DATA SET CATALOG #98

Explorer 34 C.R. Proton (RVS DE/DX)

67-051A-03A	6 tapes
67-051A-00F	5 tapes
67-051A-03C	9 tapes
67-051A-03D	2 tapes

1. Introduction

We are submitting to the NSSDC the final processed data obtained from the University of Chicago instruments on the eccentric polar orbiting satellites IMP-4 and IMP-5. IMP-4 data coverage is from the launch date of May 24, 1967 through April 29, 1969. IMP-5 data coverage is from the launch date of June 21, 1969, and continues until the present time (March, 1971). These data are presented on microfilm and on magnetic tape. On microfilm are time-intensity plots for the averaged counting rates with each plot corresponding to a Bartel's Solar Rotation. There are four categories of magnetic tape:

1) Averaged counting rates,
2) Raw accumulator readouts,
3) Pulse height analysis readouts, and
4) Orbit parameters.

This document describes the instruments, the formats of the data and the relationship between the data and the physical parameters the instruments were recording. A reference list of scientific publications by the University of Chicago group based on the IMP-4 and IMP-5 data is attached.

2. Instrumentation and Performance

The University of Chicago instruments on the satellites IMP-4 and IMP-5 are sufficiently similar that their characteristics can be described in parallel. The performance of the IMP-5 instrument will be reported when the data are submitted.

2.1 General Description

The University of Chicago instrument occupies one whole facet of the right octagonal cylinder of the IMP-4 (5) main body. Figures

collects in accumulator 7a. The prescaling on the $D1D2\overline{D3}D6$ (7a) rate is such that it collects the 1st count, then the 129th count, etc.

During the 4.8 seconds of each accumulation interval, one PHA event may be registered together with its angular sector (AS) and range identification (ID) information. The PHA comes from three pulse height analyzers: PHA1, 256 channels, assigned to D1 for ID = 0 to 5, and assigned to CK for ID = 6 and 7; PHA2, 512 channels, assigned to D2; PHA4, 256 channels, assigned to D4. The angular sector information comes from the Optical Aspect Sensor on the spacecraft and signifies an octant in the ecliptic* plane in which the PHA occurred (cf. figure 7). The range identification indicates the number of detectors the PHA event has triggered; i.e. a particle that penetrated D1 and D2 and stopped in D3 would be an ID = 3 event, and correspondingly the PHA reading from D4 should be zero. The definition of the IDs and the corresponding proton energies are given in Table 8.

* Actually in a plane perpendicular to the spacecraft spin axis which is approximately normal to the ecliptic plane.

2.5.2 IMP-5:

2.5.2a Pre-launch

The instrument has been carefully calibrated prior to launch on its electronic characteristics and its response to protons and electrons. Table 15 shows the thresholds of the detectors and Table 16 tabulates the pulser calibration of the PHA's.

TABLE 15

IMP-5 Detector Thresholds

D1	D2	D3	D4	$D5_L$	$D5_H$	CK	D6
(mV)	(mV)	(mV)	(mV)	(mV)	(mV)	(mV)	(mV)
0.685	1.35	0.640	0.275	0.105	1.39	2.08	19.6

Threshold is defined as one-half of full triggering. Thresholds are measured at room temperature.

3.3 RAte Summary Tape--RAST

The RAte Summary Tapes contain counting rates averaged over consecutive time intervals of 15 PSC's (~ 5 minutes) using only data of good quality. The last PSC in the period averaged over is assigned to the rate average. The physical and logical record size are given in Table 17.

Each logical record is generated with the following Fortran II format.

ITEM:	1	2	3	4	5	6 - 12	13	14	15
FORMAT	(1X, I3,	1X, I2,	1X, F4.1,	1X, I8,	1X, F4.1,	7 (1X, E12.5),	1X, F6.2,	1X, I3,	1H/I3)

The item names, units, and other specifications are displayed in Table 19.

3.3.1 Exceptions to the Standard Format

When reading the data from the tape, the above format statement is used except when reading the first logical record of each orbit which logical record is a heading. The second logical record of each orbit, although written in the above data format is not a data line and contains the following substitutions:

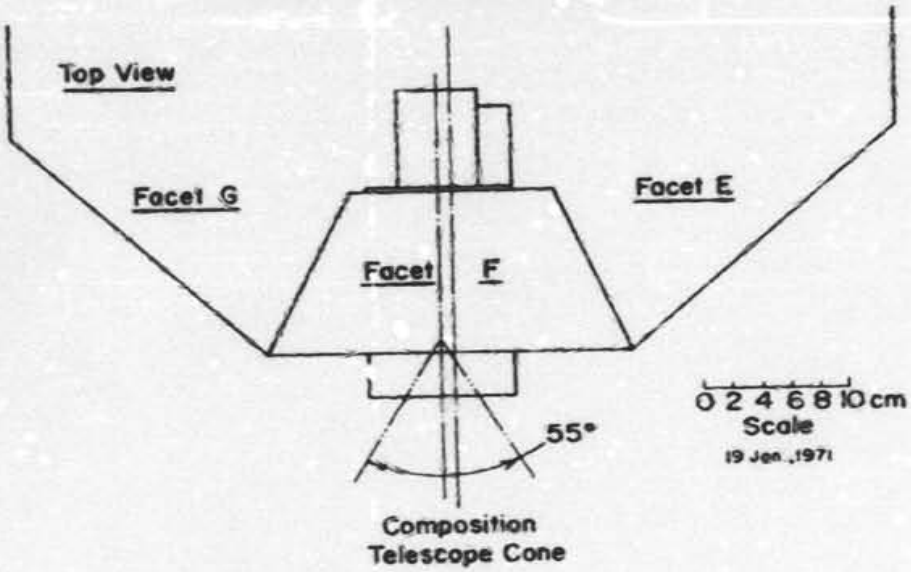
1) ITEMS 1 through 4 contain the Day, Hour, Minute and PSC for the first good data of the orbit.
2) ITEM 5 contains the orbit number.
3) ITEM 6 contains the geocentric distance of the satellite in kilometers.
4) All other ITEMS are filled with zeroes.

Similarly the last logical record of an orbit does not contain experiment data, but has the following substitutions:

1) ITEMS 1 through 3 contain the time of the last good data of the orbit.
2) ITEM 4= -1, thus acting as a sentinnel flag for the orbit.

IMP-5

Location and Orientation of University of Chicago Experiment



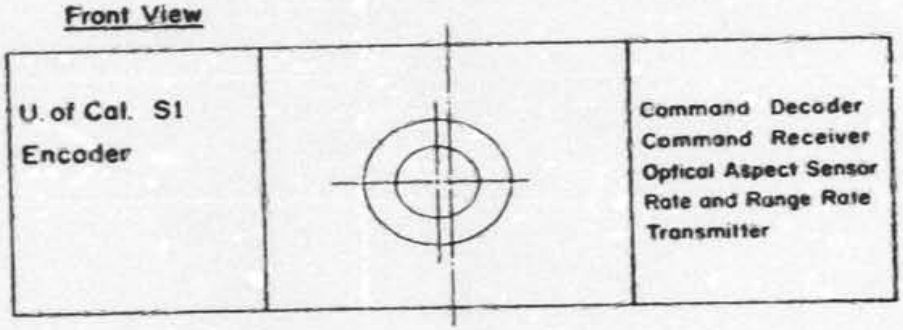


Figure 2

FILE 0001 REC 0001 CH 3264

3/24/67 -
3/30/67

0001	401271567237	7231722574	0000013503	3234752554	40577612	7607
0049	0306141275	751551123603	5710410360	7165705471	7463750	0139
0097	6012710	751175117511	7760013503	3553756	5737014	5150
0145	0367561	352654577713	5247370360	7164745	7544754	0145
0193	6012716	737377777347	1342014503	5450777	2334565	1644
0241	0367341	334514071635	0774356560	7165773	7487751	0145
0289	6012717	752575267526	7760014503	1146756	0243607	4067
0337	0367757	671401662062	0079605460	7172752	7530753	0155
0385	6012717	753075307527	5240015503	4530757	0013365	3646
0433	0366037	235600217515	0024367260	7175747	7481745	0155
0481	6012717	748174557470	5240015503	6121756	0025641	1370
0529	0365406	604000051243	0023116760	7200752	7527752	0155
0577	6012720	752175157507	5240015503	4004734	0017015	0146
0625	0336600	000300112102	0001610060	7205743	7400736	0165
0673	6012720	753073117265	5240015502	2002743	0026262	7333
0721	0365200	600300107541	0005762150	7210710	7011751	0165
0769	6012721	751575147513	5530017503	4023672	0041530	3420
0817	0338005	011000502537	0122263660	7213750	7503747	0175
0865	6012721	750074777476	2520017503	0156671	0171304	7055
0913	0350222	220001577071	0233397060	7216746	7460745	0175
0961	6012721	749274527452	2520020503	2137544	0110706	7065
1009	0343013	610201675055	0114305760	7221746	7474747	0205
1057	6012722	751175147176	2560020803	2053525	0160511	5124
1105	0350205	205301331143	0112116660	7224732	7354736	0205
1153	6012722	740174077412	7760021503	0026702	0133726	1273
1201	0355604	203000565275	0084327360	7227743	7436744	0215
1249	6012723	744374467451	7761021503	2033711	0113525	5263
1297	0363004	003400505213	0073317060	7233746	7465746	0225
1345	6012723	746774707471	7760021503	2052712	0105706	1016
1393	0394005	404700442745	0042267760	7236747	7471747	0225
1441	6012723	747074707471	7760022503	4053734	0055452	4453
1489	0334046	004700440420	0055036660	7241747	7475747	0235
1537	6012724	747174577465	7760023503	6055742	0042016	5142
1585	0320607	206100104126	0033010760	7245745	7433745	0235
1633	6012724	745374547454	5240024602	7655740	0025766	3657
1681	0270086	605600343645	0027154060	7251745	7456745	0245
1729	6012725	745474557456	5240024502	4067736	0025562	9525
1777	0245067	206500241617	0017361050	7254745	7454745	0245
1825	6012725	745274517451	5240025502	4061723	0045185	3556
1873	0214267	407000337551	0037553560	7257744	7446744	0255
1921	6012726	744674467446	5240025502	0056734	0025151	3506
1969	0171405	006500277464	0014547260	7262744	7450745	0255
2017	6012726	744474457444	5240026501	2057741	0023456	7443
2065	0150005	607000433441	0025144760	7265744	7443744	0265
2113	6012726	743674377436	5240026501	0062741	0014540	7367
2161	0146600	406600331357	0032540360	7270743	7433763	0265
2209	6012727	743774377436	5240027501	6070736	0010332	3553
2257	0143006	005700431322	0010533660	7273743	7444744	0275
2305	6012727	744674467446	5240027501	6061742	0014327	3320
2353	0137010	405700327315	0026129460	7276744	7447744	0275
2401	6012727	744474467445	5240031501	2075746	0034125	3257
2449	0138405	006100327260	0050324660	7301744	7440744	0305
2497	6012730	743674357433	5240030501	2067743	0034123	5160
2545	0136206	005000163174	0026121660	7304743	7430742	0305
2593	6012730	742774257424	5240031501	0072742	0033327	3206
2641	0122204	407200463155	0020717260	7307742	7415741	0315
2689	6012731	741274107407	5240031501	4047735	0034321	7111
2737	0133666	010000221174	0033517260	7312740	7403740	0315
2785	6012731	740474067410	5240032501	6060732	0032751	5147
2833	0132205	405300421174	0022713460	7315740	7404740	0325
2881	6012731	740374027402	5240032501	0072732	0023311	7157
2929	0130406	006500101141	0025312160	7321737	7376737	0335

EXPLORER 34

C. R. Proton (R vs DE/DX)

67-051A-03A (KATE PACKED TAPE)

800 BPI, 7-track, Binary, XDS 930 Computer

D#	C#	FILES	Start	Stop
D-05805	C-04738	30	5/24/67	9/30/67
D-05806	C-04739	30	9/30/67	2/7/68
D-05807	C-04740	30	2/7/68	6/16/68
D-05808	C-04741	30	6/16/68	10/24/68
D-05543	C-04522	30	10/24/68	3/3/69
D-05544	C-04523	14	3/3/69	5/2/69

67-051A-00F (Orbit Parameter Tape) Ephemeris Data
800 BPI, 7-track, Binary, XDS 930 Computer

D#	C#	Files	Start	Stop
D-05951	C-04845	33	5/24/67	10/14/67
D-05952	C-04846	33	10/14/67	3/5/68
D-05953	C-04847	33	3/5/68	7/25/68
D-05954	C-04848	33	7/25/68	12/15/68
D-05955	C-04849	32	12/15/68	5/3/69

Note: The only means of dtermining a time span for these data sets are by using the sequence count formula. The sequence count in data set A is in bits 2-23 of the 1st word of each logical record. The sequence count for data set B is in bits 0-23 of the 1st word of each logical record.

67-051A-03C (PHA Event Summarys)

800 BPI, 7-track Binary, XDS 930 Computer

D#	C#	Files	Start	Stop
D-05799	C-04743	20	5/24/67	8/18/67
D-05800	C-04744	20	8/18/67	11/13/67
D-05801	C-04745	20	11/13/67	2/7/68
D-05802	C-04746	20	2/7/68	5/4/68
D-05803	C-04747	20	5/4/68	7/29/68
D-05804	C-04748	20	7/29/68	10/24/68
D-05545	C-04524	20	10/24/68	1/18/69
D-05546	C-04525	20	1/18/69	4/15/69
D-05547	C-04526	4	4/15/69	5/2/69

Note: The only means of determining a time span for this data set is by using sequence count formula. The sequence count is in bits 0-23 of the first word in each logical record.

67-051A-03D (Rate Summary Tapes)

800 BPI, 7-track, BCD, XDS 930 Computer

D#	C#	Files	Start	Stop
D-05548	C-04527	~~134~~ 133	5/24/67	12/19/68
D-05549	C-04528	64	7/30/68	5/2/69

Note: Data starts in Record 2. Time span is in item 1. The time span can also be determined by using sequence count formula with the indicated sequence count in item 4.

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Laboratory for Astrophysics and Space Research

30 March 1972

Mr. Julius Brecht
Code 601.4
National Space Sciences Data Center
Goddard Space Flight Center
Greenbelt, Maryland 20441

Dear Julius:

The following equation renders the Time (T) corresponding to any Pseudo Sequence Count (PSC) on the University of Chicago data tapes for satellites IMP A, B, C, F, and G:

$$T = T_{BASE} + (PSC - PSC_{BASE}) R_{TIME/SEQ}$$

The enclosed table specifies T_{BASE}, PSC_{BASE}, and $T_{TIME/SEQ}$ for each satellite.

The error in T for IMP A, B, C will not be greater than $\pm$ 2.5 minutes, and for IMP F and G will not exceed $\pm$ .5 minutes.

Sincerely,

Eugene M. Murphy

EMM:am

Satellite	T_{BASE}				PSC_{BASE}	$R_{TIME/SEQ}$ (seconds)
	Day	Hr.	Min.	Year		
IMP-A	331	4	10.2	1963	96	81.91697
IMP-B (Orbits 1 to 50)	278	3	59.7	1964	39	81.84857
IMP-B (Orbits 51 to 12[illegible])	62	13	40.2	1965	158807	81.84356
IMP-C	149	12	44.5	1965	50	81.91690
IMP-F	144	14	26.1	1967	44651	20.45437
IMP-G	172	9	28.1	1969	28464	20.454764

SEQUENCE COUNT FORMULA

Use Sequence Count in data format to obtain data and time of measurement (start time of first orbit corresponds to sequence count 44, 651, L.E., Day 144 (May 24, 1967) at 14:26.1 U.). Each sequence was 20.45439 Sec. Long. experimenter says time span of data is 5/3/69.

Total number of intervals on sequence count minus intervals at launch on sequence count equals intervals since launch on sequence count.

Intervals since launch on sequence count times 20.45439 Sec/intervals equals sec. from launch.

Sec. from launch divided by NO. OF SEC. in a day equals days from launch.

EXAMPLE

2238356	Sequence Count
- 44651	Sequence Count at launch (base)
2193705	Sequence Interval since launch
2193705	Sequence Interval since launch
x20.45439	Sec. long per internal
44870897.61495	Sec From launch
44870897.61495 ÷ 86400 sec. in day = 519.33909 Days since launch	

Formula Used to Determine Day and
Year for Explorer 34.

A data card that was read in by the program(s) contain the start day of the orbit (144) for the year 1967.

In the program when the PSC* is calculated the following check was used.

1. When the PSC* is 0 to 221 the calculation was:

   PSC* + 144 which had the day count of 144 to 365 for the year 1967.

2. When the PSC* is 222 to 587 the calculation was:

   PSC* + 144 - 365 which had the day count of 1 to 366 for the year 1968.

3. When the PSC* is 588 and greater the calculation was:

   PSC* + 144 - 731 which had the day count of 1 and up to the final day on the input tapes for the year 1968.

*PSC = PSEUDO SEQUENCE COUNT

Data Formats for Library Magnetic Tapes and Microfilm from The University of Chicago Charged Particle Experiments on the Satellites IMP-4 and IMP-5*

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