#259

APOLLO 15 -- [illegible]

SUB SATELLITE MAGNETOMETER

71-063D-02A

[illegible]

Table of Contents

----

1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP’s).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents   To find associated documents you will need to know the document ID number and then click here.
http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

APOLLO 15

24-S VECTOR MAGNETIC FIELD TAPES

71-063D-02A PSFP-00204

THIS DATA SET HAS BEEN RESTORED. THERE WERE ORIGINALLY 29 9-TRACK, 1600 BPI TAPES, WRITTEN IN BINARY. THERE ARE FOUR RESTORED TAPES. THE ORIGINAL TAPES WERE NOT STACKED IN TIME SEQUENTIAL ORDER. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON AN IBM 360 COMPUTER AND WERE RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND TIME SPANS ARE AS FOLLOWS:

DR#	DS#	DD#	FILES	TIME SPAN	
DR005260	DS005260	D013784	1	12/29/71 - 12/31/71	(a)
		D013785	2	08/19/71 - 08/27/71	(b)
		D013786	3	01/01/72 - 01/02/72	
		D015095	4	12/11/71 - 12/19/71	
		D015096	5	12/19/71 - 12/20/71	(c)
		D015097	6	11/01/71 - 11/08/71	
		D015098	7	11/09/71 - 11/17/71	
		D015099	8	12/03/71 - 12/11/71	(d)
DR005261	DS005261	D015100	1	11/30/71 - 12/09/71	
		D015101	2	01/11/72 - 01/19/72	
		D015102	3	01/20/72 - 01/25/72	
		D015103	4	10/27/71 - 11/01/71	
		D015104	5	09/27/71 - 10/04/71	
		D015105	6	02/03/72 - 02/03/72	
		D015106	7	08/27/71 - 09/02/71	(e)
		D015107	8	08/04/71 - 08/12/71	
DR005262	DS005262	D015108	1	08/13/71 - 08/19/71	(f)
		D015109	2	09/10/71 - 09/17/71	
		D015110	3	09/17/71 - 09/25/71	
		D015677	4	09/02/71 - 09/10/71	(g)
		D015678	5	09/25/71 - 09/26/71	(h)
		D015679	6	10/05/71 - 10/13/71	
		D015680	7	10/13/71 - 10/17/71	(i)
		D015681	8	10/19/71 - 10/27/71	

71-063D-02A

DR#	DS#	DD#	FILES	TIME SPAN
DR005263	DS005263	D015683	1	11/25/71 - 11/30/71 (j)
		D015684	2	12/20/71 - 12/29/71
		D015685	3	01/01/72 - 01/11/71
		D015686	4	01/25/72 - 02/01/72
		D015682	5	11/17/71 - 11/25/71

(a) I/O ERRORS ON FILE 1, RECORDS, 54, 57, 63, 69, 75, 81, 87, 93, 111
(b) I/O ERROR ON FILE 1, RECORD, 276
(c) I/O ERROR ON FILE 1, RECORD, 19
(d) I/O ERRORS ON FILE 1, RECORDS, 20-22, 36, 48
(e) I/O ERROR ON FILE 1, RECORD, 129
(f) I/O ERRORS ON FILE 1, RECORDS, 8, 14, 15, 30
(g) I/O ERRORS ON FILE 1, RECORDS, 37, 109, 145
(h) I/O ERRORS ON FILE 1, RECORDS, 21, 33, 36, 48
(i) I/O ERRORS ON FILE 1, RECORDS, 125, 157, 160, 185, 189
(j) I/O ERRORS ON FILE 1, RECORDS, 68, 134, 140, 170, 205, 238

REQ. AGENT	RAND NO.	ACQ. AGENT
MAW	RB5471	DJH
CLB	RB5484	
WKD	RC0012	
Cmp		

APOLLO 15 & 16

SUBSATELLITE MAGNETOMETER

71-063D-02A

72-031D-02A

This data set catalog contains ~~28~~ 29 Apollo 15 and ~~9~~ 10 Apollo 16 Subsatellite Magnetometer data tapes. They are 800 BPI, binary, 7-track, with one file each and were created on a UNIVAC 1108 Computer.

The format of the data can be found in table 4 of the 'Instrument and Data Description' document from UCLA. The data on the tapes (excluding the first record of each tape) are written in arrays of 100 words per data item. The time spans for the tapes are as follows:

APOLLO 15 71-063D-02A

D#	C#	TIME SPAN
D-15107	C-11618	8/04/71 - 8/13/71
D-15108	C-11619	8/13/71 - 8/19/71
D-13785	C-11107	8/19/71 - 8/27/71
D-15106	C-11617	8/27/71 - 9/02/71
D-15677	C-12395	9/02/71 - 9/10/71
D-15109	C-11620	9/10/71 - 9/17/71
D-15110	C-11621	9/17/71 - 9/25/71
D-15678	C-12396	9/25/71 - 9/26/71
D-15104	C-11615	9/27/71 - 10/04/71
D-15679	C-12397	10/05/71 - 10/13/71
D-15680	C-12398	10/13/71 - 10/17/71
D-15681	C-12399	10/19/71 - 10/27/71
D-15103	C-11614	10/27/71 - 11/01/71

D#	C#	TIME SPAN
D-15097	C-11608	11/01/71 - 11/08/71
D-15098	C-11609	11/09/71 - 11/17/71
D-15682	C-14329	11/17/71 - 11/25/71
D-15683	C-12400	11/25/71 - 11/30/71
~~[illegible]~~	~~[illegible]~~	
D-15100	C-11611	11/30/71 - 12/08/71
D-15099	C-11610	12/09/71 - 12/11/71
D-15095	C-11606	12/11/71 - 12/19/71
D-15096	C-11607	12/19/71 - 12/20/71
D-15684	C-12401	12/20/71 - 12/29/71
D-13784	C-11106	12/29/71 - 12/31/71
D-13786	C-11108	1/01/72 - 1/02/72
D-15685	C-12402	1/03/72 - 1/11/72
D-15101	C-11612	1/11/72 - 1/19/72
D-15102	C-11613	1/20/72 - 1/25/72
D-15686	C-12403	1/25/72 - 2/01/72
D-15105	C-11616	2/03/72 - 2/03/72

APOLLO 16 72-031D-02A

D#	C#	TIME SPAN
D-14005	C-11226	4/25/72 - 4/28/72
D-14004	C-11225	4/28/72 - 4/29/72
D-14006	C-11227	4/29/72 - 5/02/72
D-14007	C-11228	5/02/72 - 5/06/72
D-14008	C-11229	5/06/72 - 5/10/72
D-14009	C-11230	5/10/72 - 5/17/72
D-14010	C-11231	5/17/72 - 5/21/72
D-14188	C-11357	5/21/72 - 5/27/72
D-14189	C-11358	5/27/72 - 5/29/72
D-28817	C-18722	4/25/72 - 5/29/72 ← 9trk, 1600 BIN, 5 files

71-063D-02A

Instrument and Data Description

of the

Particles and Fields Subsatellite

Magnetométer Experiment

for the

Apollo Data User's Handbook

by

Christopher T. Russell
Institute of Geophysics and Planetary Physics
University of California
Los Angeles, California 90024

Publication No. 1250-38

Table of Contents

1. The Experiment

1.1 Instrument Description

The subsatellite magnetometer consists of two fluxgate sensors mounted orthogonally at the end of a 1.83-m boom and an electronics unit housed in the main body of the spacecraft. The two sensors are mounted one parallel and one perpendicular to the spin axis. There are two automatically selected dynamic ranges 0 to $\pm 50\gamma$ and 0 to $\pm 200\gamma$. These are called the high sensitivity and low sensitivity ranges, respectively. The resolution of each measurement is 0.4 or 1.6γ depending on range. There are three sampling rates referred to as telemetry store normal (TSN), telemetry store fast (TSF) and real time (RT). In the former two modes, the magnetometer measures the magnitude and phase of the magnetic field in the spin plane and the vector component along the spin axis. The sample rates are one vector every 24 seconds and every 12 seconds, respectively. The magnitude in the spin plane is measured by filtering the transverse magnetometer output about the spin frequency, rectifying and filtering this. The sampled output has a ripple which can be corrected on the ground because the sampling time relative to the field direction is known. The phase is obtained by measuring both the time of the positive going zero crossing of the magnetometer output and the time of the sun crossing.

in eclipse, the sun crossing time is computed from a model of the eclipse spin up and from a knowledge of the spin frequency and phase during the sunlit portion of the orbit.

During real time operations, one sample of the spin plane output is returned every second and of the spin axis output every 2 seconds. Thus, there are about 5 samples of the spin plane signal per revolution. This signal is Fourier analyzed to obtain a magnitude and phase and referenced to the sun crossing time. Real time data is, of course, only obtained across the near side of the moon, whereas the recorded TSF and TSN data are available from both near and far sides. We note that the subsatellite did not store data while transmitting. Thus, there are gaps in the records every orbit when data was telemetered to earth. A summary of the magnetometer characteristics is given in Table 1. The only significant difference between the Apollo 15 and 16 magnetometers is an increase by a factor of 2 in the sensitivity of the Apollo 16 magnetometer increasing the resolution to 0.2 and 0.8γ and decreasing the range to ± 25 and $\pm 100\gamma$ for high and low sensitivity ranges, respectively.

1.2 Operating History

The Apollo 15 subsatellite was launched on August 4, 1971. A failure in the telemetry system after seven months of operation prevented further transmission of the magnetometer data. The Apollo 16 subsatellite was launched on April 24, 1972, into an approximately circular orbit at an altitude of 100 km, having an

TABLE 1.- APOLLO SUBSATELLITE MAGNETOMETER SPECIFICATIONS

Characteristic	Specification
Type	Second-harmonic, saturable core fluxgate
Sensor configuration	Two sensors, one sensor parallel B_P and one perpendicular B_T to the satellite-spin axis
Mounting	Sensor unit at end of 1.83-m boom; electronics unit in spacecraft body
Automatically selected dynamic ranges, γ	0 to ±50 at higher sensitivity, 0 to ±200 at lower sensitivity
Resolutions, γ	0.4 and 1.6, depending on range
Sampling rates:	
Real time	B_P every 2 seconds, B_T every second
High-rate storage	B_P and B_T magnitude and B_T phase once every 12 seconds
Low-rate storage	B_P and B_T magnitude and B_T phase once every 24 seconds
Power, W	0.70
Weight:	
Electronics unit, kg	≈0.8
Sensor unit, kg	≈0.2
Size:	
Electronics unit, cm	27.9 by 15.9 by 3.8
Sensor unit, cm	1.5 (diameter) by 7.6
Operating temperature range, °K	344 to 172

approximately circular orbit at an altitude of 100 km, having an orbital period of close to 2 hours. Due to the decision not to perform a shaping burn prior to jettisoning the subsatellite, the Apollo 16 subsatellite crashed into the moon after 34 days in lunar orbit.

During this period the magnetometers operated flawlessly. The minimum correlation technique of Hedgecock was used to measure sensor drift of the parallel axis on Apollo 15. (Final Apollo 16 data are not available as of the writing of this document). The drift rate was low and well within the range expected. Table 2 gives the offsets for each lunation. These numbers should be added to the values presently on the plots and tapes which were obtained from the preliminary calibration.

The orientation of the spin axis of the subsatellite was determined from the variation of the sun elevation angle with time during the first 30 days after launch. On Apollo 15 the predicted variation of this angle and the measured variation followed each other almost exactly until December 1971. Thereafter, measurable deviations occurred amounting to 1° in February 1972.

Table 2 Magnetometer Offsets

Lunation	Orbit Number	Offset
1	1 - 378	0.27γ
2	379 - 732	0.05
3	733 - 1086	-0.17
4	1087 - 1440	-0.38
5	1441 - 1784	-0.60
6	1785 - END	-0.81

2. The Data

2.1 Orbit Data

Three different displays of orbit data have been made plus one tape. These were all created at the Manned Spacecraft Center under the supervision of W. Wollenhaupt. The three orbit plots are altitude versus time, selenographic longitude versus latitude, and the ecliptic projection of the earth-moon system.

2.1.1 Altitude versus time

This plot shows altitude versus time for one orbit, but includes information on up to six consecutive orbits. At the top of the plot are the orbit number, the orbit start time (hours and minutes, day/month/year), the perilune time and altitude (km), the apolune time and altitude, and the time of sunrise and sunset. The plot includes two vertical shaded bars marking sunset and sunrise at the subsatellite. Time grids below the plot permit the use of this graph for up to six consecutive orbits. However, these grids may be up to four minutes off. Figure 1 shows a sample plot.

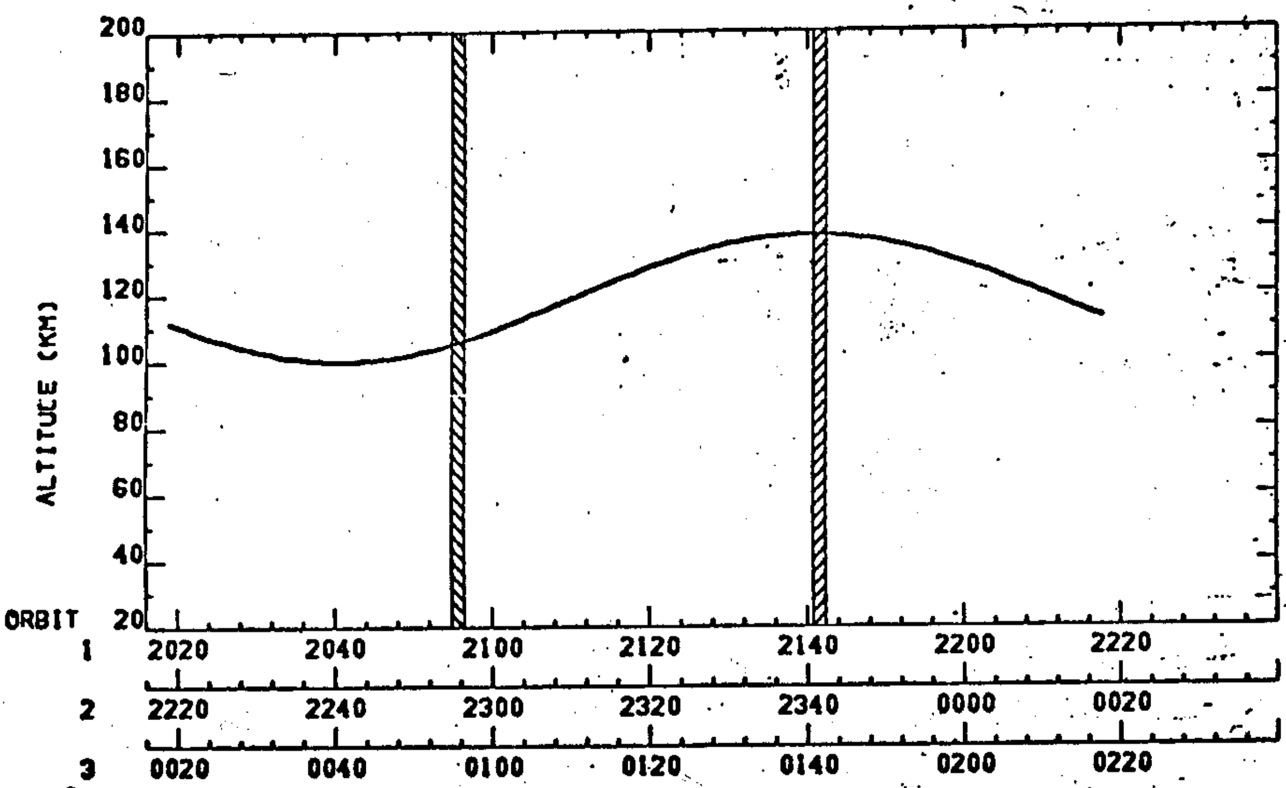
2.1.2 Latitude versus Longitude

This plot shows the track of the satellite across the lunar surface in selenographic coordinates. We note that the vertical and horizontal scale are different by a factor of two. The points of sunrise and sunset at the subsatellite are indicated by shaded vertical bars. Perilune and apolune are marked on

APØLLØ 15 SUBSATELLITE

CALCULATED 8/04/71 TRACKING ORBIT = 1 PROCESSED 3/11/72

ORBIT	START		PERILUNE		APØLUNE		SUNRISE	SUNSET
1	2019	8/04/71	2041	100.4	2141	138.4	2141	2055
2	2219	8/04/71	2241	100.6	2340	138.1	2340	2254
3	18	8/05/71	40	100.9	140	137.8	140	54



UNIVERSAL TIME

the orbit track with an 'X' and labelled with P and A, respectively. The subsolar point is similarly marked with an 'X' and labelled with an S. The location of the Apollo 15 ALSEP is similarly shown and encircled by an ellipse showing the area within 15° of the ALSEP site. Underneath the plot are given orbit numbers, perilune and apolune times. Figure 2 shows a sample plot.

2.1.3 Earth-moon system plots

This plot gives the ecliptic plane projection of the earth-moon system and includes the expected position of the magnetopause and bow shock. One point is given per orbit. Distances are labelled in earth radii. Figure 3 shows a sample plot.

2.1.4 Magnetic tape

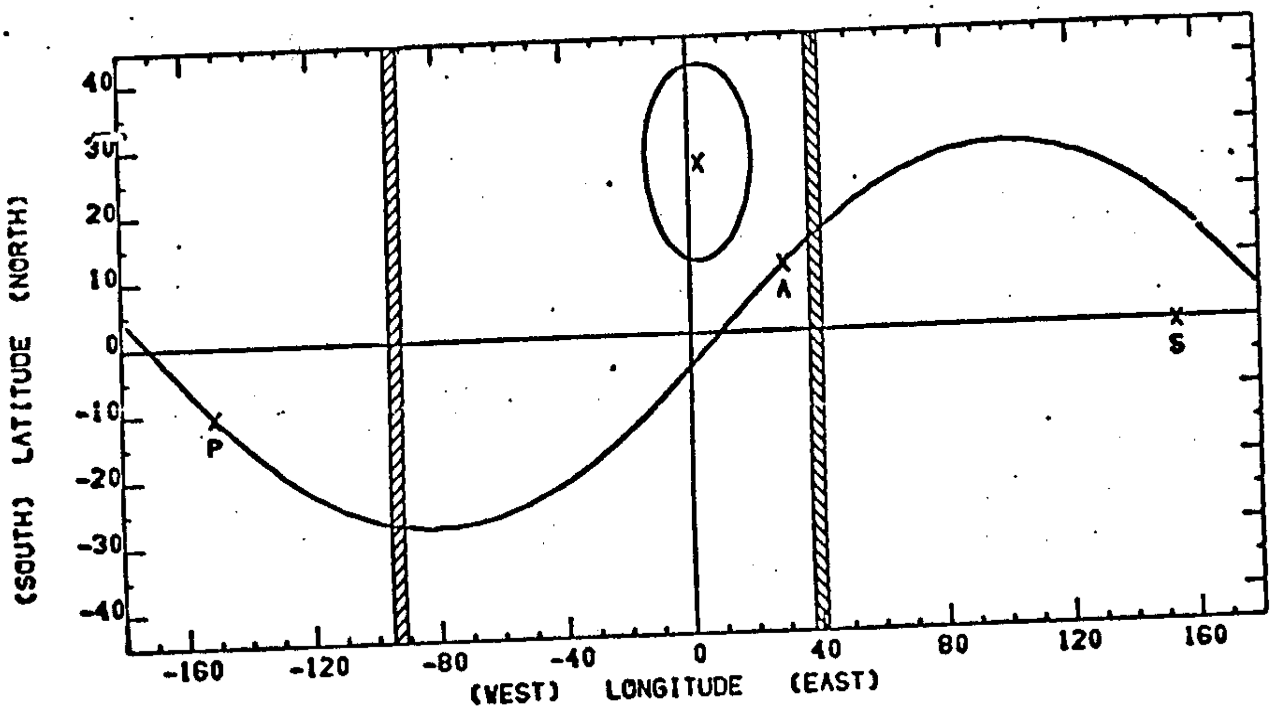
The orbit tape contains position and orientation information which changes slowly in a header record once per orbit and rapidly changing positional data every minute in a data record (one record per minute). The format of this tape is given in Table 3.

2.2 Magnetometer data

Two microfilm reels of data and one magnetic tape have been produced in preliminary processing of the data. The first reel contains two plots consisting of magnetometer measurements on the A plot and engineering data on the B plot. The second reel contains a computer listing of 192 second averages of the data. The magnetic tape contains 24 second averages of the data.

III

APOLLO 15 SUBSATELLITE SELENOGRAPHIC COORDINATES



ORBIT	2002	2003	2004	2005	2006	2007
PERILUNE	542	742	942	1142	1342	1541
APOLUNE	442	642	842	1042	1242	1442

START DAY-FIRST ORBIT 1/18/72 CALCULATED 1/18/72 PROCESSED 3/04/72

TRACKING ORBIT = 2013

SOLAR ECLIPTIC POSITION EARTH-MOON SYSTEM

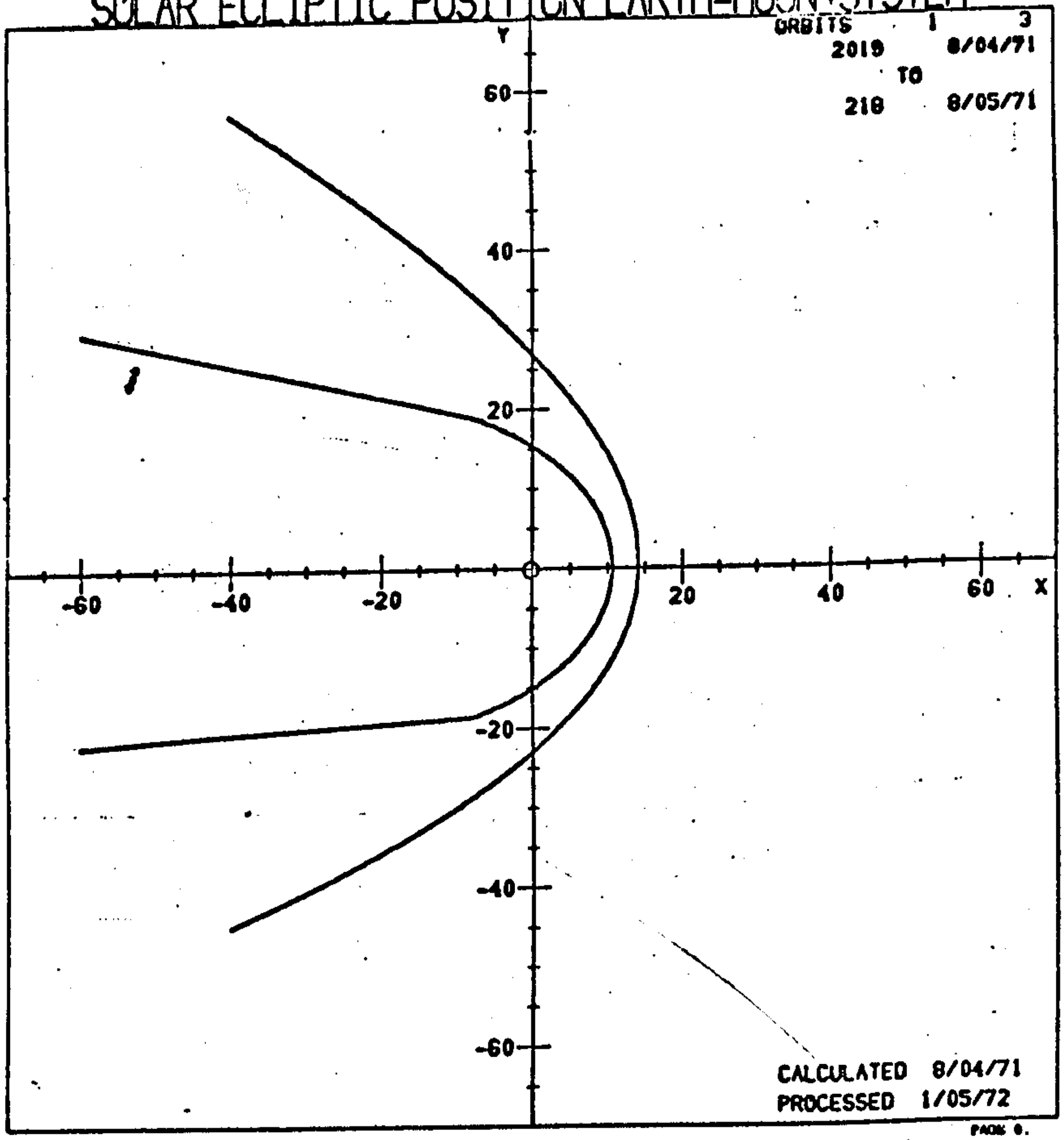


Table 3

Orbit Tape Contents

Header Record (Record 1)

Words 1-4 Integer, words 5 on Real.

1. Number of orbits on tape

2. Orbit number

3/4 Date calculated/processed

5/6 Altitude of perilune/apolune

7/8 Day of year of orbit start/year mod. 1900

9 Start time (seconds)

10 Number of points (records) in orbit

11/12 Time of perilune/apolune

13/14 Sunset time (start/stop)

15/16 Sunrise time (start/stop)

17/18 Earthrise/earthset times

19 End time of orbit

Transformation matrices of form A11 A12 A13, A21 A22 A23, A31 A32 A33

20-28	GEI to GSE	101-109	GEI to SG
29-37	GEI to GSM	110-118	SG to SSE
38-46	GEI to GSEQ	119-127	SG to SSEQ
47-55	GSM to GSE	128-136	SG to GSM
56-64	GSM to GSEQ	137-145	S/C to SSE
65-73	GSE to GSEQ	146-154	S/C to SSEQ
74-82	GEI to SSE	155-63	S/C to GSM
83-91	GEI to SSEQ	164-172	S/C to GSE
92-100	SSE to SSEQ	173-181	S/C to SG

Table 3 (continued)

GEI = geocentric equatorial inertial coordinates

GSE = geocentric solar eclipitic

GSM = geocentric solar magnetospheric

GSEQ = geocentric solar equatorial

SSE = selenocentric solar ecliptic

SG = selenographic

S/C = spacecraft coordinate

Data Record - Repeated N times - All real

1/2 Day of year/year mod. 1900

3 Seconds of day

4/5 Earth-sun/earth-moon distances

6/7 Sun-moon/subsatellite-moon distances

8-10 Unit vector to sun GEI

11-13 Unit vector to moon GEI

14-16 Unit vector parallel PFS spin axis GEI

17-19 Unit vector parallel earth's dipole GEI

20-22 Unit vector to earth SSE

23-25 Unit vector to subsatellite SSE

26-28 Unit vector parallel to PFS spin axis SSE

29-31 Unit vector to subsatellite SG

32-34 Unit vector to earth SG

35-37 Unit vector to sun SG

38-40 Unit vector parallel to PFS spin axis SG

41 Altitude of PFS

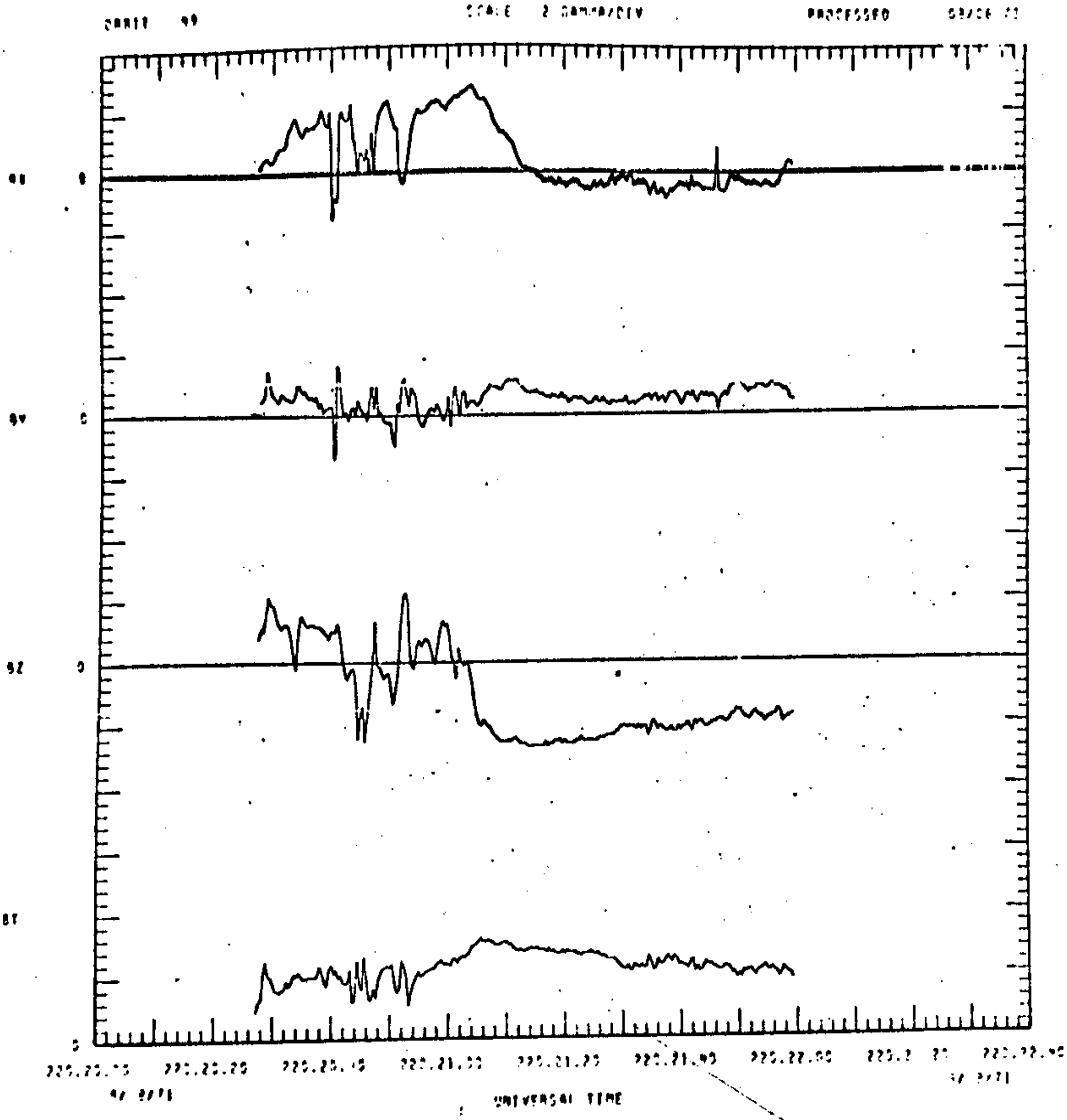
2.2.1 The A Plot

This plot shows the B_x, B_y, B_z components and B_T (total field) in spacecraft coordinates versus time for one orbit. The orbit start time is defined here and in the orbit data to be the time of the crossing of the lunar noon meridian. Spacecraft coordinates have X and Y in the spin plane with X along the projection of the earth-sun line in the spin plane and Y roughly antiparallel the direction of planetary motion. The Z direction is chosen to be parallel to the spin axis and points northward relative to the ecliptic plane. At launch the spin axes of both the Apollo 15 and 16 subsatellites were close to perpendicular to the ecliptic. Thus initially the data were returned in essentially solar ecliptic coordinates. Time on the horizontal scale is given in terms of day of year (Jan. 1=1), hour and minute. No sensor drift corrections have been applied to these data. Note that the scale of this plot varies to keep the data on scale. Figure 4 shows a sample plot.

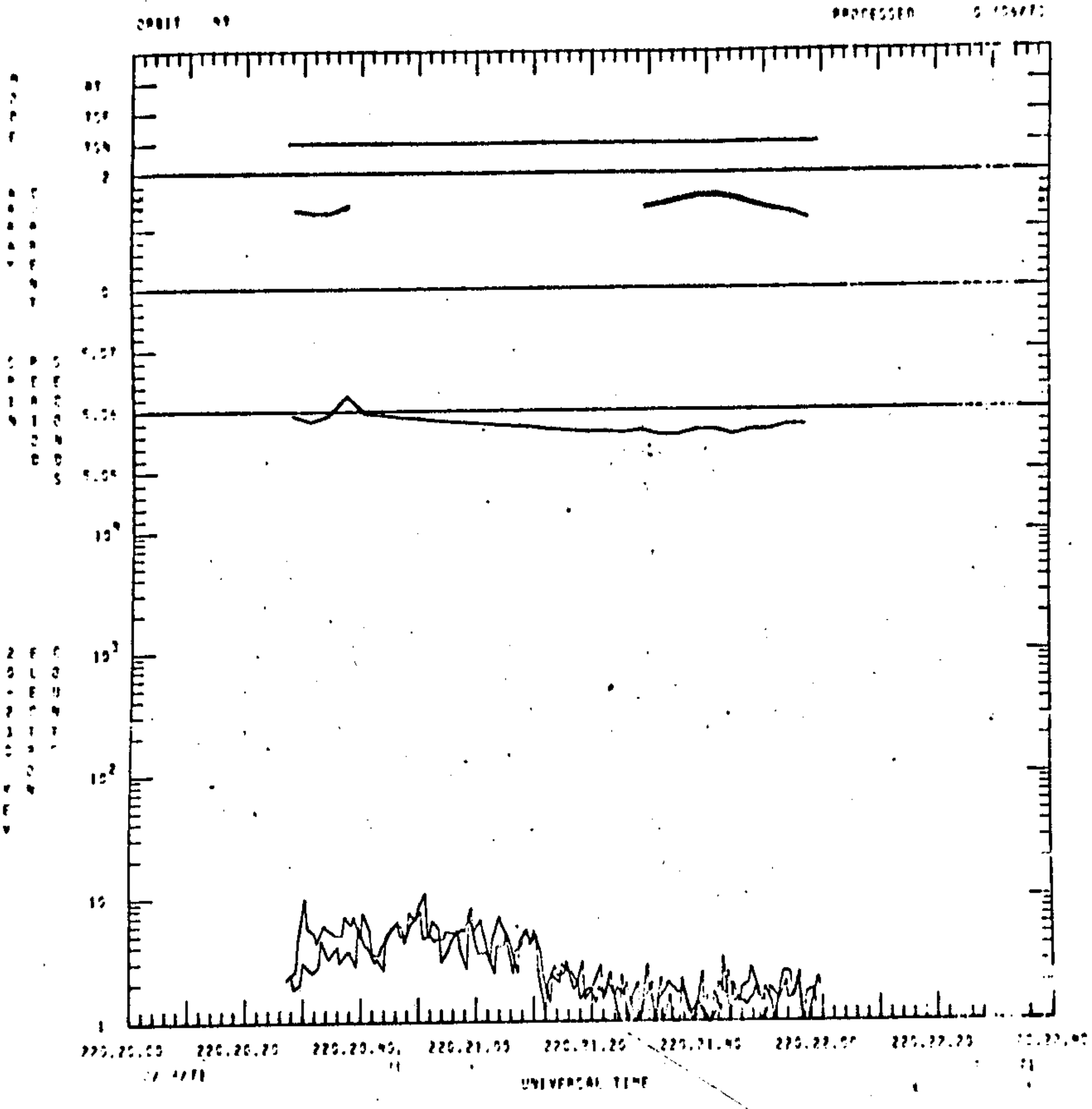
2.2.2 The B plot

The second plot contains relevant engineering and processing data and some data from the Berkeley particle experiment. The top line shows the telemetry mode TSN, TSF or RT. The second shows the array current in amps. The third shows the spin period in seconds. This is measured in sunlight and predicted in eclipse. Finally, on the bottom plotted on the same scale are Berkeley particle counts per accumulation period for the shielded and unshielded detectors. Figure 5 shows a sample plot,

APOLLO 15 PARTICLES AND FIELDS SUBSATELLITE
UCLA FLUXGATE MAGNETOMETER DATA
SPACECRAFT COORDINATES (PLOT A)



APOLLO 15 PARTICLES AND FIELDS SUBSATELLITE
UCLA FLUXGATE MAGNETOMETER DATA
SPACECRAFT COORDINATES (PLOT 03)



2.2.3 The Printout

The microfilm reel containing the printout of the data first contains data and tables generated during the processing of the data. The printouts which follow are 192 second averages of the data (192 seconds is the basic repetition cycle of the data system). The data given are:

Day of year (Jan. 1=1)

Month/day

Elapsed time on spacecraft clock (1 tick=16 sec)

B_x, B_y, B_z, B_T (spacecraft coordinates, in gammas)

Open counts (Berkeley data)

Shielded counts (Berkeley data)

Sun elevation angle (degrees)

Spin period (seconds)

Spin count (from sun pulse or magnetometer pulse)

Magnetometer temperature (^{o}F)

Battery temperature (^{o}F)

Battery voltage (volts)

Battery current (amps)

Array current (amps)

Reference voltage of magnetometer (volts)

Flag 1 I Satellite ID (1=Apollo 15)

F Data format (0=Store mode, 1=Real time)

M Automatic/manual (0=Manual mode)

C Calibration (1=On)

T Transverse range (1=low sensitivity)

P Parallel range (1=low sensitivity)

Flag 2 not used (repeats elapsed time fine). Figure 6 shows a sample plot.

2.2.4 Magnetic tape

The magnetic tape contains magnetic field data every 24 seconds and associated engineering data every 192 seconds. Its format is given in Table 4.

PARTICLES AND FIELDS MAGNETOMETER DATA APOLLO 15 ------------ORBIT 49----------- PROCESSED 03/06/73

DAY	MN/DY	HRMN:SC	EL.TIME C F	MAGNETIC FIELD (GAMMAS) BX	BY	BZ	BT	PARTICLE COUNTS OPEN	SHIELDED	SUN ANG	SPIN PER.	SPIN COUNT	MAG TEMP	BATT TEMP	BATT VOLT	BATT CURR	ARRAY CRUR	REF VOLT	FLAG1 IFMCTP	FLAG2 RTP
220	8/ 8	2027:21	83193	2.18	3.75	7.30	8.58	2	-2	-.3	5.059	170	67.8	70.2	16.8	.57	1.31	2.50	111000	193
220	8/ 8	2030:33	83205	5.44	2.75	4.95	8.21	6	-3	-.3	5.058	208	67.8	70.7	16.8	.65	1.27	2.50	111000	205
220	8/ 8	2033:45	83217	7.28	3.63	5.20	10.03	5	-3	-.3	5.059	246	67.8	70.7	16.8	.67	1.27	2.50	111000	217
220	8/ 8	2036:57	83229	8.58	1.53	5.05	10.07	6	-3	-.5	5.062	28	67.8	71.1	16.8	.65	1.42	2.50	111000	229
220	8/ 8	2040:09	83241	3.35	1.37	1.86	9.90	5	-3	-.5	5.059	65	67.8	71.1	14.5	-.69	.00	2.50	111000	241
220	8/ 8	2043:21	83253	4.18	.86	-6.92	9.34	4	-4	.0	5.059	103	67.8	71.6	14.3	-.70	.00	2.50	111000	253
220	8/ 8	2046:33	84 9	6.68	.91	-.75	8.61	5	-5	.0	5.059	142	67.3	71.6	14.2	-.70	.00	2.50	111000	9
220	8/ 8	2049:45	84 21	4.78	.86	.94	10.24	7	-5	.0	5.059	180	67.3	71.6	14.0	-.70	.00	2.50	111000	21
220	8/ 8	2052:57	84 33	6.95	.96	2.57	8.38	4	-4	.0	5.058	218	66.8	71.6	14.0	-.70	.00	2.50	111000	33
220	8/ 8	2056:09	84 45	10.68	.53	2.85	11.28	5	-4	.0	5.058	0	66.2	71.1	13.8	-.72	.00	2.50	111000	45
220	8/ 8	2059:21	84 57	11.17	1.72	1.95	12.02	6	-3	.0	5.058	39	65.7	71.1	13.8	-.72	.00	2.50	111000	57
220	8/ 8	2102:33	84 69	12.68	2.02	-4.04	13.95	5	-3	.0	5.058	76	65.7	71.1	13.6	-.72	.00	2.50	111000	69
220	8/ 8	2105:45	84 81	9.62	4.21	-10.84	15.22	3	-3	.0	5.057	114	65.2	70.7	13.5	-.72	.00	2.50	111000	81
220	8/ 8	2108:57	84 93	5.95	5.30	-12.65	14.65	4	-3	.0	5.057	152	64.7	70.7	13.5	-.73	.00	2.50	111000	93
220	8/ 8	2112:09	84105	.68	3.95	-13.30	13.91	2	-2	.0	5.057	190	64.2	70.2	13.4	-.73	.00	2.50	111000	105
220	8/ 8	2115:21	84117	-1.38	3.11	-13.41	13.84	2	-2	.0	5.057	228	64.2	69.7	13.3	-.75	.00	2.50	111000	117
220	8/ 8	2118:33	84129	-2.28	2.62	-12.97	13.44	2	-1	.0	5.057	10	63.7	69.2	13.3	-.75	.00	2.50	111000	129
220	8/ 8	2121:45	84141	-2.66	2.26	-12.79	13.28	2	-1	.0	5.056	40	63.2	68.7	13.3	-.75	.00	2.50	111000	141
220	8/ 8	2124:57	84153	-2.58	2.10	-12.44	12.89	1	-1	.0	5.056	65	62.7	68.7	16.8	.30	.00	2.50	111000	153
220	8/ 8	2128:09	84165	-1.32	2.03	-11.15	11.43	1	-1	-.5	5.057	123	62.7	68.2	16.6	.88	1.24	2.50	111000	165
220	8/ 8	2131:21	84177	-1.48	2.19	-10.56	10.95	1	-1	-.3	5.056	161	62.7	67.7	16.5	.85	1.42	2.50	111000	177
220	8/ 8	2134:33	84189	-3.38	2.46	-10.75	11.58	1	-1	-.3	5.056	199	62.2	67.3	16.5	.79	1.51	2.50	111000	189
220	8/ 8	2137:45	84201	-3.24	2.63	-11.20	12.00	1	-1	-.3	5.057	237	62.7	66.8	16.6	.74	1.55	2.50	111000	201
220	8/ 8	2140:57	84213	-2.42	2.94	-10.25	10.94	1	-1	-.3	5.057	19	62.7	66.8	16.6	.77	1.55	2.50	111000	213
220	8/ 8	2144:09	84225	-2.48	2.48	-10.14	11.03	1	-1	-.3	5.056	57	62.7	66.3	16.8	.35	1.33	2.50	111000	225
220	8/ 8	2147:21	84237	-2.52	3.95	-9.14	10.28	1	-1	-.1	5.057	95	63.2	66.3	16.7	.92	1.41	2.50	111000	237
220	8/ 8	2150:33	84249	-1.75	4.12	-8.93	10.05	1	-1	-.3	5.057	133	63.2	66.3	16.6	.70	1.33	2.50	111000	249
220	8/ 8	2153:45	85 5	-2.48	4.33	-9.22	10.52	1	-1	-.3	5.058	171	63.7	66.3	16.6	.52	1.27	2.50	111000	5
220	8/ 8	2156:57	85 17	.28	3.35	-9.96	9.73	1	-1	-.1	5.058	209	64.2	66.3	16.6	.46	1.16	2.50	111000	17

DAY MN/DY HRMN:SC EL.TIME C F MAGNETIC FIELD (GAMMAS) BX BY BZ BT PARTICLE COUNTS OPEN SHIELDED SUN ANG SPIN PER. SPIN COUNT MAG TEMP BATT TEMP BATT VOLT BATT CURR ARRAY CRUR REF VOLT FLAG1 IFMCTP FLAG2 RTP

Table 4

SUBJECT: LUNAR SUBSATELLITE MAGNETOMETER DATA REDUCTION PROGRAM (SSMAGE)
PHASE 3 DATA TAPE FORMAT

PHYSICAL DESCRIPTION OF THE TAPE *

A. PARITY: ODD
B. DENSITY: 800 BPI
C. WORD LENGTH: 36 BITS
D. WORD MODES USED
   1. INTEGER
   2. FLOATING POINT
   3. FIELDDATA
E. FORMAT

RECORD NO.	NO. OF WORDS	MODE	ARRAY	DESCRIPTION
1	5	MIXED		PROCESSING DATE AND ROUTINE VERSION
2	100	INTEGER	ORBIT(100)	Lunar orbit numbers for data contained on this tape
3	100	INTEGER	NOON(100)	Lunar noon meridians associated with the beginning of each of the above orbits
4	100	INTEGER	ECLIPSE(100)	Lunar eclipse time associated with the above orbits
5	100	INTEGER	SUNRIS(100)	Lunar sunrise time associated with the above orbits
6	200	INTEGER	ECL(100,2)	Lunar eclipse intervals (start and stop times) found from the data (last subscript denotes start or stop)
7	200	INTEGER	SUN(100,2)	Lunar sunlight intervals found from the data
8	200	INTEGER	ASUN(100,2)	Lunar sunlight intervals prior to lunar eclipse found from the data associated with the above orbits

Record 1 words:

WORD	MODE	DESCRIPTION
1	FIELDATA	Date processed "DDMMYY"
2	FIELDATA	Time of day processed "HHMMSS"
3	INTEGER	Routine version number
4	FIELDATA	Routine version generation date "DDMMYY"
5	FIELDATA	Routine version generation time of day "HHMMSS"

RECORD NO.	NO. OF WORDS	MODE	ARRAY	DESCRIPTION
9	200	INTEGER	NITE(100,2)	Lunar eclipse intervals found from the data associated with the above orbits
10	200	INTEGER	MSUN(100,2)	Lunar sunlight intervals after lunar eclipse found from the data associated with the above orbits
11	200	INTEGER	BN(100,2)	TSN data intervals found from the data
12	200	INTEGER	TSF(100,2)	TSF data intervals found from the data
13	200	INTEGER	RT(100,2)	Real time data intervals found from the data Note: All the above times are integer milliseconds (a) 1 Day = 86,400,000 milliseconds (b) 1 Hour = 3,600,000 milliseconds (c) 1 Minute = 60,000 milliseconds
14-N	560	MIXED	BUF(560)	24 second average data Note: The BUF array is described in terms of (a) 8 words per frame (b) 8 frames per data cycle (c) 16 extra words per data cycle (d) 80 total words per data cycle (e) 7 data cycles per record (f) ~~196~~ 192 seconds per data cycle SEE DESCRIPTION OF A DATA CYCLE BELOW

N - is the total number of records on the tape and is followed by 2 1108 software end-of-file marks, i.e., one word records containing an octal 17 in the 6 most significant bits and the remaining 30 least significant bits are zero.

DATA CYCLE DESCRIPTION

1 Data Cycle is 80 words. It is considered as an array dimensioned 8 by 10.

Then for DATCYC(8,10) or DATCYC(I,J):

1. I implies A_I for I = 1 to I = 8.
2. J implies frame of A_1 for J = 1 to J = 8.
3. J is meaningless for A_I for J = 9 to J = 10, but the B_K data is contained in these cells.
   a. K takes on values 1 through 16.
   b. K = I + (J-9)*8 for I = 1 to I = 8, J = 9 and J = 10.

Graphically, DATCYC(8,10) looks as follows:

1 $A_{1,1}$	9 $A_{1,2}$	17 $A_{1,3}$	25 $A_{1,4}$	33 $A_{1,5}$	41 $A_{1,6}$	49 $A_{1,7}$	57 $A_{1,8}$	65 B_1	73 B_9
2 $A_{2,1}$	10 $A_{2,2}$	18 $A_{2,3}$	26 $A_{2,4}$	34 $A_{2,5}$	42 $A_{2,6}$	50 $A_{2,7}$	58 $A_{2,8}$	66 B_2	74 B_{10}
3 $A_{3,1}$	11 $A_{3,2}$	19 $A_{3,3}$	27 $A_{3,4}$	35 $A_{3,5}$	43 $A_{3,6}$	51 $A_{3,7}$	59 $A_{3,8}$	67 B_3	75 B_{11}
4 $A_{4,1}$	12 $A_{4,2}$	20 $A_{4,3}$	28 $A_{4,4}$	36 $A_{4,5}$	44 $A_{4,6}$	52 $A_{4,7}$	60 $A_{4,8}$	68 B_4	76 B_{12}
5 $A_{5,1}$	13 $A_{5,2}$	21 $A_{5,3}$	29 $A_{5,4}$	37 $A_{5,5}$	45 $A_{5,6}$	53 $A_{5,7}$	61 $A_{5,8}$	69 B_5	77 B_{13}
6 $A_{6,1}$	14 $A_{6,2}$	22 $A_{6,3}$	30 $A_{6,4}$	38 $A_{6,5}$	46 $A_{6,6}$	54 $A_{6,7}$	62 $A_{6,8}$	70 B_6	[illegible]
7 $A_{7,1}$	15 $A_{7,2}$	23 $A_{7,3}$	31 $A_{7,4}$	39 $A_{7,5}$	47 $A_{7,6}$	55 $A_{7,7}$	63 $A_{7,8}$	71 B_7	[illegible]
8 $A_{8,1}$	16 $A_{8,2}$	24 $A_{8,3}$	32 $A_{8,4}$	40 $A_{8,5}$	48 $A_{8,6}$	56 $A_{8,7}$	64 $A_{8,8}$	72 B_8	[illegible]

Integer Cells

Floating Point Cells

Cells Not Used

From the above chart it is evident that:

(1) ((A(I,J),I=1,3),J=1,8) are integer numbers

(2) ((A(I,J),I=4,8),J=1,8) are floating point numbers

(3) (B(K),K=1,3) and B(7) are integer numbers

(4) (B(K),K=4,6) and (B(K),K=8,13) are floating point numbers

(5) (B(K),K=14,16) are cells not used.

Quantity	Description
A(1,J)	Time (days)
A(2,J)	Time(milliseconds of day)
A(3,J)	Flag
A(4,J)	Transverse Field (Gammas)
A(5,J)	Parallel Field (Gammas)
A(6,J)	Sun Pulse Delay (seconds)
A(7,J)	Magnetometer Time Delay (seconds)
A(8,J)	Particle Counts
B(1)	Elapsed time coarse
B(2)	Elapsed time fine
B(3)	Flag
B(4)	Sun Elevation Angle (Degrees)
B(5)	Spin Period
B(6)	Sector Period
B(7)	Spin Count
B(8)	Magnetometer Temperature (^{o}F)
B(9)	Battery Temperature (^{o}F)
B(10)	Battery Current (amps)
B(11)	Battery Voltage (volts)
B(12)	Array Current (amps)
B(13)	Reference Voltage (volts)

3. Bibliography

3.1. Published papers in which the subsatellite magnetometer data played a primary role.

1-1. Coleman, P.J., Jr., G. Schubert, C.T. Russell, L.R. Sharp The particles and fields subsatellite magnetometer experiment, in Apollo 15 Preliminary Science Report, NASA SP-289, 1972.

1-2. Coleman, P.J., Jr., G. Schubert, C.T. Russell, and L.R. Sharp, Satellite measurements of the Moon's Magnetic Field: A Preliminary report, The Moon, 4, 419, 1972.

1-3. Coleman, P.J., Jr., B.R. Lichtenstein, C.T. Russell, L.R. Sharp and G. Schubert, Magnetic fields near the moon, in Proceedings of the Third Lunar Science Conference, Vol. 3, 2271-2286, MIT Press, Cambridge, Mass., 1972.

1-4. Coleman, P.J., Jr., C.T. Russell, L.R. Sharp and G. Schubert, Preliminary mapping of the lunar magnetic field, Physics of Earth and Planetary Interiors, 6, 167-174, 1972.

1-5. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert and L.R. Sharp, Surface and orbital results from Apollo 15, Space Research XIII, 951-960, 1972.

1-6. Coleman, P.J., Jr., B.R. Lichtenstein, C.T. Russell, G. Schubert and L.R. Sharp, The particles and fields subsatellite magnetometer experiment, in _Apollo 16 Preliminary Science Report_, NASA SP-315, 23-1 to 23-13, 1972.

1-7. Lichtenstein, B.R., C.T. Russell and P.J. Coleman, Jr., Magnetic measurements of the solar wind interaction with the moon, in the Proceedings of the Symposium on Photon and Particle Interactions with Surfaces in Space, Noordwijk, Holland, in press, 1973.

1-8. Sharp, L.R., P.J. Coleman, Jr., B.R. Lichtenstein, C.T. Russell and G. Schubert, Orbital mapping of the lunar magnetic field, _The Moon_, 7, 322, 1973.

1-9. Russell, C.T. and B.R. Lichtenstein, On the source of lunar limb compressions, submitted to _J. Geophys. Res._, 1973.

1-10. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert and L.R. Sharp, Lunar magnetic fields, (extended abstract) submitted to _The Moon_, 1973.

1-11. Schubert, G., B.R. Lichtenstein, P.J. Coleman, Jr., and C.T. Russell, Simultaneous observations of transient events by the Explorer 35 and Apollo 15 subsatellite magnetometers: Implications for lunar electrical conductivity studies, J. Geophys. Res., in press, 1973.

1-12. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert and L.R. Sharp, Subsatellite measurements of the lunar magnetic field, in Proceedings of the Fourth Lunar Science Conference, in press, 1973.

1-13. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert, and L.R. Sharp, Apollo 15 and 16 subsatellite measurements of the lunar magnetic field, Space Research XIV, in press 1974.

3.2. Published papers in which the subsatellite data played a secondary but important role.

2-1. Anderson, K.A., L.M. Chase, R.P. Lin, J.E. McCoy and R.E. McGuire, Solar wind and interplanetary electron measurements on the Apollo 15 subsatellite, J. Geophys. Res., 77(25), 4611-4626, 1972.

3.3 Papers presented at meetings in which the subsatellite data played a primary role.

3-1. Coleman, P.J., Jr., C.T. Russell and L.R. Sharp, Magnetic field measurements with the Apollo 15 subsatellite, presented at the Conference on Lunar Geophysics, The Lunar Science Institute, Houston, Texas, October 1971.

3-2. Coleman, P.J., Jr., C.T. Russell and L.R. Sharp, Magnetic field measurements with the Apollo 15 subsatellite, presented at 41st Annual International Meeting of the Society of Exploration Geophysicists, Houston, Texas, November 1971.

3-3. Coleman, P.J., Jr., L.R. Sharp, C.T. Russell and G. Schubert, Lunar limb effects in the solar wind, presented at the Fall American Geophysical Union Meeting, December, 1971 (abstract) EOS 52(11), 855, 1971.

3-4. Sharp, L.R., P.J. Coleman, Jr., C.T. Russell and G. Schubert, Lunar magcons, presented at the Fall American Geophysical Union Meeting, December 1971, (abstract), EOS 52(11), 857, 1971.

3-5. Coleman, P.J., Jr., C.T. Russell and L.R. Sharp, Magnetic field measurements with the Apollo 15 subsatellite, presented at the Apollo 15 Principal Investigators' Conference, Houston, Texas, December 1971.

3-6. Coleman, P.J., Jr., C.T. Russell, and L.R. Sharp, Magnetic fields near the moon, Third Lunar Science Conference, Houston, Texas, January, 1972.

3-7. Sharp, L.R., P.J. Coleman, Jr., C.T. Russell and G. Schubert, The magnetic field of the moon, presented at the Spring American Geophysical Union Meeting, (abstract), EOS 53(4), 441, 1972.

3-8. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert and L.R. Sharp, Surface and orbital results from Apollo 15, presented at the XVth Plenary Meeting of COSPAR, Madrid, May, 1972.

3-9. Lichtenstein, B.R., C.T. Russell and P.J. Coleman, Jr., Magnetic measurements of the solar wind interaction with the moon, presented at Symposium on Photon and Particle Interactions with Surfaces in Space, Noordwijk, Holland, September, 1972.

3-10. Lichtenstein, B.R., C.T. Russell and P.J. Coleman, Jr., Measurements of the solar wind-moon interaction with the Apollo 15 and 16 subsatellite magnetometers, presented at the Fall American Geophysical Union Meeting (abstract), EOS 53(11), 1111, 1972.

3-11. Sharp, L.R., P.J. Coleman, Jr., and C.T. Russell, Lunar surface remanent magnetization as measured by the Apollo 15 and 16 subsatellite magnetometers, presented at the Fall American Geophysical Union Meeting (abstract), EOS 53(11), 1033, 1972.

3-12. Russell, C.T., P.J. Coleman, B.R. Lichtenstein, G. Schubert and L.R. Sharp, Lunar magnetic fields, presented at the Lunar Science Institute Conference on Geophysical and Geochemical Exploration of the Moon and Planets, Houston, Texas, January 1973.

3-13. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert and L.R. Sharp, Apollo 15 and 16 subsatellite measurements of the lunar magnetic field, presented at the 4th Lunar Science Conference (abstract) Lunar Science IV (eds. J.W. Chamberlain and C. Watkins) Lunar Science Institute, 1973.

3-14. Schubert, G., B.R. Lichtenstein, P.J. Coleman, Jr., and C.T. Russell, Simultaneous observations of transient events by the Explorer 35 and Apollo 15 subsatellite magnetometers: Implications for lunar electrical conductivity studies, presented at Symposium on Inversion of Geophysical Data, University of Utah, Salt Lake City, March 1973.

3-15. Sharp, L.R., C.T. Russell, P.J. Coleman, Jr., The dipole field of the moon, presented at the Spring American Geophysical Union meeting (abstract) EOS 54(4), 358, 1973.

3-16. Lichtenstein, B.R., C.T. Russell, and P.J. Coleman, Jr., On the nature of lunar limb compressions, presented at the Spring American Geophysical Union Meeting, (abstract), EOS, 54(4), 443, 1973.

3-17. Sharp, L.R., P.J. Coleman, Jr., B.R. Lichtenstein, C.T. Russell and G. Schubert, Orbital mapping of the lunar magnetic field, presented at the Harold Urey Symposium on the Moon at the Lunar Science Institute, Houston, Texas, May, 1973.

3-18. Russell, C.T., P.J. Coleman, Jr., B.R. Lichtenstein, G. Schubert, and L.R. Sharp, Apollo 15 and 16 subsatellite magnetometer measurements of the lunar magnetic field, presented at the XVIth Plenary Meeting of Cospar, Konstanz, Germany, June 1973.

3.4. Papers presented at meetings in which the subsatellite magnetometer data played a secondary but important role.

4-1. Anderson, K.A., L.M. Chase, R.P. Lin, J.E. McCoy and R.E. McGuire, Measurements of the solar wind cavity behind the moon from the Apollo 15 subsatellite, presented at the Fall American Geophysical Union Meeting, December 1971, (abstract), EOS 52(11), 910, 1971.

4-2. Fenner, M.A., J.W. Freeman, Jr., H.K. Hills, R.A. Lindeman, Magnetosheath structure observed by ALSEP/SIDE plasma detectors, presented at the Spring American Geophysical Union Meeting, April 1972, (abstract), EOS 53(4), 486, 1972.

4-3. Chase, L.M., Plasmasheet observations at lunar orbit, presented at the Conference on Magnetospheric Substorms, Rice University, October, 1972.

4-4. Chase, L.M., Particle characteristics in the earth's magnetotail at 60 Re, presented at the Fall American Geophysical Union Meeting, December 1972 (abstract) EOS, 53(11), 1101, 1972.

4-5. McGuire, R.E., K.A. Anderson, L.M. Chase, R.P. Lin, J.E. McCoy, Particle observations during the passage of the interplanetary shock of May 15, 1972, presented at the Fall American Geophysical Union Meeting December 1972 (abstract), EOS 53(11), 1086, 1972.

perilune time and altitude in kilometers, the apolune time and altitude, and the time of sunrise and sunset. The plot includes two vertical shaded bars marking sunset and sunrise at the subsatellite. Time grids below the plot permit the use of this graph for as many as six consecutive orbits. However, these grids may be up to 4 minutes off. Figure 33-15 is a sample plot.

Latitude as a function of longitude.- The plot of latitude as a function of longitude shows the track of the satellite across the lunar surface in selenographic coordinates. The vertical and horizontal scales are different by a factor of 2. The points of sunrise and sunset at the subsatellite are indicated by shaded vertical bars. Perilune and apolune are marked on the orbit track with an X and labeled with P and A, respectively. The subsolar point is similarly marked with an X and labeled with an S. The location of the Apollo 15 Apollo lunar surface experiments package (ALSEP) is similarly shown and encircled by an ellipse showing the area within 15° of the ALSEP site. Underneath the plot are given orbit numbers and perilune and apolune times. Figure 33-16 is a sample plot.

Earth-Moon system plots.- The Earth-Moon system plot contains the ecliptic plane projection of the Earth-Moon system and includes the expected position of the magnetopause and bow shock. One point is given per orbit. Distances are labeled in Earth radii. Figure 33-17 is a sample plot.

Magnetic tape.- The orbit tape contains position and orientation information that changed slowly in a header record once per orbit and contains rapidly changing positional data every minute in a data record (1 record/min). The format of this tape is given in table 33-X.

Magnetometer Data

Two microfilm reels of data and one magnetic tape were produced in preliminary processing of the data. The first reel contains two plots. Magnetometer measurements appear on the A plot and engineering data on the B plot. The second reel contains a computer listing of 192-sec averages of the data. The magnetic tape contains 24-sec averages of the data. Apollo 16 data submitted by JSC to the National Space Science Data Center (NSSDC) were processed with Apollo 15 calibration constants. Therefore, field scales on Apollo 16 plots are a factor of 2 too large. (For more details, see the section entitled "Converting Apollo 16 Data to Proper Units.")

6950 C-18722
9trk, ~~1600~~, BIN, 5 Files

9. Spin count (from Sun pulse or magnetometer pulse)

10. Magnetometer temperature (degrees Fahrenheit)

11. Battery temperature (degrees Fahrenheit)

12. Battery voltage (volts)

13. Battery current (amperes)

14. Array current (amperes)

15. Reference voltage of magnetometer (volts)

16. Flag 1

    a. I - satellite identity (1 = Apollo 15)

    b. F - data format (0 = store mode, 1 = real time)

    c. M - automatic/manual (0 = manual mode)

    d. C - calibration (1 = on)

    e. T - transverse range (1 = low sensitivity)

    f. P - parallel range (1 = low sensitivity)

17. Flag 2 not used (repeats elapsed time, fine)

Figure 33-20 is a sample plot.

Magnetic tape.- The magnetic tape contains magnetic field data every 24 sec and associated engineering data every 192 sec. The magnetic tape format is given in table 33-XI.

Data Cycle Description

One data cycle consists of 80 words (an array dimensioned 8 by 10). Then, for DATCYC(8,10) or DATCYC(I,J), the symbols I and J have the following functions.

1. I implies A_I for I = 1 to I = 8.

2. J implies frame of A_1 for J = 1 to J = 8.

3. J is meaningless for A_I for J = 9 to J = 10, but the B_K data are contained in these cells.

a. K takes on values 1 to 16.

b. K = I + (J - 9)*8 for I = 1 to I = 8, J = 9 and J = 10.

Graphically, DATCYC(8,10) is shown in figure 33-21. From figure 33-21, the following information is evident.

1. ((A(I,J),I=1,3),J=1,8) are integer numbers.

2. ((A(I,J),I=4,8),J=1,8) are floating point numbers.

3. (B(K),K=1,3) and B(7) are integer numbers.

4. (B(K),K=4,6) and (B(K),K=8,13) are floating point numbers.

5. (B(K),K=14,16) are unused cells.

Quantity	Description
A(1,J)	Time (days)
A(2,J)	Time (milliseconds of day)
A(3,J)	Flag
A(4,J)	Transverse field (gammas)
A(5,J)	Parallel field (gammas)
A(6,J)	Sun pulse delay (seconds)
A(7,J)	Field longitude (radians)
A(8,J)	Particle counts

Quantity	Description
B(1)	Elapsed time, coarse
B(2)	Elapsed time, fine
B(3)	Flag
B(4)	Sun elevation angle (degrees)
B(5)	Spin period

B(6)	Sector period
B(7)	Spin count
B(8)	Magnetometer temperature (degrees Fahrenheit)
B(9)	Battery temperature (degrees Fahrenheit)
B(10)	Battery current (amperes)
B(11)	Battery voltage (volts)
B(12)	Array current (amperes)
B(13)	Reference voltage (volts)

Converting Apollo 16 Data to Proper Units

When the Apollo 16 subsatellite is in sunlight, the following formulas may be used to obtain proper values for data given on the magnetic tape. For the magnetic field transverse to the spin axis (stored mode), use

$$B_T = B_T(0.512 - 0.1013)$$

For the magnetic field transverse to the spin axis (real time), use

$$B_T = B_T \times 0.503$$

For the magnetic field parallel to the spin axis, use

$$B_P = 0.4981[(B_P + 51.95) - (0.0279 \times B8)] - 24.72$$

where B_T = transverse field, word A(4,J) in data cycle

B_P = parallel field, word A(5,J) in data cycle

B8 = magnetometer temperature, word B(8) in data cycle

Note: In real time, flag A3 = XOXXXX; in memory store, flag A3 = X1XXXX.

[redacted]

Time span is found by orbits

FILE 0001 REC 0001 CH 0036

0001	626460716763	616761666165	000000000011	617060716763	606060606060	000000000000

FILE 0001 REC 0002 CH 0600

Dupe of
D-13784
H-17057
12/29/71-12/31/71

0001	$\boxed{000000003340}$	000000003341	000000003342	000000003343	000000003344	000000003345	000000003346	000000003347
0049	000000003350	000000003351	000000003352	000000003353	000000003354	000000003355	000000003356	000000003357
0097	000000003360	000000003361	000000003362	000000003363	000000003364	000000003365	000000003366	000000003367
0145	000000003370	000000003371	000000003372	000000003373	000000003374	000000003375	000000003376	000000003377
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0241	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0289	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0337	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0385	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0433	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0481	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0529	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0577	000000000000	000000000000	000000000000	000000000000				

FILE 0001 REC 0003 CH 0600

1536
192
32
12 | 1760 | 146.6
8/01/71 start orbit
217
147
364

0001	351552211150	351605522460	351641041660	351674355140	351727666450	351763201730	352016513240	352052026520
0049	352105342000	352140653310	352174166570	352227500100	352263013360	352316322720	352351636200	352405147510
0097	352440461020	352473774300	352527305610	352562617120	352616132400	352651443710	352704755220	352740270500
0145	352773602010	353027113320	353062422660	353115734170	353151245500	353204557010	353240070320	353273403600
0193	353326715110	353362226420	353415537730	353451051240	000000000000	000000000000	000000000000	000000000000
0241	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0289	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0337	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0385	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0433	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0481	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0529	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0577	000000000000	000000000000	000000000000	000000000000				

FILE 0001 REC 0004 CH 0600

add days to
day Apollo 15
started lunar
orbit 8/01/71

0001	351563027260	351616342540	351651652100	351705165360	351740500640	351774016070	352027331350	352062644630
0049	352116162060	352151475340	352205010620	352240326050	352273641330	352327143000	352362456260	352415771540
0097	352451305020	352504622250	352540135530	352573451010	352626766240	352662301520	352715615000	352751130260
0145	353004443540	353037760770	353073302140	353126615420	353162130700	353215444160	353250757440	353304272720
0193	353337606200	353373121460	353426434740	353461750220	000000000000	000000000000	000000000000	000000000000
0241	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0289	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0337	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0385	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0433	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0481	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0529	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0577	000000000000	000000000000	000000000000	000000000000				

FILE 0001 REC 0005 CH 0600

0001	351575412500	351630725760	351664227430	351717544660	351753060140	352006375370	352041710650	352075226100
0049	352130541360	352164056610	352217372070	352252707320	352306222600	352341512440	352375027670	352430343150
0097	352463660400	352517173660	352552511110	352606024370	352641337650	352674655100	352730170360	352763505610
0145	353017021070	353052334350	353105657470	353141172750	353174506230	353230021510	353263334770	353316650250
0193	353352165500	353405500760	353441014240	353474327520	000000000000	000000000000	000000000000	000000000000
0241	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0289	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0337	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0385	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0433	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0481	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0529	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000	000000000000
0577	000000000000	000000000000	000000000000	000000000000				

FILE 0001 REC 0006 CH 1200

0001	351563105371	351616406125	351651765565	351705266325	351740567061	351774067615	352027370355	352062750011
0049	352205064757	352240365513	352273745153	352327245707	352362546443	352415711377	352447124037	352502503477
0097	352536004233	352572212113	352751175611	353004476351	353040056005	353073356545	353126657301	353162160041
0145	353215537475	353251040235	353304340771	353337661231	000000000000	000000000000	000000000000	000000000000

24

0 9 7 3 09 51 27 1 8 09 73

Dupe of D-13785 H-17058

8/19/71 - 8/27/71

```
FILE 0001 REC 0001 CH 0036
     0001 626460716763 607165616267 000000000011 617060716763 606060606060 000000000000
FILE 0001 REC 0002 CH 0600
     0001 000000000261 000000000262 000000000263 000000000264 000000000265 000000000266 000000000267 000000000270
     0049 000000000271 000000000272 000000000273 000000000274 000000000275 000000000276 000000000277 000000000300
     0097 000000000301 000000000302 000000000303 000000000304 000000000305 000000000306 000000000307 000000000310
     0145 000000000311 000000000312 000000000313 000000000314 000000000315 000000000316 000000000317 000000000320
     0193 000000000321 000000000322 000000000323 000000000324 000000000325 000000000326 000000000327 000000000330
     0241 000000000331 000000000332 000000000333 000000000334 000000000335 000000000336 000000000337 000000000340
     0289 000000000341 000000000342 000000000343 000000000344 000000000345 000000000346 000000000347 000000000350
     0337 000000000351 000000000352 000000000353 000000000354 000000000355 000000000356 000000000357 000000000360
     0385 000000000361 000000000362 000000000363 000000000364 000000000365 000000000366 000000000367 000000000370
     0433 000000000371 000000000372 000000000373 000000000374 000000000375 000000000376 000000000377 000000000400
     0481 000000000401 000000000402 000000000403 000000000404 000000000405 000000000406 000000000407 000000000410
     0529 000000000411 000000000412 000000000413 000000000414 000000000415 000000000416 000000000417 000000000420
     0577 000000000421 000000000422 000000000423 000000000424
FILE 0001 REC 0003 CH 0600
     0001 225004031230 225037342540 225072656020 225126167330 225161502610 225215016070 225250327400 225303642660
     0049 225337171720 225372503230 225426016510 225461330020 225514643300 225550154610 225603470070 225637001400
     0097 225672312710 225725626170 225761137500 226014452760 226047764270 226103307410 226136620720 226172134200
     0145 226225445510 226260757020 226314272300 226347603610 226403115120 226436430400 226471741710 226525253220
     0193 226560564530 226614115540 226647427050 226702740360 226736253640 226771565150 227025076460 227060411740
     0241 227113723250 227147234560 227202546070 227236061350 227271372660 227324704170 227360231260 227413544540
     0289 227447060020 227502373300 227535706560 227571220070 227624533350 227660046630 227713362110 227746675370
     0337 230002210650 230035522160 230071045300 230124356610 230157666150 230213177460 230246510770 230302020330
     0385 230335331640 230370643150 230424152510 230457464020 230512775330 230546304670 230601614230 230635127510
     0433 230670442770 230723756250 230757271530 231012603040 231046116320 231101431600 231134745060 231170260340
     0481 231223573620 231257105130 231312420410 231345735640 231401247150 231434560460 231470071770 231523403300
     0529 231556714610 231612226120 231645537430 231701050740 231734362250 231767673560 232023205070 232056530210
     0577 232112043470 232145356750 232200672230 232234205510
FILE 0001 REC 0004 CH 0600
     0001 225014344100 225047653440 225103164750 225136476260 225172005620 225225317130 225260626470 225314140000
     0049 225347443420 225402754730 225436264270 225471575600 225525105140 225560416450 225613726010 225647237320
     0097 225702546660 225736056220 225771367530 226024677070 226060210400 226113525630 226147035170 226202346500
     0145 226235656040 226271165400 226324476710 226360006250 226413315610 226446625150 226502136460 226535446020
     0193 226570755360 226624310340 226657617700 226713127240 226746440550 227001750110 227035257450 227070567010
     0241 227124100320 227157407660 227212717220 227246230530 227301540070 227335047430 227370364660 227423674220
     0289 227457205530 227512517040 227546030350 227601341660 227634651220 227670162530 227723474040 227757005350
     0337 230012316660 230045626220 230101163150 230134472510 230170000100 230223307440 230256615030 230312124370
     0385 230345431760 230400741320 230434250660 230467556250 230523065610 230556373200 230611753550 230645265060
     0433 230700574420 230734105730 230767417240 231022726600 231056240110 231111551420 231145062730 231200374240
     0481 231233703600 231267215110 231322526420 231356071240 231411400600 231444710140 231500217500 231533527040
     0529 231567036400 231622345740 231655655300 231711164640 231744474200 232000003540 232033313100 232066642140
     0577 232122153450 232155464760 232211000240 232244311550
FILE 0001 REC 0005 CH 0600
     0001 225027016060 225062327370 225115636730 225151150240 225204461550 225237773060 225273304370 225326615700
     0049 225362123270 225415434600 225450746110 225504255450 225537566760 225573100270 225626407630 225661721140
     0097 225715232450 225750542010 226004053320 226037364630 226072674170 226126213370 226161524700 226215034240
     0145 226250345550 226303655110 226337166420 226372475760 226426007270 226461320600 226514630140 226550141450
     0193 226603451010 226637002020 226672311360 226725622670 226761132230 227014443540 227047753100 227103264410
     0241 227136573750 227172105260 227225414620 227260726130 227314235470 227347547000 227403066200 227436377510
     0289 227471711020 227525222330 227560533640 227614045150 227647356460 227702667770 227736201300 227771512610
     0337 230025024120 230060335430 230113670410 230147177750 230202507310 230236014700 230271324240 230324633600
     0385 230360143140 230413450530 230446760070 230502267430 230535576770 230571106330 230624451150 230657762460
     0433 230713273770 230746605300 231002114640 231035426150 231070737460 231124250770 231157562300 231213073610
     0481 231246405120 231301716430 231335227740 231370553060 231424062420 231457371760 231512701320 231546212630
     0529 231601522170 231635031530 231670341070 231723652400 231757161740 232012471300 232046000640 232101314120
     0577 232134627400 232170140710 232223454170 232256765500
FILE 0001 REC 0006 CH 1200
     0001 225047703255 225172102154 225225402704 225260703434 225314204164 225347504714 225403064350 [illegible]
     0049 225471665630 225525166360 225560467110 225613750102 225771445444 226024746174 226060246724 [illegible]
     0097 226147127110 226202644344 226235730370 226253103155 226271231120 226324511225 226413333347 [illegible]
     0145 226504476120 226537562144 226572646170 226625732214 226661016234 226714102260 226747166304 [illegible]
     0193 227035303706 227046130163 227125674300 227160760324 227213255330 227255020554 227302214414 [illegible]
     0241 227377632700 227423744114 227457323550 227546125030 227601407054 227670223754 227726773064 [illegible]
```

27 09 73   17 22 14   1809 73

Dupe of D-13786 H-17062

1/1/72 - 1/2/72

```
FILE 0001 REC 0001 CH 0036
     0001 626760716763 616762626164 000000000011 617060716763 606060606060 000000000000
FILE 0001 REC 0002 CH 0600
     0001 000000003404 000000003405 000000003406 000000003407 000000003410 000000003411 000000003412 000000003413
     0049 000000003414 000000003415 000000003416 000000003417 000000003420 000000003421 000000003422 000000003423
     0097 000000003424 000000003425 000000003426 000000003427 000000003430 000000003431 000000003432 000000003433
     0145 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0003 CH 0600
     0001 000530134550 000563446060 000616753450 000652264760 000705576270 000741107600 000774421110 001027730450
     0049 001063241760 001116553270 001152064600 001205374140 001240705450 001274216760 001327530270 001363035660
     0097 001416347170 001451656530 001505170040 001540477400 001574006740 001627320250 001662627610 001716141120
     0145 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0004 CH 0600
     0001 000541035500 000574350760 000627707660 000663223140 000716534450 000752047730 001005363210 001040674520
     0049 001074210000 001127523260 001163034570 001216350050 001251663330 001305174640 001340510120 001374043100
     0097 001427356360 001462667670 001516203150 001551514460 001605025770 001640341250 001673652560 001727164070
     0145 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0005 CH 0600
     0001 000553415000 000606730260 000642267160 000675602440 000731115720 000764431200 001017744460 001053257740
     0049 001106571250 001142104530 001175420010 001230733270 001264246550 001317562030 001353075310 001406424350
     0097 001441735660 001475251140 001530564420 001564075730 001617411210 001652722520 001706236000 001741551260
     0145 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0006 CH 1200
     0001 000541114100 000574414640 000627715370 000663275030 000716575570 000752076330 001005377060 001040756520
     0049 001074257260 001127560010 001251740750 001305241500 001340542240 001374121700 001430211450 001462723170
     0097 001516223730 001551603370 001605104130 001640404660 000000000000 000000000000 000000000000 000000000000
     0145 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
```

APOLLO 16

SUB-SATELLITE MAGNETOMETER

72-031D-02A PSFP-00111

This data set have been restored. Originally there were nine 7-track, 800 BPI tapes, and one 9-track, 1600 BPI tape, written in Binary. There is one restored tape. The original tapes were created on a UNIVAC 1108 computer. The restored tape was created on the IBM 9021 computer. The DR tape is 3480 cartridge and the DS tape is 9-track, 6250 BPI. The DR and DS numbers along with their corresponding D numbers and time span is as follows:

DR#	DS#	DD#	FILES	TIME SPAN
DR-004933	DS-004933	DD-014005	1	04/25/72 - 04/28/72 (a)
		DD-014004	2	04/28/72 - 04/29/72
		DD-014006	3	04/29/72 - 05/02/72 (b)
		DD-014007	4	05/02/72 - 05/06/72
		DD-014008	5	05/06/72 - 05/10/72
		DD-014009	6	05/10/72 - 05/17/72
		DD-014010	7	05/17/72 - 05/21/72
		DD-014188	8	05/21/72 - 05/27/72 (c)
		DD-014189	9	05/27/72 - 05/29/72 (d)
		DD-028817	10-14	04/25/72 - 05/29/72

(a) DD-014005: 5 errors, rec 34, 35, 36, 71 AND 71, File 1.

(b) DD-014006: 2 errors, rec 56 AND 79, File 1.

(c) DD-014188: 1 error, rec 176, File 1.

(d) DD-014189: 1 error, rec 109, File 1.

See

71-073D-02A

WORLD DATA CENTER A
ROCKETS and SATELLITES
Goddard Space Flight Center • Code 930.2
Greenbelt, Maryland 20771 • U.S.A.

TELEPHONE: (301) 286-6695 or FAX: (301) 286-4952

E-mail: NCF::REQUEST or request@nssdca.gsfc.nasa.gov

010110

16

Dupe of
D-14005
first 15 recs
4/23/72 - 4/28/72

```
FILE 0001 REC 0001 CH 0036
     0001 606360616764 616663656562 000000000013 626161626763 616260606060 000000000000
FILE 0001 REC 0002 CH 0600
     0001 000000000014 000000000015 000000000016 000000000017 000000000020 000000000021 000000000022 CC000C000023
     0049 000000000024 000000000025 000000000026 000000000027 000000000030 000000000031 000000000032 000000000033
     0097 000000000034 00000000C35 000000000036 000000000037 000000000040 000000000041 000000000042 CC000C00043
     0145 000000000044 000000000045 000000000046 000000000047 000000000050 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0003 CH 0600
     0001 113132757000 113166130540 113221302300 113254456010 113307627550 113343001310 113376153050 113431324610
     0049 113464470460 113517626440 113552766370 113606124350 113641262330 113674422260 113727560240 113762716220
     0097 114016054200 114051214130 114104352110 114137510070 114172646050 114226057010 114261222660 114314366530
     0145 114347532400 114402674300 114436040150 114471204020 114524347670 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0004 CH 0600
     0001 113143400110 113176553620 113231727330 113265105010 113320260520 113353434230 113406611710 113441765420
     0049 113475162600 113530324500 113563464430 113616626330 113651766260 113705130160 113740270110 113773432010
     0097 114026573710 114061733640 114115075540 114150235470 114203377370 114236641640 114272011430 114325157250
     0145 114360325070 114413472710 114446640530 114502006350 114535156140 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
FILE 0001 REC 0005 CH 0600
     0001 113156061730 113211237410 113244413120 113277570600 113332746260 113366121770 113421277450 113454455130
     0049 113507644420 113543006320 113576150220 113631310150 113664452050 113717613750 113752755650 114006117550
     0097 114041261450 114074423350 114127565250 114162727150 114216071050 114251323460 114304471300 114337641070
     0145 114373006710 114426156500 114461324320 114514474110 114547641730 000000000000 000000000000 000000000000
     0193 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0241 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0289 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0337 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0385 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0433 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0481 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0529 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
     0577 000000000000 000000000000 000000000000 000000000000
ILE 0001 REC 0006 CH 1200
     0001 113143620257 113201202410 113231764531 113265126460 113320272330 113353435533 113410314401 113441743530
     0049 113475164550 113530330431 113563472320 113616636170 113652001433 113740342713 113773514630 114026700250
     0097 114062042100 114115205750 114150351254 114203513520 114236657252 114272021270 114325165247 114360407143
     0145 114413530140 114446673505 000000000000 000000000000 000000000000 000000000000 000000000000 000000000000
```

Dupe of D-14006

first 15 rec's

~~5/2/72 – 5/5/72~~

4/29/72 to 5/2/72

```
FILE 0001 REC 0001 CH 0036
          0001 606460616764  617160626260  000000000013  626161626763  616260606060  000000000000
FILE 0001 REC 0002 CH 0600
          0001 000000000076  000000000077  000000000100  000000000101  000000000102  000000000103  000000000104  000000000105
          0049 000000000106  000000000107  000000000110  000000000111  000000000112  000000000113  000000000114  000000000115
          0097 000000000116  000000000117  000000000120  000000000121  000000000122  000000000123  000000000124  000000000125
          0145 000000000126  000000000127  000000000130  000000000131  000000000132  000000000133  000000000134  000000000135
          0193 000000000136  000000000137  000000000140  000000000141  000000000000  000000000000  000000000000  000000000000
          0241 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0289 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0337 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0385 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0433 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0481 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0529 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0577 000000000000  000000000000  000000000000  000000000000
FILE 0001 REC 0003 CH 0600
          0001 115652645060  115706010730  115741152630  115774316500  116027462350  116062626220  116115770120  116151201060
          0049 116204342760  116237506630  116272652500  116326014400  116361160250  116414324120  116447466020  116502631670
          0097 116535775540  116571141410  116624303310  116657516220  116712662070  116746023770  117001167640  117034331540
          0145 117067475410  117122637310  117156003160  117211145060  117244310730  117277452630  117332616500  117366000100
          0193 117421143750  117454311570  117507455440  117542623260  000000000000  000000000000  000000000000  000000000000
          0241 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0289 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0337 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0385 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0433 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0481 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0529 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0577 000000000000  000000000000  000000000000  000000000000
FILE 0001 REC 0004 CH 0600
          0001 115663547760  115716717550  115752065370  116005233210  116040401030  116073546650  116126716440  116162105730
          0049 116215253550  116250421370  116303567210  116336735030  116372104620  116425252440  116460420260  116513566100
          0097 116546735670  116602103510  116635251330  116670436650  116723604470  116756752310  117012120130  117045265750
          0145 117100433570  117133601410  117166747230  117222115050  117255262670  117310426540  117343574360  117376742200
          0193 117432111770  117465261560  117520431350  117553601140  000000000000  000000000000  000000000000  000000000000
          0241 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0289 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0337 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0385 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0433 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0481 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0529 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0577 000000000000  000000000000  000000000000  000000000000
FILE 0001 REC 0005 CH 0600
          0001 115676217770  115731365610  115764535400  116017703220  116053053010  116106220630  116141370420  116174540210
          0049 116227706030  116263055620  116316223440  116351371260  116404541050  116437706670  116473056460  116526224300
          0097 116561372120  116614541710  116647707530  116703055350  116736223170  116771371010  117024536630  117057704450
          0145 117113052270  117146220110  117201365730  117234533550  117267701370  117323047210  117356215030  117411343150
          0193 117444512740  117477662530  117533032320  117566202110  000000000000  000000000000  000000000000  000000000000
          0241 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0289 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0337 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0385 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0433 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0481 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0529 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
          0577 000000000000  000000000000  000000000000  000000000000
ILE 0001 REC 0006 CH 1200
          0001 115663512530  115716776450  115752142227  116005323720  116073603610  116127024700  116162170620  116215333733
          0049 116250476320  116303626361  116336776200  116425266030  117143563051  117166766631  117222164110  117255330106
          0097 117310473112  117343635530  117377001112  117432143300  117465307110  000000000000  000000000000  000000000000
          0145 000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000  000000000000
```