NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

APOLLO 14
CSM 110
REVISION B

COMPLETE REVISION

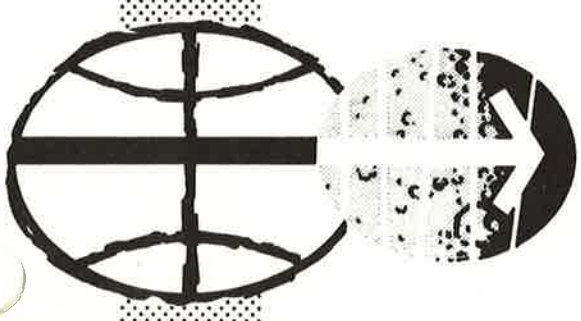
CSM CUE CARDS

PREPARED BY

FLIGHT DATA SECTION

FLIGHT PLANNING BRANCH

FLIGHT CREW SUPPORT DIVISION



MANNED SPACECRAFT CENTER

HOUSTON, TEXAS

DECEMBER 21, 1970

APOLLO 14

CSM CUE CARDS

REVISION B

DECEMBER 21, 1970

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APOLLO 14

CSM CUE CARDS

LIST OF EFFECTIVE PAGES

BASIC 8/8/70
REVISION A 11/9/70
REVISION B 12/21/70
PEN & INK 1/13/71
" " 1/20/71
" " 1/22/71, 1/26/71

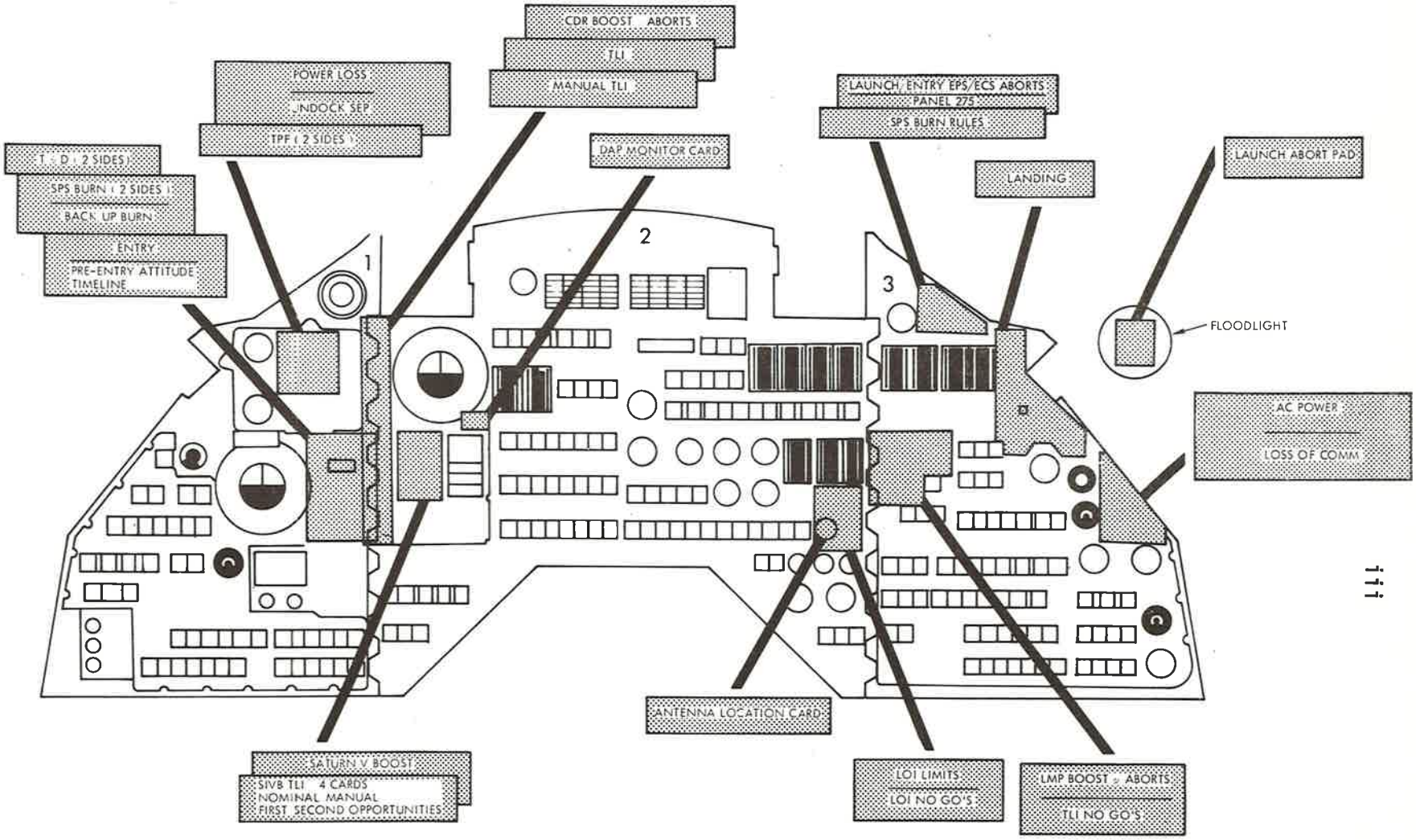
* INDICATES CURRENT CHANGE

PAGE NUMBER	CHANGE DATE
*i	12/21/70
ii and iii	BASIC
*1	12/21/70
2 and 3	BASIC
*4 thru 12	12/21/70
*13	~~BASIC~~ ~~1/13/71~~ 1/26/71
*14 ~~and 15~~	12/21/70
*15	1/20/71
16	BASIC
*17	12/21/70
18	BASIC
*19 thru 32	12/21/70
*21	1/20/71

*This revision is a complete reprint and includes all changes to date. The changes incorporated in this revision that have not been previously published are dated 12/21/70.

Velcro locations have been revised to fit Apollo 14 spacecraft per fit check 12/17/70.

CONTENTS
AUGUST 8, 1970



CSM CUE CARD LOCATIONS

AUGUST 8, 1970

F 1A

CDR BOOST & ABORTS

12/21/70

EMS - ΔV TO 6999.9 FPS
PREP
-3:00 DSKY - VERIFY P02
V75 DO NOT ENTER

00:00 LIFT OFF, MODE IA
CLOCK RUNNING
P11 AUTO START
00:02 YAW MNVR
00:11 R&P PROG — +4°/sPY
00:30 ROLL COMPL — ∓20°/sR
00:42 MODE IB
PRPLNT DUMP - RCS CMD
00:50 MONIT ∝ TO T+2:00
100%, 5° ATT ERR
CABIN PRESS DECR
01:21 MAX Q
02:00 MODE IC
EDS AUTO - OFF
2 ENG OUT - OFF
LV RATES - OFF
02:16 IECO
02:45 OECO/STAGING/IGN
03:20 TWR JETT, MODE II
MAN ATT (P)-RT CMD
∝/Pc-Pc
STEAM/H2O - AUTO
03:26 GUIDE INIT (OECO +41)
05:45 SIVB TO COI
06:00 GMBL MTRS - ON
CK GPI
P-1.42 — +9°/sPY
Y+1.32 — ∓20°/sR
07:44 IECO
08:39 LEVEL SENSE ARM
09:00 MODE IV
09:17 OECO/STAGING
09:19 SIVB IGN
10:08 MODE III
11:44 SECO
11:54 INSERT VI

CUTOFF VI+100

F 1B

MODE IA (:00 - :42)
:00 CCW NEUT *CM/SM SEP*
ELS AUTO
:14 ELS LOGIC
TWR JETT, APEX JETT
:16 DROGUES
:18 He DUMP
<3.8K OR 28s & <10K - MAINS

MODE IB (:42 - 2:00)
:00 CCW NEUT *CM/SM SEP*
ELS AUTO
:11 CANARDS
:14 ELS LOGIC
24K TWR/APEX JETT, DROGUES

MODE IC (2:00 - TWR JETT)
:00 CCW NEUT *CM/SM SEP*
RCS CMD - ON
:11 CANARDS V82E

Ha>32,PLAT GO	Ha<32, NO GO
TWR JETT	*P+5°/SEC *
MAN ATT(P)-	*HI+P, R 90°*
RT CMD	*DAMP RATES *
0/135/0	*ROLL HDS DN*
BMAG(3)-1/2	30K ELS AUTO
EMS-ENT/NORM	ELS LOGIC
.05G LT/SW-ON	24K TWR JETT
MAX LIFT	APEX/DROGUES

MODES II - III - IV
:00 ABORT - CCW(4s) NEUT
:03 CSM/LV SEP - PUSH
RCS CMD - ON
:05 +X TO :24 V82E

II N44(TFF)	III N50(ΔR)
>2m/YAW 45° L	BMAG(3) - 1/2
BMAG(3)-1/2	180/194/0
SM SEP	EMS-NORM
CM RCS	BURN ΔR=0
0/120/0	>2m/YAW 45° L
CSM/LM FNL SEP	SM SEP
EMS-ENT/NORM	0/105/0(FL)
MAX LIFT	AT .2G
	305/105/0(HL)

IV N62(VI)
180/356/0
EMS-NORM/IGN
Hp >75 +6s or
Ha=200 &+HDOT

B 1B

B 1A

HOOK VELCRO

8/8/70

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

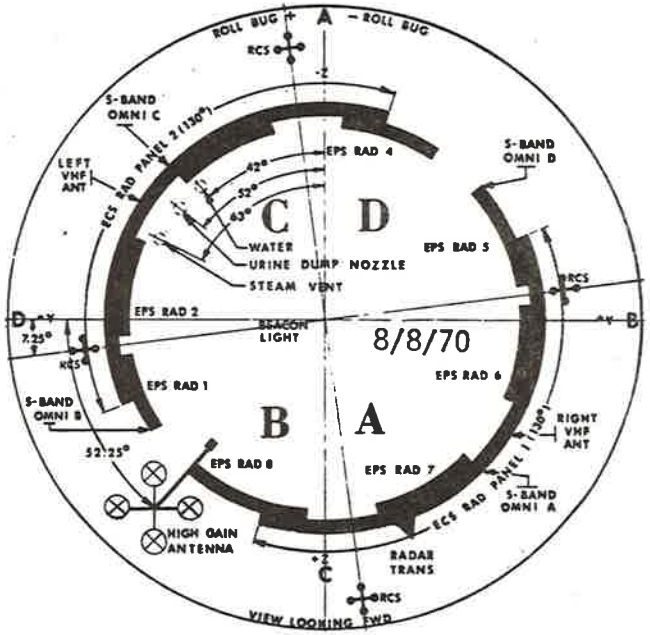
HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

LAUNCH ABORT PAD 8/8/70

TIG	
ΔV	6999.9
EMS CUTOFF	
BT	
PITCH (BURN)	
GET 300 K	
PITCH (.05G)	
GET DROGUE	



	VEHICLE CONFIG	QUAD A/C FOR $\ddot{x}$	QUAD B/D FOR $\ddot{x}$	ERR DEADBAND	RATE SELECT
R1	0 = No DAP 1 = CSM 2 = CSM & LM 3 = CSM & SIVB 6 = CSM & LM (Ascent Stg only)	0 = Fail A/C 1 = Use A/C	0 = Fail B/D 1 = Use B/D 8/8/70	0 = ±0.5° 1 = ±5.0°	0 = 0.05°/sec 1 = 0.2°/sec 2 = 0.5°/sec 3 = 2.0°/sec
	Roll Quad Select	Quad A	Quad B	Quad C	Quad D
R2	0 = Use B/D 1 = Use A/C	0 = Fail 1 = Use	0 = Fail 1 = Use	0 = Fail 1 = Use	0 = Fail 1 = Use

B 3

B 2

USE CUT EDGE OF HOOK VELCRO HERE
4 PLY SHIM. LET VELCRO & SHIM OVERHANG 1/16"
12/21/70

HOOK VELCRO
8/8/70

HOOK VELCRO

HOOK VELCRO

B 4

12/21/70

HOOK VELCRO

F 5

SATURN V BOOST

LAUNCH JAN 31, 1971 12/21/70

THIS CARD TO BE PRINTED ON INDEX WGT (K 10) STOCK

DET	θ	V_I	$\dot{H}$	H
00:00	90	1341	0	.0
:30	85	1394	271	.6
1	69	1829	755	3.0
1:30	51	2920	1405	8.3
2	34	4853	2113	17.0
2:15*	29	6202	2489	22.7
2:30	25	7442	2720	29.1
2:45*	22	8938	2988	36.0
3	22	9103	2688	43.1
3:30	24	9657	2195	55.1
4	26	10291	1836	65.1
4:30	24	11018	1508	73.3
5	21	11846	1211	80.0
5:30	17	12778	947	85.3
6	14	13823	719	89.4
6:30	11	14998	531	92.5
7	7	16320	388	94.7
7:30	4	17817	298	96.4
8	3	19289	244	97.7
8:30	359	20572	214	98.8
9	355	21999	232	99.9
9:17*	353	22862	272	100.6
9:30	351	22999	217	101.1
10	347	23527	128	102.0
10:30	343	24083	58	102.4
11	340	24668	13	102.6
11:30	337	25281	-9	102.6
11:43*	337	25562	-1	102.6

B 5

HOOK VELCRO
ADD 4 PLY SHIM

12/21/70

F 6

LAUNCH/ENTRY EPS/ECS ABORTS

8/8/70

EPS ABORTS

UNCONTROLLED MAIN BUS SHORT
LOSS OF 3 FUEL CELLS & 1 BAT
LOSS OF BOTH AC BUSES DURING I & II

LOSS 2 OR 3 FC
- ATTEMPT RECONNECT
- EDS AUTO - OFF
- USE BAT C

MN BUS SHORT >25a
- EDS AUTO - OFF
- USE BAT C, INV 3
- PWR DN SHORTED BUS

LOSS 1 AC BUS OR INV
- USE INV 3

LOSS 1 OR 2 BATS
- EDS AUTO - OFF
- USE BAT C
- cb BAT BUS/MAIN BUS - OPEN

BAT BUS SHORT >22a
- EDS AUTO - OFF
- cb BAT BUS/MAIN BUS - OPEN
- cb BAT C/MAIN BUS - CLOSE
- X IF SEP REQ - AUTO RCS X
- X TVC GMBL DRIVE - 2 X
- X SPS GMBL MOT P/Y - 2 X
- X SPS GMBL CNTL cb (4) - OPEN X

LOSS BAT RELAY BUS
- NO ACTION

ECS ABORTS
- LOSS OF CABIN & SUIT PRESS
- CABIN PRESS & SUIT O2
- NOT SUFFICIENT

CUT OFF THIS PART

F 7

LMP BOOST & ABORTS

12/21/70

00:00	IA
00:42	IB
00:50	CAB PRESS
02:00	IC
02:45	OECO/STAGING
03:20	II - TWR JETT
	STEAM/H2O-AUTO
06:00	GMBL MTRS-ON
06:15	OMNI ANT-D
09:00	IV
09:17	OECO/STAGING
10:08	III
11:44	SECO
11:54	INSERT

IA
- BELOW 3800'
- MAIN DEPLOY

IB
- 24K TWR JETT
- ✓LAND PROC

IC
- IMU GO
- PITCH-RATE CMD
- 0, 135, 0
- BMAG-1/2
- EMS-ENTRY/NORM
- .05G-MAX LIFT

IC
- IMU NO GO
- PITCH +5°/SEC
- 30K ELS LOGIC-ON
- 24K TWR JETT
- ✓LAND PROC

II
- BMAG - 1/2
- cb MN A&B BAT C (2)-CLOSED
- CM/SM SEP-ON
- 0, 120, 0
- CMS/LM FNL SEP
- EMS-ENTRY/NORM
- SINGLE RING
- .05G - EMS ROLL
- MAX LIFT

30K
- ELS LOGIC-ON
- ✓LAND PROC

III
- BMAG - 1/2
- 180, 194, 0
- EMS - NORM
- ΔV THRUST A - NORM
- 2:05 DIRECT ULLAGE pb
- THRUST ON pb
- ΔV THRUST(2) - OFF
- cb MN A&B BAT C(2)
- CM/SM SEP
- 0, 105, 0
- FULL LIFT

III
- CSM/LM FNL SEP
- EMS-ENTRY/NORM
- SINGLE RING
- .05G - EMS ROLL
- .2G 305, 105, 0
- HALF LIFT
- 30K ELS LOGIC - ON
- ✓LAND PROC

IV
- EMS NORM
- FIXED ATT BURN (Horiz, SEF, HDS DN)
- Copy PAD
- SCS TVC(2)-AUTO
- ΔV THRUST(A)-NORM
- DIRECT ULLAGE pb
- THRUST ON pb

CUT OUT THIS PART

B 6

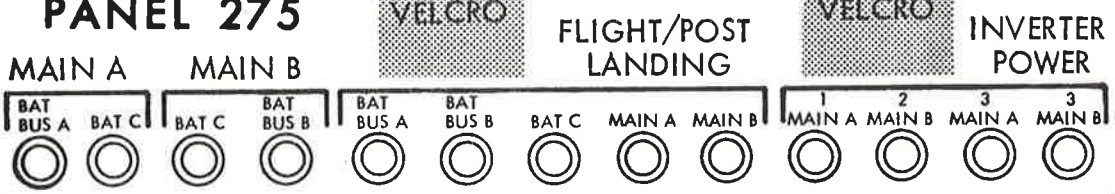
8/8/70

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

PANEL 275



B 7

TLI NO GO'S

12/21/70

HOOK VELCRO

HOOK VELCRO

LOSS OF:

1 CABIN
2 FIRE or SMOKE
3 O2 MANIFOLD (Leak)
4 MAIN O2 REG, fail: (1) closed/(2) open
5 ECS COOLANT LOOP
6 ECS RADIATOR
7 GLYCOL (Leak)
8 HUMIDITY (High)
9 SUIT COMPRESSOR
10 SUIT CIRCUIT
11 (2) OVRBD DUMPS
12 CRYO TANK
13 FUEL CELL
14 ENTRY BAT
15 MN BUS/BAT BUS/AC BUS/BAT RELAY BUS
16 (2) INVERTERS
17 AC ØA (AC1 or AC2)
18 SMJC ACTVD
19 SEQ SYSTEM
20 AUTO ATT, 1 Axis
21 RATE DAMP, 1 Axis
22 DIRECT RCS, 1 Axis
23 (2) BMAG R, P or Y
24 (2) FDAI
25 THC
26 (2) RHC
27 CMC, ISS or OSS
28 OPTICS DAC
29 TVC SERVO LOOP
30 (2) DSKY
31 SPS FU/OX (Leak)
32 GN2 TANK (Leak)
33 BALL VALVE BANK
34 FEEDLINE TEMP < 40°F
35 FU/OX ΔP > 20 psi
36 ULLAGE Capability
37 SPS He TANK (Leak)
38 SM RCS He TANK (Leak)
39 PKG TEMP < 55°F
40 THRUSTERS: (2) P,Y/(3) R
41 CM RCS He TANK (Leak)
42 CM RCS MANIFOLD (Leak)
43 CM RCS ARMED

HOOK VELCRO

F 8

AC POWER
12/21/70

AC BUS LIGHT
+
MN BUS UNDER-VOLT
+
BUS OVERLOAD

CUT OFF THIS PART

AFFECTED AC BUS - OFF
WITHIN 5 SEC
(AC BUS SHORT)

MN BUS LOSS
BRING ON INV 3
RECONFIGURE F/C's

HOOK VELCRO

AC USERS
SUIT COMP, GLY PUMP, TELECOM,
F/C PUMPS, G&N PWR, S-BD XPND/PWR AMP,
RAD FLOW CONT

ELECTRICAL POWER USERS
02 HTRS, GMBL MTRS, RAD HTRS, FC PUMPS,
SM RCS HTRS, POT H20 HTR, H2 HTRS, CABIN FANS,
SPS LINE HTR, LIGHTS, S-BD PWR AMP, TAPE RCDR,
GLY/EVAP STM PRESS, H20 FLOW CONT, TEMP IN CONT,
CMC TO STBY, G&N PWR DOWN, GLY PUMPS, SEC LOOP, ECS RAD
CONT/HTR cb's SEC PWR, VHF, HGA PWR, TELECOM GP 1&2,
ONE INVERTER OPERATION, INSTRU ESS MN A&B cb's,
SUIT COMPR, HYCON CAMERA, CRYO FANS, SPS GAUGING SWITCH,
TVC GIMBAL DR (P&Y) -1, BMAG 2-OFF, C/W NORMAL - ACK

LOSS OF COMM

12/21/70

A. Verify lunar comm config, except during coast phase: S-BAND AUX TAPE SW-OFF

B. UP TLM CMD-RESET

Verify all Panel 225 cb's closed.

C. Attempt reacquisition with HGA if signal strength <60%.

D. Select omni desired if unable to acquire with HGA.

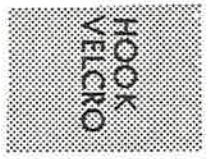
E. If still no comm, SEC XPNDR AND PWR AMP.

F. Wait 90 sec if still no comm PMP PWR-AUX.

G. If still no comm, S-BD AUX TAPE DN VOICE B/U.

H. Request ground transmit CREW ALERT

When CREW ALERT ON, UP VOICE B/U.



(Wait 3 min for MSFN reconfig.)

I. Go to T/C MALF.

F 9

POWER LOSS

12/21/70

CUT OFF THIS PART

MNA
TVC GMBL DR (P&Y) - 2
cb SPS P2, Y2 - OPEN
FDAI - 2
ΔV THRUST B - NORM
SCS TVC - RT CMD
BMAG MODE(3) - RATE 2
RHC PWR DIR 2 - MNB
AUTO RCS - MNB

HOOK VELCRO

FDAI - 1
GMBL MTRS P1,Y1
ΔV THRUST A
GDC(EXCEPT RSI)
BMAG - 1
AUTO SCS ΔV

MNB
TVC GMBL DR
(P&Y) - 1
cb SPS P1, Y1 - OPEN
ΔV THRUST A - NORM
SCS TVC - RT CMD
AUTO RCS - MNA
BMAG MODE(3) - RATE 1
RHC PWR DIR 1 - MNA

FDAI - 2
GMBL MTRS P2,Y2
ΔV THRUST B
GDC
BMAG - 2

HOOK VELCRO

AC1
TVC SERVO PWR 1-AC2/MNB
BMAG MODE(3) - RATE 2
FDAI - 2

TIGHT
Pc<80 or
>10 decay

HOOK VELCRO

FDAI - 1
BMAG - 1
GDC(EXCEPT RSI)
MIN IMP
RATE CMD
RHC 1-MTVC
GPI-1
EMS ΔV (LTG)
AUTO SCS ΔV

AC2
TVC SERVO PWR 2-AC1/MNA
BMAG MODE(3) - RATE 1
SCS TVC(2) - AUTO
ΔVCG-LM/CSM
MTVC WITH TRIM TW'S

FDAI - 2
GDC
BMAG - 2
RATE CMD
MTVC
GPI - 2

LOOSE
Pc<70

HOOK VELCRO

B 9

UNDOCK SEP 12/21/70

_____:_____:_____ GETI N33
0, 0, -1.0 ΔVXYZ N81
_____ _____ _____ RPY N22

P30 Load SEP
V49 MNVR to UNDOCK ATT
Set EMS ΔV -100.0, CK NULL BIAS, ΔV/STBY
GDC ALIGN, Verify ORDEAL, h = 40 nm
ATT DB - MIN, RATE - LOW
RHC PWR NORM - AC/DC
RHC PWR DIRECT - MNA/MNB
AUTO RCS (16) - MNA or MNB
cb DOCK PROBE (2) - close
P41 AUTO TRIM, SC CONT - SCS
BMAG (3) - ATT 1/RATE 2
V48 Load DAP 11101, X1111
RHC & THC - ARMED
59:30 EMS MODE - NORMAL, DAC - ON
THC PWR - on
00:00 PROBE - EXTD/REL Momentary
Damp ~ 5 sec
PROBE - EXTD/REL (Hold till free)
After 2 sec, THC -X for ~3 sec, VGX to +2.0
Verify SEP, PROBE EXTD/REL - OFF
THC & RHC - LOCKED, THC PWR - OFF
POO
SC CONT - CMC, ATT DB - MAX
ΔVCG - CSM, BMAG (3) - RATE 2
RHC PWR DIRECT - OFF
AUTO RCS ROLL (4) - OFF
EMS FUNC - ΔV SET/VHF RNG,
EMS MODE - VHF RNG
VHF ANT - LEFT
Set VHF for ranging

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

F 10

1/26/71
1/13/71
8/8/70

LANDING

90K(06:36) START WATCH-
STEAM PRESS
50K CABIN PRESS - B/E
154 SECS PYRO - ARM
( )TIME FR STM PRESS
40K
CM UNSTABLE
RCS CMD - OFF
APEX JETT - P
WAIT 2 SEC
DROG DEPLOY

30K ELS LOGIC - ON
1:26 ELS - AUTO START DAC-TII
24K APEX JETT - P
1:38 WAIT 2s DROG DEPLOY
( )TIME FR STM PRESS
DROGUE FAIL
ELS - MAN
STABILIZE CM
5K - MAINS
ELS - AUTO

17K IF NO CAB PRESS INCR,
CAB PRESS - DUMP
10K MAIN DEPLOY
2:29 VHF ANT - RECY
VHF AM A-SIMPLEX, VHF BCN-ON
SURGE TK-OFF, REPRESS PKG-OFF
VOICE REPORT
DIRECT O2 vlv - OPEN
CAB PRESS - CLOSE
CM RCS LOGIC - ON
CM PRPLNT - DUMP
cb F&PL BAT A, B, C(3)-CLOSE
cb F&PL MN A&B (2)-OPEN
cb BAT RELAY BUS(2)-OPEN
CM PRPLNT - PURGE
STRUT LOCKS - UNLOCK

CUT OUT

			:	:		RRT
X	X	X		:		.05G
X	X	X		:		Vcirc
X	X	X		:		BBO
X	X	X		:		EBO
X	X	X		:		PRESS
X	X	X		:		DRO
X	X	X		:		MAINS
X	X	X		:		LDG

3K CM RCS PRPLNT-OFF
FLOOD LT-POST LDG
CAB PRESS - DUMP
1K CAB PRESS-CLOSE
MN BUS TIE-OFF

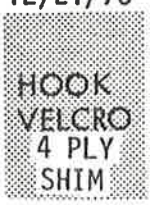
POST LANDING
cb MAIN REL PYRO(2) - CLOSE
MAIN REL - on
SECS PYRO ARM(2) - SAFE
SECS LOGIC (2) - OFF
cb PL VENT - CLOSE
cb FLOAT BAG (3) - CLOSE
cb UPRIGHT SYSTEM (2) - CLOSE
STABLE II FLOAT BAG (3)-FILL UPRIGHT
+2MIN, VHF A&B & BCN-OFF INVERTED
STABLE I AFTER 10 MIN,
FLOAT BAG(3)-FILL 7 MIN, THEN OFF

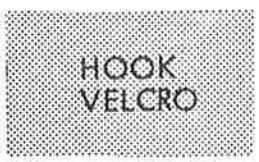
CUT OUT THIS PART

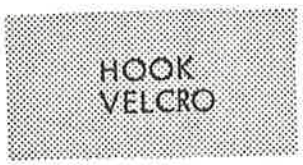
CUT OUT THIS PART

CUT OUT THIS PART

12/21/70







F 11A

1/22/71
~~1/20/71~~
~~12/21/70~~

TLI

LAUNCH JAN 31, 1971

XLUNAR-INJECT, EDS PWR-ON
EMS TEST-STBY-SET ΔVc-ΔV
GDC ALIGN, PYRO ARM (2)-on
THC PWR - ON
RHC PWR NORM (2)-AC/DC
DIR (2)-MNA/MNB
LV IND/GPI - SII/SIVB
LV GUID - IU
cb DIRECT ULLAGE(2)-close
Set DET to 51:00

GET TB6 ____ : ____ : ____

TB6 - SII SEP Lt - on
51:00 When Lt Out START DET
SC CONT - SCS
TK PRESS | O>F 36 / F>O 26 / LOX>50 | EMER SEP
ORDEAL - 300/LUNAR
57:00 FDAI P= 18°
V37E 47E
CK BIAS
58:00 N62E
SCS TVC SERVO PWR #1 - AC1/MNA, #2 - OFF
TAPE RCDR-HBR/RCD/FWD/ CMD RESET
58:20 EMS MODE - NORMAL
58:36 SII SEP Lt - on
58:38 SIVB ULLAGE
59:00 FDAI P= 10°
59:42 SII SEP Lt - out
~~(No TLI Inhibit)~~ (TLI INHIBIT, LV STAGE SW)
59:55 SIVB ULLAGE STOPS
FDAI P= 6°
59:59 LV ENG 1 Lt - ON
ORDEAL-OPR/SLOW

GET IGN ____ : ____ : ____

F 11B

00:00 SIVB IGNITION
00:02 LV ENG 1 Lt - OUT
00:12 (No TLI INHIBIT)
SIVB ECO ____ : ____ : ____
Lt ON
VI ____

*B/U ECO VI AND BT + 2 ~~8~~s *
*LV STAGE *
*THC CCW & NEUTRAL *

BT+2 ~~8~~s ____

GET ____ : ____ : ____

KEY VERB (1 Comp Cycle)
F16 83 SCS TVC SERVO PWR#1 -OFF
PCM BIT RATE - LOW
EMS MODE - STBY ΔVc/ OFF
SEC PYRO ARM(2)-SAFE
FDAI #1 - INRTL

CUT OUT THIS PART

B 11B

B 11A

HOOK VELCRO

8/8/70

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

MANUAL TLI

12/21/70

LAUNCH JAN 31, 1971

XLUNAR-INJECT (Verify)
EDS POWER - ON, EMS-ΔV/STBY
GDC-SATURN DAP
SECS PYRO ARM (2) - on
THC PWR - ON
RHC PWR NORM (2)-AC/DC
DIR (2)-MNA/MNB
ΔV IND GPI-SII/SIVB
cb DIRECT ULLAGE (2)-close
Cycle CRYO FANS
Set DET to 51:00
LOAD TB6 PROGRAM
V25 N33E
LOAD GET OF TB6
V37E 15E
16 35 - MONITOR FOR TB6
LV GUID-CMC, SC CONT-SCS

TK PRESS	0>F 36 F>O 26 LOX>50	EMER SEP

ORDEAL 300/LUNAR, FDAI #1
N20E - FLY TLI ATT
R_____ P_____ Y_____

SET FDAI #1 PITCH = 0°
INERTIAL PITCH = 126.87
MONITOR TB6
TB6 _____:_____:_____

TB6+10s, F37
START DET WHEN S-II SEP LT -OUT
P47, CHECK BIAS(N83)
N20E
FLY ATT
57:10 ORDEAL - OPR/SLOW
SCS TVC #1 - ACI/MNA
TAPE RCDR
TLI_____:_____:_____

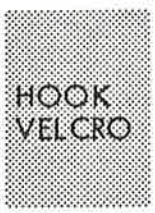
N62 VI,H,H VI _____

SECO: DET ____:____:____

GET ____:____:____

STAGE/THC

8/8/70



F13

SIVB TLI - NOMINAL FIRST OPPORTUNITY

LAUNCH JAN 31, 1971 AZ 72°
12/21/70

DET	θ	Ψ	V_I	$\dot{H}$	H
0:00	127	0.6	25579	19	106
:30	120	0.2	26154	9	106
1	119	0.7	26766	27	106
1:30	118	1.0	27406	103	106
2	117	1.2	28076	244	107
2:30	117	1.4	28817	458	109
3	116	1.0	29641	757	112
3:30	115	1.5	30510	1150	117
4	113	2.0	31429	1639	123
4:30	112	2.4	32405	2233	133
5	110	2.9	33446	2934	146
5:30	104	3.4	34566	3734	162
5:54	105	3.4	35523	4440	179

F14

SIVB TLI - MANUAL FIRST OPPORTUNITY

LAUNCH JAN 31, 1971 AZ 72°
12/21/70

DET	θ	Ψ	V_I	$\dot{H}$	H
0:00	120.8	2	25579	19	106
:30	119.7	2	26154	9	106
1	118.6	2	26766	27	106
1:30	117.5	2	27406	103	106
2	116.3	2	28076	244	107
2:30	115.4	2	28817	458	109
3	114.3	2	29641	757	112
3:30	113.3	2	30510	1150	117
4	112.2	2	31429	1639	123
4:30	111.1	2	32405	2233	133
5	110.0	2	33446	2934	146
5:30	109.0	2	34566	3734	162
5:54	108.0	2	35523	4440	179

F15

SIVB TLI - NOMINAL SECOND OPPORTUNITY

LAUNCH JAN 31, 1971 AZ 72°
12/21/70

DET	θ	Ψ	V_I	$\dot{H}$	H
0:00	127	358.8	25573	20	108
:30	120	0.7	26214	17	108
1	119	0.8	26905	51	108
1:30	118	0.7	27633	148	108
2	117	0.5	28399	316	110
2:30	116	0.4	29206	563	112
3	115	0.2	30055	898	115
3:30	113	0.1	30953	1329	121
4	112	359.9	31905	1864	129
4:30	110	359.8	32920	2508	139
5	108	359.6	34007	3265	154
5:30	105	359.5	35182	4112	172
5:42	105	359.5	35529	4374	178

F16

SIVB TLI - MANUAL SECOND OPPORTUNITY

LAUNCH JAN 31, 1971 AZ 72°
12/21/70

DET	θ	Ψ	V_I	$\dot{H}$	H
0:00	120.4	0	25573	20	108
:30	119.4	0	26214	17	108
1	118.2	0	26905	51	108
1:30	117.1	0	27633	148	108
2	116.0	0	28399	316	110
2:30	115.0	0	29206	563	112
3	113.8	0	30055	898	115
3:30	112.8	0	30953	1329	121
4	111.8	0	31905	1864	129
4:30	110.8	0	32920	2508	139
5	109.6	0	34007	3265	154
5:30	108.5	0	35182	4112	172
5:42	108.2	0	35529	4374	178

NOTE: THESE CARDS ARE TO BE PRINTED ON INDEX CARD WGT (K10) STOCK

B 14

12/21/70

B 13

12/21/70

B 16

12/21/70

B 15

12/21/70

F 17

T&D

1/20/71
~~12/21/70~~

HOOK VELCRO
4 PLY SHIM

S-IVB MNVR TO SEP ATT: TB7 + 15 MIN.

HOOK VELCRO

SEP ATT R_____P_____Y_____

EXTR ATT R_____P_____Y_____

CABIN PRESS ~ 5.7 psi

CUT OUT
THIS PART

cb DOCKING PROBE(2) - close
COAS PWR & CHK
DAP 11103/01111 - V46E
N17 (SEP) N22 (DOCK)
V63
DOCK PROBE EXTD/REL - RETRACT
SM RCS tb(8) - gray
AUTO RCS (16)
EMS -100
FDAI - 5/1
DET 59:30
MAN ATT (3) - RATE CMD
LIMIT CYCLE - OFF, DB - MIN, RATE - LOW
THC PWR - on
RHC - NORM (2) - DIRECT (2)
ASCP 0, 180, 0
GDC
CMC/FREE
BMAG (3) - RATE 2 OPEN
cb RCS LOGIC (2) - ~~close~~
TVC SERVO PWR #1 - AC1/MNA
FC REAC vlv - LATCH
V49E TO F 06 22
THC & RHC - ARMED
cb SECS LOGIC/ARM - closed
SECS LOGIC (2) - on
RCS CMD, TAPE RCDR
SECS PYRO ARM
GDC
EMS - ΔV/NORM
V62E

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

B 17

T&D CONTINUED

HOOK VELCRO 4 PLY SHIM

12/21/70

SEP GET _____ : _____ : _____

59:30 START DET
59:50 CMD/AUTO
59:58 +X THRUST
00:00 CSM/LV SEP
00:03 STOP THRUST ~ 0.5 fps
CHK RCS
FC REAC - NORM

HOOK VELCRO

O2 TK 3 ISOL vlv tb - gray
MAN ATT(Pitch) - ACCEL CMD
00:15 Pitch up ~ 0.5°/sec
When Pitch error needle is positive,
PRO F 50 18
PRO 06 18
MAN ATT(Pitch) - RATE CMD
F 50 18 ENTR AT COMPLETION

HOOK VELCRO

HOOK VELCRO

THRUST +X ~ 4 SEC (.7 fps)
DAP 11102, 01111
DAC - ON
BMAG(3) - ATT 1/RATE 2

CAPTURE
CMC/FREE
PROBE RETR - PRIM 1 (PRIM 2 Alternate)
SECS PYRO ARM - SAFE
SECS LOGIC (2) - OFF
EDS PWR - OFF
cb EDS (3) - open
DOCK PROBE EXTD/REL - OFF
DOCK PROBE RETRACT(2) - OFF
cb DOCK PROBE (2) - open
TAPE RCDR
PCM - LOW
DAC/TV - off

HOOK VELCRO

If Dock Probe EXTD/REL tb A(B) remains gray after capture: RETR-PRIM 1 (Sec 1) in that system

HOOK VELCRO

F 18

SPS BURN

4 PLY SHIM
HOOK VELCRO

12/21/70

CMC, ISS & SCS - on
Cycle CRYO FANS
EMS ΔV CK, Set ΔV, EMS FUNC - ΔV
BMAG MODE (3) - RATE 2
AUTO RCS SELECT - as req
LOAD DAP, RHC PWR NORM (2) - AC/DC
Set DET, SC CONT - CMC/AUTO
MNVR to PAD BURN ATT: V62E, V49E
BORESIGHT & SXT STAR CHECK, V41 N91E
P40 to F 50 18, Align SC ROLL, GDC ALIGN

GMBL TRIM
P _____
Y _____

HOOK VELCRO

CUT OUT
THIS PART

cb STAB CONT SYS(Pnl 8) & SPS(12) - close
MAN ATT (3) - RATE CMD
ATT DB - MIN, RATE - LOW, THC PWR - on
SCS TVC (2) - RATE CMD
ΔVCG - LM/CSM or CSM
TVC GMBL DR P & Y - AUTO

HOOK VELCRO

HOOK VELCRO

54:00 *MN BUS TIE (2) - on
(-06:00) PCM - HIGH (SOLO)
*TVC SERVO PWR 1 - AC1/MNA, 2 - AC2/MNB
RHC PWR NORM (2) - AC, DIRECT (2) - OFF
BMAG MODE (3) - ATT 1/RATE 2
SC CONT - SCS, RHC 2 - ARMED

55:00 PRIMARY TVC CHECK
(-05:00) *GMBL MOT P1 & Y1 - START
Verify trim control & set, Verify MTVC
*If SCS: SCS TVC (2) - AUTO
SC CONT - CMC(SCS), THC - CW, Verify NO MTVC

HOOK VELCRO

SEC TVC CHECK
*GMBL MOT P2 & Y2 - START
Set GPI trim, Verify MTVC
THC neutral, Verify NO MTVC
Verify GPI returns to 0,0 (CMC) or trim (SCS)
RHC PWR NORM (2) - AC/DC, DIRECT (2) - MNA/MNB
(TRIM) BMAG MODE (3) - RATE 2
PRO
(BYPASS) *BMAG (3) - ATT 1/RATE 2
ENTR
F 50 25 *GMBL TEST OPTION
(ACCEPT) PRO
06 40 FDAI SCALE - 5/5

HOOK VELCRO

SPS BURN
CONTINUED

4 PLY SHIM
HOOK VELCRO

12/21/70

RATE - HIGH, Update DET
SPS He VLV (2) - AUTO (Verify)
Check N2 A & N2 B

58:00 (-02:00) *ΔV THRUST A(B) - NORMAL
THC - ARMED, RHC (2) - ARMED
TAPE RCDR - HBR/RCD/FWD/CMD RESET
If TARGET ΔV req, V37E 76E

59:30 (-00:30) *EMS MODE - NORMAL
CK PIPA BIAS < 2 fps for 5 sec

59:XX (-00:XX) *ULLAGE ____________________

HOOK VELCRO

SCS Reignition
Check ATT
BMAGS
TVC (2) - AUTO
SC CONT - SCS
EMS - ΔV/NORM
ΔV THRUST
ULLAGE & THRUST

BT ____ : ____

59:55 (-00:05)

F 99 40 *ENG ON ENABLE REQUEST
00:00 *IGN *If SCS: THRUST PB - PUSH
00:03 ΔV THRUST (2) - NORMAL
00:XX ECO
F 16 40 ΔV THRUST (2) - OFF
GMBL MOT (4) - OFF
TVC SERVO PWR 1 & 2 - OFF
MN BUS TIE (2) - OFF
F 16 85 Null residuals
Record ΔV counter & residuals
EMS FUNC - OFF, MODE - STBY
THC PWR - OFF
RHC PWR DIRECT (2) - OFF
cb DIRECT ULLAGE (2) - open
cb SPS P1 & Y1 - open
BMAG MODE (3) - RATE 2
PCM BIT RATE - LOW

HOOK VELCRO

HOOK VELCRO

RESPONSES to F 97 40	
PRO	06 40
ENTR	F 99 40

G&N Reignition
F 97 40
ENTR
F 99 40
V69E
✓GMBL TRIM
PRO for IGN

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

BACK UP BURN
RCALL P40, MN BUS TIE (2) - on
TVC SERVO PWR 1 - AC1/MNA, 2-AC2/MNB
GMBL MOT (4) - START
F 50 18 TRIM ATT - PRO
BMAG (3) - ATT 1/RATE 2
F 50 25 GMBL TEST - PRO
ΔV THRUST
A(B) - NORMAL
EMS - ΔV/NORMAL
ULLAGE
F 99 40 PRO

GMBL TRIM
P ______
Y ______

EXPECT PROG ALARM
01703 TIG SLIPPED

HOOK VELCRO

HOOK VELCRO

F 19

SPS BURN RULES

12/21/70

FUEL TEMP >40° (45-75°F.)
FUEL PRESS >115 (170-195psi)
ΔP < 20 Pc > 70psi
GN2 PRESS > 400 psi BOTH TANKS
He VLV's - AUTO, tb-bp, CHECK He PRESS
BUS TIES/HBR/STANDBY TO START WATCH
MONITOR BALL VALVES, He VLV's, AND PUGS

CUT OFF THIS PART

SPS PRESS LT
PRESS LOW - He tb's, He VLV-ON
PRESS HI - He VLV-OFF HIGH ΔP - He VLV-ON,
If NO EFFECT, He VLV - OFF, UNTIL Pc<70

PREMATURE SHUTDOWN
✓cb's SPS PILOT VLV'S AND SPS He VLVS - CLOSED
✓cb's EPS GP 3 AND 5 - CLOSED
SPS He VLV's - ON

ENGINE DOES NOT SHUTDOWN
ΔV THRUST A/B - OFF, THC-CW, ✓SPS DIRECT ON - OFF,
cb's SPS PILOT VLV's - OPEN, cb's EPS GP 5 - OPEN

F 20

LOI LIMITS

12/21/70

VGO	BT	VM	MODE	ABORT LIMITS	CALL OUT MODES AND LIMITS
2986	00	0	I DPS @ 2hr	TIGHT INADVERTANT SHUTDOWN	
				TNK < 160+Pc↓ ΔP > 20+Pc↓ Pc < 80 or DECAY > 10	A. LIMITS EXCEEDED- NO RELIGHT B. NO LIMITS EXCEEDED - RELIGHT
				IF 1 BALL VLV CLOSES PREMATURELY, SHUTDOWN GOOD BANK 10 SEC PRIOR TO CUTOFF	
2748	0+33	238			
2441	1+15	545	I DPS @ 30m	LOOSE INADVERTANT SHUTDOWN	
2261	1+39	725	I DPS @ 30m +APS @ 2hr Later *	TNK < 115+Pc↓ Pc < 70 PHYSICAL	A. LIMITS EXCEEDED- NO RELIGHT B. NO LIMITS EXCEEDED - RELIGHT
1784	2+41	1202	II DPS @ 2hr +DPS @ PC		
1473	3+20	1513	III DPS @ PC	*IF NO COMM, APS ASAP after DPS	
0	ECO 6+07	2986	III DPS @ PC	TIGHT	

B 19

8/8/70

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

B 20

LOI NO GO'S

12/21/70

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

LOSS OF:

1 CABIN
2 FIRE or SMOKE
3 02 MANIFOLD (Leak)
4 (2) MAIN 02 REGS
5 ECS COOLANT LOOP
6 ECS RADIATOR
7 GYLCOL (Leak)
8 HUMIDITY (High)
9 (2) SUIT COMPRESS
10 SUIT CIRCUIT
11 (2) OVRBD DUMPS
12 CRYO TANK
13 FUEL CELL
14 ENTRY BAT
15 MN BUS/BAT BUS/AC BUS/BAT RELAY BUS
16 (2) INVERTERS
17 AC ØA (AC1 or AC2)
18 (4) DOCKING LATCHES
19 SMJC ACTVD
20 SEQ SYSTEM
21 AUTO ATT, 1 Axis
22 RATE DAMP, 1 Axis
23 DIRECT RCS, 1 Axis
24 (2) BMAG R,P or Y
25 (2) FDAI
26 (2) RHC
27 CMC or ISS
28 OPTICS DAC
29 TVC SERVO LOOP
30 (2) DSKY
31 SPS FU/OX (Leak)
32 GN2 TANK (Leak)
33 BALL VALVE BANK
34 FEEDLINE TEMP < 40°F
35 FU/OX ΔP > 20 psi
36 Pc < 70 psi
37 ULLAGE Capability
38 SPS He TANK (Leak)
39 SM RCS He TANK (Leak)
40 PKG TEMP < 55°F
41 THRUSTERS: (2) P,Y/(3) R
42 CM RCS He TANK (Leak)
43 CM RCS MANIFOLD (Leak)
44 CM RCS ARMED

CM PREP FOR CONTINGENCY EVA

12/21/70

A CM PREP FOR CONTINGENCY EVA
1 C&R SUIT FLOW-OFF, Interconn (A-1)
2 C-Tunnel, R-Tunnel MDC Handstraps
3 EVA Stabilizer Strut Installed
4 TSBs Instld R&L Grth Rng & LEB
5 Jack Screw (A-1) Opened
6 Tool Kit Snapped to LH Grth Rng
7 Hatch Counterbal - Pull Pip Pin, Stow (TSB)
8 Unstow MDC Ingress Bar

B FINAL PREP
1 Depress Tunnl if Reqd
2 Stow Optics, COAS, Cameras, Bkt (TSB)
3 Set Up Comm Panels
4 Remove Hel Shld - PGA bag
5 Unstow Couch Straps (2-PGA Bag)
6 Center Couch - Remove/Stow
7 PGA Bag-(Tie Side Straps to Fwd)
8 Marmon Clamps Closed/Locked
9 Stow Hand Controllers-(Trans Tunnel, ROT-Trans Strut, ROT-Fl)
10 L&R Couch - Stow Foot, Leg, Seat
11 LH X-X Strut - Disc/Tie Off Pans

CUT OUT THIS PART

C SYSTEM PREP FOR DEPRESS
1 CABIN FAN (Both) - OFF
2 REPRESS PKG vlv - FILL
3 Verify REPRESS O2 PRESS 865-935 psi
4 EMERG O2 Vlv-CLOSED
5 Verify REPRESS O2 Vlv-CLOSED
6 Verify SURGE TK vlv-ON
7 O2 PRESS IND sw - SRG/3
8 Verify surge tk press 865-935 psi
9 Sel Att Cont Mode & Mnvr S/C to EVT Attitude

D PLSS/COMM CK (if Reqd)
1 VHF AM A - DUPLEX
2 VHF AM B - OFF (Ctr) (Verify)
3 VHF RANGING-OFF (Verify)
4 Verify Comm With:
2 PLSS-CDR(EVCS#1) Then LMP (EVCS#2) - or
1 PLSS-EVCS #1 or #2

E PREP FOR DEPRESS
1 EXT LTS-RUN/EVA-ON (Up)
2 EXT LTS-RNDZ/SPOT-Off (Ctr)
3 L O2 Hoses (R/R,B/B)-Locked
4 PGA FLOW DIV vlv - Hor/Vert
5 PGA Zipper-Lock-Lock
6 Feedport Cover Locked
7 Apply Anti-fog - (A-8)
8 Don Helmet, Shield,& Gloves
9 SUIT CKT RET Vlv-CLOSE (Push)
10 EMER CAB PRESS Sel-OFF
11 Ck Conn-Hel, Glv, O2 Comm, Feedport

F PRESS INTEGRITY CK-DECAL

G CABIN DEPRESS-DECAL

H HATCH OPENING-DECAL

I AUTO RCS SEL-UNDOCKED Xfer:
A/C ROLL-A1, A2-OFF
PITCH A3-OFF, YAW B3-OFF
DOCKED-ALL (OFF)

J OPS/PURGE START TIMER

K CM INGRESS
1 CDR Hd 1st, Face to MDC
2 Retrieve O2 Hoses
3 Secure Position
4 Manage Lifeline
5 LMP:Ft 1st, Face Up, In Ctr Couch
6 Conn Elec Umbs, Verify Comm
7 PLSS Feedwater Vlv - CLOSE

L VAC XFER TO CM ECS
25 Min From OPS O2 ON:
1 C&R SUIT FLOW vlv-OFF
2 (PLSS/OPS: DISCONNECT PURGE Vlv, Then OPS Hose)
3 Conn O2 Hoses to PGA
4 PURGE vlv-CLOSE
5 SUIT FLOW vlv-Adjust for Comfort
6 OPS O2 vlv-OFF
7 (PLSS:PLSS O2 vlv-OFF PLSS PUMP-OFF, FAN-OFF)

M HATCH CLOSING-DECAL (C/3-11)

N CABIN REPRESS-DECAL

GO TO CSM CONTINGENCY C/L Page C/3-5,8,12

B 21

12/21/70

HOOK
VELCRO
4 PLY SHIM

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

PRE-DOCK CHECKLIST, SOLO BK
If CSM active:
P47 at R = 1.25nm
SEC PRPLNT FUEL PRESS (4) - OPEN
V83E; N83E then KEY REL (V83)

DAC & TV - ON
EMS MODE - STBY
FUNC - OFF
EXT RNDZ LT - OFF
LM STATION KEEP
POO
DAC & TV - OFF
Photo MNVR:
BMAG (R,Y) - ATT1/RATE 2
SC CONT - SCS
MAN ATT (P) - ACCEL CMD
CSM pitch up 360° at 2°/sec
End MNVR, Null rates
SC CONT - CMC

HOOK VELCRO

HOOK VELCRO

BRAKING GATES

R(nm)	$\dot{R}$(fps)	RETICLE ANGLE(deg)	R(ft)
1.50	45	.08	9000
1.00	30	.13	6000
.50	20	.26	3000
.25	10	.54	1500
.08	5	1.60	500
.05		2.70	300
.03		4.00	200
.02		8.50	100

HOOK VELCRO

HOOK VELCRO

TPF
CONTINUED

12/21/70

MAN ATT (P) - RATE CMD
BMAG (3) - RATE 2
CMC MODE - AUTO
AT Docking ATT, Verify HGA P_____ Y_____
BMAG (3) - ATTI/RATE 2

Cue MSFN FOR LOGIC ARM

SECS LOGIC (2) - on

MSFN GO FOR PYRO ARM

HOOK VELCRO

PYRO ARM (2) - on
P47
DAC & TV - ON
LM pitch dn 90°
XLATE to capture LATCH
At Capture:
  PROBE tb (2) - bp
  Report Capture to LM
  SC CONT - CMC
  CMC MODE - FREE
  Allow motion to damp, 10 sec
  When within ± 3° of DOCK ATT,
  PROBE RETRACT SEC - 1
    (PRIM - 2 if req)
At Latch:
  PROBE tb (2) - gray
Go to SOLO BK DOCKING CHECKLIST,
  AFTER HARD DOCK
DAC & TV - OFF
POO

HOOK VELCRO

HOOK VELCRO

HOOK VELCRO

ENTRY

12/21/70

TGT LAT _____ TGT LONG _____

MOONSET ____ : ____ : ____ P61

EI (400K) _____

RRT ____ : ____ : ____

PITCH _____ +5° VI _____

EVENT TIMER
00:00

CUT OUT THIS PART

.05G (~ 300K)

DET _____

GET ____ : ____ : ____ P63

VI _____

RTOGO _____

EMS ± 3 sec
.05g switch
EMS ROLL

* EMS *
*BACK UP *

P64

PITCH _____ +5°(Horiz 34.0°)
needles null

DROGUES P65

DL _____ _____

GET ____ : ____ : ____

VL _____ _____

VCIRC DET _____

GET ____ : ____ : ____

DET _____

50K SECS PYRO (2) - ARM
30K ELS LOGIC - ON
ELS - AUTO

P61

F 06 61	IMP LAT	.01°
	IMP LONG	.01°
PRO	HDS UP/DN	±00001
F 06 60	GMAX	.01G
	V400K	fps
PRO	GAMMA EI	.01°
F 16 63	RTOGO	.1 nm
	VIO	fps
PRO	TF .05G	min-sec

P62

F 50 25	00041 REQ SEP	
PRO		
F 06 61	IMP LAT	.01°
	IMP LONG	.01°
PRO	HDS/DN	±00001
06 22	Poss R,P,Y	.01°

P63

06 64	G	.01G
	VI	fps
	RTOGO	.1 nm

P64

	.05 LT, EMS START	
	*No EMS 3 sec: *	
	EMS-BACKUP/VHF RNG	
06 74	BETA	.01°
	VI	fps
	G	.01G

P65

F 16 69	BETA	.01°
	DL	.01G
PRO	VL	fps
06 74	BETA, VI, G	
	V16 N68E	
	BETA	.01°
	VI	fps
	HDOT	fps
At P67	Lift DN to HDOT neg	

P66

06 22	R,P,Y	.01°

P67

06 66	BETA	.01°
	CR ERR	.1 nm
	DR ERR	.1 nm
F 16 67	RTOGO	.1 nm
	LAT	.01°
	LONG	.01°

B 23

4 PLY SHIM
HOOK
VELCRO

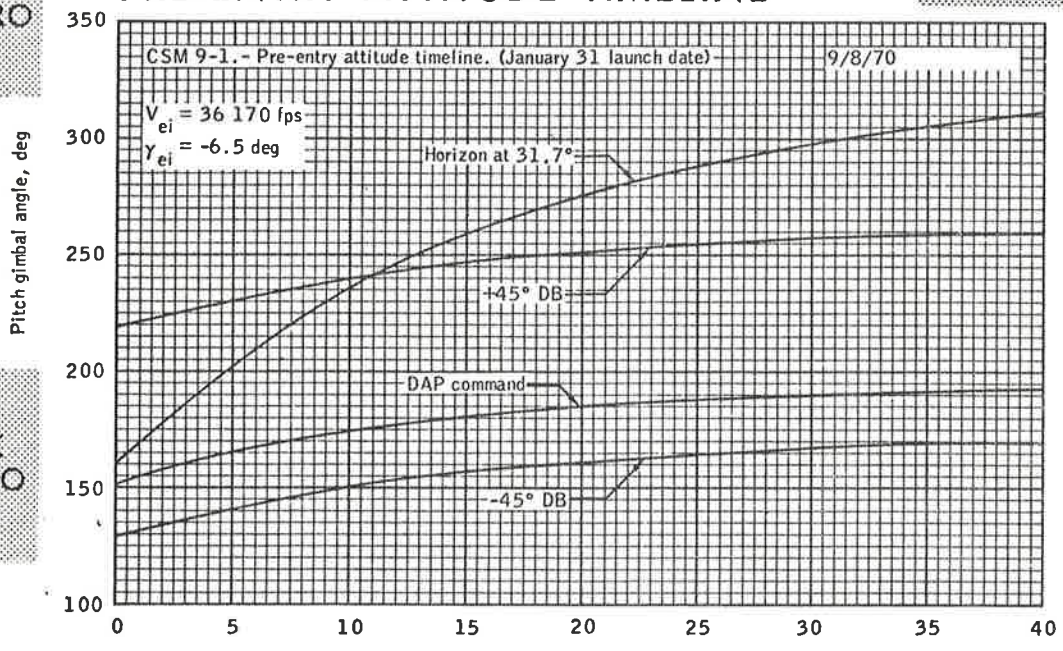
HOOK
VELCRO

HOOK
VELCRO

12/21/70

HOOK
VELCRO

PRE-ENTRY ATTITUDE TIMELINE



HOOK
VELCRO

HOOK
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