DATA SET CATALOG # 175

68-066B-01A, 02A, 03A, 04A

INJUN 5

MASTER SCIENCE FILE DATA

Request Agent
PAR

Acq. Agent
JJB

IKJUN V

MASTER SCIENCE FILE DATA

68-0668-01A, 02A, 03A, 04A

B-8848 - B-9796

C-7592 - C-7688

This data set consists of 949 merged Master Science File Data tapes. These tapes were originally created on a UNIVAC 418 computer. They are 800 BPI, Binary, 7-track, 1 file, with 696 character logical records and 10 logical records per physical record.

Only 91 (about 10%) of the tapes were duped. These tapes were selected uniformly from the 949 in the complete data set. The time spans for these tapes are as follows:

D#	C#	DATES
D-08848	C-07592	06/09/68 - 06/10/68
D-08858	C-07593	08/31/68 - 09/03/68
D-08868	C-07594	09/21/68 - 09/22/68
D-08878	C-07595	10/03/68 - 10/06/68
D-08888	C-07596	10/15/68 - 10/16/68
D-08898	C-07597	10/30/68 - 11/02/68
D-08908	C-07598	11/20/68 - 11/22/68
D-08918	C-07599	01/07/69 - 01/08/69
D-08928	C-07600	01/16/69 - 01/17/69
D-08938	C-07601	01/26/69 - 01/27/69
D-08948	C-07602	02/06/69 - 02/07/69
D-08958	C-07603	03/19/69 - 03/22/69
D-08968	C-07604	04/21/69 - 04/22/69
D-08978	C-07605	05/07/69 - 05/09/69
D-08988	C-07606	05/26/69 - 05/28/69
D-08998	C-07607	06/17/69 - 06/19/69
D-09008	C-07608	07/08/69 - 07/11/69
D-09018	C-07609	08/04/69 - 08/07/69
D-09038	C-07611	10/09/69 - 10/10/69
D-09048	C-07612	11/09/69 - 11/11/69
D-09058	C-07613	12/02/69 - 12/04/69
D-09068	C-07614	12/30/69 - 01/02/70
D-09078	C-07615	01/22/70 - 01/23/70
D-09088	C-07616	02/12/70 - 02/14/70
D-09098	C-07617	02/25/70 - 02/27/70
D-09108	C-07618	03/11/70 - 03/12/70
D-09118	C-07619	03/22/70 - 03/23/70
D-09128	C-07620	04/06/70 - 04/07/70

D#	C#	DATES
D-09138	C-07621	04/25/70 - 04/27/70
D-09156	C-07622	11/03/68 - 11/15/68
D-09166	C-07623	11/26/68 - 11/27/68
D-09176	C-07624	12/01/68 - 12/01/68
D-09186	C-07625	12/03/68 - 12/03/68
D-09196	C-07626	12/05/68 - 12/05/68
D-09206	C-07627	12/07/68 - 12/08/68
D-09216	C-07628	12/10/68 - 12/10/68
D-09226	C-07629	12/12/68 - 12/13/68
D-09236	C-07630	12/15/68 - 12/15/68
D-09246	C-07631	12/17/68 - 12/17/68
D-09256	C-07632	12/19/68 - 12/19/68
D-09266	C-07633	12/21/68 - 12/21/68
D-09276	C-07634	12/23/68 - 12/23/68
D-09286	C-07635	12/27/68 - 12/27/68
D-09296	C-07636	12/31/68 - 01/01/69
D-09316	C-07638	01/08/69 - 01/11/69
D-09326	C-07639	02/06/69 - 02/11/69
D-09336	C-07640	02/17/69 - 02/18/69
D-09346	C-07641	03/15/69 - 03/19/69
D-09356	C-07642	04/18/69 - 04/19/69
D-09366	C-07643	05/02/69 - 05/03/69
D-09376	C-07644	05/19/69 - 05/19/69
D-09386	C-07645	05/29/69 - 05/29/69
D-09396	C-07646	06/05/69 - 06/05/69
D-09406	C-07647	06/09/69 - 06/09/69
D-09416	C-07648	06/15/69 - 06/16/69
D-09426	C-07649	06/21/69 - 06/22/69

D#	C#	DATES
D-09436	C-07650	06/25/69 - 06/25/69
D-09446	C-07651	06/28/69 - 06/29/69
D-09456	C-07652	07/02/69 - 07/03/69
D-09466	C-07653	07/06/69 - 07/07/69
D-09476	C-07654	07/12/69 - 07/12/69
D-09486	C-07655	07/16/69 - 07/17/69
D-09496	C-07656	07/21/69 - 07/22/69
D-09506	C-07657	07/27/69 - 07/28/69
D-09516	C-07658	08/05/69 - 08/07/69
D-09526	C-07659	08/24/69 - 08/24/69
D-09536	C-07660	10/20/69 - 10/25/69
D-09556	C-07662	11/07/69 - 11/10/69
D-09566	C-07663	11/20/69 - 11/21/69
D-09576	C-07664	11/27/69 - 11/27/69
D-09586	C-07665	12/06/69 - 12/06/69
D-09596	C-07666	12/13/69 - 12/14/69
D-09606	C-07667	12/21/69 - 12/21/69
D-09616	C-07668	12/31/69 - 12/31/69
D-09626	C-07669	01/08/70 - 01/09/70
D-09636	C-07670	01/16/70 - 01/17/70
D-09646	C-07671	01/24/70 - 01/25/70
D-09666	C-07673	02/10/70 - 02/11/70
D-09676	C-07674	02/19/70 - 02/20/70
D-09686	C-07675	03/03/70 - 03/04/70
D-09696	C-07676	03/11/70 - 03/12/70
D-09706	C-07677	03/19/70 - 03/20/70
D-09716	C-07678	03/28/70 - 03/30/70
D-09726	C-07679	04/05/70 - 04/05/70

D#	C#	DATES
D-09736	C-07680	04/11/70 - 04/12/70
D-09746	C-07681	04/19/70 - 04/19/70
D-09756	C-07682	04/26/70 - 04/27/70
D-09766	C-07683	05/06/70 - 05/06/70
D-09776	C-07684	05/28/70 - 05/29/70
D-09786	C-07685	05/27/70 - 05/29/70
D-09796	C-07686	12/04/69 - 12/05/69

INJUN V

MASTER SCIENCE FILE DATA

FORMAT

CHARACTER	FIELD NAME	FORMAT	DESCRIPTION
1- 12	GRDTIM	XS3	Ground time derived from the computer clock - YRDDD HHMMSS
13- 21	CLOCK	XS3	Spacecraft clock - MMMMMMFSS * F - not a current value
22- 24	STATUS	BIN	Address of test status buffer
25- 36	NAMSEG	XS3	Name of other segments in residence.
37- 39	PRTST	BIN	Printer status - If zero, printer available to the segments.
40- 42	MODE1	BIN	Bit no. 18= 418 no. - 1= 4 mic. 0= 2 mic. 17-16= DEMOD. number 15-10= Operator number 9- 4= Station number 3- 1= Time code type
43- 45	REV	BIN	Revolution number
46- 48	TAPEST	BIN	Tape status - If zero, then tape available to the segments
49- 51	TAPEAS	BIN	Tape assignment - logical tape unit
52- 54	EOR	BIN	Tape end of medium - address of end of reel routine in the driver
55- 57	CMDENT	BIN	Command sent this frame INSATD
58- 63	CMDSTT	BIN	Command status - see pages E41 - E44 for codes. Commands are numbered from right to left.
64- 69	PRETIM	BIN	Predict time - YRDDD HRMNSC Octal 6 bits to a field
70- 72	ANALOG	BIN	Analog tape number.
73- 75	FRACNT	BIN	Frame counter - between 0 and 29.
76- 78	MODE	BIN	Mode indicator - 0 = real time 037777 = non-real time
79- 81	TEST	BIN	Test status reference to Field 'MUX'
82- 84	BUSSI	BIN	Bus current reference to Field 'MUX'

CHARACTER	FIELD NAME	FORMAT	DESCRIPTION
85- 87	MUX	BIN	MUX return
88- 90	BUSSV	BIN	Bus reference to Field 'VSC'
91- 93	BATTI	BIN	Battery charge voltage reference to Field 'VSC'
94- 96	VSC	BIN	Voltage sense common
97- 99	MODE2	BIN	Mode indicator no. 3 - bit no. 18 - unassigned 17-15 - Speed at which data was recorded 14-12 - Speed at which data was played 11- 9 - Data type 1 = PCM 2 = 30X 4 = 40X 8 - PAM flag 7 - Epoch flag - 0=Prelaunch 1=Post launch 6- 4 - Data quality 3 - VLF flag 2- 1 - Spacecraft number 0 = Prototype 1 = Flight 2 = Flight spare 3 = INJUN VI
100-105	TIMCOD	BIN	Time code reference - YRDDD HRMNSC
106-108	MILLI	BIN	Millisecond counter from time code
109-111	R100M	BIN	100 CPS counter time reference
112-114	R100S	BIN	100 CPS counter time reference
115-117	D100M	BIN	100 CPS counter data reference
118-120	D100S	BIN	100 CPS counter data reference
121-390	DATA	BIN	Satellite data - one satellite data word = 18 bits. The format for these 90 items can be found between pages E-6 and E-63.
391-396		BIN	Geographic longitude
397-402		BIN	Geographic latitude
403-403		BIN	Radial distance
409-414		BIN	Altitude above reference spheriod
415-420		BIN	Real field longitude of the intersection of the line of force and a surface 100Km above the reference spheroid

CHARACTER	FIELD NAME	FORMAT	DESCRIPTION
421-426		BIN	The intersection of the line of force and a surface 100 KM. above the reference spheriod (Ingress & Egress)
427-432		BIN	Real field latitude of the intersection of
433-438		BIN	the line of force & a surface 100 KM. above the reference spheriod (Ingress & Egress)
439-444		BIN	Local time (hours)
445-450		BIN	Right ascension
451-456		BIN	Velocity vector right ascension
457-462		BIN	Velocity vector declination
463-468		BIN	Velocity vector magnitude
469-474		BIN	Real field right ascension
475-480		BIN	Real field declination
481-486		BIN	Celestial right ascension of sun
487-492		BIN	Celestial declination of sun
493-498		BIN	Geomagnetic longitude
499-504		BIN	Geomagnetic latitude
505-510		BIN	Equatorial distance to line of force (Rø)
511-516		BIN	Longitude of intersection of line of force and a surface 100 KM. above the reference spheriod (Ingress & Egress)
517-522		BIN	
523-528		BIN	Latitude of intersection of line of force and a surface 100 KM. above the reference spheriod (Ingress & Egress)
529-534		BIN	
535-540		BIN	Local time (hours)
541-546		BIN	L (McIlwain Parameter)
547-552		BIN	B
553-558		BIN	B/B (Equator)
559-564		BIN	Invariant latitude
565-570		BIN	Time to next sunrise
571-576		BIN	Time to next sunset

CHARACTER	FIELD NAME	FORMAT	DESCRIPTION
577-579		BIN	X Magnetometer (component of B)
580-582		BIN	Y Magnetometer (component of B)
583-585		BIN	Z Magnetometer (component of B)
586-588		BIN	X Solar Aspect (COSINE)
589-591		BIN	Y Solar Aspect (COSINE)
592-594		BIN	Z Solar Aspect (COSINE)
595-600		BIN	Velocity Vector X (COSINE)
601-606		BIN	Velocity Vector Y (COSINE)
607-612		BIN	Velocity Vector Z (COSINE)
613-618		BIN	B_R R Component of B
619-624		BIN	B_φ φ Component of B
625-630		BIN	B_θ θ Component of B
631-636		BIN	0 Sun 1000 shade
637-642		BIN	E
643-648		BIN	Angle between B + S
649-654		BIN	Angle between B + V
655-660		BIN	Angle between E + S
661-666		BIN	X position inertial
667-672		BIN	Y position inertial
673-678		BIN	Z position inertial
679-684		BIN	XDOT inertial
685-690		BIN	YDOT inertial
691-696		BIN	ZDOT inertial

I. INJUN V DATA FORMATS

A. Introduction

The following section is a summary of data formats and housekeeping conversions. This summary includes information on both the pre and post-launch data systems.

B. Data Definitions

The smallest unit of information received from the spacecraft is called a WORD. Each word consists of nine bits, eight of which contain data and the ninth used as a parity check bit. The parity bit is in the low order or right-most portion of a word and is used to maintain the condition such that an odd number of bits in each word are in the on or "1" state.

Word Format

```
Bit Number    8 7 6 5 4 3 2 1 0
Contents      -------Data-------------Parity
```

The words are transmitted in groups of 90, the first two of which contain an 11 bit sync to indicate the start of the group. This group of 90 words is called a FRAME.

Frame Format

Word No. 0 1 ----------89

Words 0 and 1 contain a frame start flag.

Words 47, 69, and 81 of each frame are further divided (subcommutated) so that it takes 30 frames to represent all the data that appears in these positions. The start of a set of 30 frames representing 2700 satellite words is determined by a flag called a sync word that appears simultaneously in words 69 and 81. This sync pattern also appears in word 81 frames 10 and 20, word 47 frame 17.

The data is transmitted in digital form in two modes, Bi-Phase and Non-Return to Zero. The Bi-Phase is the normal mode of operation and is transmitted at a rate of one frame per second. This form of data is the LOW RATE mode of operation.

The NRZ data is transmitted at one of two speeds. First, there is the real-time mode in which the data is transmitted live at a rate of 30 frames per second. The form of operation is called HIGH RATE data. Second, there is the nonreal-time NRZ data. This data is that which is recorded and transmitted at a rate of 40 frames per second. This recorder playback is known as TAPE DUMP data.

C. Frame Format

The 90 words of the frame are divided up between the experiments data and engineering data. The following is a table of data word assignments for each frame.

FUNCTION	WORD NUMBERS
Frame Sync	0, 1
Engineering Subcommutator	47, 69, 81
Magnetometer	66, 67, 68
Solar Aspect	85, 86, 87, 88, 89
AFCRL	21 to 23, 59 to 61, 82 to 84
LEPEDEA	2 to 12, 24 to 33, 48 to 58, 70 to 80
SSD	13 to 20, 34 to 46
VLF	62 to 65

Main Frame Format Diagram

	0	1	2	3	4	5	6	7	8	9
0	B	B	L	L	L	L	L	L	L	L
1	L	L	L	S	S	S	S	S	S	S
2	S	A	A	A	L	L	L	L	L	L
3	L	L	L	L	S	S	S	S	S	S
4	S	S	S	S	S	S	S	H	L	L
5	L	L	L	L	L	L	L	L	L	A
6	A	A	V	V	V	V	M	M	M	H
7	L	L	L	L	L	L	L	L	L	L
8	L	H	A	A	A	SA	SA	SA	SA	SA*

B	Frame Sync	A	AFCRL
L	LEPEDEA	H	HOUSEKEEPING
S	SSD	SA	SOLAR ASPECT
V	VLF	M	MAGNETOMETER

*Word 89 contains 3 bits of Solar Aspect information plus 2 Housekeeping bits.

FIGURE 1

TABLE 1

90 STATE COMMUTATOR FUNCTIONS

Channel	User	Function
00	SC	Frame Sync Word (1)
01	SC	Frame Sync and Status (2)
02	LEPEDEA	Flex Format
03	LEPEDEA	Flex Format
04	LEPEDEA	Flex Format
05	LEPEDEA	Flex Format
06	LEPEDEA	Flex Format
07	LEPEDEA	Flex Format
08	LEPEDEA	Flex Format
09	LEPEDEA	Flex Format
10	LEPEDEA	Flex Format
11	LEPEDEA	Flex Format
12	LEPEDEA	Flex Format
13	PNJ	CMD Status
14	PNJ	Alpha 2-1
15	PNJ	Alpha 3-1
16	PNJ	Alpha 4-1
17	PNJ	Alpha 1-1
18	PNJ	PET 1-4
19	PNJ	PET 1-3
20	PNJ	PET 1-2
21	AFCRL	Expt. Output TM No. 1
22	AFCRL	Expt. Output TM No. 2
23	AFCRL	Expt. Output TM No. 3
24	LEPEDEA	Flex Format
25	LEPEDEA	Flex Format
26	LEPEDEA	Flex Format
27	LEPEDEA	Flex Format
28	LEPEDEA	Flex Format

Table 1 (Continued)

Channel	User	Function
29	LEPEDEA	Flex Format
30	LEPEDEA	Flex Format
31	LEPEDEA	Flex Format
32	LEPEDEA	Flex Format
33	LEPEDEA	Flex Format
34	PNJ	PET 1-1
35	PNJ	PET 2-4
36	PNJ	PET 2-3
37	PNJ	PET 2-2
38	PNJ	PET 2-1
39	PNJ	PET 3-4
40	PNJ	PET 3-3
41	PNJ	PET 3-2
42	PNJ	PET 3-1
43	PNJ	PET 4-4
44	PNJ	PET 4-3
45	PNJ	PET 4-2
46	PNJ	PET 4-1
47	SC	Housekeeping Subcommutator
48	LEPEDEA	Flex Format
49	LEPEDEA	Flex Format
50	LEPEDEA	Flex Format
51	LEPEDEA	Flex Format
52	LEPEDEA	Flex Format
53	LEPEDEA	Flex Format
54	LEPEDEA	Flex Format
55	LEPEDEA	Flex Format
56	LEPEDEA	Flex Format
57	LEPEDEA	Flex Format
58	LEPEDEA	Flex Format
59	AFCRL	Expt. Output TM No. 1
60	AFCRL	Expt. Output TM No. 2

Table 1 (Continued)

Channel	User	Function
61	AFCRL	Expt. Output TM No. 3
62	VLF	
63	VLF	
64	VLF	
65	VLF	
66	SC	Magnetometer Axis X
67	SC	Magnetometer Axis Y
68	SC	Magnetometer Axis Z
69	SC	Experiments Subcommutator
70	LEPEDEA	Flex Format
71	LEPEDEA	Flex Format
72	LEPEDEA	Flex Format
73	LEPEDEA	Flex Format
74	LEPEDEA	Flex Format
75	LEPEDEA	Flex Format
76	LEPEDEA	Flex Format
77	LEPEDEA	Flex Format
78	LEPEDEA	Flex Format
79	LEPEDEA	Flex Format
80	LEPEDEA	Flex Format
81	SC	Housekeeping Subcommutator
82	AFCRL	Expt. Output TM No. 1
83	AFCRL	Expt. Output TM No. 2
84	AFCRL	Expt. Output TM No. 3
85	SC	Solar Aspect Output No. 1
86	SC	Solar Aspect Output No. 2
87	SC	Solar Aspect Output No. 3
88	SC	Solar Aspect Output No. 4
89	SC	Solar Aspect Output No. 5

D. Frame Sync Format

The first two words of each frame contain an 11 bit frame start flag.

Frame Sync Format

Word No.	0									1								
Bit No.	8	7	6	5	4	3	2	1	0	8	7	6	5	4	3	2	1	0
Pattern	0	1	0	0	1	0	0	I	P	0	1	1	1	T	I	I	I	P

I These positions are ignored.

T Time code bit. This bit is a 0 when command 14 is on and a 1 when command 14 is off.

P Parity bit.

E. Magnetometer Format

The magnetometer data is read out in words 66, 67 and 68 plus a calibration voltage in word 47 frame 7. Words 66, 67 and 68 represent the x, y and z directions respectively.

The preflight calibrations done on the magnetometer were found to be somewhat in error, and it was necessary to determine new calibration curves from flight data. The following equations were used to determine the magnetic field as measured by the spacecraft.

$$B_x = -.151+.2117.X$$

$$B_y = .655-.245.Y$$

$$B_z = .562-.2.Z$$

The following pages contain the calibration data for the Flight unit and Flight space magnetometer.

TABLE 2

Magnetometer Calibration

Flight S/N 1619 6-14-68

Z Axis

GAUSS	VOLTS
+.50	4.80
+.45	4.57
.40	4.33
.35	4.08
.30	3.86
.25	3.61
.20	3.39
.15	3.14
.10	2.88
.05	2.65
.00	2.43
-.05	2.18
-.10	1.94
-.15	1.71
-.20	1.45
-.25	1.23
-.30	1.00
-.35	.74
-.40	.49
-.45	.25
-.50	.02

Z Axis bias .0137 Gauss

TABLE 3

Magnetometer Calibration

Flight S/N 1619 6-14-68

Y Axis

GAUSS	VOLTS
+.50	.10
.45	.35
.40	.59
.35	.80
.30	1.06
.25	1.29
.20	1.55
.15	1.78
.10	2.02
.05	2.23
.00	2.47
-.05	2.72
-.10	2.96
-.15	3.19
-.20	3.41
-.25	3.67
-.30	3.88
-.35	4.14
-.40	4.37
-.45	4.61
-.50	4.84

Y Axis bias .002 Gauss

TABLE 4

Magnetometer Calibration

Flight S/N 1619 6-14-68

X Axis

GAUSS	VOLTS
+.50	.16
.45	.37
.40	.63
.35	.87
.30	1.10
.25	1.33
.20	1.57
.15	1.82
.10	2.04
.05	2.29
.00	2.49
-.05	2.74
-.10	2.98
-.15	3.21
-.20	3.45
-.25	3.67
-.30	3.92
-.35	4.16
-.40	4.39
-.45	4.63
-.50	4.86

X Axis bias .0061 Gauss

S/C on table. Magnetometer in S/C magnets are out of S/C.

X Axis 2.47 Cal. 2.49

Y Axis 2.53

Z Axis 2.57

Period of oscillation with spring Z axis vertical (roll axis).

4.4 sec

Spring Constants 46.2 lbs. 1 ft.

Moment Arm 10-5/32"

$$I = \frac{KL^2}{W^2}$$

S/C on table. Magnets in S/C

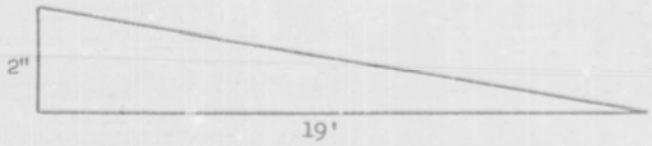
X Axis .69
Y Axis 2.63 } 1, 3. 8, 13
Z Axis 3.14

All systems on

X Axis .69

Y Axis 2.63

Z Axis 3.16

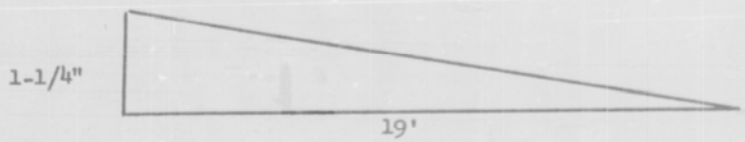


Osc. frequency 368 sec .6 gauss applied

33 grams--lever arm 1-1/8" perpendicular to field H=.6 gauss

$$M = \frac{T}{H}$$

Turned S/C with Z axis parallel to table.



Period of oscillation with spring no field applied -- 5 sec.

Period of oscillation without spring and with a .6 gauss field applied in the X axis, 359 sec.

32 grams--lever arm 1-1/8" perpendicular to field.

TABLE 5

Calibration of Flight Space Magnetometer

6-12-68

X Axis

GAUSS	VOLTS
+.50	.14
.45	.37
.40	.61
.35	.86
.30	1.09
.25	1.33
.20	1.57
.15	1.80
.10	2.04
.05	2.29
.00	2.49
-.05	2.74
-.10	2.98
-.15	3.21
-.20	3.43
-.25	3.67
-.30	3.92
-.35	4.16
-.40	4.37
-.45	4.63
-.50	4.86

X Axis bias .0061 Gauss

TABLE 6

Calibration of Flight Space Magnetometer

6-12-68

Y Axis

GAUSS	VOLTS
+.50	.08
.45	.33
.40	.57
.35	.80
.30	1.06
.25	1.29
.20	1.53
.15	1.76
.10	2.00
.05	2.23
.00	2.47
-.05	2.70
-.10	2.94
-.15	3.19
-.20	3.41
-.25	3.67
-.30	3.88
-.35	4.14
-.40	4.37
-.45	4.61
-.50	4.86

Y Axis bias .002 Gauss

TABLE 7

Calibration of Flight Space Magnetometer

6-12-68

Z Axis

GAUSS	VOLTS
+.50	4.80
.45	4.57
.40	4.33
.35	4.08
.30	3.84
.25	3.61
.20	3.37
.15	3.12
.10	2.88
.05	2.65
.00	2.41
-.05	2.18
-.10	1.92
-.15	1.69
-.20	1.45
-.25	1.22
-.30	.98
-.35	.73
-.40	.47
-.45	.24
-.50	.00

Z Axis bias .0137 Gauss

F. Solar Aspect Format

The solar aspect data appears in words 85, 86, 87, 88 and 89 of each frame. The spacecraft contains six aspect sensors which are wired in pairs. The three pairs are further subcommutated between a narrow view angle and a wide view angle. Three of the sensors contain photo diodes, to aid in resolving which of the sensor pairs are facing toward the sun. Except for the diodes the data is an analog voltage that reflects the presents of sunlight.

Sensor Format

Frame No.	Word No.	Function
EVEN	85,86,87	COSINE (Wide Angle)
ODD	85,86,87	LINEAR (Narrow Angle)
ALL	88	SENSOR CALIBRATION
ALL	89	PHOTO DIODES

The photo diodes are added together and are readout in word 89.

Word 89 Format

Bit No.	8	7	6	5	4	3	2	1	0
Function	DA	DB	DC	H	H	X	X	X	P

DA Diode for Axis A
DB Diode for Axis B
DC Diode for Axis C
H Housekeeping
X Ignored
P Parity bit

Figures 2 through 6 contain typical calibration curves for the solar aspect sensors.

TABLE 8

ASPECT NUMBERING CONVENTIONS

NO.	LETTER	POSITION	DIODE
1	+A	60° Top	No
2	-A	240° Bottom	Yes
3	+B	120° Top	No
4	-B	300° Bottom	Yes
5	+C	300° Top	No
6	-C	120° Bottom	Yes

Wide Angle Detectors have a 90° 1/2 angle.

Narrow Angle Detectors have a 45° 1/2 angle.

Calibration Detectors have a 4° and 15° 1/2 angle.

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SOLAR ASPECT VIEWING DIRECTIONS

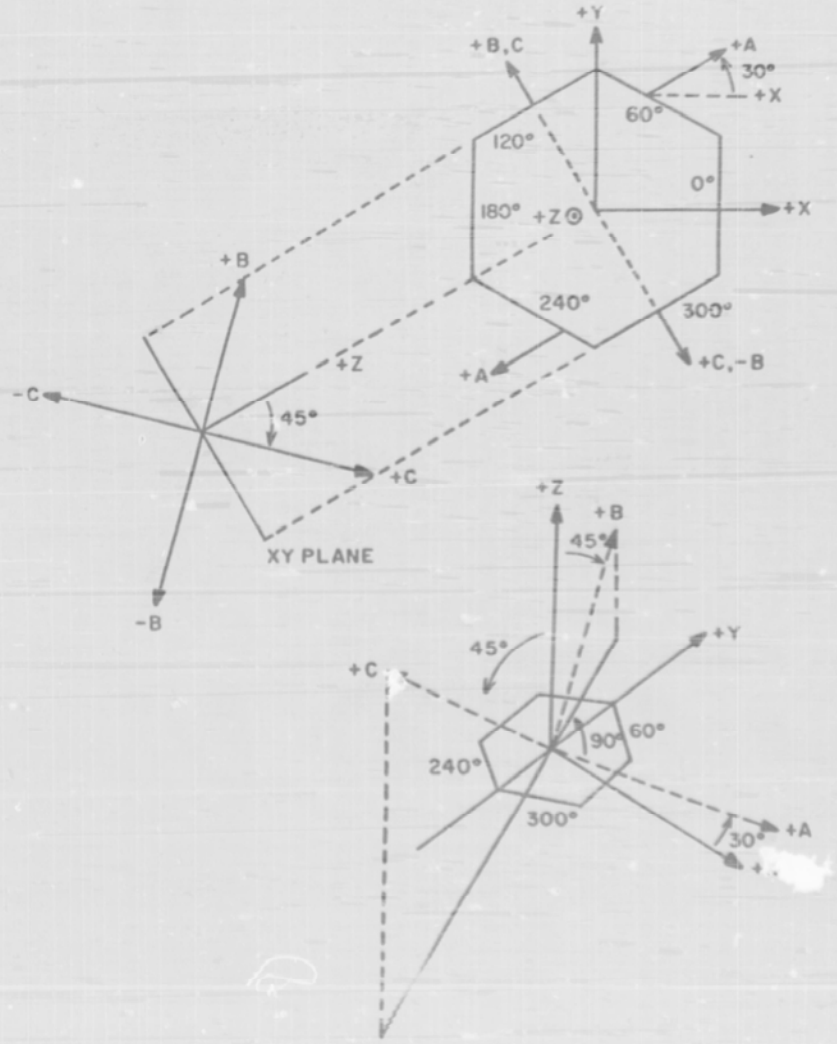

FIGURE 2

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SOLAR ASPECT VIEW ANGLES

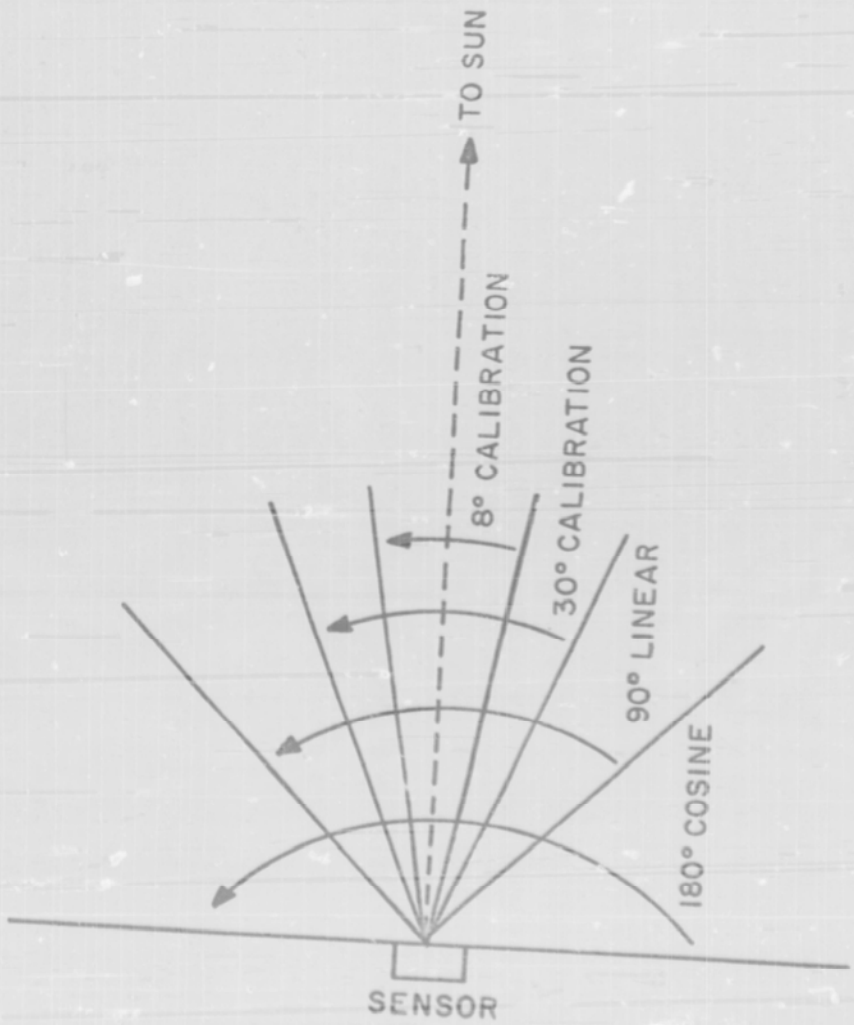
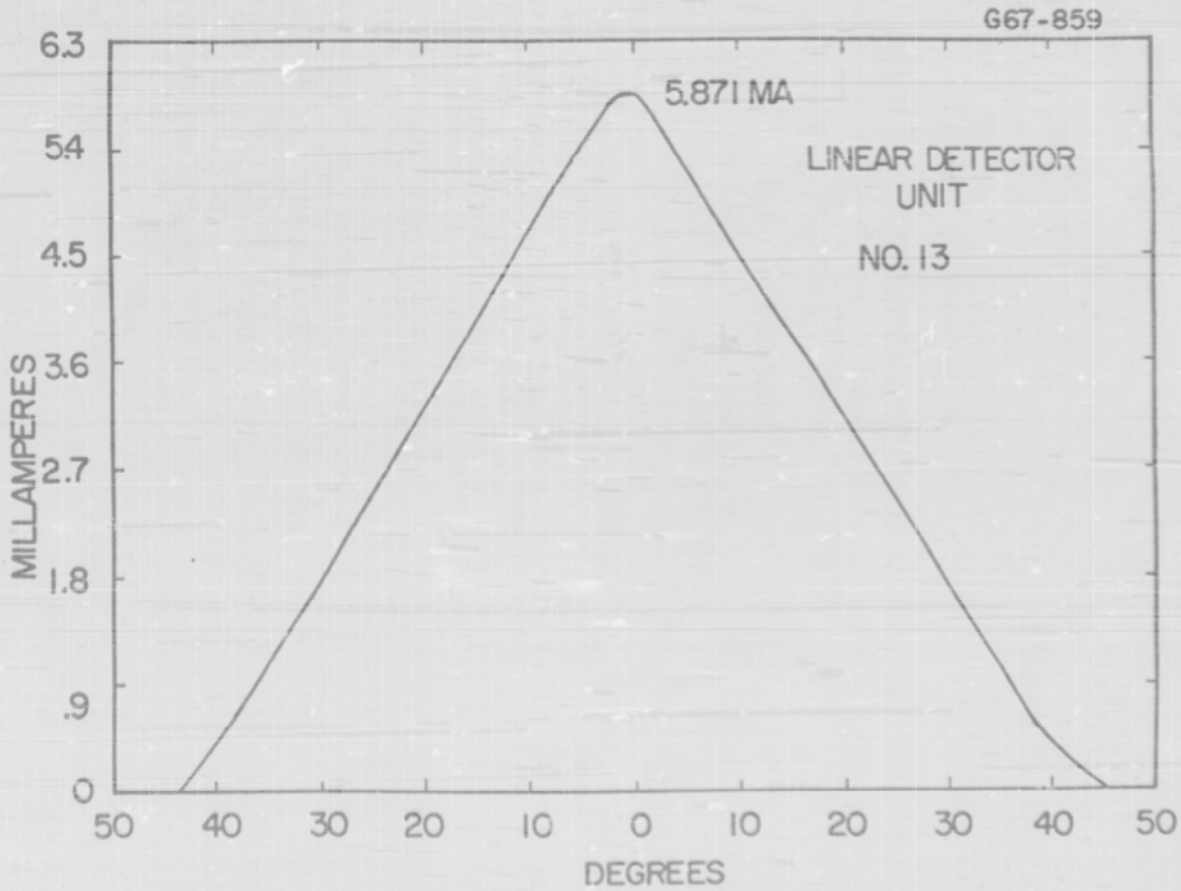
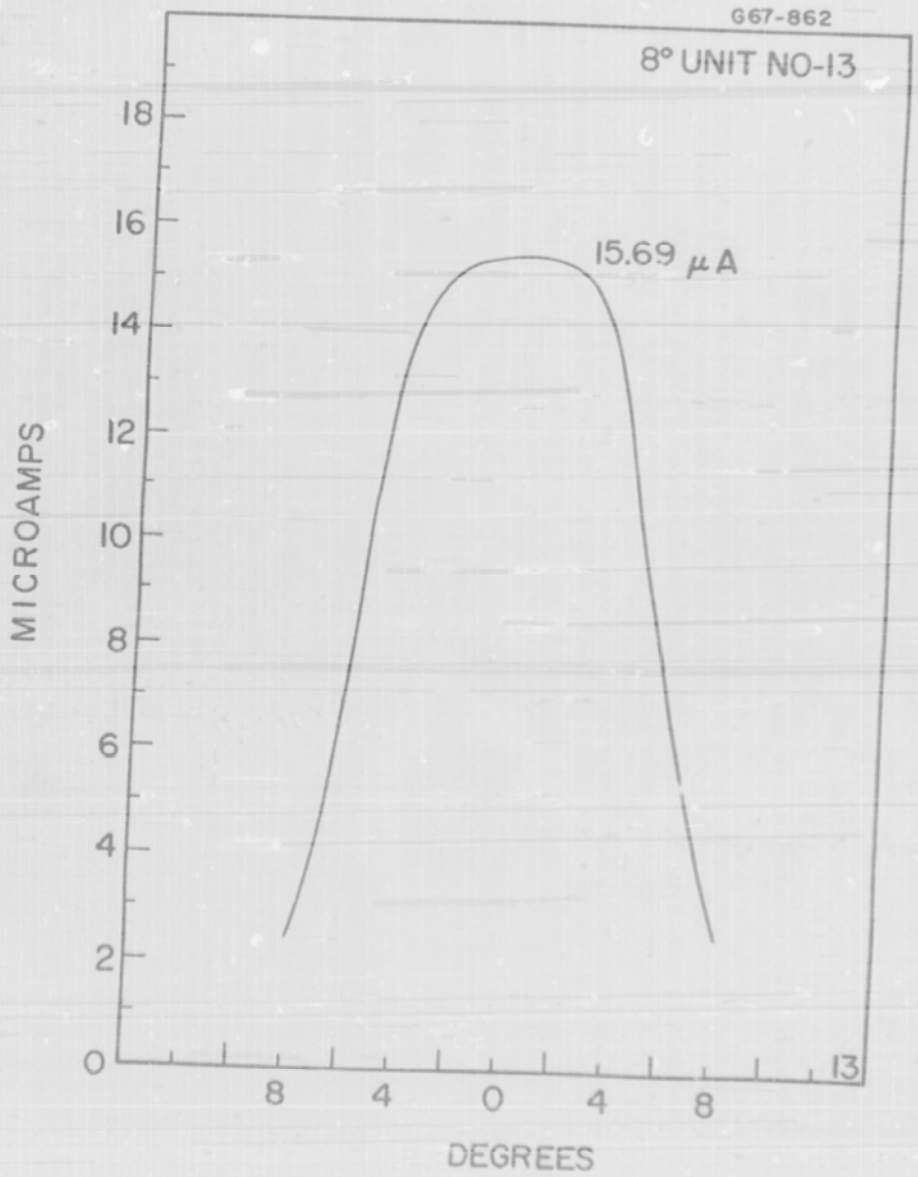


FIGURE 3



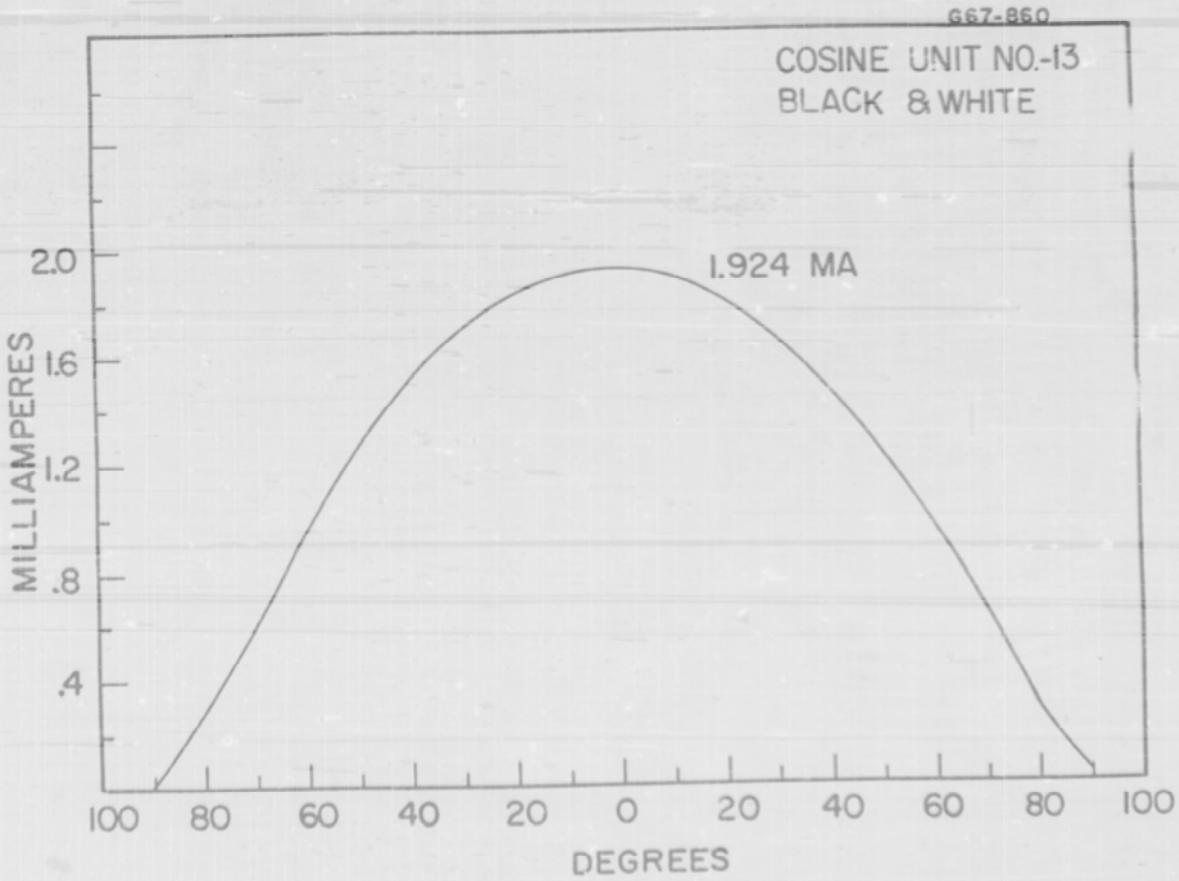
TYPICAL SOLAR ASPECT CALIBRATION CURVE (LINEAR DETECTOR)

FIGURE 4



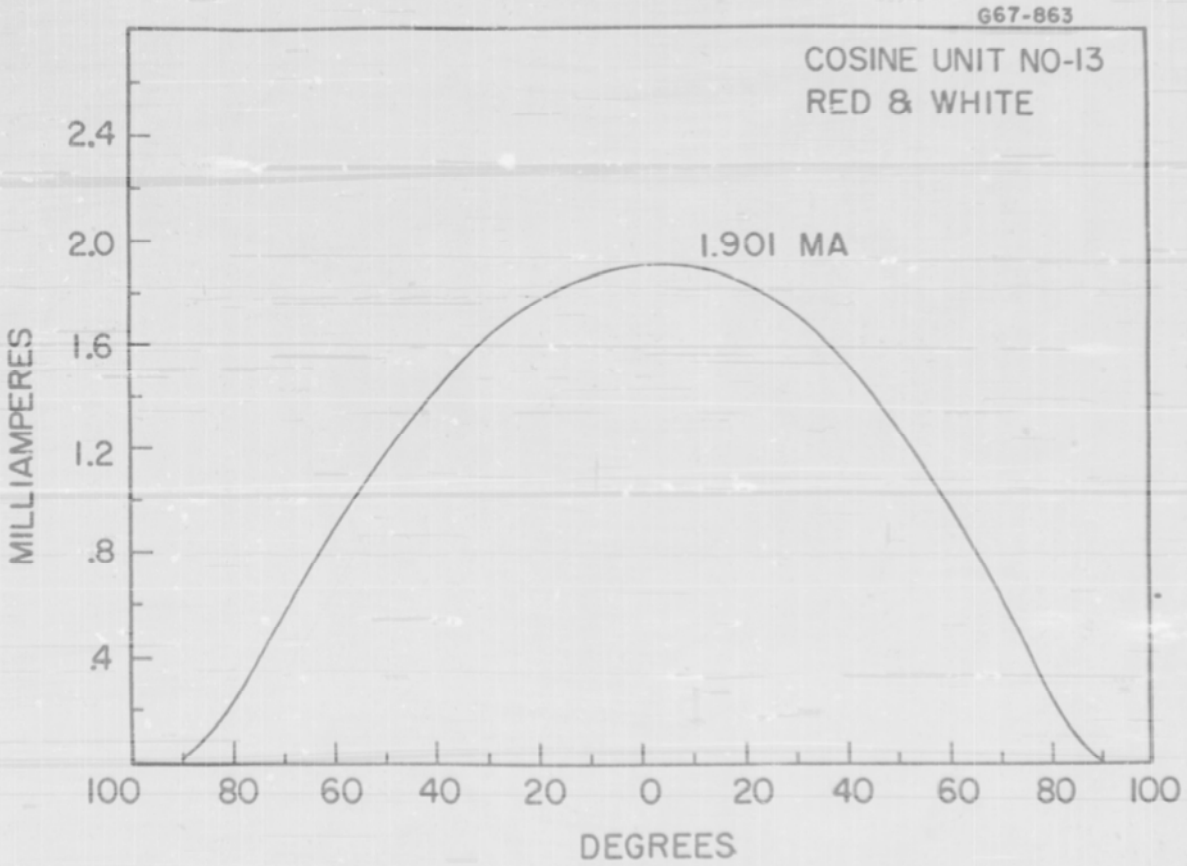
TYPICAL SOLAR ASPECT CALIBRATION CURVE (8° DETECTOR)

FIGURE 5



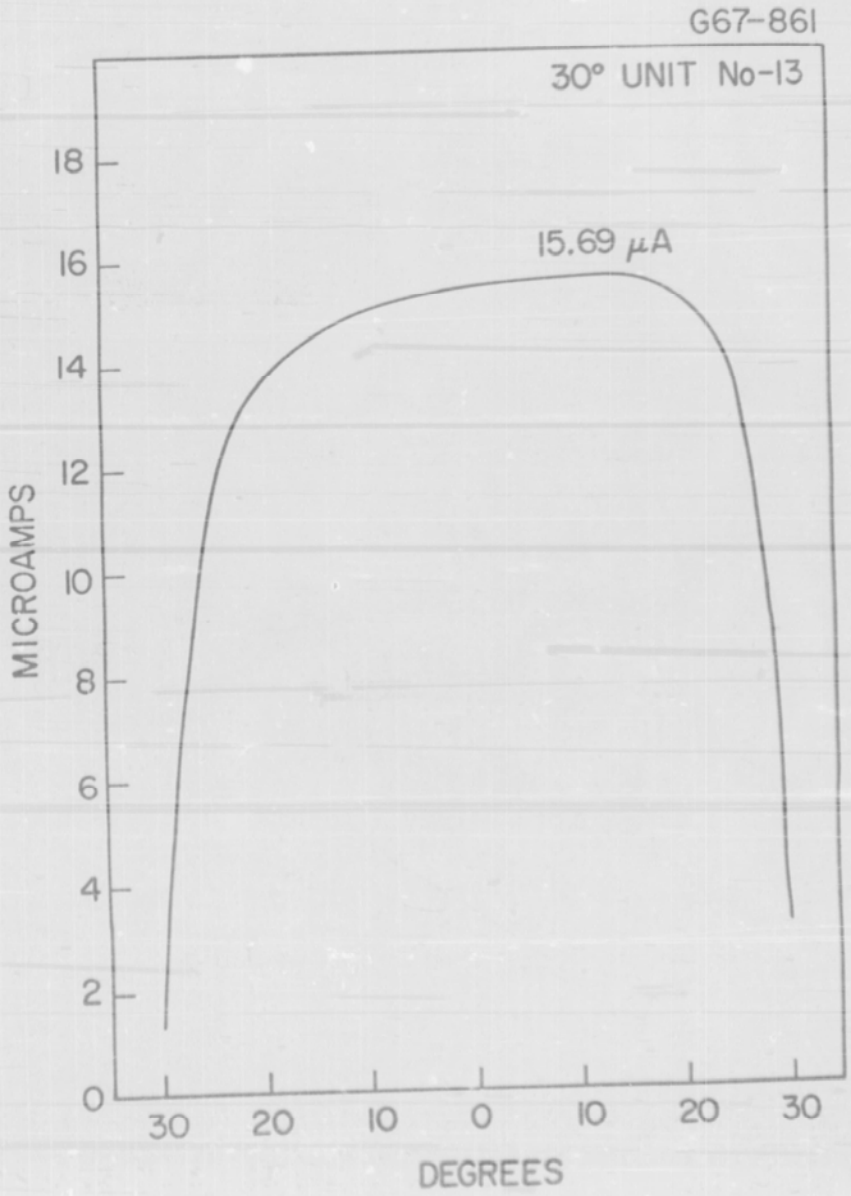
TYPICAL SOLAR ASPECT CALIBRATION CURVE (COSINE DETECTOR)

FIGURE 5



TYPICAL SOLAR ASPECT CALIBRATION CURVE (COSINE DETECTOR)

FIGURE 7



TYPICAL SOLAR ASPECT CALIBRATION CURVE (30° DETECTOR)

FIGURE 8

G. Formats of Housekeeping Data

The spacecraft housekeeping is read on words 47, 69 and 81 of a data frame. The following is a table of housekeeping functions and their word assignments.

Function	Position (WD-FR)
Frame Sync	47-17, 69-00, 81-00, 81-10, 81-20
Calibration Voltages	47-01, 47-02, 47-03, 47-04, 47-05, 47-06
Calibration Magnetometer	47-07
Clock	47-00, 47-10, 47-11, 47-12, 47-13, 47-14, 47-20, 81-02, 81-12
Command Status	47-18, 47-19, 47-21, 47-22, 47-23, 47-24, 47-25, 47-26, 47-29
Recorder Status	81-03
Array Voltage	47-15, 47-27
Array Current	47-16, 47-28
Bus Voltage	69-15, 69-27
Battery Current	69-16, 69-28
Dump Voltage	81-15, 81-27
Load Current	81-16, 81-28
Auxilary Supply	47-08, 81-04
Panel Temperatures	81-06, 81-07, 81-08, 81-13, 81-14, 81-17, 81-18
Aspect Temperatures	81-05, 69-23, 69-24, 81-25, 69-29, 69-26
Cage Temperatures	81-23, 81-24
VLF	69-01, 69-02, 69-03, 69-04, 69-06, 69-07, 69-08, 69-09, 69-10, 69-11, 69-12, 69-13, 69-14, 69-17, 69-25, 69-29, 81-29
SSD	69-18, 69-19, 69-20, 69-21, 69-22

TABLE 9

INJUN V ENGINEERING SUBCOMMUTATOR ASSIGNMENTS

	WORD 47	WORD 69	WORD 81
0	CLOCK NO. 1	FRAME SYNC WORD	FRAME SYNC WORD
1	CALIBRATE 0.0	SPHERE POTENTIAL DIFF.	AGC VOLTAGE
2	CALIBRATE 1.0	SPHERE ELECTRONICS TEMP.	CLOCK NO. 1
3	CALIBRATE 2.0	ELEC. ANT. BOOM NO. 1 POSITION	RECORDER STATUS
4	CALIBRATE 3.0	ELEC. ANT. BOOM NO. 2 POSITION	AUX. SUPPLY +5.0 MONITOR
5	CALIBRATE 4.0	SPHERE POTENTIAL DIFF.	SOLAR ASPECT TEMP. NO. 1
6	CALIBRATE 5.0	MAG. ANT. BOOM POSITION 1, 2	TOP PANEL TEMP.
7	CALIBRATE MAGNETOMETER	MAG. PREAMP TEMP.	BOTTOM PANEL TEMP.
8	12 VOLT AUX. SUPPLY MONITOR	VLF ELECTRONICS TEMP.	PANEL A TEMP.
9	TEST STATUS IND.	SPHERE POTENTIAL DIFF.	PANEL B TEMP.
10	CLOCK NO. 1	ELECTRON GUN POTENTIAL	FRAME SYNC WORD
11	CLOCK NO. 2	SPHERE POTENTIAL AVERAGE	AGC VOLTAGE
12	CLOCK NO. 3	MAG. ANT. BOOM POSITION 3, 4	CLOCK NO. 1
13	CLOCK NO. 4	SPHERE POTENTIAL DIFF.	PANEL C TEMP.
14	CLOCK NO. 5	BALLOON EVENT MONITOR	PANEL D TEMP.
15	SOLAR ARRAY VOLTAGE	BUS VOLTAGE	POWER LAMP VOLTAGE (5 OHM)
16	SOLAR ARRAY CURRENT	BATTERY CURRENT	LOAD CURRENT
17	FRAME SYNC WORD	SPHERE POTENTIAL DIFF.	PANEL E TEMP.
18	CCS STATUS NO. 7	SSD TEMP. NO. 2	PANEL F TEMP.
19	CCS STATUS NO. 8	SSD VOLTAGE (+3.0)	BATTERY TEMP.
20	CLOCK NO. 1	SSD TEMP. NO. 1	FRAME SYNC WORD

TABLE 9 (Continued)

	WORD 47	WORD 69	WORD 81
21	CCS STATUS NO. 1	SPHERE POTENTIAL DIFF.	AGC VOLTAGE
22	CCS STATUS NO. 2	SSD VOLTAGE (+8.0)	CLOCK NO. 1
23	CCS STATUS NO. 3	SOLAR ASPECT TEMP. NO. 2	CAGE A TEMP.
24	CCS STATUS NO. 4	SOLAR ASPECT TEMP. NO. 3	CAGE B TEMP.
25	CCS STATUS NO. 5	SPHERE POTENTIAL DIFF.	SOLAR ASPECT TEMP. NO. 5
26	CCS STATUS NO. 6	SOLAR ASPECT TEMP. NO. 4	SOLAR ASPECT TEMP. NO. 6
27	SOLAR ARRAY VOLTAGE	BUS VOLTAGE	POWER DUMP VOLTAGE (5 OHM)
28	SOLAR ARRAY CURRENT	BATTERY CURRENT	LOAD CURRENT
29	CCS STATUS NO. 9	SPHERE POTENTIAL DIFF.	BALLOON EVENT MONITOR

1. Frame Sync Format

The frame number is determined by looking for certain fixed values in a sequence. The main value used to determine the frame number is called a sync word. This sync word appears in word 47 frame 17, word 69 frame 00, and word 81 frames 0, 10, and 20. Because of the uncertainty in the analog-to-digital conversion in the spacecraft data system, the sync word may be one of two values.

Sync Word Format

Bit No.	8	7	6	5	4	3	2	1	0	Resulting Output
Pattern 1	0	1	0	0	1	0	0	0	1	1.41 Volts
Pattern 2	0	1	0	0	1	0	0	1	0	1.43 Volts

2. Calibration Voltage Format

The status of the data system is monitored by a set of calibration voltages that appear in word 47. These voltages are the 0, 1, 2, 3, 4, and 5 volt references. These voltages on the flight unit read 20 to 40 millivolts lower than their name value; that is, the 1 volt calibrate will read .98 or .96 volts instead of 1 volt.

Subcommutator Position in Word 47

FRAME	CALIBRATE	NORMAL VALUE
1	0 Volt	.00 Volts
2	1 Volt	.98 Volts
3	2 Volt	1.98 Volts
4	3 Volt	2.98 Volts
5	4 Volt	3.98 Volts
6	5 Volt	4.96 Volts

3. Accumulator Clock Format

The spacecraft clock is read out in the housekeeping data in words 47 and 81. The accumulator clock is a 24 bit register that has been divided into five sections, each of which is read out in a separate word. The low order 6 bits of the accumulator is short cycled to count from 0 to 29 instead of 32. The accumulator is incremented once every second no matter which data rate is being used.

Clock Read Out Format

BIT NO.	WORD NO.	CLOCK RANGE	RAW VALUE
4-0	47-0,47-10, 47-20,81-2, 81-12,81-22	0-29	0-5.00V
9-5	47-11	0-31	0-5.00V
14-10	47-12	0-31	0-5.00V
19-15	47-13	0-31	0-5.00V
23-20	47-14	0-15	0-5.00V

Register Format

Bit No.	23----------6	5----------0
	Minutes	Seconds

Conversion Table for Spacecraft Clock

VOLTS	REGISTER VALUE	
	Reg. 1,2,3,4	Reg. 5
0.00-0.08	00000	0000
0.09-0.24	00001	
0.25-0.40	00010	0001
0.41-0.56	00011	0001
0.57-0.72	00100	0010
0.73-0.88	00101	0010
0.89-1.04	00110	0011

VOLTS	REGISTER VALUE	
	Reg. 1,2,3,4	Reg. 5
1.05-1.20	00111	0011
1.21-1.36	01000	0100
1.37-1.52	01001	0100
1.53-1.68	01010	0101
1.69-1.84	01011	0101
1.85-2.00	01100	0110
2.01-2.16	01101	0110
2.17-2.32	01110	0111
2.33-2.48	01111	0111
2.49-2.64	10000	1000
2.65-2.80	10001	1000
2.81-2.96	10010	1001
2.97-3.12	10011	1001
3.13-3.28	10100	1010
3.29-3.44	10101	1010
3.45-3.60	10110	1011
3.61-3.76	10111	1011
3.77-3.92	11000	1100
3.93-4.08	11001	1100
4.09-4.24	11010	1101
4.25-4.40	11011	1101
4.41-4.56	11100	1110
4.57-4.72	11101	1110
4.73-4.88	11110	1111
4.89-5.04	11111	1111

4. Command Status Format

The spacecraft has 35 command statuses, each of which can be in either of two states. The commands are numbered in two different ways; first, for internal use the statuses are numbered from 1 to 35; and second, for STADAN use the commands are numbered from 1 to 70.

Command Word Assignment

COMMAND NO.	WORD NO.	FRAME NO.	STATUS NO.
1-4	47	21	1
5-8	47	22	2
9-12	47	23	3
13-16	47	24	4
17-20	47	25	5
21-24	47	26	6
25-28	47	18	7
29-32	47	19	8
33-35	47	29	9

The command statuses are displayed in 9 words as indicated above. Each of the words represent the four of the commands giving 16 discrete voltage levels per word.

The spacecraft command system uses an eight address code plus a command code. The command address is generated by the command generator and need not be considered when generating commands from the computer.

The following is a summary of the command format and code numbers.

(a) Address word format is 00001001.

(b) The command execute words are made up from seventy combinations of 8 bits using a 4 out of 8 validity code. To find the bit pattern of the command, convert the number headed console code in Table 12 to a binary 8 position number.

The following pages contain calibration data for the command system status indicators. Because these indicators were not on a calibrated supply, it was necessary to normalize the command status voltage before it was converted to a bit pattern.

The command status bit pattern may be computed from the following formula:

$$\text{BITS} = \frac{(\text{RAW})(\text{BV}(26)/\text{BV}(\text{CURRENT})+.10)}{.27}$$

where

RAW	=	Raw voltages from command status word.
BV(26)	=	Raw bus voltage at 26 volts normally 3.63.
BV(CURRENT)	=	Current raw bus voltage.
BITS	=	Command status bit pattern.

NOTE: See Section H for command reception indicator.

TABLE 10

COMMAND SYSTEM CALIBRATION

COMMAND STATUS VOLTAGE VERSUS BUS (FLIGHT)

10 NOVEMBER 1967

BUS VOLTAGE (CONSOLE)	WORD (69,15)	CCS1 0101	CCS2 1000	CCS4 1000	CCS5 0111
22.5	3.14	1.23	1.96	1.90	1.65
23	3.19	1.27	2.02	1.94	1.67
23.5	3.27	1.29	2.06	1.98	1.71
24	3.35	1.31	2.10	2.04	1.74
24.5	3.41	1.33	2.14	2.08	1.78
25	3.49	1.37	2.18	2.12	1.82
25.5	3.55	1.39	2.21	2.16	1.86
26	3.63	1.43	2.25	2.20	1.90
26.5	3.68	1.45	2.31	2.23	1.94
27	3.76	1.47	2.35	2.29	1.96
27.5	3.84	1.51	2.39	2.33	2.00
28	3.90	1.53	2.43	2.37	2.04
28.5	3.98	1.57	2.47	2.41	2.08
29	4.04	1.59	2.53	2.45	2.12
29.5	4.12	1.61	2.55	2.51	2.16
30	4.17	1.65	2.59	2.55	2.20

CCS	MAX ΔV/STEP	MIN ΔV/STEP
1	.04	.02
2	.06	.04
4	.06	.04
5	.04	.02
WD (69,15)	.08	.05

TABLE 11

COMMAND SYSTEM CALIBRATION

COMMAND STATUS VOLTAGE VERSUS COMMAND (FLIGHT)

10 NOVEMBER 1967

CCS5	BIT	BUS	CCS5 NORMAL TO 26V
0	0000	3.47	0.00
0.25	0001	3.61	0.25138
0.53	0010	3.63	0.53
0.80	0011	3.61	0.804432
1.08	0100	3.61	1.0859
1.33	0101	3.59	1.3448
1.63	0110	3.61	1.639
1.88	0111	3.59	1.9009

ΔV PEP BIT MAX = .2942 MIN = .25138

TABLE 12

INJUN V COMMAND CODES

SUI Command No.	Stadan Command No.	Console Code	Baudot Code	Function
1 on	1	15-00	Letters, T	CCS receiver on
1 off	2	00-15	T, letters	CCS receiver cycle
2 on	3	14-08	V, O	Power regulator on
2 off	4	01-07	Z, Q	Power regulator off
3 on	5	13-08	X, O	Data on
3 off	6	02-07	L, Q	Data off
4 on	7	11-08	Figures, O	Data bit rate 24.3 kbps
4 off	8	04-07	H, Q	Data bit rate 810 bps
5 on	9	07-08	Q, O	Data storage start
5 off	10	08-07	O, Q	Data storage stop
6 on	11	14-04	V, H	Data storage record
6 off	12	01-11	Z, figures	Data storage reproduce
7 on	13	13-04	X, H	Data storage channel one
7 off	14	02-11	L, figures	Data storage channel two
8 on	15	11-04	Figures, H	Telemetry, 136 MHz transmitter on
8 off	16	04-11	H, figures	Telemetry, 136 MHz transmitter off
9 on	17	07-04	Q, H	Telemetry, 400 MHz transmitter on
9 off	18	08-11	O, figures	Telemetry, 400 MHz transmitter off

TABLE 1[illegible] (Continued)

SUI Command No.	Stadan Command No.	Console Code	Baudot Code	Function
10 on	19	12-12	M, M	Telemetry transmitters mod reversed
10 off	20	03-03	W, W	Telemetry transmitter mod normal
11 on	21	10-12	G, M	Telemetry 400 MHz non-VLF
11 off	22	05-03	Y, W	Telemetry 400 MHz VLF
12 on	23	06-12	P, M	Telemetry 400 MHz select storage
12 off	24	09-03	B, W	Telemetry 400 MHz select CCS
13 on	25	09-12	B, M	Housekeeping, 136 MHz on
13 off	26	06-03	P, W	Housekeeping, 136 MHz off
14 on	27	05-12	Y, M	Time code insertion on
14 off	28	10-03	G, W	Time code insertion off
15 on	29	03-12	W, M	Lepedea 1 on
15 off	30	12-03	M, W	Lepedea 1 off
16 on	31	14-02	V, L	Lepedea 2 on
16 off	32	01-13	Z, X	Lepedea 2 off
17 on	33	13-02	X, L	Lepedea 3 on
17 off	34	02-13	L, X	Lepedea 3 off
18 on	35	11-02	Figures, L	Lepedea 4 on
18 off	36	04-13	H, X	Lepedea 4 off
19 on	37	07-02	Q, L	Lepedea 5 on
19 off	38	08-13	O, X	Lepedea 5 off

TABLE 12 (Continued)

SUI Command No.	Stadan Command No.	Console Code	Baudot Code	Function
20 on	39	12-10	M, G	Lepedea 6 on
20 off	40	03-05	W, Y	Lepedea 6 off
21 on	41	10-10	G, G	Lepedea 7 on
21 off	42	05-05	Y, Y	Lepedea 7 off
22 on	43	06-10	P, G	Lepedea 8 on
22 off	44	09-05	B, Y	Lepedea 8 off
23 on	45	09-10	B, G	Lepedea 9 on
23 off	46	06-05	P, Y	Lepedea 9 off
24 on	47	05-10	Y, G	Lepedea 10 on
24 off	48	10-05	G, Y	Lepedea 10 off
25 on	49	03-10	W, G	Lepedea 11 on
25 off	50	12-05	M, Y	Lepedea 11 off
26 on	51	12-06	M, P	Lepedea 12 on
26 off	52	03-09	W, B	Lepedea 12 off
27 on	53	10-06	G, P	Lepedea 13 on
27 off	54	05-09	Y, B	Lepedea 13 off
28 on	55	06-06	P, P	VLF 1 on
28 off	56	09-09	B, B	VLF 1 off
29 on	57	09-06	B, P	VLF 2 on
29 off	58	06-09	P, B	VLF 2 off

TABLE 12 (Continued)

SUI Command No.	Stadan Command No.	Console Code	Baudot Code	Function
30 on	59	05-06	Y, P	VLF 3 on
30 off	60	10-09	G, B	VLF 3 off
31 on	61	03-06	W, P	SSD 1 on
31 off	62	12-09	M, B	SSD 1 off
32 on	63	08-14	O, V	S3D 2 on
32 off	64	07-01	Q, Z	SSD 2 off
33 on	65	04-14	H, V	SSD 3 on
33 off	66	11-01	Figures, Z	SSD 3 off
34 on	67	02-14	L, V	AFCRL 1 on
34 off	68	13-01	X, Z	AFCRL 1 off
35 on	69	01-14	Z, V	AFCRL 2 on
35 off	70	14-01	V, Z	AFCRL 2 off

5. Power System Conversion

The power system parameters are read out in words 47, 69, and 81. The following table shows the conversions of the raw values to engineering parameters.

FUNCTION	POSITION IN SEQUENCE
Solar Aspect Voltage	47-15, 47-27
Solar Aspect Current	47-16, 47-28
Bus Voltage	69-15, 69-27
Battery Current	69-16, 69-28
Power Dump Voltage	81-15, 81-27
Load Current	81-16, 81-28
Aux. 6.0 Supply	81-04
Aux. 12.0 Supply	47-08

FUNCTION	CONVERSION	RANGE	UNITS
12 Volt Aux.	R*3.00	12 +2%	Volts
6 Volt Aux.	R*2.00	6 +1%	Volts
Panel Volts	R*(55.7/4.64)	24-44	Volts
Panel Current	R*.30	.0-1.5	Amps
Bus Voltage	R*(33.4/4.64)	22-30	Volts
Bus Current	R*.30	0-+1.50	Amps
Battery Current*	R*.50-1.00	+1.50--1.50	Amps
Dump Current ((Bus Current*.25) + Bus Volt-Dump Volt)/5.0		0-1.00	Amps
Dump Volt	R*(33.4/4.64)	0-30	Volts

*NOTE

The battery current for the flight spare is somewhat different than the rest of the power systems. This calculation is done as follows:

Battery Current R*.40-.50

6. Temperature Conversions

There are several temperatures read out in the housekeeping words. The conversions for all the spacecraft values are the same.

$$V = E_{12} \left[1/(1 + (R_1 (R_2 + R_T))/R2*RT) \right]$$

where

V = raw value from data frame

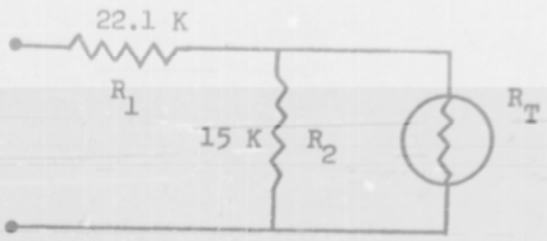
E = 12 volt supply voltage

R_1 = 22,100

R_2 = 15,000

R_T = value of sensor

T (degree C)	R_T
-70	935,000
-60	421,000
-50	201,000
-40	101,000
-30	53,100
-20	29,100
-10	16,600
+00	9,800
+10	5,970
+20	3,750
+30	2,420
+40	1,600
+50	1,080
+60	746
+70	526
+80	377



The flight data indicated that the battery temperature indicator was a sensistor instead of a thermister, and it was necessary to use a different conversion. This conversion was based on Table 14.

TABLE 13

THERMISTER TEMPERATURE CONVERSIONS

DEC C	VOLTS	DEC C	VOLTS	DEC C	VOLTS
-70.0	4.54	-40.0	4.21	-10.0	2.98
-69.0	4.54	-39.0	4.18	-9.0	2.92
-68.0	4.53	-38.0	4.15	-8.0	2.86
-67.0	4.53	-37.0	4.13	-7.0	2.81
-66.0	4.52	-36.0	4.10	-6.0	2.75
-65.0	4.52	-35.0	4.07	-5.0	2.69
-64.0	4.51	-34.0	4.04	-4.0	2.63
-63.0	4.51	-33.0	4.01	-3.0	2.57
-62.0	4.50	-32.0	3.98	-2.0	2.51
-61.0	4.49	-31.0	3.95	-1.0	2.46
-60.0	4.49	-30.0	3.92	0.0	2.40
-59.0	4.48	-29.0	3.88	1.0	2.34
-58.0	4.47	-28.0	3.84	2.0	2.29
-57.0	4.46	-27.0	3.80	3.0	2.23
-56.0	4.45	-26.0	3.76	4.0	2.17
-55.0	4.44	-25.0	3.72	5.0	2.12
-54.0	4.43	-24.0	3.67	6.0	2.06
-53.0	4.42	-23.0	3.63	7.0	2.00
-52.0	4.41	-22.0	3.59	8.0	1.95
-51.0	4.40	-21.0	3.55	9.0	1.89
-50.0	4.39	-20.0	3.51	10.0	1.84
-49.0	4.37	-19.0	3.46	11.0	1.79
-48.0	4.35	-18.0	3.40	12.0	1.74
-47.0	4.34	-17.0	3.35	13.0	1.69
-46.0	4.32	-16.0	3.30	14.0	1.64
-45.0	4.30	-15.0	3.24	15.0	1.60
-44.0	4.28	-14.0	3.19	16.0	1.55
-43.0	4.27	-13.0	3.14	17.0	1.50
-42.0	4.25	-12.0	3.09	18.0	1.45
-41.0	4.23	-11.0	3.03	19.0	1.40

TABLE 13 (Continued)

DEC C	VOLTS	DEC C	VOLTS	DEC C	VOLTS
20.0	1.36	40.0	0.70	60.0	0.35
21.0	1.32	41.0	0.68	61.0	0.34
22.0	1.28	42.0	0.66	62.0	0.33
23.0	1.24	43.0	0.64	63.0	0.32
24.0	1.20	44.0	0.62	64.0	0.31
25.0	1.17	45.0	0.60	65.0	0.30
26.0	1.13	46.0	0.58	66.0	0.29
27.0	1.09	47.0	0.55	67.0	0.28
28.0	1.05	48.0	0.53	68.0	0.27
29.0	1.01	49.0	0.51	69.0	0.26
30.0	0.98	50.0	0.49	70.0	0.25
31.0	0.95	51.0	0.48	71.0	0.25
32.0	0.92	52.0	0.47	72.0	0.24
33.0	0.89	53.0	0.45	73.0	0.23
34.0	0.86	54.0	0.44	74.0	0.23
35.0	0.84	55.0	0.42	75.0	0.22
36.0	0.81	56.0	0.41	76.0	0.21
37.0	0.78	57.0	0.40	77.0	0.21
38.0	0.75	58.0	0.38	78.0	0.20
39.0	0.72	59.0	0.37	79.0	0.19

TABLE 14

BATTERY TEMPERATURE VERSUS VOLTAGE

TEMP	VOLTS	TEMP	VOLTS
-49.000	0.553	-19.000	0.664
-48.000	0.556	-18.000	0.668
-47.000	0.560	-17.000	0.672
-46.000	0.563	-16.000	0.676
-45.000	0.567	-15.000	0.680
-44.000	0.570	-14.000	0.684
-43.000	0.574	-13.000	0.689
-42.000	0.577	-12.000	0.693
-41.000	0.581	-11.000	0.697
-40.000	0.585	-10.000	0.701
-39.000	0.588	-9.000	0.705
-38.000	0.592	-8.000	0.709
-37.000	0.595	-7.000	0.714
-36.000	0.599	-6.000	0.718
-35.000	0.603	-5.000	0.722
-34.000	0.606	-4.000	0.726
-33.000	0.610	-3.000	0.731
-32.000	0.614	-2.000	0.735
-31.000	0.618	-1.000	0.739
-30.000	0.621	0.000	0.744
-29.000	0.625	1.000	0.748
-28.000	0.629	2.000	0.753
-27.000	0.633	3.000	0.757
-26.000	0.637	4.000	0.762
-25.000	0.641	5.000	0.766
-24.000	0.644	6.000	0.771
-23.000	0.648	7.000	0.775
-22.000	0.652	8.000	0.780
-21.000	0.656	9.000	0.784
-20.000	0.660	10.000	0.789

TABLE 14 (Continued)

TEMP	VOLTS	TEMP	VOLTS
11.000	0.793	31.000	0.890
12.000	0.798	32.000	0.895
13.000	0.803	33.000	0.900
14.000	0.807	34.000	0.906
15.000	0.812	35.000	0.911
16.000	0.817	36.000	0.916
17.000	0.822	37.000	0.921
18.000	0.826	38.000	0.926
19.000	0.831	39.000	0.931
20.000	0.836	40.000	0.937
21.000	0.841	41.000	0.942
22.000	0.846	42.000	0.947
23.000	0.850	43.000	0.953
24.000	0.855	44.000	0.958
25.000	0.860	45.000	0.963
26.000	0.865	46.000	0.969
27.000	0.870	47.000	0.974
28.000	0.875	48.000	0.980
29.000	0.880	49.000	0.985
30.000	0.885	50.000	0.990

7. Event Monitor Formats

Balloon Monitor	R = 0	Ready
Words 69-14, 81-29	R = 1.8	Squib Fired
	R = 2.7	Inflation
	R = 3.18	Separation
Recorder Status	R = 2.95	On
Word 81-03	R = .15	Off

	1F2F	1E1F	1F2E	1E2E	WORD
Elec. Boom No. 1	4.94	3.70	2.47	1.23	69-3
Elec. Boom No. 2	5.00	3.76	2.51	1.25	69-4
Mag. Boom 1.2	4.94	3.70	2.49	1.23	69-6
Mag. Boom 3.4	4.92	3.68	2.47	1.22	69-12

E Extended

F Folded

R = raw value in volts.

H. Time, Command, and R Bit Format

There are three bits in each word that convey additional housekeeping information. These bits are called the T, V and R bit.

The T bit is an indicator which is a one or a zero depending on the state of command 14. This bit is used as a timing mark for checking the accuracy of the time assignments.

The V bit is an indicator that changes from a 1 to a 0 every time a command is received by the spacecraft. The bit will be in the 0 state for two or three frames and then return to a 1 each time a valid command is received by the spacecraft.

The R bit is an output of line R from the spacecraft clock. The R bit is a 1 for frames 0 to 15 and a 0 for frames 16 to 29. This indicator is used primarily to check the validity of the frame number assignment.

Format of Bits

T Bit	Word 1 all frames	0111TXXXP
R and V Bit	Word 89 all frames	SSSRVXXXP

P Parity

X Ignored or unknown

S Solar aspect diode (See Section F)

TABLE 15

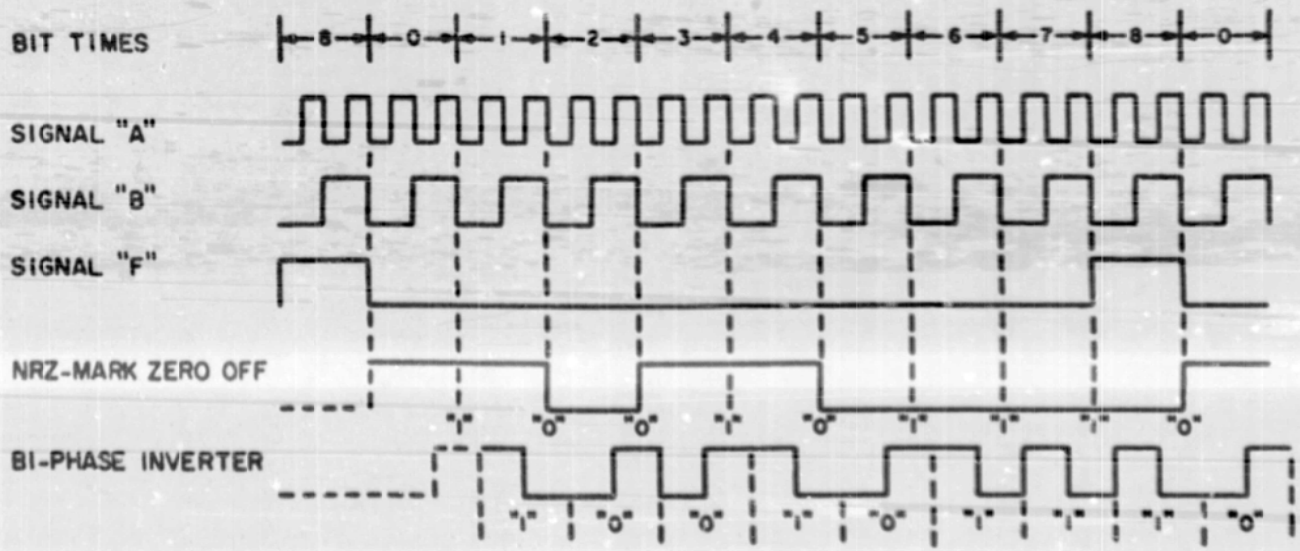
CODE CONVERSION CHART

1004 PRINTER	418 CONSOLE TYPEWRITER	1004 80-COLUMN*	1004 XS-3*	418 CONSOLE FIELDATA	BCD (Tape-H)
A	A	12-1	24	06	61
B	B	12-2	25	07	62
C	C	12-3	26	10	63
D	D	12-4	27	11	64
E	E	12-5	30	12	65
F	F	12-6	31	13	66
G	G	12-7	32	14	67
H	H	12-8	33	15	70
I	I	12-9	34	16	71
J	J	11-1	44	17	41
K	K	11-2	45	20	42
L	L	11-3	46	21	43
M	M	11-4	47	22	44
N	N	11-5	50	23	45
O	O	11-6	51	24	46
P	P	11-7	52	25	47
Q	Q	11-8	53	26	50
R	R	11-9	54	27	51
S	S	0-2	65	30	22
T	T	0-3	66	31	23
U	U	0-4	67	32	24
V	V	0-5	70	33	25
W	W	0-6	71	34	26
X	X	0-7	72	35	27
Y	Y	0-8	73	36	30
Z	Z	0-9	74	37	31
0	0	0	03	60	12
1	1	1	04	61	01
2	2	2	05	62	02
3	3	3	06	63	03
4	4	4	07	64	04
5	5	5	10	65	05
6	6	6	11	66	06
7	7	7	12	67	07
8	8	8	13	70	10
9	9	9	14	71	11
+	+	2-8 (12)	63 (20)	42	60
−	−	11	02	41	40
(	(	0-5-8 (0-4-8)	55 (53)	51	34
)	)	0-7-8 (12-4-8)	77 (75)	40	74
/	/	0-1	64	74	21
\	\	0-6-8	15	1	36
[	N/A	12-5-8	17	N/A	75
]	N/A	11-5-8	01	N/A	55
<	<	12-6-8 (4-5-8)	36	43	76
>	>	6-8 (3-5-8)	76	45	16
=	=	12-7-8 (3-8)	37 (35)	44	13
¢	N/A	0-2-8	60	N/A	32
?	?	12-0	23	54	72
!	!	11-0	43	55	52
:	:	5-8	21	53	15
;	;	11-6-8 (1-4-8)	16	73	56
.	.	12-3-8	22	75	73
'(apos)	'(apos)	7-8 (4-8)	40 (56)	72	14
,(comma)	,(comma)	0-3-8	62	56	33
&	N/A	12	20	N/A	N/A
#	N/A	3-8	35	N/A	N/A
@	N/A	4-8	56	N/A	N/A
%	%	0-4-8	63	02	N/A
$	$	11-3-8	42	47	53
*	*	11-4-8	41	50	54
^	N/A	11-7-8	57	N/A	57
¤	N/A	12-4-8	75	N/A	N/A
Space(N.P.)	Space(N.P.)	Blank	00	05	20
N/A	□	N/A	N/A	76	N/A
N/A	^	N/A	N/A	77	N/A
N/A	÷	N/A	N/A	46	N/A
N/A	ⓘ	N/A	N/A	57	N/A
N/A	?	N/A	N/A	00	N/A
N/A	*	N/A	N/A	52	N/A
N/A	CR	N/A	N/A	04	N/A
N/A	LF	N/A	N/A	03	N/A
N/A	\	N/A	N/A	01	N/A
N/A	½	N/A	N/A	02	N/A

I. Clock Timing Chart

Figure 2 shows the relationship between word, bit and clock time for the data system.

A-G71-488



CLOCK TIMING CHART

FIGURE 9

J. Time Demodulator Data Format

	WORD0	WORD1	WORD2	WORD3
BIT 0 (LSB)	tSC1	USC1	TMC1	UDC1
BIT 1	tSC2	USC2	TMC2	UDC2
BIT 2	tSC4	USC4	TMC4	UDC4
BIT 3	tSC8	USC8	0	UDC8
BIT 4	0	0	0	0
BIT 5	0	0	0	0
BIT 6	SOURCE1	TSC1	UHC1	TDC1
BIT 7	SOURCE2	TSC2	UHC2	TDC2
BIT 8	REFERENCE1	TSC4	UHC4	TDC4
BIT 9	REFERENCE2	0	UHC8	TDC8
BIT 10	418 NO.	0	0	0
BIT 11	INTERFACE NO.	0	0	0
BIT 12	X BIT 1	UMC1	THC1	HDC1
BIT 13	X BIT 2	UMC2	THC2	HDC2
BIT 14	X BIT 4	UMC4	0	0
BIT 15	X BIT 8	UMC8	0	0
BIT 16	VALID CODE	0	0	0
BIT 17 (MSB)	1	0	0	0

tSC = TENTHS OF SECONDS COUNTER
USC = UNITS OF SECONDS COUNTER
TSC = TENS OF SECONDS COUNTER
UMC = UNITS OF MINUTES COUNTER
TMC = TENS OF MINUTES COUNTER
UHC = UNITS OF HOURS COUNTER
THC = TENS OF HOURS COUNTER
UDC = UNITS OF DAYS COUNTER
TDC = TENS OF DAYS COUNTER
HDC = HUNDREDS OF DAY COUNTER

K. Injun V Modes of Modulation

MODE NO.	TRANSMIT FREQUENCY	DESCRIPTION OF MODULATION	BIT RATE
1	136.29	Split-O data plus a Pam signal	810 bps
2	136.29	PCM(NRZ-S)/PM	24.3 kps
3A	400.65	32.4 kps data from tape recorder Channel 1	32.4 kps
4	400.65	VLF experiment	
5	400.65	Command receiver output signal	

L. Data Conversion

The spacecraft data is converted to a voltage at the time it is put into digital form. The conversion gives a voltage in tens of millivolts which is positive for words with correct parity and negative for words with bad parity.

The spacecraft data system has an accuracy of 19.6 millivolts so that the value of any datum has an uncertainty of that value.

The formula for conversion to voltages from the spacecraft data is as follows:

Converted = (Raw * 196. + 50.)/100.0

Table 16 shows the relationship between the raw and the converted data as well as to correspond bit pattern.

TABLE 16

DATA CONVERSIONS

RAW	CVT.	1 2 3 4 5 6 7 8 P	RAW	CVT.	1 2 3 4 5 6 7 8 P
0	0	0 0 0 0 0 0 0 0 1	28	55	0 0 0 1 1 1 0 0 0
1	2	0 0 0 0 0 0 0 1 0	29	57	0 0 0 1 1 1 0 1 1
2	4	0 0 0 0 0 0 1 0 0	30	59	0 0 0 1 1 1 1 0 1
3	6	0 0 0 0 0 0 1 1 1	31	61	0 0 0 1 1 1 1 1 0
4	8	0 0 0 0 0 1 0 0 0	32	63	0 0 1 0 0 0 0 0 0
5	10	0 0 0 0 0 1 0 1 1	33	65	0 0 1 0 0 0 0 1 1
6	12	0 0 0 0 0 1 1 0 1	34	67	0 0 1 0 0 0 1 0 1
7	14	0 0 0 0 0 1 1 1 0	35	69	0 0 1 0 0 0 1 1 0
8	16	0 0 0 0 1 0 0 0 0	36	71	0 0 1 0 0 1 0 0 1
9	18	0 0 0 0 1 0 0 1 1	37	73	0 0 1 0 0 1 0 1 0
10	20	0 0 0 0 1 0 1 0 1	38	74	0 0 1 0 0 1 1 0 0
11	22	0 0 0 0 1 0 1 1 0	39	76	0 0 1 0 0 1 1 1 1
12	24	0 0 0 0 1 1 0 0 1	40	78	0 0 1 0 1 0 0 0 1
13	25	0 0 0 0 1 1 0 1 0	41	80	0 0 1 0 1 0 0 1 0
14	27	0 0 0 0 1 1 1 0 0	42	82	0 0 1 0 1 0 1 0 0
15	29	0 0 0 0 1 1 1 1 1	43	84	0 0 1 0 1 0 1 1 1
16	31	0 0 0 1 0 0 0 0 0	44	86	0 0 1 0 1 1 0 0 0
17	33	0 0 0 1 0 0 0 1 1	45	88	0 0 1 0 1 1 0 1 1
18	35	0 0 0 1 0 0 1 0 1	46	90	0 0 1 0 1 1 1 0 1
19	37	0 0 0 1 0 0 1 1 0	47	92	0 0 1 0 1 1 1 1 0
20	39	0 0 0 1 0 1 0 0 1	48	94	0 0 1 1 0 0 0 0 1
21	41	0 0 0 1 0 1 0 1 0	49	96	0 0 1 1 0 0 0 1 0
22	43	0 0 0 1 0 1 1 0 0	50	98	0 0 1 1 0 0 [illegible]
23	45	0 0 0 1 0 1 1 1 1	51	100	0 0 1 1 0 0 1 1 1
24	47	0 0 0 1 1 0 0 0 1	52	102	0 0 1 1 0 1 0 0 0
25	49	0 0 0 1 1 0 0 1 0	53	104	0 0 1 1 0 1 0 1 1
26	51	0 0 0 1 1 0 1 0 0	54	106	0 0 1 1 0 1 1 0 1
27	53	0 0 0 1 1 0 1 1 1	55	108	0 0 1 1 0 1 1 1 0

CVT = (RAW * 196. + 50.)/100.0

TABLE 16 (Continued)

RAW	CVT.	1	2	3	4	5	6	7	8	P	RAW	CVT.	1	2	3	4	5	6	7	8	P
56	110	0	0	1	1	1	0	0	0	0	85	167	0	1	0	1	0	1	0	1	1
57	112	0	0	1	1	1	0	0	1	1	86	169	0	1	0	1	0	1	1	0	1
58	114	0	0	1	1	1	0	1	0	1	87	171	0	1	0	1	0	1	1	1	0
59	116	0	0	1	1	1	0	1	1	0	88	172	0	1	0	1	1	0	0	0	0
60	118	0	0	1	1	1	1	0	0	1	89	174	0	1	0	1	1	0	0	1	1
61	120	0	0	1	1	1	1	0	1	0	90	176	0	1	0	1	1	0	1	0	1
62	122	0	0	1	1	1	1	1	0	0	91	178	0	1	0	1	1	0	1	1	0
63	123	0	0	1	1	1	1	1	1	1	92	180	0	1	0	1	1	1	0	0	1
64	125	0	1	0	0	0	0	0	0	0	93	182	0	1	0	1	1	1	0	1	0
65	127	0	1	0	0	0	0	0	1	1	94	184	0	1	0	1	1	1	1	0	0
66	129	0	1	0	0	0	0	1	0	1	95	186	0	1	0	1	1	1	1	1	1
67	131	0	1	0	0	0	0	1	1	0	96	188	0	1	1	0	0	0	0	0	1
68	133	0	1	0	0	0	1	0	0	1	97	190	0	1	1	0	0	0	0	1	0
69	135	0	1	0	0	0	1	0	1	0	98	192	0	1	1	0	0	0	1	0	0
70	137	0	1	0	0	0	1	1	0	0	99	194	0	1	1	0	0	0	1	1	1
71	139	0	1	0	0	0	1	[illegible]	[illegible]	[illegible]	100	196	0	1	1	0	0	1	0	0	0
72	141	0	1	0	0	1	0	0	0	1	101	198	0	1	1	0	0	1	0	1	1
73	143	0	1	0	0	1	0	0	1	0	102	200	0	1	1	0	0	1	1	0	1
74	145	0	1	0	0	1	0	1	0	0	103	202	0	1	1	0	0	1	1	1	0
75	147	0	1	0	0	1	0	1	1	1	104	204	0	1	1	0	1	0	0	0	0
76	149	0	1	0	0	1	1	0	0	0	105	206	0	1	1	0	1	0	0	1	1
77	151	0	1	0	0	1	1	0	1	1	106	208	0	1	1	0	1	0	1	0	1
78	153	0	1	0	0	1	1	1	0	1	107	210	0	1	1	0	1	0	1	1	0
79	155	0	1	0	0	1	1	1	1	0	108	212	0	1	1	0	1	1	0	0	1
80	157	0	1	0	1	0	0	0	0	1	109	214	0	1	1	0	1	1	0	1	0
81	159	0	1	0	1	0	0	0	1	0	110	216	0	1	1	0	1	1	1	0	0
82	161	0	1	0	1	0	0	1	0	0	111	218	0	1	1	0	1	1	1	1	1
83	163	0	1	0	1	0	0	1	1	1	112	220	0	1	1	1	0	0	0	0	0
84	165	0	1	0	1	0	1	0	0	0	113	221	0	1	1	1	0	0	0	1	1

TABLE 16 (Continued)

RAW	CVT.	1	2	3	4	5	6	7	8	P	RAW	CVT.	1	2	3	4	5	6	7	8	P
114	223	0	1	1	1	0	0	1	0	1	143	280	1	0	0	0	1	1	1	1	0
115	225	0	1	1	1	0	0	1	1	0	144	282	1	0	0	1	0	0	0	0	1
116	227	0	1	1	1	0	1	0	0	1	145	284	1	0	0	1	0	0	0	1	0
117	229	0	1	1	1	0	1	0	1	0	146	286	1	0	0	1	0	0	1	0	0
118	231	0	1	1	1	0	1	1	0	0	147	288	1	0	0	1	0	0	1	1	1
119	233	0	1	1	1	0	1	1	1	1	148	290	1	0	0	1	0	1	0	0	0
120	235	0	1	1	1	1	0	0	0	1	149	292	1	0	0	1	0	1	0	1	1
121	237	0	1	1	1	1	0	0	1	0	150	294	1	0	0	1	0	1	1	0	1
122	239	0	1	1	1	1	0	1	0	0	151	296	1	0	0	1	0	1	1	1	0
123	241	0	1	1	1	1	0	1	1	1	152	298	1	0	0	1	1	0	0	0	0
124	243	0	1	1	1	1	1	0	0	0	153	300	1	0	0	1	1	0	0	1	1
125	245	0	1	1	1	1	1	0	1	1	154	302	1	0	0	1	1	0	1	0	1
126	247	0	1	1	1	1	1	1	0	1	155	304	1	0	0	1	1	0	1	1	0
127	249	0	1	1	1	1	1	1	1	0	156	306	1	0	0	1	1	1	0	0	1
128	251	1	0	0	0	0	0	0	0	0	157	308	1	0	0	1	1	1	0	1	0
129	253	1	0	0	0	0	0	0	1	1	158	310	1	0	0	1	1	1	1	0	0
130	255	1	0	0	0	0	0	1	0	1	159	312	1	0	0	1	1	1	1	1	1
131	257	1	0	0	0	0	0	1	1	0	160	314	1	0	1	0	0	0	0	0	1
132	259	1	0	0	0	0	1	0	0	1	161	316	1	0	1	0	0	0	0	1	0
133	261	1	0	0	0	0	1	0	1	0	162	318	1	0	1	0	0	0	1	0	0
134	263	1	0	0	0	0	1	1	0	0	163	319	1	0	1	0	0	0	1	1	1
135	265	1	0	0	0	0	1	1	1	1	164	321	1	0	1	0	0	1	0	0	0
136	267	1	0	0	0	1	0	0	0	1	165	323	1	0	1	0	0	1	0	1	1
137	269	1	0	0	0	1	0	0	1	0	166	325	1	0	1	0	0	1	1	0	1
138	270	1	0	0	0	1	0	1	0	0	167	327	1	0	1	0	0	1	1	1	0
139	272	1	0	0	0	1	0	1	1	1	168	329	1	0	1	0	1	0	0	0	0
140	274	1	0	0	0	1	1	0	0	0	169	331	1	0	1	0	1	0	0	1	1
141	276	1	0	0	0	1	1	0	1	1	170	333	1	0	1	0	1	0	1	0	1
142	278	1	0	0	0	1	1	1	0	1	171	335	1	0	1	0	1	0	1	1	0

TABLE 16 (Continued)

RAW	CVT.	1	2	3	4	5	6	7	8	P	RAW	CVT.	1	2	3	4	5	6	7	8	P
172	337	1	0	1	0	1	1	0	0	1	201	394	1	1	0	0	1	0	0	1	1
173	339	1	0	1	0	1	1	0	1	0	202	396	1	1	0	0	1	0	1	0	1
174	341	1	0	1	0	1	1	1	0	0	203	398	1	1	0	0	1	0	1	1	0
175	343	1	0	1	0	1	1	1	1	1	204	400	1	1	0	0	1	1	0	0	1
176	345	1	0	1	1	0	0	0	0	0	205	402	1	1	0	0	1	1	0	1	0
177	347	1	0	1	1	0	0	0	1	1	206	404	1	1	0	0	1	1	1	0	0
178	349	1	0	1	1	0	0	1	0	1	207	406	1	1	0	0	1	1	1	1	1
179	351	1	0	1	1	0	0	1	1	0	208	408	1	1	0	1	0	0	0	0	0
180	353	1	0	1	1	0	1	0	0	1	209	410	1	1	0	1	0	0	0	1	1
181	355	1	0	1	1	0	1	0	1	0	210	412	1	1	0	1	0	0	1	0	1
182	357	1	0	1	1	0	1	1	0	0	211	414	1	1	0	1	0	0	1	1	0
183	359	1	0	1	1	0	1	1	1	1	212	416	1	1	0	1	0	1	0	0	1
184	361	1	0	1	1	1	0	0	0	1	213	417	1	1	0	1	0	1	0	1	0
185	363	1	0	1	1	1	0	0	1	0	214	419	1	1	0	1	0	1	1	0	0
186	365	1	0	1	1	1	0	1	0	0	215	421	1	1	0	1	0	1	1	1	1
187	367	1	0	1	1	1	0	1	1	1	216	423	1	1	0	1	1	0	0	0	1
188	368	1	0	1	1	1	1	0	0	0	217	425	1	1	0	1	1	0	0	1	0
189	370	1	0	1	1	1	1	0	1	1	218	427	1	1	0	1	1	0	1	0	0
190	372	1	0	1	1	1	1	1	0	1	219	429	1	1	0	1	1	0	1	1	1
191	374	1	0	1	1	1	1	1	1	0	220	431	1	1	0	1	1	1	0	0	0
192	376	1	1	0	0	0	0	0	0	1	221	433	1	1	0	1	1	1	0	1	1
193	378	1	1	0	0	0	0	0	1	0	222	435	1	1	0	1	1	1	1	0	1
194	380	1	1	0	0	0	0	1	0	0	223	437	1	1	0	1	1	1	1	1	0
195	382	1	1	0	0	0	0	1	1	1	224	439	1	1	1	0	0	0	0	0	0
196	384	1	1	0	0	0	1	0	0	0	225	441	1	1	1	0	0	0	0	1	1
197	386	1	1	0	0	0	1	0	1	1	226	443	1	1	1	0	0	0	1	0	1
198	388	1	1	0	0	0	1	1	0	1	227	445	1	1	1	0	0	0	1	1	0
199	390	1	1	0	0	0	1	1	1	0	228	447	1	1	1	0	0	1	0	0	1
200	392	1	1	0	0	1	0	0	0	0	229	449	1	1	1	0	0	1	0	1	0

TABLE 16 (Continued)

RAW	CVT.	1	2	3	4	5	6	7	8	P
230	451	1	1	1	0	0	1	1	0	0
231	453	1	1	1	0	0	1	1	1	1
232	455	1	1	1	0	1	0	0	0	1
233	457	1	1	1	0	1	0	0	1	0
234	459	1	1	1	0	1	0	1	0	0
235	461	1	1	1	0	1	0	1	1	1
236	463	1	1	1	0	1	1	0	0	0
237	465	1	1	1	0	1	1	0	1	1
238	466	1	1	1	0	1	1	1	0	1
239	468	1	1	1	0	1	1	1	1	0
240	470	1	1	1	1	0	0	0	0	1
241	472	1	1	1	1	0	0	0	1	0
242	474	1	1	1	1	0	0	1	0	0
243	476	1	1	1	1	0	0	1	1	1
244	478	1	1	1	1	0	1	0	0	0
245	480	1	1	1	1	0	1	0	1	1
246	482	1	1	1	1	0	1	1	0	1
247	484	1	1	1	1	0	1	1	1	0
248	486	1	1	1	1	1	0	0	0	0
249	488	1	1	1	1	1	0	0	1	1
250	490	1	1	1	1	1	0	1	0	1
251	492	1	1	1	1	1	0	1	1	0
252	494	1	1	1	1	1	1	0	0	1
253	496	1	1	1	1	1	1	0	1	0
254	498	1	1	1	1	1	1	1	0	0
255	500	1	1	1	1	1	1	1	1	1

FILE 0001 REC 0001 CH 6560

2977	000341000051	000205000002	000440000416	000472000231	000452000144	000055000010	000006000010	000037000010	
3025	000010000010	000010000010	000010000010	000010000351	000004000002	000002000002	000002000517	000120000002	
3073	000002000002	000010000000	000000000000	000000000000	000000000000	000000000000	000000000551	000026000002	
3121	000002000002	000004000523	000002000002	000002000002	000002000411	000000000000	000000000740	000742000742	
3169	000663000000	000001116237	000000105341	000036137750	000005704521	000000000000	000000000000	000000000000	
3217	000000000000	000010461522	000001153474	000000353351	000000132665	000000015727	000000426451	777777752523	
3265	000000467256	000000020740	000000031713	000000132243	000000005045	000000000000	000000000000	000000000000	
3313	000000000000	000010523133	000000005226	000000062623	000000040352	000000146574	000135073720	000135107540	
3361	000000000000	000000001200	000545777622	000000001737	000000000034	777777777600	000000055760	777777772357	
3409	000000024674	000000001750	000000000236	000000061211	000000165703	000000147170	000022145126	777757045214	
3457	000021155001	777777773167	000000010116	000000012147	031305070700	030505060410	030414071006	000711777776	
3505	651013000000	000000000000	003777062001	000417003777	000000013132	000000010765	204667100364	021700777456	
3553	000032377777	000000000000	000000000000	000000002101	062501100364	022713010066	301605004061	301605003465	
3601	000217000357	000172000000	000002000002	000010000541	000120000002	000002000002	000004000024	000010000006	
3649	000010000010	000006000006	000037000000	000000000000	000407000166	000002000002	000341000432	000424000253	
3697	000434000643	000071000010	000006000010	000037000010	000010000010	000010000010	000010000010	000010000000	
3745	000053000002	000002000002	000006000525	000002000002	000002000002	000002000000	000000000000	000000000000	
3793	000000000000	000000000000	000000000665	000002000002	000002000002	000004000531	000026000002	000002000002	
3841	000004000341	000000000000	000000000756	000750000750	000665000000	000001116247	000000105424	000036136247	
3889	000005703042	000000000000	000000000000	000000000000	000000000000	000010461644	000001153510	000000353373	
3937	000000132603	000000015730	000000426467	777777752374	000000467256	000000020740	000000031713	000000132243	
3985	000000005045	000000000000	000000000000	000000000000	000000000000	000010523323	000000005232	000000062646	
4033	000000040506	000000146640	000135073720	000135107540	000000000000	000000001200	000545777622	000000001737	
4081	000000000033	777777777600	000000056010	777777772355	000000024664	000000001750	000000000237	000000061304	
4129	000000165752	000000146765	000022145126	777757045214	000021155001	777777773167	000000010116	000000012147	
4177	031305070700	030505060411	030414071006	000712777776	651013000000	000000000000	003777062001	000417003777	
4225	000000013132	000000010765	204667100364	021700777456	000031377777	000000000000	000000000000	000000002101	
4273	062501100364	022713010066	301605004061	301605003321	000217000357	000030000000	000002000002	000004000547	
4321	000122000002	000002000002	000004000107	000010000006	000010000010	000006000006	000006000000	000000000000	
4369	000227000002	000002000002	000225000454	000264000276	000452000004	000024000010	000006000010	000024000010	
4417	000010000010	000024000010	000010000010	000010000177	000053000002	000002000002	000002000533	000002000002	
4465	000002000002	000002000000	000000000000	000000000000	000000000000	000000000000	000000000000	000002000002	
4513	000002000002	000004000535	000002000002	000002000002	000002000610	000000000000	000000000740	000742000742	
4561	000663000000	000001116257	000000105506	000036134546	000005701363	000000000000	000000000000	000000000000	
4609	000000000000	000010461767	000001153525	000000353414	000000132522	000000015730	000000426505	777777752244	
4657	000000467256	000000020740	000000031713	000000132243	000000005045	000000000000	000000000000	000000000000	
4705	000000000000	000010523513	000000005237	000000062671	000000040643	000000146703	000135073720	000135107540	
4753	000000000000	000000001200	000545777622	000000001737	000000000033	777777777601	000000056041	777777772353	
4801	000000024655	000000001750	000000000237	000000061377	000000166022	000000146564	000022145126	777757045214	
4849	000021155001	777777773167	000000010116	000000012147	031305070700	030505060412	030414071006	000713777776	
4897	651013000000	000000000000	003777062001	000417003777	000000013132	000000010765	204667100364	021700777456	
4945	000032377777	000000000000	000000000000	000000002101	062501100364	022713010066	301605004061	301605003155	
4993	000217000357	000002000000	000002000002	000004000555	000002000002	000002000002	000004000065	000010000006	
5041	000010000010	000006000006	000006000000	000000000000	000047000276	000164000002	000033000477	000126000320	
5089	000454000440	000105000010	000006000010	000105000010	000010000010	000071000010	000010000010	000010000517	
5137	000004000002	000002000002	000002000537	000002000002	000002000002	000002000000	000000000000	000000000000	
5185	000000000000	000000000000	000000000476	000077000002	000002000002	000004000541	000077000002	000002000002	
5233	000004000653	000000000000	000000000756	000746000750	000665000000	000001116267	000000105571	000036133046	
5281	000005677704	000000000000	000000000000	000000000000	000000000000	000010462111	000001153541	000000353435	
5329	000000132441	000000015731	000000426523	777777752114	000000467256	000000020740	000000031713	000000132243	
5377	000000005045	000000000000	000000000000	000000000006	000000000000	000010523703	000000005243	000000062714	
5425	000000041000	000000146746	000135073720	000135107540	000000000000	000000001170	000564777643	000000001737	
5473	000000000032	777777777602	000000056071	777777772351	000000024645	000000001750	000000000237	000000061472	
5521	000000166071	000000146363	000022145126	777757045214	000021155001	777777773167	000000010116	000000012147	
5569	031305070700	030505060413	030414071006	000714777776	651013000000	000000000000	003777062001	000417003777	
5617	000000013132	000000010765	204667100364	021700777456	000033377777	000000000000	000000000000	000000002101	
5665	062501100364	022713010066	301605004061	301605003011	000217000357	000002000000	000002000002	000004000[illegible]62	
5713	000002000002	000002000002	000004000043	000010000006	000010000010	000006000006	000031000000	000000000000	
5761	000341000322	000047000002	000006000505	000020000341	000454000022	000006000010	000006000010	000006000010	
5809	000010000010	000010000010	000010000010	000010000312	000030000002	000002000002	000002000543	000002000002	
5857	000002000002	000002000000	000000000000	000000000000	000000000000	000000000000	000000000527	000026000002	
5905	000002000002	000004000545	000077000002	000002000002	000010000472	000000000000	000000000740	000742000742	