

BEAN

SL-3

SECOND SKYLAB MISSION

FINAL

SKYLAB ENTRY CHECKLIST

PREPARED BY

FLIGHT PROCEDURES BRANCH

CREW PROCEDURES DIVISION



National Aeronautics and Space Administration
LYNDON B. JOHNSON SPACE CENTER
Houston, Texas

JUNE 29, 1973

SKYLAB

SKYLAB ENTRY CHECKLIST

JUNE 29, 1973

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CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
001	FINAL	2/7/73	(1) SUPERSEDED BY 059
002	FINAL	2/7/73	
003	FINAL	2/7/73	
004A	FINAL	2/7/73	
005	FINAL	2/7/73	
006A	FINAL	2/7/73	
007			
008			
009	FINAL	2/7/73	
010	FINAL	2/7/73	
011	FINAL	2/7/73	
012	FINAL	2/7/73	
013	FINAL	2/7/73	
014	FINAL	2/7/73	
015	FINAL	2/7/73	
016			SUPERSEDED BY 027 (1)
017	FINAL	2/7/73	
018	FINAL	2/7/73	
019			
020	FINAL	2/7/73	
021	FINAL	2/7/73	
022	FINAL	2/7/73	
023	FINAL	2/7/73	
024	FINAL	2/7/73	
025	FINAL	2/7/73	
026A	FINAL	2/7/73	
027	FINAL	2/7/73	

(1) Change was superseded by 048 & 049 and was not incorporated in FINAL. But 048 & 049 were subsequently disapproved. Change therefore was incorporated in FINAL, REV. A.

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
028	FINAL	2/7/73	
029	FINAL	2/7/73	
030	FINAL	2/7/73	
031	FINAL	2/7/73	
032	FINAL	2/7/73	
033	FINAL	2/7/73	
034	FINAL	2/7/73	
035	FINAL	2/7/73	
036	FINAL	2/7/73	
037	FINAL	2/7/73	
038	FINAL	2/7/73	
039	FINAL	2/7/73	
040	FINAL	2/7/73	
041	FINAL	2/7/73	
042	FINAL	2/7/73	
043	FINAL	2/7/73	
044	FINAL	2/7/73	
045	FINAL	2/7/73	
046			SUPERSEDED BY 076
047	FINAL	2/7/73	
048	FINAL	2/7/73	(2)
049	FINAL	2/7/73	(2)
050	FINAL	2/7/73	(3)
051	FINAL	2/7/73	
052	FINAL	2/7/73	
053	FINAL	2/7/73	
054	FINAL	2/7/73	

(2) Disapproved after publication of FINAL. Changes removed from FINAL, REV. A.

(3) Part 3 of 050 was superseded by 019 because of (1). Correction was made

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
055	FINAL, REV. A	4/6/73	(4)
056			DISAPPROVED
057	FINAL, REV. A	4/6/73	SUPERSEDES 030, 032
058	FINAL, REV. A	4/6/73	
059	FINAL	2/7/73	
060			DISAPPROVED
061A	FINAL, REV. A	4/6/73	(5)
062	FINAL, REV. A	4/6/73	
063A	FINAL, REV. A	4/6/73	SUPERSEDES 030
064			(6) DISAPPROVED
065	FINAL, REV. A	4/6/73	
066	FINAL, REV. A	4/6/73	
067	FINAL, REV. A	4/6/73	
068			(7) DISAPPROVED
069	FINAL, REV. A	4/6/73	(8)
070	FINAL, REV. A	4/6/73	
071			SUPERSEDED BY 086
072	FINAL, REV. A	4/6/73	
073	FINAL, REV. A	4/6/73	
074	FINAL, REV. A	4/6/73	
075	FINAL, REV. A	4/6/73	
076	FINAL, REV. A	4/6/73	SUPERSEDES 046
077	FINAL, REV. A	4/6/73	

- (4) Part A superseded by 086. Part B in FINAL, REV A.
 (5) Part B approved. Parts A, C & D disapproved. Part E already made by 059.
 (6) Part 2 already incorporated as 043.
 (7) Superseded by 084.
 (8) Part 2 already accomplished as 044.

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
078A			SUPERSEDED BY 103
079	FINAL, REV. A	4/6/73	(9)
080	FINAL, REV. A	4/6/73	
081A	FINAL, REV. A	4/6/73	
082	FINAL, REV. A	4/6/73	
083	FINAL, REV. A	4/6/73	
084	FINAL, REV. A	4/6/73	
085	FINAL, REV. A	4/6/73	
086	FINAL, REV. A	4/6/73	
087	FINAL, REV. A	4/6/73	
088	FINAL, REV. A	4/6/73	
089	FINAL, REV. A	4/6/73	
090	FINAL, REV. A	4/6/73	
091	FINAL, REV. A	4/6/73	
092	FINAL, REV. A	4/6/73	
093			SUPERSEDED BY 094
094	FINAL, REV. A	4/6/73	SUPERSEDES 093
095	FINAL, REV. A	4/6/73	SUPERSEDED BY 103
096	FINAL, REV. A	4/6/73	
097	FINAL, REV. A	4/6/73	
098	FINAL, REV. A	4/6/73	
099	FINAL, REV. A	4/6/73	
100	FINAL, REV. A	4/6/73	
101	FINAL, REV. A	4/6/73	
102			
103	FINAL, REV. A	4/6/73	SUPERSEDES 078A & 102
104	FINAL, REV. A	4/6/73	

(9) Supersedes 071 and part A of 055.

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
105	FINAL, REV. A	4/6/73	CANCELLED
106	FINAL, REV. A, CHANGE A	4/20/73	
107	FINAL, REV. A	4/6/73	
108			
109	FINAL, REV. A, CHANGE A	4/20/73	
110	FINAL, REV. A	4/6/73	CANCELS 108
111	FINAL, REV. A, CHANGE A	4/20/73	
112	FINAL, REV. A, CHANGE A	4/20/73	
113	FINAL, REV. A, CHANGE A	4/20/73	
114			
115	FINAL, REV. A, CHANGE A	4/20/73	

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
116			DISAPPROVED CANCELLED
117	FINAL, REV A, CHANGE B (P&I)	5/4/73	
118			
119	FINAL, REV A, CHANGE B (P&I)	5/4/73	
120	FINAL, REV A, CHANGE B (P&I)	5/4/73	
121	FINAL, REV A, CHANGE B (P&I)	5/4/73	
122	FINAL, REV A, CHANGE B (P&I)	5/4/73	
123	FINAL, REV A, CHANGE B (P&I)	5/4/73	
124	FINAL, REV A, CHANGE B (P&I)	5/4/73	PART 1 DEFERRED TO SL-3. PARTS 2 & 3 INCORPORATED
125	FINAL, REV A, CHANGE B (P&I)	5/4/73	
126			DEFERRED TO SL-3 CANCELS 118
127	FINAL, REV A, CHANGE B (P&I)	5/4/73	
128	FINAL, REV A, CHANGE B (P&I)	5/4/73	
129	FINAL, REV A, CHANGE B (P&I)	5/4/73	
130	FINAL, REV A, CHANGE B (P&I)	5/4/73	
131	FINAL, REV A, CHANGE B (P&I)	5/4/73	
132	FINAL, REV A, CHANGE B (P&I)	5/4/73	
133	FINAL, REV A, CHANGE B (P&I)	5/4/73	
134	FINAL, REV A, CHANGE B (P&I)	5/4/73	
135	FINAL, REV A, CHANGE B (P&I)	5/4/73	
136	FINAL, REV A, CHANGE B (P&I)	5/4/73	

CHANGE CONTROL RECORD

SL ALL ENTRY CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
137	FINAL, REV. A, CHANGE B (P&I)	5/4/73	
138	FINAL, REV. A, CHANGE B (P&I)	5/4/73	.

CHANGE CONTROL RECORD

SL -2/SL-3

ENTRY

CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
139	SL-3 FINAL	6/29/73	
140	SL-2 FINAL, REV. A, CHANGE C (P&I)	5/15/73	
141	SL-3 FINAL	6/29/73	
142	SL-3 FINAL	6/29/73	
143	SL-3 FINAL	6/29/73	
144	SL-3 FINAL	6/29/73	
145	SL-2 FINAL, REV. A SL-3 FINAL	REALTIME 6/29/73	
146	SL-2 FINAL, REV. A SL-3 FINAL	REALTIME 6/29/73	
147	SL-3 FINAL	6/29/73	
148	SL-3 FINAL	6/29/73	
149	SL-3 FINAL	6/29/73	
150	SL-3 FINAL	6/29/73	
151	SL-3 FINAL	6/29/73	
152	SL-3 FINAL	6/29/73	
153	SL-3 FINAL	6/29/73	
154	SL-2 FINAL, REV. A SL-3 FINAL	REALTIME 6/29/73	
155	SL-3 FINAL	6/29/73	
156	SL-3 FINAL	6/29/73	
157	SL-3 FINAL	6/29/73	
165-1	SL-2 FINAL, REV. A	REALTIME	

CHANGE CONTROL RECORD

SL -2/SL-3

ENTRY

CHECKLIST

CONTROL NO.	FDF EDITION INCORPORATED		DISAPPROVED OR OTHER DISPOSITION
	TITLE	DATE	
171-1	SL-2 FINAL, REV. A	REALTIME	
170-4	SL-2 FINAL, REV. A	REALTIME	
171-13	SL-2 FINAL, REV. A	REALTIME	
158	SL-3 FINAL	6/29/73	
172-1	SL-2 FINAL, REV. A	REALTIME	
159	SL-3 FINAL	6/29/73	

SL-3
SKYLAB ENTRY CHECKLIST

LIST OF EFFECTIVE PAGES

FINAL 6/29/73

PAGE	DATE
i	6/29/73
ii	6/29/73
iii	6/29/73
iv	6/29/73
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4-1	6/29/73
4-2	6/29/73
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4-4	6/29/73
4-5	6/29/73
4-6	6/29/73
4-7	6/29/73
4-8	6/29/73
4-9	6/29/73
4-10	6/29/73
4-11	6/29/73
5-1	6/29/73
5-2	6/29/73
5-3	6/29/73
5-4	6/29/73
5-5	6/29/73
5-6	6/29/73
5-7	6/29/73
5-8	6/29/73
5-9	6/29/73
6-1	6/29/73
6-2	6/29/73
3-1	6/29/73
3-2	6/29/73
3-3	6/29/73
3-4	6/29/73
3-5	6/29/73
3-6	6/29/73
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3-8	6/29/73
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4-12	6/29/73
4-13	6/29/73
4-14	6/29/73
4-15	6/29/73
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5-4	6/29/73
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5-6	6/29/73
5-7	6/29/73
5-8	6/29/73
5-9	6/29/73
6-1	6/29/73
6-2	6/29/73
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6-5	6/29/73
6-6	6/29/73
6-7	6/29/73
6-8	6/29/73
6-9	6/29/73
6-10	6/29/73
7-1	6/29/73
7-2	6/29/73
7-3	6/29/73
7-4	6/29/73
7-5	6/29/73
7-6	6/29/73
8-1	6/29/73
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8-3	6/29/73
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8-5	6/29/73
8-6	6/29/73
8-7	6/29/73
8-8	6/29/73

NOTE: PAGES 4-1 to 4-11, 5-1 to 5-9, 6-1 & 6-2
APPEAR IN TWO PLACES IN THIS BOOK.

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9-7	6/29/73
9-8	6/29/73
9-9	6/29/73
9-10	6/29/73
10-1	6/29/73
10-2	6/29/73
10-3	6/29/73
10-4	6/29/73
10-5	6/29/73
11-1	6/29/73
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11-4	6/29/73
11-5	6/29/73
11-6	6/29/73
11-7	6/29/73
11-8	6/29/73
11-9	6/29/73
11-10	6/29/73
11-11	6/29/73
11-12	6/29/73
11-13	6/29/73
11-14	6/29/73
12-1	6/29/73
12-2	6/29/73
12-3	6/29/73
12-4	6/29/73
12-5	6/29/73
13-1	6/29/73
13-2	6/29/73
13-3	6/29/73
13-4	6/29/73
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NF	3 PRE-DEORBIT SYSTEMS CHECKS (ENTRY -7 DAYS) SEQUENCE	3-1
NF	4 NOMINAL SEQUENCE UNDocking FLY AROUND SEPARATION SPS1 OR RCS1 SHAPING BURN ENTRY VEHICLE PREP SPS2 OR RCS2 DEORBIT BURN	4-1
	5 ENTRY	5-1
	6 EARTH/POST LANDING	6-1
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	7 RCS COMPLETION OF SPS2 (CHARTS) NO QUADS FAILED ONE QUAD FAILED PITCH QUADS A & C FAILED YAW QUADS B & D FAILED ADJACENT QUADS FAILED UNPLANNED HYBRID RCS DEORBIT BURN (COMING FROM Pg E/7-5)	7-1 7-2 7-3 7-4 7-5 7-6
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	9 PLANNED HYBRID RCS DEORBIT BURN	9-1
	10 UNPLANNED HYBRID RCS DEORBIT BURN (FROM SM RCS DEORBIT BURN FAILURE)	10-1

NF - NEW FORMAT

CONTENTS (CONT)

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NF	12 G&N SPS SINGLE IMPULSE DEORBIT BURN SEQUENCE	12-1
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	OPTICS FROZEN	14-4
	AC BUS 1 FAILED OR EMS RANGE DISPLAY BLANK	14-4
	MARK BUTTON FAILED	14-4
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	BACKUP PROBE RETRACT	14-4
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	15 LOW PWR DEACT & ENTRY	15-1
NF - NEW FORMAT		

(THIS SECTION HAS BEEN DELETED)

ENTRY SIMS
(-24 DAYS)

(THIS SECTION HAS BEEN DELETED)

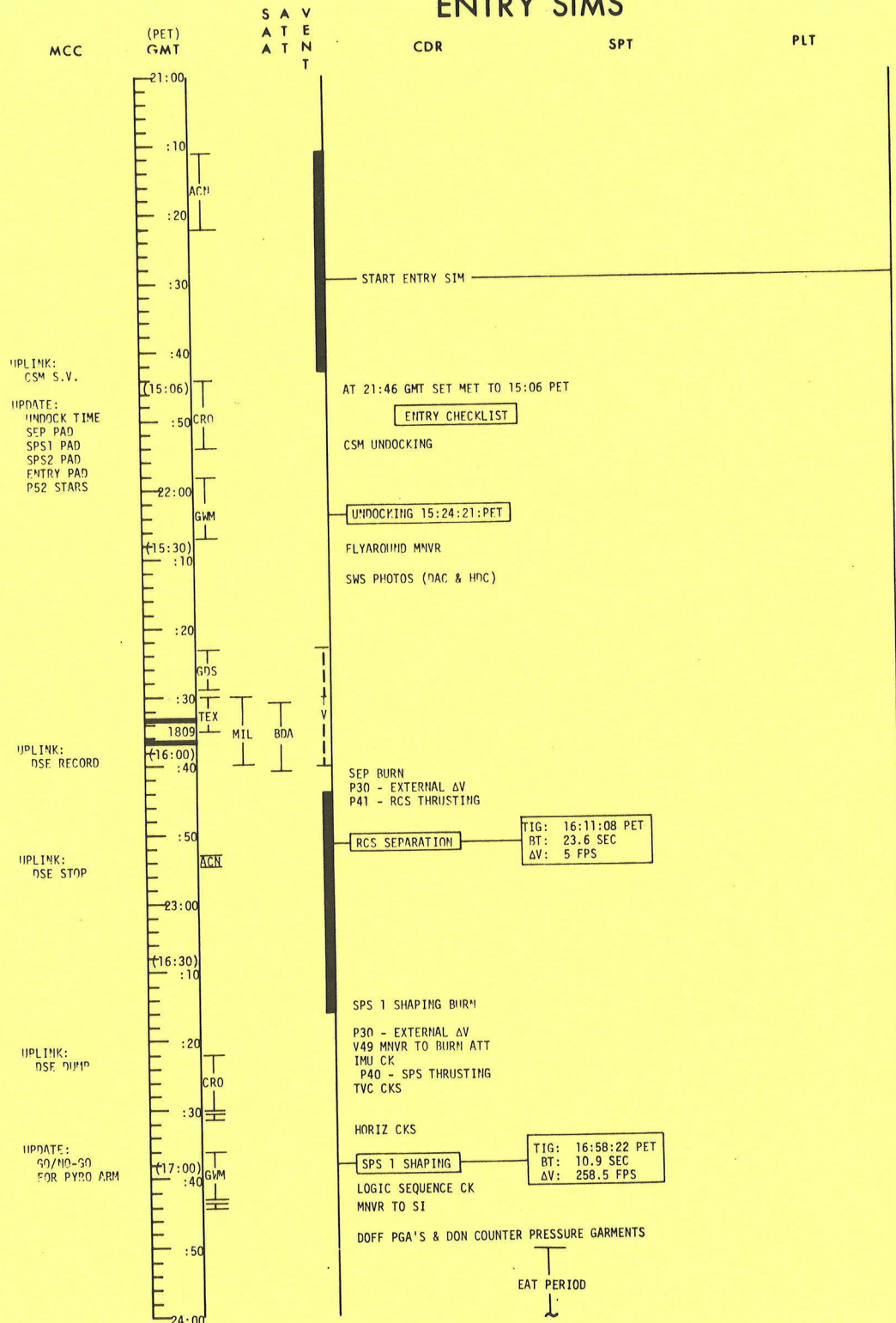
FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON PHASE
	21:00 - 24:00	51/259	SEPTEMBER 16, 1973	1809	-40.8	

ENTRY SIMS

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S

ENTRY SIMS
(-6 DAYS)

MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

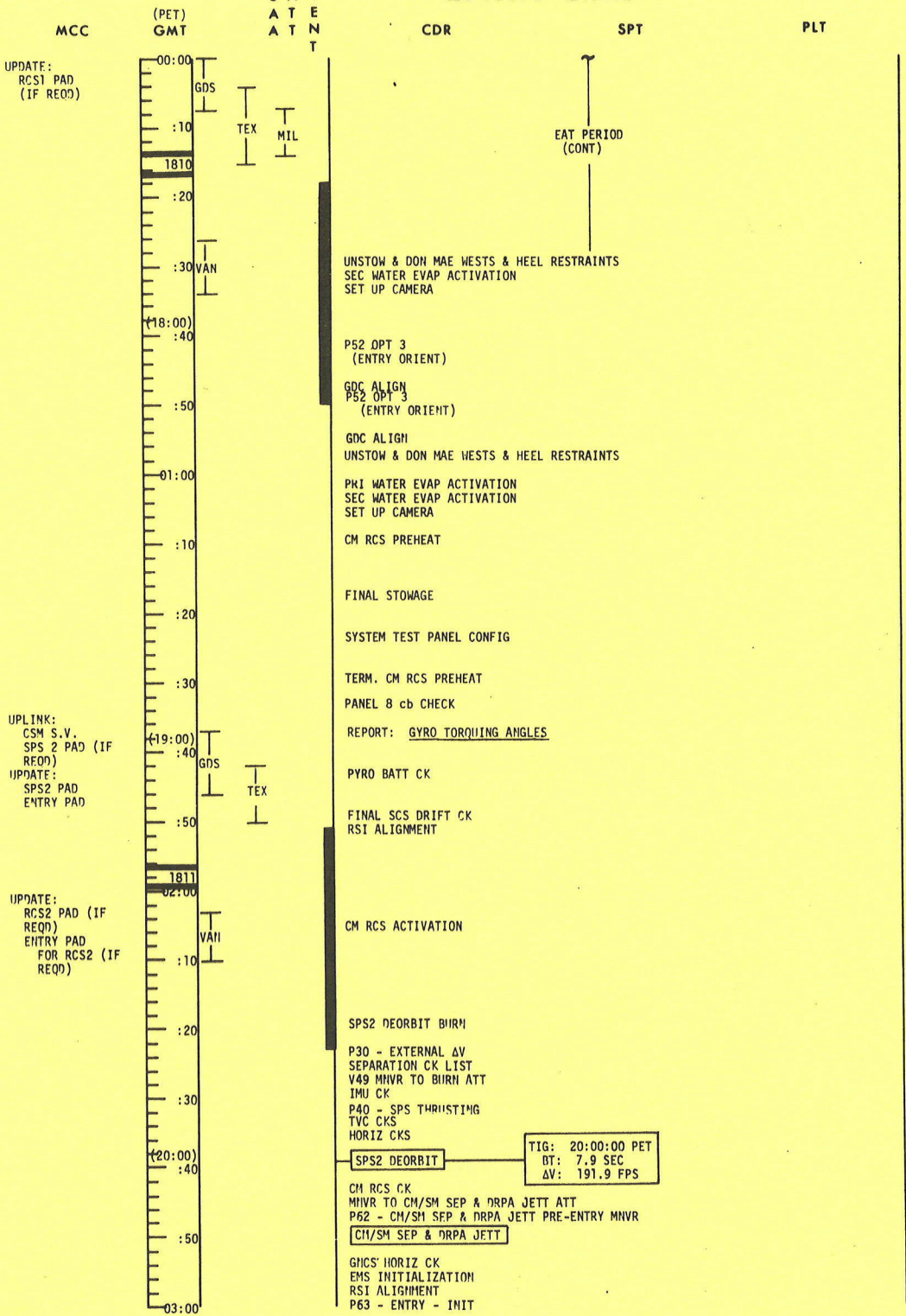
FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\pm$	MOON
	00:00 - 03:00	51/260	SEPTEMBER 16, 1973	1810	-40.8	PHASE

ENTRY SIMS

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S



ENTRY SIMS
(-6 DAYS)

MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

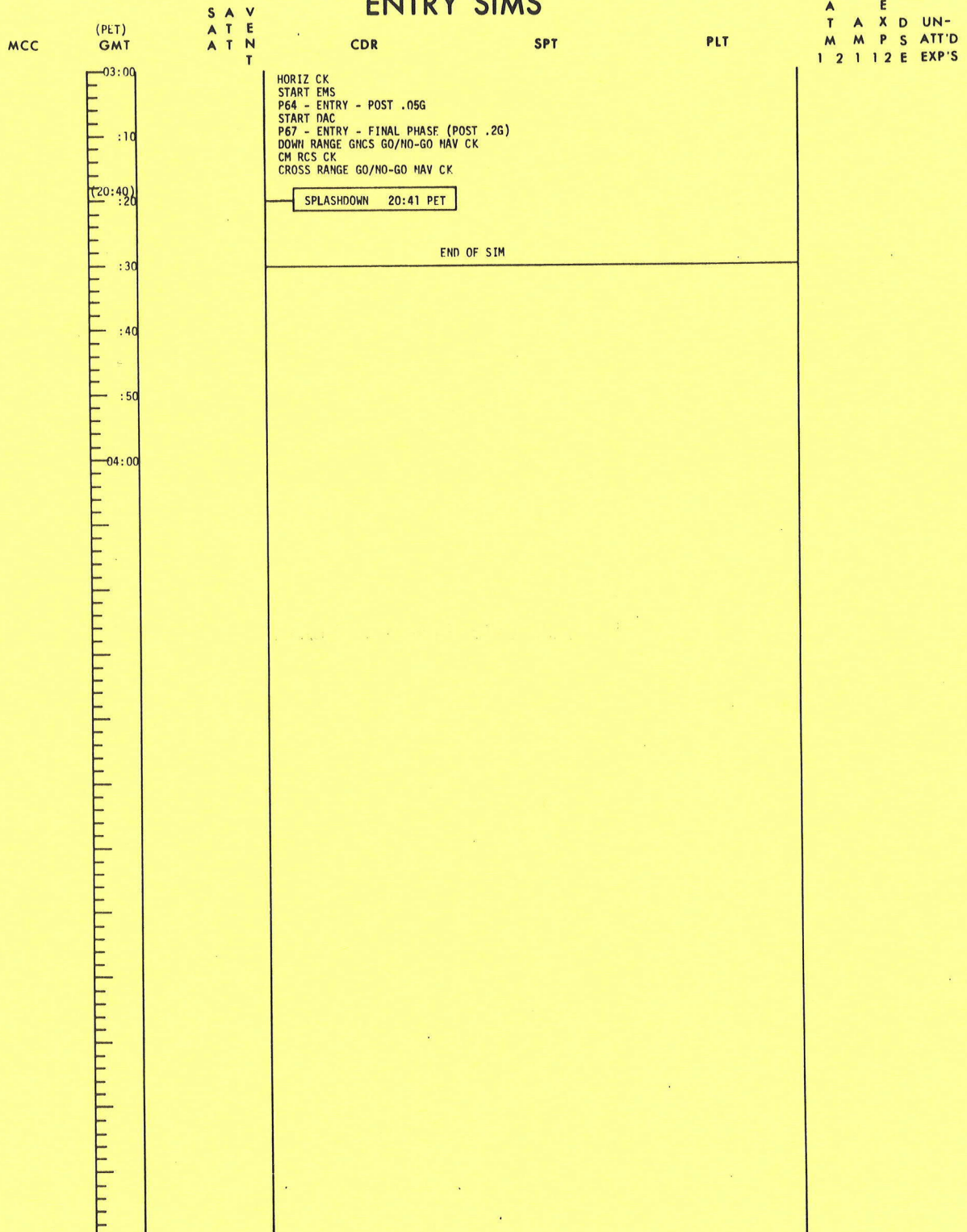
FLIGHT PLANNING BRANCH

SOL	A-SOL

FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON
	03:00 - 04:00	51/260	SEPTEMBER 16, 1973	1811	-40.8	PHASE

ENTRY SIMS



MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

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NOMINAL

15+00
(11102)
(11111)

45:00
15+10

(10103)
(01111)

15+20

59:30
00:00

02:50

15+30

C
R
O

G
W
M

DEACTIVATION CK LIST COMPLETE

PHASE ELAPSED TIME (PET) IS THE FLOATING TIME BASE REFERENCED TO SPS2 IGNITION WHICH, BY DEFINITION, IS 20+00:00 (20 HOURS +00 MINUTES :00 SECONDS).

START DET COUNTING UP TO UNDOCKING PET (Pg E/4-1)
REMOVE HDC FROM TSB
SET UP CAMERAS FOR FLY AROUND PHOTOS:
CM2/DAC/18/CX02 - BRKT, MIR
(T8, 1/250, ∞) 6 FPS (1 MAG)
CM4/HDC/CX04 - (f8, 1/250, ∞)
50 FR (LIGHTED SIDE ONLY)
CM4/TV

PERFORM TV PREPARATION CK LIST (Pg E/4-1)

PERFORM PRE UNDOCKING SWITCH LIST (Pg E/4-1)

V48E, LOAD 2 JET X TRANS, (YAW INSTEAD OF PITCH
+X JETS ARE USED BECAUSE C.G. OFFSET IS LESS IN
YAW PLANE) 2°/SEC, B/D ROLL; LOAD N47 AND N48
FROM SEP BURN PAD (Pg E/4-3)
V46E

EMS MODE - NORMAL
PERFORM UNDOCKING CK LIST (Pg E/4-1)

UNDOCK

ROLL TO 180° ON GDC BALL AT .5°/SEC
(USE GDC BALL FOR FLY AROUND MNVR)
POINT CSM WITH COAS ON DOCK PORT

NOTE TIME WHEN DOCK PORT SUBTENDS
3° IN COAS (67 FT). IF PORT
SUBTENDS 3° AT 02:50, ΔV = 0.4 FPS
SPOT LIGHT - OFF

IF UNDOCKING FROM RADIAL
PORT: DO NOT PERFORM
FLY AROUND MNVR.
PERFORM SEP BURN AT
UNDOCKING +5 MINUTES
PER SEP BURN PAD
(Pg E/4-3)

UNDOCKING TIME (PET)

NOMINAL

PRELIMINARY

FINAL

15 + 24 : 21

+

:

+

:

TV PREPARATION CK LIST

TV SOURCE - CM
LINEAR SW - LINEAR
AVG SW - PEAK
F/STOP - 16
ZOOM - 25
FOCUS - ∞
S BD AUX TV - TV
MONITOR ON - ON
REFINE SETTINGS AS REQ'D
NOTE: IF SUN ANGLE <22.5°,
S BD AUX TV - OFF
F/STOP - FC

PRE UNDOCKING SWITCH LIST

SET ΔVC = +100.0 (IF ΔV COUNTER
IS SET AT 0.0, LOGIC RACE
CAUSES COUNTER TO JUMP WHEN
ACCELERATION IS SENSED)
EMS FUNC - ΔV
MAN ATT (3) - RATE CMD
DBD/RATE - MIN/HIGH (SELECTS 4°
DEADBAND WHICH CAN BE USED FOR
ROLL & YAW ATTITUDE HOLD
DURING COAST PERIODS)
RHC PWR NORMAL #2 - AC/DC
RHC PWR DIRECT #2 - MNA/B
THC PWR - ON (UP)
SC CONT - CMC/FREE (CMC/FREE
REQ'D TO PREVENT -X JETS FROM
FIRING CLOSE TO SWS)
BMAG MODE (3) - RATE 2
SPOT LIGHT - ON
AUTO RCS SEL (16) - MNA/B
CB SCS A/C ROLL MNA - CLOSE
CB SCS B/D ROLL MNA - CLOSE
CB SCS PITCH MNA - CLOSE (VERIFY)
CB SCS YAW MNA - CLOSE (VERIFY)
CB DOCK PROBE (2) - CLOSE
RHC #2 & THC - ARMED

UNDOCKING CK LIST

PROBE EXTND/REL - EXTND REL
TB - BP/THEN GRAY (HOLD ~5 SEC
UNTIL UNDOCK VERIFIED, BUT
<20 SEC. EXPECTED SEP ΔV
IS 0.38 TO 0.51 FPS)
PROBE EXTND/REL - RETR (PROVIDES
CAPTURE LATCH TB'S IF
REDOCKING NECESSARY)
PROBE EXTND/REL - OFF
RECORD EMS ΔV (RECORDED
FOR POST FLIGHT EVALUATION OF
UNDOCKING ΔV)

DATE 6/29/73

PAGE E/4-1

NOMINAL SEQUENCE

15+30
(10103)
(01111)

WHEN SWS DIA SUBTENDS 4.3°,
START DAC
THRUST +X FOR 2.5 SEC (~0.5 FPS)
THRUST -Z (UP) FOR 4.5 SEC
NOTE: THRUST CAN BE RESULTANT
DIRECTION AND MAGNITUDE IF DESIRED.

FLY AROUND MNVR

11:00

INERTIAL
PITCH, °
DET
TIME, SEC
ΔT, SEC

1. MNVR WITH RHC IN MIN IMPULSE (CREW PREFERENCE OVER ATT HOLD MODE) TO POINT COAS AT SWS C.M. CONTINUOUSLY ($R = 180^\circ$).
2. MAINTAIN ESTIMATED 300 FT RANGE FROM SWS C.M. MAKE CORRECTIONS USING OCCASIONAL SHORT +X PULSES WITH THC.
3. SPT LOG TIMES FOR CROSSING 10° PITCH MARKS ON INERTIAL FDI. MAINTAIN ANGULAR RATE SO THAT TIME TO TRAVERSE 10° IS 50-58 SEC ($N56$, $R2 = .20$ TO $.17$ DEG/SEC). USE OCCASIONAL SHORT +Z PULSES WITH THC, +Z ONLY IF $\Delta T < 50$ SECONDS.

THRUST DIRECTION	RADIAL CLOSURE RATE	ANGULAR RATE	RCS PULSE DURATIONS
+X	INCREASE	INCREASE	0.5 SEC
+Z	INCREASE	DECREASE	
-Z	DECREASE	INCREASE	

NOTE: NO -X THRUSTING EXCEPT IN AN EMERGENCY

STOP DAC

S BD AUX TV - OFF (CTR)

THE FLY AROUND MNVR MAY BE COMPLETED EARLY, BUT IT SHOULD NOT BE COMPLETED LATE, OR THE CSM MAY NOT BE IN A FAVORABLE POSITION RELATIVE TO THE SWS FOR THE SEP BURN.

15+40

19:00

15+50

27:00

35:00

16+00

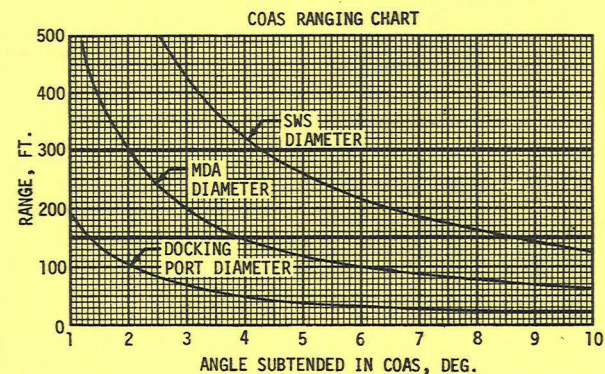
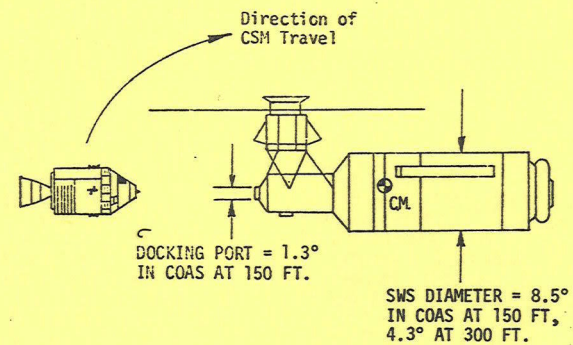
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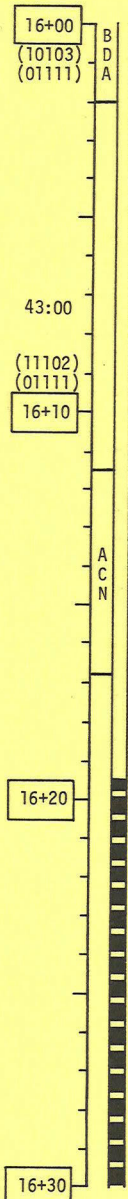
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NOMINAL



NOMINAL



CMC MODE - AUTO; ALIGN GDC TO IMU
 V48E, LOAD 4 JET X TRANS AND .5 DEG/SEC
 P30, LOAD N33 AND N81 FROM SEP BURN PAD (Pg E/4-3)
 P41, BYPASS MNVR, KEEP SWS IN WINDOW (-Z TRANS NORMALLY USED)
 CSM SHOULD BE ABOVE OR BEHIND SWS WHEN
 RETROGRADE BURN IS PERFORMED.

SEP BURN NOTE: IF UNDOCKING FROM AXIAL PORT,
 P41 ENSURES RETROGRADE BURN FOR SEP.

V82E, VERIFY HP
 P00

THC PWR - OFF

WARNING: WAIT UNTIL COMP ACTY LT - OUT

V66E (TRANSFERS CSM SV TO OWS SLOTS. DO NOT DO WHEN
 AVERAGE G IS RUNNING. DO NOT DO UNLESS SATISFIED
 THAT CSM SV IS GOOD)

SEP BURN PAD

NOMINAL									PRELIMINARY									FINAL								
N33	HR	+	X	X	X	0	1	6	+	X	X	X	X	X			+	X	X	X	X	X				
	MIN	+	X	X	X	X		1	1	+	X	X	X	X			+	X	X	X	X					
	SEC	+	X			0	8	0	0	+	X						+	X								
N81	ΔVX	-	X			0	0	5	0	X	X	X	X				X	X	X	X						
	ΔVY	+	X			0	0	0	0	X	X	X	X				X	X	X	X						
	ΔVZ	+	X			0	0	0	0	X	X	X	X				X	X	X	X						
N22	R	+	1	8	2	0	0		+				0	0			+				0	0				
	P	+	0	8	7	0	0		+				0	0			+				0	0				
	Y	+	0	0	1	0	0		+				0	0			+				0	0				
	ΔVC	X	X			0	0	5	0	X	X	X	X				X	X	X	X						
	BT	X	X			0	0	2	4	X	X	X	X				X	X	X	X						

N47	WT	+					
N48	PT		X	X	X		
	YT		X	X	X		

BACKUP GDC/IMU ALIGNMENT
 FOR SOUTH SET STARS
 ATRIA (34) AND ACUX (25)

R			
P			
Y			

16+30
(11102)
(01111)

16+40

16+50

17+00

P30, LOAD N33 AND N81 FROM SHAPING BURN PAD (Pg E/4-4)
 SET DET COUNTING UP TO SHAPING BURN TIG
 P00
 V49E, MNVR TO SHAPING BURN PAD ATT (0,180,0) (Pg E/4-4)

CAUTION: MONITOR FDAI 1
 FOR POSS GMBL LOCK

PERFORM IMU CK
 P52 (OPT 3) (12, 15) AUTO OPTICS TO STAR
 LIMIT: SXT FOV, GNCS GO/NO-GO)
 EXIT 06 92, V37E 40E
 SET ASCP TW TO PAD BURN ATT
 DIM LIGHTS FOR HORIZ CK
 GO TO SPS BURN-ENTRY CUE CARD
 (BANK A)

P40

SPS1 HORIZ CK

HORIZ CK - HORIZ on 17°
 WINDOW MK (HDS DN)
 AT TIG -3 MIN
 (LIMIT: +3°, GNCS GO/NO-G)
 *IF NO-GO, SET TW TO *
 * PAD BURN ATT *
 * SC CONT - SCS *
 * TRACK HORIZ WITH 13° *
 * WINDOW MK (HDS DN) *
 * AT TIG -2 MIN, *
 * HOLD ATT *
 * GDC ALIGN PB - PUSH*
 * BURN SCS *
 HORIZ ON 5° WINDOW MK (HDS DN)
 AT TIG

SHAPING BURN

V82E, VERIFY HP

P00

WARNING: WAIT UNTIL COMP ACTY LT - OUT

V66E

** IF RCS1 REQ'D **
 ** V37E 41E **
 ** SET ASCP TW TO **
 ** PAD BURN ATT **
 ** DIM LIGHTS FOR **
 ** HORIZ CK **
 ** P41 **
 ** RCS1 HORIZ CK **
 ** HORIZ ~40° ABOVE X **
 ** AXIS AT TIG **
 ** (HDS DN) **
 ** (~2° ABOVE WINDOW **
 ** FRAME) **
 ** INFO ONLY, NOT A **
 ** GNCS GO/NO-GO CK **
 ** * * * * *

SHAPING BURN PAD

NOMINAL				PRELIMINARY				FINAL			
N33	HR	+	0	1	6	+		+			
	MIN	+		5	8	+		+			
	SEC	+	2	2	0	+		+			
N81	ΔVX	-	2	4	8						
	ΔVY	+	0	0	0						
	ΔVZ	+	0	7	1						
N22	R	+	3	5	9	+	0	+	0	0	0
	P	+	1	8	3	+	0	+	0	0	0
	Y	+	3	5	9	+	0	+	0	0	0
	ΔVC		2	4	4						
	BT		0	0	1						
	ΔV70		3	0	2						
ULLAGE: 1 4 SECS 4 QUADS				ULLAGE: SECS QUADS							
N47	WT	+	2	8	8	9	2	+			
N48	PT	+			1	5	9	+			
	YT	+			0	5	4	+			

SPS BURN STATUS

ATIG							
AFTER TRIM							
ΔVC							
FDAI (IF ATTITUDE NOT NOMINAL)	R	+					
	P	+					
	Y	+					
N85 (IF VG > .2)	VGX		0	0			
	VGY		0	0			
	VGZ		0	0			
TRANSMIT N81 APPLIED							

SHAPING BURN TABLE

P OR Y RATES	ATT DEVIATION	CO TIME	SITUATION & VG	COMPLETION RULE
+5°/SEC TAKEOVER COMPLETE	+5° TAKEOVER COMPLETE	0BT +1 SEC	>22	RESTART SPS SCS
			NO RESTART & >100	DO RCS1 AT NEXT HA
			NO RESTART & <100	TRIM VGX & VGZ TO ±.2
			<22 TO OVERBURN	TRIM VGX & VGZ TO ±.2

NOMINAL

$17+30$

STOW TV CAM AND CABLE IN (B1),
TV MOUNT IN (A5),
HDC AND MAG IN (B3), AND
DAC MAG CX02 IN (R13)
CHANGE DAC TO CM4 WINDOW
UNSTOW CX03 MAG FROM (TSB)
AND INSTALL ON DAC

NOTE: CHECKS STATUS OF ELS PUSHBUTTONS,
CM/SM SEP SWITCHES, AND 24K' BARO SWITCHES

SECS PYRO ARM (2) - SAFE (VERIFY)
SECS LOGIC (2) - OFF (VERIFY)
CB SECS LOGIC (2) - CLOSE (VERIFY)
CB SECS ARM (2) - CLOSE
CB ELS/CM-SM SEP (2) - CLOSE
ELS LOGIC - ON (UP)
ELS - AUTO
COORDINATE NEXT 3 STEPS WITH STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO FOR PYRO ARM AS REQ'D
SECS LOGIC (2) - OFF
CB SECS ARM (2) - OPEN
ELS LOGIC - OFF
ELS - MAN
CB ELS/CM-SM SEP (2) - OPEN

[illegible]

$$\begin{array}{r} 18+00 \\ (11112) \\ (01111) \end{array}$$

30:00

 $18+10$ $18+20$

18+30

```
* IF BMAG 2 >10°/HR/AXIS* * * * *
* END SCS DRIFT CK (BMAG 1); PERFORM *
* GDC/IMU COMPARISON CK LIST(Pg E/4-6)*
* * * * *
```

P52 (OPT 3)
(02, 04, 06) (RECORD)

POO

```

*IF >1.5°/HR: * * *
* RECYCLE P52 *
*IF CONFIRMED: *
* USE SCS FOR EMS*
* ENTRY *
* * * * *

```

GDC ALIGN

```

* * IF RCS SHAPING REQ'D AT NEXT HA * * *
*   CYCLE CMC MODE SWITCH - FREE - AUTO
*   (RECENTERS DBD)
*   V48E, LOAD .5° DBD (11102), LOAD N47
*   FROM RCS SHAPING BURN PAD (Pg E/4-7)*

```

* P30, LOAD M33 AND N81 FROM
* RCS SHAPING BURN PAD (Pg E/4-7)
* P00
* V49E, MNVR TO RCS SHAPING
* BURN PAD ATT (Pg E/4-7)

```
* P52 (OPT 3) (__, __) AUTO OPTICS TO
* STAR
* (LIMIT: SXT FOV, GNCS GO/NO-GO)
* EXIT 06 92, V37E 41E
*
* P41
```

* **SHAPING**

*SHAF INC
P00

*
* WARNING: WAIT UNTIL COMP ACTY LT - OUT
* V66E
*

* V48E, LOAD 5° DBD (11112)

PERFORM PRIMARY AND SECONDARY
WATER EVAP ACTIVATION (Pg E/4-7)

SET UP CAMERA FOR FIREBALL PHOTOGRAPHY
CM4/DAC/18/CX03 - BRKT, MIR
(T11, 500, 7) 12 FPS

P52 (OPTION 3)

N71 1ST STAR		0	0	0	
N71 2ND STAR		0	0	0	
NO5(R1) § ERR					
N93	X				
GYRO TORQUING ANGLES	Y				
	Z				
	HR	+	0	0	0
TIME OF GYRO TORQUE	MIN	+	0	0	0
	SEC	+	0		

BMAG 1 GDC/IMU COMPARISON
RESULTS

			RESETS					
N20	R						.	
IMU	P						.	
	Y						.	
ASCP tw	R	X	X				.	X
	P	X	X				.	X
	Y	X	X				.	X
DET	ΔT	X	X				.	

(30:00)

RCS SHAPING BURN PAD

PRELIMINARY

FINAI

FINAL UPDATE

[illegible]

BURN STATUS

PRIMARY WATER EVAP ACTIVATION

GLY EVAP H2O FLOW - AUTO (VERIFY)
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - AC1 (VERIFY)

SEC WATER EVAP ACTIVATION

(2) ECS IND SEL - SEC
SEC COOL LOOP PUMP - AC2
SEC EVAP H2O FLOW - AUTO
GLY DISCH SEC PRESS - 39-51 PSIG
SEC COOL LOOP EVAP - EVAP
SEC GLY EVAP OUT TEMP - 38-50.5°F
SUIT CKT HT EXCH - BYPASS 20 SEC, OFF
ECS IND SEL - PRIM

ΔTIG

AFTER TRIM

FDAI
(IF ATTITUDE
NOT NOMINAL)

N85
(IF VG > .2)

1

18+30
(11112)
(01111)

PERFORM CM RCS PREHEAT CK LIST (Pg E/4-8)
(DIRECT COILS ARE UTILIZED FOR PREHEATING JETS (20 MIN))

FINAL STOWAGE
ORDEAL

FDAI (2) - INRTL
PWR - OFF, STOW

(377) GLY TO RAD SEC VLV - BYPASS (CCW) (VERIFY)
ATTACH BOTH STRUT UNLOCK LANYARDS

18+40

SYSTEMS TEST PANEL CONFIGURATION
SYS TEST METER - 3B (BAT RLY BUS)

18+50

PERFORM CM RCS PREHEAT TERMINATION CK LIST (Pg E/4-8)

PERFORM PANEL 8 CB CK
SEE DIAGRAM Pg E/4-8

STDN UPLINK
P27 (SV, SPS2 TARGET LOAD)
DEORBIT BURN PAD (COPY Pg E/4-10)
ENTRY PAD (COPY Pg E/5-1)

PYRO BAT CK (Pg E/4-8)

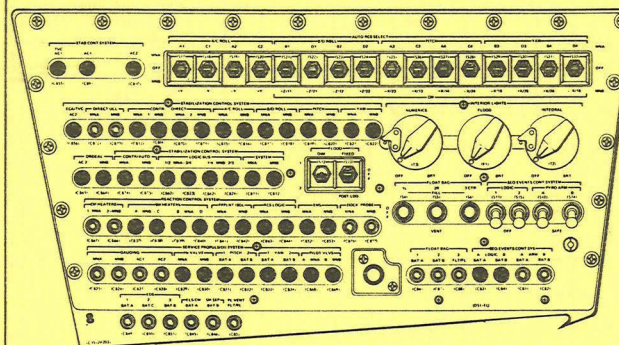
G
D
S

19+00

NOMINAL

CM RCS PREHEAT CK LIST

NOTE: DIRECT COILS UTILIZED FOR
PREHEATING JETS (20 MIN)
IF SYS TEST MTR 4B, 5B, 6B, 7B, 8B, &
9B ALL READ 1.5 VDC (40°F) OR MORE,
OMIT PREHEAT:
(CHECKS CM RCS 12, 14, 16, 21,
23, & 25 JET INJECTOR VALVE
TEMPERATURES, RESPECTIVELY)
(8) CB RCS LOGIC (2) - CLOSE
(1) CM RCS LOGIC - ON (UP)
(ENERGIZES RCS LOGIC BUS)
(8) CB CM RCS HTRS (2) - CLOSE
(101) CM RCS HTRS - ON (UP) (PLT CONFIRM,
MONITOR MANF PRESS FOR PRESS DROP)



PANEL 8

● - CLOSE
○ - OPEN

CM RCS PREHEAT TERMINATION CK LIST

(101) CM RCS HTRS - OFF (SPT CONFIRM)
(1) CM RCS LOGIC - OFF
(8) CB CM RCS HTRS (2) - OPEN

PYRO BAT CK

(229) CB PYRO BUS A
PYRO BAT A - CLOSE (VERIFY)
CB PYRO BUS B
PYRO BAT B - CLOSE (VERIFY)
DC IND - PYRO BAT A, THEN B
IF PYRO BAT A(B) <31.5 VDC
(REPLACES FAILED PYRO BAT)
* WITH ENTRY BAT: *
* CB PYRO BUS A(B) PYRO BAT *
* A(B) - OPEN *
* CB PYRO BUS A(B) BAT BUS *
* A(B) - CLOSE *
(275) CB MNA BAT C - CLOSE
CB MNB BAT C - CLOSE (APPLIES
ENTRY BAT C TO BOTH MAIN
BUSES WHEN MN BUS TIE
SWITCHES ARE ON)
DC IND - MNB

NOMINAL

19+00
(11112)
(01111)

T
E
X

PERFORM RSI ALIGNMENT (Pg E/4-9)

19+10

CM RCS ACTIVATION (Pg E/4-9)

* IF RCS SHAPING DONE AT LAST HA* * * *
* STDN UPDATE *
* DEORBIT BURN PAD (COPY Pg E/4-10) *
* ENTRY PAD (COPY Pg E/5-1) *
* * * * * * * * * * * * * * * *

19+20

V
A
N

OBTAIN ENTRY CUE CARD AND TEMPORARILY STOW
PLT VERIFY ALL STOWED ITEMS SECURED FOR ENTRY
CDR & PLT (SPT LATER) STRAPPED IN, SEAT PANS LOCKED

19+30

RSI ALIGNMENT

NOTE: RSI ALIGNMENT IS PERFORMED
EVEN IF RSI ALIGNMENT IS CORRECT
IN ORDER TO CHECK OPERATION OF RSI
FDAI SOURCE - ATT SET
ATT SET - GDC
EMS ROLL - ON (UP)
GDC ALIGN PB - PUSH & HOLD
YAW TW - POSITION RSI THRU 45° &
SET TO LIFT UP (HDS DN) OR TO
LIFT DN (HDS UP) ATT PER ENTRY
UPDATE PAD
GDC ALIGN PB - RELEASE
EMS ROLL - OFF
ALIGN GDC TO IMU
FDAI SOURCE - CMC

CM RCS ACTIVATION

CB SECS ARM (2) - CLOSE
CUE STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO
FOR PYRO ARM (IF POSS)
SECS PYRO ARM (2) - ON (UP)
CM RCS PRPLNT 1 & 2
TB (2) - GRAY (VERIFY) (INDI-
CATES FUEL AND OXIDIZER
ISOLATION VALVES OPEN)
CM RCS PRESS - ON (UP)
RCS IND SW - CM1, THEN 2
HE PRESS STABILIZES AT 3750-3850
PSIA AFTER 15 MINUTES
MANF PRESS 287-302 PSIA
SECS PYRO ARM (2) - SAFE

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (PULL)
REPRESS PKG VLV - ON (ASSURES CM 02 SUPPLY
FULL BEFORE CM/SM SEP)
02 SM SUPPLY VLV - OFF
SURGE TK - ON (VERIFY)
CAB PRESS REL VLV (2) - NORM
(5) CB WASTE H2O/URINE DUMP HTR (2) - OPEN
CB ECS PRIM RAD CONTR MNA/B (2) - OPEN
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN (REMOVES POWER FROM
GLYCOL MIXER TO CONSERVE BATTERY POWER)
ABORT SYS PRPLNT - RCS CMD (VERIFY)

20+00

DEORBIT BURN	(0,180,0)
--------------	-----------

NOMINAL

DEORBIT BURN PAD

NOMINAL				PRELIMINARY				FINAL			
N33	HR	+	X	X	0	2	0	+	X	X	
	MIN	+	X	X	X	0	0	+	X	X	
	SEC	+	X	0	0	0	0	+	X		.
N81	ΔVX	-	X	1	8	4	.6	X	X		.
	ΔVY	+	X	0	0	0	.0	X	X		.
	ΔVZ	+	X	0	5	2	.2	X	X		.
N22	R	+	0	0	0	0	0	+		0	0
	P	+	1	8	0	0	0	+		0	0
	Y	+	3	5	9	0	0	+		0	0
	ΔVC	X	X	1	7	5	.4	X	X		.
	BT	X	X	0	0	0	8	X	X		.
	ΔV ₇₀	X	X	0	3	9	.0	X	X		.

ULLAGE: 14 SECS 4 QUADS ULLAGE: _____ SECS _____ QUADS

N47	WT	+	2	8	1	5	9
N48	PT	+			1	6	0
	YT	+			0	4	1

DEORBIT BURN TABLE

P OR Y RATES	ATT DEVIATION	CO TIME	SITUATION & VG	COMPLETION RULE
+5°/SEC TAKEOVER COMPLETE	+5° TAKEOVER COMPLETE	@BT +1 SEC	>22	RESTART SPS SCS
			NO RESTART & >22	USE RCS COMPLETION CHART
			<22 TO OVERBURN	TRIM VGX- & VGZ TO ±.2

SPS BURN STATUS

NOTE: LARGEST SPS2 EXECUTION ERRORS THAT CAN BE STEERED OUT BY ENTRY GUIDANCE: BURN LATE (176 SEC) UNDERBURN (20 FPS) OVERBURN (30 FPS) IF SPS2 TRIM RESIDUALS >+.2 FPS, .2G DOWN RANGE GNCS GO/NO-GO NAV CK IS NOT VALID	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">ATIG</td> <td style="width: 15%; text-align: center;">X</td> <td style="width: 15%; text-align: center;">X</td> <td style="width: 15%; text-align: center;">X</td> <td style="width: 15%; text-align: center;">X</td> <td style="width: 15%; text-align: center;">X</td> </tr> <tr> <td colspan="6" style="text-align: center;">AFTER TRIM</td> </tr> <tr> <td>ΔVC</td> <td></td> <td style="text-align: center;">X</td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="3">FDAI (IF ATTITUDE NOT NOMINAL)</td> <td>R</td> <td style="text-align: center;">+</td> <td></td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td>P</td> <td style="text-align: center;">+</td> <td></td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td>Y</td> <td style="text-align: center;">+</td> <td></td> <td></td> <td style="text-align: center;">X</td> </tr> <tr> <td rowspan="3">N85 (IF VG >.2)</td> <td>VGX</td> <td></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td>VGY</td> <td></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td>VGZ</td> <td></td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td></td> </tr> <tr> <td colspan="6" style="text-align: center;">TRANSMIT N81 APPLIED</td> </tr> </table>	ATIG	X	X	X	X	X	AFTER TRIM						ΔVC		X				FDAI (IF ATTITUDE NOT NOMINAL)	R	+			X	P	+			X	Y	+			X	N85 (IF VG >.2)	VGX		0	0		VGY		0	0		VGZ		0	0		TRANSMIT N81 APPLIED					
ATIG	X	X	X	X	X																																																				
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TRANSMIT N81 APPLIED																																																									

NOMINAL

20+00
(11102)
(01111)

V82E, VERIFY HP <38 NM (IF >, CONTINUE BURN UNTIL <)

P00

WARNING: WAIT UNTIL COMP ACTY LT - OUT

V66E (TRANSFERS CSM SV TO OWS SLOTS. DO NOT DO WHEN AVERAGE G IS RUNNING. DO NOT DO UNLESS SATISFIED THAT CSM SV IS GOOD.)

CM RCS CK (Pg E/4-11)

IF BOTH RINGS FAILED

PERFORM ROLLING ENTRY

* CK LIST (Pg E/4-11)*

MOUNT ENTRY CUE CARD

MNVR TO CM/SM SEP & DRPA JETT ATT (ASAP) (CM/SM SEP SHOULD BE

ACCOMPLISHED ASAP AFTER DEORBIT. IF DELAYED TO WITHIN 8 MIN OF EI, RECONTACT MAY OCCUR)

SC CONT - SCS

BMAG MODE (3) - ATT 1/RATE 2

YAW LEFT 45° FROM BURN ATT (315°)

GO TO ENTRY (Pg E/5-1)

20+10

20+20

20+30

CM RCS CK

AUTO RCS SEL A/C ROLL (4) - OFF (VERIFY)

CB RCS LOGIC (2) - CLOSE (VERIFY)

SC CONT - CMC/FREE (CONTROL MAY BE

SCS/MIN IMP AT OPTION OF CREW)

RCS TRNFR - CM

AUTO RCS SEL (RING 1) - OFF

AUTO RCS SEL (RING 2) - MNB

TEST RING 2 THRUSTERS (MIN IMP MAY

NOT PRODUCE AUDIBLE JET FIRING.

MORE THAN ONE CYCLE MAY BE REQ'D

TO CLEAR LINES OF RESIDUALS AND

ALLOW PROPELLANT TO JETS. IF

MIN IMP, USE >1 CYCLE)

AUTO RCS SEL (RING 1) - MNA

AUTO RCS SEL (RING 2) - OFF

TEST RING 1 THRUSTERS

AUTO RCS SEL (RING 2) - MNB

RCS TRNFR - SM

ROLLING ENTRY CK LIST

* BMAG MODE (3) - ATT 1/RATE 2 *
* MAN ATT (3) - RATE CMD (VERIFY) *
* SC CONT - SCS *
* MNVR TO 0°, 0° *
* (PITCH FROM ENTRY PAD REMARKS) *
* DBD/RAIE - MIN/LOW *
* AT RET .05G -90 SEC, JUST *
* BEFORE CM/SM SEP: *
* MAN ATT ROLL - ACCEL CMD *
* ROLL RIGHT ~20°/SEC *
* CAUTION: ATT HOLD IN PITCH AND *
* YAW MUST BE MAINTAINED UNTIL *
* CM/SM SEP *

DEORBIT BURN PAD

FINAL UPDATE OR RCS2

N33	HR	+							
	MIN	+							
	SEC	+							
N81	ΔVX								
	ΔVY								
	ΔVZ								
N22	R	+					0	0	
	P	+					0	0	
	Y	+					0	0	
	ΔVC								
	BT								
	ΔV70								

N47	WT	+							
N48	PT								
	YT								

RCS2 PAD REMARKS

RCS2 TARGET HP = _____ NM

CAPTURE HP = _____ NM

CM RCS PITCH ATTITUDE = _____°

TIG -2 MIN HORIZ CK

WINDOW MK= _____°

DATE 6/29/73

PAGE E/4-11

ENTRY UPDATE												
AREA	X			+		X			+			
P .05G	+			0	0	+			0	0		
N61 LAT		0					0					
LONG												
RTOGO .05G	+					+						
VIO .05G	+					+						
RET .05G	X	X				X	X					
RET .2G	X	X				X	X					
N66 DRE												
BANK AN	R			/		R			/			
RET RB	X	X				X	X					
RET BBO	X	X				X	X					
RET EBO	X	X				X	X					
RET DROG	X	X				X	X					
REMARKS: _____												

REMARKS: _____												

ENTRY UPDATE PAD DESCRIPTION

- Revolution number and landing area
- Pitch angle at .05G P .05G)
- Latitude and longitude of splashdown point (LAT, LONG), noun 61 display
- EMS initialization value for range-to-go at .05G (RTOGO .05G)
- EMS initialization value of inertial velocity at .05G (VIO .05G)
- Time to .05G referenced from retroburn (RET .05G)
- Time to .2G referenced from retroburn (RET .2G)
- Downrange error (DRE), noun 66 display
- Bank angle, roll (R) first in specified direction
- Time to bank angle reversal from retroburn (RET RB)
- Time to S-Band blackout from retroburn (RET BBO)
- Time to the end of S-Band blackout from retroburn (RET EBO)
- Time to drogue chute deployment from retroburn (RET DROG)

ENTRY UPDATE												
AREA	X			+		X			+			
P .05G	+				0 0	+				0 0		
N61 LAT		0					0					
LONG												
RTOGO .05G	+					+						
VIO .05G	+					+						
RET .05G	X	X				X	X					
RET .2G	X	X				X	X					
N66 DRE												
BANK AN	R			/		R			/			
RET RB	X	X				X	X					
RET BBO	X	X				X	X					
RET EBO	X	X				X	X					
RET DROG	X	X				X	X					

REMARKS: _____

REMARKS: _____

ENTRY UPDATE												
AREA	X			+		X			+			
P .05G	+				0 0	+				0 0		
N61 LAT		0					0					
LONG												
RTOGO .05G	+					+						
VIO .05G	+					+						
RET .05G	X	X				X	X					
RET .2G	X	X				X	X					
N66 DRE												
BANK AN	R			/		R			/			
RET RB	X	X				X	X					
RET BBO	X	X				X	X					
RET EBO	X	X				X	X					
RET DROG	X	X				X	X					

REMARKS: _____

REMARKS: _____

ENTRYP62 - CM/SM SEP & DRPA JETT & PRE-ENTRY MNVR

1 V37E 62E (AVE G ON)

05 09 01427 - ROLL REVERSED

*05 09 01426 - IMU UNSAT *

2 F 50 25 00041 REQUEST CM/SM SEP

cb SPS P & Y (4) - open

cb ELS/CM-SM SEP (2) - close

cb DOCK RING SEP (2) - close

VHF AM (A & B) - off (ctr)

PRIM GLY TO RAD - BYPASS (verify)

EMS MODE - STBY (verify)

CM RCS LOGIC - on (up)

Cue STDN if in contact

SECS LOGIC (2) - on (up) (verify)

STDN confirm GO for PYRO ARM (if poss)

SECS PYRO ARM (2) - on (up)

MN BUS TIE (2) - on (up) (verify)

CM/SM SEP (2) - on (up)

DOCK RING SEP (2) - on (up)

*If no DRPA JETT, go to backup *

* probe retract procedure, pg E/14-4*

MAN ATT (3) - MIN IMP

BMAG MODE (3) - RATE 2

C/W MODE - CM

RCS TRNFR - CM

CM RCS MANF PRESS - 287-302 psia

CM RCS LOGIC - OFF

Monitor V MNA/B:

If <25vdc go to EMERG POWER DOWN

YAW back to 0°

PRO

CM VHF antennas not available until apex cover jett.

Enables auto RCS transfer at CM/SM SEP.

Pyro bus should remain armed until splashdown because J series ELS pushbuttons are not single point failures.

Backup to auto transfer.

If SC CONT is CMC/AUTO, entry DAP will control spacecraft.

3 F 06 61 IMPACT LAT, LONG, LIFT UP/DN (-/+)
(.01°, ±00001)

Verify LAT, LONG from PAD
Load R3 = -1 (lift up); +1 (lift dn)
PRO

EMS INITIALIZATION

EMS FUNC - TEST 5

Verify scroll on 37K fps

EMS FUNC - RNG SET

Set RNG to PAD DATA RTGO

EMS FUNC - Vo SET

Slew scroll to PAD DATA VIO

EMS MODE - STBY (verify)

EMS FUNC - ENTRY

Verify .05G lt filter is down

RSI ALIGNMENT

Verify correct RSI alignment

lift up = 0°

lift dn = 180°

SCS control is maintained because ENTRY DAP mnvr
rate is 4°/sec.

Removing filter improves visibility of .05G lt.

GNCS HORIZ CK

Dim lights to dark adapt eyes for
horiz ck

If lift up (SPS1 + SPS2, or

4 quad compl, or

poss SPS1 + RCS2)

R____(0°) lift up

P____(035°)

Y____(0°)

After sep, fly to pad
entry att

```
*****
*If lift dn (RCS1 + RCS2, or *
* hybrid, or 2 & 3 quad compl *
* (VG >22), or poss SPS1 + RCS2)*
* R____(180°) lift dn *
* P____(XXX°) *
* Y____(0°) *
* After sep, track horiz *
* on 9° window mk *
*****
```

5 POSS 06 22 FINAL ATT DISP, RPY (.01°)
(Only if angle of attack >45°)

P63 - ENTRY - INIT

6 06 64 G,VI,RTOGO (.01G,fps,.1nm)
 FDAI SCALE - 5/5
 RHC PWR DIRECT #2 - MNA/B (verify)
 TAPE RCDR - HBR/RCD/FWD/CMD RESET

RET .05G
 -1 min

GNCS HORIZ CKIf lift up

At RET .05G -1 min, ck horiz
 on 33° window mk (Limit:
 +5°, GNCS GO/NO-GO)
 If GO, continue hold
 pad entry att
 If NO-GO, track horiz
 * on 29° window mk *
 Hold lift up to .2G

RET .05G
 (+0__:_:_)
 (__:__:_)

EMS MODE - BACKUP/VHF RNG
 (.05G 1t - on)
 .05G sw - on (up)
 EMS ROLL - on (up)

GNCS HORIZ CKIf lift dn

 *At RET .05G, compare IMU *
 * with pad entry att *
 * (Limit: +5°, GNCS GO/NO-GO) *
 * Whether GO *or NO-GO*, *
 * continue track horiz on *
 * 9° window mk *
 *Hold lift dn to 1G *

CMC entry pitch att is indicated by pitch error
 needle. Spacecraft BEF capture envelope is
 P +40°, Y +60°. Horiz ck ensures good IMU.

EMS is started manually at RET .05G to ensure
 start of range counter at a fixed position
 (range from target) as defined by RTCC.

P64 - ENTRY - POST .05G

7 06 74 BETA,VI,G (.01°,fps,.01G)
Start DAC

RET .2G
(+0__:_:_) P67 - ENTRY - FINAL PHASE (POST .2G)

8 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°, .1nm)
(+ is north & long)

DOWN RANGE GNCS GO/NO-GO NAV CK:

KEY VERB

Record DNRNG ERR _____ PAD _____

KEY RLSE

(Limit: +70 nm (lift up) or +120 nm
(lift dn), GNCS GO/NO-GO)

1ST CROSS RANGE GNCS GO/NO-GO NAV CK

If initial BETA direction not same
as PAD, GNCS is NO-GO

*If GNCS NO-GO: *

* Fly EMS (see below)*

MAN ATT (3) - RATE CMD

GNCS suspicious if CMC program change from P63
to P64 is >+15 sec from RET .05G.

0° BETA is possible prior to P67.
Fireball photography.

Other dislays for monitoring entry:
N74 BETA,VI,G (.01°,fps,.01G)
N64 G,VI,RTOGO (.01G,fps,.1nm)

The G meter can be used as a third vote
in the event of a discrepancy
between CMC (N74 or N64) G and EMS G.

Beta should be positive for targets north of track
and negative for targets south of track.

At .2G (lift up) or 1G (lift dn)

If GNCS is GO:

SC CONT - CMC/AUTO

*If DAP NO-GO: *

* SC CONT - SCS*

* Fly BETA *

*If GNCS NO-GO:

* Fly EMS

* Go to PAD BACKUP BANK AN at .2G

* Reverse bank at RET RB

* At 800 nm scroll line

* If RTOGO <500 nm, roll toward 90°

* If RTOGO >600 nm, roll toward 0°

* Fly to get RTOGO convergence between

* 300 nm and 200 nm scroll lines

* At 4000 fps for nom tgt, 16 nm at 2.7G*

* If RTOGO >16 nm, fly toward lift up *

* If RTOGO <16 nm, fly toward lift dn *

*If GNCS & EMS NO-GO: *

* Fly PAD bank/reverse bank*

CM RCS CK

RCS IND - CM 1, 2

*If both RCS rings *

* He pressure <2000 psia:*

* Roll right ~20°/sec *

Lift up to .2G then roll right from 0°
(lift vector N) to pad BANK AN

Lift up to .2G then roll left from 0°
(lift vector S) to pad BANK AN

Lift dn to 1G then roll left from 180°
(lift vector N) to pad BANK AN

Lift dn to 1G then roll right from 180°
(lift vector S) to pad BANK AN

He source pressure for a guided entry: below 2000 psia (up from 1650 psia on Apollo) go ballistic. This is based on 26 lbs of RCS in each ring with a He bottle temperature of 50°F prior to arming the RCS. The 2000 psia figure increases to 2150 psia at 70°F.

RET RB
-1 min
(+0__:__)

2ND CROSS RANGE GNCS GO/NO-GO NAV CK:
If BETA reverses earlier than 1 min
before PAD RET RB, GNCS is NO-GO.
*If GNCS NO-GO: *
* Fly EMS (see above)*

RET
90K' (__:__)
(3)

STEAM PRESS - pegged at ~90K'
S BD NORM PWR AMPL - HI (verify)

Start Watch
(00:00)

9 F 16 67 RTOGO, LAT, LONG (Vrel=1000fps) (.1nm, .01°)
SC CONT - SCS
RTOGO NEG (R1) - LIFT UP
RTOGO POS (R1) - LIFT DN

Monitor altimeter
Stop DAC
DAC - T8

Go to EARTH/POST LANDING, pg E/6-1

RET is time to event referenced from retroburn.
Watch is used as a backup altimeter and gives an approximate time to expect cabin pressure increasing and cabin pressure = 10 psia, which are valid cues for drogue deploy and main deploy, respectively.

This last bit of ranging must be done manually.
ENTRY DAP maintains last command after
Vrel = 1000 fps.

f-stop for parachute photography.

EARTH/POST LANDING

	RET	Watch
50K' (__:__)	CABIN PRESS REL vlv (2) - BOOST/ENTRY SECS PYRO ARM (2) - on (up) (verify) Check altimeter	(00:50)
40K' (__:__)	*If CM unstable: * RCS CMD - OFF * 40K' APEX COVER JETT pb - push * DROGUE DEPLOY pb - push * (2 sec after apex cover jett)*	(01:04)
30K'	ELS LOGIC - on (up) ELS - AUTO	(01:23)
24K' (__:__) (May be 23K')	RCS disable (auto) *RCS CMD - OFF* Apex cover jett (auto) *APEX COVER JETT pb - push* (Wait 2 sec) Drogue parachutes deployed (auto) *DROGUE DEPLOY pb - push* *If both drogues fail: * ELS - MAN * Stabilize CM (direct RCS)* * 5K' MAIN DPLY pb - push * ELS - AUTO	Start DAC (01:36)
23.5K'	Cabin pressure increasing *If not increasing by 17K': * CABIN PRESS REL vlv (RH) - DUMP* CM RCS PRPLNT (2) - OFF	
10K' (__:__) (Cab Press = 10 psia)	Main chutes deployed (drogues +46 sec) MAIN DEPLOY pb - push	(02:22)

Arms ELS baro switches.

Parachute photography.

Drogue failure results in CM velocity too great for main chute deploy at 10K'. Increased drag will slow CM to acceptable velocity for main chute deploy at 5K'.

Cabin pressure increasing via BOOST/ENTRY position of PRESS REL vlv is an accurate indication of 23.5K'. If still no increase, assuming a valid altimeter, use side hatch dump valve to equalize pressure. Closes propellant isolation valves.

VHF ANT - RECY
VHF AM A - SIMPLEX

VHF BCN - ON

Record LAT _____, LONG _____,
& voice to REC'Y at 10K'

Record EMS RTGO _____

EMS - OFF/STBY

CABIN PRESS REL vlv (2) - DUMP

Stow DAC

STRUT LOCKS (4) - UNLOCK

*If night landing: *

* cb FLOAT BAG #3, FLT/PL (1) - close*

* PL BCN LT - LO *

(5) cb FLT & PL BUS BAT A, B, & C (3) - close

cb FLT & PL BUS MNA & B (2) - open

cb BAT RLY BUS (2) - open

(8) cb SPS P & Y (4) - open (verify)

ELS - AUTO (verify)

ELS LOGIC - on (up) (verify)

FLOOD LTS - POST LDG

800'

CAB PRESS RELF vlv (2) - CLOSE (latch off)

DIRECT O2 vlv - OPEN (CCW) (if suited)

MN BUS TIE (2) - OFF

STABILIZATION AFTER LANDING

(229) cb MAIN REL PYRO (2) - close

MAIN RELEASE - on (up)

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

If no contact with recovery forces:

* VHF AM A & B - off (ctr) *

* VHF AM RCV ONLY - A *

(8) cb PL VENT - close

cb FLOAT BAG (3) - close

(278) cb UPRIGHT SYS COMPRESS (2) - close

If Stable II:

FLOAT BAG (3) - FILL till 2 min after
upright, then OFF

VHF AM A/B & BCN - OFF while inverted

If Stable I:

After 10 min cooling period,

FLOAT BAG (3) - FILL 7 min, then OFF

If B-SIMPLEX or A-DUPLEX req'd, turn beacon off during comm.

Allows pressure to equalize more rapidly than BOOST/ENTRY position of valve.

Beacon is powered through FLOAT BAG #3 circuit breaker. HI position reduces lifetime from 24 hrs to 4 hrs.

ELS AUTO & ELS LOGIC must be on for at least 14 sec after drogue deploy to enable MAIN RELEASE switch. Total on-time must be less than 14 hrs (power limitation) per 72 hr profile.

Prevents water from entering CM.

Last function that requires pyro power.

Wait 15 minutes before running compressors again.

SYSTEMS CKS
(-7 DAYS)

DATE 6/29/73

PAGE E/3-1

13:00

13:10

13:20

13:30

CONFIGURE PANEL 8 CB'S (SEE DIAGRAM Pg E/3-1)
AUTO RCS SEL (16) - OFF (VERIFY) (THESE SWITCHES
ARE TURNED OFF TO PREVENT JET FIRINGS DURING THE
FOLLOWING SYSTEMS CHECKS)

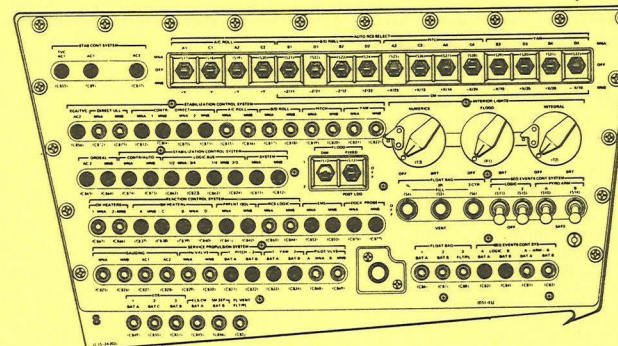
CMC POWER UP
PRO, HOLD (~5 SEC) UNTIL STBY LT - OUT
(REPEAT, IF NECESSARY)
V96E

CMC WARNING * * * *
RESTART, PROG ALARM
*RSET AND CONTINUE *
* * * * *

PERFORM IMU POWER UP (Pg E/3-1)

PERFORM SCS POWER UP (Pg E/3-1)

PERFORM CMC SELF CK (Pg E/3-1)



PANEL 8

● - CLOSE
○ - OPEN

IMU POWER UP

CMC MODE - FREE (VERIFY)
G/N IMU PWR - ON (UP)
NO ATT LT - ON (90 SEC)
NO ATT LT - OUT
WAIT 15 SEC (TO ALLOW
PIPA INHIBIT RESET)

SCS POWER UP

LOGIC PWR 2/3 - ON (UP)
SCS SIG CONDR/DR BIAS PWR 1 & 2 - AC1
SCS ELEC PWR - GDC/ECA
BMAG MODE (3) - RATE 2
SC CONT - CMC/FREE
ATVC GAIN - HI (VERIFY)
BMAG PWR 1 & 2 - WARMUP (40 MIN - ON)
FDAI/GPI POWER - BOTH
FDAI SEL - 1/2
(201) C/W 8A-D; 10A, B - ENABLE

CMC SELF CK

V25 N01E, 1365E
E, E, E
F 21 01
V15 N01E, 1365E
R1 NUMBER OF ERRORS
R2 NUMBER OF TESTS STARTED
R3 NUMBER OF E-MEM TESTS SUCCESSFUL
V21 N27E, 10E, SELF TEST ERASABLE
& FIXED (4E SELF CHECKS ERASABLE
& 5E SELF CHECKS FIXED)
15 01 TEST SUCCESSFUL WHEN R2 ≥ 3
(78 SEC MINIMUM)
*IF PROG LT - ON *
*V05 N09E 01102 SELF *
* TEST ERROR *
*N8E - RECORD FOR STDN *
* R1, R2, R3 *
(TERM) V21 N27E, 0E

13:30

B
D
A

V74E (WAIT ~42 SEC IF HIGH BIT RATE, OR
208 SEC IF LOW BIT RATE)

STDN UPLINK
P27 (CLOCK SYNC, SV, ENTRY REFSMMAT)
BURN PAD (Pg E/3-4)

V16 N65E, SYNCHRONIZE MET WITH CMC TIME

13:40

M
A
D

PERFORM LOGIC SEQUENCER CK (Pg E/3-2)

PERFORM VHF CK (Pg E/3-2)

13:50

PERFORM FDAI ERROR NEEDLES TEST (Pg E/3-2)

14:00

LOGIC SEQUENCER CK

NOTE: CHECKS STATUS OF ELS PUSHBUTTONS,
CM/SM SEP SWITCHES, AND 24K' BARO SWITCHES
SECS PYRO ARM (2) - SAFE (VERIFY)
SECS LOGIC (2) - OFF (VERIFY)
(8) CB SECS LOGIC (2) - CLOSE (VERIFY)
CB SECS ARM (2) - CLOSE
CB ELS/CM-SM SEP (2) - CLOSE
ELS LOGIC - ON (UP)
ELS - AUTO
COORDINATE NEXT 3 STEPS WITH STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO FOR PYRO ARM AS REQ'D
SECS LOGIC (2) - OFF
CB SECS ARM (2) - OPEN
ELS LOGIC - OFF
ELS - MAN
CB ELS/CM-SM SEP (2) - OPEN

VHF CHECK

(98) CALL/SLEEP - ON
(98) SPEAKER/HDST - SPEAKER
(10) S BD - OFF
(10) VHF AM - T/R
(3) VHF AM A - SIMPLEX
(3) SQUELCH A TW - NOISE +1
(3) VHF ANTENNA - LEFT OR RIGHT AS REQ'D
(98) PERFORM VHF COMM CK

FOLLOWING COMM CK:

(3) VHF AM A - OFF (CTR)
(10) S BD - T/R
(10) VHF AM - OFF
(98) AS REQ'D

FDAI ERROR NEEDLES TEST

INVERTER 1 IS CONNECTED TO AC1
AND INVERTER 2 IS CONNECTED
TO AC2. INVERTER 3 IS OFF.
FDAI SCALE - 5/5
FDAI SEL - 1
FDAI SOURCE - ATT SET
ATT SET - GDC (VERIFY)
ATT SET TW (3) - 0°, 180°, 0°
GDC ALIGN PB - PUSH
FDAI 1 - ERRORS NULL
ATT SET TW (3) - 5°, 175°, 5°
FDAI 1 - ERRORS FULL SCALE (VERIFY)
R RIGHT, P DOWN, Y RIGHT
FDAI SEL - 2
FDAI 2 - IND SAME AS FDAI 1 (VERIFY)
GDC ALIGN PB - PUSH
FDAI 2 - ERRORS NULL
ATT SET TW (3) - 0°, 180°, 0°
FDAI 2 - ERRORS FULL SCALE (VERIFY)
R LEFT, P UP, Y LEFT
FDAI SEL - 1
FDAI 1 - IND SAME AS FDAI 2 (VERIFY)
GDC ALIGN PB - PUSH
FDAI 1 - TOTAL ATT (VERIFY)
0°, 180°, 0°
FDAI SEL - 1/2

SYSTEMS CKS
(-7 DAYS)

14:00

P51 (SS/ST) (RECORD Pg E/3-3)
NOTE: COMPLETE PRIOR TO START OF SWS MOMENTUM DUMP
G/N LTS - ACT
INSTALL OPTICS EYEPIECES

P52 (OPTION 1) (RECORD TIME OF GYRO TORQUE) (Pg E/3-3)

14:10

FDAI/GPI PWR - OFF (PREVENTS RATE NEEDLES FROM
OSCILLATING FULL SCALE WHEN BMAG'S COME UP TO SPEED)
BMAG PWR 1 & 2 - ON (25 SEC SPIN-UP)
FDAI/GPI PWR - BOTH
START SCS DRIFT CK (BMAG 2)
ALIGN GDC
RECORD MET (Pg E/3-3)

14:20

PERFORM EMS ENTRY CK (Pg E/3-3)

PERFORM EMS ΔV TEST AND NULL BIAS CK (Pg G/2-9)

14:30

P51					
N71 1ST STAR	☒	0	0		
N71 2ND STAR	☒	0	0		
N14 STAR	☒				
TKR ANG	IG				
N05 (R1) δ ERR	☒				

P52 (OPTION 1)
TIME OF
GYRO
TORQUE

P50 (OPTION 2)					
N71 STAR CODE	☒	0	0	0	
N14 STAR	OG				
TKR ANG	IG				
N23 DOCK	α				
ANGS	β				
	γ				

EMS ENTRY CK

- EMS FUNC - OFF
(8) CB EMS (2) - CLOSE
EMS MODE - STBY
EMS FUNC - EMS TEST 1 (WAIT 5 SEC)
EMS MODE - NORMAL (WAIT 10 SEC)
CHECK IND LTS - OUT
RANGE IND - 0.0
SLEW HAIRLINE OVER NOTCH
IN SELF-TEST PATTERN
EMS FUNC - EMS TEST 2
.05G LT - ON (ALL OTHERS OUT)
WAIT 10 SEC
EMS FUNC - EMS TEST 3
.05G LT - ON
RSI LOWER LT - ON (10 SEC LATER)
SET RANGE COUNTER TO 58 NM ± 0.0
EMS FUNC - EMS TEST 4
.05G LT - ON (ALL OTHERS OUT)
G-V TRACE WITHIN PATTERN TO LWR RT
CORNER @9G
RANGE IND COUNTS DOWN TO 0.0 ± 0.2 NM
EMS FUNC - EMS TEST 5
.05G LT - ON
RSI UPPER LT - ON (10 SEC LATER)
RANGE IND - 0.0
SCRIBE TRACES VERTICAL LINE 9G TO
0.28 $\pm 0.1G$
EMS - OFF/STBY

GDC/IMU COMPARISON CK LIST

V16 N20E
FDAI SELECT - 1
FDAI SOURCE - ATT SET
ATT SET - GDC
ZERO FDAI 1 ERROR NEEDLES
WITH ASCP TW
KEY VERB WHEN ZERO
RECORD N20 VALUES
RECORD ASCP TW VALUES
RECORD DET
FDAI SELECT - 1/2

BMAG 2 GDC/IMU COMPARISON RESULTS

N20	R	+							
	IMU	P	+						
	Y	+							
ASCP TW	R	☒						☒	
	GDC	P	☒					☒	
	Y	☒						☒	
MET	START	☒	0						
	STOP	☒	0						
	ΔT (01:00 HR)	☒	0	0					

14:30

14:40

14:50

45:00

53:00

15:00

P50 (OPT 2) (SS/ST) (RECORD Pg E/3-3)
NOTE: DO NOT BEGIN PRIOR TO END OF SWS MOMENTUM DUMP

P30, LOAD N33 AND N81 FROM BURN PAD (Pg E/3-4)
SET DET COUNTING UP TO GMTI
PERFORM SPS THRUSTING PREP (Pg E/3-4)

P40, ENTER ON F 50 18 (BYPASS MNVR TO BURN ATT)
CONFIGURE PANEL 275 CB'S (SEE DIAGRAM Pg E/3-5)
PERFORM TVC PREP (Pg E/3-4)

SYSTEMS CKS
(-7 DAYS)

BURN PAD

N33	HR	+	X	X	X						
	MIN	+	X	X	X	X					
	SEC	+	X								
N81	ΔVX	+	1	0	0	0	0	0			
	ΔVY	+	0	0	0	0	0	0			
	ΔVZ	+	0	0	0	0	0	0			

SPS THRUSTING PREP

EMS - ΔV SET/STBY
SET ΔVC = +100.0
EMS FUNC - ΔV
FDAI SCALE - 5/1
MAN ATT (3) - RATE CMD (VERIFY)
BMAG MODE (3) - RATE 2 (VERIFY)
SC CONT - CMC/AUTO
FDAI (2) - INRTL (VERIFY)
(5) SM RCS HTRS ENG PKG (4) - OFF
SM RCS HTRS QUAD (4) - OFF
(REQUIRED TO ENSURE ADEQUATE
VOLTAGE (25 VDC, CMC CON-
STRAINT) FOR GIMBAL MOTOR
DRIVE TEST. IF ONLY SWS
POWER AVAILABLE, SWS POWER
CONSUMPTION MUST BE REDUCED)

PRIMARY TVC CHECK

TAPE RCDR - HBR/RCD/FWD/CMD RESET
GMBL MTRS P1-Y1 - START/ON
(PLT CONFIRM)
VERIFY TRIM CONTROL & SET

GMBL TRIM	
P	(+1.44)
Y	(+0.33)

VERIFY MTVC
(VERIFIES CONTROL OF PRIMARY
SERVO LOOPS THROUGH RHC)
THC - CW
VERIFY NO MTVC
(VERIFIES TVC SWITCHES TO
SECONDARY SERVO LOOPS)

TVC PREP

DBD/RATE - MIN/LOW
SCS TVC (2) - RATE CMD
TVC GMBL DRIVE P & Y - AUTO
ATVC GAIN - HI (VERIFY)
MN BUS TIE (2) - ON (UP)
(MONITOR BAT BUS CURRENT
INCREASE)
MONITOR SWS CURRENT IN MDA OR STS
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
RHC PWR NORMAL #2 - AC
(PREVENTS ATTITUDE MANEUVERS)
DURING MTVC CHECKS BY RE-
MOVING POWER FROM BREAKOUT
SWITCHES)
RHC PWR DIRECT #2 - OFF
BMAG MODE (3) - ATT 1/RATE 2
SC CONT - SCS
RHC #2 - ARMED

SEC TVC CK

GMBL MTRS P2-Y2 - START/ON
(PLT CONFIRM)
VERIFY TRIM CONTROL & SET
SC CONT - CMC
VERIFY MTVC
(VERIFIES CONTROL OF SECONDARY
SERVO LOOPS THROUGH RHC)
THC - NEUTRAL
VERIFY NO MTVC
(VERIFIES TVC SWITCHES TO CMC
CONTROL)
VERIFY GPI RETURNS TO 0,0
RHC PWR NORMAL #2 - AC/DC

(-7 DAYS)

DATE 6/29/73

PAGE E/3-5

15:00

T
E
X

PERFORM PRIM AND SEC TVC CKS (Pg E/3-4)

SC CONT - CMC (VERIFY)
PRO ON F 50 25 (ACCEPT GMBL TEST OPTION)
MONITOR GPI RESPONSE: P & Y (0,+2,-2,0), TRIM
PERFORM SPS COLD FIRE CK LIST (Pg E/3-5)

59:30
00:00

M
I
L

VERIFY ΔV THRUST A(B) - OFF

SPS COLD FIRE

CONFIGURE PANEL 275 CB'S (SEE DIAGRAM Pg E/3-6)
SM RCS HTRS ENG PKG (4) - 1
SM RCS HTRS QUAD (4) - PRIM
PERFORM THC THRUSTER ON CMD TEST (Pg E/3-6)

15:10

B
D
A

END SCS DRIFT CK (BMAG 2), PERFORM
GDC/IMU COMPARISON CK LIST (Pg E/3-3)
IF DRIFT $>10^{\circ}/\text{HR}$, BMAG 2 FAILED

15:20

00:00

M
A
D

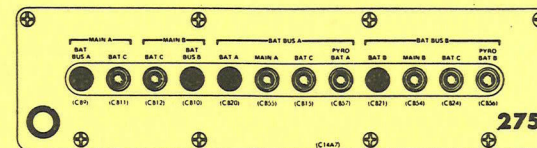
START SCS DRIFT CK (BMAG 1)
ALIGN GDC
RESET AND START DET COUNTING UP

15:30

PANEL 275

● - CLOSE

○ - OPEN



SPS COLD FIRE CK LIST

06 40 TFI,VG, $\Delta V M$ (MIN-SEC,.1FPS)
PROG ALARM - TIG SLIPPED
* V5 N9E 01703 *
* KEY RLSE *
RATE - HIGH
UPDATE DET
SPS HE VLVS (2) - AUTO (VERIFY)
CHECK N2A & N2B (THE NITROGEN PRESSURE
SHOULD BE GREATER THAN 200 PSIA AND LESS
THAN 2900 PSIA)
59:00 EMS MODE - NORMAL
THC PWR - OFF (VERIFY) (NO ULLAGE WILL BE
PERFORMED)
59:25 DSKY BLANKS
59:30 ΔV THRUST A(B) - OFF (VERIFY)
(SPS ENGINE WILL NOT BE FIRED)
06 40 TFI,VG, $\Delta V M$ (AVE G ON) (MIN-SEC,.1FPS)
CHECK PIPA BIAS <2 FPS FOR 5 SEC
59:55
F 99 40 ENG ON ENABLE REQUEST
(AUTO IGN) PRO AT TFI ≥ 0 SEC
00:00 NO IGNITION
06 40 TFC,VG, $\Delta V M$ (MIN-SEC,.1FPS)
(EXPECT F 97 40 - THRUST FAIL)
SPS THRUST LT - ON (VERIFY) (SPS THRUST LT -
ON INDICATES THAT THE CMC IS ISSUING AN
ENGINE-ON COMMAND)
SPS HE VLVS TB (2) - BP (VERIFY)
SPS INJ VLVS (4) - CLOSED (VERIFY)
RECORD N2A & N2B & (THE NITROGEN
PRESSURE SHOULD BE GREATER THAN 200 PSIA
AND LESS THAN 2900 PSIA)
F 97 40 SPS THRUST FAIL
ENTR
F 06 40 SPS THRUST LT - OUT (SPS THRUST LT - OUT
INDICATES THAT THE CMC HAS REMOVED THE
ENGINE - ON COMMAND)
F 99 40 ENTR
F 16 85 PRO
F 37 OOE
PCM BIT RATE - LOW
GMBL MTRS (4) - OFF (PLT CONFIRM)
TVC SERVO PWR 1 & 2 - OFF
BMAG MODE (3) - RATE 2
MN BUS TIE (2) - OFF (MONITOR BAT BUS CURRENT
DECREASE)
EMS - OFF/STBY
DSE DUMP

15:30

15:40

15:50

30:00

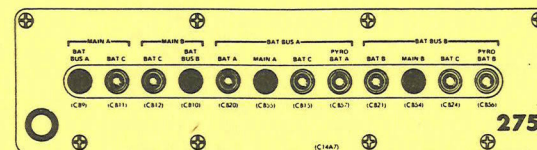
16:00

C
R
O

END SCS DRIFT CK (BMAG 1), PERFORM
GDC/IMU COMPARISON CK LIST (Pg E/3-3)
IF DRIFT > 10°/HR, BMAG 1 FAILED

P52 (OPTION 3) (SXT) (RECORD Pg E/3-6)
IF > 1.5°/HR, RECYCLE P52

SYSTEMS CKS
(-7 DAYS)



PANEL 275

● - CLOSE

○ - OPEN

THC THRUSTER ON CMD TEST
(RCS DISABLED)

THC - LOCKED (VERIFY)
CB SCS CONTR/AUTO (2) - CLOSE (VERIFY)
THC PWR - ON (UP)
SC CONT - CMC/HOLD

V11 N10E, 06E

11 10 R1 OCTAL CONTENTS OF CHANNEL 6

RHC #1 & #2 - LOCKED

THC - ARMED AND COMMAND:

+Y 00220

-Y 00140

+Z 00011

-Z 00006

V11 N10E, 05E

11 10 R1 OCTAL CONTENTS OF CHANNEL 5

THC COMMAND:

+X 00231

-X 00146

THC - LOCKED

THC PWR - OFF

P52 (OPTION 3)

N71 1ST STAR		X	0	0	0				
N71 2ND STAR		X	0	0	0				
N05(R1) 3 ERR		X							
N93	X								
GYRO TORQUING ANGLES	Y								
	Z								
TIME OF GYRO TORQUE	HR	+	0	0	0				
	MIN	+	0	0	0				
	SEC	+	0						

SYSTEMS CKS
(-7 DAYS)

16:00

PERFORM OPTICS POWER DOWN (Pg E/3-7)

POWER DOWN IMU
CMC MODE - FREE
G/N IMU PWR - OFF

ISS WARNING
*RSET *
* * * * *

POWER DOWN CMC

V45E

P06

PRO ON F 50 25 (00062) AND HOLD (~5 SEC)
UNTIL STBY LT - ON (REPEAT IF NECESSARY)

POWER DOWN SCS (Pg E/3-7)

CONFIGURE PANEL 8 CB'S FOR QUIESCENT PHASE
(SEE DIAGRAM Pg E/3-7)

16:10

16:20

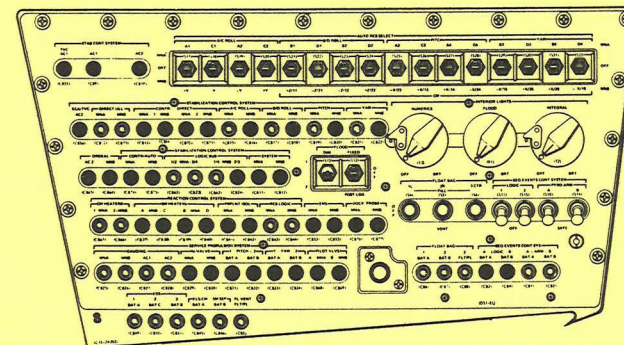
16:30

OPTICS POWER DOWN
(TO QUIESCENT)

OHC - DRIVE TRUN <10
OPT ZERO - ZERO
G/N PWR OPTICS - OFF
G/N LTS - OFF

SCS POWER DOWN

FDAI SEL - 1
MAN ATT (3) - RATE CMD
DBD/RATE - MAX/HI
AUTO RCS (C1,A2,C2,B1,D1,
B2,C3,A4,D3,B4) - MNA
SC CONT - SCS
CMC MODE - FREE (VERIFY)
BMAG MODE (3) - RATE 1
.05G SW - OFF (VERIFY)
α/PC SW - PC (VERIFY)
TVC GMBL DRIVE P & Y - AUTO (VERIFY)
FDAI/GPI PWR - OFF
BMAG PWR 1 - OFF
BMAG PWR 2 - OFF
LOGIC PWR 2/3 - OFF
SCS ELEC PWR - OFF
SCS SIG CONDR/DR BIAS PWR 1 & 2 - OFF
(201) C/W 8A-D; 10A, B - INHIBIT



PANEL 8

● - CLOSE

○ - OPEN

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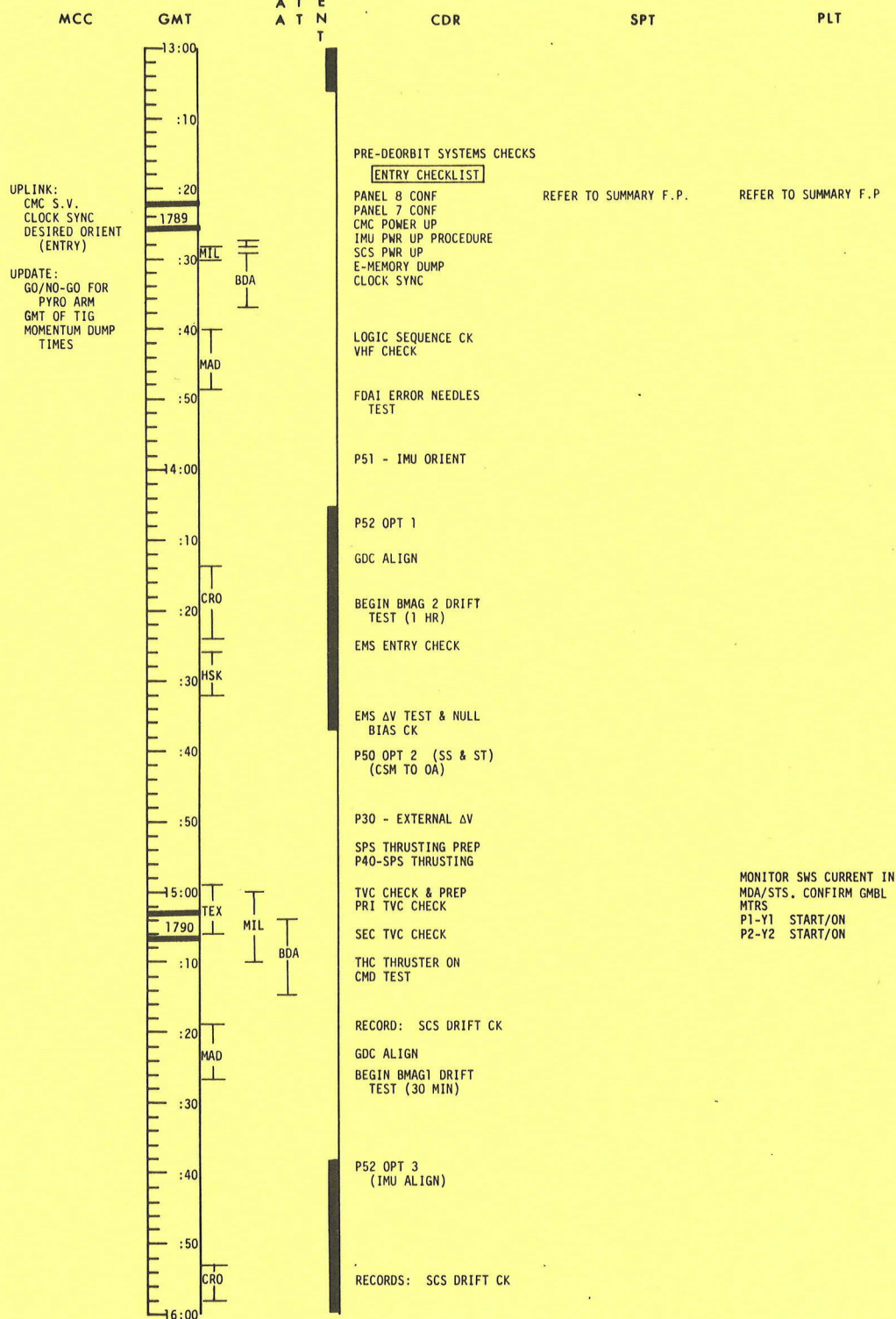
FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON	
	13:00 - 16:00	50/258	SEPTEMBER 15, 1973	1789	-37.53	PHASE	

ENTRY -7 DAY CHECKS

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S



MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

S	SOL	A-SOL
A		
L		

FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON PHASE
	16:00 - 19:00	50/258	STEMBER 15, 1973	1790	-37.53	

MCC

GMT

S A V
A T E
A T N
T

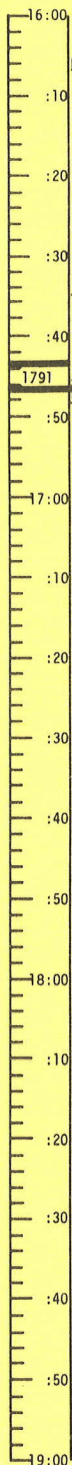
CDR

SPT

PLT

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S



IMU PMR DOWN
PROCEDURE
PO6 - CMC PMR DOWN
SCS PMR DOWN
QUIESCENT PHASE
PANEL 8 cb CONFIG

MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

NOMINAL

DATE 6/29/73

PAGE E/4-1

NOMINAL		PRELIMINARY		FINAL	
15+00	(11102) (11111)	15	+ 24 : 21	+	:

DEACTIVATION CK LIST COMPLETE

PHASE ELAPSED TIME (PET) IS THE FLOATING TIME BASE REFERENCED TO SPS2 IGNITION WHICH, BY DEFINITION, IS 20+00:00 (20 HOURS +00 MINUTES :00 SECONDS).

START DET COUNTING UP TO UNDOCKING PET (Pg E/4-1)

REMOVE HDC FROM TSB

SET UP CAMERAS FOR FLY AROUND PHOTOS:

CM2/DAC/18/CX02 - BRKT, MIR
(T8, 1/250, ∞) 6 FPS (1 MAG)

CM4/HDC/CX04 - (f8, 1/250, ∞)
50 FR (LIGHTED SIDE ONLY)

CM4/TV

PERFORM TV PREPARATION CK LIST (Pg E/4-1)

PERFORM PRE UNDOCKING SWITCH LIST (Pg E/4-1)

V48E, LOAD 2 JET X TRANS, (YAW INSTEAD OF PITCH
+X JETS ARE USED BECAUSE C.G. OFFSET IS LESS IN
YAW PLANE) 2°/SEC, B/D ROLL; LOAD N47 AND N48
FROM SEP BURN PAD (Pg E/4-3)

V46E

EMS MODE - NORMAL

PERFORM UNDOCKING CK LIST (Pg E/4-1)

UNDOCK

ROLL TO 180° ON GDC BALL AT .5°/SEC
(USE GDC BALL FOR FLY AROUND MNVR)
POINT CSM WITH COAS ON DOCK PORT

NOTE TIME WHEN DOCK PORT SUBTENDS
3° IN COAS (67 FT). IF PORT
SUBTENDS 3° AT 02:50, ΔV = 0.4 FPS

SPOT LIGHT - OFF

UNDOCKING TIME (PET)

TV PREPARATION CK LIST

TV SOURCE - CM
LINEAR SW - LINEAR
AVG SW - PEAK
F/STOP - 16
ZOOM - 25
FOCUS - ∞
S BD AUX TV - TV
MONITOR ON - ON
REFINE SETTINGS AS REQ'D
NOTE: IF SUN ANGLE <22.5°,
S BD AUX TV - OFF
F/STOP - FC

PRE UNDOCKING SWITCH LIST

SET ΔVC = +100.0 (IF ΔV COUNTER
IS SET AT 0.0, LOGIC RACE
CAUSES COUNTER TO JUMP WHEN
ACCELERATION IS SENSED)

EMS FUNC - ΔV
MAN ATT (3) - RATE CMD
DBD/RATE - MIN/HIGH (SELECTS 4°
DEADBAND WHICH CAN BE USED FOR
ROLL & YAW ATTITUDE HOLD
DURING COAST PERIODS)

RHC PWR NORMAL #2 - AC/DC
RHC PWR DIRECT #2 - MNA/B
THC PWR - ON (UP)
SC CONT - CMC/FREE (CMC/FREE
REQ'D TO PREVENT -X JETS FROM
FIRING CLOSE TO SWS)

BMAG MODE (3) - RATE 2
SPOT LIGHT - ON
AUTO RCS SEL (16) - MNA/B
CB SCS A/C ROLL MNA - CLOSE
CB SCS B/D ROLL MNA - CLOSE
CB SCS PITCH MNA - CLOSE (VERIFY)
CB SCS YAW MNA - CLOSE (VERIFY)
CB DOCK PROBE (2) - CLOSE
RHC #2 & THC - ARMED

UNDOCKING CK LIST

PROBE EXTD/REL - EXTD REL
TB - BP/THEN GRAY (HOLD ~5 SEC
UNTIL UNDOCK VERIFIED, BUT
<20 SEC. EXPECTED SEP ΔV
IS 0.38 TO 0.51 FPS)

PROBE EXTD/REL - RETR (PROVIDES
CAPTURE LATCH TB'S IF
REDOCKING NECESSARY)

PROBE EXTD/REL - OFF
RECORD EMS ΔVC (RECORDED
FOR POST FLIGHT EVALUATION OF
UNDOCKING ΔV)

NOMINAL
SEQUENCE

NOMINAL SEQUENCE

15+30
(10103)
(01111)

WHEN SWS DIA SUBTENDS 4.3°,
START DAC
THRUST +X FOR 2.5 SEC (~0.5 FPS)
THRUST -Z (UP) FOR 4.5 SEC
NOTE: THRUST CAN BE RESULTANT
DIRECTION AND MAGNITUDE IF DESIRED.

FLY AROUND MNVR

11:00

INERTIAL
PITCH,° DET
TIME,SEC ΔT,SEC

90

100

110

120

130

15+40

140

150

160

19:00

170

180

190

200

210

220

230

240

15+50

250

27:00

260

270

280

290

300

310

320

330

340

35:00

350

16+00

0

G
D
S

T
E
X

M
I
L

B
D
A

1. MNVR WITH RHC IN MIN IMPULSE (CREW PREFERENCE OVER ATT HOLD MODE) TO POINT COAS AT SWS C.M. CONTINUOUSLY ($R = 180^\circ$).
2. MAINTAIN ESTIMATED 300 FT RANGE FROM SWS C.M. MAKE CORRECTIONS USING OCCASIONAL SHORT +X PULSES WITH THC.
3. SPT LOG TIMES FOR CROSSING 10° PITCH MARKS ON INERTIAL FDI. MAINTAIN ANGULAR RATE SO THAT TIME TO TRAVERSE 10° IS 50-58 SEC ($N56, R2 = .20$ TO $.17$ DEG/SEC). USE OCCASIONAL SHORT +Z PULSES WITH THC, +Z ONLY IF $\Delta T < 50$ SECONDS.

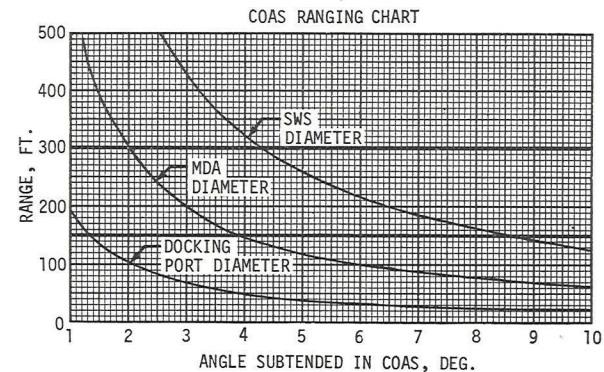
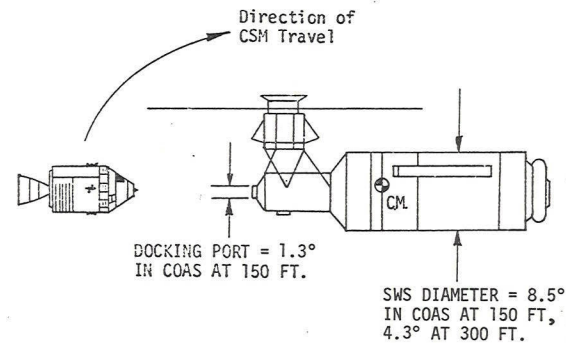
THRUST DIRECTION	RADIAL CLOSURE RATE	ANGULAR RATE	RCS PULSE DURATIONS
+X	INCREASE	INCREASE	0.5 SEC
+Z	INCREASE	DECREASE	
-Z	DECREASE	INCREASE	

NOTE: NO -X THRUSTING EXCEPT IN AN EMERGENCY

STOP DAC

S BD AUX TV - OFF (CTR)

THE FLY AROUND MNVR MAY BE COMPLETED EARLY, BUT IT SHOULD NOT BE COMPLETED LATE, OR THE CSM MAY NOT BE IN A FAVORABLE POSITION RELATIVE TO THE SWS FOR THE SEP BURN.



NOMINAL

NOMINAL

16+00
(10103)
(01111)B
D
A0
10
20
30
40
50
60
70
80
90

43:00

(11102)
(01111)

16+10

A
C
N

16+20

16+30

CMC MODE - AUTO; ALIGN GDC TO IMU
 V48E, LOAD 4 JET X TRANS AND .5 DEG/SEC
 P30, LOAD N33 AND N81 FROM SEP BURN PAD (Pg E/4-3)
 P41, BYPASS MNVR, KEEP SWS IN WINDOW (-Z TRANS NORMALLY USED)
 CSM SHOULD BE ABOVE OR BEHIND SWS WHEN
 RETROGRADE BURN IS PERFORMED.

SEP BURN NOTE: IF UNDOCKING FROM AXIAL PORT,
 P41 ENSURES RETROGRADE BURN FOR SEP.

V82E, VERIFY HP

P00

THC PWR - OFF

WARNING: WAIT UNTIL COMP ACTY LT - OUT

V66E (TRANSFERS CSM SV TO OWS SLOTS. DO NOT DO WHEN
 AVERAGE G IS RUNNING. DO NOT DO UNLESS SATISFIED
 THAT CSM SV IS GOOD)

SEP BURN PAD

		NOMINAL						PRELIMINARY						FINAL					
N33	HR	+	X	X	0	1	6	+	X	X				+	X	X			
	MIN	+	X	X	X	1	1	+	X	X	X			+	X	X	X		
	SEC	+	X		0	8	0	+	X					+	X				
N81	ΔVX	-	X		0	0	5		X						X				
	ΔVY	+	X		0	0	0		X						X				
	ΔVZ	+	X		0	0	0		X						X				
N22	R	+	1	8	2	0	0	+				0	0	+				0	0
	P	+	0	8	7	0	0	+				0	0	+				0	0
	Y	+	0	0	1	0	0	+				0	0	+				0	0
	ΔVC	X	X		0	0	5		X	X					X	X			
	BT	X	X		0	0	2		X	X					X	X			

N47	WT	+					
N48	PT		X	X			
	YT		X	X			

BACKUP GDC/IMU ALIGNMENT
 FOR SOUTH SET STARS
 ATRIA (34) AND ACRUX (25)

R		
P		
Y		

16+30
(11102)
(01111)

16+40

16+50

17+00

C
R
OG
W
M

P30, LOAD N33 AND N81 FROM SHAPING BURN PAD (Pg E/4-4)
SET DET COUNTING UP TO SHAPING BURN TIG
P00
V49E, MNVR TO SHAPING BURN PAD ATT (0,180,0) (Pg E/4-4)

CAUTION: MONITOR FDAI 1
FOR POSS GMBL LOCK

PERFORM IMU CK
P52 (OPT 3) (12, 15) AUTO OPTICS TO STAR
LIMIT: SXT FOV, GNCS GO/NO-GO)
EXIT 06 92, V37E 40E
SET ASCP TW TO PAD BURN ATT
DIM LIGHTS FOR HORIZ CK
GO TO SPS BURN-ENTRY CUE CARD
(BANK A)

P40

SPS1 HORIZ CK

HORIZ CK - HORIZ on 17°
WINDOW MK (HDS DN)
AT TIG -3 MIN
(LIMIT: +3°, GNCS GO/NO-G)
*IF NO-GO, SET TW TO *
* PAD BURN ATT *
* SC CONT - SCS *
* TRACK HORIZ WITH 13° *
* WINDOW MK (HDS DN) *

* AT TIG -2 MIN, *
* HOLD ATT *
* GDC ALIGN PB - PUSH*
* BURN SCS *
HORIZ ON 5° WINDOW MK (HDS DN)
AT TIG

SHAPING BURN

V82E, VERIFY HP
P00

WARNING: WAIT UNTIL COMP ACTY LT - OUT
V66E

* * IF RCS1 REQ'D * *
* * V37E 41E * *
* * SET ASCP TW TO * *
* * PAD BURN ATT * *
* * DIM LIGHTS FOR * *
* * HORIZ CK * *
* * P41 * *
* * * * *
* * RCS1 HORIZ CK * *
* * HORIZ ~40° ABOVE X * *
* * AXIS AT TIG * *
* * (HDS DN) * *
* * (~2° ABOVE WINDOW * *
* * FRAME) * *
* * INFO ONLY, NOT A * *
* * GNCS GO/NO-GO CK * *
* * * * * * * * *

SHAPING BURN PAD

NOMINAL				PRELIMINARY				FINAL			
N33	HR	+	0 1 6	+				+			
	MIN	+	5 8	+				+			
	SEC	+	2 2 0 0	+				+			
N81	ΔVX	-	2 4 8 4								
	ΔVY	+	0 0 0 0								
	ΔVZ	+	0 7 1 7								
N22	R	+	3 5 9 0 0	+		0 0		+		0 0	
	P	+	1 8 3 0 0	+		0 0		+		0 0	
	Y	+	3 5 9 0 0	+		0 0		+		0 0	
	ΔVC		2 4 4 1								
	BT		0 0 1 1								
	ΔV70		3 0 2 0								
ULLAGE: 1 4 SECS 4 QUADS				ULLAGE: SECS QUADS							
N47	WT	+	2 8 8 9 2	+				+			
N48	PT	+	1 5 9								
	YT	+	0 5 4								

SPS BURN STATUS

ΔTIG					
AFTER TRIM					
ΔVC					
FDAI (IF ATTITUDE NOT NOMINAL)	R	+			
	P	+			
	Y	+			
N85 (IF VG > .2)	VGX		0 0		
	VGY		0 0		
	VGZ		0 0		
TRANSMIT N81 APPLIED					

SHAPING BURN TABLE

P OR Y RATES	ATT DEVIATION	CO TIME	SITUATION & VG	COMPLETION RULE
+5°/SEC TAKEOVER COMPLETE	+5° TAKEOVER COMPLETE	@BT +1 SEC	>22	RESTART SPS SCS
			NO RESTART & >100	DO RCS1 AT NEXT HA
			NO RESTART & <100	TRIM VGX & VGZ TO ±.2
			<22 TO OVERBURN	TRIM VGX & VGZ TO ±.2

NOMINAL

NOMINAL

18+00

(11112)
(01111)

30:00

18+10

18+20

18+30

P52 (OPT 3)
(02, 04, 06) (RECORD)

P00
 *IF >1.5°/HR: * * *
 * RECYCLE P52 *
 *IF CONFIRMED:
 * USE SCS FOR EMS*
 * ENTRY *
 * * * * *

GDC ALIGN

* IF BMAG 2 >10°/HR/AXIS* * * * *
 * END SCS DRIFT CK (BMAG 1); PERFORM *
 * GDC/IMU COMPARISON CK LIST (Pg E/4-6)*
 * * * * *

* * IF RCS SHAPING REQ'D AT NEXT HA * * *
 * CYCLE CMC MODE SWITCH - FREE - AUTO *
 * (RECENTERS DBD)
 * V48E, LOAD .5° DBD (11102), LOAD N47 *
 * FROM RCS SHAPING BURN PAD (Pg E/4-7)*

* P30, LOAD N33 AND N81 FROM
 * RCS SHAPING BURN PAD (Pg E/4-7)

* P00
 * V49E, MNVR TO RCS SHAPING
 * BURN PAD ATT (Pg E/4-7)

* P52 (OPT 3) (__, __) AUTO OPTICS TO
 * STAR
 * (LIMIT: SXT FOV, GNCS GO/NO-GO)
 * EXIT 06 92, V37E 41E

* P41

* SHAPING

* P00

* WARNING: WAIT UNTIL COMP ACTY LT - OUT
 * V66E

* V48E, LOAD 5° DBD (11112)

* * * * *

PERFORM PRIMARY AND SECONDARY
 WATER EVAP ACTIVATION (Pg E/4-7)

SET UP CAMERA FOR FIREBALL PHOTOGRAPHY

CM4/DAC/18/CX03 - BRKT, MIR
 (T11, 500, 7) 12 FPS

P52 (OPTION 3)

N71 1ST STAR	X	0	0	0		
N71 2ND STAR	X	0	0	0		
N05(R1) § ERR	X					
N93	X					
GYRO	Y					
TORQUING	Z					
ANGLES						
HR	+	0	0	0		
MIN	+	0	0	0		
SEC	+	0				

BMAG 1 GDC/IMU COMPARISON RESULTS

N20	R					
IMU	P					
	Y					
ASC	R	X	X	X	X	X
tw	GDC	P				
	Y					
DET	ΔT	X	X	X	X	X

(30:00)

RCS SHAPING BURN PAD

PRELIMINARY

FINAL

FINAL UPDATE

N33	HR	+	X	X	X						
	MIN	+	X	X	X						
	SEC	+	X	X	X						
N81	ΔVX		X	X	X						
	ΔVY		X	X	X						
	ΔVZ		X	X	X						
N22	R	+				0	0				
	P	+				0	0				
	Y	+				0	0				
	ΔVC	X	X	X	X						
	BT	X	X	X	X						
	ΔV70	X	X	X	X						
N47	WT	+									

PRIMARY WATER EVAP ACTIVATION

GLY EVAP H2O FLOW - AUTO (VERIFY)
 GLY EVAP STM PRESS - AUTO
 PRI ECS GLY PUMP - ACT (VERIFY)

SEC WATER EVAP ACTIVATION

ECS IND SEL - SEC
 SEC COOL LOOP PUMP - AC2
 SEC EVAP H2O FLOW - AUTO
 GLY DISCH SEC PRESS - 39-51 PSIG
 SEC COOL LOOP EVAP - EVAP
 SEC GLY EVAP OUT TEMP - 38-50.5°F
 SUIT CKT HT EXCH - BYPASS 20 SEC, OFF
 ECS IND SEL - PRIM

BURN STATUS

ΔTIG		X	X				
AFTER TRIM							
FDAI	R	+					
(IF ATTITUDE	P	+					
NOT NOMINAL)	Y	+					
N85	VGX		0	0			
(IF VG >.2)	VGX		0	0			
	VGZ		0	0			

18+30
(11112)
(01111)

PERFORM CM RCS PREHEAT CK LIST (Pg E/4-8)
(DIRECT COILS ARE UTILIZED FOR PREHEATING JETS (20 MIN))

18+40

FINAL STOWAGE
ORDEAL
FDAI (2) - INRTL
PWR - OFF, STOW
(377) GLY TO RAD SEC VLV - BYPASS (CCW) (VERIFY)
ATTACH BOTH STRUT UNLOCK LANYARDS

18+50

PERFORM CM RCS PREHEAT TERMINATION CK LIST (Pg E/4-8)
PERFORM PANEL 8 CB CK
SEE DIAGRAM Pg E/4-8

G
D
S

STDN UPLINK
P27 (SV, SPS2 TARGET LOAD)
DEORBIT BURN PAD (COPY Pg E/4-10)
ENTRY PAD (COPY Pg E/5-1)

19+00

PYRO BAT CK (Pg E/4-8)

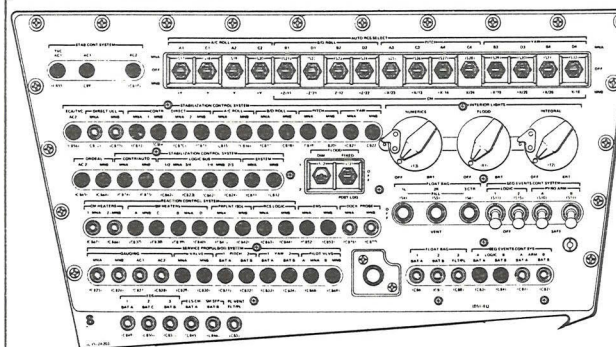
NOMINAL

CM RCS PREHEAT CK LIST

NOTE: DIRECT COILS UTILIZED FOR
PREHEATING JETS (20 MIN)
IF SYS TEST MTR 4B, 5B, 6B, 7B, 8B, &
9B ALL READ 1.5 VDC (40°F) OR MORE,
OMIT PREHEAT:

(CHECKS CM RCS 12, 14, 16, 21,
23, & 25 JET INJECTOR VALVE
TEMPERATURES, RESPECTIVELY)

- (8) CB RCS LOGIC (2) - CLOSE
- (1) CM RCS LOGIC - ON (UP)
(ENERGIZES RCS LOGIC BUS)
- (8) CB CM RCS HTRS (2) - CLOSE
- (101) CM RCS HTRS - ON (UP) (PLT CONFIRM,
MONITOR MANF PRESS FOR PRESS DROP)



PANEL 8

● - CLOSE

○ - OPEN

CM RCS PREHEAT TERMINATION CK LIST

- (101) CM RCS HTRS - OFF (SPT CONFIRM)
- (1) CM RCS LOGIC - OFF
- (8) CB CM RCS HTRS (2) - OPEN

PYRO BAT CK

- (229) CB PYRO BUS A
PYRO BAT A - CLOSE (VERIFY)
CB PYRO BUS B
PYRO BAT B - CLOSE (VERIFY)
DC IND - PYRO BAT A, THEN B
IF PYRO BAT A(B) <31.5 VDC
* (REPLACES FAILED PYRO BAT*
* WITH ENTRY BAT): *
- * CB PYRO BUS A(B) PYRO BAT* *
- * A(B) - OPEN *
- * CB PYRO BUS A(B) BAT BUS *
- * A(B) - CLOSE *
- (275) CB MNA BAT C - CLOSE
CB MNB BAT C - CLOSE (APPLIES
ENTRY BAT C TO BOTH MAIN
BUSES WHEN MN BUS TIE
SWITCHES ARE ON)
DC IND - MNB

NOMINAL

19+00
(11112)
(01111)

T
E
X

PERFORM RSI ALIGNMENT (Pg E/4-9)

19+10

19+20

V
A
N

CM RCS ACTIVATION (Pg E/4-9)

* IF RCS SHAPING DONE AT LAST HA* * * *
* STDN UPDATE *
* DEORBIT BURN PAD (COPY Pg E/4-10) *
* ENTRY PAD (COPY Pg E/5-1) *
* * * * * *

OBTAIN ENTRY CUE CARD AND TEMPORARILY STOW
PLT VERIFY ALL STOWED ITEMS SECURED FOR ENTRY
CDR & PLT (SPT LATER) STRAPPED IN, SEAT PANS LOCKED

19+30

RSI ALIGNMENT

NOTE: RSI ALIGNMENT IS PERFORMED
EVEN IF RSI ALIGNMENT IS CORRECT
IN ORDER TO CHECK OPERATION OF RSI
FDAI SOURCE - ATT SET
ATT SET - GDC
EMS ROLL - ON (UP)
GDC ALIGN PB - PUSH & HOLD
YAW TW - POSITION RSI THRU 45° &
SET TO LIFT UP (HDS DN) OR TO
LIFT DN (HDS UP) ATT PER ENTRY
UPDATE PAD
GDC ALIGN PB - RELEASE
EMS ROLL - OFF
ALIGN GDC TO IMU
FDAI SOURCE - CMC

CM RCS ACTIVATION

CB SECS ARM (2) - CLOSE
CUE STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO
FOR PYRO ARM (IF POSS)
SECS PYRO ARM (2) - ON (UP)
CM RCS PRPLNT 1 & 2
TB (2) - GRAY (VERIFY) (INDI-
CATES FUEL AND OXIDIZER
ISOLATION VALVES OPEN)
CM RCS PRESS - ON (UP)
RCS IND SW - CM1, THEN 2
HE PRESS STABILIZES AT 3750-3850
PSIA AFTER 15 MINUTES
MANF PRESS 287-302 PSIA
SECS PYRO ARM (2) - SAFE

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (PULL)
REPRESS PKG VLV - ON (ASSURES CM O2 SUPPLY
FULL BEFORE CM/SM SEP)
O2 SM SUPPLY VLV - OFF
SURGE TK - ON (VERIFY)
CAB PRESS REL VLV (2) - NORM
(5) CB WASTE H2O/URINE DUMP HTR (2) - OPEN
CB ECS PRIM RAD CONTR MNA/B (2) - OPEN
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN (REMOVES POWER FROM
GLYCOL MIXER TO CONSERVE BATTERY POWER)
ABORT SYS PRPLNT - RCS CMD (VERIFY)

DATE 6/29/73

PAGE E/4-9

NOMINAL

20+00
(11102)
(01111)

V82E, VERIFY HP <38 NM (IF >, CONTINUE BURN UNTIL <)
P00

WARNING: WAIT UNTIL COMP ACTY LT - OUT

V66E (TRANSFERS CSM SV TO OWS SLOTS. DO NOT DO WHEN AVERAGE G IS RUNNING. DO NOT DO UNLESS SATISFIED THAT CSM SV IS GOOD.)

CM RCS CK (Pg E/4-11)

IF BOTH RINGS FAILED

PERFORM ROLLING ENTRY

* CK LIST (Pg E/4-11)*

MOUNT ENTRY CUE CARD

MNVR TO CM/SM SEP & DRPA JETT ATT (ASAP) (CM/SM SEP SHOULD BE

ACCOMPLISHED ASAP AFTER DEORBIT. IF DELAYED TO WITHIN 8 MIN OF EI, RECONTACT MAY OCCUR)

SC CONT - SCS

BMAG MODE (3) - ATT 1/RATE 2

YAW LEFT 45° FROM BURN ATT (315°)

GO TO ENTRY (Pg E/5-1)

20+10

20+20

20+30

CM RCS CK

AUTO RCS SEL A/C ROLL (4) - OFF (VERIFY)
CB RCS LOGIC (2) - CLOSE (VERIFY)
SC CONT - CMC/FREE (CONTROL MAY BE SCS/MIN IMP AT OPTION OF CREW)
RCS TRNFR - CM
AUTO RCS SEL (RING 1) - OFF
AUTO RCS SEL (RING 2) - MNB
TEST RING 2 THRUSTERS (MIN IMP MAY NOT PRODUCE AUDIBLE JET FIRING. MORE THAN ONE CYCLE MAY BE REQ'D TO CLEAR LINES OF RESIDUALS AND ALLOW PROPELLANT TO JETS. IF MIN IMP, USE >1 CYCLE)
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - OFF
TEST RING 1 THRUSTERS
AUTO RCS SEL (RING 2) - MNB
RCS TRNFR - SM

ROLLING ENTRY CK LIST

* BMAG MODE (3) - ATT 1/RATE 2 *
* MAN ATT (3) - RATE CMD (VERIFY) *
* SC CONT - SCS *
* MNVR TO 0°, 0° *
* (PITCH FROM ENTRY PAD REMARKS) *
* DBD/RAIE - MIN/LOW *
* AT RET .05G -90 SEC, JUST *
* BEFORE CM/SM SEP: *
* MAN ATT ROLL - ACCEL CMD *
* ROLL RIGHT ~20°/SEC *
*
* CAUTION: ATT HOLD IN PITCH AND *
* YAW MUST BE MAINTAINED UNTIL *
* CM/SM SEP *

DEORBIT BURN PAD

FINAL UPDATE OR RCS2

N33	HR	+							
	MIN	+							
	SEC	+							
N81	ΔVX								
	ΔVY								
	ΔVZ								
N22	R	+					0	0	
	P	+					0	0	
	Y	+					0	0	
	ΔVC								
	BT								
	ΔV ₇₀								

N47	WT	+							
N48	PT								
	YT								

RCS2 PAD REMARKS

RCS2 TARGET HP = _____ NM

CAPTURE HP = _____ NM

CM RCS PITCH ATTITUDE = _____ °

TIG ~2 MIN HORIZ CK
WINDOW MK= _____

DATE 6/29/73

PAGE E/4-11

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FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON
	16:57 - 19:57	56/265	SEPTEMBER 22, 1973	1893	-49.0	PHASE

UNDOCKING

MCC

PET

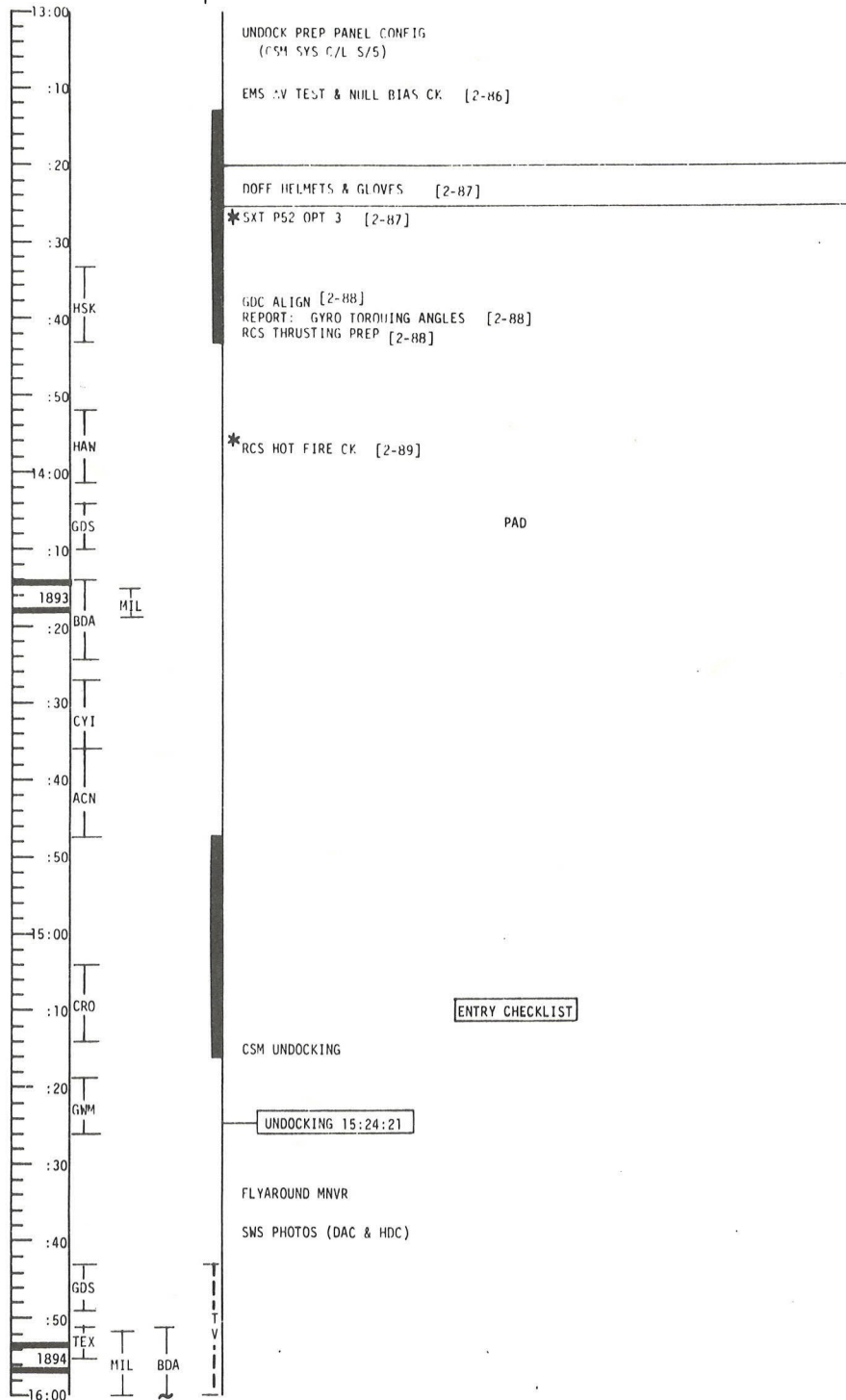
S A V
A T E
A T N
T

CDR

SPT

PLT

RCOR

 A E
 T A X D UN-
 M M P S ATT'D
 1 2 1 1 2 E EXP'S


MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\rightarrow$	MOON	
	19:57-22:57	57/265	SEPTEMBER 22, 1973	1895	-49.0	PHASE	

SEP/SHAPING

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S

MCC

PET

S A V
A T T
A T T

CDR

SPT

PLT

BDA

SEP BURN
P30-EXTERNAL ΔV
P41-RCS THRUSTING

RCS SEPARATION

TIG: 16:11:08
BT: 23.6 SEC
 ΔV : 5: FPS

SPS SHAPING BURN
P30-EXTERNAL ΔV
V49 MNVR TO BURN ATT

IMU CK

P40-SPS THRUSTING

TVC CKS

HORIZ CKS

SPS1 SHAPING

TIG: 16:58:22
BT: 10.9 SEC
 ΔV : 258.5 FPS

LOGIC SEQUENCER CK
MNVR TO S1

DOFF PGA'S & DON COUNTER PRESSURE GARMENTS

EAT PERIOD

GDS

TEX

MIL

1895

UNSTOW & DON MAE WESTS & HEEL RESTRAINTS

P52 OPT 3
(ENTRY ORIENT)

GDC ALIGN

PRI WATER EVAP ACTIVATION
SEC WATER EVAP ACTIVATION
SET UP CAMERA
CM RCS PREHEAT

FINAL STOWAGE

SYSTEMS TEST PANEL CONFIGURATION

TERM CM RCS PREHEAT

PANEL B cb CHECK
REPORT: GYRO TORQUING ANGLES

GDS

UPDATE:
GO/NO-GO FOR
PYRO ARM
RCS1 PAD
(IF REQD)

UPLINK:
CSM S.V
SPS2 TGT LOAD

MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

FLIGHT PLAN

GET	GMT	MD/DOY	HOUSTON DATE	REV	BETA $\downarrow$	MOON PHASE
	22:57 - 00:57	57/266	SEPTEMBER 22, 1973	1896	-49.0	

DEORBIT/ENTRY

RCDR

A E
T A X D UN-
M M P S ATT'D
1 2 1 1 2 E EXP'S

MCC

PET

S A V
A T E
A T N
T

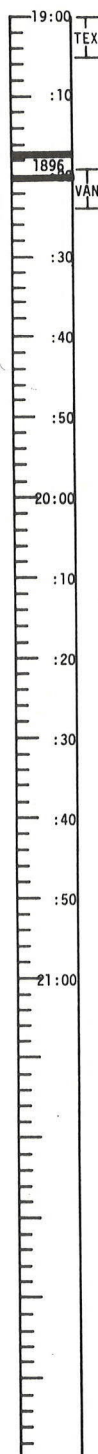
CDR

SPT

PLT

UPDATE:
SPS2 PAD
ENTRY PAD

UPDATE:
RCS2 PAD
& ENTRY PAD
FOR RCS 2
(IF REQD)



PYRO BATT CK
FINAL SCS DRIFT CK
RSI ALIGNMENT

CM RCS ACTIVATION

SPS2 DEORBIT BURN
P30 EXTERNAL ΔV
SEPARATION CK LIST
V49 MNVR TO BURN ATT
IMU CK
P40 - SPS THRUSTING
TVC CKS
HORIZ CKS

SPS2 DEORBIT

TIG: 20:00:00
BT: 7.9 SEC
 ΔV : 191.9 FPS

CM RCS CK
MNVR TO CM/SM SEP & DRPA JETT ATT
P62 - CM/SM SEP & DRPA JETT
PRE-ENTRY MNVR

CM/SM SEP & DRPA JETT

GNCS HORIZ CK
EMS INITIALIZATION
RSI ALIGNMENT
P63 - ENTRY - INIT
HORIZ CK
START EMS
P64 - ENTRY - POST .05G
START DAC
P67 - ENTRY - FINAL PHASE (POST .2G)
DOWN RANGE GNCS GO/NO GO NAV CK
CM RCS CK
CROSS RANGE GNCS GO/NO NAV CK

SPLASHDOWN 20:41

MISSION	EDITION	PUBLICATION DATE
SL-3	FINAL	JULY 14, 1973

FLIGHT PLANNING BRANCH

SOL	A-SOL

ENTRY UPDATE											
AREA	X			+		X			+		
P .05G	+				0 0	+				0 0	
N61 LAT		0					0				
LONG											
RTOGO .05G	+					+					
VIO .05G	+					+					
RET .05G	X	X				X	X				
RET .2G	X	X				X	X				
N66 DRE											
BANK AN	R					R					
RET RB	X	X				X	X				
RET BBO	X	X				X	X				
RET EBO	X	X				X	X				
RET DROG	X	X				X	X				
REMARKS:											
REMARKS:											

ENTRY UPDATE PAD DESCRIPTION

- Revolution number and landing area
- Pitch angle at .05G P .05G)
- Latitude and longitude of splashdown point (LAT, LONG), noun 61 display
- EMS initialization value for range-to-go at .05G (RTOGO .05G)
- EMS initialization value of inertial velocity at .05G (VIO .05G)
- Time to .05G referenced from retroburn (RET .05G)
- Time to .2G referenced from retroburn (RET .2G)
- Downrange error (DRE), noun 66 display
- Bank angle, roll (R) first in specified direction
- Time to bank angle reversal from retroburn (RET RB)
- Time to S-Band blackout from retroburn (RET BBO)
- Time to the end of S-Band blackout from retroburn (RET EBO)
- Time to drogue chute deployment from retroburn (RET DROG)

ENTRY UPDATE												
AREA	X			+		X			+			
P .05G	+			.0	0	+			.0	0		
N61 LAT	☐	0				☐	0					
LONG	☐					☐						
RTOGO .05G	+					+						
VIO .05G	+					+						
RET .05G	X	X		:		X	X		:			
RET .2G	X	X		:		X	X		:			
N66 DRE	☐					☐						
BANK AN	R	☐		/		R	☐		/			
RET RB	X	X		:		X	X		:			
RET BBO	X	X		:		X	X		:			
RET EBO	X	X		:		X	X		:			
RET DROG	X	X		:		X	X		:			
REMARKS: _____												

REMARKS: _____												

ENTRY UPDATE												
AREA	X			+		X			+			
P .05G	+			.0	0	+			.0	0		
N61 LAT	☐	0				☐	0					
LONG	☐					☐						
RTOGO .05G	+					+						
VIO .05G	+					+						
RET .05G	X	X		:		X	X		:			
RET .2G	X	X		:		X	X		:			
N66 DRE	☐					☐						
BANK AN	R	☐		/		R	☐		/			
RET RB	X	X		:		X	X		:			
RET BBO	X	X		:		X	X		:			
RET EBO	X	X		:		X	X		:			
RET DROG	X	X		:		X	X		:			
REMARKS: _____												

REMARKS: _____												

ENTRY

P62 - CM/SM SEP & DRPA JETT & PRE-ENTRY MNVR

1 V37E 62E (AVE G ON)
05 09 01427 - ROLL REVERSED
*05 09 01426 - IMU UNSAT *

2 F 50 25 00041 REQUEST CM/SM SEP

cb SPS P & Y (4) - open
cb ELS/CM-SM SEP (2) - close
cb DOCK RING SEP (2) - close
VHF AM (A & B) - off (ctr)
PRIM GLY TO RAD - BYPASS (verify)
EMS MODE - STBY (verify)
CM RCS LOGIC - on (up)
Cue STDN if in contact
SECS LOGIC (2) - on (up) (verify)
STDN confirm GO for PYRO ARM (if poss)
SECS PYRO ARM (2) - on (up)

MN BUS TIE (2) - on (up) (verify)
CM/SM SEP (2) - on (up)
DOCK RING SEP (2) - on (up)
*If no DRPA JETT, go to backup *
* probe retract procedure, pg E/14-4*
MAN ATT (3) - MIN IMP
BMAG MODE (3) - RATE 2
C/W MODE - CM
RCS TRNFR - CM
CM RCS MANF PRESS - 287-302 psia
CM RCS LOGIC - OFF
Monitor V MNA/B:
If <25vdc go to EMERG POWER DOWN
YAW back to 0°
PRO

CM VHF antennas not available until apex cover jett.

Enables auto RCS transfer at CM/SM SEP.

Pyro bus should remain armed until splashdown because J series ELS pushbuttons are not single point failures.

Backup to auto transfer.

If SC CONT is CMC/AUTO, entry DAP will control spacecraft.

3 F 06 61 IMPACT LAT, LONG, LIFT UP/DN (-/+)
(.01°, ±00001)

Verify LAT, LONG from PAD
Load R3 = -1 (lift up); +1 (lift dn)
PRO

EMS INITIALIZATION

EMS FUNC - TEST 5
Verify scroll on 37K fps
EMS FUNC - RNG SET
Set RNG to PAD DATA RTGO
EMS FUNC - Vo SET
Slew scroll to PAD DATA VIO
EMS MODE - STBY (verify)
EMS FUNC - ENTRY
Verify .05G lt filter is down

RSI ALIGNMENT

Verify correct RSI alignment
lift up = 0°
lift dn = 180°

SCS control is maintained because ENTRY DAP mnvr
rate is 4°/sec.

Removing filter improves visibility of .05G lt.

GNCS HORIZ CK

Dim lights to dark adapt eyes for
horiz ck

If lift up (SPS1 + SPS2, or

4 quad compl, or

poss SPS1 + RCS2)

R____(0°) lift up

P____(035°)

Y____(0°)

After sep, fly to pad
entry att

```
*****
*If lift dn (RCS1 + RCS2, or *
* hybrid, or 2 & 3 quad compl *
* (VG >22), or poss SPS1 + RCS2)*
* R____(180°) lift dn *
* P____(XXX°) *
* Y____(0°) *
* After sep, track horiz *
* on 9° window mk *
*****
```

5 POSS 06 22 FINAL ATT DISP, RPY (.01°)
(Only if angle of attack >45°)

P63 - ENTRY - INIT

6 06 64 G,VI,RTOGO (.01G,fps,.1nm)
 FDAI SCALE - 5/5
 RHC PWR DIRECT #2 - MNA/B (verify)
 TAPE RCDR - HBR/RCD/FWD/CMD RESET

CMC entry pitch att is indicated by pitch error
 needle. Spacecraft BEF capture envelope is
 P $\pm 40^\circ$, Y $\pm 60^\circ$. Horiz ck ensures good IMU.

RET .05G
 -1 min

GNCS HORIZ CKIf lift up

At RET .05G -1 min, ck horiz
 on 33° window mk (Limit:
 $\pm 5^\circ$, GNCS GO/NO-GO)
 If GO, continue hold
 pad entry att
 If NO-GO, track horiz
 * on 29° window mk *
 Hold lift up to .2G

RET .05G
 (+0__:_)
 (__:__:_)

EMS MODE - BACKUP/VHF RNG
 (.05G 1t - on)
 .05G sw - on (up)
 EMS ROLL - on (up)

EMS is started manually at RET .05G to ensure
 start of range counter at a fixed position
 (range from target) as defined by RTCC.

GNCS HORIZ CKIf lift dn

 *At RET .05G, compare IMU *
 * with pad entry att *
 * (Limit: $\pm 5^\circ$, GNCS GO/NO-GO) *
 * Whether GO *or NO-GO*, *
 * continue track horiz on *
 * 9° window mk *
 *Hold lift dn to 1G *

P64 - ENTRY - POST .05G

7 06 74 BETA,VI,G (.01°,fps,.01G)
Start DAC

RET .2G
(+0__:_)

P67 - ENTRY - FINAL PHASE (POST .2G)

8 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°, .1nm)
(+ is north & long)

DOWN RANGE GNCS GO/NO-GO NAV CK:

KEY VERB

Record DNRNG ERR _____ PAD _____

KEY RLSE

(Limit: +70 nm (lift up) or +120 nm
(lift dn), GNCS GO/NO-GO)

1ST CROSS RANGE GNCS GO/NO-GO NAV CK

If initial BETA direction not same
as PAD, GNCS is NO-GO

*If GNCS NO-GO: *

* Fly EMS (see below)*

MAN ATT (3) - RATE CMD

GNCS suspicious if CMC program change from P63
to P64 is >+15 sec from RET .05G.

0° BETA is possible prior to P67.
Fireball photography.

Other dispays for monitoring entry:
N74 BETA,VI,G (.01°,fps,.01G)
N64 G,VI,RTOGO (.01G,fps,.1nm)

The G meter can be used as a third vote
in the event of a discrepancy
between CMC (N74 or N64) G and EMS G.

Beta should be positive for targets north of track
and negative for targets south of track.

At .2G (lift up) or 1G (lift dn)

If GNCS is GO:

SC CONT - CMC/AUTO

*If DAP NO-GO: *

* SC CONT - SCS*

* Fly BETA *

*If GNCS NO-GO:

* Fly EMS

* Go to PAD BACKUP BANK AN at .2G

* Reverse bank at RET RB

* At 800 nm scroll line

* If RTOGO <500 nm, roll toward 90°

* If RTOGO >600 nm, roll toward 0°

* Fly to get RTOGO convergence between

* 300 nm and 200 nm scroll lines

* At 4000 fps for nom tgt, 16 nm at 2.7G*

* If RTOGO >16 nm, fly toward lift up *

* If RTOGO <16 nm, fly toward lift dn *

*If GNCS & EMS NO-GO: *

* Fly PAD bank/reverse bank*

CM RCS CK

RCS IND - CM 1, 2

*If both RCS rings *

* He pressure <2000 psia:*

* Roll right ~20°/sec *

Lift up to .2G then roll right from 0°
(lift vector N) to pad BANK AN

Lift up to .2G then roll left from 0°
(lift vector S) to pad BANK AN

Lift dn to 1G then roll left from 180°
(lift vector N) to pad BANK AN

Lift dn to 1G then roll right from 180°
(lift vector S) to pad BANK AN

He source pressure for a guided entry: below 2000 psia (up from 1650 psia on Apollo) go ballistic. This is based on 26 lbs of RCS in each ring with a He bottle temperature of 50°F prior to arming the RCS. The 2000 psia figure increases to 2150 psia at 70°F.

RET RB
-1 min
(+0__:__)

2ND CROSS RANGE GNCS GO/NO-GO NAV CK:

If BETA reverses earlier than 1 min
before PAD RET RB, GNCS is NO-GO.

*If GNCS NO-GO: *

* Fly EMS (see above)*

RET
90K' (__:__)
(3)

STEAM PRESS - pegged at ~90K'
S BD NORM PWR AMPL - HI (verify)

Start Watch
(00:00)

9 F 16 67 RTOGO, LAT, LONG (Vrel=1000fps) (.1nm, .01°)

SC CONT - SCS

RTOGO NEG (R1) - LIFT UP

RTOGO POS (R1) - LIFT DN

Monitor altimeter

Stop DAC

DAC - T8

Go to EARTH/POST LANDING, pg E/6-1

RET is time to event referenced from retroburn.

Watch is used as a backup altimeter and gives an approximate time to expect cabin pressure increasing and cabin pressure = 10 psia, which are valid cues for drogue deploy and main deploy, respectively.

This last bit of ranging must be done manually.

ENTRY DAP maintains last command after

Vrel = 1000 fps.

f-stop for parachute photography.

EARTH/POST LANDING

RET	Watch
50K' (__:__) CABIN PRESS REL vlv (2) - BOOST/ENTRY (00:50)	
SECS PYRO ARM (2) - on (up) (verify)	
Check altimeter	
40K' (__:__) *If CM unstable: * (01:04)	
* RCS CMD - OFF *	
* 40K' APEX COVER JETT pb - push *	
* DROGUE DEPLOY pb - push *	
* (2 sec after apex cover jett)*	
30K' ELS LOGIC - on (up) (01:23)	
ELS - AUTO	
24K' (__:__) RCS disable (auto)	Start DAC
(May be 23K') *RCS CMD - OFF* (01:36)	
Apex cover jett (auto)	
APEX COVER JETT pb - push	
(Wait 2 sec)	
Drogue parachutes deployed (auto)	
DROGUE DEPLOY pb - push	
*If both drogues fail: *	
* ELS - MAN *	
* Stabilize CM (direct RCS)*	
* 5K' MAIN DPLY pb - push *	
* ELS - AUTO *	
23.5K' Cabin pressure increasing	
*If not increasing by 17K': *	
* CABIN PRESS REL vlv (RH) - DUMP*	
CM RCS PRPLNT (2) - OFF	
10K' (__:__) Main chutes deployed (drogues +46 sec) (02:22)	
(Cab Press MAIN DEPLOY pb - push	
= 10 psia)	

Arms ELS baro switches.

Parachute photography.

Drogue failure results in CM velocity too great for main chute deploy at 10K'. Increased drag will slow CM to acceptable velocity for main chute deploy at 5K'.

Cabin pressure increasing via BOOST/ENTRY position of PRESS REL vlv is an accurate indication of 23.5K'. If still no increase, assuming a valid altimeter, use side hatch dump valve to equalize pressure. Closes propellant isolation valves.

EARTH/POST
LANDING

VHF ANT - RECY
VHF AM A - SIMPLEX

VHF BCN - ON

Record LAT _____, LONG _____,
& voice to REC'Y at 10K'

Record EMS RTOGO _____

EMS - OFF/STBY

CABIN PRESS REL vlv (2) - DUMP

Stow DAC

STRUT LOCKS (4) - UNLOCK

*If night landing:

* cb FLOAT BAG #3, FLT/PL (1) - close*

* PL BCN LT - LO *

(5) cb FLT & PL BUS BAT A, B, & C (3) - close

cb FLT & PL BUS MNA & B (2) - open

cb BAT RLY BUS (2) - open

(8) cb SPS P & Y (4) - open (verify)

ELS - AUTO (verify)

ELS LOGIC - on (up) (verify)

FLOOD LTS - POST LDG

800'

CAB PRESS RELF vlv (2) - CLOSE (latch off)

DIRECT O2 vlv - OPEN (CCW) (if suited)

MN BUS TIE (2) - OFF

STABILIZATION AFTER LANDING

(229) cb MAIN REL PYRO (2) - close

MAIN RELEASE - on (up)

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

If no contact with recovery forces:

* VHF AM A & B - off (ctr) *

* VHF AM RCV ONLY - A *

(8) cb PL VENT - close

cb FLOAT BAG (3) - close

(278) cb UPRIGHT SYS COMPRESS (2) - close

If Stable II:

FLOAT BAG (3) - FILL till 2 min after

upright, then OFF

VHF AM A/B & BCN - OFF while inverted

If Stable I:

After 10 min cooling period,

FLOAT BAG (3) - FILL 7 min, then OFF

If B-SIMPLEX or A-DUPLEX req'd, turn beacon off during comm.

Allows pressure to equalize more rapidly than BOOST/ENTRY position of valve.

Beacon is powered through FLOAT BAG #3 circuit breaker. HI position reduces lifetime from 24 hrs to 4 hrs.

ELS AUTO & ELS LOGIC must be on for at least 14 sec after drogue deploy to enable MAIN RELEASE switch. Total on-time must be less than 14 hrs (power limitation) per 72 hr profile.

Prevents water from entering CM.

Last function that requires pyro power.

Wait 15 minutes before running compressors again.

POST STABILIZATION AND VENTILATION

PL BCN LT - BCN LT LOW (night landing)

PL VENT vlv - UNLOCK (pull into detent)

Remove PL VENT exh cover

PL VENT - HIGH or LOW

*If fan frozen

* PL VENT - LOW

* cb PL VENT - open

If attitude switch failure, to operate PLV

* PLV - OPEN

* PL VENT - OFF

* PL VENT - LOW

Pressurize counter pressure garments to 175
± 5.0 mm Hg

If dye marker req'd:

PL DYE MARKER - ON (by request)

Release restraints

(275) cb MNA BAT BUS A & BAT C (2) - open

cb MNB BAT BUS B & BAT C (2) - open

(5) cb FLT & PL BUS BAT C - open

(229) cb PYRO BUS A PYRO BAT A - open

cb PYRO BUS B PYRO BAT B - open

Verify BAT BUS voltage ≥27.5 vdc

*If <27.5 vdc

* cb FLT & PL BUS BAT C (1) - close

* cb FLT & PL BUS BAT A & B (2) - open*

* Go to LOW POWER CHECKLIST, Pg E/6-10*

Unstow and install PLV DISTRIB DUCT (3)

Deploy grappling hook and line if req'd (by
request)

Place to HI position on request of recovery aircraft.
Maximum of 5 minutes HI mode operation at any one time.

PL fan can operate in HIGH for 12 hrs maximum. If
RCS fumes noted, close PLV. If fumes persist,
prepare to egress immediately.

Initially opens PLV valves.

Closes PLV valves.

Reopens valves.

Inflate for helicopter recovery.

Do not inflate for shipboard recovery.

Battery C and pyro batteries held in reserve for use
after depletion of battery A & B charge.

POST LANDING COMMUNICATIONS

VHF ANT - RECY (verify)

VHF BCN - ON (verify)

If no contact with recovery forces:

* Perform VHF BEACON check *

MONITOR VHF BEACON transmission with

VHF AM B Rcvr and/or Survival Trncvr (VOICE)

If VHF BEACON not operating or after 24 hrs

* of S/C BCN operation: *

* Connect Survival Trncvr cable conn *

* J1 to bcu ant cable conn P112 behind *

* ant access pnl and place radio in BCN *

* mode *

If shipboard recovery, go to Pg E/6-5

If helicopter recovery, go to Pg E/6-6

If supine recovery, go to Pg E/6-7

*If unaided egress, go to Pg E/6-7 *

Use tool E to open VHF antenna access panel.

Use tool F to loosen connector P112.

SHIPBOARD EGRESS & POWERDOWN

Perform blood pressure check

Check hatch GN2 pressure gauge

If in green:

GN2 vlv HNDL - DEPRESS (push)

GN2 vlv HNDL - Neutral (detent)

Check pressure gauge (mid-white)

Repeat press/vent to obtain mid-white

If not green:

Charge hatch counterbalance

GN2 vlv HNDL - PRESS (push)

GN2 vlv HNDL - Neutral (detent)

Check pressure gauge (mid-white)

Repeat press/vent to obtain mid-white

Inform recovery you are ready for egress

(15) PL VENT - OFF

(5) cb FLT/PL BUS BAT C (1) - open

cb BAT CHRG BAT C/EDS 2 (1) - open

cb PANEL 275 (all) - open

*If required - open side hatch *

* GEAR BOX SEL - UNLATCH *

* ACTR HNDL SEL - UNLATCH *

* LOCK PIN REL KNOB - UNLOCK *

* Operate ratchet handle until hatch open *

* Verify hatch overcenter lock engaged *

* ACTR HNDL SEL - M *

Do not inflate counter pressure garment.

Recovery will keep you informed of retrieval status.
CM will remain powered up for comm until immediately prior to egress.

Stay strapped in couch for retrieval.

When CM on ship perform blood pressure check.

Wait until CM dolly is stationary before unstrapping for check.

Recovery will be active on opening hatch.

Counterbalance vented to mid-white range to assist in securing hatch after crew egress.

Operate GN2 bottle ratchet handle until handle hits hard stop.

Counterbalance pressurized to mid-white range to assist in securing side hatch after crew egress.

HELICOPTER EGRESS & POWERDOWN

Check hatch GN2 pressure gauge

If in green:

GN2 vlv HNDL - DEPRESS (push)

GN2 vlv HNDL - Neutral (detent)

Check pressure gauge (mid-white)

Repeat press/vent to obtain mid-white

If not in green:

Charge hatch counterbalance

GN2 vlv HNDL - PRESS (push)

GN2 vlv HNDL - Neutral (detent)

Check pressure gauge (mid-white)

Repeat press/vent to obtain mid-white

Inform swimmer you are ready for equipment bag.

Receive equipment bag

Close hatch

GEAR BOX SEL - LATCH

ACTR HNDL SEL - LATCH

Overcenter Lock - Disengage

Operate ratchet handle until hatch locked

ACTR HNDL SEL - N

Tape Tempscribe to X-X foot strut

Don LPU's

(15) PL VENT - OFF

PL BCN LT - LOW (verify)

(3) VHF AM A/B - OFF

VHF BCN - ON (verify)

(6,9,10) VHF AM - OFF

Inform swimmer you are ready for egress.

Egress, inflate LPU when out of hatch

Inflate counter pressure garments.

CM VHF - BCN and BCN LT will remain on to aid in maintaining visual/radio acquisition after crew egress. Swimmer will be active on opening hatch. Swimmer will hand in equipment bag containing Life Preserver Units (LPU), Tempscribe temperature recorder, and tape.

Crew is active on closing hatch; swimmers will assist.

Counterbalance vented to mid-white to assist in securing hatch after crew egress.

Operate GN2 bottle ratchet handle until handle hits hard stop.

Counterbalance pressurized to mid-white range to assist in securing side hatch after crew egress. Knock on hatch window. Swimmer will open hatch.

Use D Ring to disengage lock.

If night landing.

Knock on hatch window. Swimmer will open hatch.

*SUPINE EGRESS & POWERDOWN

*
*
*
*
* Swimmer will open hatch and unstrap center*
* couch crewman *
* Swimmer will place helmet with goggles on *
* center crewman *
* Center crewman will be egressed *
* Swimmer will enter CM and hatch will be *
* closed *
* Swimmer inside CM will unstrap side couch *
* crewmen; place helmet and goggles on *
* crewmen *
* Side couch crewmen will then be egressed, *
* one at a time *

3 CREWMEN UNAIDED EGRESS PROCEDURES

*If no ventilation or CM O2 supply *
* If Stable I, open side hatch as req'd*
* If Stable II, initiate egress within *
* 2-1/2 hrs *

CM will remain powered up.
Crew will assist to greatest extent possible.
Procedure assumes no crew assistance.
Swimmer/Recovery personnel will be active on
opening/closing hatch.

STABLE I

- (F2) Disconnect umbilicals
Neck dams on (if suited)
Configure center couch to 0°
Armrests stowed
Check hatch GN2 pressure gauge
If in green:
GN2 vlv HNDL - DEPRESS (push)
GN2 vlv HNDL - Neutral (detent)
Check pressure gauge (mid-white)
Repeat press/vent to obtain mid-white
If not in green:
Charge hatch counterbalance

GN2 vlv HNDL - PRESS (push)
GN2 vlv HNDL - Neutral (detent)
Check pressure gauge (mid-white)
Repeat press/vent to obtain mid-white
- (R4) Unstow rucksacks #1 & #2
Connect lanyards
(yellow to rucksack, green to S/C, white to crew, in order of egress printed on lanyards)
- (15) PL VENT - OFF
(5) cb FLT/PL BUS BAT C (1) - open (verify)
cb BAT CHRG BAT C/EDS 2 (1) - open
cb PANEL 275 (all) - open
Open side hatch
GEAR BOX SEL - UNLATCH
ACTR HNDL SEL - UNLATCH
LOCK PIN REL KNOB - UNLOCK
Operate ratchet handle until hatch opens
Verify hatch overcenter lock engaged
ACTR HNDL SEL - N
Remove raft from rucksack #2
Throw life raft overboard and inflate
Transfer to life raft with rucksack 1

CAUTION: Inflate life vests and egress in order designated on white lanyards.

Last man out disconnect green lanyard from head strut. Attach lanyard to sea anchor attach fitting on CM

Counterbalance vented to mid-white to enable closing it after egress.

Operate GN2 bottle ratchet handle until handle hits hard stop.

Counterbalance pressurized to mid-white to enable closing it after egress.

STABLE II

- (F2) Disconnect umbilicals
Neck dams on (if suited)
Configure center couch to 0°
Armrests stowed
- (6,9,10) PWR (3) - OFF
SUIT PWR (3) - OFF
- (R3)(R4) Unstow rucksacks 1 & 2
Attach yellow lanyards from rucksack 2 to 1
Reposition umbilicals to clear tunnel area
Review tunnel hatch handle location and hatch
unlocking procedure
PRESS EQUAL vlv - OPEN
NOTE: Tunnel will fill with water
- (F2) Remove and stow tunnel hatch on F2
Connect lanyards from rucksack 2 (green to
foot strut, white to crewmen in order of
egress printed on lanyards

Egress Procedure: Face LEB, verify lanyard routing, exit feet first, first man carrying rucksack. When clear of S/C inflate life vest and board raft.

CAUTION: Egress in order designated on white lanyards.

1st - Before egress lower rucksack 1 thru man tunnel. Carry rucksack 2 out.
out After egress inflate raft, retrieve rucksack 1.

2nd - Egress

3rd - Before egress disconnect green lanyard from foot strut. After egress attach green lanyard to sea anchor attach fitting on CM.

Pull detent knob on end of handle, then pivot up 90°. Rotate crank ~3 turns CCW to fully open valve. This will flood tunnel prior to opening hatch.

LOW POWER CHECKLIST

VHF BCN - OFF

VHF AM (3) - RCV

FLOOD LTS - OFF

VHF AM A & B - off (ctr)

VHF AM RCV ONLY - A (verify)

POST LANDING VENT SYS: minimize use

SURV RADIO - plug into VHF BCN ANT cable

conn P112 behind VHF ant access pnl &

turn radio on in BCN mode

*If BAT C <27.5 vdc:

* cb BAT BUS A BAT A - open *

* cb BAT BUS A PYRO BAT A - close *

* cb FLT/PL BUS BAT A - close *

* cb FLT/PL BUS BAT C - open (verify)*

* Monitor PYRO BAT A voltage *

* on BAT BUS A *

*If PYRO BAT A <27.5 vdc:

* cb BAT BUS B BAT B - open *

* cb BAT BUS B PYRO BAT B - close *

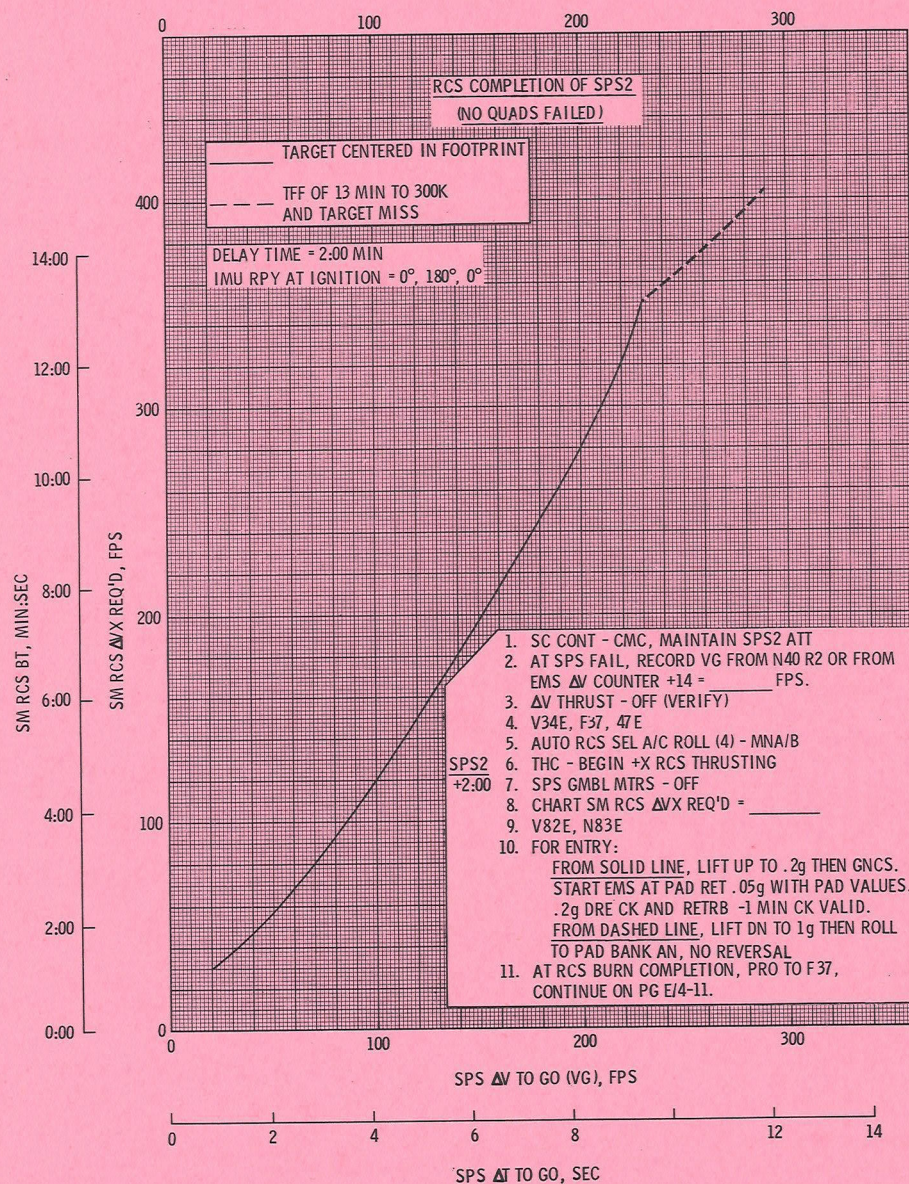
* cb FLT/PL BUS BAT B - close *

* cb FLT/PL BUS BAT A - open *

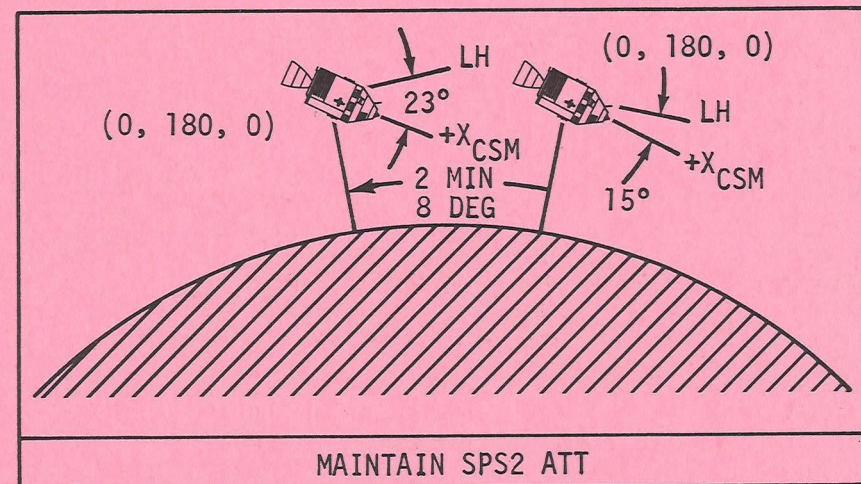
* Monitor PYRO BAT B voltage *

* on BAT BUS B *

Five minutes of PLV operation every hour to scrub cabin of CO2.



±X SM RCS BURN LIMIT IS 40 MIN



Option:

Use of P47 is specified, but if desired, a four quad completion burn can be made by monitoring P40 (V16 N85).

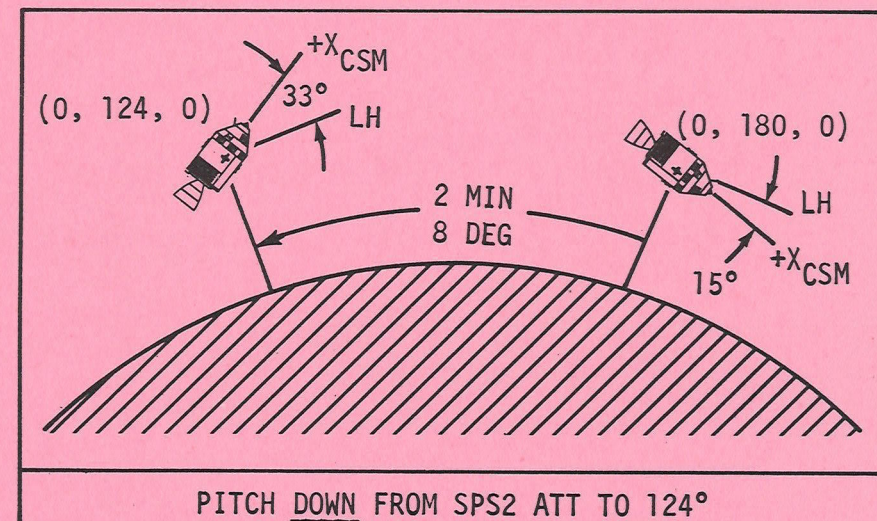
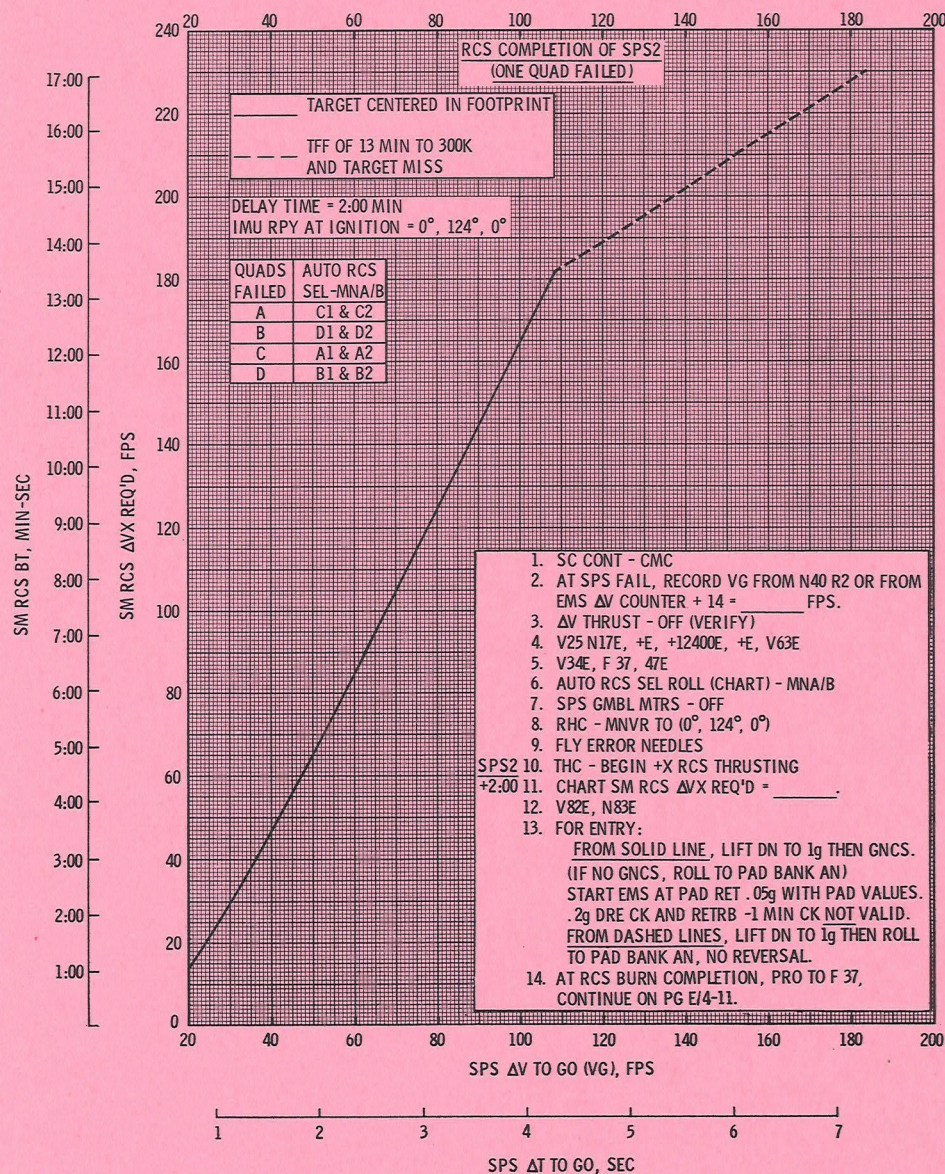
Procedure:

ENTR from F 99 40 to F 16 85, omit step 4, and burn SM RCS $\Delta V X$ REQ'D.

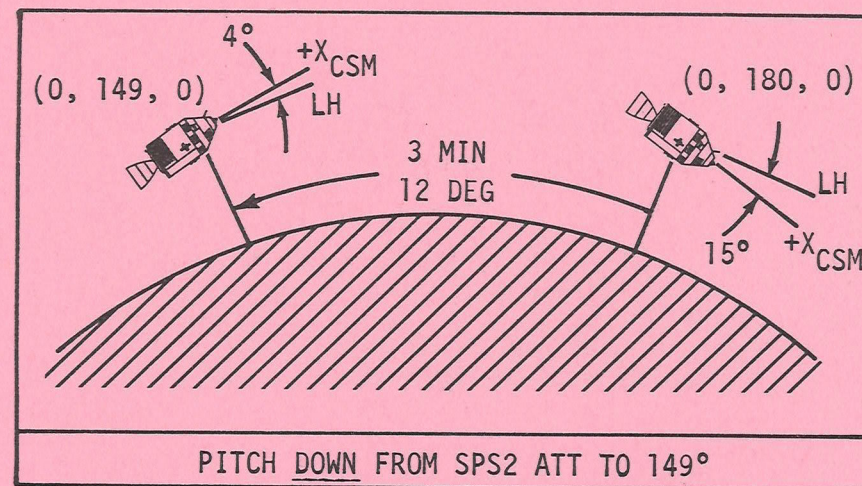
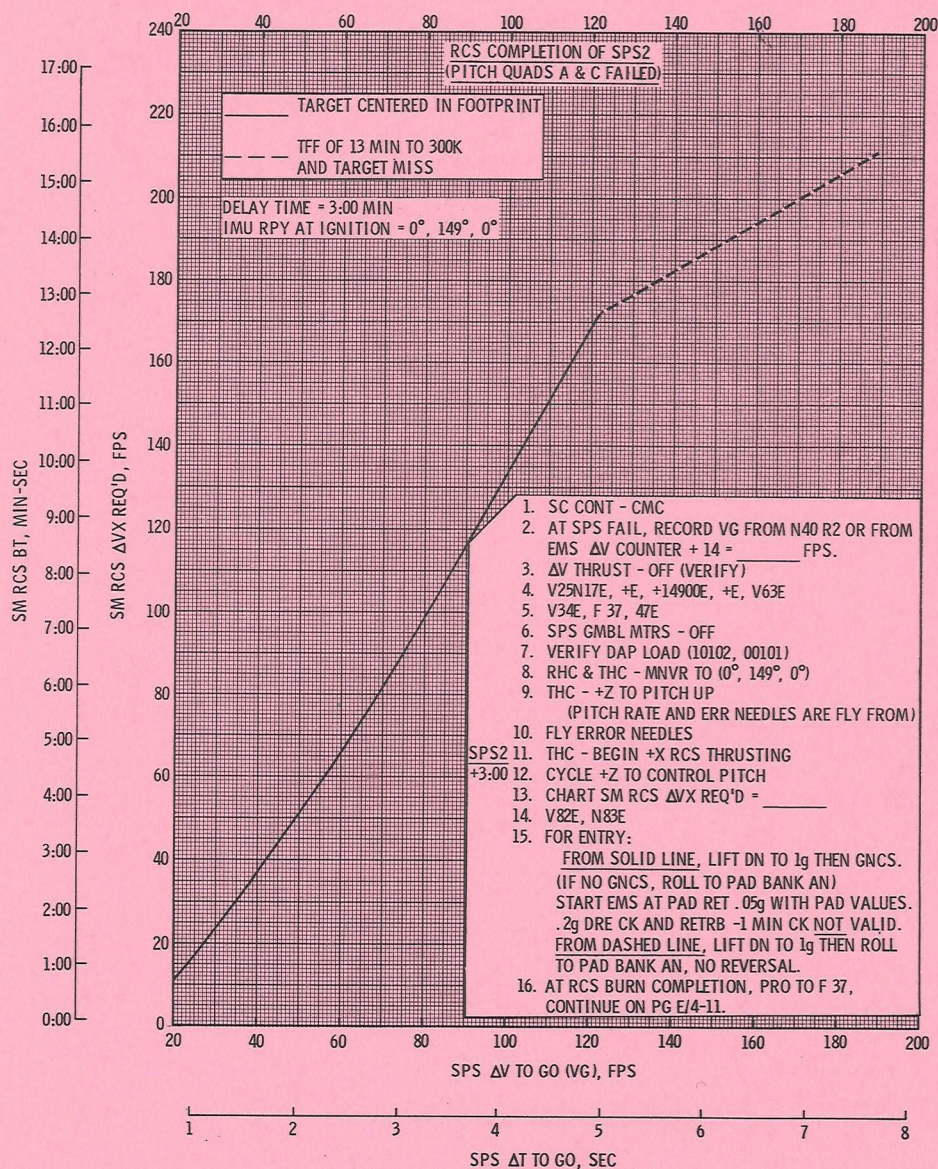
Equation:

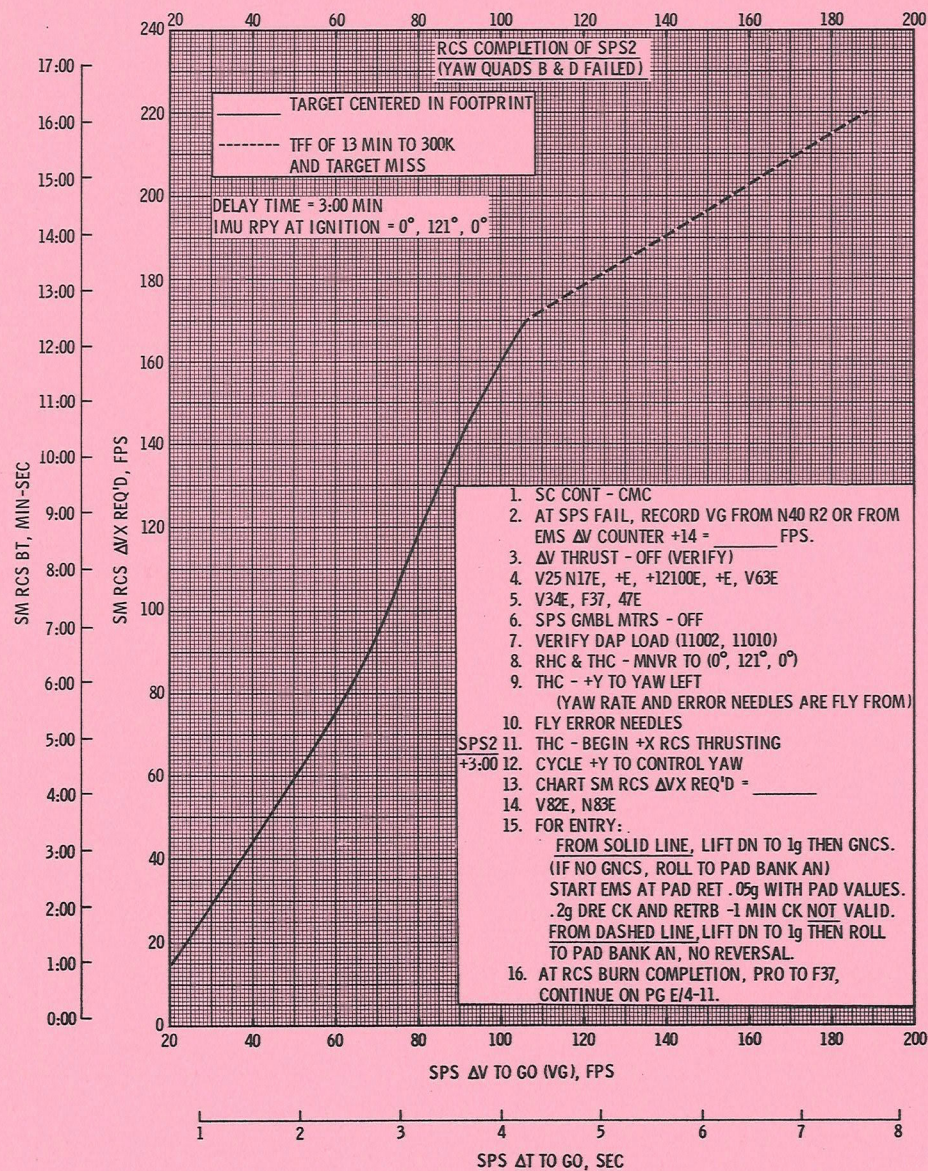
$$\Delta V (R1 \text{ FINAL}) = \Delta V (R1 \text{ INITIAL}) - \text{CHART } \Delta V X \text{ REQ'D}$$

±X SM RCS BURN LIMIT IS 40 MIN

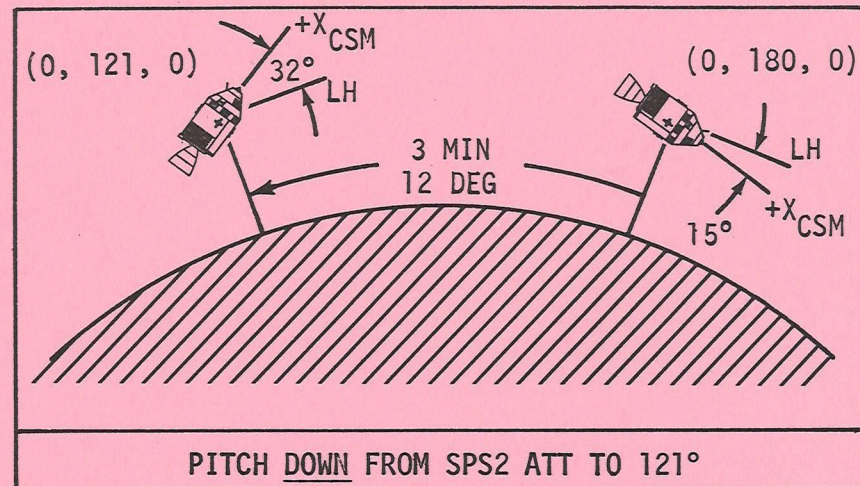


±X SM RCS BURN LIMIT IS 40 MIN

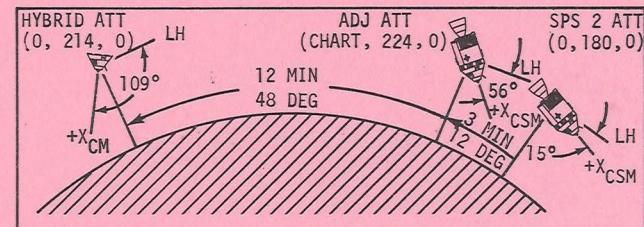
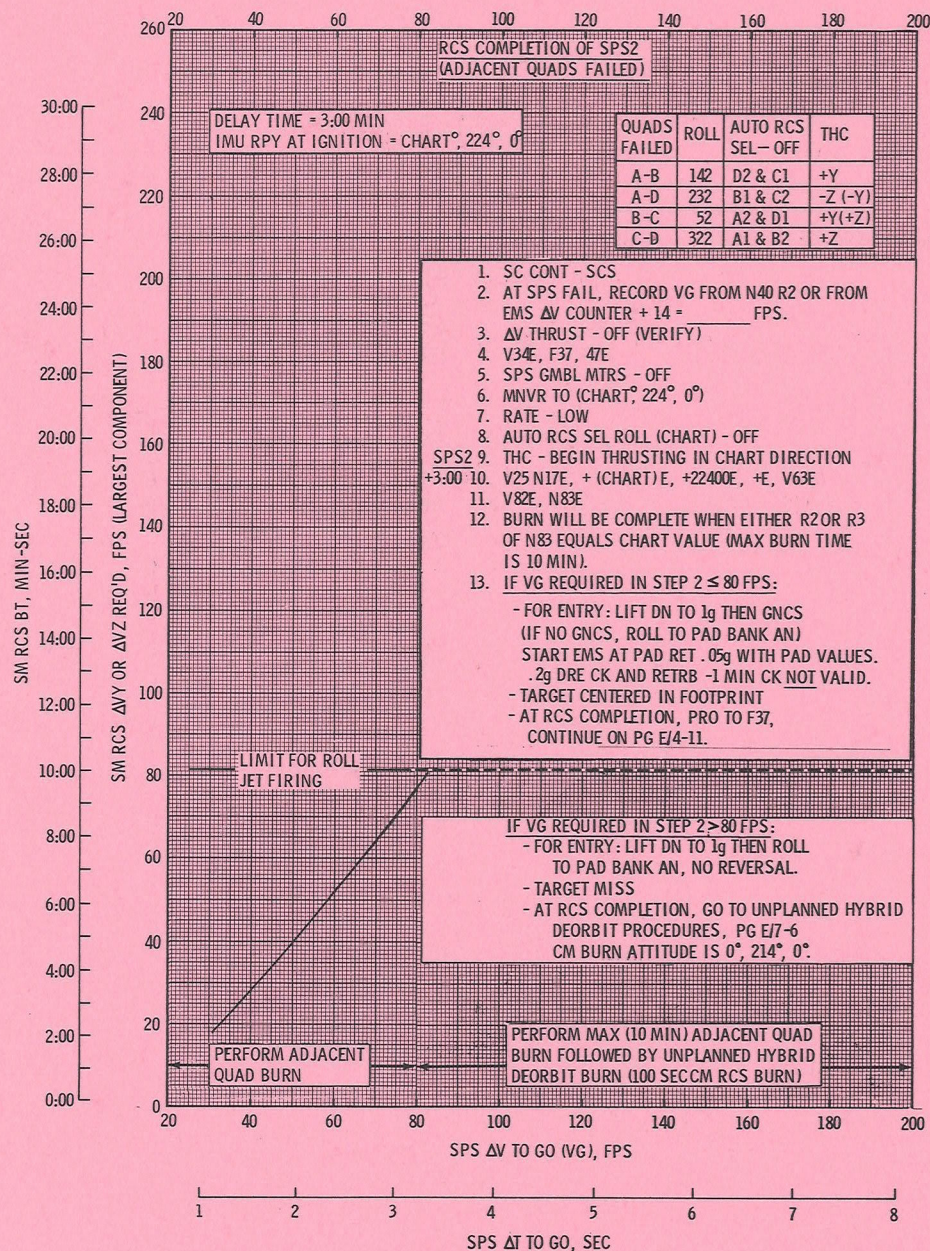




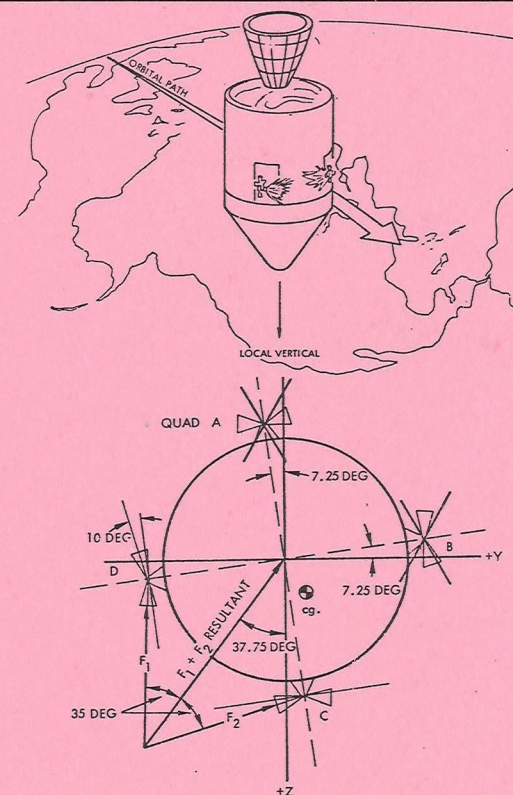
±X SM RCS BURN LIMIT IS 40 MIN



SM RCS ROLL JET THERMAL BURN LIMIT IS 10 MIN



FOR ADJ QUAD BURN, PITCH UP FROM SPS2 ATT
TO 224° AND ROLL TO CHART ATT
FOR HYBRID BURN, PITCH UP FROM ADJ QUAD BURN
ATT TO 214° AND ROLL TO 0°



EXAMPLE USES COMBINED +Y, -Z TRANSLATION
FOR QUADS A AND B DISABLED

HORIZONTAL RETRO
THRUSTING MODE
{ X-AXIS ALONG LOCAL VERTICAL
SC ROLLED SO $F_1 + F_2$ RESULTANT OPPOSES
SPACECRAFT VELOCITY VECTOR

UNPLANNED HYBRID RCS DEORBIT BURN (COMING FROM Pg E/7-5)

1

↑

V25 N17E (.01°)

OE, 21400E, OE

SECS LOGIC (2) - on (up) (verify)

SECS PYRO ARM (2) - on (up)

CM RCS LOGIC - on (up)

PRIM GLY TO RAD - BYPASS (verify)

MN BUS TIE (2) - on (up) (verify)

RHC PWR NORMAL #1 - AC/DC

RHC PWR DIRECT #1 - MNA/B

RHC PWR #1 - ARMED

RATE - HIGH

AUTO RCS SEL (12) - ON

(A/C ROLL (4) - OFF)

cb ELS/CM-SM SEP (2) - close

cb DOCK RING SEP (2) - close

CM/SM SEP (2) - on (up)

DOCK RING SEP (2) - on (up)

MAN ATT PITCH - ACCEL CMD

V63E (N17, CM burn att)

C/W MODE - CM

RCS TRNFR - CM

Monitor V MNA/B:

If <25 vdc, go to EMERG POWER DOWN

MNVR TO CM BURN ATT (NULL ERR NEEDLES)

(~110° >SM BURN ATT)

CM RCS LOGIC - OFF

↓

2 MIN
OR ASAP

2

CM RCS BURN (canned 100 sec burn)

FDAI SCALE - 5/5

RESET DET & COUNT UP

RHC #1 - Continuous pitch-down for 100 sec

RHC #2 - Modulate pitch

to null needles

*If only 1 RHC *

* Pulse +P = 5° from retro att* *

* Maintain rates <3°/sec *

F 16 44 HA,HP,TFF (.1nm,min-sec)

Check capture HP <38 nm:

If >, continue burn until <

Check CM RCS He TK PRESS:

RCS IND sel - CM1, CM2

If both rings <2000 psia:

* NO-GO for guided entry *

* (Go ballistic) *

PRO

3 F 16 83 VGX,Y,Z (.1fps)

PRO

EMS - OFF/STBY

MAN ATT (3) - MIN IMP

RHC #1 - LOCKED

RHC PWR NORMAL #1 - OFF

RHC PWR DIRECT #1 & #2 - OFF

THC - LOCKED

THC PWR - OFF

BMAG MODE (3) - RATE 2

cb DIRECT ULLAGE (2) - open

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

4 F 37 00E

WARNING: Wait until
COMP ACTY 1t - out

5 V66E

6 Configure CM RCS
for single-ring entry

Go to ENTRY, pg E/5-1

MANEUVER UPDATE (P30)

PURPOSE

N33 HR

MIN

SEC

N81 LOCAL ΔV_X VERT ΔV_Y ΔV_Z

N22 R

P

Y

 ΔVC

BT

 ΔV_{70}

ULLAGE: _____ SECS _____ QUADS

N47 WT STAR ☒ ☒ ☒ ☒ ☐ ☐ GDC R N48 PT ☐ ☒ ☒ ☐ ☐ ☐ SFT P YT ☐ ☒ ☒ ☐ ☐ ☐ TRN Y

REMARKS: _____

MANEUVER UPDATE (P30) PAD DESCRIPTION

- GMT of ignition (GMTI) in noun 33 display
- Change in velocity components in noun 81 display
- Ground calculated S/C burn attitude relative to the IMU at GMTI called by V49 N22
- EMS ΔV counter load (ΔVC)
- Burn duration (BT)
- Change in velocity necessary to lower perigee below 70 nm (ΔV_{70})
- Ullage duration, and number of quads (2 or 4) used
- Vehicle weight, and pitch and yaw trim engine gimbal angles, for DAP data load
- Star number, and optics shaft and trunnion angles
- GDC align angles for Backup GDC and IMU Alignment (IMU or CMC failed), pg G/3-18. Assume south set stars Atria (34) and Acrux (25) unless noted otherwise in REMARKS.

PLANNED TWO
QUADS FAILED

MANEUVER UPDATE (P30)

PURPOSE		
N33 HR	+ X X	+ X X
MIN	+ X X X	+ X X X
SEC	+ X	+ X
N81 LOCAL ΔVX	X	X
VERT ΔVY	X	X
ΔVZ	X	X
N22 R	+ . 0 0	+ . 0 0
P	+ . 0 0	+ . 0 0
Y	+ . 0 0	+ . 0 0
ΔVC	X X	X X
BT	X X	X X
ΔV70	X X	X X

ULLAGE: _____ SECS _____ QUADS

N47 WT + [] [] [] [] STAR [X] [X] [X] [X] GDC R [] [] []

N48 PT [] [X] [X] [] [] SFT + [] [] [] [0] P [] [] []
YT [] [X] [X] [] [] TRN + [] [] [0] [0] Y [] [] []

REMARKS: _____

MANEUVER UPDATE (P30)

PURPOSE		
N33 HR	+ X X	+ X X
MIN	+ X X X	+ X X X
SEC	+ X	+ X
N81 LOCAL ΔVX	X	X
VERT ΔVY	X	X
ΔVZ	X	X
N22 R	+ . 0 0	+ . 0 0
P	+ . 0 0	+ . 0 0
Y	+ . 0 0	+ . 0 0
ΔVC	X X	X X
BT	X X	X X
ΔV70	X X	X X

ULLAGE: _____ SECS _____ QUADS

N47 WT + [] [] [] [] STAR [X] [X] [X] [X] GDC R [] [] []

N48 PT [] [X] [X] [] [] SFT + [] [] [] [0] P [] [] []
YT [] [X] [X] [] [] TRN + [] [] [0] [0] Y [] [] []

REMARKS: _____

PLANNED TWO QUADS FAILED RCS DEORBIT BURN

1	(hrs:min) +__:__h	If deorbit burn: ENTRY VEHICLE PREPARATION - complete
2		<u>P30 - EXTERNAL ΔV</u> V37E 30E
3	F 06 33	GMTI (hrs,min,.01sec) Load desired TIG PRO
4	F 06 81	ΔVX,Y,Z(LV) (.1fps) Load desired ΔV's (Do not use all 0's) PRO
5	F 06 42	HA,HP,ΔV(req'd) (.1nm,.1fps) PRO
6	F 16 45	MARKS,TFI,MGA (marks,min-sec,.01°) Set DET counting up to GMTI PRO
7	F 37	00E

Stored VG components along local vertical axes at GMTI.

MARKS not applicable.
MGA is middle gimbal angle at GMTI. MGA set to -00002 if REFSMMAT flag not set.

8

If shaping burn:

Go to step 9

If deorbit burn:

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (pull)

REPRESS PKG vlv - ON

O2 SM SUPPLY vlv - OFF

SURGE TK - ON (verify)

CAB PRESS REL vlv (2) - NORM

(5) cb WASTE H2O/URINE DUMP HTR (2) - open

cb ECS PRIM RAD CONTR MNA/B (2) - open

POT H2O HTR - OFF

GLY EVAP TEMP IN - MAN

ABORT SYS PRPLNT - RCS CMD (verify)

9

RCS THRUSTING PREP

Load DAP

Quads failed:

A-B	A-C	A-D	B-C	B-D	C-D
11102	10102	11102	11102	11002	11102
00011	00101	10110	01001	11010	11100

AUTO RCS SEL (8) - switch OFF the
jets on the quads failed

FDAI SCALE - 5/1

MAN ATT (3) - RATE CMD

RHC PWR NORMAL #2 - AC/DC

RHC PWR DIRECT #2 - MNA/B

THC PWR - on (up)

THC - ARMED

BMAG MODE (3) - RATE 2

SC CONT - CMC/AUTO

Assures CM O2 supply full before CM/SM SEP.

Removes power from glycol mixer to conserve battery power.

10 MNVR TO PAD BURN ATT
 V49E (.01°)
 R _____
 P _____
 Y _____
 If opposite quads failed, use THC to
 mnvr about uncontrolled axis
 A-C failed: THC - +Z to control +pitch
 B-D failed: THC - +Y to control +yaw

11 IMU CK
 P52 (OPT 3) AUTO OPTICS TO STAR
 (Limit: SXT FOV, GNCS GO/NO-GO)
 Exit 06 92, V37E 00E

If deorbit burn:
 Stow optics eyepieces
 Install optics covers
 Stow COAS & lock in mount

V25 N17E (load PAD burn att)
 V63E

GDC ALIGN TO IMU

Set ASCP tw to PAD burn att

12 P41 - RCS THRUSTING
 V37E 41E

13 F 50 18 REQ MNVR TO BURN ATT (.01°)
 DBD/RATE - MIN/LOW
 BMAG MODE (3) - ATT 1/RATE 2
 SC CONT - CMC/AUTO (opp quads failed)
 or - SCS (adj quads failed)
 ENTR

The V49E mnvr is req'd because the P41 computed attitude is not optimal for the quads failed cases.

SXT star should be within SXT FOV.
 If not, GNCS is NO-GO.

Displays correct error needles during thrust.
 Displays difference between present attitude and N17,
 the burn attitude.

Provides for backup attitude error display if GNCS fails.

The CMC computed attitude is not valid when two RCS
 quads are failed; bypass the auto mnvr.

55:00m
14 06 85 VGX,Y,Z (.1fps)
EMS - ΔV SET/STBY
SET ΔVC
EMS FUNC - ΔV
If adjacent quads failed:
AUTO RCS SEL (2) - switch OFF
the appropriate roll jets
Quads failed: A-B A-D B-C C-D
Disable: D2&C1 BT&C2 A2&D1 AT&B2

58:00 RHC #2 - ARMED
TAPE RCDR - HBR/RCD/FWD/CMD RESET

59:00 EMS MODE - NORMAL

15 59:25 DSKY BLANKS

59:30
16 16 85 VGX,Y,Z(AVE G ON) (.1fps)

00:00
17 F 16 85 REQ NULL VGX,Y,Z (.1fps)
Adjacent quads failed:
Trim largest initial VG to ±.2
A-B THC - +Y
A-D THC - -Z (-Y)
B-C THC - +Y (+Z)
C-D THC - +Z
Opposite quads failed:
Trim VGX to ±.2
THC - +X and cycle in following
direction:
Quads failed Direction
A-C +Z to control pitch
B-D +Y to control yaw
*If GNCS NO-GO *
* FDAI SELECT - 1 *
* Terminate burn on time*
Verify EMS ΔV CTR ~ZERO

EMS ΔV counter set with pad ΔVC.

The SCS will automatically hold attitude. As spacecraft weight decreases, c.g. may shift, requiring thrusting in the parenthesized direction for automatic SCS attitude control.

Maintain burn attitude by cycling THC in appropriate direction.

EMS ΔV counter should be zero at end of burn.

18 F 16 44 V82E
 HA,HP,TFF (.1nm,min-sec)
Check capture HP <38 nm:
 If >, continue burn until <

PRO

19 F 16 85 VGX,Y,Z (.1fps)
 Record

PRO

EMS - OFF/STBY
 RHC PWR DIRECT #1 & #2 - OFF
 THC - LOCKED
 THC PWR - OFF
 BMAG MODE (3) - RATE 2
 TAPE RCDR - off (ctr)
 PCM BIT RATE - LOW

20 F 37

00E

WARNING: Wait until
 COMP ACTY lt - out

V66E

RCS BURN STATUS

AFTER BURN									
FDAI(ONLY IF NOT AT BURN ATT)	R	+							
	P	+							
	Y	+							
N85	VGX		0	0					
	VGX		0	0					
	VGZ		0	0					
EMS	ΔVC								

Transfers CSM SV to OWS slots. Do not do when
 average G is running. Do not do unless satisfied
 that CSM SV is good.

21

If deorbit burn:

Go to step 22

If shaping burn:

AUTO RCS SEL (2) - enable appropriate
roll jets (adj quads failed only)

Quads failed: A-B A-D B-C C-D

Enable: D2&C1 B1&C2 A2&D1 A1&B2

Go to ENTRY VEHICLE PREP, pg E/4-5

22

CM RCS CHECK

AUTO RCS SEL A/C ROLL (4) - OFF
(verify)

cb RCS LOGIC (2) - close (verify)

SC CONT - CMC/FREE

RCS TRNFR - CM

AUTO RCS SEL (ring 1) - OFF

AUTO RCS SEL (ring 2) - MNB

Test ring 2 thrusters

AUTO RCS SEL (ring 1) - MNA

AUTO RCS SEL (ring 2) - OFF

Test ring 1 thrusters

AUTO RCS SEL (ring 2) - MNB

RCS TRNFR - SM

*If both rings failed: *

* BMAG MODE (3) - ATT 1/RATE 2 *

* MAN ATT (3) - RATE CMD (verify)*

* SC CONT - SCS *

* MNVR to 0°, _____, 0° *

* (pitch from PAD REMARKS) *

* DBD/RATE - MIN/LOW *

* At RET .05G -90 sec, just *

* before CM/SM SEP: *

* MAN ATT ROLL - ACCEL CMD *

* Roll right ~20°/sec *

CAUTION: Att hold in pitch and
yaw must be maintained until
CM/SM SEP

Control may be SCS/MIN IMP at option of crew.

MIN IMP may not produce audible jet firing. More than
one cycle may be req'd to clear lines of residuals
and allow propellant to jets.
If MIN IMP, use >1 cycle.

23 MNVR TO CM/SM SEP & DRPA JETT ATT (ASAP)

DBD/RATE - MIN/HIGH

SC CONT - SCS

BMAG MODE (3) - ATT 1/RATE 2

ROLL to 180° (hds up)

YAW right to 315°

24

PRELOAD ENTRY BATTERIES

MN BUS TIE (2) - on (up)

Go to ENTRY, pg E/5-1

CM/SM SEP should be accomplished ASAP after deorbit.
If delayed to within 8 min of EI, recontact may occur.

Monitor bat bus current increase.

MANEUVER UPDATE (P30)													
PURPOSE													
N33 HR		+	X	X				+	X	X			
MIN		+	X	X	X			+	X	X	X		
SEC		+	X					+	X				
N81 LOCAL ΔV_X			X						X				
VERT ΔV_Y			X						X				
ΔV_Z			X						X				
N22 R		+				0	0	+				0	0
P		+				0	0	+				0	0
Y		+				0	0	+				0	0
ΔV_C		X	X					X	X				
BT		X	X					X	X				
ΔV_{70}		X	X					X	X				
ULLAGE: _____ SECS _____ QUADS													
N47 WT		+						STAR	X	X	X	X	
								GDC R					
N48 PT			X	X				SFT	+				0
YT			X	X				P					
								TRN	+			0	0
								Y					
REMARKS: _____													

MANEUVER UPDATE (P30) PAD DESCRIPTION

- a. GMT of ignition (GMTI) in noun 33 display
- b. Change in velocity components in noun 81 display
- c. Ground calculated S/C burn attitude relative to the IMU at GMTI called by V49 N22
- d. EMS ΔV counter load (ΔV_C)
- e. Burn duration (BT)
- f. Change in velocity necessary to lower perigee below 70 nm (ΔV_{70})
- g. Ullage duration, and number of quads (2 or 4) used
- h. Vehicle weight, and pitch and yaw trim engine gimbal angles, for DAP data load
- i. Star number, and optics shaft and trunnion angles
- j. GDC align angles for Backup GDC and IMU Alignment (IMU or CMC failed), pg G/3-18. Assume south set stars Atria (34) and Acrux (25) unless noted otherwise in REMARKS.

MANEUVER UPDATE (P30)

PURPOSE												
N33 HR	+	X	X				+	X	X			
MIN	+	X	X	X			+	X	X	X		
SEC	+	X					+	X				
N81 LOCAL ΔVX		X						X				
VERT ΔVY		X						X				
ΔVZ		X						X				
N22 R	+				0	0	+				0	0
P	+				0	0	+				0	0
Y	+				0	0	+				0	0
ΔVC	X	X					X	X				
BT	X	X					X	X				
ΔV70	X	X					X	X				

ULLAGE: _____ SECS _____ QUADS

N47 WT + STAR XXXX GDC R

N48 PT XX SFT +0 P

YT XX TRN +00 Y

REMARKS: _____

MANEUVER UPDATE (P30)

PURPOSE												
N33 HR	+	X	X				+	X	X			
MIN	+	X	X	X			+	X	X	X		
SEC	+	X					+	X				
N81 LOCAL ΔVX		X						X				
VERT ΔVY		X						X				
ΔVZ		X						X				
N22 R	+				0	0	+				0	0
P	+				0	0	+				0	0
Y	+				0	0	+				0	0
ΔVC	X	X					X	X				
BT	X	X					X	X				
ΔV70	X	X					X	X				

ULLAGE: _____ SECS _____ QUADS

N47 WT + STAR XXXX GDC R

N48 PT XX SFT +0 P

YT XX TRN +00 Y

REMARKS: _____

PLANNED HYBRID RCS DEORBIT BURN

(hrs:min)
1 +__:__h ENTRY VEHICLE PREPARATION - complete

2 P30 - EXTERNAL ΔV
V37E 30E

3 F 06 33 GMTI (hrs,min,.01sec)
Load desired TIG
PRO

4 F 06 81 ΔVX,Y,Z(LV) (.1fps)
Load desired ΔV's (Do not use all 0's)
PRO

5 F 06 42 HA,HP,ΔV(req'd) (.1nm,.1fps)
PRO

6 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)

Set DET counting up to GMTI
PRO

7 F 37 00E

8 SEPARATION CK LIST
PRIM GLY TO RAD - BYPASS (pull)
REPRESS PKG vlv - ON
02 SM SUPPLY vlv - OFF
SURGE TK - ON (verify)
CAB PRESS REL vlv (2) - NORM
(5) cb WASTE H2O/URINE DUMP HTR (2) - open
cb ECS PRIM RAD CONTR MNA/B (2) - open
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN

ABORT SYS PRPLNT - RCS CMD (verify)

Stored VG components along local vertical axes
at GMTI.

MARKS not applicable.
MGA is middle gimbal angle at GMTI. MGA set to
-00002 if REFSMMAT flag not set

Assures CM 02 supply full before CM/SM SEP.

Removes power from glycol mixer to conserve battery
power.

9

CM RCS CHECK

AUTO RCS SEL A/C ROLL (4) - OFF
 (verify)
 cb RCS LOGIC (2) - close (verify)
 SC CONT - CMC/FREE
 RCS TRNFR - CM
 AUTO RCS SEL (ring 1) - OFF
 AUTO RCS SEL (ring 2) - MNB
 Test ring 2 thrusters
 AUTO RCS SEL (ring 1) - MNA
 AUTO RCS SEL (ring 2) - OFF
 Test ring 1 thrusters
 AUTO RCS SEL (ring 2) - MNB
 RCS TRNFR - SM

10

RCS THRUSTING PREP

Load DAP, 11102, X1111
 AUTO RCS SEL A/C ROLL (4) - MNA/B
 FDAI SCALE - 5/1
 MAN ATT (3) - RATE CMD
 RHC PWR NORMAL #1 & #2 - AC/DC
 RHC PWR DIRECT #1 & #2 - MNA/B
 BMAG MODE (3) - RATE 2
 SC CONT - CMC/AUTO

11

MNVR TO PAD BURN ATT (HDS DN)

V49E (load N22 with PAD values) (.01°)
 R _____ (0°)
 P _____ (XXX°)
 Y _____ (0°)

12

IMU CK

P52 (OPT 3) AUTO OPTICS TO STAR
 (Limit: SXT FOV, GNCS GO/NO-GO)
 Exit 06 92, V37E 00E

Stow optics eyepieces
 Install optics covers
 Stow COAS & lock in mount

Control may be SCS/MIN IMP at option of crew.

MIN IMP may not produce audible jet firing. More than one cycle may be req'd to clear lines of residuals and allow propellant to jets.
 If MIN IMP, use >1 cycle.

Constrains roll to be zero.

SXT star should be within SXT FOV.
 If not, GNCS is NO-GO.

- 13 GDC ALIGN TO IMU
- V25 N17E (.01°)
 Load PAD data GMBL angles
 for CM burn att
 ATT SET tw - set
 to PAD data GMBL angles
 for CM burn att
- 14 PRELOAD ENTRY BATTERIES
 MN BUS TIE (2) - on (up)
- VHF AM (A & B) - off (ctr)
 (5) cb WASTE H2O/URINE DUMP HTR (2) - open
 POT H2O HTR - OFF
 GLY EVAP TEMP IN - MAN
- 15 P41 - RCS THRUSTING
 V37E 41E
- 16 F 50 18 REQ MNVR TO BURN ATT (HDS DN) (.01°)
 (AUTO) PRO
- 17 06 18 AUTO MNVR TO FDAI RPY (.01°)
- 18 F 50 18 REQ TRIM MNVR (.01°)
 Change S/C roll, if req'd
 (TRIM) PRO
 DBD/RATE - MIN/LOW
 BMAG MODE (3) - ATT 1/RATE 2
 ENTR

Prepares CMC to display astronaut total attitude error on FDAI 1 for attitude mnvr to CM burn attitude.

Prepares EPS to switch from SM batteries to CM batteries. Verify battery bus A & B currents increasing and/or battery voltage decreasing.
 The fuel cells were powered down after docking.

55:00m
 19 06 85 VGX,Y,Z (.1fps)
 EMS - ΔV SET/STBY
 Set ΔV for SM burn = ΔVC pad +100.0
 EMS FUNC - ΔV
 S BD OMNI ANT - C
 Cue STDN if in contact
 SECS LOGIC (2) - on (up) (verify)
 STDN confirm GO to PYRO ARM (if poss)
 SECS PYRO ARM (2) - on (up)
 CM RCS LOGIC - on (up)
 PRIM GLY TO RAD - BYPASS (verify)
 MN BUS TIE (2) - on (up) (verify)

58:00 RHC #1, #2, & THC - ARMED
 TAPE RCDR - HBR/RCD/FWD/CMD RESET

TIG -2 min HORIZ CK - Horiz on ____ (36°)
 window mk (hds dn) (Limit:
 +3°, GNCS GO/NO-GO)
 If NO-GO, set tw to pad burn att
 * SC CONT - SCS *
 * Track horiz with ____ (32°) *
 * window mk (hds dn) *
 * At TIG -1 min, *
 * Hold att *
 * GDC ALIGN pb - push *
 * Redo step 13 after burn *

TIG -2 min HORIZ CK window mk will be
 in mnvr pad remarks. TIG -1 min horiz
 track window mk is 4° less. TIG burn
 att window mk is 8° less.

59:00 EMS MODE - NORMAL
THC PWR - on (up)

20 59:25 DSKY BLANKS

21 59:30
16 85 VGX,Y,Z(AVE G ON) (.1fps)

00:00 Horiz on _____(28°) window mark (hds dn)

22 F 16 85 REQ NULL VGX,Y,Z (.1fps)
Burn EMS ΔV CTR to +100.0

RATE - HIGH
 SC CONT - SCS
 (8) cb ELS/CM-SM SEP (2) - close
 CM/SM SEP (2) - on (up)
 MAN ATT PITCH - ACCEL CMD
 V63E (N17, CM burn att)

*If CMC NO-GO: *
 * FDAI SOURCE - ATT SET*
 * FDAI SEL - 1 or 2 *
 * ATT SET - GDC *

C/W MODE - CM
 RCS TRNFR - CM

Monitor V MNA/B:

If <25 vdc, go to EMERG POWER DOWN
 MNVR TO CM BURN ATT (NULL ERR NEEDLES)

R 0°
 (θ ~290°) P (~110° >SM burn att)
 Y 0°
 CM RCS LOGIC - OFF

CM RCS BURN RULES

Burn VGZ to ± 2 . If resulting HP > PAD target, burn to PAD target unless both He TK PRESS go below 2000 psia, in which case, burn to PAD capture HP.

CM RCS BURN

FDAI SCALE - 5/5

RHC #1 - Continuous pitch down

RHC #2 - Modulate pitch
 to null needles

*If only 1 RHC *

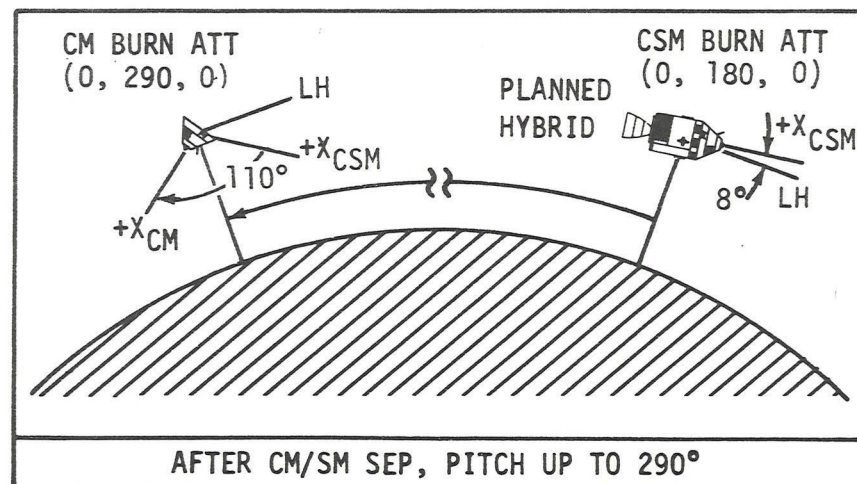
* Pulse $\pm P = 5^\circ$ from retro att* *

* Maintain rates <3°/sec *

Check both CM RCS He TK PRESS

Burn VGZ to ± 2

Establishes attitude error needle display.



There is 80 fps of CM RCS for a hybrid deorbit, which leaves enough RCS in each ring for a guided entry. He source pressure for a guided entry: below 2000 psia (up from 1650 psia on Apollo) go ballistic. This is based on 26 lbs of RRCS in each ring with a He bottle temperature of 50°F prior to arming the RCS. The 2000 psia figure increases to 2150 psia at 70°F. Negative pitch jets have approx 25% less authority due to location of the jets relative to the CM c.g.

24 F 16 44 V82E
HA,HP,TFF (.1nm,min-sec)

PAD target HP _____

PAD capture HP _____

*If no PAD capture HP given, use *

* 38 nm *

Fly lift dn to 1G with guided entry

*If both He TK PRESS <2000 psia, *

* lift dn to 1G, then ballistic *

* entry (roll right ~20°/sec). *

PRO

25 F 16 85 VGX,Y,Z
Record (.1fps)

PRO

EMS - OFF/STBY

MAN ATT (3) - MIN IMP

RHC #1 - LOCKED

RHC PWR NORMAL #1 - OFF

RHC PWR DIRECT #1 & #2 - OFF

THC - LOCKED

THC PWR - OFF

BMAG MODE (3) - RATE 2

AUTO RCS SEL A/C ROLL (4) - OFF

cb DIRECT ULLAGE (2) - open

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

After desired HP is achieved by CM RCS thrusting, no further attention should be paid to HP predictions, regardless of subsequent variations.

RCS BURN STATUS

AFTER BURN									
FDAI(ONLY IF NOT AT BURN ATT)	R	+							
	P	+							
	Y	+							
N85	VGX		0	0					
	VGY		0	0					
	VGZ		0	0					
EMS	ΔVC								

WARNING: Wait until
COMP ACTY 1t - out

V66E

Configure CM RCS
for single-ring entry

Go to ENTRY, pg E/5-1

Transfers CSM SV to OWS slots. Do not do
when average G is running. Do not do
unless satisfied that CSM SV is good.

Single-ring operation (and switching to the other
ring if the first fails) following a hybrid deorbit
maximizes RCS capability.

MANEUVER UPDATE (P30)													
PURPOSE													
N33 HR MIN SEC		+	X	X				+	X	X			
		+	X	X	X			+	X	X	X		
		+	X					+	X				
N81 LOCAL ΔV_X VERT ΔV_Y ΔV_Z			X						X				
			X						X				
			X						X				
N22 R P Y		+				0	0	+				0	0
		+				0	0	+				0	0
		+				0	0	+				0	0
ΔVC		X	X					X	X				
BT		X	X					X	X				
ΔV_{70}		X	X					X	X				
ULLAGE: _____ SECS _____ QUADS													
N47 WT		+						STAR		X	X	X	X
N48 PT			X	X				SFT		+			0
YT			X	X									
								TRN		+			0
REMARKS: _____													

MANEUVER UPDATE (P30) PAD DESCRIPTION

- a. GMT of ignition (GMTI) in noun 33 display
- b. Change in velocity components in noun 81 display
- c. Ground calculated S/C burn attitude relative to the IMU at GMTI called by V49 N22
- d. EMS ΔV counter load (ΔVC)
- e. Burn duration (BT)
- f. Change in velocity necessary to lower perigee below 70 nm (ΔV_{70})
- g. Ullage duration, and number of quads (2 or 4) used
- h. Vehicle weight, and pitch and yaw trim engine gimbal angles, for DAP data load
- i. Star number, and optics shaft and trunnion angles
- j. GDC align angles for Backup GDC and IMU Alignment (IMU or CMC failed), pg G/3-18. Assume south set stars Atria (34) and Acrux (25) unless noted otherwise in REMARKS.

MANEUVER UPDATE (P30)

PURPOSE												
N33 HR	+	X	X				+	X	X			
MIN	+	X	X	X			+	X	X	X		
SEC	+	X					+	X				
N81 LOCAL ΔVX		X						X				
VERT ΔVY		X						X				
ΔVZ		X						X				
N22 R	+				0	0	+				0	0
P	+				0	0	+				0	0
Y	+				0	0	+				0	0
ΔVC	X	X					X	X				
BT	X	X					X	X				
ΔV70	X	X					X	X				

ULLAGE: _____ SECS _____ QUADS

N47 WT + STAR ☒☒☒☒☐☐ GDC R

N48 PT ☐☒☒☐☐☐ SFT +0 P
YT ☐☒☒☐☐☐ TRN +00 Y

REMARKS: _____

MANEUVER UPDATE (P30)

PURPOSE												
N33 HR	+	X	X				+	X	X			
MIN	+	X	X	X			+	X	X	X		
SEC	+	X					+	X				
N81 LOCAL ΔVX		X						X				
VERT ΔVY		X						X				
ΔVZ		X						X				
N22 R	+				0	0	+				0	0
P	+				0	0	+				0	0
Y	+				0	0	+				0	0
ΔVC	X	X					X	X				
BT	X	X					X	X				
ΔV70	X	X					X	X				

ULLAGE: _____ SECS _____ QUADS

N47 WT + STAR ☒☒☒☒☐☐ GDC R

N48 PT ☐☒☒☐☐☐ SFT +0 P
YT ☐☒☒☐☐☐ TRN +00 Y

REMARKS: _____

UNPLANNED HYBRID RCS DEORBIT BURN
(FROM SM RCS DEORBIT BURN FAILURE)

1 ——— PRELOAD ENTRY BATTERIES
MN BUS TIE (2) - on (up)

2 MIN
OR ASAP

V25 N17E (.01°)
Load CM burn att from RCS2
MNVR UPDATE PAD
SECS LOGIC (2) - on (up) (verify)
SECS PYRO ARM (2) - on (up)
CM RCS LOGIC - on (up)
PRIM GLY TO RAD - BYPASS (verify)
MN BUS TIE (2) - on (up) (verify)
RHC PWR NORMAL #1 - AC/DC
RHC PWR DIRECT #1 - MNA/B
RHC PWR #1 - ARMED

Prepares EPS to switch from SM batteries to CM batteries. Verify battery bus A & B currents increasing and/or battery voltage decreasing.
The fuel cells were powered down after docking.

Prepares CMC to display astronaut total attitude error on FDAI 1 for attitude mnvr to CM burn attitude.

DATE 6/29/73

PAGE E/10-3

- RATE - HIGH
 SC CONT - SCS
 (8) cb ELS/CM-SM SEP (2) - close
 CM/SM SEP (2) - on (up)
 MAN ATT PITCH - ACCEL CMD
 V63E (N17, CM burn att)

*If CMC NO-GO: *

* ATT SET tw - set to CM burn*

* att from RCS2 MNVR UPDATE*

* PAD *

* FDAI SOURCE - ATT SET *

* FDAI SEL - 1 or 2 *

* ATT SET - GDC *

C/W MODE - CM

RCS TRNFR - CM

Monitor V MNA/B:

If <25 vdc, go to EMERG POWER DOWN

MNVR TO CM BURN ATT (NULL ERR NEEDLES)

(~110° >SM BURN ATT)

CM RCS LOGIC - OFF

2 — CM RCS BURN

FDAI SCALE - 5/5

RESET DET & COUNT UP

RHC #1 - Continuous pitch-down for 100 sec

RHC #2 - Modulate pitch

to null needles

*If only 1 RHC *

* Pulse +P = 5° from retro att*

* Maintain rates <3°/sec *

F 16 44

HA,HP,TFF (.1nm,min-sec)

Check capture HP <38 nm:

If >, continue burn until <

Check CM RCS He TK PRESS:

RCS IND sel - CM1, CM2

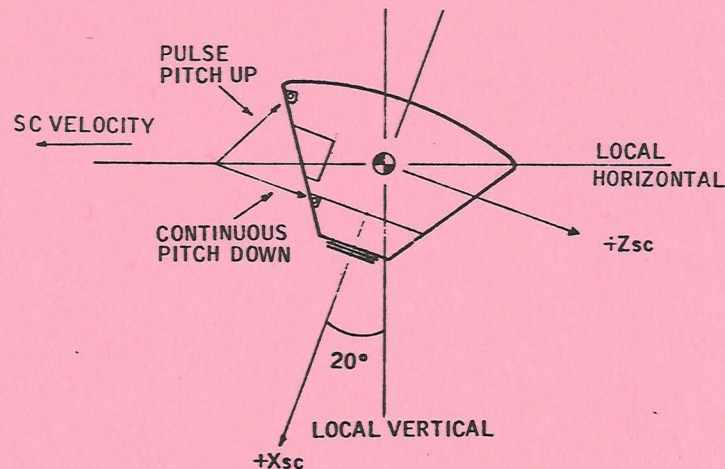
If both rings <2000 psia:

* NO-GO for guided entry *

* (Go ballistic) *

PRO

Establishes attitude error needles display.



CM RCS DEORBIT BURN ATTITUDE

Negative pitch jets have approx 25% less authority due to location of the jets relative to the CM c.g.

He source pressure for a guided entry: below 2000 psia (up from 1650 psia on Apollo) go ballistic. This is based on 26 lbs of RCS in each ring with a He bottle temperature of 50°F prior to arming the RCS. The 2000 psia figure increases to 2150 psia at 70°F.

3 F 16 85

VGX,Y,Z
Record

(.1fps)

PRO

EMS - OFF/STBY
 MAN ATT (3) - MIN IMP
 RHC #1 - LOCKED
 RHC PWR NORMAL #1 - OFF
 RHC PWR DIRECT #1 & #2 - OFF
 THC - LOCKED
 THC PWR - OFF
 BMAG MODE (3) - RATE 2
 AUTO RCS SEL A/C ROLL (4) - OFF
 cb DIRECT ULLAGE (2) - open
 TAPE RCDR - off (ctr)
 PCM BIT RATE - LOW

4 F 37

OOE

WARNING: Wait until COMP ACTY 1t - out

5

V66E

6

Configure CM RCS
 for single-ring entry

Go to ENTRY, pg E/5-1

RCS BURN STATUS

AFTER BURN									
FDAI(ONLY IF NOT AT BURN ATT)	R	+							
	P	+							
	Y	+							
N85	VGX		0	0					
	VGY		0	0					
	VGZ		0	0					
EMS	ΔVC								

Transfers CSM SV to OWS slots. Do not do when average G is running. Do not do unless satisfied that CSM SV is good.

Single-ring operation (and switching to the other ring if the first fails) following a hybrid deorbit maximizes RCS capability.

BLOCK DATA

TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												

REMARKS: _____												

BLOCK DATA PAD DESCRIPTION

- Block data pads provide a single impulse deorbit capability in the event of communications failure or rapid deorbit requirements
- Deorbit burn ignition time (TIG) referenced to GMT in Julian days (i.e., 1 January = day 1)
- Deorbit burn velocity change, fps (ΔVC)
- Deorbit burn duration (BT)
- GDC align tw settings for GDC alignment to ATM
- GDC burn attitude is 0°, 180°, 0°
- .05G time referenced from retroburn (RET .05G)
- EMS initialization value for range-to-go at .05G (RTOGO .05G)
- EMS initialization value of inertial velocity at .05G (VIO .05G)
- Entry interface (400,000-ft altitude) time referenced from retroburn (RET EI)
- Target latitude and longitude of splashdown

BLOCK DATA												
TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												
REMARKS: _____												

BLOCK DATA												
TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												
REMARKS: _____												

BLOCK DATA														
TIG DAY	X	X	X				X	X	X					
HR	X	X	X	X			X	X	X	X				
MIN	X	X	X	X			X	X	X	X				
SEC	X	X	X	X			X	X	X	X				
ΔVC	X	X					X	X						
BT	X	X					X	X						
GDC ALIGN R	X	X	X				X	X	X					
TW P	X	X	X				X	X	X					
SETTINGS Y	X	X	X				X	X	X					
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°							
RET .05G	X	X					X	X						
RTOGO .05G	+						+							
VIO .05G	+						+							
RET EI	X	X					X	X						
LAT		0						0						
LONG														
REMARKS: _____														
REMARKS: _____														

BLOCK DATA														
TIG DAY	X	X	X				X	X	X					
HR	X	X	X	X			X	X	X	X				
MIN	X	X	X	X			X	X	X	X				
SEC	X	X	X	X			X	X	X	X				
ΔVC	X	X					X	X						
BT	X	X					X	X						
GDC ALIGN R	X	X	X				X	X	X					
TW P	X	X	X				X	X	X					
SETTINGS Y	X	X	X				X	X	X					
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°							
RET .05G	X	X					X	X						
RTOGO .05G	+						+							
VIO .05G	+						+							
RET EI	X	X					X	X						
LAT		0						0						
LONG														
REMARKS: _____														
REMARKS: _____														

BLOCK DATA

TIG DAY	X	X	X				X	X	X				
HR	X	X	X	X			X	X	X	X			
MIN	X	X	X	X			X	X	X	X			
SEC	X	X	X	X			X	X	X	X			
ΔVC	X	X					X	X					
BT	X	X					X	X					
GDC ALIGN R	X	X	X				X	X	X				
TW P	X	X	X				X	X	X				
SETTINGS Y	X	X	X				X	X	X				
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°						
RET .05G	X	X					X	X					
RTOGO .05G	+						+						
VIO .05G	+						+						
RET EI	X	X					X	X					
LAT		0						0					
LONG													

REMARKS: _____

REMARKS: _____

BLOCK DATA

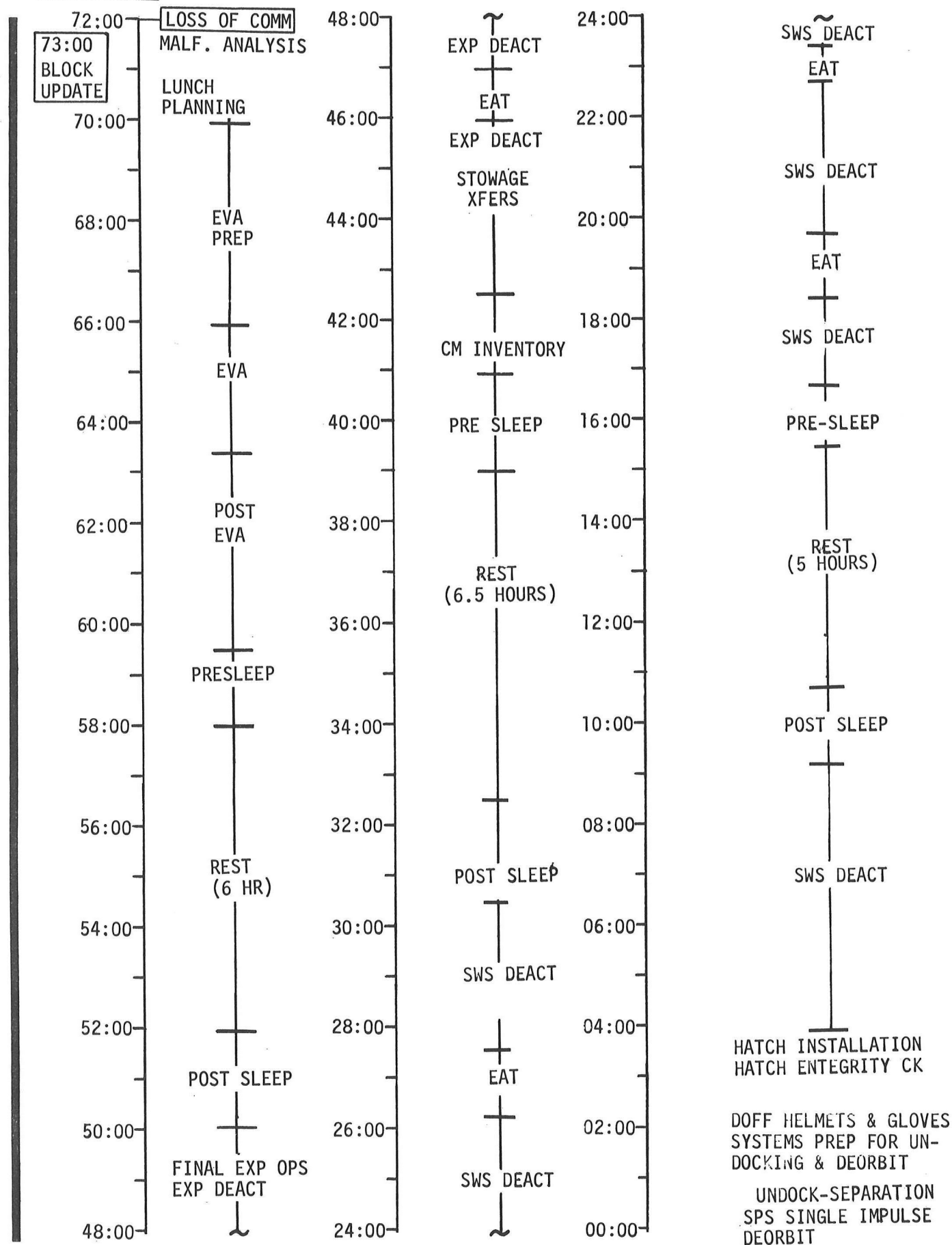
TIG DAY	X	X	X				X	X	X				
HR	X	X	X	X			X	X	X	X			
MIN	X	X	X	X			X	X	X	X			
SEC	X	X	X	X			X	X	X	X			
ΔVC	X	X					X	X					
BT	X	X					X	X					
GDC ALIGN R	X	X	X				X	X	X				
TW P	X	X	X				X	X	X				
SETTINGS Y	X	X	X				X	X	X				
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°						
RET .05G	X	X					X	X					
RTOGO .05G	+						+						
VIO .05G	+						+						
RET EI	X	X					X	X					
LAT		0						0					
LONG													

REMARKS: _____

REMARKS: _____

TIME FROM
DEORBIT BURN

3-DAY LOSS OF COMM SUMMARY TIMELINE



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NO COMM SPS SINGLE IMPULSE DEORBIT BURN
AND ENTRY SEQUENCE

WHEN NO COMM OCCURS

1 Copy BLOCK DATA PAD (Pg E/11-1) from
Teleprinter BLOCK DATA PAD.

2 Make the following changes to the
Deactivation Checklist:
Pg 2-10 Delete: E-MEMORY DUMP
Delete: UPLINK/UPDATE
Add: BACKUP CMC CLOCK
INITIALIZATION,
steps 1 through 5
(Pg G/2-14)

Pg 2-26

CAUTION: Prior to doing the
following, ensure that the
ATMDC is in the docked
gain configuration.

Add: V41 N20, Coarse
Align (no dumps)
IMU to (GDC to
ATM) PAD angles,
V40E, then P51

Pg 2-30 Delete: SXT P52 IMU REALIGN
(OPT 1)

Pg 2-44 Delete: PET UPDATE

Pg 2-50 Delete: Step 2 teleprinter pads

Pg 2-79 Delete: UPLINK/UPDATE

Pg 2-87 Delete: P52 OPT 3

Pg 2-89 Delete: CSM UNDOCKING
(ENTRY C/L)

Add: Go to NO COMM SPS
SINGLE IMPULSE
DEORBIT BURN AND ENTRY
SEQUENCE (Pg E/11-8)

DURING NO COMM SWS DEACTIVATION

Perform the following procedures prior to completion of the Deactivation Checklist.

1

CM RCS PREHEAT

If sys test mtr 4b,5b,6b,7b,8b,9b
all read 1.5 vdc (40°F) or more,
omit preheat:

- (8) cb RCS LOGIC (2) - close
- (1) CM RCS LOGIC - on (up)
- (8) cb CM RCS HTRS (2) - close
- (101) CM RCS HTRS - on (up) (PLT confirm)
(Monitor manf press for press drop)

2

(F1) UNSTOW & DON MAE WESTS

3

SET UP CAMERA

CM4/DAC/18/CX03 - BRKT, MIR
(T11, 500, 7) 12 FPS

4

FINAL STOWAGE

ORDEAL

- FDAI (2) - INRTL
- PWR - OFF, STOW
- (377) GLY TO RAD SEC vlv - BYPASS (CCW) (verify)
Attach both strut unlock lanyards

5

TERM. CM RCS PREHEAT (if initiated)

- (101) CM RCS HTRS - OFF (SPT confirm)
- (1) CM RCS LOGIC - OFF
- (8) cb CM RCS HTRS (2) - open

Checks CM RCS 12,14,16,21,23 and 25 jet injector valve temperatures, respectively.

Energizes RCS logic bus.

Direct coils utilized for preheating jets, (20 min).

Configures camera for fireball photography.

6

PYRO BAT CK

- (229) cb PYRO BUS A
 PYRO BAT A - close (verify)
 cb PYRO BUS B
 PYRO BAT B - close (verify)
 DC IND - PYRO BAT A, then B
 *If PYRO BAT A(B) <31.5 vdc: *
 * cb PYRO BUS A(B) PYRO BAT *
 * A(B) - open *
 * cb PYRO BUS A(B) BAT BUS *
 * A(B) - close *
- (275) cb MNA BAT C - close
 cb MNB BAT C - close
 DC IND - MNB

Replaces failed pyro battery with entry battery.

Applies entry battery C to both main buses when
 MN BUS TIE switches are on.

7

RSI ALIGNMENT

FDAI SOURCE - ATT SET
 ATT SET - GDC
 EMS ROLL - on (up)
 GDC ALIGN pb - push & hold
 YAW tw - position RSI thru 45°
 & set to lift up (hds dn)
 GDC ALIGN pb - release
 EMS ROLL - OFF
 Align GDC to IMU
 FDAI SOURCE - CMC

RSI ALIGNMENT is performed even if RSI alignment is
 correct in order to check operation of RSI.

DEACTIVATION CK LIST COMPLETE

50:00

START DET COUNTING UP TO UNDOCKING
PERFORM PRE UNDOCKING SWITCH LIST (Pg E/11-10)

(11103)
(01111)

V48E, LOAD 4 JET, 2°/SEC, B/D ROLL; LOAD
N47 AND N48 FROM DEORBIT BURN PAD

(GMT)

V46E

PRE UNDOCKING SWITCH LIST

SET $\Delta V C = +100.0$ (IF ΔV COUNTER
IS SET AT 0.0, LOGIC RACE
CAUSES COUNTER TO JUMP WHEN
ACCELERATION IS SENSED)
EMS FUNC - ΔV
MAN ATT (3) - RATE CMD
DBD/RATE - MIN/HIGH (SELECTS 4°
DEADBAND WHICH CAN BE USED FOR
ROLL & YAW ATTITUDE HOLD
DURING COAST PERIODS)
RHC PWR NORMAL #2 - AC/DC
RHC PWR DIRECT #2 - MNA/B
THC PWR - ON (UP)
SC CONT - CMC/FREE (CMC/FREE
REQ'D TO PREVENT -X JETS FROM
FIRING CLOSE TO SWS)
BMAG MODE (3) - RATE 2
SPOT LIGHT - ON
AUTO RCS SEL (16) - MNA/B
CB SCS A/C ROLL MNA - CLOSE
CB SCS B/D ROLL MNA - CLOSE
CB SCS PITCH MNA - CLOSE (VERIFY)
CB SCS YAW MNA - CLOSE (VERIFY)
CB DOCK PROBE (2) - CLOSE
RHC #2 & THC - ARMED

NO COMM SINGLE IMPULSE

NO COMM SINGLE IMPULSE

(11103)
(01111)

00:00

PERFORM UNDOCKING CK LIST (Pg E/11-10) AT UNDOCKING TIME
(Pg E/11-10)

UNDOCK AT ORBITAL MIDNIGHT

THIS TIME INTERVAL CAN BE 2 MINUTES TO 90 MINUTES
IF TIME INTERVAL >45 MINUTES, PERFORM SUIT DOFFING CK LIST
(Pg E/11-12)

38:00

SET DET COUNTING UP TO DEORBIT TIG
V49E, MNVR TO BLOCK DATA PAD BURN ATT (0,180,0) (Pg E/11-1)
PERFORM PRIMARY AND SECONDARY
WATER EVAP ACTIVATION (Pg E/11-10)
SYS TEST METER - 3B (BAT RLY BUS)
PERFORM PANEL 8 CB CHECK (DIAGRAM Pg E/11-10)

ACTIVATE CM RCS (Pg E/11-11)

45:00

PERFORM CM/SM SEPARATION CK LIST (Pg E/11-11)

GO TO SPS BURN-ENTRY CUE CARD
P40 (SCS)

DEORBIT HORIZ CK

HORIZ CK - HORIZ ON 17° WINDOW MK (HDS DN)
AT TIG -3 MIN
(LIMIT: +3°, GDC ALIGNMENT GO/NO-GO)
*If NO-GO, *
* TRACK HORIZ WITH 13° *
* WINDOW MK (HDS DN) *

* AT TIG -2 MIN, *
* HOLD ATT *
* GDC ALIGN PB - PUSH*
* BURN SCS *

HORIZ ON 6° (5° AT TIG)
WINDOW MK (HDS DN) AT ULLAGE TIME

(GMT)

DEORBIT BURN

UNDOCKING TIME

UNDOCKING CK LIST

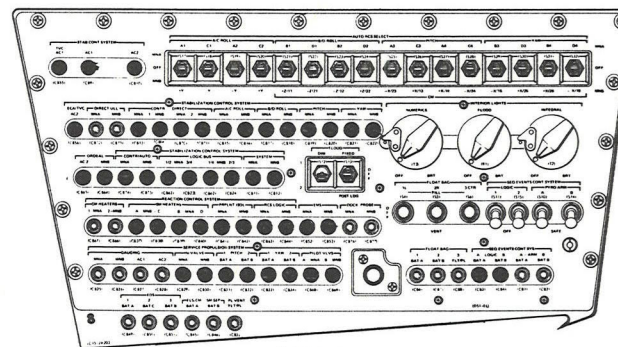
PROBE EXTD/REL - EXTD REL
TB - BP/THEN GRAY (HOLD ~5 SEC
UNTIL UNDOCK VERIFIED, BUT
<20 SEC. EXPECTED SEP ΔV
IS 0.38 TO 0.51 FPS)
PROBE EXTD/REL - RETR (PROVIDES
CAPTURE LATCH TB'S IF
REDOCKING NECESSARY)
PROBE EXTD/REL - OFF
RECORD EMS ΔVC (RECORDED
FOR POST FLIGHT EVALUATION OF
UNDOCKING ΔV)

PRIMARY WATER EVAP ACTIVATION

GLY EVAP H2O FLOW - AUTO (VERIFY)
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - ACT (VERIFY)

SEC WATER EVAP ACTIVATION

ECS IND SEL - SEC
SEC COOL LOOP PUMP - AC2
(2) SEC EVAP H2O FLOW - AUTO
GLY DISCH SEC PRESS - 39-51 PSIG
SEC COOL LOOP EVAP - EVAP
SEC GLY EVAP OUT TEMP - 38-50.5°F
SUIT CKT HT EXCH - BYPASS 20 SEC, OFF
ECS IND SEL - PRIM



PANEL 8

● - CLOSE
○ - OPEN

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (PULL)
REPRESS PKG VLV - ON (ASSURES CM O2 SUPPLY
FULL BEFORE CM/SM SEP)
O2 SM SUPPLY VLV - OFF
SURGE TK - ON (VERIFY)
CAB PRESS REL VLV (2) - NORM
(5) CB WASTE H2O/URINE DUMP HTR (2) - OPEN
CB ECS PRIM RAD CONTR MNA/B (2) - OPEN
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN (REMOVES POWER FROM
GLYCOL MIXER TO CONSERVE BATTERY POWER)
ABORT SYS PRPLNT - RCS CMD (VERIFY)

CM RCS ACTIVATION

CB SECS ARM (2) - CLOSE
CUE STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO
FOR PYRO ARM (IF POSS)
SECS PYRO ARM (2) - ON (UP)
CM RCS PRPLNT 1 & 2
TB (2) - GRAY (VERIFY) (INDI-
CATES FUEL AND OXIDIZER
ISOLATION VALVES OPEN)
CM RCS PRESS - ON (UP)
RCS IND SW - CM1, THEN 2
HE PRESS STABILIZES AT 3750-3850
PSIA AFTER 15 MINUTES
MANF PRESS 287-302 PSIA
SECS PYRO ARM (2) - SAFE

CM RCS CHECK (Pg E/11-12)

*IF BOTH RINGS FAILED *
 *PERFORM ROLLING ENTRY *
 * CK LIST (Pg E/11-12)*

MAN ATT (3) - RATE CMD
 BMAG MODE (3) - ATT 1/RATE 2 (VERIFY)
 RHC - YAW LEFT 45° FROM BURN ATT (315°)

GO TO ENTRY (Pg E/11-13)

CM RCS CK

AUTO RCS SEL A/C ROLL (4) - OFF
 (VERIFY)
 CB RCS LOGIC (2) - CLOSE (VERIFY)
 SC CONT - CMC/FREE (CONTROL MAY BE
 SCS/MIN IMP AT OPTION OF CREW)
 RCS TRNFR - CM
 AUTO RCS SEL (RING 1) - OFF
 AUTO RCS SEL (RING 2) - MNB
 TEST RING 2 THRUSTERS (MIN IMP MAY
 NOT PRODUCE AUDIBLE JET FIRING.
 MORE THAN ONE CYCLE MAY BE REQ'D
 TO CLEAR LINES OF RESIDUALS AND
 ALLOW PROPELLANT TO JETS. IF
 MIN IMP, USE >1 CYCLE)
 AUTO RCS SEL (RING 1) - MNA
 AUTO RCS SEL (RING 2) - OFF
 TEST RING 1 THRUSTERS
 AUTO RCS SEL (RING 2) - MNB
 RCS TRNFR - SM

ROLLING ENTRY CK LIST

 * BMAG MODE (3) - ATT 1/RATE 2 *
 * MAN ATT (3) - RATE CMD (VERIFY) *
 * SC CONT - SCS *
 * MNVR TO 0°, 0° *
 * (PITCH FROM ENTRY PAD REMARKS) *
 * DBD/RATE - MIN/LOW *
 * AT RET .05G -90 SEC, JUST *
 * BEFORE CM/SM SEP: *
 * MAN ATT ROLL - ACCEL CMD *
 * ROLL RIGHT ~20°/SEC *
 * CAUTION: ATT HOLD IN PITCH AND *
 * YAW MUST BE MAINTAINED UNTIL *
 * CM/SM SEP *

PGA DOFFING AND STOWAGE CK LIST

EMER CABIN PRESS VLV - BOTH
 SUIT RET AIR VLV - OPEN (PULL)
 INSTALL HOSE SCREENS (B2)
 ON RETURN HOSES
 PWR - OFF
 SUIT PWR - OFF FOR DISCONNECT
 AUDIO CONT - NORM
 SUIT FLOW VLV - CABIN FLOW
 (FOR UNSUITED CREWMAN)
 (FULL FLOW FOR 3 UNSUITED)
 DOFF PGA'S
 (PGA bag C, DON BOOTS, JACKETS, COUNTER
 aft bkh) PRESSURE GARMENTS, AND CWG
 HARNESS (W/O CONN COVER)
 SNAP BIO-BELTS TO GARMENTS
 (U2) UNSTOW PGA BAG L AND R
 STOW PGA'S, HELMETS, HELMET
 BAGS, AND ACCESSORY BAGS IN PGA
 BAGS AND STOW ON TOP OF
 A1, A4, & A6
 REMOVE THE PGA POCKET ASSEMBLIES,
 WRIST DAMS, AND NECK DAMS FROM
 F2 AND STOW WITH THE RESPECTIVE
 PGA'S ON A1, A4, & A6
 SECURE BAGS WITH TIE DOWN STRAPS
 ATTACHED TO LOCKERS
 (R11) UNSTOW UCTA CLAMPS, ATTACH TO
 UCTA'S, AND STOW IN PORTABLE
 WASTE STOWAGE CONTAINER (U1)

NO COMM SINGLE IMPULSE

ENTRY

1

CM/SM SEP & DRPA JETT & PRE-ENTRY MNVR

cb SPS P & Y (4) - open
cb ELS/CM-SM SEP (2) - close
cb DOCK RING SEP (2) - close
VHF AM (A & B) - off (ctr)
PRIM GLY TO RAD - BYPASS (verify)
EMS MODE - STBY (verify)
CM RCS LOGIC - on (up)
SECS LOGIC (2) - on (up) (verify)
SECS PYRO ARM (2) - on (up)

MN BUS TIE (2) - on (up) (verify)
CM/SM SEP (2) - on (up)
DOCK RING SEP (2) - on (up)
 *If no DRPA JETT, go to backup *
 * probe retract procedure, pg E/14-4*
MAN ATT (3) - MIN IMP
BMAG MODE (3) - RATE 2
C/W MODE - CM
RCS TRNFR - CM
CM RCS MANF PRESS - 287-302 psia
CM RCS LOGIC - OFF
Monitor V MNA/B
 If <25 vdc go to EMERG POWER DOWN
YAW back to 0°
Track horiz on 29° window mark
 lift up until .2G

CM VHF antennas not available until apex cover jett.

Enables auto RCS transfer to CM/SM SEP.

Pyro bus should remain armed until splashdown because J series ELS pushbuttons are not single point failures.

Backup to auto transfer.

DATE 6/29/73

PAGE E/11-13

2

EMS INITIALIZATION

EMS FUNC - TEST 5
 Verify scroll on 37K fps
 EMS FUNC - RNG SET
 Set RNG to PAD DATA RTOGO
 EMS FUNC - Vo SET
 Slew scroll to PAD DATA VIO
 EMS MODE - STBY
 EMS FUNC - ENTRY
 Verify .05G lt filter is down

Removing filter improves visibility of .05G lt.

3

RSI ALIGNMENT

Verify RSI aligned to 0° (lift up)

FDAI SCALE - 5/5
 RHC PWR DIRECT #2 - MNA/B (verify)
 TAPE RCDR - HBR/RCD/FWD/CMD RESET

RET .05G

EMS MODE - BACKUP/VHF RNG
 (.05G lt - on)
 .05G sw - on (up)

EMS is started manually at RET .05G to ensure start of range counter at a fixed position (range from target) as defined by RTCC.

.2G

EMS ROLL - on (up)
 Roll to PAD bank angle
 MAN ATT (3) - RATE CMD

4

1G

Fly EMS, no roll reversal

Monitor altimeter
 Stop DAC
 DAC - T8

Go to EARTH/POST LANDING, Pg E/6-1

G&N SPS SINGLE IMPULSE DEORBIT BURN SEQUENCE

DURING SWS DEACTIVATION

Perform the following procedures after UNDOCK PREP
PANEL CONFIG CK (pg D/2-50) but prior to DEACTIVATION
CK LIST COMPLETE (pg E/12-3).

- 1 CM RCS PREHEAT
If sys test mtr 4b,5b,6b,7b,8b,9b
all read 1.5 vdc (40°F) or more,
omit preheat:
(8) cb RCS LOGIC (2) - close
(1) CM RCS LOGIC - on (up)
(8) cb CM RCS HTRS (2) - close
(101) CM RCS HTRS - on (up)
(Monitor manf press for press drop)
- 2 (F1)UNSTOW & DON MAE WESTS
- 3 SET UP CAMERA
CM4/DAC/18/CX03 - BRKT, MIR
(T11, 500, 7) 12 FPS
- 4 FINAL STOWAGE
ORDEAL
FDAI (2) - INRTL
PWR - OFF, STOW
(377) GLY TO RAD SEC vlv - BYPASS (CCW) (verify)
Attach both strut unlock lanyards
- 5 TERM. CM RCS PREHEAT (if initiated)
(101) CM RCS HTRS - OFF
(1) CM RCS LOGIC - OFF
(8) cb CM RCS HTRS (2) - open

Checks CM RCS 12,14,16,21,23 and 25 jet injector
valve temperatures, respectively.

Energizes RCS logic bus.

Direct coils utilized for preheating jets, (20 min).

Configures camera for fireball photography.

6 PYRO BAT CK
(229) cb PYRO BUS A
 PYRO BAT A - close (verify)
 cb PYRO BUS B
 PYRO BAT B - close (verify)
 DC IND - PYRO BAT A, then B
 *If PYRO BAT A(B) <31.5 vdc: *
 * cb PYRO BUS A(B) PYRO BAT *
 * A(B) - open *
 * cb PYRO BUS A(B) BAT BUS *
 * A(B) - close *
(275) cb MNA BAT C - close
 cb MNB BAT C - close
 DC IND - MNB

7 RSI ALIGNMENT
 FDAI SOURCE - ATT SET
 ATT SET - GDC
 EMS ROLL - on (up)
 GDC ALIGN pb - push & hold
 YAW tw - position RSI thru 45°
 & set to lift up (hds dn)
 or to lift dn (hds up)
 att per ENTRY UPDATE PAD
 GDC ALIGN pb - release
 EMS ROLL - OFF
 Align GDC to IMU
 FDAI SOURCE - CMC

Replaces failed pyro battery with entry battery.

Applies entry battery C to both main buses when
MN BUS TIE switches are on.

RSI ALIGNMENT is performed even if RSI alignment is
correct in order to check operation of RSI.

DEACTIVATION CK LIST COMPLETE

START DET COUNTING UP TO UNDOCKING
PERFORM PRE UNDOCKING SWITCH LIST (Pg E/12-3)

V48E, LOAD 4 JET, 2°/SEC, B/D ROLL; LOAD
N47 AND N48 FROM DEORBIT BURN PAD (Pg E/12-4)

V46E

PRE UNDOCKING SWITCH LIST

SET ΔV = +100.0 (IF ΔV COUNTER
IS SET AT 0.0, LOGIC RACE
CAUSES COUNTER TO JUMP WHEN
ACCELERATION IS SENSED)
EMS FUNC - ΔV
MAN ATT (3) - RATE CMD
DBD/RATE - MIN/HIGH (SELECTS 4°
DEADBAND WHICH CAN BE USED FOR
ROLL & YAW ATTITUDE HOLD
DURING COAST PERIODS)
RHC PWR NORMAL #2 - AC/DC
RHC PWR DIRECT #2 - MNA/B
THC PWR - ON (UP)
SC CONT - CMC/FREE (CMC/FREE
REQ'D TO PREVENT -X JETS FROM
FIRING CLOSE TO SWS)
BMAG MODE (3) - RATE 2
SPOT LIGHT - ON
AUTO RCS SEL (16) - MNA/B
CB SCS A/C ROLL MNA - CLOSE
CB SCS B/D ROLL MNA - CLOSE
CB SCS PITCH MNA - CLOSE (VERIFY)
CB SCS YAW MNA - CLOSE (VERIFY)
CB DOCK PROBE (2) - CLOSE
RHC #2 & THC - ARMED

UNDOCKING CK LIST

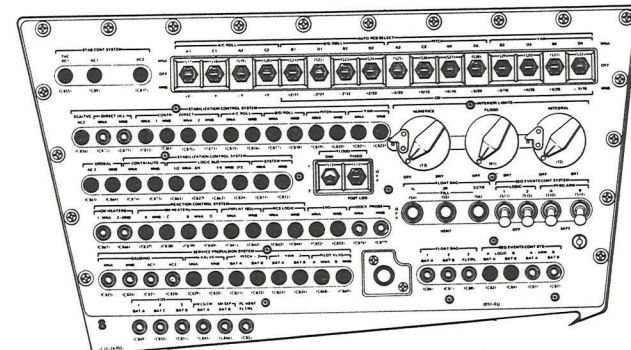
PROBE EXTD/REL - EXTD REL
TB - BP/THEN GRAY (HOLD ~5 SEC
UNTIL UNDOCK VERIFIED, BUT
<20 SEC. EXPECTED SEP ΔV
IS 0.38 TO 0.51 FPS)
PROBE EXTD/REL - RETR (PROVIDES
CAPTURE LATCH TB'S IF
REDOCKING NECESSARY)
PROBE EXTD/REL - OFF
RECORD EMS ΔV (RECORDED
FOR POST FLIGHT EVALUATION OF
UNDOCKING ΔV)

PRIMARY WATER EVAP ACTIVATION

GLY EVAP H2O FLOW - AUTO (VERIFY)
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - ACT (VERIFY)

SEC WATER EVAP ACTIVATION

ECS IND SEL - SEC
SEC COOL LOOP PUMP - AC2
(2) SEC EVAP H2O FLOW - AUTO
GLY DISCH SEC PRESS - 39-51 PSIG
SEC COOL LOOP EVAP - EVAP
SEC GLY EVAP OUT TEMP - 38-50.5°F
SUIT CKT HT EXCH - BYPASS 20 SEC, OFF
ECS IND SEL - PRIM



PANEL 8

● - CLOSE
○ - OPEN

20+00

G&N SINGLE IMPULSE

G&N SINGLE IMPULSE

20+00
(11103)
(01111)

V82E, VERIFY HP <38 NM (IF >, CONTINUE BURN UNTIL <)
P00
WARNING: WAIT UNTIL COMP ACTY LT - OUT
V66E (TRANSFERS CSM SV TO OWS SLOTS. DO NOT DO WHEN AVERAGE G
IS RUNNING. DO NOT DO UNLESS SATISFIED THAT CSM SV IS GOOD)
CM RCS CHECK (Pg E/12-5) *IF BOTH RINGS FAILED *
PERFORM ROLLING ENTRY
* CK LIST (Pg E/12-5)*
MNVR TO CM/SM SEP & DRPA JETT ATT (ASAP) (CM/SM SEP SHOULD BE
ACCOMPLISHED ASAP AFTER DEORBIT. IF DELAYED TO WITHIN 8 MIN
OF EI, RECONTACT MAY OCCUR)
SC CONT - SCS
BMAG MODE (3) - ATT 1/ RATE 2
YAW LEFT 45° FROM BURN ATT (315°)
GO TO ENTRY (Pg E/5-1)

20+10

20+20

20+30

CM RCS CK

AUTO RCS SEL A/C ROLL (4) - OFF
(VERIFY)
CB RCS LOGIC (2) - CLOSE (VERIFY)
SC CONT - CMC/FREE (CONTROL MAY BE
SCS/MIN IMP AT OPTION OF CREW)
RCS TRNFR - CM
AUTO RCS SEL (RING 1) - OFF
AUTO RCS SEL (RING 2) - MNB
TEST RING 2 THRUSTERS (MIN IMP MAY
NOT PRODUCE AUDIBLE JET FIRING.
MORE THAN ONE CYCLE MAY BE REQ'D
TO CLEAR LINES OF RESIDUALS AND
ALLOW PROPELLANT TO JETS. IF
MIN IMP, USE >1 CYCLE)
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - OFF
TEST RING 1 THRUSTERS
AUTO RCS SEL (RING 2) - MNB
RCS TRNFR - SM

ROLLING ENTRY CK LIST

* BMAG MODE (3) - ATT 1/RATE 2 *
* MAN ATT (3) - RATE CMD (VERIFY) *
* SC CONT - SCS *
* MNVR TO 0°, 0° *
* (PITCH FROM ENTRY PAD REMARKS) *
* DBD/RAIE - MIN/LOW *
* AT RET .05G -90 SEC, JUST *
* BEFORE CM/SM SEP: *
* MAN ATT ROLL - ACCEL CMD *
* ROLL RIGHT ~20°/SEC *
* CAUTION: ATT HOLD IN PITCH AND *
* YAW MUST BE MAINTAINED UNTIL *
* CM/SM SEP *

PGA DOFFING AND STOWAGE CK LIST

EMER CABIN PRESS VLV - BOTH
SUIT RET AIR VLV - OPEN (PULL)
INSTALL HOSE SCREENS (B2)
ON RETURN HOSES
PWR - OFF
SUIT PWR - OFF FOR DISCONNECT
AUDIO CONT - NORM
SUIT FLOW VLV - CABIN FLOW
(FOR UNSUITED CREWMAN)
(FULL FLOW FOR 3 UNSUITED)
DOFF PGA'S
(PGA bag C, DON BOOTS, JACKETS, COUNTER
aft bkh) PRESSURE GARMENTS, AND CWG
HARNESS (W/O CONN COVER)
(U2) SNAP BIO-BELTS TO GARMENTS
UNSTOW PGA BAG L AND R
STOW PGA'S, HELMETS, HELMET
BAGS, AND ACCESSORY BAGS IN PGA
BAGS AND STOW ON TOP OF
A1, A4, & A6
REMOVE THE PGA POCKET ASSEMBLIES,
WRIST DAMS, AND NECK DAMS FROM
F2 AND STOW WITH THE RESPECTIVE
PGA'S ON A1, A4, & A6
SECURE BAGS WITH TIE DOWN STRAPS
ATTACHED TO LOCKERS
(R11) UNSTOW UCTA CLAMPS, ATTACH TO
UCTA'S, AND STOW IN PORTABLE
WASTE STOWAGE CONTAINER (UT)

BLOCK DATA

TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												

REMARKS: _____												

BLOCK DATA PAD DESCRIPTION

- Block data pads provide a single impulse deorbit capability in the event of communications failure or rapid deorbit requirements
- Deorbit burn ignition time (TIG) referenced to GMT in Julian days (i.e., 1 January = day 1)
- Deorbit burn velocity change, fps (ΔVC)
- Deorbit burn duration (BT)
- GDC align tw settings for GDC alignment to ATM
- GDC burn attitude is 0°, 180°, 0°
- .05G time referenced from retroburn (RET .05G)
- EMS initialization value for range-to-go at .05G (RTOGO .05G)
- EMS initialization value of inertial velocity at .05G (VIO .05G)
- Entry interface (400,000-ft altitude) time referenced from retroburn (RET EI)
- Target latitude and longitude of splashdown

BLOCK DATA												
TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												
REMARKS: _____												

BLOCK DATA												
TIG DAY	X	X	X				X	X	X			
HR	X	X	X	X			X	X	X	X		
MIN	X	X	X	X			X	X	X	X		
SEC	X	X	X	X			X	X	X	X		
ΔVC	X	X					X	X				
BT	X	X					X	X				
GDC ALIGN R	X	X	X				X	X	X			
TW P	X	X	X				X	X	X			
SETTINGS Y	X	X	X				X	X	X			
BRN ATT GDC FDAI	R, P, Y						0°, 180°, 0°					
RET .05G	X	X					X	X				
RTOGO .05G	+						+					
VIO .05G	+						+					
RET EI	X	X					X	X				
LAT		0						0				
LONG												
REMARKS: _____												
REMARKS: _____												

2-1
3-2

(GET)

00+40

03+10

18:00

00+50

03+20

(11103)

(01111)

25:00

01+00

03+30

ASSUMPTIONS:

1. NOMINAL INSERTION ORBIT
2. NO RENDEZVOUS MANEUVERS HAVE BEEN PERFORMED
3. SUITS MAY BE DOFFED AT CREW'S DISCRETION IF TIME PERMITS (Pg E/13-5)
4. PRE-BURN PROCEDURES MARKED BY "*" ARE NECESSARY TO ENSURE A SAFE RETURN AND MUST BE PERFORMED BY THE CREW
THESE PROCEDURES CAN NOMINALLY BE PERFORMED IN ~20 MINUTES
5. PROCEDURES NOT MARKED BY "*" SHOULD BE PERFORMED AT THE CREW'S DISCRETION AS TIME PERMITS
6. THE DEORBIT BURN IS PERFORMED WITH THE G&M (N81 ΔV'S FROM BLOCK DATA PAD REMARKS)
7. USE EMS FOR ENTRY. IF EMS NO-GO, FLY PAD BANK ANGLE

- * SET DET COUNTING UP TO DEORBIT BURN TIG
- * VERIFY ECS POST INSERTION CONFIG PERFORMED (Pg L/3-2)
- * V48E, VERIFY CSM DAP, 4 JET, .5° DBD, AND 2°/SEC V46E
- * PERFORM CM RCS PREHEAT CK LIST (Pg E/13-3)
- * VERIFY ORDEAL STOWED
- * PERFORM LOGIC SEQUENCER CK (Pg E/13-3)

UNSTOW & DON MAE WESTS (F1)
& HEEL RESTRAINTS (B1)

SET UP CAMERA FOR FIREBALL PHOTOGRAPHY
CM4/DAC/18/CX03 - BRKT, MIR
(T11, 500, 7) 12 FPS

- * PERFORM PYRO BAT CK (Pg E/13-3)

CM RCS PREHEAT CK LIST

NOTE: DIRECT COILS UTILIZED FOR PREHEATING JETS (20 MIN)
IF SYS TEST MTR 4B, 5B, 6B, 7B, 8B, & 9B ALL READ 1.5 VDC (40°F) OR MORE,
OMIT PREHEAT:
(CHECKS CM RCS 12, 14, 16, 21, 23, & 25 JET INJECTOR VALVE TEMPERATURES, RESPECTIVELY)
(8) CB RCS LOGIC (2) - CLOSE
(1) CM RCS LOGIC - ON (UP)
(ENERGIZES RCS LOGIC BUS)
(8) CB CM RCS HTRS (2) - CLOSE
(101) CM RCS HTRS - ON (UP) (PLT CONFIRM, MONITOR MANF PRESS FOR PRESS DROP)

LOGIC SEQUENCER CK

NOTE: CHECKS STATUS OF ELS PUSHBUTTONS, CM/SM SEP SWITCHES, AND 24K' BARO SWITCHES
SECS PYRO ARM (2) - SAFE (VERIFY)
SECS LOGIC (2) - OFF (VERIFY)
(8) CB SECS LOGIC (2) - CLOSE (VERIFY)
CB SECS ARM (2) - CLOSE
CB ELS/CM-SM SEP (2) - CLOSE
ELS LOGIC - ON (UP)
ELS - AUTO
COORDINATE NEXT 3 STEPS WITH STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO FOR PYRO ARM AS REQ'D
SECS LOGIC (2) - OFF
CB SECS ARM (2) - OPEN
ELS LOGIC - OFF
ELS - MAN
CB ELS/CM-SM SEP (2) - OPEN

PYRO BAT CK

(229) CB PYRO BUS A
PYRO BAT A - CLOSE (VERIFY)
CB PYRO BUS B
PYRO BAT B - CLOSE (VERIFY)
DC IND - PYRO BAT A, THEN B
IF PYRO BAT A(B) <31.5 VDC
* (REPLACES FAILED PYRO BAT*
* WITH ENTRY BAT): *
* CB PYRO BUS A(B) PYRO BAT*
* A(B) - OPEN *
* CB PYRO BUS A(B) BAT BUS *
* A(B) - CLOSE *
(275) CB MNA BAT C - CLOSE
CB MNB BAT C - CLOSE (APPLIES
ENTRY BAT C TO BOTH MAIN
BUSES WHEN MN BUS TIE
SWITCHES ARE ON)
DC IND - MNB

RSI ALIGNMENT

NOTE: RSI ALIGNMENT IS PERFORMED EVEN IF RSI ALIGNMENT IS CORRECT IN ORDER TO CHECK OPERATION OF RSI
FDAI SOURCE - ATT SET
ATT SET - GDC
EMS ROLL - ON (UP)
GDC ALIGN PB - PUSH & HOLD
YAW TW - POSITION RSI THRU 45° & SET TO LIFT UP (HDS DN) OR TO LIFT DN (HDS UP) ATT PER ENTRY
UPDATE PAD
GDC ALIGN PB - RELEASE
EMS ROLL - OFF
ALIGN GDC TO IMU
FDAI SOURCE - CMC

EMS ENTRY CK

(8) EMS FUNC - OFF
CB EMS (2) - CLOSE
EMS MODE - STBY
EMS FUNC - EMS TEST 1 (WAIT 5 SEC)
EMS MODE - NORMAL (WAIT 10 SEC)
CHECK IND LTS - OUT
RANGE IND - 0.0
SLEW HAIRLINE OVER NOTCH
IN SELF-TEST PATTERN
EMS FUNC - EMS TEST 2
.05G LT - ON (ALL OTHERS OUT)
WAIT 10 SEC
EMS FUNC - EMS TEST 3
.05G LT - ON
RSI LOWER LT - ON (10 SEC LATER)
SET RANGE COUNTER TO 58 NM ±0.0
EMS FUNC - EMS TEST 4
.05G LT - ON (ALL OTHERS OUT)
G-V TRACE WITHIN PATTERN TO LWR RT CORNER @9G
RANGE IND COUNTS DOWN TO 0.0 ±0.2 NM
EMS FUNC - EMS TEST 5
.05G LT - ON
RSI UPPER LT - ON (10 SEC LATER)
RANGE IND - 0.0
SCRIBE TRACES VERTICAL LINE 9G TO 0.28 ±0.1G
EMS - OFF/STBY

01+00
03+30
(11103)
(01111)

PERFORM RSI ALIGNMENT (Pg E/13-3)

PERFORM EMS ENTRY CK (Pg E/13-3)

35:00

- * V49E, MNVR TO DEORBIT BURN PAD ATT (0,180,0) (Pg E/13-1)
- PERFORM PRIMARY AND SECONDARY
- WATER EVAP ACTIVATION (Pg E/13-4)
- * PANEL 8 CB CK (DIAGRAM Pg E/13-4)
- PERFORM CM RCS PREHEAT TERMINATION CK LIST (Pg E/13-4)
- * ACTIVATE CM RCS (Pg E/13-4)
- * SYS TEST METER - 3B (BAT RLY BUS)

01+10
03+40

45:00

- * P30, LOAD N33 FROM BLOCK DATA PAD; N81 FROM BLOCK DATA PAD REMARKS (Pg E/13-1)
- * PERFORM SEPARATION CK LIST (Pg E/13-4)

P52 (OPT 3) (,) AUTO OPTICS TO STAR
(LIMIT: SXT FOV, GNCS GO/NO-GO)

- * EXIT 06 92, V37E 40E
- PERFORM DEORBIT BURN PREP CK LIST (Pg E/13-4)
- GO TO SPS BURN-ENTRY CUE CARD

01+20
03+50

P40
SPS2 HORIZ CK

HORIZ CK - HORIZ ON 17°
WINDOW MK (HDS DN)
AT TIG -3 MIN
(LIMIT: +3°, GNCS GO/NO-GO)
*IF NO-GO, SET TW TO *
* PAD BURN ATT *
* SC CONT - SCS *
* TRACK HORIZ WITH 13° *
* WINDOW MK (HDS DN) *
* AT TIG -2 MIN, *
* HOLD ATT *
* GDC ALIGN PB - PUSH*
* BURN SCS *

HORIZ ON 5° WINDOW MK (HDS DN)
AT TIG

DEORBIT BURN

01+30
04+00

2-1/3-2
DEORBIT

PRIMARY WATER EVAP ACTIVATION

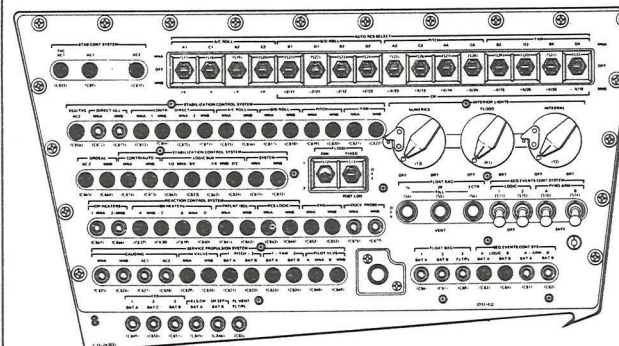
GLY EVAP H2O FLOW - AUTO (VERIFY)
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - ACT (VERIFY)

SEC WATER EVAP ACTIVATION

ECS IND SEL - SEC
SEC COOL LOOP PUMP - AC2
(2) SEC EVAP H2O FLOW - AUTO
GLY DISCH SEC PRESS - 39-51 PSIG
SEC COOL LOOP EVAP - EVAP
SEC GLY EVAP OUT TEMP - 38-50.5°F
SUIT CKT HT EXCH - BYPASS 20 SEC, OFF
ECS IND SEL - PRIM

CM RCS PREHEAT TERMINATION CK LIST

(101) CM RCS HTRS - OFF (SPT CONFIRM)
(1) CM RCS LOGIC - OFF
(8) CB CM RCS HTRS (2) - OPEN



PANEL 8

● - CLOSE
○ - OPEN

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (PULL)
REPRESS PKG VLV - ON (ASSURES CM O2 SUPPLY
FULL BEFORE CM/SM SEP)
O2 SM SUPPLY VLV - OFF
SURGE TK - ON (VERIFY)
CAB PRESS REL VLV (2) - NORM
(5) CB WASTE H2O/URINE DUMP HTR (2) - OPEN
CB ECS PRIM RAD CONTR MNA/B (2) - OPEN
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN (REMOVES POWER FROM
GLYCOL MIXER TO CONSERVE BATTERY POWER)
ABORT SYS PRPLNT - RCS CMD (VERIFY)

CM RCS ACTIVATION

CB SECS ARM (2) - CLOSE
CUE STDN
SECS LOGIC (2) - ON (UP)
STDN CONFIRM GO
FOR PYRO ARM (IF POSS)
SECS PYRO ARM (2) - ON (UP)
CM RCS PRPLNT 1 & 2
TB (2) - GRAY (VERIFY) (INDI-
CATES FUEL AND OXIDIZER
ISOLATION VALVES OPEN)
CM RCS PRESS - ON (UP)
RCS IND SW - CM1, THEN 2
HE PRESS STABILIZES AT 3750-3850
PSIA AFTER 15 MINUTES
MANF PRESS 287-302 PSIA
SECS PYRO ARM (2) - SAFE

DEORBIT BURN PREP CK LIST

STOW OPTICS EYEPieces
INSTALL OPTICS COVERS
CREW STRAPPED IN
SEAT PANS LOCKED
STOW COAS & LOCK IN MOUNT
SET ASCP TW TO DEORBIT BURN
PAD ATTITUDE
DIM LIGHTS FOR HORIZ CK

01+30
04+00

CM RCS CK (Pg E/13-5)

*IF BOTH RINGS FAILED *
PERFORM ROLLING ENTRY CK LIST
* (Pg E/13-5) *

MNVR TO CM/SM SEP & DRPA JETT ATT (ASAP) (CM/SM SEP SHOULD BE ACCOMPLISHED ASAP AFTER DEORBIT. IF DELAYED TO WITHIN 8 MIN OF EI, RECONTACT MAY OCCUR)

SC CONT - SCS

BMAG MODE (3) - ATT 1/RATE 2

YAW LEFT 45° FROM BURN ATT (315°)

GO TO ENTRY (Pg E/5-1)

05:00

01+40
04+10

01+50
04+20

02+00
04+30

CM RCS CK

AUTO RCS SEL A/C ROLL (4) - OFF
(VERIFY)
CB RCS LOGIC (2) - CLOSE (VERIFY)
SC CONT - CMC/FREE (CONTROL MAY BE
SCS/MIN IMP AT OPTION OF CREW)
RCS TRNFR - CM
AUTO RCS SEL (RING 1) - OFF
AUTO RCS SEL (RING 2) - MNB
TEST RING 2 THRUSTERS (MIN IMP MAY
NOT PRODUCE AUDIBLE JET FIRING.
MORE THAN ONE CYCLE MAY BE REQ'D
TO CLEAR LINES OF RESIDUALS AND
ALLOW PROPELLANT TO JETS. IF
MIN IMP, USE >1 CYCLE)
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - OFF
TEST RING 1 THRUSTERS
AUTO RCS SEL (RING 2) - MNB
RCS TRNFR - SM

ROLLING ENTRY CK LIST

* BMAG MODE (3) - ATT 1/RATE 2 *
* MAN ATT (3) - RATE CMD (VERIFY) *
* SC CONT - SCS *
* MNVR TO 0°, 0° *
* (PITCH FROM ENTRY PAD REMARKS) *
* DBD/RAIE - MIN/LOW *
* AT RET .05G -90 SEC, JUST *
* BEFORE CM/SM SEP: *
* MAN ATT ROLL - ACCEL CMD *
* ROLL RIGHT ~20°/SEC *
* CAUTION: ATT HOLD IN PITCH AND *
* YAW MUST BE MAINTAINED UNTIL *
* CM/SM SEP *

SYSTEMS FAILED PROCEDURES

IMU FAILURE

NOTES

1. N20 NEED NOT AGREE WITH CURRENT SC ATTITUDE EXCEPT WHEN TAKING AN OPTICS MARK, PERFORMING COAS LOS DETERMINATION, OR IN V83 FOR θ .
2. EMP SL-50 CONVERTS GYRO TORQUING ANGLES (N93) INTO RESULTANT ACTUAL CDU ANGLES (N22) AND SETS N20 = N22.

(I) WHEN IMU FAILURE OCCURS

1. PERFORM STEPS (II), (III), AND (IV)
2. REQUEST EMP SL-50 UPLINK AT 1ST AVAILABLE OPPORTUNITY (MANUAL LOAD Pg E/14-3)
3. PROCEED TO APPROPRIATE POINT IN THE TIMELINE AND:
 - A. PERFORM GDC REFSMMAT REALIGN (P52) (Pg E/14-2) AS REQ'D
 - B. USE SCS FOR SEP, SHAPING, AND DEORBIT BURNS
 - C. USE EMS FOR ENTRY

(II) PRE-UNDOCK IMU FAILURE SWITCH LIST

FDAI SELECT - 1
FDAI SOURCE - ATT SET
ATT SET - GDC

POST UNDOCK IMU FAILURE SWITCH LIST

SC CONT - SCS
IMU PWR - OFF
DBD/RATE - MIN/HIGH
BMAG MODE (3) - ATT 1/RATE 2
MAN ATT (3) - RATE CMD
FDAI SELECT - 1
FDAI SOURCE - ATT SET
ATT SET - GDC
LIMIT CYCLE - ON

(III) SET REFSMMAT FLAG

KEY V37E 00E
V25 N7E, 77E, 10000E, 1E

(IV) INITIALIZE NO-DAP CONFIG

(VERIFY CSM-DAP HAS BEEN ACTIVATED PRIOR TO NO-DAP CONFIG)
KEY V48E, V21E, 00000E, PRO, PRO, PRO, V46E

GDC REFSMMAT REALIGN (P52)

NOTE: A VALID GDC ALIGNMENT IS NOT REQUIRED TO
PERFORM THIS PROCEDURE.

ASSUMPTIONS: EMP SL-50 IS LOADED
CMC - ON, SCS OPERATING, IMU - OFF
OPTICS ARE ZEROED
FOR OPTION 1, PREFERRED ENTRY REFSMMAT
HAS BEEN UPLINKED BY STDN

1. ZERO FDAI 1 ERR NEEDLES WITH ASCP TW
V25 N20E
LOAD N20 WITH ASCP TW ANGLES
V37E 52E

2. F 04 06 R1 00001 ALIGN OPTION
R2 00001 PREF PRO TO 3
3 REFSMMAT PRO TO 5

3. F 06 22 NEW ICDU ANGLES OG, IG, MG
(IF MG $>+70^\circ$, MNVR AND RELOAD N20,
V32E TO 4)
SET ASCP TW TO N22 VALUES
GDC ALIGN PB - PUSH
PRO

4. F 50 25 00013 GYRO TORQUE
PRO (NO ATT LT - ON, THEN OUT,
PROG ALM - IGNORE,
WILL TAKE 5 TO 6 MINUTES BEFORE
F 50 25 00015 IS DISPLAYED)

5. F 50 25 00015 ACQ STARS
(OPT 1) V37E 00E, PROCEDURES COMPLETE
(OPT 3) LIMIT CYCLE - ON (UP)
PRO (IF SS/ST, ENTR)
F 05 09 00405 NO PAIR
*PRO TO 6 *

6. F 01 70 OOCDE SENSOR/STAR CODE
LOAD DESIRED CODE
OPT MODE - CMC (VERIFY)
OPT ZERO - OFF
PRO

*F 05 09 00404 TA $>90^\circ$ *
*PRO TO 7, MANUALLY *
*ACQUIRE STARS OR USE *
*SS/ST *

7. 06 92 SHAFT, TRUN (.01, .001°)
(MARK ROUTINE) OPT MODE - MAN
(3RD STAR CHECK) V37E TO 17

8. F 51 PLEASE MARK
N20 = CURRENT GDC ATTITUDE (VERIFY)
MARK

9. F 50 25 00016 TERMINATE MARKS
PRO

10. F 01 71 000DE STAR CODE
LOAD STAR CODE (IF NECESSARY)
PRO: C = 2 TO 11
1ST MARK, TO 6
2ND MARK, TO 12

11. F 06 14 STAR TRACKER GMBL ANG
LOAD RECORDED ANGLES
PRO
1ST MARK TO 6
2ND MARK TO 12

12. F 06 05 ANGULAR SEP ERROR, ANGULAR SEP (.01°)
(REJECT) V32E TO 16 IF ANG ERROR $>.4^\circ$
(ACCEPT) PRO