Bendix
Aerospace Systems Division

Command List
(Array D)

NO.	REV. NO.
ATM-872	A

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This command list is applicable to Array D of ALSEP.

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TABLE 1

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CD-31	ASE High Bit Rate ON[3]	003	3	Data Processor
CD-32	ASE High Bit Rate OFF[1]	005	5	" "
CD-33	Normal Bit Rate[1, 3]	006	6	" "
CD-34	Slow Bit Rate[3]	007	7	" "
CD-35	Normal Bit Rate Reset[4]	011	9	" "
CD-1	Transmitter "A" Select[2]	012	10	Power Dist. Unit
CD-2	Transmitter ON[2]	013	11	" " "
CD-3	Transmitter OFF	014	12	" " "
CD-4	Transmitter "B" Select	015	13	" " "
CD-5	PDR #1 ON	017	15	" " "
CD-6	PDR #1 OFF[2]	021	17	" " "
CD-7	PDR #2 ON	022	18	" " "
CD-8	PDR #2 OFF[2]	023	19	" " "
CD-9	DSS HTR 3 ON[2]	024	20	" " "
CD-10	DSS HTR 3 OFF	025	21	" " "
CD-11	Data Processor "X" Select[2]	034	28	" " "
CD-12	Data Processor "Y" Select	035	29	" " "
CD-13	Experiment 1 Operational Power ON[6]	036	30	" " "
CD-14	Experiment 1 Standby Power[2, 6]	037	31	" " "
CD-15	Experiment 1 Standby OFF	041	33	" " "
CD-16	Experiment 2 Operational Power ON	042	34	" " "
CD-17	Experiment 2 Standby Power[2]	043	35	" " "

[1] Preset turn-on operating mode.
[2] Lunar surface initial conditions programmed in during final system checkout.
[3] Changes bit rate at end of ALSEP frame during which command is executed.
[4] Changes bit rate upon command execution.
[5] Experiment 3 is effectively OFF in this mode.
[6] Experiments are numbered as follows: 1 PSE, 2 ASE, 3 LSM, and 4 HFE.

TABLE 1 (CONT.)

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CD-18	Experiment 2 Standby OFF	044	36	Power Dist. Unit
CD-19	Experiment 3 Operational Power ON	045	37	" " "
CD-20	Experiment 3 Standby Power[2, 5]	046	38	" " "
CD-21	Experiment 3 Standby OFF	050	40	" " "
CD-22	Experiment 4 Operational Power ON	052	42	" " "
CD-23	Experiment 4 Standby Power[2]	053	43	" " "
CD-24	Experiment 4 Standby OFF	054	44	" " "
CD-25	DSS HTR 1 Select (10w)	055	45	" " "
CD-26	DSS HTR 2 Select (5w)	056	46	" " "
CD-27	DSS HTR 2 OFF[2, 7]	057	47	" " "
CD-36	Timer Output Accept[1]	032	26	Command Decoder
CD-37	Timer Output Inhibit	033	27	" "
CU-1	PCU #1 Select[1]	060	48	Power Cond. Unit
CU-2	PCU #2 Select	062	50	" " "
CL-1	Gain Change LPX, LPY (Steps through following sequence one step per command[1]) -30dB, 0dB, -10dB, -20dB	063	51	Passive Seismic Exp.
CL-2	Gain Change LPZ (Steps through same sequence as CL-1)	064	52	" " "
CL-3	Calibration SP ON/OFF[1, 8]	065	53	" " "
CL-4	Calibration LP ON/OFF[1]	066	54	" " "

[7] Command CD-27 must be preceded by CD-26.

[8] SP Calibration and Uncage are initiated automatically at 18-hour intervals by the timer unless this feature has been inhibited by execution of CD-37.

TABLE 1 (CONT.)

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CL-5	Gain Change SPZ (Steps through same sequence as CL-1)	067	55	Passive Seismic Exp.
CL-6	Leveling Power X Motor[9] ON/OFF[1]	070	56	" " "
CL-7	Leveling Power Y Motor[9] ON/OFF[1]	071	57	" " "
CL-8	Leveling Power Z Motor[9] ON/OFF[1]	072	58	" " "
CL-9	Uncage[8,11] Arm/Fire	073	59	" " "
CL-10	Leveling Direction[9] Plus [1]/Minus	074	60	" " "
CL-11	Leveling Speed[9] Low[1]/High	075	61	" " "
CL-12	Thermal Control Mode Auto[1]/Manual[10]	076	62	" " "
CL-13	Feedback Filter IN/OUT[1]	101	65	" " "
CL-14	Coarse Level Sensor[1] IN/OUT[1]	102	66	" " "
CL-15	Leveling Mode[9] Auto[1]/Manual	103	67	" " "

[9]Manual leveling sequence is as follows: Send CL-15 to change from auto to manual leveling mode, change direction, and speed by CL-10 and CL-11 as necessary, and then execute leveling operation by sending appropriate leveling motor commands, CL-6, CL-7, or CL-8. Leveling operation is terminated by retransmission of CL-6, CL-7, or CL-8.

[10]Sequence of command is auto on[1]/auto off/manual on/ manual off.

[11]The uncage command is executed automatically by the delayed command sequencer at 144 hours +2 minutes although uncaging may have been previously accomplished by ground command or as outlined in Note 8 above.

TABLE 1 (CONT.)

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CM-1	LSM Range Select (Steps through three ranges, one step per command)[12]	123	83	LSM Experiment
	200 gammas full scale[1]			
	50 gammas full scale			
	100 gammas full scale			
	repeat			
CM-2	Steady Field Offset[13] (Step through seven values, one step per command)	124	84	" "
	0 percent of full scale[1]			
	+25 percent of full scale			
	+50 percent of full scale			
	+75 percent of full scale			
	-75 percent of full scale			
	-50 percent of full scale			
	-25 percent of full scale			
	0 percent of full scale and repeat			
CM-3	Steady Field Address (Steps through following X axis to Y axis to Z axis to neutral[1])	125	85	" "
CM-4	Flip/Cal Inhibit In[1]/Out	127	87	" "
CM-5	Flip/Cal Initiate (Returns to Science mode after Flip/Cal sequence)[15]	131	89	" "

[14] For 0° flip position; reverse sign for 180° flip position.

[12] Expected ranges shown.

[13] Field offset sequence is as follows: Select proper axis with CM-3, then execute CM-2 the proper number of times to step from present value to desired value.

[15] Also activated every 18 hours after and including hour 162 by delayed command sequencer.

TABLE 1 (CONT.)

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CM-6	LSM Filter (In[1]/Out)	132	90	LSM Experiment
CM-7	Site Survey[16]	133	91	" "
CM-8	Temperature Control X[1]/Y/OFF Repeat (Changes from X-axis sensor[1] to Y-axis sensor to OFF)	134	92	" "
CH-1	Normal (Gradient) Mode Select[1]	135	93	Heat Flow Experiment
CH-2	Low Conductivity Mode Select (Ring Source)	136	94	" " "
CH-3	High Conductivity Mode Select (Heat Pulse)	140	96	" " "
CH-4	HF Full Sequence Select[1]	141	97	" " "
CH-5	HF Probe #1 Sequence Select	142	98	" " "
CH-6	HF Probe #2 Sequence Select	143	99	" " "
CH-7	HF Subsequence #1 } Command	144	100	" " "
CH-8	HF Subsequence #2 } Functions as shown	145	101	" " "
CH-9	HF Subsequence #3 } in Note 1, page 15	146	102	" " "
CH-10	HF Heater Advance (Steps through following 16-step sequence, one step per command)	152	106	" " "

All heaters off	All heaters off
Probe #1 heater #2 ON	Probe #2 heater #2 ON
All heaters off	All heaters off
Probe #1 heater #4 ON	Probe #2 heater #4 ON
All heaters off	All heaters off
Probe #1 heater #1 ON	Probe #2 heater #1 ON
All heaters off	All heaters off
Probe #1 heater #3 ON	Probe #2 heater #3 ON
	repeat

[16] First execution of CM-7 performs X-axis survey, second execution Y-axis survey, and third execution Z-axis survey. The associated command line is then disabled and cannot be further used

TABLE 1 (CONT.)

Symbol	Command Nomenclature	Octal Command	Decimal Command	Termination Point
CS-1	Geophone Calibrate	156	110	Active Seismic Expt.
CS-3	ASE Grenade Sequential Single Fire (Fires single grenades in sequence 2, 4, 3, 1. Previous grenade must fire before next grenade will fire. Four executions required.)	162	114	" " "
CS-4	ASE Grenade #1 Fire	163	115	" " "
CS-5	ASE Grenade #2 Fire	164	116	" " "
CS-6	ASE Grenade #3 Fire	165	117	" " "
CS-7	ASE Grenade #4 Fire	166	118	" " "
CS-8	Arm Grenades[17]	170	120	" " "
CR-1	Timer Reset	150	104	Timer

[17]Command CS-8 is required to arm grenades before each "Fire" Command.

TABLE 2
COMMAND SUMMARY

Termination Point	Number of Commands
Data Processor	5
Power Distribution Unit (Power Switching)	27
Power Conditioning Unit	2
Command Decoder	2
Timer	1
Passive Seismic	15
Magnetometer	8
Heat Flow	10
Active Seismic	7
Total	77

Function	Octal Code	Number
Test Command	1, 2, 4, 10, 20, 40, 100, 77, 137, 157, 167, 173, 175, 176	14
ALSEP Addresses	130, 30, 116, 16, 151, 51, 25, 65, 62, 144*	10
Address Complements	47, 147, 61, 161, 26, 126, 152, 112, 115, 33**	10
No Command	0, 177	2
Commands Assigned to Array D		77
Commands Exclusively Reserved for Other Usage		29
Available Commands Not Assigned in Array D		22
Total Commands		128

*Addresses for Array D are 62, 144
**Address complements for Array D are 115, 33

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Test Cmds.	Address	Address Complement	No Command	Not Assigned
1	1			X				
2	2			X				
3	3	CD-31	X					
4	4			X				
5	5	CD-32	X					
6	6	CD-33	X					
7	7	CD-34	X					
8	10			X				
9	11	CD-35	X					
10	12	CD-1	X					
11	13	CD-2	X					
12	14	CD-3	X					
13	15	CD-4	X					
14	16				X			
15	17	CD-5	X					
16	20			X				
17	21	CD-6	X					
18	22	CD-7	X					
19	23	CD-8	X					
20	24	CD-9	X					
21	25	CD-10	* (X)		(X)			
22	26					X		

* X in parentheses indicates dual usage.

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Test Cmds.	Address	Address Complement	No Command	Not Assigned
23	27							X
24	30				X			
25	31							X
26	32	CD-36	X					
27	33	CD-37	(X)			(X)		
28	34	CD-11	X					
29	35	CD-12	X					
30	36	CD-13	X					
31	37	CD-14	X					
32	40			X				
33	41	CD-15	X					
34	42	CD-16	X					
35	43	CD-17	X					
36	44	CD-18	X					
37	45	CD-19	X					
38	46	CD-20	X					
39	47					X		
40	50	CD-21	X					
41	51				X			
42	52	CD-22	X					
43	53	CD-23	X					
44	54	CD-24	X					
45	55	CD-25	X					
46	56	CD-26	X					

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Test Cmds.	Address	Address Complement	No Command	Not Assigned
47	57	CD-27	X					
48	60	CU-1	X					
49	61					X		
50	62	CU-2	(X)		(X)			
51	63	CL-1	X					
52	64	CL-2	X					
53	65	CL-3	(X)		(X)			
54	66	CL-4	X					
55	67	CL-5	X					
56	70	CL-6	X					
57	71	CL-7	X					
58	72	CL-8	X					
59	73	CL-9	X					
60	74	CL-10	X					
61	75	CL-11	X					
62	76	CL-12	X					
63	77			X				
64	100			X				
65	101	CL-13	X					
66	102	CL-14	X					
67	103	CL-15	X					
68	104							X

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Tests Cmds.	Address	Address Complement	No Command	Not Assigned
69	105							X
70	106							X
71	107							X
72	110							X
73	111							X
74	112					X		
75	113							X
76	114							X
77	115					X		
78	116				X			
79	117							X
80	120							X
81	121							X
82	122							X
83	123	CM-1	X					
84	124	CM-2	X					
85	125	CM-3	X					
86	126					X		
87	127	CM-4	X					
88	130				X			
89	131	CM-5	X					
90	132	CM-6	X					

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Test Cmds.	Address	Address Complement	No Command	Not Assigned
91	133	CM-7	X					
92	134	CM-8	X					
93	135	CH-1	X					
94	136	CH-2	X					
95	137			X				
96	140	CH-3	X					
97	141	CH-4	X					
98	142	CH-5	X					
99	143	CH-6	X					
100	144	CH-7	(X)		(X)			
101	145	CH-8	X					
102	146	CH-9	X					
103	147					X		
104	150	CR-1	X					
105	151				X			
106	152	CH-10	(X)			(X)		
107	153							X
108	154							X
109	155							X
110	156	CS-1	X					
111	157			X				
112	160							X

TABLE 3

CROSS REFERENCE OF COMMAND NUMBER TO COMMAND FUNCTION

Decimal Command	Octal Command	Command Symbol	Array D Usage	Test Cmds.	Address	Address Complement	No Command	Not Assigned
113	161					X		
114	162	CS-3	X					
115	163	CS-4	X					
116	164	CS-5	X					
117	165	CS-6	X					
118	166	CS-7	X					
119	167			X				
120	170	CS-8	X					
121	171							X
122	172							X
123	173			X				
124	174							X
125	175			X				
126	176			X				
127	177						X	
0	000						X	
		Totals	77	14	10	10	2	22

NOTE 1

Heat Flow Command Structure

Octal commands 144 through 146 are used to select subsets of the full heat flow measurement sequence as follows:

Command 144 selects a subset consisting of the four high sensitivity gradient measurements only.

Command 144 followed by command 145 selects a subset consisting of the four low sensitivity gradient measurements only.

Command 144 followed by command 146 selects a subset consisting of probe ambient temperature measurements only.

Command 145 followed by command 146 selects a subset consisting of thermocouple measurements only.