

FAO

APOLLO 12	
LAUNCH OPERATIONS CHECKLIST	
PART NO	S/N
SKB32100081-306	1003

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LIFTOFF CONFIGURATION

PANEL 1

EMS FUNC - ΔV
 EMS MODE - STBY
 GTA - off (down)
 EMS GTA COVER - Secure
 CMC ATT - IMU
 FDAI SCALE - 5/5
 FDAI SEL - 1/2
 FDAI SOURCE - CMC
 ATT SET - GDC
 MAN ATT ROLL - RATE CMD
 MAN ATT PITCH - ACCEL CMD
 MAN ATT YAW - RATE CMD
 LIM CYCLE - OFF
 ATT DBD - MIN
 RATE - HIGH
 TRANS CONTR PWR - on (up)
 RHC PWR NORM (2) - AC/DC
 RHC PWR DIR (2) - MNA/MNB
 SC CONT - SCS
 CMC MODE - FREE
 BMAG MODE ROLL - RATE 1
 BMAG MODE PITCH - RATE 1
 BMAG MODE YAW - RATE 1
 SPS THRUST - NORMAL (lock)
 ΔV THRUST (2) - OFF (guarded)
 SCS TVC PITCH - RATE CMD
 SCS TVC YAW - RATE CMD
 SPS GMBL MOT PITCH (2) - OFF
 SPS GMBL MOT YAW (2) - OFF
 ΔV CG - CSM
 ELS LOGIC - OFF (guarded)
 ELS AUTO - AUTO
 CM RCS LOGIC - on (up)
 CM PRPLNT DUMP - OFF (guarded)
 CM PRPLNT PURG - off (down) (guarded)
 IMU CAGE - off (down) (guarded)
 EMS ROLL - OFF
 .05G sw - OFF

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LIFTOFF CONFIG

α/Pc IND sw - α
LV/SPS IND SII/SIVB - SII/SIVB
TVC GMBL DR PITCH - AUTO
TVC GMBL DR YAW - AUTO
EVNT TMR RSET - up (center)
EVNT TMR STRT - center
EVNT TMR MIN - center
EVNT TMR SEC - center

PANEL 2

PL VENT vlv - push (lock)
PROBE EXTD/REL - OFF (guarded)
PROBE EXTD/RETR (2) tb - gray
DOCK PROBE RETR PRIM - OFF
DOCK PROBE RETR SEC - OFF
EXT RUN/EVA LT - OFF
EXT RNDZ LT - off (center)
TUNL LT - OFF
LM PWR - OFF
SM RCS He 1 (4) - center (on,up*)
SM RCS He 1 tb(4) - gray
UP TLM CM - BLOCK
UP TLM IU - BLOCK
CM RCS PRESS - off (down) (guarded)
SM RCS IND sw - PRPLNT QTY
SM RCS He 2 (4) - center (on,up*)
SM RCS He 2 (4) tb - gray
SM RCS HTRS (4) - OFF
SM RCS PRPLNT (4) - center (on, up*)
SM RCS PRPLNT tb (8) - gray
RCS CMD - center (OFF*)
RCS TRNFR - center (SM*)
CM RCS PRPLNT (2) - center (on,up*)
CM RCS PRPLNT tb(2) - gray
SM RCS SEC FUEL PRESS (4) - Center (CLOSE*)
EDS AUTO - on (up)
CSM/LM FINAL SEP (2) - off (down) (guarded)
CM/SM SEP (2) - off (down) (guarded)
SIVB/LM SEP - off(down)(guarded)
PRPLNT DUMP - AUTO
2 ENG OUT - AUTO
LV RATES - AUTO

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TWR JETT (2) - AUTO (down) (guarded)
 LV GUID - IU
 LV STAGE - off(down)(guarded)
 XLUNAR - INJECT
 MN REL - off(down)(guarded)
 MSN TMR HR - off (center)
 MSN TMR MIN - off (center)
 MSN TMR SEC - off (center)
 C/W NORM - BOOST
 C/W CSM - CSM
 C/W PWR - 1
 C/W LAMP TEST - off (center)
 MSN TMR - START
 RCS IND sel - SM D
 CAB FAN (2) - OFF
 H2 HTRS (2) - AUTO
 O2 HTRS (2) - AUTO
 O2 PRES IND sw - SURGE TK
 H2 FANS (2) - OFF
 O2 FANS (2) - OFF
 ECS IND sel - PRIM
 ECS RAD FLOW AUTO CONT - AUTO
 ECS RAD tb - gray
 ECS RAD FLOW PWR CONT - off (center)
 ECS RAD MAN SEL - RAD 1
 ECS RAD PRIM HTR - off (center)
 ECS RAD SEC HTR - OFF
 POT H2O HTR - OFF
 SUIT CKT H2O ACCUM AUTO - 1
 SUIT CKT H2O ACCUM ON - off (center)
 SUIT CKT HT EXCH - off (center)
 SEC COOL LOOP EVAP - off (center)
 SEC COOL LOOP PUMP - off (center)
 H2O QTY IND sw - POT
 GLY EVAP IN TEMP - MAN
 GLY EVAP STM PRESS AUTO - MAN
 GLY EVAP STM PRESS INCR - center
 GLY EVAP H2O FLOW - off (center)
 CAB TEMP - MAN
 CAB AUTO TEMP tw - max decr
 HI GAIN ANT TRACK - AUTO
 HI GAIN ANT BEAM - WIDE
 HI GAIN ANT PITCH POS - 0°

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3706 3706

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HI GAIN ANT YAW POS - 180°
HI GAIN ANT PWR - OFF
HI GAIN ANT SERVO ELECT - PRIM

PANEL 3

VHF ANT - SM LEFT
SPS ENG INJ VLV ind (4) - CLOSE
FC RAD (3) - center (NORMAL*)
FC RAD (3) tb - N/A
FC HTRS (3) - on (up)
FC IND sel - 2
SPS QTY TEST - off (center)
OXID FLOW VLV INCR - NORM
OXID FLOW VLV PRIM - PRIM
PUG MODE - NORM
FC PURG (3) - OFF
FC REAC (3) - center (on,up*)
FC REAC tb (3) - gray
FC 1 MN BUS A - center (on,up*)
FC 1 MN BUS A tb - gray
FC 2 MN BUS A - center (on,up*)
FC 2 MN BUS A tb - gray
FC 3 MN BUS A - OFF
FC 3 MN BUS A tb - bp
MN BUS A RSET - center (RESET*)
FC 1 MN BUS B - OFF
FC 1 MN BUS B tb - bp
FC 2 MN BUS B - center (on,up*)
FC 2 MN BUS B tb - gray
FC 3 MN BUS B - center (on,up*)
FC 3 MN BUS B tb - gray
MN BUS B RSET - center (RESET*)
DC IND sel - MNA
BAT CHARGE - OFF
SPS He vlv (2) - AUTO
SPS He vlv tb (2) - bp
SPS LINE HTRS - off (center)
SPS PRESS IND sw - He
S BD XPNDR - PRIM
S BD PWR AMPL PRIM - PRIM
S BD PWR AMPL HI - HIGH
PWR AMPL tb - gray

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S BD MODE VOICE - VOICE
S BD MODE PCM - PCM
S BD MODE RNG - RNG
S BD AUX TAPE - off (center)
S BD AUX TV - off (center)
UP TLM DATA - DATA
UP TLM CMD - NORM
S BD ANT OMNI - B
S BD ANT - OMNI
VHF AM A - (center)
VHF AM B - DUPLEX
VHF AM RCV - off (center)
VHF AM SQLCH tw (2) - noise threshold + 1 div
VHF BCN - OFF
VHF RNG - OFF
S BD SQUELCH - ENABLE
FC REACS vlv - LATCH
H2 PURG LINE HTR - OFF
TAPE RCDR PCM - PCM/ANLG
TAPE RCDR RCD - RCD
TAPE RCDR FWD - FWD
TAPE MOTION tb - gray
SCE PWR - NORM
PMP PWR - NORM
PCM BIT RATE - HI
AC INV 1 - MNA
AC INV 2 - MNB
AC INV 3 - OFF
 INV 1 AC 1 - on (up)
 INV 2 AC 1 - OFF
 INV 3 AC 1 - OFF
AC 1 RSET - center (RSET*)
 INV 1 AC 2 - OFF
 INV 2 AC 2 - on (up)
 INV 3 AC 2 - OFF
AC BUS 2 RSET - center (RSET*)
AC IND sel - BUS 20C

PANEL 4

SPS GAUGING - AC1
TELCOM GRP 1 - AC1
TELCOM GRP 2 - AC2
GLY PUMPS - 1 - AC1

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SUIT COMPR 1 - AC1
SUIT COMPR 2 - OFF
CB Panel 4 - all closed

PANEL 5

FC1 PUMPS - AC1
FC2 PUMPS - AC2
FC3 PUMPS - AC2
G/N PWR - AC1
MN BUS TIE BAT A/C - on (up)
MN BUS TIE BAT B/C - on (up)
BAT CHGR - AC1
NONESS BUS - OFF
INT INTGL LT - as desired
INT FLOOD LT - OFF, full dim or full bright
INT FLOOD LT DIM - 1
INT FLOOD LT FIXED - OFF
CB Panel 5 all closed except:
 CB INST NONESS - open
 CB INST SCI EQUIP SEB 1 - open
 CB INST SCI EQUIP SEB 2 - open
 CB INST SCI EQUIP HATCH - open
 CB WASTE H2O/UR DUMP HTRS (2)-open

PANEL 6

MODE - INTERCOM/PTT
PWR - AUDIO/TONE
INTERCOM - T/R
PAD COMM - OFF
S BD - T/R
VHF AM - T/R
AUDIO CONT - NORM
SUIT PWR - on (up)
tw settings - as desired

PANEL 7

EDS PWR - on (up)
SCS TVC SERVO PWR #1 - AC1/MNA
SCS TVC SERVO PWR #2 - AC2/MNB
FDAI/GPI PWR - BOTH
LOGIC 2/3 PWR - on (up)

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CSA. 8

SCS ELEC PWR - GDC/ECA
SCS SIG CONDR/DR BIAS 1 - AC1
SCS SIG CONDR/DR BIAS 2 - AC2
BMAG PWR (2) - ON
DIRECT 02 vlv - open (CCW) (>2 in H20 on SUIT/CAB ΔP ind)

PANEL 8

CB Panel 8 - all closed except:
CB CM RCS HTRS (2)- open
AUTO RCS SEL A/C ROLL A1 - OFF
AUTO RCS SEL A/C ROLL C1 - OFF
AUTO RCS SEL A/C ROLL A2 - OFF
AUTO RCS SEL A/C ROLL C2 - OFF
AUTO RCS SEL B/D ROLL B1 - MNA
AUTO RCS SEL B/D ROLL D1 - MNB
AUTO RCS SEL B/D ROLL B2 - MNA
AUTO RCS SEL B/D ROLL D2 - MNB
AUTO RCS SEL PITCH A3 - MNB
AUTO RCS SEL PITCH C3 - MNA
AUTO RCS SEL PITCH A4 - MNA
AUTO RCS SEL PITCH C4 - MNB
AUTO RCS SEL YAW B3 - MNA
AUTO RCS SEL YAW D3 - MNB
AUTO RCS SEL YAW B4 - MNB
AUTO RCS SEL YAW D4 - MNA
INT NUM LT - as desired
INT INTGL LT - as desired
INT FLOOD LT - OFF, full dim, or full brt
FLOOD LTS DIM - 1
FLOOD LTS FIXED - OFF
FLOAT BAG (3) - VENT (locked)
SECS LOGIC (2) - on (up) (locked)
SECS PYRO ARM (2) - on (up) (locked)

PANEL 9

MODE - INTERCOM/PTT
PWR - AUDIO/TONE
INTERCOM - T/R
PAD COMM - OFF
S BD - T/R
VHF AM - T/R

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AUDIO CONT - NORM
SUIT PWR - on (up)
VHF RNG - NORM
tw settings - as desired

PANEL 10

MODE - INTERCOM/PTT
PWR - AUDIO/TONE
PAD COMM - OFF
INTERCOM - T/R
S BD - T/R
VHF AM - T/R
AUDIO CONT - NORM
SUIT PWR - on (up)
tw settings - as desired

PANEL 12

LM TUNL VENT vlv - LM/CM ΔP

PANEL 13

FDAI sw (2) - INRTL
EARTH/LUNAR - PWR OFF
ALT SET - 100
LTG - OFF
MODE - HOLD/FAST
SLEW - off (center)

PANEL 15

COAS PWR - OFF
UTIL PWR - OFF
PL BCN LT - off (center)
PL DYE MARKER - off (down)(guarded)
PL VENT - OFF

PANEL 16

DOCK TRGT - OFF
UTIL PWR - OFF
COAS PWR - OFF

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UTIL PWR - OFF
FLOOD LTS DIM - 1
FLOOD LTS FIXED - OFF
OPT PWR - OFF
IMU PWR - on (up) (guarded)
RNDZ XPNDR - OFF
NUMERICS LT - as desired
FLOOD LTS - off, full dim, or full bright
INTGL LT - as desired

PANEL 101

SYS TEST (LH) - 4
SYS TEST (RH) - B
CM RCS HTRS - OFF
UR DUMP - HTR A
WASTE H2O DUMP - HTR A
RNDZ XPNDR - OPR

PANEL 122

OPT ZERO - ZERO
OPT TELTRUN - SLAVE TO SXT
OPT COUPLING - DIRECT
OPT MODE - MAN
OPT SPEED - LO
COND LAMPS - ON
UP TLM - ACCEPT

PANEL 162

SCI PWR - OFF (verified at panel closeout)

PANEL 163

SCI/UTIL PWR - OFF (verified at panel closeout)

PANEL 225

CB Panel 225 - all closed except:
CB HI GAIN ANT FLT BUS - open
CB HI GAIN ANT GRP 2 - open

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PANEL 226

CB Panel 226 - all closed except:
CB FC REACS (3)-open
CB FC RAD (3) - open
CB COAS/TUNL LTG MNB - open

PANEL 227

SCI PWR - OFF

PANEL 229

CB Panel 229 all closed except:
CB MAIN REL PYRO (2)- open
CB 02 VAC ION PUMPS (2) - open

PANEL 250

CB Panel 250 - all closed except:
CB PYRO A TIE TO BAT BUS A - open
CB PYRO B TIE TO BAT BUS B - open
CB BAT C TO BAT BUS A - open
CB BAT C TO BAT BUS B - open

PANEL 251

WASTE MGMT OVBD DRAIN vlv - OFF

PANEL 252

BAT VENT vlv - CLOSED
WASTE STOWAGE VENT vlv - VENT

PANEL 275

CB Panel 275 - all closed except:
CB MNA BAT C - open
CB MNB BAT C - open
CB FLT/PL BAT BUS A - open
CB FLT/PL BAT BUS B - open
CB FLT/PL BAT C - open

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CSM 3

PANEL 276

CB Panel 276 - all closed

PANEL 278

CB Panel 278 - all closed except:
CB UPRT SYS COMPR (2) - open

PANEL 300

LH SUIT FLOW vlv - FULL FLOW

PANEL 301

RH SUIT FLOW vlv - FULL FLOW

PANEL 302

CTR SUIT FLOW vlv - FULL FLOW

PANEL 303

PRIM CAB TEMP vlv - COLD (CW)
SEC CAB TEMP vlv - COOL-MAX (CW)

PANEL 304

DRNK H2O SUPPLY vlv - OFF (CW)

PANEL 305

FOOD PREP COLD H2O vlv - rel
FOOD PREP HOT H2O vlv - rel

PANEL 306

MSN TMR - START
EVNT TMR RSET - UP (center)
EVNT TMR STRT - center
EVNT TMR MIN - center
EVNT TMR SEC - center
MSN TMR HR - center
MSN TMR MIN - center
MSN TMR SEC - center

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PANEL 325

CAB PRESS RELF vlv (RH) - BOOST/ENTRY
CAB PRESS RELF vlv (LH) - BOOST/ENTRY
PRIM GLY TO RAD vlv - BYPASS (pull)

PANEL 326

REPRESS PKG vlv - ON
SM 02 SUPPLY vlv - ON
SURGE TK 02 vlv - ON
GLY RSVR IN vlv - OPEN
GLY RSVR BYPASS vlv - CLOSE
GLY RSVR OUT vlv - OPEN

PANEL 350

CO2 CSTR DIVERT vlv - both (center)

PANEL 351

MAIN REG vlv (2) - open
H2O/GLY TK PRESS REG vlv - BOTH
H2O/GLY TK PRESS RELF vlv - BOTH
EMER CAB PRESS vlv - OFF
CAB REPRESS vlv - OFF (CCW)

PANEL 352

WASTE TK SERVICING vlv - CLOSE
PRESS RELF vlv - 2
POT TK IN vlv - OPEN
WASTE TK IN vlv - AUTO

PANEL 375

SURGE TK PRESS RELF vlv - open (CW)

PANEL 376

PLVC - NORMAL (up)

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PANEL 377

GLY TO RAD SEC vlv - BYPASS (CCW)

PANEL 378

PRIM GLY ACCUM vlv - open (CCW)

PANEL 379

PRIM ACCUM FILL vlv - OFF (CW)

PANEL 380

02 DEMAND REG vlv - BOTH
SUIT TEST vlv - OFF
SUIT CKT RET vlv - close (push)

PANEL 382

SUIT HT EXCH PRIM GLY vlv - FLOW (CCW)
SUIT FLOW RELF vlv - OFF
PRIM GLY EVAP IN TEMP vlv - MIN (CCW)
SUIT HT EXCH SEC GLY vlv - FLOW (CCW)
SEC EVAP H2O CONT vlv - AUTO (CW)
PRIM EVAP H2O CONT vlv - AUTO (CW)
H2O ACCUM vlv (2) - RMTE (CCW)

PANEL 600

EMER 02 vlv - close

PANEL 601

REPRESS 02 vlv - close

PANEL 602

REPRESS 02 RELF vlv - OPEN (CW)

FWD HATCH

PRESS EQUAL vlv - CLOSE
ACTR HNDL sel - stow/check locked

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SIDE HATCH

CAB PRESS DUMP vlv - close (CW)

GEAR BOX sel - LATCH

ACTR HANDLE sel - UNLATCH

LOCK PIN REL KNOB - LOCK

LOCK PIN ind - flush

GN2 VLV HANDLE - outboard

BPC JETT KNOB - toward BPC JETT

* - last momentary position before liftoff.

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CSM 8

BOOST-INSERTION - TLI

BOOST PREPARATION

-20:00 SM RCS PRPLNT (4) - on (up)
SM RCS PRPLNT tb (8) - gray

-15:00 CTE UPDATE VERIFICATION
Change X STABLE MEMBER AZIMUTH, if necessary

*V78E *
F 06 29 X SM AZ (.01°)
*V21E *
*Load new Azimuth *
*PRO *
*ALIGN GDC *

FDAI-1 total att R=90+AZ, P=90, Y=0
BMAG MODE(3) - RATE 1
FDAI SCALE - 5/5
RATE - HIGH
RHC #1 - ARMED
RHC PWR DIRECT(2)-MNA/MNB
CMC MODE - FREE
TRANS CONTR PWR -on(up) (verify)
ASTRO LAUNCH OPERATIONS VOICE CHECK
VOICE CHECK WITH MCCH
ADJUST MASTER VOL CONTROLS
SPS THRUST - NORMAL (locked)
AV THRUST (2) - OFF
α/PC IND sw - α
LV IND/GPI - SII/SIVB
EDS AUTO - on (up)
LV RATES - AUTO
2 ENG OUT - AUTO
CM RCS PROP tb(2)-gray (verify)
RCS CMD - OFF

-10:00 FC REAC vlv - LATCH

-08:30 SEC COOL LOOP PUMP - off (ctr) (verify)

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BOOST-INSERTION-TLI

L
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-06:00 TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB

-04:00 ASTRO LAUNCH OPERATIONS COMM CHECK

-03:00 DSKY - Verify P02
V75 (NO ENTR)
TAPE RCDR FWD - FWD (tb-gray)

-2:15 PRIM GLY TO RAD - pull (bypass)

-1:15 MN BUS TIE (2)-on (up)

-1:00 PAD COMM (2) - OFF

-00:45 GDC ALIGN pb - PUSH & HOLD
R=90+AZ, P=90, Y=0
FDAI 2 Total att - no motion
GDC ALIGN pb - release

BOOST-INSERTION-TLI

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L/2-3

Time from first motion, min:sec, g.e.t.	SC IMU pitch gimbal angle, ψ , deg	DSKY displays			Time from first motion, min:sec, g.e.t.	SC IMU pitch gimbal angle, θ , deg	DSKY displays		
		Inertial velocity, V_1 , fps	Altitude rate, $\dot{h}$, fps	Altitude, h , n. mi.			Inertial velocity, V_1 , fps	Altitude rate, $\dot{h}$, fps	Altitude h , n. mi.
00:00	90	1 340	0	0.0	06:00	11	14 147	678	93.5
00:30	86	1 390	286	0.6	06:30	8	15 367	461	96.3
01:00	68	1 858	796	3.2	07:00	5	16 739	297	98.1
01:30	49	3 023	1460	7.1	07:30	2	18 291	197	99.3
02:00	34	5 052	2193	17.7	08:00	3	19 827	161	100.2
^a 02:15	29	6 455	2607	23.6	08:30	359	21 114	151	101.0
02:30	26	7 773	2883	30.4	09:00	355	22 398	164	101.7
^b 02:42.24	23	9 059	3144	36.5	^c 09:10.73	353	22 856	179	102.0
03:00	23	9 261	2812	45.2	09:30	350	23 143	112	102.5
03:30	25	9 816	2350	57.9	10:00	346	23 708	32	102.8
04:00	22	10 471	1951	68.5	10:30	344	24 300	-17	102.8
04:30	20	11 227	1581	77.2	11:00	340	24 921	-30	102.7
05:00	17	12 088	1243	84.1	^d 11:29:61	340	25 562	0	102.6
05:30	14	13 058	940	89.5					

^aS-IC center-engine cutoff (TB2).

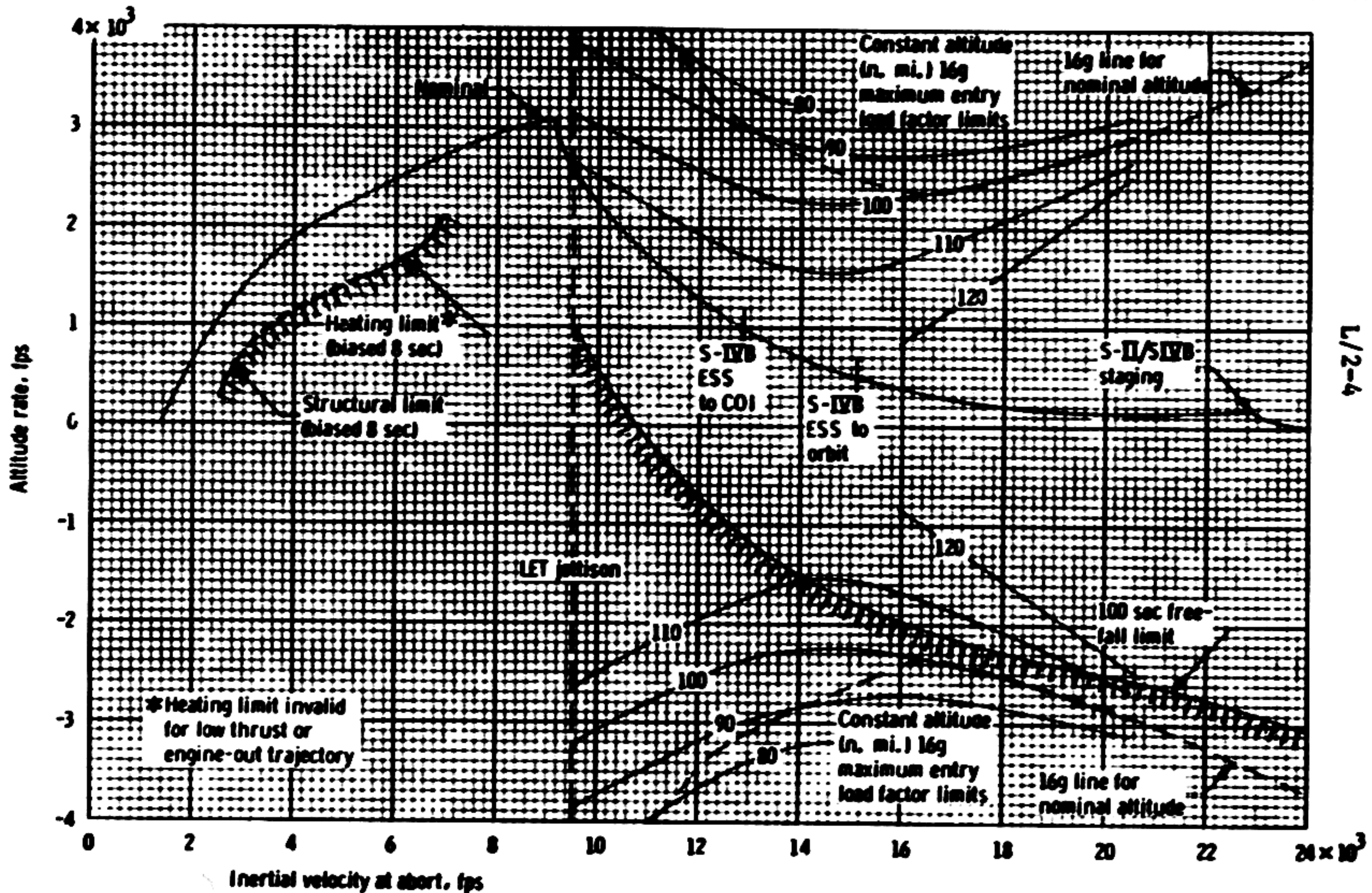
^bS-IC outboard-engine cutoff (TB3).

^cS-II engine cutoff (TB4).

^dS-IVB guidance cutoff signal.

LAUNCH TRAJECTORY

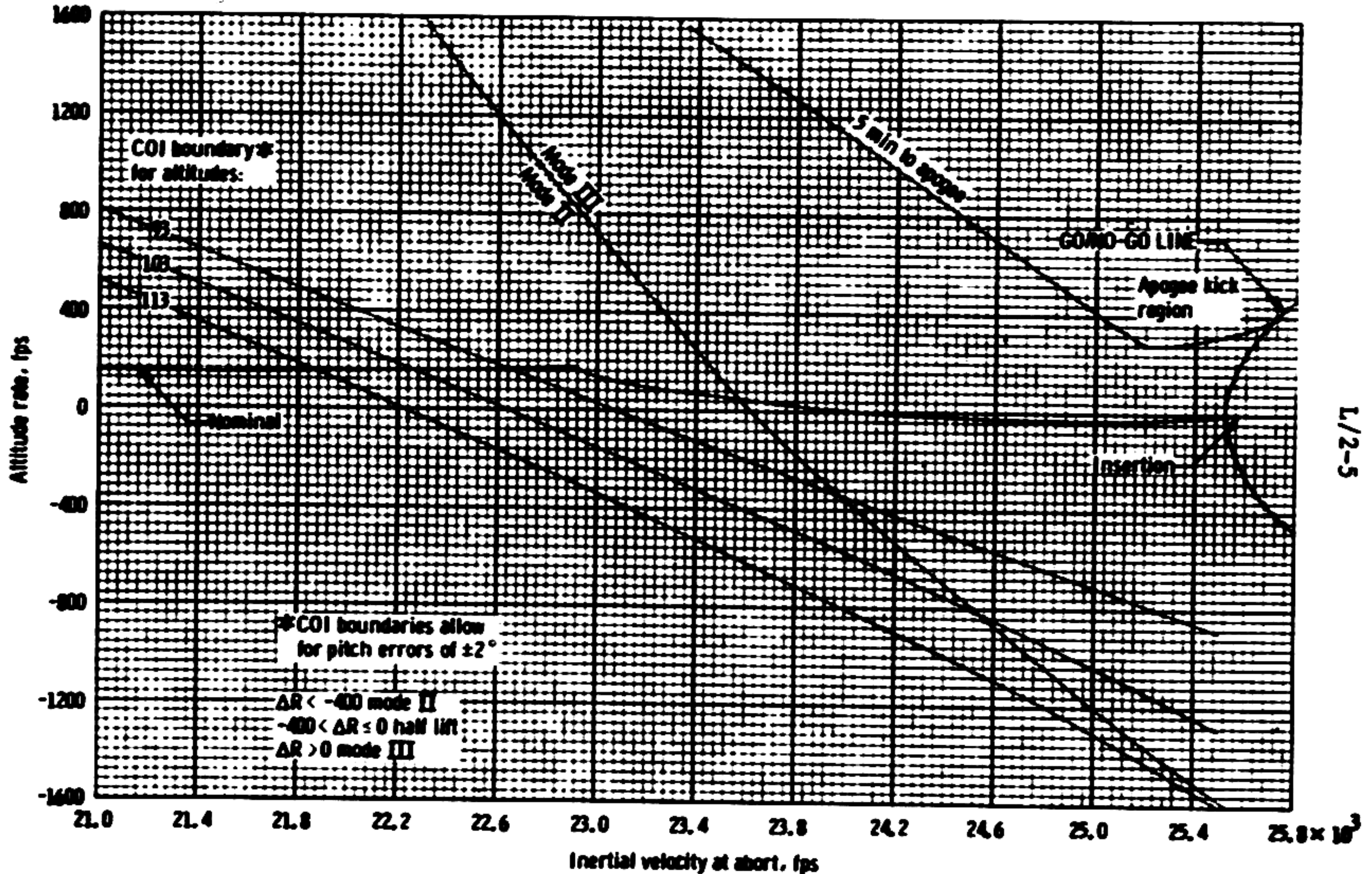
LAUNCH ABORT



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L/2-5

ABORT
 REAR INSERTION

ALTITUDE V_s V_i

Altitude, h, n. mi.	Inertial velocity, V_i , fps
75	25 713
80	25 686
85	25 659
90	25 631
95	25 604
100	25 577
105	25 550
110	25 523
115	25 496
120	25 469
125	25 442
130	25 416
135	25 389
140	25 362
145	25 336
150	25 309

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BOOST

-00:09 Ignition CMD
-00:01 L/V ENGINES lts (5) - out
00:00 LIFTOFF lt - on

* LIFTOFF VERIFIED: *
* If LIFTOFF lt off - push *
* If NO AUTO ABORT lt on - push *

Clock Running (auto) - report
MET Resets & starts counting up auto
P11 auto

* NO P11 - Key ENTR *
* START DET & RESET MET*

06 62 VI,H DOT, H PAD (fps,fps,.1nm)
* LV GUID & LV RATE lts ON*
* LV GUID - CMC *

+00:02 Yaw Mnvr.- report
+00:11 Roll & Pitch Program - report
+00:30 Roll complete - report

+00:42 MODE IB - report
PRPLNT DUMP - RCS CMD
+00:50 Monitor α to T +02:00
(100%, 5° Att error)

CABIN PRESSURE DECREASING (~14K)

* NO PRESSURE DECREASE by 25K *
* CAB PRESS RELIEF vlv (RH) - *
* DUMP *

+01:21 MAX Q

00:00

+4°/sec P,Y
+20°/sec R

MODE IA

00:42

+4°/sec P,Y
+20°/sec R

MODE IB

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L
2-8

+01:56 MODE IC - report (R3 = 16.5NM)

1:56

+02:00 EDS AUTO - OFF
2 ENG OUT - OFF
LV RATES - OFF
α/Pc sw - Pc
LV RATE lt disabled as IU failure cue
GO/NO GO FOR STAGING - report

+9°/sec P,Y
+20°/sec R

MODE IC

+02:16 INBOARD CUTOFF - (lt 5 on)

LIFTOFF lt - out

+02:39 CMC BOOST Polynomial ends

+02:42 OUTBOARD CUTOFF - report (lts 1,2,3,4 on)

+02:43 SIC/SII STAGING (lts off)

+02:44 SII Ign Command (lts on)

SII SEP lt - on

+02:45 SII 65% - lts out

02:44

+03:13 SII SEP lt - out report

MODE IC

+03:18 TWR JETT (2) - on(up) (TFP>1+20)

3:18

* NO TWR JETT, pg L/5-1 *

* For MAN BOOSTER CONTROL *

* LV GUID - CMC *

* Key V46E *

* SCS TVC (2) - AUTO *

MAN ATT PITCH - RATE CMD

Twr Jett & MODE II - Report

GLY EVAP STEAM PRESS - AUTO

GLY EVAP H2O FLOW - AUTO

MODE II

+03:23 Guidance Initiate - report (OECO +41sec)

+03:53 Guidance Good

+04:00 Report status

+05:00 Report Status

+05:30 SIVB to COI

+06:00 Report Status

GMBL MOT (4) - START - ON (LMP Confirm)

Check GPI

SII/SIVB/GPI - GPI (Momentarily)

PITCH = -1.49

YAW = +1.32

Basic Date — October 6, 1969
Changed —

CSM 108

Basic Date — October 6, 1969
 Changed — November 4, 1969

L
 2-9

+06:15 OMNI ANT - D (AZ < 96°)
 - C (AZ > 96°)
 +06:25 SIVB to orbit - Level sense arm 08:37
 +07:00 Report Status
 +07:42 IECO (1t 5 - on)
 +08:00 Report Status
 +08:01 PU SHIFT
 +08:30 GO/NO GO FOR STAGING - report
 +09:00 Mode IV - Report
 (VI ~ 22,200, H DOT ~ +160,
 Report Status H ~ +100)
 +09:11 OECO (1ts 1,2,3, & 4 - on)
 +09:14 SII Staging - 1ts out
 +09:17 SIVB Ign Cmd - 1t on
 +09:19 SIVB 65% - 1t out

+10:00 GO/NO GO FOR ORBIT - report

+11:00 Report Status
 +11:29 SECO (1t on) - report
 (Begin TB5)

09:00
 10:08
 MODE III
 MODE IV
 INSERTION

*If LV GUID - CMC *
 *LV STAGE sw - SII/SIVB (LEAD BY 60 FPS) *
 *SECO *
 *LV ENG 1 1t - on *
 *Begin TB5 *

*If no SECO, (VI +100 fps) *
 *LV STAGE sw SII/SIVB *
 *If still no SECO, THC *
 * CCW & neutral in 1 sec *

+11:39 INSERTION - 1t out (TB5 + 10 sec)

L
2-10

Record VI _____ (fps)
H DOT _____ (fps)
H PAD _____ (.1nm)
KEY V82E

Record HA _____ (.1nm)
HP _____ (.1nm)
TFF _____ (min-sec)
PRO

V37E 00E
When CMC ACTY 1t out:
V66E
V45E
Verify DAP load, V48: R1 = 31102, R2 = 01111
V46E CSM WT _____
V83E (check ?) P TRIM _____
PRO Y TRIM _____

BDA LOS
(00:12:50)

Basic Date _____ October 6, 1969
Changed _____

INSERTION CHECKLIST

- CDR 1 GMBL MTRS (4) - OFF (LMP confirm)
EDS PWR - OFF
TVC SERVO PWR (2) - OFF
MN BUS TIE (2) - OFF (LMP)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
BMAG MODE (3) - RATE 2
ELS - MAN
CM RCS LOGIC - OFF
CAB PRESS REL vlv (2) - NORMAL/LATCHED
REPRESS PKG vlv - OFF
cb DIRECT ULLAGE (2) - open
cb FLOAT BAG (3) - open
cb FLT/PL VENT - open
cb ELS BAT (2) - open
DIRECT 02 vlv - CLOSE
ROT CONTR PWR DIRECT (2) - OFF
EMS FUNCT - OFF
INSTALL COAS
TRANS CONTR PWR - OFF
MONITOR LV TANK PRESS
*AP >36 psid (OXID > FUEL) *
*AP >26 psid (FUEL > OXID) *
*LOX TK PRESS >50 psia *
EMERGENCY CSM/LV SEP pg L/5-1
- CYI AOS
(00:16:37)
- CMF 2 SM RCS HTRS (4) - PRIM
CM RCS PRPLNT (2) - OFF, tb (2) - bp
C/W - NORMAL
BPC JETT KNOB - 180° from BPC JETT
GN2 VLV HNDL - pull
HATCH GEAR BOX - LATCH (verify)
ACTR HNDL SELECTOR - neutral
- LMP 3 cb WASTE H2O/URINE DUMP HTRS (2) - close
FC REACS vlv - NORM
H2 PURGE LINE HTR - ON
- 4 MCCH - G/N Status .
Z Torquing angle _____

Basic Date October 6, 1969
Changed November 7, 1969

SYS MONITORING & CHECKING

- 1 SM RCS MONITORING CHECK (CMP)
SM RCS PRPLNT tb (8) - gray
SM RCS He 1 & 2 tb (8) - gray
RCS IND sel - SM A, B, C, D
PKG TEMP - 115°-175° F (C/W 75°-205°)
He PRESS - record
MANF PRESS - 192-207 psia (C/W 145-215 psia) |
He TK TEMP - record
PRPLNT QTY - record
When MANIF PRESS <150 psia
RCS SEC FUEL PRESS A (B, C, D) - OPEN
- 2 CM RCS MONITORING CHECK (CMP)
CM RCS PRPLNT tb (2) - bp
RCS IND sw - CM 1,2
He TEMP - 60-90°F
He PRESS - 4100-4200 psia
MANIF PRESS - 80-105 psia
- 3 C/W OPERATIONAL CHECK (LMP)
C/W LAMP TEST - 1 (LH MA & 15 lts)
C/W LAMP TEST - 2 (RH MA & 20 lts)
C/W CSM - CM (CM RCS 1t (2) - on)
C/W CSM - CSM (CM RCS 1t (2) - out)
- 4 CMP to LEB for MN REG CHECK
STRUT UNLOCK LANYARD (2) - STOW
DRINKING WATER SUPPLY vlv - ON
cb COAS/TUNL LTG MNB - close
Unstow:
Helmet bags (R6)
Accessory bags (R6)
Tool E (L2)
- 5 Confirm normal suit pressure, cabin pressure, & O2 flow
EMERG CABIN PRESS vlv - BOTH
SUIT CKT RET vlv - open (pull)
Remove helmet & gloves & stow in PGA bag
Unstow & mount TSB's (A1)

October 6, 1969
October 27, 1969
Basic Date -
Changed —

6 MAIN REG CHECK

MAIN REG B vlv - close
EMER CABIN PRESS sel - 1
PUSH TO TEST PB - PUSH (O2 FLOW INC)
MAIN REG B vlv - open
MAIN REG A vlv - close
EMER CABIN PRESS sel - 2
PUSH TO TEST PB - PUSH (O2 FLOW INC)
MAIN REG A vlv - open
EMER CABIN PRESS sel - BOTH

7 SEC RAD LEAK Ck

Monitor SEC ACCUM QUANTITY (LMP)
SEC GLY To RAD vlv - NORM for 30 sec, then
BYPASS (CDR)

+20:00 8 ECS Post Insertion Config (CDR)

GLY RSVR BYPASS vlv - OPEN
GLY RSVR OUT vlv - CLOSE
GLY RSVR IN vlv - CLOSE
PRIM GLY ACCUM QTY 25-50Z
PRIM ACCUM FILL vlv - ON until 50-55Z
ECS RAD FLOW CONT - PWR
PRIM GLY TO RAD vlv - NORMAL (push)
ECS RAD HTR - PRIM 1 (LMP)
ECS RAD TEMP PRIM OUT below PRIM IN
If outlet temp after 5 min
* above INLET TEMP *
*PRIM GLY TO RAD vlv - *
* BYPASS (pull) *
*Recheck in 10 min *
ECS RAD tb - gray
GLY EVAP TEMP IN - AUTO

9 POT H2O HTR - MNA

CYI LOS
(00:23:44) PCM BIT RATE - LOW
UP TLM - CMD RSET, then NORM
VHF AM A - SIMPLEX
VHF AM B - off (ctr)

Basic Date - October 6, 1969
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- 10 FC Purge Ck (LMP)
H2/O2 PURGE (6) - ON (monitor)
Observe Flow rate inc
Reset MA (as req'd)
H2 PURGE LINE HTR - OFF

PRE-TLI SYS VERIFICATION & MONITORING

1 EPS MONITORING CHECK (LMP)

Cryogenic Pressure - Quantity Check

- H2 PRESS (2) - 225-260 psia
O2 PRESS (2) - 865-935 psia
SURGE TK PRESS - 865-935 psia
H2 QTY (2) - record
O2 QTY (2) - record
CRYO FANS - OFF; ON as req'd

FC Power Plant Check

- FC HTRS(3) -on(up)
FC REACT tb (3) - gray
FC IND sel - 1, 2, 3
H2 FLOW - 0.03-0.15 lb/hr
O2 FLOW - 0.25-1.2 lb/hr
MOD SKIN TEMP - 390-450° F
MOD COND EXH TEMP - 150-175° F
FC pH HI tb - gray
FC RAD TEMP LO tb - gray
FC REACS & RAD cb (6) - out, all others in(verify)

D-C Voltage-Amperage Check

- MN BUS TIE (2) - OFF (verify)
FC MNA tb - 1 & 2 gray, 3 bp
FC MNB tb - 1 bp, 2 & 3 gray
FC 1, 2, & 3 (RECORD AMPS)
MAIN BUS A, B, (26.5-31 vdc - Record)
BAT BUS A, B, & BAT C (31.5-38 vdc < 3 amp)
PYRO BAT A, B (36.5 - 37.5 vdc)
DC IND sel - MNB
SYS TEST 4B (BAT RLY BUS - 3.4-4.1 vdc)

A-C VOLTS - 113 to 117 all phases

Basic Date - October 6, 1969
Changed - _____

2 ECS MONITORING CHECK

SUIT COMP ΔP - .3-.4 psid
 02 FLOW - 0.2-0.45 lb/hr (after changeover)
 02 SURGE TANK PRESS - 865-935 psia
 REPRESS 02 >865 psia
 PRIM RAD tb - gray
 *If PRIM RAD tb - 2 *
 * ECS RAD FLOW AUTO CONT - 1 until *
 * tb gray, then AUTO *

ECS RAD TEMP PRIM IN - 67-97° F
 ECS RAD TEMP PRIM OUT - -20° to +63° F
 PRIM GLY EVAP TEMP OUT - 38-50.5° F
 PRIM GLY EVAP STEAM PRESS
 .1-.15 boiling, > .16 not boiling
 PRIM GLY DISCH PRESS - 40-52 psig
 SUIT TEMP - 45-55° F
 SUIT PRESS/CABIN PRESS - 4.7-5.3 psia
 PART PRESS CO2 < 7.6 mm Hg
 POT H2O QTY - 10-100%
 WASTE H2O QTY - 25-85%

3 SPS MONITORING CHECK (LMP)

SPS PRPLNT TK TEMP ind - +45 to +75° F
 *IF<45°F, SPS LINE HTRS - A *
 *IF>75°F, SPS LINE HTRS - off (ctr) *

SPS PRESS IND sw - He, N2A, & N2B
 SPS PRPLNT TK PRESS ind
 He 3900 psia max
 N2A 2900 psia max
 N2B 2900 psia max

SPS PRESS IND sw - He
 FUEL & OXID PRESS ind - 170 to 195 psia
 SPS ENG INJ VLVS (4) - CLOSE
 SPS OXID, FUEL & UNBAL QTY - record
 OXID FLOW VLV PRIM - PRIM
 SPS He VLV (1&2) - AUTO, tb - bp

4 GDC ALIGN (CDR)

5 UNSTOW SEQ CAMERA BRACKET & ORDEAL (CDR)

6 MOUNT ORDEAL BOX & Initialize

October 6, 1969

Basic Date
Changed -

CSM 108

ECS IND SW - PRIM

(Assemble & mount in L.H. rendezvous window)

(Stow in LMP TSB)

(Assemble, connect cables & hand to LMP)

(SXT 40°, SCT 80° shaft ang)

SUNSET 11 IMU REFSMMAT Realign Check (P52), (CMP)
(00:31:42) P52 - (PAD REFSMMAT)

N71: _ _ , _ _

N05: _ _ _ . _ _

N93:
X _ _ . _ _ _

Y _ _ . _ _ _

Z _ _ . _ _ _

GET: _ _ : _ _ : _ _

CRO AOS
(00:52:20)

If IMU is realigned,
Realign GDC (CDR)
OOE
RETICLE BRIGHTNESS - DIM
Stow Optics Eyepieces
Increase S BD volume

CRO LOS
(00:58:11)

HSK AOS(s) 12 Two way USB VOICE Check
(00:59:38) Report GYRO torquing angles

HSK LOS
(01:05:41)

SUNRISE
(01:05:47)

US AOS
(01:28:22)

13 SCS ATT Ref Comp Check
V16 N20E

FDAI SELECT - 1

FDAI SOURCE - ATT SET

ATT SET - GDC

ATT SET dials - null FDAI 1 err needles

Basic Date - October 6, 1969
Changed -

Key VERB when nulled (freeze display)

Record from DSKY:

R _____, P _____, Y _____

Record from ATT SET dials:

R _____, P _____, Y _____

FDAI SEL - 1/2

14 EXTEND DOCKING PROBE

cb DOCK PROBE (2) - close (verify)

DOCK PROBE EXTD/REL - EXTD/REL until
full probe extension

(DOCK PROBE tb - grey at full extension)

	EXT	RET
FULL EXT	Grey	Grey
FULL RET	BP	BP
PART EXT	BP	Grey

DOCK PROBE EXTD/REL - RETRACT (tb-gray)

15 COPY TLI, TLI ABORT, & P37 PADS

SV UPDATES (MCCH)

16 SM RCS HOT FIRE

MAN ATT (3) - MIN IMP

SC CONT - SCS (verify)

cb SECS ARM (2) - close

RCS CMD - ON

Test SM RCS jets - report

RCS CMD - OFF

MAN ATT (3) - RATE CMD

AC ROLL (4) - MANA →
AC ROLL (4) - OFF →

17 SECS LOGIC (2) - on(up)

MSFN confirm GO for PYRO ARM

US LOS
(01:45:44)

CYI AOS
(01:50:10)

Basic Date - ober 6, 1969
Changed - November 7, 1969

TLI

X					X					TB6p
X	X	X			X	X	X			R
X	X	X			X	X	X			P
X	X	X			X	X	X			Y
X	X	X			X	X	X			BT
										$\Delta VC'$
+					+					V_i
X	X	X			X	X	X			R
X	X	X			X	X	X			P
X	X	X			X	X	X			Y
X	X	X			X	X	X			R
X	X	X			X	X	X			P
X	X	X			X	X	X			Y

TLI

SEP

EXTRACTION

Basic Date: October 6, 1969
Changed:

L
2-20

P27 UPDATE

PURP		V			V			V				
GET		:	:	:	:	:	:	:	:			
304	01	INDEX			INDEX			INDEX				
	02											
	03											
	04											
	05											
	06											
	07											
	10											
	11											
	12											
	13											
	14											
	15											
	16											
	17											
	20											
	21											
	22											
	23											
	24											
	N34 HRS		X	X	X				X	X	X	
	MIN		X	X	X	X			X	X	X	X
	NAV CHECK SEC		X	X					X	X		
	N43 LAT			0						0		
LONG												
ALT		+	0					+	0			

Basic Date October 6, 1969
 Channed _____

CSA .08

Basic Date October 6, 1969
Changed

CSM 108

PURPOSE					
PROP/GUID					
+					
0 0					
0 0					
+ 0 0					
+ 0 0 0					
+ 0					
ΔV_X					
ΔV_Y					
ΔV_Z					
X X X					
X X X					
X X X					
+					
H_A					
H_P					
+					
ΔVT					
X X X					
X					
ΔVC					
X X X X					
SXTS					
+					
SFT					
+					
TRN					
X X X					
BSS					
X X					
SPA					
X X X					
SXP					
0					
LAT					
LONG					
+					
RTGO					
+					
VIO					
GET					
0.05G					

P30 MANEUVER

L/2-22

SET STARS

R ALIGN _____
P ALIGN _____
Y ALIGN _____

ULLAGE _____

HORIZON/WINDOW _____

P37 FOR L/0+8

X				
X				

GETI

ΔVT

LONG

GET 400K

						PURPOSE
						PROP/GUID
+						WT N47
	0	0				P TRIM N48
	0	0				Y TRIM
+	0	0				HRS GETI
+	0	0	0			MIN N33
+	0					SEC
						ΔV_X N81
						ΔV_Y
						ΔV_Z
X	X	X				R
X	X	X				P
X	X	X				Y
+						H _A N44
						H _P
+						ΔVT
X	X	X				BT
X						ΔVC
X	X	X	X			SXTS
+					0	SFT
+				0	0	TRN
X	X	X				BSS
X	X					SPA
X	X	X				SXP
	0					LAT N61
						LONG
+						RTGO EMS
+						VIO
						GET 0.05G

Basic Date October 6, 1969
Changed

CSM 38

TLI PREPARATION

GET - 1:50

Basic Date - October 6, 1969
Changed - October 27, 1969

CSM 108

CYI LOS
(01:55:29)

SUNSET
(01:59:54)

CRO AOS
(02:25:28)

CRO LOS
(02:31:44)

SUNRISE
(02:33:56)

XLUNAR - INJECT (verify)
EDS PWR - on (up)
EMS FUNC - OFF (verify)
EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
Set ΔV ind. to +1586.8 fps
EMS MODE - NORMAL
EMS FUNC - ΔV Test
SPS THRUST lt - on/off (10 sec)
ΔV ind stops at -0.1 to -41.5
EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
Set ΔVC
EMS FUNC - ΔV

GDC ALIGN
V48E, 31102, 01111
Key V83E
Set ORDEAL
SECS PYRO ARM (2) - on (up)
TRANS CONTROL PWR - ON
ROT CONTR PWR NORMAL (2)-AC/DC (verify)
ROT CONTR PWR DIRECT (2)-MNA/MNB
LV IND/GPI - SII/SIVB (verify)
LV GUID - IU (verify)
cb DIRECT ULLAGE (2) - closed
SET EVENT TIMER to 51:00
Begin MONITOR For TB6

59:42	SII SEP 1t - out (TIG - 18 sec)	
59:52	SIVB FUEL LEAD	
59:55	SIVB ULLAGE discontinues	
	Insure FDAI 1 PITCH = 3°	
59:59	LV ENG 1 1t - on	
MSFN AOS	Start ORDEAL torquing	
(02:52:44)		
00:00	SIVB IGNITION (__:__:__GETI)	
00:02	LV ENG 1 1t - out	
	MONITOR THRUST & ATTITUDE	+45°/P,Y
	MONITOR LV TANK PRESS	+10°/sec P,Y
05:45	SIVB ECO (1t on) (BEGIN TB7)	+20°/sec R

	*EMER SIVB CUTOFF AT 6 SEC	*
	* PAST BURN TIME IF VI ATTAINED*	
	*LV STAGE sw - SII/SIVB	*
	*If still no ECO,	*
	* THC CCW & NEUTRAL in 1 sec	*
	*If LV GUID - CMC,	*
	* LV STAGE sw-SII/SIVB on VI	*

Key VERB (freeze display)

05:55	LV ENG 1 1t - out (TB7 + 10 sec)	
	SIVB ATT HOLD 20 sec & BEGIN VENTING	
	SIVB MNVR TO ORB RT (HDS DN) (.3°/sec)	
	VI _____ & AVC _____ report	
	HDOT _____	
	HPAD _____	
	KEY RLSE	
F 16 62	KEY RLSE	
F 16 83	ΔVX,Y,Z	(.1fps)
	SCS TVC SERVO PWR #1 - OFF	
	PCM BIT RATE - LOW	
	EMS MODE - STBY	
	EMS FUNC - OFF	
	SECS PYRO ARM (2) - SAFE	
	FDAI #1 - INRTL	
	PRO	
F 37		
	OOE	

Basic Date October 6, 1969
 Changed October 27, 1969

When CMC ACTY lt out,
Key V66E
CMP to LH couch
CDR to CTR couch
WASTE STOWAGE VENT vlv - CLOSED
HI GAIN ANT PWR - OFF (Verify)
cb HI GAIN ANT FLT BUS - close
cb HI GAIN ANT GRP 2 - close
T, D, & E, pg L/3-1

Basic Date - October 6, 1969
Changed

Basic Date October 6, 1969
 Changed

SIVB TLI - NOMINAL

Nov. 14, 1969 AZ 72°
 FIRST OPPORTUNITY

θ	ψ	DET	V_I	$\dot{H}$	H
59	1.0	0:00	25559	9	106
56	- 2.0	0:30	26116	24	106
55	0.0	1:00	26727	85	106
54	2.5	1:30	27364	206	107
53	3.0	2:00	28092	399	108
53	6.8	2:30	28903	681	111
52	8.7	3:00	29754	1057	115
51	10.6	3:30	30649	1534	122
50	12.5	4:00	31594	2122	131
48	14.3	4:30	32595	2819	143
46	15.9	5:00	33664	3633	159
41	17.6	5:30	34819	4536	179
41	17.5	5:44	35426	5026	190

SIVB TLI - MANUAL

Nov. 14, 1969 AZ 72°
 FIRST OPPORTUNITY

θ	ψ	DET	V_I	$\dot{H}$	H
57	8.0	0:00	25559	9	106
56	8.0	0:30	26116	24	106
55	8.0	1:00	26727	85	106
54	8.0	1:30	27364	206	107
53	8.0	2:00	28092	399	108
52	8.0	2:30	28903	681	111
51	8.0	3:00	29754	1057	115
50	8.0	3:30	30649	1534	122
49	8.0	4:00	31594	2122	131
48	8.0	4:30	32595	2819	143
47	8.0	5:00	33664	3633	159
45	8.0	5:30	34819	4536	179
45	8.0	5:44	35426	5026	190

2-27
 L

TLI TRAJECTORY OPP 1
 NOM & MAN

TLI BACKUP GUIDANCE PROCEDURES

TB5

Key V46E
LV GUID - CMC
*V96E
V25 N33E
Load GET of TB6
V25 N26E
26000E
01513E
10067E
**V30E
F 06 34 Time from TB6
SC CONT - SCS (verify)
MONITOR LV TANK PRESS
*AP > 36 psid (OXID > FUEL) *
*AP > 26 psid (FUEL > OXID) *
*LOX TK PRESS >50 psia *
*EMERGENCY CSM/LV SEP pg L/5-1 *
ORDEAL ALT = 300 NM
EARTH/LUNAR = LUNAR
Mnvr SIVB to TLI Att:
R = 180°, P = 59.25°, Y = 8.0° (1st OPP)
R = 180°, P = 59.60°, Y = 355.0° (2nd OPP)
Key V16 N20E (DSKY R2 = 59.25°)
Null SIVB rates
ORDEAL FDAI #1 = ORB RATE
ORDEAL MODE - FAST/HOLD
Slew FDAI #1 TO P = 0°
Insure R2 = 59.25°
KEY REL

TB6

UPLK ACTY 1t - on
S-II SEP 1t - on

TB6+10sec

UPLK ACTY 1t - out
F37 00E

51:00

S-II SEP 1t - out
Start DET

57:00

V37E 47E (check bias) Record
(Limit: 9.8 fps/min)

F 16 83

AVX,Y,Z (.1fps)

N20E

58:00

Insure FDAI #1 P = 0° & R2 = 59.25°, R3 = 8.0°

October 6, 1969
October 27, 1969
Basic Date
Changed

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SIVB TLI - NOMINAL					
Nov. 14, 1969 AZ 72° SECOND OPPORTUNITY					
θ	ψ	DET	V_I	$\dot{H}$	H
60	1.0	0:00	25553	10	108
54	5.5	0:30	26189	3	108
52	3.2	1:00	26912	38	108
52	1.0	1:30	27673	143	108
51	- 1.5	2:00	28475	326	109
50	- 3.5	2:30	29319	598	112
49	- 5.7	3:00	30208	967	115
48	- 7.9	3:30	31143	1441	121
47	- 9.9	4:00	32135	2025	130
45	-12.0	4:30	33190	2732	142
43	-13.8	5:00	34320	3556	157
41	-14.6	5:29	35502	4447	177

SIVB TLI - MANUAL					
Nov. 14, 1969 AZ 72° SECOND OPPORTUNITY					
θ	ψ	DET	V_I	$\dot{H}$	H
55	-5.0	0:00	25553	10	108
54	-5.0	0:30	26189	3	108
52	-5.0	1:00	26912	38	108
51	-5.0	1:30	27673	143	108
51	-5.0	2:00	28475	326	109
50	-5.0	2:30	29319	598	112
48	-5.0	3:00	30208	967	115
47	-5.0	3:30	31143	1441	121
46	-5.0	4:00	32135	2025	130
45	-5.0	4:30	33190	2732	142
44	-5.0	5:00	34320	3556	157
43	-5.0	5:29	35502	4447	177

N62E

F 16 62

VI, HDOT, HPAD (fps, fps, .1nm)
MONITOR VI () at ECO
SCS TVC SERVO PWR #1 - AC1/MNA
SCS TVC SERVO PWR #2 - OFF (verify)
TAPE RECR - HBR/RCD/FWD/CMD RESET

58:20

EMS MODE - NORMAL

58:36

SII SEP 1t - on

TLI Inhibit Signals will not
* be honored after 59:42 *

58:38

SIVB ULLAGE Begins

59:05

Start ORDEAL torquing

59:42

S-II SEP 1t - out (TIG - 18 sec)

59:52

SIVB FUEL LEAD

59:55

SIVB ULLAGE discontinues

59:59

LV ENG 1 1t - on

00:00

SIVB IGNITION (): :) GETI

00:02

LV ENG 1 1t - out

FLY P = 0°, Y = 8.0°

MONITOR THRUST & ATTITUDE

MONITOR LV TANK PRESS

+45°/P,Y +10°/sec P,Y +20°sec R

05:45(1st)

CUTOFF ON PAD VI (lead by 100 fps)

LV STAGE sw -SII/SIVB

05:29(2nd)

Key VERB (freeze display)

VI & ΔVC report

HDOT

HPAD

KEY RLSE

F 16 62

KEY RLSE

F 16 83

ΔVX,Y,Z (.1fps)

SCS TVC SERVO PWR #1 - OFF

PCM BIT RATE - LOW

EMS MODE - STBY

EMS FUNC - OFF

SECS PYRO ARM (2) - SAFE

FDAI #1 - INRTL

PRO

F 37

OOE

Basic Date - October 6, 1969
Changed - October 27, 1969

CS: '08

L
2-31

When CMC ACTY lt out,
Key V66E

CMF to LH couch

CDR to CTR couch

WASTE STOWAGE VENT vlv - CLOSED

HI GAIN ANT PWR - OFF (Verify)

cb HI GAIN ANT FLT BUS - close

cb HI GAIN ANT GRP 2 - close

T, D, & E, pg L/3-1

Do not select P20, P23, P3X, P4X, P6X or P7X prior to TB6
or MANUAL TB6 will be necessary

If V37E XXE or RESTART occurs after (*V96E), key V21 N1E,
3573EE & repeat steps (*V96E) to (**V30E

*MANUAL TB6 *
*V1 N10E *
*12E *
*R1=0BCDE *
*V21E *
*12E *
*Load R1=1BCDE *
*ENTR *
After S-II SEP
* lt - on *
*V37E 00E *

(__:__) (TB6)

SATURN RATE CHANGE

V24 N1 E
3322E, XXE, YYYYYE

SIVB RATE	SAT RATE +1 address 3322 XXX	SAT RATE +2 address 3323 YYYYY
.05°/sec RPY	161	77616
.1 RPY	210	77567
.2 RPY	266	77511
*.3 RPY	344	77433
.3P,Y .5 R	476	77301

*USE FOR TLI

Basic Date October 6, 1969
Changed October 27, 1969

CSM 108

NORMAL SC/BOOSTER SEPARATIONS

1 PRE CSM SEPARATION

DIRECT O2 vlv - OPEN until
CAB PRESS = 5.7, then close
cb DOCK PROBE (2) - close (verify)
COAS PWR - on
ALIGN GDC
Verify RCS DAP loaded
R1=11102, R2=01111

SIVB MNVR (: :)
SEP (: :)

V46E

OMNI ANT - B

Load N17 & N22 (PAD)

V63E (Monitor SIVB Mnvr) (TB7 + 15 min)

* If error needles not nulled:			*
* V60E			*
* V16N20E			*
* R	* P	* Y	*
* <u> </u>	* <u> </u>	* <u> </u>	(N20) *
* -56	* +180	* +/-	* *
* <u> </u>	* <u> </u>	* <u> </u>	(N22) *
* Load new Docking Attitude			*

2 CSM SEPARATION PREP

DOCK PROBE EXTD/REL - RETRACT (verify)
SM RCS PRPLNT tb (8) gray (verify)
AUTO RCS SELECT (16) - MNA/MNB
EMS FUNCT - ΔV SET/VHP RNG
Set EMS ΔV ctr to -100
EMS FUNCT - ΔV
MAN ATT (3) - RATE CMD
LIMIT CYCLE - OFF (verify)
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - on (up) (verify)
ROT CONT PWR NORMAL (2) - AC/DC (verify)
ROT CONT PWR DIRECT (2) - MNA/MNB (verify)

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NORMAL SC/BOOSTER SEP

CMC MODE - FREE (verify)
SC CONT - CMC
EMAG MODE (3) - RATE 2 (verify)
cb RCS LOGIC (2) - close (verify)
TVC SERVO PWR #1 - AC1/MNA
DET RSET - RESET
DET - 59:30
PC REAC vlv - LATCH

3 CSM SEPARATION
THC - armed
RHC #2 - armed
cb SECS LOGIC (2) - closed (verify)
cb SECS ARM (2) - closed (verify)
SECS LOGIC (2) - on (up)(verify)
RCS CMD - ON
TAPE RCDR - HBR/RCD/FWD/CMD RESET
EMS FUNCT - ΔV (verify)
EMS MODE - NORMAL
SECS PYRO ARM (2) - on (up)
Start DET up
59:50 CMC MODE - AUTO
59:58 THC - +X and hold
00:00 CSM/LV SEP pb - push, hold, and release
LV TANK PRESS - full scale Low

*No Separation: ★
*THC - CCW (leave in detent) until 1 fps ★
*DET reset and counting up (auto) ★
* LV TK PRESS-full scale low (SEP ind) ★
* THC - neutral ★
*Confirm ΔV = .8 fps ★

THC - release
 ΔV ind - -100.8 fps
SM RCS PRPLNT tb (8)-gray (verify)
SM RCS He tb (8)-gray (verify)
SM RCS SEC PRPLNT FUEL PRESS (4) - CLOSE
PC REAC vlv - NORM

NORM SC/BOOSTER SEP

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00:15 Thrust -X to -100.5 fps
BMAG MODE (3) - ATT 1/RATE 2
SC CONT - SCS
MAN ATT (PITCH) - ACCEL CMD
Pitch up at 1.5° sec
Key V62E
MAN ATT (PITCH) - RATE CMD (after 180° pitch)
Null Translation and rates
Thrust +X ($\Delta V \sim .5$ fps)
SC CONT - CMC
BMAG MODE (3) - RATE 2
V49E F 06 22 (DOCKING ATT) OMNI ANT - C
PRO F 50 18
PRO 06 18
F 50 18 (Completion of MNVR)
ENTR
HI GAIN ANT TRACK - MAN
HI GAIN ANT PWR - POWER
Slew ANT to verify operation
HGA angles: P = -20, Y = 290
S BD ANT OMNI - HI GAIN
HI GAIN ANT TRACK - REACQ
For TV go to pg F/10-20

4 DOCKING

Stabilize & align CSM
BMAG MODE (3) - ATT 1/RATE 2
THC +X to close at .25 to .5 fps
At capture:
PROBE EXTEND/RETR tb-bp (A, pg F/11-8)
CMC MODE - FREE
Allow probe to damp S/C motions
(approx 10 sec)
Align Pitch and Yaw with THC (<3°)
(minimum possible)
DOCK PROBE RETRACT PRIM -1 (E,pg F/11-8)

After dock latches have engaged:

PROBE EXTEND/RETR tb - grey
(A-1,5,9,;B-3,7,11)
SECS PYRO ARM (2) - 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 - off (ctr)
PCM BIT RATE - LOW

5 POST DOCKING

RATE - HIGH
ATT DB - MAX
COAS PWR - OFF
cb RCS LOGIC (2) - open
TVC SERVO PWR #1 - OFF
THC,RHC - locked
EMS MODE - STBY
EMS FUNCT - OFF
BMAG MODE (3) - RATE 2 (verify)
Verify Suit Integrity
COUCHES - CDR-90°,CMP-0°,LMP-180°
LM PWR - OFF (verify)
TUNNEL LIGHTS - ON

6 CM/LM PRESSURE EQUALIZATION (Decal)

02 PRESS IND sw - SURGE TANK
Verify CRYO 02 PRESS 1 ind - 865-935 psia
EMER CAB PRESS sel - OFF
REPRESS PKG vlv - OFF
DIRECT 02 vlv - CLOSE (verify)
TUNL VENT vlv - LM/CM AP
LM/CM AP ind - +4 psid (pegged)
PRESS EQUAL vlv - OPEN (D, pg F/11-8)
CAB PRESS ind - 4.5 psia
PRESS EQUAL vlv - CLOSE
LM/CM AP ind - ~ 2.4 psid
Monitor LM/CM AP ind for 3 min
and verify AP stable
PRESS EQUAL vlv - OPEN
CAB PRESS ind - 4.0 psia
REPRESS 02 vlv - OPEN

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Basic Date. _____
Changed _____

CAB PRESS ind 5.7 psia
 Cycle REPRESS 02 as required
 between 4.0 and 5.7 psia limits
 until REPRESS 02 PRESS ind
 ~0.0 psia
 REPRESS 02 - CLOSE
 CAB PRESS ind $\geq$ 4.0 psia
 *If CAB PRESS ind $<$ 4.0 psia *
 * PRESS EQUAL vlv - CLOSE *
 LM/CM Δ P ind - ~ 0.0 psid
 CRYO 02 PRESS 1 ind (SURGE TK) $>$ 400 psia
 REPRESS PKG vlv - FILL to 865-935, then OFF
 EMER CAB PRESS sel - BOTH
 TUNL VENT vlv - OFF
 WASTE STOW vlv - VENT (until cabin purge complete
 at ~8 hrs)

7 TUNNEL HATCH REMOVAL (Decal)
 HATCH PRESS EQUAL vlv - open (CCW) (verify)
 ACTR HNDL sel - unstow, pull to stop,
 - set to U
 - Push to stop
 Verify gearbox disconnect socket - U
 ACTR HNDL sel - stow
 ACTR HNDL - push to stow
 Remove hatch, stow

8 DOCKING LATCH VERIFICATION (Decal)
 LATCH HANDLE - Pull to verify hook en-
 gaged (12 latches)
 Not Engaged - Attempt to engage
 * before recocking *
 LATCH IND BUTTON (Red) - Flush (12 latches)
 Power BUNGEE FAIRING - Parallel to +X
 * Not parallel - Push +X end of *
 * bungee before recocking*
 *UNLOCKED LATCHES: *
 * Recock Latches *
 * Hook does not release: *
 * AUX REL (yellow)-push *
 * Cock latch *
 Release Latch - push man-release

October 6, 1969

Basic Date
 Changed -

Verify EXTEND LATCH ENGAGED INDICATOR (RED)
not visible
GN2 BLEED button (red) - press (10 sec)

9 LM UMBILICAL CONNECTION (Decal)

LM connector fairings (2) (orange)-open
LM umbilical connectors (2)-install & lock
LM connector fairings (2)(orange) - close
SYS Test - 4D
LM PWR - CSM
SYS Test ind - 0.5-3.2 volts

10 HATCH INSTALLATION (Decal)

Align Hatch in Tunnel
ACTR HNDL sel - unstow, set to L
- push to stop
Verify gearbox disconnect socket - L

*If latches cannot be closed: *

GEARBOX DISCONNECT - 180° CCW (Tool B)

*AUX LATCH DRIVE - LATCH (113° CW) *

*Verify hatch latches, remove tool B *

ACTR HNDL sel - stow
ACTR HNDL - push to stow
HATCH PRESS EQUAL vlv - close (CW) (C,pg F/11-8)
LM TUNL VENT vlv - LM/CM ΔP
LM TUNNEL LIGHTS - OFF

11 PRE LM SEP & EJECTION

cb SIVB/LM SEP (2) - close (verify)
EMS FUNCT - ΔV SET/VHF RNG
Slew ΔV ind to +100.0
EMS FUNCT - ΔV
TAPE RCDR - HBR/RCD/FWD/CMD RESET
EMS MODE - NORMAL
LOAD DAP, N46:
R1 = 2/102, R2 = 01111
V46E

Basic Date - October 6, 1969
Changed - May 7, 1969

Set DET: 00:00
cb SECS ARM (2) - close (verify)
SECS LOGIC (2) - on (up)
Obtain GO from MSFN
SECS PYRO ARM (2) - ARM
TVC SERVO PWR #1 - AC1/MNA
Key V37E 47E

- 12 LM SEP & EJECTION
HAND CONTROLLERS - unlocked
SIVB/LM SEP - on (up)
Start DET
CMC MODE - AUTO
00:05sec
Thrust AFT (-X) for 3 sec

13 POST LM EJECTION

Key V37E 00E
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
cb SIVB/LM SEP (2) - open
LV/SPS IND sw - GPI
TVC SERVO PWR (2) - OFF
EMS MODE - STBY
TAPE RCDR - off (ctr)
PCM BIT RATE - LOW
V49E
F 06 22
Load N22 att
96.3°, 277.1°, 343.5°
PRO
PRO (mnvr to burn att)
F 50 18
ENTR (POO)
TRANS CONT PWR - OFF
ROT CONTR PWR DIR (2) - OFF
Hand controllers - locked

October 6, 1969
Basic Date
Changed November 4, 1969

Monitor SIVB thru Hatch Window

Time from Ejection (min:sec)	APS EVASIVE		
	CSM Inertial Att		
	<u>Roll</u>	<u>Pitch</u>	<u>Yaw</u>
00:00			
03:00	96.3	277.1	343.5
11:40	96.3	277.1	343.5
15:00	120.2	165.8	42.5
20:00	145.2	147.2	30.4

*NO APS EVASIVE at 11:40 *

*TRANS CONTR +X (5 sec) *

Monitor SIVB thru Hatch Window

Time from Ejection (min:sec)	RCS EVASIVE		
	CSM Inertial Att		
	<u>Roll</u>	<u>Pitch</u>	<u>Yaw</u>
15:00	29.0	224.0	18.5
20:00	32.9	222.0	22.0

Basic Date October 6, 1969
Changed November 4, 1969

ABORT PROCEDURES

MODE IA ABORT

(00:00 to 00:42) (10K)

00:00 TRANS CONTR - CCW then NEUTRAL
CM/SM SEP (2) - on (up)

00:14 ELS LOGIC - on
TWR JETT (2) - on (up)
APEX COVER JETT PB - PUSH

00:16 DROGUE DEPLOY PB - PUSH

00:18 CM RCS He DUMP PB - PUSH

Monitor altimeter

If <3800 ft - DEPLOY MAINS
>3800 ft - NO ACTION

00:28 If <10,000 ft - DEPLOY MAINS

GO TO LANDING PHASE AT 10,000 ft pg L/4-8

MODE IB ABORT

(00:42 to 16.5 nm) (1:56)

00:00 TRANS CONTR - CCW then NEUTRAL
CM/SM SEP (2)-on (up)

00:11 CANARD DEPLOY - PUSH

00:14 ELS LOGIC - on (up)
RCS CMD - ON

GO TO LANDING PHASE pg L/4-8

MODE 1

October 6, 1969

Basic Date

Changed

CSM 108

MODE 1C ABORT

(16.5 nm to TWR JETT) (01:56 - 03:18)

00:00 TRANS CONTR - CCW then NEUTRAL
CM/SM SEP (2) - on (up)

RCS CMD - ON

00:11 CANARDS DEPLOY
CM RCS PRESS - on (up)
RCS TRNFR - CM
RCS IND - CM (1 or 2)
C/W MODE - CM

S/C PLATFORM GO/NO GO (Excessive Rates)
V82E Check HA

HA>32nm & PLAT GO

HA<32nm or PLAT NO GO

TWR JETT sw(2)-on(up)
MAN PITCH - RATE CMD
ENT ATT RO°,P135°,Y0°
BMAG (3)- ATT1/RATE 2
EMS FUNC - ENTRY
EMS MODE - NORMAL
At .05G Lt,
.05G sw - on (up)
Fly Max Lift

Estab. +5°/SEC
pitch rate
EXCESSIVE + PITCH RATES

*ROLL 90° *
*USE YAW THRUSTERS TO *
*CONTROL RATE *
ROLL BACK TO HEADS DN

0 (.05G) _____
GET DROGUE _____

LET FAILS To JET - L/5-1

GO TO LANDING PHASE pg L/4-8

MODE 1

October 6, 1969

Basic Date _____

Changed _____

CSM 1C

MODE II RCS ABORT
(TWR JETT to MODE III) (03:18 - 10:08)

00:00 TRANS CONTR - CCW (4 sec min)
No BECO-Reset THC,Req. RSO Shutdown
*Reset & start DET *

00:03 *CSM/LV SEP - PUSH*
*RCS CMD - ON *

00:05 TRANS CONTR - NEUTRAL THEN +X

00:24 TRANS CONTR +X OFF
Entry ATT - (R=0°,P=120°,Y=0°) (Comp1 by 1:40)
V82E - NOTE TFF (Ha, Hp, TFF)
If TFF>2 min, Yaw 45° (LEFT) out-of-plane
EMAG MODE (3) - ATT1/RATE 2
cb MNA&B BAT C (2) - closed
CM/SM SEP - on (up) GET 300K _____
CSM/LM FNL SEP (2) - on (up)
CM RCS - PRESS 0 (.05G) _____
RCS TRNFR - CM GET DROGUE _____
C&W MODE - CM
EMS FUNC - ENTRY
EMS MODE - NORMAL

Set up Single Ring RCS
At .05G Lt, Sw - on (up)
EMS ROLL - ON
Fly Max. Lift
N62E VI, HDOT, H

GO TO LANDING PHASE pg L/4-8

October 6, 1969

Basic Date
Changed _____

MODE III SPS ABORT

($\Delta R = -400$ NM to INSERTION) (10:08 - 11:39)

00:00 TRANS CONTR - CCW (4 Sec Min)
 *NO BECO - RESET THC, *
 * LV STAGE sw - SII/SIVB*
 *Reset & start DET *

00:03 *CSM/LV SEP - PUSH*
 *RCS CMD - ON *

00:05 TRANS CONTR - NEUTRAL THEN +X
 LV IND/GPI sw - GPI

00:24 TRANS CONTR +X OFF
 KEY V82E N50E $\Delta R, HP, TFF$ (.1mm,min-sec)
 If $\Delta R > 0$:
 Mnvr to retro att ($R=180^\circ, P=194^\circ, Y=0^\circ$)
 (Scribe on horiz, BEF, Hds up)
 EMAG MODE (3) - ATT1/RATE2
 SCS TVC P&Y - AUTO
 EMS MODE - NORMAL GETI _____
 ΔV THRUST A - NORMAL (6999.9)
 02:05 DIRECT ULLAGE PB - PUSH ΔV _____
 THRUST ON PB - PUSH VC _____
 Burn to VC ($\Delta R=0$) Δtb _____
 ΔV THRUST (2) - OFF GET 300K _____
 θ (.05G) _____
 If $TFF > 2min$, Yaw (RT) 45° GET Drogue _____
 out-of-plane
 cb MNA&B BAT C(2) - closed
 CM/SM SEP - on (up)
 CSM/LM FNL SEP (2) - on (up)
 CM RCS PRESS - on (up)
 RCS TRANSFER - CM
 C&W MODE - CM
 Mnvr to entry att ($R=0^\circ, P=105^\circ, Y=0^\circ$)
 (BEF, Hds Dn, Full Lift)
 Note TFF

Basic Date October 6, 1969

Changed _____

CSM 101

MODE II, MODE III

Basic Date - October 6, 1969
Changed

L
4-5

EMS MODE - STBY
EMS FUNC - ENTRY
EMS MODE - NORMAL
Set up single ring RCS
.05G Lt., Sw - on (up)
EMS Roll - on (up)
.2G Lt., Roll left 55°
Fly Half Lift

GO TO LANDING PHASE pg L/4-8

MODE III, MODE IV

MODE IV SPS TO ORBIT

(VI=21,800 HDOT ~ +250 Alt ~100 NM to INSERTION)

00:00 TRANS CONT - CCW (4 sec min)
 *NO BECO-RESET THC, *
 * LV STAGE sw - SII/SIVB *
 *RESET & START DET *

00:03 *CSM/LV SEP - PUSH*
 *RCS CMD - ON *

00:05 TRANS CONTR - NEUTRAL THEN +X
 LV IND/GPI sw - GPI

00:24 TRANS CONTR - +X OFF
 (Scribe on horiz, SEF, Hds Dn)
 BMAG MODE (3) - ATT1/RATE2
 EMS MODE - NORMAL

01:30 ΔV THRUST A - NORMAL GETI _____
 DIRECT ULLAGE PB - PUSH 6999.9
 THRUST ON PB - PUSH ΔV _____
 FLY VI, HDOT, H VC _____
 *Burn to VC (hp>75 nm *
 * +6 sec BT or HA=200nm*
 * & +HDOT *
 ΔV THRUST (2) - OFF Δt_b _____
 EMS MODE - STBY

Record VI _____ (fps)
 H DOT _____ (fps)
 H PAD _____ (.1nm)

KEY V82E

Record HA _____ (.1nm)
 HP _____ (.1nm)
 TFF _____ (min-sec)

PRO

October 6, 1969

Basic Date_

Changed_

Basic Date - October 6, 1969
Changed -

L
4-7

V37E 00E

When CMC ACTY lt out:

V66E

V45E

Verify DAP load, V48: R1=11102, R2=01111

V46E

V83E (check)

PRO

CSM WT

P TRIM

Y TRIM

BDA LOS

(00:12:50)

GO TO INSERTION CHECKLIST pg L/2-11

LANDING PHASE

LANDING PHASE (30K, DESCENDING)

30K' cb ELS (2) - close
 ELS - AUTO
 ELS LOGIC - on (up)

24K' Twr jett (auto)
*TWR JETT (2) - on (up) *
*CSM/LM FNL SEP(2)-on(up) *
Apex cover jett (auto)
*APEX COVER JETT PB-PUSH) *

(WAIT 2 SECS)

Drogues deployed (auto)
DROGUE DPLY PB-PUSH

If Both drogues Fail:

*ELS - Man *
*STABILIZE CM *
5K' MAIN DPLY PB - PUSH
*ELS - AUTO *

49 sec

23.5K' Cabin Pressure increasing
*If not increasing by 17K': *
*CABIN PRESS REL vlv (RH)-DUMP *

10K' Main parachutes deployed
MAIN DEPLOY PB - PUSH (within 1 sec)
VHF ANT - RECY
VHF AM A - SIMPLEX
VHF BCN - ON
CABIN PRESS REL vlv (2) - CLOSE
DIRECT O2 vlv - OPEN (verify)
RCS DUMP (Auto for Mode IA)
CM RCS LOGIC - on (up)
CM PRPLNT - DUMP (burn audible)
MONITOR CM RCS 1&2 for He press decrease
NO BURN or PRESS DECREASE
* USE BOTH RHC's *
*DO NOT FIRE PITCH JETS *
CM PRPLNT - PURGE
CM RCS He DUMP PB-PUSH
*RHC (both) - 30 secs *
* NO PITCH *
CABIN PRESS REL vlv - BOOST/ENTRY

October 6, 1969

Basic Date Changed _____

CSM 108

STRUT LOCKS (4) - UNLOCK
cb FLT & PL BAT BUS A,B,&BAT C (3) - close
cb FLT & PL MNA & B (2) - open
cb ECS RAD HTR OVLD (2) - open
cb SPS P&Y (4) - open

3K' CM RCS PRPLNT (2) - OFF (terminates purge)
CABIN PRESS REL vlv (RH) - DUMP
FLOOD Lts - POST LDG
ROT CONTR PWR DIRECT - OFF
ELS - AUTO (verify)
ELS LOGIC - ON (verify)

800' CAB PRESS REL vlv - CLOSE (latch off)
MN BUS TIE (2) - OFF
cb BAT RLY BUS (2) - open

POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

1

Stabilization after landing

cb MAIN REL PYRO (2) - close

MAIN RELEASE - on (up)

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

DIRECT 02 - OFF (verify)

No contact with recovery forces

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

*VHF AM RCV ONLY - A *

cb PL VENT - close

cb FLOAT BAG (3) - close

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

October 6, 1969

Basic Date -
Changed -

2

Post Stabilization And Ventilation

PL BCN LT - BCN LT LOW

PL VENT vlv - UNLOCK (Pull)

Remove PL VENT Exh Cover

PL VENT - HIGH or LOW

PL DYE MARKER - ON (swimmer comm) (NA 108)

Release footstraps and restraints

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

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

cb FLT & PL BAT C - open

cb PYRO A SEQ A - open

cb PYRO B SEQ B - open

*EACH HR - CHECK DC VOLTS $\geq$ 27.5 V *

*If Not: *

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

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

* GO TO LOW POWER CHECKLIST *

Unstow and install PLV DISTRIB DUCT

Deploy grappling hook and line if req.

UNAIDED EGRESS PROCEDURES

PREPARATION

DISCONNECT UMBILICALS

NECK DAMS ON (if suited)

CONFIGURE COUCH(S) - 270°

ARMRESTS STOWED

UNSTOW SURVIVAL KITS

CONNECT LANYARDS, (Green to S/C, White to Crew)

STABLE I

PL VENT - OFF

CB PNL 250 (ALL) - OPEN

CHARGE HATCH COUNTERBALANCE

OPEN SIDE HATCH

ACTR HNDL SEL - N

REMOVE RAFT FROM KIT NO. 2

PUT RAFT OVERBOARD & PULL INFLATION LANYARD

PASS KITS TO RAFT

EGRESS, INFLATE LIFE VEST, BOARD RAFT

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STABLE II

CB CREW STA AUDIO (3) - OPEN
PWR (3) - OFF
SUIT PWR (3) - OFF
PRESS EQUAL VLV - OPEN
REMOVE & STOW HATCH
PUT SURVIVAL RUCKSACKS DOWN TUNNEL
EXIT FEET FIRST; WHEN CLEAR OF S/C INFLATE
WATER WINGS
REMOVE LIFE RAFT FROM KIT NO. 2 AND INFLATE

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 Transceiver

*VHF Beacon not operating

*connect Survival Transceiver to ant

cable Conn P112 behind VHF ant access pnl and

*place radio in BCN mode

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)

COUCH LIGHTS - OFF

POSTLANDING 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

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TLI-90 MIN ABORT

TLI 90 MIN ABORT

(Return to targeted splash point;
SPS burn at SIVB C/O +90 min)

V37E 47E

If abort decision occurs after CSM/LV
separation, go to 00:14.

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

(TLI+25min)

00:00

TRANS CONTR - CCW (4 sec)

DET RESET (verify)

00:03

SIVB/CSM SEP

LV ENG 1 Lt - out

CSM/LV SEP PB - PUSH

*RCS CMD-ON *

00:05

TRANS CONTR - neutral then +X for
10 sec

SIVB/GPI sw - GPI

00:14

TRANS CONTR +X - OFF

PITCH UP to LOCAL VERT (+X axis
toward the earth)

RATE - LOW

BMAG MODE (3) - ATT1/RATE 2

EDS PWR - OFF

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

cb SECS ARM (2) - open

cb EDS (3) - open

01:00

TRANS CONTR -X (8 to 10 sec)

V37E 00E

RATE - HIGH

MNVR TO RETRO ATT

R _____ (Block Data)

P _____ (Block Data)

Y _____ (Block Data)

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RETRO UPDATE (NO COMM - use Block Data)
GETI _____ 0 .05G _____

ΔV	_____	GET DROGUE	_____
VC	_____	ENTRY R	_____
Δtb	_____	P	_____
GET 400K	_____	Y	_____

If time permits, go to G&N thrusting procedures;
if time critical, continue with SCS ΔV.

XX:XX

Set DET counting up to GETI
GDC ALIGN
EMS FUNC - ΔV SET/VHF RNG
SET ΔVc ABORT
EMS FUNCT - ΔV

TVC CHECK & PREP

cb STAB CONT SYS (Pnl 8) - close
cb SPS (12) - close
MAN ATT (3) - RATE CMD
LIMIT CYCLE - ON
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
SCS TVC (2) - RATE CMD
ΔVCG - LM/CSM or CSM
TVC GMBL DRIVE P&Y - AUTO

(54:00)
(-06:00)

MN BUS TIE (2) - ON
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
ROT CONTR PWR NORMAL (2) - AC
ROT CONT PWR DIRECT (2) - OFF
EMAG MODE (3) - ATT1/RATE2
SC CONT - SCS
RHC #2 - ARMED

Basic Date — October 6, 1969
Changed — October 27, 1969

(55:00) PRIMARY TVC CHECK
(-05:00) GMBL MOT P1-Y1 - START/ON (LMP Confirm)
Verify TRIM CONTROL & SET
Verify MTVC
SCS TVC (2) - AUTO
THC - CW
Verify NO MTVC

SEC TVC CHECK

GMBL MOT P2-Y2 - START/ON (LMP Confirm)
SET GPI TRIM
Verify MTVC
THC NEUTRAL
Verify NO MTVC
Verify GPI returns to trim
ROT CONT PWR NORM (2) - AC/DC
ROT CONT PWR DIRECT (2) - MNA/MNB
FDAI SCALE - 5/5
LIMIT CYCLE - OFF
RATE - HIGH
UPDATE DET

(58:00)
(-02:00) ΔV THRUST A(B) - NORMAL
V37E 47E
THC - ARMED
RHC (2) - ARMED
SPS He vlvs (2) - AUTO (verify)
(59:30) TAPE RCDR - HBR/RCD/FWD/CMD RESET
(-00:30) EMS MODE - NORMAL

00:00 ULLAGE & THRUST ON PB - PUSH
SPS THRUST Lt - ON
00:03 ΔV THRUST B(A) - NORMAL
ULLAGE & THRUST ON PB - PUSH

MONITOR THRUSTING

Pc 95-105 psia
EMS COUNTING DOWN
SPS INJ VLVS (4) - OPEN
SPS He vlvs tb-gray
SPS FUEL/OXID PRESS - 170-195 psia
PUGS - BALANCED

October 6, 1969
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L
4-15/16

00:XX

ECO

ΔV THRUST A&B - OFF

VERIFY THRUST OFF

SPS INJ VLVS (4) - CLOSED

SPS He vlvs tb (2) - bp

GMBL MTRS (4) - OFF (LMP Confirm)

TVC SERVO PWR 1&2 - OFF

MN BUS TIE (2) - OFF

19 F 16 83

ΔV XYZ (CM)

(.1fps)

RECORD

ΔVC

EMS FUNC - OFF

ΔVX

EMS MODE - STBY

ΔVY

LIMIT CYCLE - ON

ΔVZ

ATT DB - MAX

TRANS CONT PWR - OFF

ROT CONTR PWR DIRECT (2) - OFF

BMAG MODE (3) - RATE 2

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

PRO

F37 00E

V66E

Go to ENTRY PREP & SUPERCIRC ENTRY PROCEDURE

October 0, 1983

Basic Date -
Changed -

LAUNCH EMERGENCY PROCEDURES

LET FAILS TO JETTISON

LEGS CUT/NO MOTOR FIRE (pyro audible)

LES MOTOR FIRE PB - push

NO RESPONSE to ABORT SYS TWR JETT switches

cb SECS ARM (2) - close (verify)

cb SECS LOGIC (2) - close (verify)

cb EDS (3) - close (verify)

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

SECS PYRO ARM (2) - on (up) (verify)

EDS PWR - on (up) (verify)

ABORT SYS TWR JETT (2) - on (up) (verify)

NO TWR JETT - continue to orbit

ABORT SYS TWR JETT (2) - off (ctr)

EMERGENCY CSM/LV SEPARATION

(During TLI Burn, start at step 2)

1

cb SECS ARM (2) - close

SECS LOGIC (2) - on (up)

SECS PYRO ARM (2) - ARM

ROT CONTR PWR DIRECT (2) - MNA/MNB

SC CONT - SCS

2

CSM/LV SEP (ATTACHED TO SIVB)

00:00 TRANS CONTR - CCW (4sec) (Go to step 3)

or CSM/LV SEP (DOCKED, UMBILICAL NOT CONNECTED)

CSM/LM FINAL SEP (2) - ON (.4fps sep)

TRANS CONTR -X (5 sec)

MNVR TO BURN ATTITUDE (Go to step 3)

or CSM/LM-LV SEP (DOCKED, UMBILICAL CONNECTED)

SIVB/LM SEP - on (up)

TRANS CONTR -X (5 sec)

MNVR TO BURN ATTITUDE

ΔVCG - LM/CSM

Set GPI trim: P=+.94, Y=-.25 (Go to step 3)

3

MN BUS TIE (2) - ON

TVC SERVO PWR #1 - AC1/MNA

TVC SERVO PWR #2 - AC2/MNB

BMAG MODE (3) - ATT1/RATE 2

GMBL MTRS (4) - ON (LMP confirm)

ΔV THRUST A - NORMAL

00:06 DIRECT ULLAGE & THRUST ON PB - PUSH

00:11 ΔV THRUST (2) - OFF

Basic Date - October 6, 1969
Changed November 4, 1969

LAUNCH EMERG

RAPID HATCH OPENING

- 1 GEAR BOX SEL - UNLATCH (verify)
ACTR HANDLE rel - push or squeeze
- 2 ACTR HANDLE - operate (until hatch is unlatched)
 *If hatch fails to open *
 * GN2 RATCHET HNDL - operate *
 * GN2 VLV HNDL - unlock and *
 * push (outboard) *

FIRE IN CM DURING BOOST

- 1 CABIN FAN (2) - OFF (verify)
- 2 Monitor EPS indicators for excessive current.
Immediately remove power from affected bus.
If in abort modes I or II:
 Verify suit compressor on good AC bus
If in abort mode III with affected bus Main A (B):
 TVC GMBL DRIVE (2) - 2 (1)
 AC INV 1 (2) AC BUS 1 (2) - OFF
 AC INV 2 (1) AC BUS 1 (2) - on (up)
- 3 CAB PRESS REL vlv (RH) - DUMP
- 4 ABORT using appropriate mode & reconfigure per
 Bus Lost Reconfiguration List, pg L/5-8

Basic Date_ October 6, 1969

Changed_

CONTAMINATION IN CM

- 1 Don O2 masks and/or PGA's immediately
- 2 Evaluate contamination level (isolate & correct source of contamination if possible) and proceed with one of the following steps:
 - a. Retain O2 masks or remain in suit and accept contamination level in cabin.

CAUTION

If in PGA's, adjust DIRECT O2 to maintain suit to cabin AP > +2 in. H2O

CSM 105

LAUNCH EMERG

- b. Retain O2 masks and scrub cabin atmosphere through suit loop. If initially suited, establish partially suited or shirtsleeve configuration and don O2 masks.

CAUTION

Change LiOH cartridges after scrub completed.

- c. Retain PGA's or don PGA's
Verify suit integrity (visually)
Perform Cabin Dump
Perform Cabin Repress

CONTAMINATION IN SUIT

- 1 SUIT COMPR 2 - AC1
- 2 SUIT COMPR 1 - OFF
- 3 DIRECT O2 vlv - OPEN for 1 minute
then CLOSE

If condition persists:

- 4 SUIT COMPR 2 - OFF
- 5 DIRECT O2 vlv - CLOSE
- 6 Doff helmet
- 7 Don emergency O2 masks

FIRE/SMOKE IN CM (CREW SUITED)

- 1 CAB FAN (2) - OFF (verify)
- 2 Monitor EPS for excessive current and remove power from affected bus
- 3 Verify suit compressor on good AC bus
- 4 Use fire extinguisher as appropriate

October 6, 1969

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FIRE IS OUT

- 5 Remove smoke from cabin per "Contamination in CM" procedures before removing helmets
- 5a Reconfigure per Bus Lost Reconfiguration List
pg L/5-8

FIRE PERSISTS - DUMP CABIN

- 6 Verify:
 SUIT CKT RET vlv - CLOSE (push)
 EMER CAB PRESS vlv - OFF
 REPRESS PKG vlv - OFF
- 7 Visually check suit integrity
- 8 CAB PRESS REL (RH) - DUMP to 3.0 psia
 then to BOOST ENTRY
 Provides controlled cabin dump until
 suit circuit pressure is verified
- 9 Verify Suit pressure > 3.5 psia
- 10 CAB PRESS REL (RH) - DUMP
 and/or CAB PRESS DUMP vlv - OPEN
- 11 CAB PRESS ind 0.0 psia for 6 min
- 12 CAB PRESS REL (RH) - NORMAL
- 13 CAB PRESS DUMP vlv - CLOSE
- 14 Do not repress cabin until fire source is removed

FIRE/SMOKE IN CM (CREW UNSUITED)

- 1 Don emergency O2 masks
- 2 CAB FAN (2) - OFF (verify)
- 3 SUIT COMPR (2) - OFF

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CSM 108

- EST 1963**

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- 19 CAB PRESS REL (RH) - NORMAL
- 20 CAB PRESS DUMP vlv - CLOSE
- 21 Do not repress cabin until fire source is removed

FIRE/SMOKE IN CM DURING ENTRY

- 1 CABIN FAN (2) - OFF (verify)
- 2 Monitor EPS indicators for excessive current.
Immediately remove power from affected bus.
- 3 ROT CONTR PWR DIRECT (2) - MNA/MNB
& maintain attitude if required.
- 4 If affected bus is:
MNA
AC INV 1 AC BUS 1 - OFF
AC INV 2 AC BUS 1 - on (up)
Set up for CM/RCS sys 2
AUTO RCS SEL A/C ROLL (4) - OFF
AUTO RCS SEL CM 1(6) - OFF
AUTO RCS SEL CM 2(6) - MNB
Use RHC's for RCS dump, not CM PRPLNT DUMP switch
MNB
AC INV 2 AC BUS 2 - OFF
AC INV 1 AC BUS 2 - on (up)
Use RHC's for RCS dump, not CM PRPLNT DUMP switch
- 5 CAB PRESS REL vlv (RH) - DUMP
- 6 Reconfigure per bus loss list
- 7 Continue ENTRY

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LAUNCH EMERGENCY POWER DOWN

(MN BUS Voltage <26.0, no short verified
Powerdown until MN BUS voltage >26.5 vdc)

	<u>Amps</u>	
02 HTRS (2) - off (ctr)	11.05	
If GET > 2 min		
EDS AUTO - OFF		
2 ENG OUT - OFF		
LV RATES - OFF		
cb MNA BAT C - close		
cb MNB BAT C - close		
S BD PWR AMP - off (ctr)	4:00	
FC PUMPS (3) - OFF	8:73	
H2 HTRS (2) - off (ctr)	1.43	
LIGHTS (min req'd)	1.57	
TAPE RCDR FWD - off (ctr)	1.54	
*GMBL MTRS P2, Y2 - OFF	10.00	
TVC GMBL DR (P&Y)-1		
IMU PWR DN (STBY)	6.33	
CMC MODE - FREE		
G&N IMU PWR - OFF		
CMC to STBY	1.96	
V48E		
F 04 46, load 0 in left digit R1		
PRO,PRO,PRO,V46E		
V37E 06E		
F 50 25 00062 CMC PWR DN		
PRO, hold until STBY lt on		
G&N PWR - OFF	1.50	
ECS GLY PUMP 1 - OFF	2.57	
cb ECS RAD CONT/HTR (2) - open	1.05	
SCE PWR - off (ctr)	0.65	
TELECOM GRP 1&2 - OFF	1.76	
cb INSTR ESS MNA&B - open	4.85	

*Crew Option

October 10, 1967

Basic Date
Changed -

BUS LOST RECONFIGURATION

A. Loss of MAIN BUS A

EDS AUTO/OFF - off
FC 2 - MAIN B only
FC 1 - off (MAIN A and B)
cb MAIN B BAT C - closed
cb MAIN A BAT BUS A - open
AC INV 3 - MNB
AC INV 3 AC 1 - on (up)
SCS TVC P, Y - RATE CMD (verify)
FDAI SELECT - 2
TVC GIMBAL DRIVE (P, Y) - 2
BMAG MODE (3) - RATE 2
ROT CONTR POWER DIRECT 2 - MNB

IF ABORT REQUIRED,

For SPS Burn

cb's SPS PITCH 2 & YAW 2 (2) - open
(After Sec Gmb1 Mtr turn on & prior to Ign)
If Mode IV,
cb's SPS PITCH 2 & YAW 2 (2) - closed
(prior to Sec Gmb1 Mtr turn off)

Use RHC's for RCS dump, not CM PRPLNT DUMP switch

At insertion, proceed to flight reconfiguration list

B. Loss of MAIN BUS B

EDS AUTO/OFF - off
FC 2 - MAIN A only
FC 3 - off (MAIN A and B)
cb MAIN A BAT C - closed
cb MAIN B BAT BUS B - open
AC INV 2 - off
AC INV 2 AC 2 - off
AC INV 3 - MNA
AC INV 3 AC 2 - on (up)
TVC GIMBAL DRIVE (p, y) - 1
ROT CONTR POWER DIRECT 1 - MNA

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IF ABORT REQUIRED,

For SPS Burn

cb's SPS PITCH 1 & YAW 1 (2) - open
(After Pri Gmb1 Mtr turn on & prior to Ign)
If Mode IV,
cb's SPS PITCH 1 & YAW 1 (2) - closed
(prior to Pri Gmb1 Mtr turn off)

Use RHC's for RCS dump, not CM PRPLNT DUMP switch

At insertion, proceed to flight reconfiguration
list

C. Loss of BAT BUS A

EDS AUTO/OFF - off
cb MAIN A to BAT C - closed
TVC GIMBAL DRIVE (P, Y) -2
(if bus lost prior to Gmb1 Mtr turn on)
AUTO RCS SELECT RING 1 - off
AUTO RCS SELECT B/D ROLL B1, B2 (2) - off

IF ABORT REQUIRED,

For SPS Burn

If SPS GMBL MTRS off:

Sec Gmb1 Mtrs (2) - on (up)
cb SPS P2 & Y2 (2) - open
(After Sec Gmb1 Mtr turn on & prior to Ign)
If Mode IV,
cb SPS P2 & Y2 (2) - closed
(prior to Sec Gmb1 Mtr turn off)

WARNING - Primary gimbal motors cannot be turned
off if bus lost while they are running

At insertion, proceed to flight reconfiguration
list

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D. Loss of BAT BUS B

EDS AUTO/OFF - off
cb MAIN B to BAT C - closed
TVC GIMBAL DRIVE (P,Y) - 1 (prior to Gmb1 Mtr turn on)
AUTO RCS SELECT RING 2 - off
AUTO RCS SELECT - B/D ROLL D1, D2 (2) - off

IF ABORT REQUIRED,

For SPS Burn

If SPS GMBL MTRS off:

Pri Gmb1 Mtrs (2) - on (up)

cb SPS P1 & Y1 (2) - open

(After Pri Gmb1 Mtr turn on & prior to Ign)

If Mode IV,

cb SPS P1, & Y1 (2) - closed (prior to Pri
Gmb1 Mtr turn off)

WARNING - Secondary gimbal motors cannot be turned
off if bus lost while they are running.

At insertion, proceed to flight reconfiguration list

E. Loss of AC BUS 1

AC INV 1 MNA - OFF
SUIT COMPR 2 - AC2
FDAI SEL - 2
BMAG MODE (3) - RATE 2
TVC SERVO PWR #1 - AC2/MNB (loss of ϕ A only)
SCS TVC (P&Y) - RATE CMD (Verify)

F. Loss of AC BUS 2

AC INV 2 MNB - OFF
TVC SERVO PWR #2 - AC1/MNA (loss of ϕ A only)
SCS TVC (P&Y) - AUTO
 Δ V CG - LM/CSM
Control SPS with trim wheels

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LOSS OF TWO FUEL CELLS AT LIFTOFF

Entry Area 3-1

After 2 min EDS AUTO - OFF

1. If loss of FC 1&2, tie BAT C to MNA
2. If loss of FC 2&3, tie BAT C to MNB
3. If loss of FC 1&3, tie BAT C to both MNA&B

Failed FC PUMPS (2) - OFF

At insertion perform insertion checklist plus the following power down. Leave batteries on until power down complete.

Pnl 2

02 & H2 HTRS (4) - off (ctr)
C/W NORM - ACK

Power down CMC per checklist, leave IMU powered up (Note: No need to realign IMU for 3-1 entry).

Pnl 3

TAPE RCDR FWD - off (ctr)
S BD NORM PWR AMP - off (ctr)
Remaining fuel cell to both Main Buses. Select single inverter operation.

Pnl 5

cb RAD HTR OVLD (2) - open
Do not reset cb's unless batteries are tied to the Main Buses.

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Pnl 7

LOGIC 2/3 PWR - OFF
FDAI/GPI PWR - OFF
ELEC PWR - OFF
BMAG PWR (2) - OFF

Note: If voltage permits leave BMAG
PWR in WARMUP after the batteries are off
the main bus, if not place BMAG
PWR - ON 40 min prior to IMU/GDC
align.

Pnl 8

AUTO RCS SEL (16) - OFF
cb SCS LOGIC (4) - open

4. Batteries off line
Charge lowest battery

5. 1 hour to SPS ignition
BMAG PWR (2) - WARMUP

Pressurize CM RCS

6. 10 min to SPS ignition
Power up CMC and SCS and perform IMU/GDC align

7. Perform SPS normal deorbit

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APOLLO

[illegible]

CREW LOG

CREW LOG

[illegible]

APOLLO 12

NASA — MSC

Basic Date. 1CTOBER 20, 1969
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OCTOBER 20, 1969

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APOLLO

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Basic Date OCTOBER 20, 1969

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Basic Date - OCTOBER 20, 1969

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APOLLO

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Basic Date OCTOBER 20, 1969

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OCTOBER 20, 1969

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NASA — NBC

Basic Date CTOBER 20, 1969
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APOLLO 12

Basic Date - OCTOBER 20, 1969

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Basic Date OCTOBER 20, 1969

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OCTOBER 20, 1969

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