#283

APOLLO 15 AND 16

MASS SPECTROM DATA

71-063A-13A, 72-031A-11A

7 TAPES

APOLLO 16 CSM

MASS SPECTROMETER DATA ON TAPE

72-031A-11A

This data set has been restored. There were originally four 7-track, 800 BPI tapes written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tapes were created on an IBM 7094 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005368	DS005368	D014193	1	04/20/72 - 04/21/72 (a)
		D014194	2	04/21/72 - 04/22/72
		D014195	3	04/22/72 - 04/23/72
		D014196	4	04/23/72 - 04/24/72

(a) D014193: Read errors occurred in records: 706, 1360, 1687 of file 1.

See 71-063A-13A

APOLLO 15 CSM

MASS SPECTROMETER DATA ON TAPE

71-063A-13A

This data set has been restored. There were originally three 7-track, 800 BPI tapes written in Binary. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The original tapes were created on an IBM 7094 computer and the restored tapes were created on an IBM 9021 computer. The DR and DS numbers along with the corresponding D numbers are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR005409	DS005409	D014190	1	07/30/71 - 08/02/71
		D014191	2	08/03/71 - 08/05/71 (a)
		D014192	3	08/05/71 - 08/07/71 (b)

(a) D014191: Read error occurred in record: 3672 of file 1.
(b) D014192: Read error occurred in record: 142 of file 1.

REQ. AGENT	RAND NO.	ACQ. AGENT
MAW	RC0167	RNH

APOLLO 15 AND 16

MASS SPECTROMETER DATA ON TAPE

71-063A-13A AND 72-031A-11A

There are seven tapes in this catalog, 3 Apollo 15 data tapes and 4 Apollo 16 data tapes. Each tape is 800 BPI, binary, 7 track and containing one file. The original tapes were created on the 360/75 and were copied on the 7094.

The time spans were determined by converting the 4th word of the record containing 945 characters from hex to decimal, then dividing the decimal number by 86,400,000. That number is the Julian day. The days since launch were determined by multiplying the Julian day by 24, adding the hours from lift off and dividing the sum by 24. The time spans are as follows:

APOLLO 15, (71-063A-13A)

D#	C#	NO. OF FILES	TIME SPANS
D-14190	C-12933	1	7/30/71 - 8/02/71
D-14191	C-12934	1	8/03/71 - 8/05/71
D-14192	C-12935	1	8/05/71 - 8/07/71

APOLLO 16, (72-031A-11A)

D#	C#	NO. OF FILES	TIME SPANS
D-14193	C-12929	1	4/20/72 - 4/21/72
D-14194	C-12930	1	4/21/72 - 4/22/72
D-14195	C-12931	1	4/22/72 - 4/23/72
D-14196	C-12932	1	4/23/72 - 4/24/72

LUNAR ORBITAL MASS SPECTROMETER

APOLLOS 15 AND 16

DESCRIPTION AND FORMATS OF DATA

AT THE

NATIONAL SPACE SCIENCE DATA CENTER

JANUARY 16, 1974

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INTRODUCTION

The Mass Spectrometer flown on Apollos 15 and 16 as part of the orbital science payload measured the concentration of gas molecules it encountered both in lunar orbit and during transearth coast for the purpose of studying the lunar atmosphere-its sources, sinks, and transport mechanisms. Nearly 80 hours of operation in lunar orbit and 50 hours in transearth coast produced some 8,000 spectra of gases in the vicinity of the instrument entrance aperture.

Table 1 gives the history of operation of the Apollo 15 and 16 lunar orbital mass spectrometers. Time is in terms of ground elapsed time (GET), measured in hours from lift-off at 13:34:00.79 G.M.T. on July 26, 1971 for Apollo 15 and at 17:54:00.57 G.M.T. on April 16, 1972 for Apollo 16.

DESCRIPTION OF DATA AT NSSDC

1.0 FORMAT OF DATA

Data processing has resulted in the blocking of data into complete mass spectra on magnetic tape. Brief time gaps in the data, due to telemetry dropouts, are filled with flag words to insure proper location of the good measurements in the spectra. Reduced data also includes the background count level of each analyzer channel, the amplitude of each mass peak, decommutated housekeeping data, and pertinent spacecraft trajectory information.

Microfilm records are formatted outputs of the data on magnetic tape. The format gives sequential pairs of mass spectra (high and low mass channels), along with background, peak amplitude, housekeeping and trajectory data. In addition, there are periodic tabulated summaries of the peak amplitudes, housekeeping and trajectory data. Each summary covers several hours of operation of the experiment. Section 3 gives examples of each type of data format.

2.0 DATA TAPES

The blocked data from the Apollo 15 and 16 LOMSE are contained on 7

TIME (GET)	SPACE CRAFT ATTITUDE
85:05 - 95:15	-X
108:55 - 119:20	-X
130:30 - 141:00	-X
195:50 - 200:25	+X
202:00 - 211:40	-X
211:40 - 214:15	+X
224:30 - 238:00	TEC
245:50 - 288:05	TEC

APOLLO 16 OPERATIONAL HISTORY

TIME (GET)	SPACE CRAFT ATTITUDE
8[illegible]:10 - 92:03	-X
108:00 - 121:20	-X
121:20 - 124:40	+X (OBLIQUE PHOTOS)
124:40 - 131:10	+X
131:10 - 142:10	-X
142:10 - 143:15	ANTI-SOLAR HOLD
143:15 - 144:15	-X
144:15 - 146:20	+X (OBLIQUE PHOTOS)
146:20 - 151:20	+X
151:20 - 152:50	+X (OBLIQUE PHOTOS)
152:50 - 164:20	+X
164:20 - 167:00	+X
167:00 - 168:10	+X (OBLIQUE PHOTOS)
180:05 - 193:45	-X

magnetic tapes. Apollo 15 data is contained on tapes CC6051 thru CC6053 and Apollo 16 data is contained on tapes CC6061 thru CC6064.

The tapes were written IBM 360, 9 track, 800 BPI, No-LABEL, Variable length records. The first 4 bytes at each record contains the record length minus 4 bytes in Binary. All integers and real numbers are internal 360 binary and floating point representation.

Each spectra of data is contained in three records of 916, 2804 and 2468 bytes. Table 2 is a listing of the contents of each record. Section 3.0 gives a discription of each variable as formatted on microfilm.

GET times for each tape is as follows:

CC6051	74:09	141:25	D14190
CC6052	194:44	248:23	
CC6053	248:36	288:16	
CC6061	80:07	106:56	D-14193
CC6062	107:06	128:21	
CC6063	128:22	150:34	
CC6064	155:28	193:59	

3.0 SAMPLES OF DATA

3.1 LOW MASS - TABLE 3

GET TIME -	Ground elapsed time from liftoff
APOLLO 16-	Apollo mission number
AO, A1, BO, B1 -	See 3.2
REV -	See 3.4
SUN HR -	See 3.4
LONG -	See 3.4
LAT -	See 3.4
SUN A -	See 3.4

TABLE 2

RECORD 1

WORDS	NAME
1	APOLLO NO
1	TIME
1	A0
1	A1
1	B0
1	B1
1	REV
1	SUN HR
1	LONG
1	LAT
1	RADIUS
1	VELOCITY
1	ALTITUDE
1	SS LONG
1	SS LAT
1	SUN A
1	SUN B
1	VEL ALPHA
1	VEL BETA
28	LOW MASS PEAK AMPLITUDES
28	LOW MASS PEAK FLAGS
67	HIGH MASS PEAK AMPLITUDES
67	HIGH MASS PEAK FLAGS
1	SYNC CODE
1	OK
1	LOW MASS BACKGROUND AVG
1	HIGH MASS BACKGROUND AVG
15	HOUSEKEEPING VOLTAGE MONITORS
RECORD 2	
600	LOW MASS DATA
50	LOW MASS CALIBRATION
50	HIGH MASS CALIBRATION

TABLE 2 (Continued)

RECORD 3

WORDS	NAME
8	SYNC FLAGS
8	SYNC BIT
600	HIGH MASS DATA

GET	TIME	APOLLO 16	A0	A1	B0	B1	REV	SUN MN	LOEG	LAT	SUN A	SUN B	TEMP	ALT	VEL ALPHA	VEL	
180 18 20	LOW	MASS	-509.50	34456.50	-54.50	17329.20	54.87	176.63	-131.57	4.15	92.46	45.35	2.88	104.76	178.31	1.63	
1	696	484	37	32	29	104	30203	9984	1808	14	146	648	1024				
2	752	468	31	23	24	121	30464	9856	1808	13	186	624	272				
3	640	444	32	28	33	142	30203	9856	1792	13	202	656	47				
4	464	440	38	30	39	140	30203	9856	1824	16	188	664	3				
5	276	436	30	28	28	142	30203	9856	1808	16	218	664	1				
6	256	444	28	28	41	134	30203	9984	1776	10	208	624	0				
7	576	484	27	39	42	128	30203	9856	1696	15	214	648	0				
8	2240	440	27	40	37	144	30464	9856	1584	16	220	640	0				
9	4416	432	25	31	30	140	30203	9984	1072	35	212	640	0				BACK
10	5248	448	21	38	38	134	30464	9984	536	156	210	656	0				
11	5376	432	15	34	51	156	30464	9856	204	492	216	640	0				
12	5376	348	10	36	50	136	30464	9216	64	744	192	616	0				
13	5504	226	3	32	75	138	29696	7872	33	800	200	536	0				
14	5440	122	6	30	108	120	27648	5824	21	816	196	336	0				
15	5568	58	5	27	122	128	22016	3968	15	824	196	204	0				
16	5504	21	5	27	122	117	14976	2272	15	840	140	99	1536				
17	5504	15	8	20	118	132	8960	1200	14	760	70	38	1536				
18	5568	17	6	16	114	104	4416	544	17	808	44	20	1536				
19	5504	42	3	10	115	98	2000	242	12	824	17	19	1536				
20	5504	64	8	10	123	97	768	112	17	792	15	19	1536				
21	5184	85	11	9	117	89	280	53	16	824	14	13	1536				
22	4224	94	5	7	110	64	132	37	16	808	9	16	1536				
23	2688	81	7	7	114	47	68	42	20	808	9	13	1536				
24	1120	86	9	14	108	31	51	25	27	728	15	16	1536				CALI
25	396	84	7	8	104	22	39	22	119	492	16	14	1536				
26	300	100	9	6	107	18	34	17	616	228	12	16	1536				
27	560	85	8	10	101	16	22	19	1152	87	15	15	1536				
28	840	74	5	8	105	17	24	16	1296	28	15	14	1536				
29	808	85	8	10	107	10	18	17	1312	22	13	14	1536				
30	896	100	6	13	106	13	18	18	1264	17	12	16	1536				
31	808	88	3	10	97	16	18	14	1280	22	11	13					
32	896	82	6	8	91	14	19	18	1328	17	12	13					
33	912	87	4	8	62	15	10	25	1280	22	12	14					
34	896	88	6	12	42	14	18	21	1280	16	14	13	HOUSE				
35	912	71	5	10	35	15	19	19	1328	22	12	15	KEEPING				
36	920	45	7	9	27	19	51	26	1360	22	15	12	3.86+12				
37	944	32	8	7	17	32	127	47	1312	17	14	10	2.43+ 5				
38	928	16	7	9	16	55	396	49	1248	19	13	16	2.96-12				
39	910	13	4	8	20	168	1456	82	960	20	13	16	4.67-15				
40	832	6	6	12	21	616	4224	112	528	18	11	14	2.08 EM				
41	672	10	5	8	25	2272	7168	224	182	24	9		3.10 F1				
42	436	12	6	7	32	8192	8960	428	66	20	13		.12 F2				
43	214	19	3	11	55	19456	9728	816	31	22	18		2.59 LM				HOUSE
44	83	25	7	10	80	27648	9984	1232	17	23	21		2.69 HM				
45	46	26	8	11	67	30720	9984	1504	16	25	43		1.75 SW				
46	70	27	6	14	54	31488	9984	1616	22	12	98		2.27 T1				
47	100	32	10	20	51	31232	9984	1760	13	13	292		2.88 T2				
48	368	32	16	21	60	30976	9984	1744	18	18	484		.02 MF				
49	408	29	28	19	67	30720	9984	1808	13	25	608		2.57 DF				
50	424	34	33	24	88	30464	9984	1760	17	57	648		2.51 IC				
PEAK AMPLITUDES 28	5505	25	83 23	1 22	27 20	93 19	119 17	9892 16	1763 15	1296 14	793 13	195					
27	510	24	28	21	0	18	30264				12	636					
26	941																

PBKG 0 — PRE BKG

BKG 0 — CUR BKG

N 10 — NUM

LOW MASS DATA FORMAT
TABLE 3

3.1 LOW MASS (continued)

SUN B - See 3.4

TEMP - Ion source temp monitor

ALT - See 3.4

VEL ALPHA - See 3.4

VEL - See 3.4

BACKGROUND - Background data

CALIBRATE - Interval calibrate data

HOUSEKEEPING -

+12 - +12 volts monitor

+5 - +5 volts monitor

-12 - -12 volts monitor

-15 - -15 volts monitor

EM - Emission current monitor

F1 - Filament No. 1 current monitor

F2 - Filament No. 2 current monitor

LM - Low mass multiplier high voltage monitor

HM - High mass multiplier high voltage monitor

SW - Sweep high voltage monitor

T1 - Electronics temp monitor

T2 - Ion source temp monitor

MF - Multiplier high voltage HI/LO flag

DF - Discriminator HI/LO flag

IC - Instrument current

PEAK AMPLITUDES-

Mass number and peak amplitude

3.1 LOW MASS (continued)

PEAK AMPLITUDES -	Mass number and peak amplitude
PRE BKG -	Background counts at start of sweep
CUR BKG -	Background counts at end of sweep
NUM -	Number data points used in calculating BKG

3.2 HIGH MASS - TABLE 4

GET TIME -	See 3.1
APOLLO 16 -	See 3.1
24 October 1972 -	Data date tapes were processed
A0, A1, B0, B1 -	Peak location coefficients for high mass channel
STEP NO	A0 + A1/mass step $\leq$ 400 B0 + B1/mass step > 400
SYNC START -	Data C at Start of sweep
SYNC END -	Data C at end of sweep
PBKG -	Background count at start of sweep
BKG -	Background count at end of sweep
N -	No. Data points used in calculating BKG
BACKGROUND -	Background Data
CALIBRATE -	Internal calibrate data
PEAK AMPLITUDES -	Mass no. and peak amplitude
STAR -	Incorrect peak shape

3.3 APOLLO 16 PEAK SUMMARY - TABLE 5

GET TIME -	See 3.1
SUN HR -	See 3.4
C-	Peak error code. If code greater than 0 previous peak location coefficients are used
27 → 39 -	Mass No.
L -	Low mass BKG
H -	Hi mass BKG

SYNC START → SYNC END

GET TIME APOLLO 16 24 OCTOBER 1972 DATA C FLAG 00000000

180 18 20 HIGH MASS AO -504.50 A1 34456.50 B0 -54.90 B1 17329.20 DATA C SYNC 11000011 PBKG 1 BKG 1 N 10

1	28	8	80	6	19	5	126	13	127	10	36	34	138
2	31	13	59	10	19	9	69	31	110	14	79	28	.26
3	22	8	26	11	8	6	23	49	89	6	135	33	4
4	13	3	10	33	7	10	10	67	38	14	155	31	2
5	10	3	6	75	8	14	7	83	18	25	145	27	1
6	14	8	13	120	7	19	10	107	19	17	114	37	1
7	19	7	27	173	4	59	11	125	20	15	64	31	1
8	37	16	53	179	7	131	10	122	15	9	36	32	1
9	52	16	96	165	6	209	16	99	12	11	21	49	1
10	53	13	107	120	9	255	23	69	17	9	15	135	1
11	37	16	110	66	11	287	34	66	23	4	15	639	1
12	16	11	73	28	16	271	87	33	41	11	15	2463	1
13	8	8	41	16	15	225	143	24	58	8	14	5119	1
14	5	2	24	9	14	165	217	14	63	3	16	7359	1
15	9	4	11	13	14	111	263	12	51	7	10	7359	1
16	12	9	11	22	13	43	241	13	35	9	15	5951	1536
17	17	8	24	41	8	25	211	9	15	11	17	3807	1536
18	11	15	46	80	9	15	179	12	9	15	22	1711	1536
19	13	30	90	135	4	12	133	13	10	42	29	483	1536
20	2	26	135	165	8	12	89	13	11	47	131	114	1536
21	3	15	149	191	5	7	37	15	8	48	347	52	1536
22	4	15	159	183	5	16	20	12	9	35	639	44	1536
23	7	6	149	133	6	40	13	34	7	23	759	28	1536
24	18	3	98	85	8	102	8	71	13	13	663	30	1536
25	19	5	42	42	13	275	8	129	31	14	463	36	1536
26	18	11	24	18	15	695	9	193	63	5	267	24	1536
27	13	24	4	10	25	1087	8	271	85	7	101	37	1536
28	9	44	12	9	24	1487	12	303	70	8	27	27	1536
29	4	48	11	9	33	1599	13	363	48	12	21	33	1536
30	4	45	17	21	23	1551	46	347	17	13	24	33	1536
31	3	36	27	47	27	1263	69	287	10	13	20	37	
32	5	15	48	93	22	879	165	241	9	9	27	43	
33	8	13	53	123	12	479	259	163	10	12	19	92	
34	13	3	57	151	10	225	343	101	11	25	18	267	
35	10	6	30	149	9	62	391	61	5	55	20	639	
36	13	15	22	133	9	24	423	34	8	123	21	1007	
37	5	23	11	88	4	20	391	18	8	169	21	1183	
38	5	33	10	68	9	14	303	15	15	149	27	1135	
39	8	47	9	28	7	14	241	14	14	94	76	855	
40	20	46	4	14	13	22	141	19	19	54	205	491	
41	26	26	10	9	15	33	66	14	20	20	487		
42	27	18	15	7	23	82	38	16	23	11	735		
43	23	9	39	7	38	147	18	16	16	9	791		
44	22	5	40	8	47	263	17	15	16	13	711		
45	10	13	50	14	47	343	12	11	16	7	479		
46	2	27	53	21	34	383	11	17	14	12	263		
47	3	59	40	33	30	303	12	25	14	14	100		
48	6	65	22	25	18	347	11	29	5	9	47		
49	6	96	13	35	13	291	7	60	12	11	34		
50	10	112	11	26	10	193	12	77	13	16	26		

BAC (rows 1–15); CAL (rows 16–30)

PEAK AMPLITUDES

67	50 61	12•56	100 52	169 48	9 45	279 42	256 39	353 37	50 33	40 30	741 28	7608
66	13•60	23 55	144 51	102 47	20•44	1589 41	413 38	112 36	75 32	160 29	765 27	1162•
65	15 59	45 54	51 50	145 46	41 43	375 40	115	35	8•31	143		
64	9•58	42 53	47 49	21•				34	17			
63	22 57	103										
62	5•											

STAR → 1162•

HIGH MASS DATA FORMAT
TABLE 4

CSM DIRECTION

LOW MASS

HIGH MASS

MASS NUMBER

GAP

STAR

APOLLO 16 PEAK SUMMARY

GET	TIME	SUM MR	C	27	27	29	29	29	30	31	32	33	34	35	36	37	38	39	L	H
-100	3 53	-140.2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	4 55	-143.3	0	[illegible]	3977*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	5 57	-145.4	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	6 59	-145.4	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	8 1	-152.5	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	9 3	-155.6	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	10 5	-158.7	0	[illegible]	2037*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	11 7	-161.7	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	12 9	-164.8	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	13 11	-167.9	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	14 13	-171.0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	15 15	-174.1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	16 17	-177.2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	17 19	179.7	0	[illegible]	1237*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	18 20	176.6	0	[illegible]	1162*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	19 22	173.5	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	20 24	170.4	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	21 26	167.3	0	[illegible]	910*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	22 28	164.2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	23 30	161.0	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	24 32	157.9	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	25 34	154.7	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	26 36	151.6	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	27 38	148.4	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	28 40	145.2	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	29 42	142.1	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	30 44	138.9	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	31 46	135.7	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	32 48	132.5	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	33 50	129.3	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	34 52	126.1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	35 54	122.9	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	36 56	119.7	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-100	37 58	116.5	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
*********																				
181	3 46	37.4	3	335	352*	3737	4999	322	322	26*	124	21*	6*	0*	9*	20	41	89	15	191
-181	4 49	34.3	0	297	394*	3277	5186	345	364	65	157	28*	12*	29	21*	0*	16	84*	76	282
-181	5 50	31.2	3	331	439*	3649	5249	317	309	40*	142	11*	5*	10*	8*	10*	24*	73*	4	159
-181	6 52	28.1	2	352	433*	3986	5512	320	352	69	175	7*	10	12	12*	0*	21*	62*	13	146
-181	7 54	25.1	3	353	431*	3962	5540	366	328	61*	152	9*	0*	11	14*	8*	16*	81	9	157
-181	8 56	22.0	3	350	448*	3904	5798	381	330	66	185	14*	6*	7*	21	9*	21	102	6	152
*********																				
-181	12 2	12.8	0	282	487*	3949	6587	505	364	119	220	24	3*	3*	24	9*	34	83	5	113
-181	13 4	9.7	0	416	527*	5017	6956	499	396	174	277	27	11	4	19	25	17*	95*	4	120
-181	14 6	6.6	1	339	554*	3955	7449	606	449	233	292	20	4*	5*	25	15*	33	86*	1	4
-181	15 8	3.6	2	454	591*	5431	7715	725	468	298	337	21	13	6*	33	11*	29	109	2	122
-181	16 10	.5	1	507	631*	5940	8038	854	540	389	371	27	2*	0*	10*	29	40	91*	2	134
-181	17 12	-2.6	1	546	711*	6130	8519	1024	618	503	416	20*	0*	2*	29	17*	44	99*	2	149
-181	18 14	-5.6	0	587	751*	6358	8986	1208	678	616	487	45	5*	0*	32	29	34	128	1	169
-181	19 16	-8.7	2	526	822*	5584	9565	1397	769	692	526	68	11*	2*	28*	35	61	137	1	240
-181	20 17	-11.8	0	729	880*	7342	9933	1657	899	801	604	37*	19*	14*	27	33*	49*	115*	1	232

PEAK SUMMARY FORMAT

TABLE 5

3.3 APOLLO 16 PEAK SUMMARY (Continued)

GAP -	Time gap in data
STAR -	Incorrect peak shape
CSM DIRECTION -	Minus (-) denotes -X orientation

3.4 APOLLO 16 TRAJECTORY SUMMARY - TABLE 6

GET TIME -	See 3.1
REV -	Orbit No.
SUN HR -	Long - SS long
LONG -	Sub satellite longitude
LAT -	Sub satellite latitude
RADIUS -	Orbit radius (km)
VELOCITY -	CSM velocity (km/sec)
ALTITUDE -	CSM altitude (km)
SS LONG -	Sub solar longitude
SS LAT -	Sub solar latitude
SUN A -	Angle from CSM X axis to sun
SUN B -	Azimuth of sun from -z axis
VEL ALPHA -	Angle of attack from X axis
VEL BETA -	Azimuth of Vel vector from -z axis

3.5 APOLLO 16 HOUSEKEEPING SUMMARY - TABLE 7

GET TIME -	Ground elapsed time from liftoff
+12 -	+12V monitor
+5 -	+5V monitor
-12 -	-12V monitor
-15 -	-15V monitor
EMISSION -	Emission current monitor
FIL 1	Filament No. 1 current monitor
FIL 2	Filament No. 2 current monitor
LM HV -	Low mass multiplier high voltage monitor

APOLLO 16 TRAJECTORY SUMMARY

GET	TIME	REV	SUN HR	LONG	LAT	RADIUS	VELOCITY	ALTITUDE	SS LONG	SS LAT	SUN A	SUN B	VEL ALPHA	VEL BETA
100	3 53	54.75	-140.21	-88.29	-3.66	1851.83	1.6262	114.00	51.92	1.57	49.01	45.91	177.76	76.21
100	4 55	54.75	-143.29	-91.37	-3.12	1851.31	1.6267	113.48	51.91	1.57	52.28	45.24	177.80	82.35
100	5 57	54.76	-146.36	-94.46	-2.57	1850.78	1.6272	112.95	51.91	1.57	55.54	44.77	177.83	87.17
100	6 59	54.77	-149.44	-97.54	-2.01	1850.25	1.6277	112.42	51.90	1.57	58.78	44.32	177.79	92.56
100	8 1	54.78	-152.51	-100.62	-1.45	1849.72	1.6282	111.89	51.89	1.57	62.03	44.01	177.80	96.74
100	9 3	54.79	-155.59	-103.71	-.88	1849.18	1.6206	111.35	51.88	1.57	65.30	43.85	177.77	101.99
100	10 5	54.80	-158.66	-106.79	-.31	1848.65	1.6291	110.82	51.87	1.57	68.60	43.77	177.72	108.32
100	11 7	54.81	-161.74	-109.88	.26	1848.12	1.6296	110.29	51.86	1.57	71.88	43.84	177.69	113.04
100	12 9	54.81	-164.82	-112.97	.83	1847.59	1.6301	109.76	51.85	1.57	75.19	43.94	177.59	118.88
100	13 11	54.82	-167.90	-116.05	1.40	1847.07	1.6306	109.24	51.84	1.57	78.45	44.19	177.46	123.19
100	14 13	54.83	-170.98	-119.15	1.96	1846.55	1.6310	108.72	51.84	1.57	81.87	44.49	177.35	130.40
100	15 15	54.84	-174.07	-122.25	2.52	1846.05	1.6315	108.22	51.83	1.57	85.24	44.91	177.22	136.31
100	16 17	54.85	-177.17	-125.35	3.07	1845.55	1.6319	107.72	51.82	1.57	88.21	45.37	177.62	130.17
100	17 19	54.86	179.74	-128.46	3.62	1845.07	1.6324	107.24	51.81	1.57	90.56	45.53	178.55	90.78
100	18 20	54.87	176.63	-131.57	4.15	1844.59	1.6328	106.76	51.80	1.57	92.96	45.35	178.31	36.51
100	19 22	54.87	173.52	-134.69	4.67	1844.14	1.6332	106.31	51.79	1.57	95.50	45.21	177.36	11.24
100	20 24	54.88	170.41	-137.81	5.18	1843.69	1.6336	105.86	51.78	1.57	98.62	45.02	177.03	146.90
100	21 26	54.89	167.29	-140.94	5.67	1843.27	1.6340	105.44	51.77	1.57	102.14	44.78	177.30	355.86
100	22 28	54.90	164.16	-144.08	6.15	1842.86	1.6343	105.03	51.77	1.57	105.61	44.52	177.49	349.31
100	23 30	54.91	161.02	-147.22	6.61	1842.47	1.6347	104.64	51.76	1.57	109.11	44.19	177.64	340.75
100	24 32	54.92	157.88	-150.37	7.05	1842.11	1.6350	104.28	51.75	1.57	112.60	43.97	177.77	332.26
100	25 34	54.93	154.73	-153.53	7.47	1841.76	1.6353	103.93	51.74	1.57	116.11	43.89	177.87	322.20
100	26 36	54.94	151.58	-156.69	7.86	1841.44	1.6356	103.61	51.73	1.57	119.64	44.07	177.93	311.70
100	27 38	54.94	148.41	-159.87	8.24	1841.14	1.6359	103.31	51.72	1.57	123.17	44.51	177.92	300.65
100	28 40	54.95	145.24	-163.04	8.58	1840.87	1.6361	103.04	51.71	1.57	126.77	44.98	177.80	288.93
100	29 42	54.96	142.07	-166.23	8.91	1840.62	1.6363	102.79	51.70	1.57	130.32	45.41	177.62	279.49
100	30 44	54.97	138.88	-169.42	9.20	1840.40	1.6365	102.57	51.70	1.57	133.92	45.63	177.36	270.41
100	31 46	54.98	135.70	-172.62	9.47	1840.20	1.6367	102.37	51.69	1.57	137.57	45.38	177.03	261.37
100	32 48	54.99	132.50	-175.82	9.71	1840.04	1.6368	102.21	51.68	1.57	140.94	45.54	176.99	252.92
100	33 50	55.00	129.30	-179.03	9.92	1839.90	1.6370	102.07	51.67	1.57	144.21	46.22	177.02	243.01
100	34 52	55.01	126.10	177.76	10.09	1839.79	1.6370	101.96	51.66	1.57	147.54	47.27	176.91	232.59
100	35 54	55.02	122.90	174.55	10.24	1839.71	1.6371	101.88	51.65	1.57	150.91	48.79	176.64	222.76
100	36 56	55.02	119.69	171.33	10.36	1839.66	1.6372	101.83	51.64	1.57	154.22	50.59	176.33	215.08
100	37 58	55.03	116.48	168.11	10.44	1839.64	1.6372	101.81	51.63	1.57	157.39	52.74	176.12	211.01
********														
101	3 55	55.25	37.23	85.80	3.23	1847.55	1.6300	109.72	51.42	1.57	94.96	161.31	135.79	143.38
101	4 53	55.26	34.29	83.70	2.68	1848.10	1.6296	110.27	51.41	1.57	121.16	210.43	176.90	192.87
101	5 50	55.27	31.21	82.61	2.13	1848.64	1.6291	110.81	51.40	1.57	117.74	210.64	176.68	199.92
101	6 52	55.28	28.13	79.52	1.56	1849.20	1.6286	111.37	51.39	1.57	114.31	210.80	176.41	206.14
101	7 54	55.29	25.06	76.44	1.00	1849.75	1.6281	111.92	51.38	1.57	111.40	211.24	176.57	219.77
101	8 56	55.30	21.99	73.36	.43	1850.30	1.6276	112.47	51.37	1.57	109.02	211.97	176.76	246.22
********														
101	12 2	55.32	12.78	64.13	-1.28	1851.95	1.6261	114.12	51.35	1.57	102.42	213.94	175.87	-45.76
101	13 4	55.33	9.72	61.05	-1.84	1852.49	1.6257	114.66	51.34	1.57	99.40	214.31	175.90	306.22
101	14 6	55.34	6.65	57.53	-2.40	1853.02	1.6252	115.19	51.33	1.57	96.30	214.72	175.96	306.87
101	15 8	55.35	3.53	54.50	-2.95	1853.54	1.6248	115.71	51.32	1.57	93.13	215.04	176.14	306.50
101	16 10	55.35	.51	51.02	-3.49	1854.05	1.6243	116.22	51.31	1.57	89.92	215.31	176.35	305.28
101	17 12	55.36	-2.56	48.75	-4.03	1854.54	1.6239	116.71	51.30	1.57	86.67	215.32	176.63	302.91
101	18 14	55.37	-5.63	45.66	-4.54	1855.03	1.6235	117.20	51.29	1.57	83.32	214.64	176.95	297.46
101	19 16	55.38	-8.71	42.58	-5.05	1855.49	1.6231	117.66	51.29	1.57	79.95	214.24	177.22	290.72
101	20 17	55.39	-11.78	39.49	-5.54	1855.94	1.6227	118.11	51.28	1.57	76.57	213.97	177.43	282.63

TRAJECTORY SUMMARY FORMAT

TABLE 6

APOLLO 16 HOUSEKEEPING SUMMARY

GET	TIME	+12	+ 5	-12	-15	EMISSION	FIL 1	FIL 2	LM HV	KM HV	S HV	ETEMP	STEMP	M LO/HI	D HI/LO	I
100	3 53	3.86	2.43	2.96	4.67	2.25	3.10	.10	2.57	2.69	1.88	2.24	3.49	.02	2.57	2.67
100	4 55	3.86	2.43	2.94	4.67	2.22	3.10	.10	2.57	2.69	1.96	2.24	3.43	.02	2.57	2.67
100	5 57	3.88	2.43	2.96	4.67	2.14	3.10	.10	2.57	2.69	2.04	2.25	3.37	.02	2.57	2.67
100	6 59	3.88	2.43	2.94	4.67	2.10	3.10	.10	2.59	2.69	2.14	2.25	3.33	.02	2.57	2.65
100	8 1	3.86	2.45	2.96	4.67	2.20	3.10	.12	2.57	2.69	2.22	2.25	3.27	.02	2.57	2.65
100	9 3	3.88	2.43	2.96	4.67	2.14	3.10	.12	2.57	2.69	2.29	2.25	3.24	.02	2.57	2.67
100	10 5	3.86	2.43	2.96	4.67	2.16	3.10	.12	2.59	2.69	1.73	2.25	3.20	.02	2.57	2.65
100	11 7	3.86	2.43	2.96	4.65	2.16	3.10	.10	2.57	2.69	1.80	2.27	3.16	.02	2.59	2.65
100	12 9	3.88	2.43	2.96	4.67	2.02	3.10	.10	2.57	2.69	1.88	2.25	3.10	.02	2.57	2.65
100	13 11	3.86	2.43	2.96	4.67	2.06	3.10	.12	2.59	2.71	1.96	2.27	3.06	.02	2.57	2.65
100	14 13	3.88	2.43	2.96	4.67	2.14	3.10	.12	2.57	2.69	2.04	2.27	3.02	.02	2.59	2.51
100	15 15	3.88	2.43	2.94	4.67	2.14	3.10	.12	2.57	2.69	2.14	2.27	2.98	.02	2.57	2.49
100	16 17	3.88	2.43	2.96	4.67	2.18	3.10	.12	2.57	2.67	2.20	2.27	2.96	.02	2.57	2.49
100	17 19	3.86	2.43	2.96	4.67	2.16	3.10	.12	2.57	2.69	2.29	2.27	2.92	.02	2.57	2.53
100	18 20	3.86	2.43	2.96	4.67	2.08	3.10	.12	2.59	2.69	1.75	2.27	2.88	.02	2.57	2.51
100	19 22	3.86	2.43	2.96	4.67	2.16	3.08	.12	2.57	2.69	1.80	2.29	2.86	.02	2.57	2.51
100	20 24	3.86	2.43	2.96	4.67	2.12	3.10	.10	2.54	2.69	1.90	2.29	2.78	.02	2.57	2.51
100	21 26	3.86	2.43	2.96	4.67	2.14	3.10	.12	2.57	2.69	1.98	2.29	2.76	.02	2.57	2.51
100	22 28	3.86	2.43	2.94	4.65	2.16	3.10	.12	2.57	2.69	2.06	2.29	2.76	.02	2.57	2.49
100	23 30	3.88	2.43	2.96	4.67	2.14	3.08	.12	2.57	2.69	2.14	2.29	2.73	.02	2.57	2.49
100	24 32	3.86	2.43	2.96	4.67	2.14	3.10	.12	2.57	2.69	2.22	2.29	2.69	.02	2.57	2.47
100	25 34	3.86	2.43	2.96	4.67	2.22	3.10	.12	2.57	2.69	2.29	2.29	2.67	.02	2.57	2.51
100	26 36	3.86	2.43	2.96	4.67	2.14	3.10	.12	2.57	2.69	1.73	2.31	2.65	.02	2.57	2.49
100	27 38	3.86	2.45	2.94	4.67	2.16	3.10	.12	2.59	2.71	1.80	2.29	2.63	.02	2.57	2.49
100	28 40	3.86	2.43	2.96	4.67	2.12	3.10	.12	2.57	2.69	1.90	2.31	2.59	.02	2.57	2.47
100	29 42	3.88	2.43	2.94	4.67	2.14	3.10	.12	2.59	2.71	1.96	2.29	2.57	.04	2.57	2.49
100	30 44	3.88	2.43	2.94	4.67	2.10	3.10	.12	2.57	2.69	2.06	2.29	2.55	.02	2.57	2.49
100	31 46	3.86	2.43	2.96	4.67	2.12	3.10	.12	2.59	2.67	2.12	2.31	2.51	.04	2.57	2.47
100	32 48	3.86	2.43	2.96	4.67	2.16	3.10	.12	2.57	2.69	2.22	2.33	2.51	.02	2.57	2.47
100	33 50	3.86	2.43	2.96	4.67	2.12	3.10	.12	2.57	2.69	2.29	2.31	2.49	.04	2.57	2.49
100	34 52	3.86	2.43	2.96	4.67	2.16	3.10	.12	2.57	2.67	1.75	2.31	2.47	.02	2.57	3.22
100	35 54	3.88	2.43	2.96	4.67	2.12	3.10	.12	2.55	2.65	1.82	2.31	2.45	.02	2.57	4.10
100	36 56	3.88	2.43	2.96	4.67	2.12	3.10	.12	2.55	2.65	1.88	2.31	2.41	.02	2.57	4.10
100	37 58	3.88	2.43	2.96	4.67	2.14	3.10	.12	2.55	2.67	1.98	2.31	2.41	.02	2.57	4.08
.....																
101	3 45	3.88	2.43	2.96	4.65	2.14	3.10	.14	2.59	2.71	2.06	2.39	2.43	.02	2.55	2.06
101	4 48	3.86	2.43	2.96	4.67	2.14	3.12	.14	2.59	2.69	2.14	2.41	2.43	.02	2.57	2.02
101	5 50	3.88	2.43	2.96	4.67	2.04	3.10	.14	2.59	2.69	2.22	2.41	2.43	.02	2.55	2.08
101	6 52	3.86	2.43	2.96	4.67	2.14	3.12	.14	2.59	2.69	2.29	2.43	2.43	.02	2.55	2.20
101	7 54	3.88	2.14	2.96	4.67	2.14	3.12	.14	2.57	2.69	1.75	2.41	2.43	.02	2.55	2.29
101	8 56	3.86	2.43	2.94	4.69	2.14	3.10	.14	2.57	2.69	1.80	2.43	2.43	.02	2.55	2.41
.....																
101	12 2	3.88	2.43	2.94	4.65	2.10	3.12	.14	2.57	2.69	2.06	2.45	2.41	.02	2.55	2.25
101	13 4	3.86	2.43	2.96	4.67	2.08	3.10	.14	2.59	2.69	2.14	2.43	2.41	.02	2.55	2.18
101	14 6	3.86	2.45	2.96	4.67	2.08	3.12	.14	2.59	2.69	2.22	2.45	2.43	.02	2.55	2.10
101	15 8	3.86	2.43	2.96	4.67	2.02	3.12	.12	2.59	2.69	2.29	2.45	2.43	.02	2.55	2.12
101	16 10	3.88	2.43	2.94	4.67	2.12	3.12	.14	2.59	2.69	1.75	2.47	2.43	.02	2.55	2.06
101	17 12	3.86	2.43	2.96	4.67	2.14	3.10	.14	2.59	2.69	1.80	2.45	2.43	.02	2.55	2.06
101	18 14	3.86	2.41	2.96	4.67	2.08	3.10	.14	2.57	2.69	1.88	2.49	2.41	.02	2.55	2.08
101	19 16	3.88	2.43	2.96	4.67	2.14	3.12	.14	2.59	2.69	1.98	2.49	2.41	.02	2.55	2.12
101	20 17	3.88	2.43	2.96	4.65	2.08	3.12	.14	2.57	2.69	2.06	2.49	2.43	.02	2.55	2.10

HOUSEKEEPING SUMMARY FORMAT

TABLE 7

HM HV -	High mass multiplier high voltage monitor
S HV -	Sweep high voltage monitor
ETEMP -	Electronics temp. monitor
STEMP -	Ion source temp. monitor
M LO/HI -	Multiplier high voltage LO/HI flag
D HI/LO -	Discriminator HI/LO flag
I -	Instrument current (Total)

REC 1, LENGTH 945

Dupe of D-14190
Apollo 15
7/30/71 - 8/2/71


```
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0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000010000
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4126E69A412373183F5C48163F5048164 12F5F06000000000000000000000000000000000000000000000000000
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REC 2, LENGTH 2817


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