06BE     5    14     6 110101010000
                                            2752  2424  2428 011100111111
46446178 47168800 23 669F 000010004 B06BD   352  1139     3 110101000000
                                            2592  2360  1934 001111000001
46464178 47186800 24 9240 000010004 B06BD     0    10     8 111111111010
                                            2110  1775  1697 000101010001
46482179 47204800 25 6B1F 000010004 B06BC    17    28     4 110111001100
                                            2157  2576   670 010001001001
46500180 47222800 26 9240 000010004 B06BB     4     2     2 111111101110
                                             127   127   127 001101011001
46518180 47240800 27 6F9F 000010004 B06BB  4095     1   326 110101000100
                                            2472  2720   127 001111000101
46536181 47258800 28 9240 000010004 B06BA     2     5     4 111111110010
                                             127  2432  2880 000001010101
46554181 47276800 29 741F 000010004 B06BA     0     3    12 110101011000
                                             127  1682  2194 010001001101
46572182 47294800 30 9240 000010004 B06B9     0     0     0 111111100010
                                            2352  2608   127 101001011101
46590183 47312800 31 789F 000010004 B06B9     8    67    47 110101011100
                                            2688  2688  3968 000001000011
46608183 47330800 32 9240 000010004 B06B8     0    27    43 111111110010
                                            2608  2688  2688 010001010011
46626184 47348800 33 7D1F 000010004 B06B7  4095     2   824 110101111000
                                            2944  2944  2880 100001001011
46644184 47366800 34 9240 000010004 B06B7     2     3     3 111111110110
                                            2880  2688  3968 011001011011
46662185 47384800 35 819F 000010004 B06B6     3     5     4 110110001100
                                            2592  2944  2880 000001000111
46680175 47402790 36 9240 000020004 B06B6     0     6     9 111111101010
                                            2752  2816  3968 110001010111
46698176 47420790 37 861F 000020004 B06B5  4095    69    56 110101011000
                                            2624  2816  2880 000001001111
46716177 47438790 38 9240 000020004 B06B4     1     5     5 111111111010
                                            2752  3968  2688 011101011111
46734177 47456790 39 8A9F 000020004 B06B4     1     5     0 110101010100
                                            2944  2880  2488 001111000001
```

```
198   2324    127 1000110111101 FC000073 00000000 00000000 00000000 00000113
172   2132   2146 000000000011
156   1923   1931 100000010011 FC000073 00000000 00000000 00000000 00000113
176   1929   1927 100000001011
120   2154   1922 010000011011 FC000073 00000000 00000000 00000000 00000113
120   2151   2138 000000000111
184   1923   2135 001000010111 FC403F73 00000000 00000000 00000000 00000113
192   1925   2164 001100001111
160   1928   2150 011000011111 FC403F73 00000000 00000000 00000000 00000113
132   2412   2002 001111000001
129   1266   1184 110111110001 FC403F73 00000000 00000000 00000000 00000113
191   2098    382 101011101001
144    127    127 000111111001 FC403F73 00000000 00000000 00000000 00000113
160   2720   1065 001111000101
154   2308   2512 101011110101 FC403F73 00000000 00000000 00000000 00000113
116   3968    127 101011101101
127    127    127 100011111101 FC403F73 00000000 00000000 00000000 00000113
172   2132   2146 000000000011
156   1923   1931 000000010011 FC403F73 00000000 00000000 00000000 00000113
                               11 16 17 28

139 9280 C4 800116 280 04 01 007  103C79062679
  4,IDM=          0,ITREC=          500,NUMFIL=          5

112   2944   3968 000000110101
127   1876    127 111000101101 00000000 00000000 00000000 00000000 0000FFFF
 11     36      4 111110000100
127    127   3968 101000111101 00000000 00000000 00000000 00000000 0000FFFF
 10      7      5 111111100010
 12   2210   2212 000000100011 00000000 00000000 00000000 00000000 0000FFFF
 15     60     62 110101010100
 18   2208   2196 000100110011 00000000 00000000 00000000 00000000 0000FFFF
 10      8      5 111111101110
 14   2416   2392 110000101011 00000000 00000000 00000000 00000000 0000FFFF
 12      5     63 110101010000
 16   2424   2400 011100111011 00000000 00000000 00000000 00000000 0000FFFF
 10      1     12 111111100110
 16   2400   2424 000000100111 FC000000 00000000 00000000 00000000 0000FFFF
 11     18     31 110111000000
 16   2186   2190 111100110111 FC000000 00000000 00000000 00000000 0000FFFF
 10      9      6 111111100110
 10   2196   2408 101000101111 FC000071 00000000 00000000 00000000 0000FFFF
 15     14      6 110101010000
 12   2424   2428 011100111111 FC000071 00000000 00000000 00000000 0000FFFF
 12   1139      3 110101000000
 12   2360   1934 001111000001 FC000071 CBD0D3F0 CFD50000 00000000 0000FFFF
 10     10      8 111111111010
 17   1775   1697 000101010001 FC000071 CBD0D3F0 CFD50000 00000000 0000FFFF
 17     28      4 110111001100
 17   2576    670 010001001001 FC000071 CBD0D3F0 CFD50000 00000000 0000FFFF
 12      2      2 111111101110
 17    127    127 001101011001 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 0000FFFF
 12      1    326 110101000100
 12   2720    127 001111000101 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 0000FFFF
 15      5      4 111111110010
 12   2432   2880 000001010101 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 0000FFFF
 13      3     12 110101011000
 16   1662   2194 010001001101 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 10      0      0 111111100010
 12   2608    127 101001011101 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 15     67     47 110101011100
 12   2688   3968 000001000011 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 15     27     43 111111110010
 12   2688   2688 010001010011 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 12      2    824 110101111000
 12   2944   2880 100001001011 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 13      3      3 111111110110
 12   2688   3968 011001011011 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 15      5      4 110110001100
 12   2944   2880 000001000111 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 16      6      9 111111101010
 12   2816   3968 110001010111 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 15     69     56 110101011000
 12   2816   2880 000001001111 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 16      5      5 111111111010
 12   3968   2688 011101011111 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
 15      5      0 110101010100
 12   2880   2488 001111000001 FC000071 CBD0D3F0 CFD5D3D6 F2D5D4D2 E9D1FFFF
```

Converting Engineering words see also page 83

Eng frame Word H60S-2-2-000 change 21 pg 16 —

			Pg 9	Pg 8	F/N-wd	Data Prot Chan	acronym	Descpp
0	11		B-003	POW	0-011	E-036-43	E4PWR-E0PWR	bit 4 = E7PWR
0	16		D-000	D/H	0-16	E-076	SPNRPM	Spin rate
0	17		D-001	D/H	0-17	F-006	SPNRPM	Spin rate
1	11		B-003	(Pg 34)				
1	28		C-048	E7	1-028	E-187-194	*	
1	40	+	D-042	E7	1-40	D-042	HET-T	het temp E7C
1	41	+	D-043	E7	1-41	D-043	VLETZT	vlet 2 tem E7C
1	42		D-044	E7	1-042	D-044	DETMPT	det mnt plt temp
1	43		D-045	E7	1-043	D-045	T-XDET	X-ray det temp
1	44		D-046	E7	1-044	D-046	TBSP1T	Th blanket sup 1
1	45		D-047	E7	1-045	D-047	TBSP2T	Th blanket sup 2
1	64		D-048	E7	1-064	D-048	ELEC-T	Elec temp
1	65		D-049	E7	1-065	D-049	RBAP-T	rear bs temp
1	66		D-050	E7	1-066	D-050	+12V.M	+12 v mon
1	67		D-051	E7	1-067	D-051	+6VDGM	+6 V dig mon
1	68		D-052	E7	1-068	D-052	+6VANM	+6 v ana mon
1	69		D053	E7	1-069	D-053	+7.75V	+7.75 v mon
1	88		D-054	E7	1-088	D-054	+4.7V	+4.7 v mon
1	89		D-055	E7	1-089	D-05K	FBAP-T	Ft bs pl temp
2	11		B-003					
2	40		D-006	TX	0-040	F-076	MODPWM	power monitor
2	41		D-007	TX	0-41	F-080	VSO-T	temp of VSO
3	11		B-003					
3	28		C-048					

* E187 XRWCLO X ray window clock
188 XRWDAT X-ray window data
189 ICAL.A Internal calibrator A
190 ICAL.B Internal calibrator B
191 XRH.V X-ray high voltage
192 SECSYN Sector synchronizer
193 FOB/OM Force blackout mode
194 XRSDM X-ray sector data mode

† D078 + D079 are also extracted. When Eng frame = 1 the word is D042, 43

Table A-1. Telemetry Data Format 1

TELEMETR, WORD NO.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	SYNC	SYNC	SYNC	SYNC	E3	E3	E3	E3	E7	E7	E7	E7	E7	E7	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1
24	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E6	E6	E6	E6	E6	E6
02	E6	E6	E6	E6	E3	E3	E3	E3	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a
03	FN	ID	TIME	TIME	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c	E5c
04	E5b	E5b	E5b	E5b	E3	E3	E3	E3	E5b	E5b	E5b	E8	E8	E8	E8	E8	E4	E4	E4	E4	E4	E4	E4	E4
05	E4	E4	E4	E4	E4	E4	E4	E4	E9	E10		E2	E2	E2	E2	E2	E2	E2	E2	E2	ENG	ENG	ENG	ENG

EXP.	EDF LENGTH (W)	WORDS/FRAME	SUBCOM. RATE
1	504	28	18
2	72	9	8
3	48	12	4
4	32*	16	2
5a	32*	16	2
5b	336	7	48
5c	40*	20	2
6	80	10	8
7	6*	6	11
8	20*	5	4
9	72	1	72
10	36	1	36

(DETAILED MODE)

(PULSE HIGH DATA BLOCK OR RATE DATA BLOCK)

*NUMBER INDICATES BLOCKLENGTH.

4 eng words (bytes)
36 mf for one eng mf
144 mf for one EMF

Table A-2. Telemetry Data Format 2

TELEMETRY WORD NO.	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	SYNC	SYNC	SYNC	SYNC	E3	E3	E3	E3	E7	E7	E7	E7	E7	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1
01	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1
02	E1	E1	E1	E1	E3	E2	E3	E3	E5a	E5a	E5a	E5a	E6c	E5c	E5c	E5c	E5c	E5b	E5b	E5b	E6b	E9	E9	
03	EN	ID	TIME	TIME	E4	E4	E4	E4	E7	E7	E7	E7	E7	E7	E8	E8	E8	E8	E8	E10	E10	E10	E10	E10
04	E10	E1	E1	E1	E3	E3	E3	E3	E1	E1	E1	E1	E1	E1	E1	E6	E6	E6	E6	E6	E6	E6	E6	E6
05	E6	E6	E6	E6	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	E2	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG

EXP.	EDF LENGTH (W)	WORDS/FRAME	SUBCOM. RATE
1	432	48	9
2	72	12	6
3	4	12	1/3
3	48	12	4
4	32	4	8
5a	32	4	8
5b	192	4	48
5c	40*	5	8
6	78	12	1/2
8	20*	5	4
9	72	2	36
10	36	6	6

(AVERAGE MODE OR DETAILED MODE)

(PULSE HIGH DATA BLOCK OR RATE DATA BLOCK)

*NUMBER INDICATES BLOCKLENGTH.

8 eng bytes
18 mf for one eng mf
72 mf for one EMF

Table A-3. Telemetry Data Format 3

TELEMETRY WORD NO	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
00	SYNC	SYNC	SYNC	SYNC	E3	E3	E3	E3	E7	E7	E7	E7	E7	E7	E7	E1	E1	E1	E1	E1	E1	E1	E1	E1
01	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E1	E6	E6	E6	E6	E6	E6	E6	E6	E6	E6
02	E6	E6	E6	E6	E3	E3	E3	E3	E10	E10	E10	E10	E10	E10	E8	E8	E8	E8	E8	E8	E8	E8	E8	E8
03	FN	ID	TIME	TIME	E4	E4	E4	E4	E7	E7	E7	E7	E7	E7	E5c	E5c	E5c	E5b	E5b	E5b	E5b	E5b	E5b	E5b
04		E5c	E5c		E3	E3	E3	E3	E2	E2	E2	E2	E2	E2	E2	E2	E2	E9	E9	E9	E9	E9	E9	E9
05	E5a	E5a	E5a	E5a	E5a	E5a	E5a	E5a	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG	ENG

EXP.	EDF LENGTH (W)	WORDS/FRAME	SUBCOM. RATE
1	432	24	18
2	72	9	8
3	4	12	1/3
4	32*	4	8
5a	32*	8	4
5b	336	7	48
5c	40*	5	8
6	84	14	6
7	6*	12	1/2
8	20*	10	2
9	56	7	8
10	36	6	6

*NUMBER INDICATES BLOCKLENGTH.

(AVERAGE MODE OR DETAILED MODE)

(PULSE HIGH DATA BLOCK OR RATE DATA)

16 eng words
requires 9 mf to read 144 eng words
(1 eng mf). 9×4 = 36 mf for one
eng major frame (EMF)

Table A-4. Telemetry Data Format 4

	C								B								A							
	X-000	SYNC X-001	SYNC X-002	X-003	004 C-000	005 C-001	006 C-002	007 C-003	008 B-000	009 B-001	010 B-002	011 B-003	012 B-004	013 B-005	014 B-006	015 B-007	016 D-000	017 D-001	018 D-002	019 D-003	020 D-004	021 D-005	022 A-000	023 A-001
WORD NUMBER →	024 C-004	025 C-005	026 C-006	207 C-007	028 C-008	029 C-009	030 C-010	031 C-011	032 B-008	033 B-009	034 B-010	035 B-011	036 B-012	037 B-013	038 B-014	039 B-015	040 D-006	041 D-007	042 D-008	043 D-009	044 D-010	045 D-011	046 A-002	407 A-003
	048 C-012	049 C-013	050 C-014	051 C-015	052 C-016	053 C-017	054 C-018	055 C-019	056 B-016	057 B-017	058 B-018	059 B-019	060 B-020	061 B-021	062 B-022	063 B-023	064 D-012	065 D-013	066 D-014	067 D-015	068 D-016	069 D-017		
FRAME NUMBER →	FN X-004	ID X-005	TIME X-006	TIME X-007	076 C-020	077 C-021	078 C-022	079 C-023	080 B-024	081 B-025	082 B-026	083 B-027	084 B-028	085 B-029	086 B-030	087 B-031	088 D-018	089 D-019	090 D-020	091 D-021	092 D-022	093 D-023		
CHANNEL NUMBER →	096 C-024	097 C-025	098 C-026	099 C-027	100 C-028	101 C-029	102 C-030	103 C-031	104 B-032	105 B-033	106 B-034	107 B-035	108 B-036	109 B-037	110 B-038	111 B-039	112 D-024	113 D-025	114 D-026	115 D-027	116 D-028	117 D-029		
	120 C-032	121 C-033	122 C-034	123 C-035	124 C-036	125 C-037	126 C-038	127 C-039	128 B-040	129 B-041	130 B-042	131 B-043	132 B-044	133 B-045	134 B-046	135 B-047	136 D-030	137 D-031	138 D-032	139 D-033	140 D-034	141 D-035		
	000	001 SYNC	002 SYNC	003	004 C-040	005 C-041	006 C-042	007 C-043									016 D-036	017 D-037	018 D-038	019 D-039	020 D-040	021 D-041		
	024 C-044	025 C-045	026 C-046	027 C-047	028 C-048	029 C-049	030 C-050	031 C-051									040 D-042	041 D-043	042 D-044	043 D-045	044 D-046	045 D-047		
1	048 C-052	049 C-052	050 C-054	051 C-055	052 C-056	053 C-057	054 C-058	055 C-059									064 D-048	065 D-049	066 D-050	067 D-051	068 D-052	069 D-053		
	FN	ID	TIME		076 C-060	077 C-061	078 C-062	079 C-063									088 D-054	089 D-055	090 D-056	091 D-056	092 D-058	093 D-059		
	096 C-064	097 C-065	098 C-066	099 C-067	100 C-068	101 C-069	102 C-070	103 C-071									112 D-060	113 D-061	114 D-062	115 D-063	116 D-064	117 D-065		
	120 C-072	121 C-073	122 C-074	123 C-075	124 C-076	125 C-077	126 C-078	127 C-079									136 D-066	137 D-067	138 D-068	139 D-069	140 D-070	141 D-071		
																	016 D-072	017 D-073	018 D-074	019 D-075	020 D-076	021 D-077		
																	040 D-078	041 D-079	042 D-080	043 D-081	044 D-082	045 D-083		
2																	064 D-084	065 D-085	066 D-086	067 D-087	068 D-088	069 D-089		
																	088 D-090	089 D-091	090 D-092	091 D-093	092 D-094	093 D-095		
																	112 D-096	113 D-097	114 D-098	115 D-099	116 D-100	117 D-101		
																	136 D-102	137 D-103	138 D-104	139 D-105	140 D-106	141 D-107		
																	016 D-108	017 D-109	018 D-110	019 D-111	020 D-112	021 D-113		
																	040 D-114	041 D-115	042 D-116	043 D-117	044 D-118	045 D119		
3																	064 D-120	065 D-121	066 D-122	067 D-123	068 D-124	069 D-125		
																	088 D-126	089 D-127	090 D-128	091 D-129	092 D-130	093 D-131		
																	112 D-132	113 D-133	114 D-134	115 D-135	116 D-136	117 D-137		
																	136 D-138	137 D-139	138 D-140	139 D-141	140 D-142	141 D-143		

CSC COMPUTER SCIENCES CORPORATION

INTEROFFICE CORRESPONDENCE

to F. B. McDonald from E. Ronish date July 11, 1980

subject Software changes

There are two software changes that IPD could make which would solve a lot of our problems:

1. Handle DM7 the same as other distribution modes. Right now IPD does not check for data gaps in DM7. Rather than change the code, just process DM7 along with the real time data. There is nothing in DM7 at IPDs' level that makes it special.

2. Extract all engineering numbers before writing the record. The engineering data is scattered throughout several minor frames. If IPD would buffer enough frames then all of the engineering words could be extracted at the beginning of processing rather than one monor frame at a time. The buffer has to be 144 minor frames long to hold one engineering major frame in format 1. The data probably is already in a buffer that large and it is just a matter of extracting the engineering words at once.

cc: J. Muckel

Response Matrices

Modes	Rate	PHA					energy
Protons	DI DII F (R11a)	DI vs DII	I≥E	HS2	Let	2par	3. → 5.6 MeV
		DI vs DII	I≤E	HS3	Let		5.6 → 22.2
	A1 A2 B1 C (R1a)	A vs B	CI+CII=0	HS2	HET	2parm	22.2 → 31 ~~5 → 22.2 → 40~~
		A or B vs CI+CII		HS3	HET	3parm	31 → 58
		B vs CI+CII	CIII given	HPBF	HET	3parm	58 → 500
		CI+CII vs CIII	B given	HA PB			
		B vs CIII	CI+CII given	HPF			

How to tackle U-39 problem.

U-39 Definition:

U.39 abend can occur in Revisp or Revisa Subroutines of Helprp. This first means a new pha or Rate record does not fit into old Rate or Pha record while merging data because of bit rate and format being different from new record to be to old record.

To solve this problem Steps taken:

1. Look at the ~~dump~~ job abend before the processing messages you will find a message saying

'Rates or Pha record mismatch'

and also gives the status of old and new records for U-39 abend from this it is easy to locate the problem.

2. ~~get~~ Get the load EDR of new and old tape dumps for that times period.
From these dumps to look for is
a. check the label.
b. check the frame time. 1152000 / bit Rate.
c. check for back up times. or day change.
d. check the Spacecraft clock times.
In case some kind of problem from a-d don't process that new file. or

3. if there ~~are~~ is no problem from ~~the~~ a-d
then get a rates list for that region from old Rates
tape. ~~if~~ And then look at the dump of new EDR file and old Rates list if one can get away of ~~delete~~ deleting new records from old Rates tapes and process new tape can be done. If one of the old or new bit rates are wrong delete records of Rates & PHA for old tapes and process the new tape. or don't proce