APOLLO 11	
LAUNCH OPERATIONS CHECKLIST	
PART NO	S/N
SKB32100080-306	100

STRUT SOFTENER - LOWER LEFT

O_2 QUANT #1 90% #2 95%

(MSN RULE 4% MAX DIFF?)

Neil suit pocket interfaces w Mount Handle

BAT BUS (A OR B) VOLTAGE LOW :

PRIOR 2:00, EDS AUTO - OFF

PNL 275: cb BAT C to MN A(B)

AC-1 + AC-2 :

ABORT MODE I OR II (NOT III)

(DIR O_2 ON)

F/C # 2 DISCONNECT, EDS AUTO-OFF

BAT RELAY BUS FAILS (PNL 5 CB POPS OR GND CONFIRMS)

BUS TIES OFF

ABORT { SHORTED MN BUS, UNABLE TO REMOVE F/C
LOSS OF 3 F/C + 1 BAT T

ABORT { LOSS OF CABIN + SUIT PRESS
O_2 MANIF LEAK > 4 PPH
BOTH SUIT COMPRESSORS + CABIN PRESS LOST
LOSS OF CABIN PRESS + O_2 MANIF LK

CM RCS - BOTH HE PRESS ↓ - ABORT IF MODE I

CMP

LAUNCH TABLE OF CONTENTS

1.	LIFTOFF SWITCH CONFIGURATION	1-1
2.	BOOST - INSERTION - TLI	2-1
	Boost Preparation (T - 20:00)	2-1
	Boost	2-3
	Insertion	2-7
	System Checks	2-8
	Pre-TLI Monitoring & Verifications	2-10
	TLI Preparation	2-19
	TLI	2-20
	TLI Backup Guidance Procedure	2-23
	Saturn Rate Change	2-24
3.	NORMAL SC/BOOSTER SEPARATIONS	3-1
4.	ABORTS (LAUNCH & TLI)	4-1
	MODE I A	4-1
	MODE I B	4-1
	MODE I C	4-2
	MODE II	4-3
	MODE III	4-4
	MODE IV	4-6
	Landing Phase	4-7
	Post Landing	4-8
	TLI - 10 Min	4-11
	TLI - 90 Min	4-14
5.	LAUNCH EMERGENCY	5-1
	Rapid Hatch Opening	5-1
	Fire in CM During Boost	5-1
	Contamination in CM	5-1
	Contamination in Suit	5-2
	LET Fails to Jettison	5-2
	Emergency CSM/SIVB Separation	5-3
	Fire/Smoke in CM (CREW SUITED)	5-3
	Fire/Smoke in CM (CREW UNSUITED)	5-4
	Fire/Smoke in CM During Entry	5-6
	Launch Emergency Power Down	5-6
	Bus Lost Reconfiguration	5-7
	Loss of Two Fuel Cells at Liftoff	5-10
6.	CREW LOG	6-1

Basic Date April 15, 1969
Changed June 27, 1969
CSM 107 & SUBS

SECTION 1. 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 - ~~AUTO~~ RATE CMD
SCS TVC YAW - ~~AUTO~~ 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

Basic Date APRIL 15, 1969
Changed JUNE 16, 1969
CSM 107 & SUBS

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 (START*)
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 (2) tb - 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
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°
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
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 - off (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
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 2ØC

PANEL 4

SPS GAUGING - AC1
TELCOM GRP 1 - AC1
TELCOM GRP 2 - AC2
GLY PUMPS - 1 - AC1
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 H20/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

Basic Date April 15, 1969
Changed June 27, 1969
CSM 7 & SUBS

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)
SCS ELEC PWR - GDC/ECA
SCS SIG CONDR/DR BIAS 1 - AC1
SCS SIG CONDR/DR BIAS 2 - AC2
BMAG PWR (2) - ON
DIRECT O2 vlv - open (CCW) (>2 in H20 on SUIT/CAB ΔP ind)

PANEL 8

CB Panel 8 - all closed
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 FLOOD LT - OFF, full dim, full bright
INT INTGL LT - as desired
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
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

PANEL 100

UTIL PWR - OFF
FLOOD LTS DIM - 1
FLOOD LTS FIXED - OFF
OPT PWR - OFF
IMU PWR - on (up)
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 H20 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

CSM 107 & SUBS Basic Date APRIL 15, 1969
Changed JUL 16, 1969

PANEL 162

SCI PWR - OFF

PANEL 163

SCI/UTIL PWR - OFF

PANEL 180

S BD SQUELCH - ENABLE

PANEL 225

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

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

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 (START*)
EVNT TMR MIN - center
EVNT TMR SEC - center
MSN TMR HR - center
MSN TMR MIN - center
MSN TMR SEC - center

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

Basic Date April 15, 1969
Changed June 1, 1969
CSM 7 & SUBS

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)

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

O2 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 O2 vlv - close

PANEL 601

REPRESS O2 vlv - close

PANEL 602

REPRESS O2 RELF vlv - OPEN (CW)

FWD HATCH

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

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.

Basic Date April 15, 1969
Changed June 27, 1969
CSM & SUBS

417 items

SECTION 2. 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&#2 - unlocked
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)
ΔV 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 REACT vlv - LATCH
-08:30 SEC COOL LOOP PUMP - OFF (ctr) (verify)
-06:00 SCS TVC SERVO PWR #1 - AC1/MNA
SCS TVC SERVO PWR #2 - AC2/MNB

-04:00	ASTRO LAUNCH OPERATIONS COMM CHECK
-03:00	DSKY - Verify P02
	V75 (NO ENTR)
	TAPE RCD FWD - FWD (tb-gray)
-2:~~00~~ 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

-00:09 Ignition CMD
-00:01 L/V ENGINES lts (5) - out — 00:00
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 — ±4°/sec P,Y ±20°/sec R

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

06 62 VI,H DOT, H PAD (fps,fps,.1nm)
* LV GUID & LV RATE lts ON* — MODE IA
* LV GUID - CMC *
+00:02 Yaw Mnvr.- report
+00:11 Roll & Pitch Program - report
+00:30 Roll complete - report

+00:42 MODE IB - report — 00:42
PRPLNT DUMP - RCS CMD
+00:50 Monitor α to T +02:00
(100%, 5° Att error) — ±4°/sec P,Y ±20°/sec R

CABIN PRESSURE DECREASING (∿14K)

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

MODE IB

+01:21 MAX Q — 1:56

+01:56 MODE IC - report (R3 = 16.5 NM)
+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
+02:16 INBOARD CUTOFF - (lt 5 on)
LIFTOFF lt - out
+02:39 CMC BOOST Polynomial ends
+02:40 OUTBOARD CUTOFF - report (lts 1,2,3,4 on)
+02:41 SIC/SII STAGING (lts off)
+02:42 SII Ign Command (lts on)
SII SEP lt - on
+02:44 SII 65% - lts out

+03:11 SII SEP lt - out report

+03:16 TWR JETT (2) - on(up) (TFF>1+20)
ELS - MAN

* NO TWR JETT, pg L/5-2 *

* For MAN BOOSTER CONTROL *
* LV GUID - CMC *
* Key V46E *

MAN ATT PITCH - RATE CMD
Twr Jett & Mode II - Report
3:16 GLY EVAP STEAM PRESS - AUTO
GLY EVAP H20 FLOW - AUTO

+03:21 Guidance Initiate - report (OECO +41 sec)
+03:53 Guidance Good
+04:00 Report status
+05:00 Report Status
+05:20 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

+9°/sec, P,Y
+20°/sec R

MODE IC

02:42

MODE IC

03:16

MODE II

Basic Date April 1, 1969
Changed June 27, 1969

CSM 10 SUBS

+06:15 OMNI ANT - D (AZ < 96°)
- C (AZ > 96°)
+06:25 SIVB to orbit - Level sense arm 08:15
+07:00 Report Status
+07:40 IECO (lt 5 - on)
+08:00 Report Status
+08:01 PU SHIFT
+08:30 GO/NO GO FOR STAGING - report
+09:00 Mode IV - Report
(VI∿ 21,800, H DOT = +250)
Report Status
+09:13 OECO (lts 1,2,3, & 4 - on)
+09:14 SII Staging - lts out
+09:17 SIVB Ign Cmd - lt on
+09:19 SIVB 65% - lt out

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

09:00

10:08

MODE IV

MODE III

INSERTION

+11:00 Report Status
+11:40 SECO (lt on) - report
(Begin TB5)

If LV GUID - CMC, (+____)
*LV STAGE sw - SII/SIVB *
*SECO *
*LV ENG 1 lt - on *
*Begin TB5 *

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

+11:50 INSERTION - lt out (TB5 + 10 sec)

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

Key V82E

Record HA_____ (.1nm)
HP_____ (.1nm)
TFF_____ (min-sec)
PRO

V37E OOE
When CMC ACTY lt out:
V66 (transfer SV into LM memory)
Verify DAP load,V48: R1=31102, R2=X1111
V46E CSM WT _____
V83E (check θ) P TRIM _____
PRO Y TRIM _____

BDA LOS
(00:12:42)

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 (verify)
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 - OFF
EMS FUNCT - OFF
INSTALL COAS

VAN LOS
(00:14:32)
15

MONITOR LV TANK PRESS
$\Delta P < 36$ psid (OXID > FUEL)
$\Delta P < 26$ psid (FUEL > OXID)
LOX TK PRESS >50 psia
*EMERGENCY CSM/LV SEP pg L/5-3

CYI AOS
(00:16:29)

CMP 1630 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
STRUT UNLOCK LANYARD (2)-stow

LMP 3

cb WASTE H20/URINE DUMP HTRS (2) - close
FC REACS vlv - NORM
H2 PURGE LINE HTR - ON
cb COAS/TUNL LTG MNB - close

FOLD RH COUCH
PNL 226

CSM 107 & SUBS Basic Date APRIL 15, 1969
Changed JUNE 16, 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 - ~~105~~°-~~195~~° F (C/W 75°-205°) 55°-210°
He PRESS - record
MANF PRESS - 178-192 psia (C/W 145-205 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 - 25-105 psia
(287-302 after activation)
CM RCS HTRS - OFF (on 20 min prior to pressurization if req'd)

3 C/W OPERATIONAL CHECK (CMP)
C/W LAMP TEST - 1 (LH MA & 16 lts)
C/W LAMP TEST - 2 (RH MA & 23 lts)
C/W CSM - CM (CM RCS lt (2) - on)
C/W CSM - CSM (CM RCS lt (2) - out)

4 Confirm normal suit pressure, cabin pressure, & 02 flow
EMERG CABIN PRESS vlv - BOTH
NEW SUIT CKT RET vlv - open (pull)
Remove helmet & gloves

5 CMP to LEB for MN REG CHECK
Unstow from R6:
Tape for optics
3 Helmet bags
3 Accessory bags

Basic Date APRIL 15, 1969
Changed JUNE , 1969
CSM 1 & SUBS

MAIN REG CHECK

MAIN REG B vlv - close
EMER CABIN PRESS sel - 1
PUSH TO TEST PB - PUSH (02 FLOW INC)

MAIN REG B vlv - open
MAIN REG A vlv - close
EMER CABIN PRESS sel - 2
PUSH TO TEST PB - PUSH (02 FLOW INC)
EMER CABIN PRESS - BOTH
MAIN REG A vlv - open

ORDEAL UNSTOW

Unstow:
tool E for CDR PUT IN SEC GLYCOL
cameras 16mm + 70mm TO BUZZ
Install optics eyepieces
DRINKING WATER SUPPLY vlv - ON

6 SEC RAD LEAK Ck
Monitor SEC ACCUM QUANTITY (LMP)
SEC GLY TO RAD vlv - NORM for 30 sec, then
BYPASS (CMP)

+20:00 7 ECS Post Insertion Config (CDR)
GLY RSVR BYPASS vlv - OPEN
GLY RSVR OUT vlv - CLOSE
GLY RSVR IN vlv - CLOSE
ECS RAD FLOW CONT - PWR
PRIM GLY TO RAD vlv - NORMAL (push)
LMP note PRIM ACCUM QTY
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

8 POT H20 HTR - MNA
CYI LOS PCM BIT RATE - LOW
(00:23:36) UP TLM - CMD RSET

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

9 FC Purge Ck (LMP)
H2/02 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
02 PRESS (2) - 865-935 psia
SURGE TK PRESS - 865-935 psia
H2 QTY (2) - record
02 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
02 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)

Basic Date April 15, 1969
Changed JUNE 27, 1969
CSM 7 & SUBS

SYS TEST 4A (BAT COMPT PRESS) - <1.5 vdc
(NA until 1st Vent)
If >1.5: BAT VENT vlv -
VENT (to ∿0) then CLOSED

A-C VOLTS - 113 to 117 all phases

2 ECS MONITORING CHECK

CABIN ΔP - -1 to -3.5 in H20
02 FLOW - 0.02-0.45 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 - 40-50.5° F
PRIM GLY EVAP STEAM PRESS
.1-.15 boiling, > .16 not boiling
PRIM GLY DISCH PRESS - 40-52 psig
SUIT TEMP - 45-55° F
CABIN TEMP - 70-80° F
SUIT PRESS/CABIN PRESS - 4.7-5.3 psia
PART PRESS CO2 < 7.6 mm Hg

Basic Date April 15, 1969
Changed June 27, 1969

SUIT COMP ΔP - 0.3-0.4 psid
PRIM GLY ACCUM QTY 30-65% (expect 20-50% at insert)
*If <30% - PRIM ACCUM FILL vlv - *
* ON (Until 40-55%) *
POT H20 QTY - 10-100%
WASTE H20 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

7 SECONDARY GLYCOL LOOP CHECK
ECS IND sw - SEC
SEC COOL LOOP PUMP - AC1
GLY DISCH SEC PRESS - 39-51 psig
ACCUM SEC QTY IND - 30-55%
SEC COOL LOOP PUMP - off (ctr)
ECS IND sw - PRIM

SEC COOL LOOP - EVAP
SEC EVAP STM PRESS - .1 - .15, >.16 NOT BOILING
AFTER 5 MIN:
SEC EVAP TEMP OUT - 40° - 50.5°F
SEC COOLANT LOOP EVAP - RSET 1 MIN, OFF (CTR)

Basic Date April 15, 1969
Changed June 27, 1969

CSM 107 & SUBS

8 SET UP CAMERAS (CMP)
16 MM /18/CEX - BRKT - MIR
(f8,250,7) 6 FPS
1 MAG (FOR T+D)
EL/80/CEX (f8,250,INF)

TAN AOS 9 ~~OPTICS DUST COVER JETT (CMP)~~
(00:37:01) OPT ZERO - OFF
G/N PWR OPTICS - on (up)
OPT MODE - MAN
OPT COUPLING CONT - DIRECT
OPT SPEED CONT - HI
OHC - MAX RIGHT (Obs eject thru eyepiece)

TAN LOS 10 MCCH - G/N STATUS
(00:42:35) Z Torquing Angle +.22

SUNSET 11 IMU REFSMMAT Realign Check (P52), (CMP)
P52 - (PAD REFSMMAT)

N71: __ __, __ __

N05: __ __ . __ __

N93:
X __ __ . __ __ __

Y __ __ . __ __ __

Z __ __ . __ __ __

GET: __ __:__ __:__ __

(00:43:29) If IMU is realigned,
CRO AOS Realign GDC (CDR)
(00:52:15) OOE
RETICLE BRIGHTNESS - DIM
Stow Optics Eyepieces
Collins to RH Seat w Helmet & gloves -
CRO LOS SBD VOL- INCREASE
(00:58:01)

Basic Date April 15, 1969
Changed June 27, 1969

CSM 107 & SUBS

HSK AOS(s)12 Two way USB VOICE Check
(00:59:30) Report GYRO torquing angles

HSK LOS
(01:05:35)

SUNRISE
(01:20:58)

US AOS
(01:28:19)

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
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 PROB EXTD/REL-RETRACT(tb-gray)

15 COPY TLI, TLI ABORT, & P37 PADS

SV UPDATES (MCCH)

Basic Date April 15, 1969
Changed June 27, 1969
C 107 & SUBS

~~51:38~~
~~8~~ 2

2:58:07
9
2:41:07
553

TLI

X	2	3	5	1	4	X						TB6p
X	X	X	1	7	9	X	X	X				R
X	X	X	0	7	1	X	X	X				P — TLI
X	X	X	0	0	1	X	X	X				Y
X	X	X	5	4	7	X	X	X				BT
1	0	4	3	5	6							ΔVC'
+	3	5	5	7	5	+						VI
X	X	X	3	5	7	X	X	X				R
X	X	X	1	0	7	X	X	X				P — SEP
X	X	X	0	4	1	X	X	X				Y
X	X	X	3	0	1	X	X	X				R
X	X	X	2	8	7	X	X	X				P — EXTRACTION
X	X	X	3	1	9	X	X	X				Y

TLI 10 MIN ABORT P = 223°

Basic Date April 15, 1969
Changed June 1, 1969

CSM 107 & SUBS

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 JUL 15, 1969
Changed June 1, 1969

CS 07 & SUBS

L/2-17

P30 MANEUVER

SET STARS

R ALIGN 0 7 1
P ALIGN 2 9 1
Y ALIGN 3 4 1

ULLAGE NO
UNDOCKED
Vega/Deneb

HORIZON/WINDOW

P37 FOR TLI+~~4~~ 5

	T2	1+	80				PURPOSE
	SP	S/G	GN				PROP/GUID
+	6	3	4	8	1		WT N47
−	0	0	1	.5	3		P_{TRIM} N48
+	0	0	1	.3	2		Y_{TRIM}
+	0	0	0	0	4		HRS GETI
+	0	0	0	1	0		MIN N33
+	0	2	5	.3	8		SEC
−	0	4	7	6	.1		ΔV_X N81
+	0	0	0	0	.1		ΔV_Y
+	5	3	3	6	.1		ΔV_Z
X	X	X	1	8	0		R
X	X	X	1	9	3		P
X	X	X	0	0	0		Y
+	—	—	—	—	—		H_A N~~44~~
+	0	0	2	0	.3		H_P ~~42~~ 44
+	5	3	5	7	.3		ΔVT
X	X	X	6	.3	3		BT
X	5	3	3	4	.9		ΔVC
X	X	X	X	3	3		SXTS
+	1	5	7	.8	0		SFT
+	1	2	.2	0	0		TRN
X	X	X	—	—	—		BSS
X	X	—	—	—	—		SPA
X	X	X	—	—	—		SXP
−	0	0	2	.5	2		LAT N61
−	0	2	5	.8	0		LONG
+	1	1	8	8	.7		RTGO EMS
+	3	4	3	4	5		VIO
	1	6	.0	3	.5	0	GET 0.05G

0	0	7	.4	4	GETI
X	6	4	8	5	ΔVT
X	1	1	6	5	LONG
0	2	5	0	6	GET 400K

Basic Date APRIL 15, 1969
Changed June 1, 1969

CSM 107 & SUBS

SET STARS							PURPOSE	
							PROP/GUID	
	+						WT	N47
R_{ALIGN} ___ ___ ___		0	0		•		P_{TRIM}	N48
P_{ALIGN} ___ ___ ___		0	0		•		Y_{TRIM}	
Y_{ALIGN} ___ ___ ___	+	0	0				HRS	GETI
	+	0	0	0			MIN	N33
	+	0			•		SEC	
ULLAGE ___						•	ΔV_X	N81
___						•	ΔV_Y	
___						•	ΔV_Z	
___	X	X	X				R	
___	X	X	X				P	
	X	X	X				Y	
	+					•	H_A	N~~47~~
						•	H_P	~~42~~ 44
	+					•	ΔVT	
HORIZON/WINDOW ___	X	X	X		•		BT	
___	X					•	ΔVC	
___	X	X	X	X			SXTS	
___	+				•	0	SFT	
	+			•	0	0	TRN	
	X	X	X				BSS	
	X	X				•	SPA	
P37 FOR TLI+4	X	X	X			•	SXP	
GETI		0			•		LAT	N61
X ΔVT					•		LONG	
X LONG	+					•	RTGO	EMS
GET_{400K}	+						VIO	
			•		•		GET	0.05G

Basic Date APRIL 15, 1969
Changed June 1, 1969

107 & SUBS

16 SM RCS HOT FIRE
MAN ATT (3) - MIN IMP
SC CONT - SCS
cb SECS ARM (2) - close
RCS CMD - ON
Test SM RCS jets
RCS CMD - OFF
MAN ATT (3) - RATE CMD

US LOS (01:47:48) — 17 SECS LOGIC (2) - on(up)
MSFN confirm GO for PYRO ARM

CYI AOS (01:50:01)

TLI PREPARATION

GET = 1:50
Don Helmets & Gloves (CMP helmet visor
SUIT CKT RET vlv - CLOSE (push)
XLUNAR - INJECT (verify)

CYI LOS (01:55:23)
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

TAN AOS (V) (02:09:07)
GDC ALIGN
V48E, _____, _____
Key V83E
Set ORDEAL
SECS PYRO ARM (2) - on (up)

SUNSET (02:11:36)
TRANS CONTROL PWR - ON
ROT CONTR PWR NORMAL (2)-AC/DC (verify
ROT CONTR PWR DIRECT (2) - MNA/MNB

CSM 107 & SUBS Basic Date APRIL 15, 1969
Changed JUNE 27, 1969

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

TLI

TAN LOS
(02:15:58)
(02:34:48)

CMP to Couch

TB 6 - SII SEP lt on (TIG-9 min, 38 sec)
SII SEP lt out (38 sec later)

51:00 Start DET COUNTING UP
SC CONT - SCS (verify)
MONITOR LV TANK PRESS

CRO AOS
(02:[redacted]:22)
36

*ΔP < 36 psid (OXID > FUEL) *
*ΔP < 26 psid (FUEL > OXID) *
*LOX TK PRESS >50 psia *
EMERGENCY CSM/LV SEP pg L/5-3

UP TLM CM - BLOCK (verify)
UP TLM IU - BLOCK (verify)

57:00 V37E 47E (check bias) Record _____
(Limit: 9.8 fps/min)
F 16 83 ΔVX,Y,Z (.1fps)
ORDEAL - 200/LUNAR
ORDEAL FDAI 1 - ORB RATE
FDAI 2 - INERTIAL
Slew FDAI to PITCH = [redacted]° 16°

58:00 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 RCDR - FWD/RCD/HBR/CMD RESET
EMS MODE - NORMAL

58:36	SII SEP lt - on
	TLI Inhibit Signals will not
	* be honored after 59:42 *
CRO LOS (02:37:36)	
58:38	SIVB ULLAGE Begins
59:00	Slew FDAI to PITCH = 8.0°
59:42	SII SEP lt - out (TIG - 18 sec)
59:52	SIVB FUEL LEAD
59:55	SIVB ULLAGE discontinues
	Insure FDAI 1 PITCH = ~~3.0~~° 4.0°
59:59	LV ENG 1 lt - on
	Start ORDEAL torquing
00:00	SIVB IGNITION (__:__:__GETI)
00:02	LV ENG 1 lt - out
	MONITOR THRUST & ATTITUDE ±45°/P,Y
	MONITOR LV TANK PRESS ±10°/sec P,Y
05:48	SIVB ECO (lt on) (BEGIN TB7)
	*EMER SIVB CUTOFF AT 6 SEC *
	* PAST BURN TIME IF VI ATTAINED*
	* THC CCW & NEUTRAL in 1 sec *
	*If still no ECO, *
	* LV STAGE sw - SII/SIVB *
	* IF LV GUID-CMC, THC CCW (NEUTRAL IN 1 SEC) ON VI*
MSFN AOS (02:~~49~~:39) 55	UP TLM IU - ACCEPT
	KEY VERB (freeze display)
	SIVB ATT HOLD 20 sec & BEGIN VENTING
	SIVB MNVR TO ORB RT (HDS DN) (.3°/sec)
	Record VI _____
	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

APRIL 15, 1969
JNE 27, 1969
Basic Date
Changed
CCM 107 & SUBS

EMS FUNC - OFF
SECS PYRO ARM (2) - SAFE
FDAI #1 - INRTL

PRO

Report VI_____
ΔVC_____

F 37

GDS AOS
(__:___:__)

OOE
When CMC ACTY lt out,
  Key V66E (Trans CSM SV to LM storage)
CMP to LH couch
CDR to CTR couch
Time to begin MNVR to SEP ATT: _____
T, D, & E, pg L/3-1

Basic Date July 5, 1969 REV I
Changed

SIVB TLI - NOMINAL I					
July 16, 1969 AZ 72° FIRST OPPORTUNITY					
Θ	Ψ	DET	V_I	$\dot{H}$	H
70.6	0	0:00	25554	9	107
65	0	0:30	26100	-4	107
64	1.5	1:00	26700	19	107
63	2.0	1:30	27380	90	107
62	3.0	2:00	28100	210	108
61	4.0	2:30	28880	425	110
60	4.5	3:00	29700	725	112
59	5.5	3:30	30600	1100	117
57	6.5	4:00	31600	1580	124
56	7.0	4:30	32600	2200	133
54	8.0	5:00	33650	2910	145
50	9.0	5:30	34800	3750	162
50	9.0	5:48	35563	4285	174

SIVB TLI - MANUAL I					
July 16, 1969 AZ 72° FIRST OPPORTUNITY					
Θ	Ψ	DET	V_I	$\dot{H}$	H
66.6	4.5	0:00	25554	9	107
65	4.5	0:30	26100	-4	107
64	4.5	1:00	26700	19	107
63	4.5	1:30	27380	90	107
62	4.5	2:00	28100	210	108
61	4.5	2:30	28880	425	110
59	4.5	3:00	29700	725	112
58	4.5	3:30	30600	1100	117
57	4.5	4:00	31600	1580	124
56	4.5	4:30	32600	2200	133
54	4.5	5:00	33650	2910	145
53	4.5	5:30	34800	3750	162
52	4.5	5:48	35563	4285	174

TLI TRAJECTORY
OPP 1 NOM & MAN

TLI TRAJECTORY
OPP 2 NOM & MAN

SIVB TLI - NOMINAL					
July 16, 1969 AZ 72° SECOND OPPORTUNITY					
Θ	Ψ	DET	V_I	$\dot{H}$	H
70	1.0	0:00	25546	6	109
64	2.0	0:32	26228	-5	109
62	2.0	1:02	26945	+16	109
61	2.0	1:32	27698	101	109
60	2.0	2:02	28491	260	110
59	2.0	2:32	29325	497	112
58	1.5	3:02	30206	825	115
56	1.5	3:32	31140	1260	120
55	1.5	4:02	32133	1785	127
53	1.0	4:32	33194	2431	138
51	1.0	5:02	34335	3195	152
49	1.0	5:32	35575	4054	170

SIVB TLI - MANUAL					
July 16, 1969 AZ 72° SECOND OPPORTUNITY					
Θ	Ψ	DET	V_I	$\dot{H}$	H
69	1.0	0:00	25546	6	109
63	2.0	0:32	26228	-5	109
61	2.0	1:02	26945	+16	109
60	2.0	1:32	27698	101	109
59	2.0	2:02	28491	260	110
58	2.0	2:32	29325	497	112
57	1.5	3:02	30206	825	115
55	1.5	3:32	31140	1260	120
54	1.5	4:02	32133	1785	127
52	1.0	4:32	33194	2431	138
50	1.0	5:02	34335	3195	152
48	1.0	5:32	35575	4054	170

Basic Date July 5, 1969
Changed July 7, 1969 Rev J

TLI BACKUP GUIDANCE PROCEDURES

TB5	KEY V46E
	LV GUIDANCE - CMC
	ORDEAL ALT = 200 NM
	EARTH/LUNAR = LUNAR
	MANEUVER LV TO START ATT:
	R = 180°, P = 70.98°, Y = 4.5° (1st OPP)
	R = 180°, P = 69.3°, Y = 4.5° (2nd OPP)
	KEY V16 N20E (DSKY R2 = 70.98°)
	NULL LV RATES
	ORDEAL FDAI #1 - ORB RATE
	ORDEAL MODE - FAST/HOLD
	SLEW FDAI #1 TO P = 0°
	INSURE R2 = 70.98°
TB6	S-II SEP LT - ON
51:00	S-II SEP LT - OFF
	START DET COUNTING UP FROM 51:00
57:00	KEY V37E 47E, CHECK BIAS
	N20E
58:00	INSURE FDAI #1 P = 0° & R2 = 70.98°, R3 = 4.5°
58:20	ORDEAL MODE - OPERATE/SLOW
	(STARTS ORDEAL TORQUING)
	EMS MODE - NORMAL
58:36	S-II SEP LT - ON
58:38	LV ULLAGE START
59:42	S-II SEP LT - OFF (IGN - 18 SEC)
59:50	N62E
59:52	SIVB FUEL LEAD
59:55	LV ULLAGE TERMINATES
59:59	ENG #1 LT - ON
00:00	IGNITION
00:02	ENG #1 LT - OFF
	FLY P = 0°, Y = 4.5°
05:48(1st)	CUTOFF ON PAD VI THC - CCW FOR 1 SEC & RESET
05:29(2nd)	

Basic Date April 15, 1969
Changed July 8, 1969 K
CSM 107 & SUBS

Back

Color_____

L
2-24

SATURN RATE CHANGE

V24 N1 E
3322E, XXXE, YYYYYE

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

*USE FOR TLI

Basic Date April 15, 1969
Changed JUNE 27, 1969

EM 107 & SUBS

SECTION 3. NORMAL SC/BOOSTER SEPARATIONS

1 PRE CSM SEPARATION

WASTE STOWAGE VENT vlv - CLOSED
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=11103
R2=X1111
V46E
V60E (When in SEP attitude)
V63E
V16 N20E

SIVB maneuver to SEP attitude 15 minutes from TB7

R	P	Y
-56	+180	+/-

V49E
V25E
Load docking gimbal angles

2 CSM SEPARATION PREP DOCK PROBE EXT/REL-RETRACT (VERIFY)

SIVB attitude, DB & H2 Vent rate, Confirmed by T/B GREY
MSFN SM RCS PRIM PROP T/B - VERIFY 8 GREY
AUTO RCS SELECT (16) - MNA/MNB
EMS FUNCT - ΔV SET/VHF RNG
Set EMS ΔV ctr to -100
EMS FUNCT - ΔV
MAN ATT (3) - RATE CMD
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)
~~SM RCS PRPLNT tb (8) - gray (verify)~~

CMC MODE - FREE (verify)
SC CONT - CMC
BMAG MODE (3) - RATE 2 (verify)
DOCK PROBE EXTD/REL - RETRACT (tb-gray) (verify)
cb RCS LOGIC (2) - close (verify)
TVC SERVO PWR #1 - AC1/MNA
DET RSET - RESET
DET - ~~00:00~~ 59:40

3 CSM SEPARATION
THC - armed
RHC #2 - armed
cb SECS LOGIC (2) - closed (verify)
cb SECS PYRO ARM (2) - closed (verify)
SECS LOGIC (2) - on (up)(verify)
RCS CMD - ON

TAPE RCDR - CMD RESET/HBR
EMS FUNCT - ΔV (verify)
EMS MODE - NORMAL
SECS PYRO ARM (2) - on (up)
CMC MODE - AUTO ← START DET
THC - +X and hold @ 59:58
CSM/LV SEP pb - push, hold, and release @ 00:00
LV TANK PRESS - full scale Low
LV ENG 1 lt - out

00:00
DET - start up

```
*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)

Basic Date April 15, 1969
Changed June 27, 1969

00:15 sec
Thrust -X to -100.5 fps
Key V62E
PRO
MAN ATT (PITCH) - ACCEL CMD
+ pitch of 1.5°/sec
PRO
MAN ATT (PITCH) - RATE CMD
Null translation and rates
EMS ΔV ind: -101.0 fps
F 50 18
At Completion of MNVR: ENTR
cb HI GAIN ANT FLT BUS - close
cb HI GAIN ANT GRP 2 - close
HI GAIN ANT TRACK - MAN
HI GAIN ANT PWR - POWER
Slew ANT to verify operation
HGA angles: P= -52°, Y= +270

4 DOCKING
Stabilize & align CSM
BMAG MODE (3) - ATT 1/RATE 2
THC +X to close at .25 to .5 fps
At Capture
PROBE EXTD/RETR tb-bp (A,B,pg F/11-6)
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 EXTD/RETR tb - gray
(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

Basic Date April 15, 1969
Changed J 27, 1969
CSM 107 SUBS

cb DOCK PROBE (2) - open
PCM BIT RATE - LOW

5 POST DOCKING
RATE - HIGH
ATT DB - MAX
COAS PWR - OFF
cb RCS LOGIC (2) - open
TVC SERVO PWR (2) - 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 ΔP
LM/CM ΔP ind - +4 psid (pegged)
CRYO 02 PRESS ind - 850 psia
PRESS EQUAL vlv - OPEN (D, PG F/11-7)
CAB PRESS ind - 4.5 psia
PRESS EQUAL vlv - CLOSE
LM/CM ΔP ind - ∿ 2.4 psid
Monitor LM/CM ΔP ind for 3 min
and verify ΔP stable
PRESS EQUAL vlv - OPEN
CAB PRESS ind - 4.0 psia
REPRESS 02 vlv - OPEN
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 ≥ 4.0 psia
*If CAB PRESS ind <4.0 psia *
* PRESS EQUAL vlv - CLOSE *
LM/CM ΔP ind -∿ 0.0 psid
CAB PRESS ind - 5.0 psia
REPRESS PKG vlv - FILL
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 engaged (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
Verify EXTEND LATCH ENGAGED INDICATOR (RED) not visible
BN2 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 sel - push to stow
HATCH PRESS EQUAL vlv - close (CW) (C,pg F/11-7)
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
EMS MODE - NORMAL
LOAD DAP, N46:
R1 = 21101
R2 = X1111
V46E
~~V62E~~
~~V49E~~
~~F 06 22~~
~~Load N22 SPS att:~~

Basic Date April 15, 1969
Changed June 27, 1969

CSM & SUBS

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
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
~~PRO, PRO to mnvr at Sep +25 sec~~
~~(-20 ft)~~
~~F 50 18~~
~~At completion of mnvr: ENTR~~

13 POST LM EJECTION
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
~~Reconfigure DAP, N46:~~
~~R1 - 01111~~ 21101
~~R2 - X1111~~
Prepare for G&N SPS evasive burn
ROT CONTR PWR DIRECT (2) - OFF
TRANS CONTR PWR - OFF
Hand controllers - locked
V 49E
F06 22
LOAD N22 SPS ATT:
_____, _____, _____
PRO-PRO TO BURN ATT
F50 18 - ENTER

Basic Date April 15, 1969
Changed June 27, 1969
CSM 107 & SUBS

CSM UPDATES

Basic Date APRIL 5, 1969
Changed ____

APOLLO 11

P30 MANEUVER

								PURPOSE
SET STARS				/				PROP/GUID
	+							WT N47
RALIGN ___ ___ ___		0	0		•			P_{TRIM} N48
PALIGN ___ ___ ___		0	0		•			Y_{TRIM}
YALIGN ___ ___ ___	+	0	0					HRS GETI
	+	0	0	0				MIN N33
	+	0			•			SEC
ULLAGE ___							•	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
HORIZON/WINDOW ___	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
OTHER ___		0			•			LAT N61
___					•			LONG
___	+						•	RTGO EMS
	+							V10
			•		•			GET 0.05G

P30 MANEUVER

								PURPOSE
SET STARS				/				PROP/GUID
	+							WT N47
R_{ALIGN} ___ ___ ___		0	0		•			P_{TRIM} N48
P_{ALIGN} ___ ___ ___		0	0		•			Y_{TRIM}
Y_{ALIGN} ___ ___ ___	+	0	0					HRS GETI
	+	0	0	0				MIN N33
	+	0			•			SEC
ULLAGE ___						•		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
HORIZON/WINDOW ___	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
OTHER ___		0			•			LAT N61
___					•			LONG
___	+					•		RTGO EMS
	+							V10
			•		•			GET 0.05G

CSM UPDATES

Basic Date JUL 5, 1969
Changed ___

APOLLO 1

SECTION 4. ABORT PROCEDURES

READ LANDING CK LIST ONLY FOR 1A & 1B

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 - AUTO
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/4-7

MODE IB ABORT
(00:42 to 16.5 nm) (1:56)

00:00 TRANS CONTR - CCW then NEUTRAL
CM/SM SEP (both) - ON

00:11 CANARD DEPLOY - PUSH

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

GO TO LANDING PHASE pg L/4-7

MODE IC ABORT
(16.5 nm to TWR JETT) (01:56 - 03:16)

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)	Estab. +5°/SEC pitch rate
MAN PITCH - RATE CMD	EXCESSIVE + PITCH RATES
ENT ATT R0°,P135°,Y0°	
BMAG (3)- ATT1/RATE 2	
EMS FUNC - ENTRY	*ROLL 90° *
EMS MODE - NORMAL	*USE YAW THRUSTERS TO *
At .05G Lt,	*CONTROL RATE *
.05G sw - on (up)	*ROLL BACK TO HEADS DN*
Fly Max Lift	

θ (.05G)_____
GET DROGUE_____

LET FAILS To JET - L/5-2

GO TO LANDING PHASE pg L/4-7

Basic Date April 15, 1969
Changed June 27, 1969
CSM 7 & SUBS

MODE II RCS ABORT
(TWR JETT to MODE III) (03:16 - 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°)(Compl by 1:40)
V82E - NOTE TFF HA[redacted], Hp, TFF
If TFF>2 min, Yaw 45° (LEFT) out-of-plane
BMAG MODE (3) - ATT1/RATE 2
cb MNA&B BAT C (2) - closed
CM/SM SEP - on (up) GET 400K_____
CSM/LM FNL SEP (2) - on (up)
CM RCS - PRESS θ (.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/4-7

MODE III SPS ABORT
(ΔR= -400 NM to INSERTION) (10:08 - 11:53)

```
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  ΔR,HP,TFF      (.1nm,min-sec)
       If ΔR>0:
              MNVR to retro att (R=180°,P=194°,Y=0°)
              (Scribe on horiz, BEF, Hds up)
       BMAG MODE (3) - ATT1/RATE2
       RATE - LOW
       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 (ΔR=0)                Δtb____________
       ΔV THRUST (2) - OFF          GET 400K___________
       RATE - HIGH                  θ (.05G)___________
       If TFF>2min,Yaw (RT) 45°     GET Drogue_________
         out-of-plane               Entry R____________
       cb MNA&B BAT C(2) - closed       P_____________
       CM/SM SEP - on (up)              Y_____________
       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° ,P=105°,Y=0°)
         (BEF, Hds Dn, Full Lift)
       Note TFF
```

SCS TVC P & Y - AUTO

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/4-7

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* VERIFY SEP BY
*RCS CMD - ON * GPI FULL SCALE LOW

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

00:24 TRANS CONTR - +X OFF
(Scribe on horiz, SEF, Hds Dn)
EMS MODE - NORMAL
ΔV THRUST A - NORMAL GETI_____
01:30 DIRECT ULLAGE PB - PUSH 6999.9
THRUST ON PB - PUSH ΔV_____
FLY VI, HDOT, H VC _____
*Burn to VC (hp>75nm *
+5 sec BT or HA=200nm
*& +HDOT) *
ΔV THRUST (2) - OFF Δtb_____
EMS MODE - STBY)
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 lt out:
V66 (transfer SV into LM memory)
Verify DAP load, V48: R1=_____, R2_____
V46E CSM WT_____
V83E (check θ) P TRIM_____
PRO Y TRIM_____

GO TO INSERTION CHECKLIST, pg L/2-7

Basic Date April 15, 1969
Changed June 27, 1969
CSM 107 & Subs

LANDING PHASE (30K, DESCENDING)

30K' cb ELS (2) - close (VERIFY)
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 *

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

MODE IA
10K' Main parachutes deployed
MAIN DEPLOY PB - PUSH (within 1 sec)
VHF ANT - RECY
VHF AM A - SIMPLEX
VHF BCN - ON

RCS DUMP (Auto for Mode IA)
CABIN PRESS REL vlv (2) - CLOSE
DIRECT O2 vlv - OPEN (verify)
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 (to zero He press)
CM RCS He DUMP PB-PUSH
*RHC (both) - 30 secs *
* NO PITCH *
CABIN PRESS REL vlv - BOOST/ENTRY

DO NOT READ FOR MODE 1A

STRUT LOCKS 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
cb BAT RLY BUS (2) - open

3K' CABIN PRESS REL vlv (RH) - DUMP
FLOOD Lts - POST LDG
CM RCS PRPLNT (2) - OFF
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

POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

1 Stabilization after landing
~~ELS - AUTO (verify)~~
cb MAIN REL PYRO (2) - close
~~ELS LOGIC - ON (verify)~~
MAIN RELEASE - on (up)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
DIRECT O2 - 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

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)
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 ≥ 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.

EGRESS PROCEDURES

CMP	PL VENT - OFF
LMP	cb Pnl 250 (all) - open

STABLE I

ALL	Disconnect umbilicals
	Neck dam on (if suited)
CMP	Center couch - 270° position
CDR,LMP	Armrests stowed
CDR	Connect raft to S/C, if desired, with green lanyard
	Connect raft white lanyards to suits inflate water wings when exiting
CMP	GN2 RATCHET HNDL - CW
	GN2 VLV HNDL - UNLATCH & PUSH (Outbd)
	Side Hatch opened
	ACTR HNDL SEL - N
	Egress with liferaft
LMP	Put hardware kit out
LMP,CDR	Egress

CSM 107 & SUBS Basic Date APRIL 15, 1969
Changed JUNE 1969

or C. STABLE II

LMP	cb CREW STA AUDIO (3) - open
ALL	Disconnect umbilicals
	Couch seat pans (3) - 170° position
	Neck dam on (if suited)
CMP	Arm rests stowed
	Survival kits removed from stowage
CDR	Connect life raft mainline to CDR or S/C
CMP	Connect first raft white lanyard to suit
CDR	Connect third raft white lanyard to suit
CMP	PRESSURE EQUALIZATION vlv - OPEN
CMP,LMP	Remove and stow hatch
CMP	Exit feet first with rucksacks; when clear of S/C inflate water wings and raft
LMP	Exit feet first; when clear of S/C inflate water wings
CDR	Exit feet first; when clear of S/C inflate water wings

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 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 behind VHF ant access pnl & turn radio on in BCN mode

TLI 10 MIN ABORT (CRIT SC MALF)
(Quick return to earth with possible land landing; SPS burn at manual SIVB C/O + 10 min)

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

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 _____ (180°)
P _____ (224°)
Y _____ (0°)

RETRO UPDATE

GETI	_____	Θ.05G	_____
		GET DROGUE	_____
ΔV	_____	ENTRY R	_____
VC	_____	P	_____
Δtb	_____	Y	_____
GET 400K	_____		

Set DET counting up to GET I
ALIGN HORIZ ON RET +1° MK
cb STAB CONT SYS (Pnl 8) - close
cb SPS (12) - close
SC CONT - SCS
ATT DB - MIN
RATE - LOW
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT1/RATE 2 (verify)
SCS TVC (2) - AUTO
TVC GMBL DRIVE P&Y - AUTO
MN BUS TIES (2) - ON
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
TRANS CONT PWR - ON
RHC #2 - ARMED

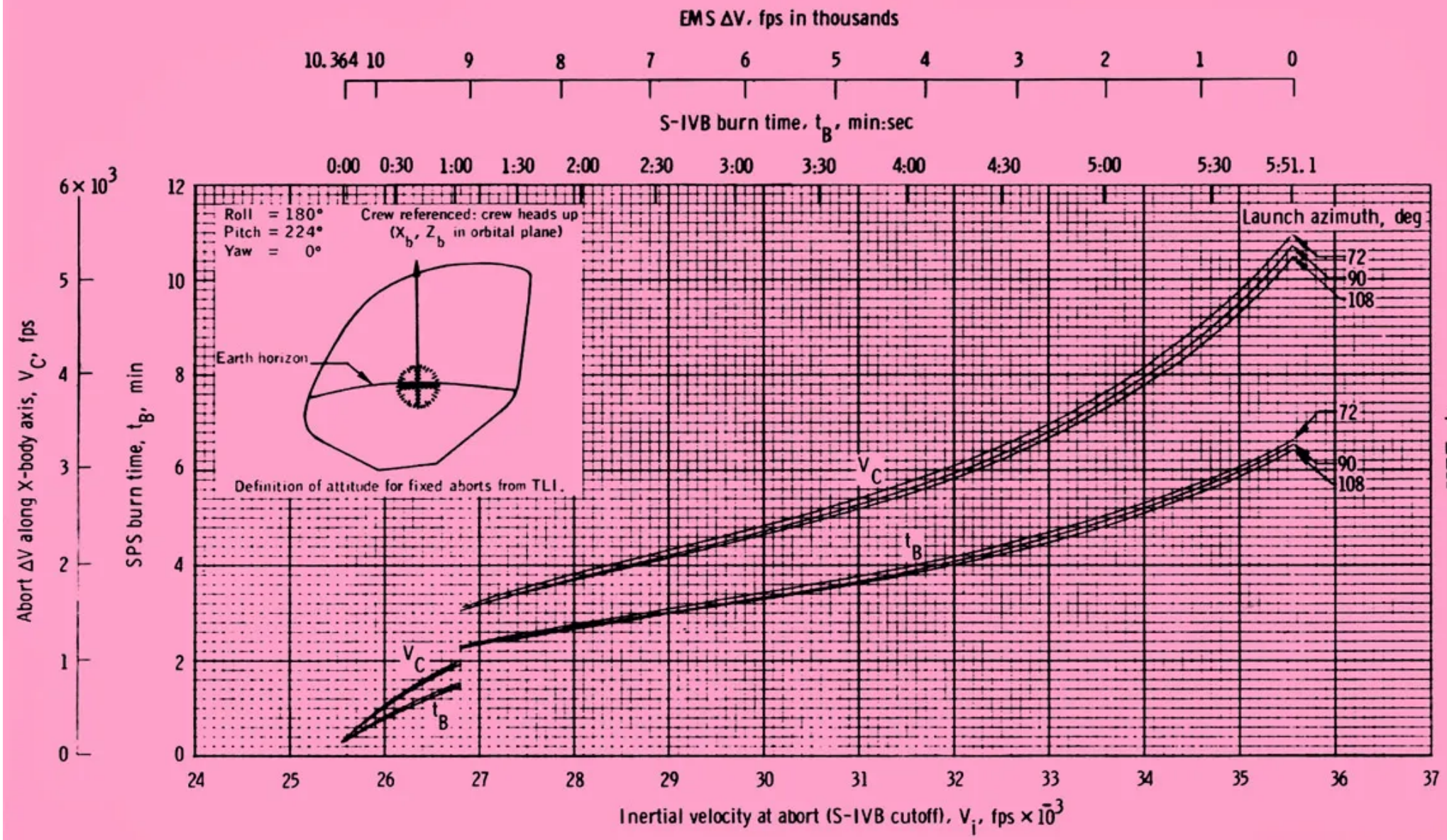
Perform GMBL CHECK (if time permits)

PRIMARY TVC CHECK
ROT CONT PWR DIRECT(2)-OFF
ROT CONT PWR NORMAL #2-AC
GMBL MOT P1-Y1-START/ON (LMP confirm)
Verify thumbwheel trim
THC - CW
Verify NO MTVC

SEC TVC CHECK
GMBL MOT P2-Y2-START/ON(LMP confirm)
Set GPI trim
Verify MTVC
THC NEUTRAL (GPI returns to trim)
ROT CONT PWR NORMAL #2-AC/DC
ROT CONT PWR DIRECT(2)-MNA/B

Basic Date ___il 15, 1969
Changed ___JUNE 27, 1969
C 107 & SUBS

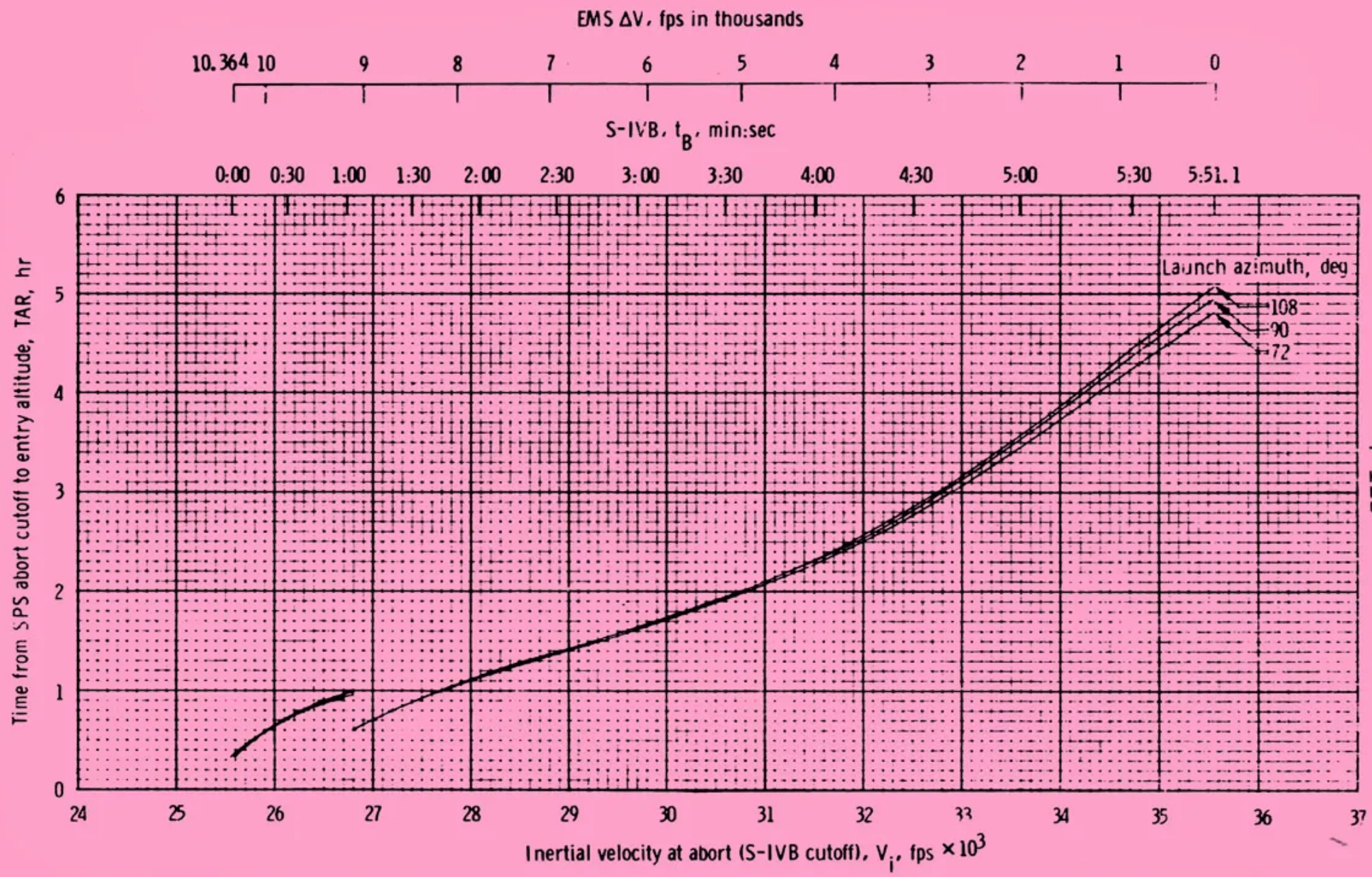
Basic Date June 13, 1969
Changed Ju 27, 1969



L
4-12A

TLI plus 10 minute abort crew chart; abort ΔV and SPS burn time versus inertial velocity.

BD



L
4-12B

BD

TLI plus 10 minute abort cre[illegible]hart; TAR versus inertial velocity.

Basic Date June 13, 1969

Changed _____

GMBL MOT (4) - ON (verify)
EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
SET ΔV from chart
EMS FUNC - ΔV
EMS MODE - NORMAL

09:45 ΔV THRUST A - NORMAL
V37E 47E (THRUST MONITOR)

F 16 83 ΔVX,Y,Z (.1fps)

NOTE: For aborts during 1st min of TLI,
KEY V82E F 16 44 (Ha,Hp,Tff)
Burn until Hp < 19NM.

09:50 TRANS CONTR +X

10:00 THRUST ON PB - PUSH
TRANS CONTR +X - OFF
BURN ΔV req'd
ΔV THRUST (2) - OFF
Report cutoff
GMBL MTRS (4) - OFF (LMP Confirm)
TRANS CONT PWR - OFF
TVC SERVO PWR (2) - OFF
MN BUS TIE (2) - OFF
cb SPS P1&2, Y1&2 - open
PRO (twice if V82)

F 37 00E

Go to ENTRY PREP & SUPERCIRC ENTRY PROCEDURE
If est. time to EI<01:55:00 omit MCC and enter the SUPERCIRC CKLIST as early as possible.
If est. time to EI>01:55:00 anticipate a MCC. Enter the ENTRY PREP CKLIST at step 9 pg E/1-1

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 + 25 min)	
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)

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

Basic Date April 15, 1969
Changed JUNE 27, 1969
C 107 & SUBS

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
ALIGN HORIZ ON RET +1° MK
cb STAB CONT SYS (Pnl 8) - close
cb SPS (12) - close
SC CONT - SCS
ATT DB - MIN
RATE - LOW
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT1/RATE 2(verify)
SCS TVC (2) - AUTO
TVC GMBL DRIVE P&Y - AUTO
MN BUS TIES (2) - ON
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
TRANS CONT PWR - ON
RHC #2 - ARMED

Perform GMBL CHECK (if time permits)

PRIMARY TVC CHECK
- ROT CONT PWR DIRECT(2) - OFF
- ROT CONT PWR NORMAL #2 - AC
- GMBL MOT P1-Y1 - START/ON(LMP confirm)
- Verify thumbwheel trim
- THC - CW
- Verify NO MTVC

SEC TVC CHECK
- GMBL MOT P2-Y2-START/ON(LMP confirm)
- Set GPI trim
- Verify MTVC
- THC NEUTRAL (GPI returns to trim)
- ROT CONT PWR NORMAL #2 - AC/DC
- ROT CONT PWR DIRECT (2) - MNA/B

GMBL MOT (4) - ON (verify)
EMS MODE - STBY
EMS FUNC - ΔV SET/VHF RNG
SET ΔV from chart
EMS FUNC - ΔV
EMS MODE - NORMAL
TAPE RCDR - CMD RESET/HBR/RCD/FWD

59:45 ΔV THRUST A - NORMAL
V37E 47E (THRUST MONITOR)

F 16 83 ΔVX,Y,Z (.1fps)
59:49 TRANS CONTR - +X
59:59 THRUST ON PB - PUSH
TRANS CONTR +X - OFF
BURN ΔV req'd
ΔV THRUST (2) - OFF
Report cutoff
GMBL MTRS (4) - OFF (LMP Confirm)
TRANS CONT PWR - OFF
TVC SERVO PWR (2) - OFF
MN BUS TIE (2) - OFF
cb SPS P1&2, Y1&2 - open
PRO
F 37 00E

Go to ENTRY PREP & SUPERCIRC ENTRY PROCEDURE
Step 9 pg E/1-1

CSM UPDATES

Basic Date APRIL 5, 1969
Changed ____

APOLLO 11

P30 MANEUVER

							PURPOSE
SET STARS			/				PROP/GUID
	+						WT N47
R_{ALIGN} ___ ___ ___		0	0		•		P_{TRIM} N48
P_{ALIGN} ___ ___ ___		0	0		•		Y_{TRIM}
Y_{ALIGN} ___ ___ ___	+	0	0				HRS GETI
	+	0	0	0			MIN N33
	+	0			•		SEC
ULLAGE ___						•	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
HORIZON/WINDOW ___	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
OTHER ___		0			•		LAT N61
___					•		LONG
___	+					•	RTGO EMS
	+						V10
			•		•		GET 0.05G

P30 MANEUVER

								PURPOSE
SET STARS				/				PROP/GUID
	+							WT N47
R_{ALIGN} ___ ___ ___		0	0		•			P_{TRIM} N48
P_{ALIGN} ___ ___ ___		0	0		•			Y_{TRIM}
Y_{ALIGN} ___ ___ ___	+	0	0					HRS GETI
	+	0	0	0				MIN N33
	+	0			•			SEC
ULLAGE ___						•		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
HORIZON/WINDOW ___	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
OTHER ___		0			•			LAT N61
___					•			LONG
___	+					•		RTGO EMS
	+							V10
			•		•			GET 0.05G

CSM L. DATES

Basic Date APRIL 5, 1969
Changed ___

APOLLO

SECTION 5. LAUNCH EMERGENCY PROCEDURES

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

WARNING: CM water must not be used to extinguish fire

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

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 $\Delta P > +2$ in. H_2O

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

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

COASTING

LV XLUNAR - SAFE
cb SECS ARM (2) - close
SECS LOGIC (2) - ON
SECS PYRO ARM (2) - ARM
ROT CONTR PWR DIRECT (2) - MNA/MNB
SC CONT - SCS
BMAG MODE (3) - ATT 1/RATE 2
TVC SERVO PWR #1 - AC1/MNA
TVC SERVO PWR #2 - AC2/MNB
(Continue through thrusting)

THRUSTING (TLI)

00:00 TRANS CONTR - CCW (4 Sec)
MN BUS TIE (2) - ON
TVC SERVO PWR #1-AC1/MNA (verify)
TVC SERVO PWR #2-AC2/MNB
GMBL MTRS (4) - ON (LMP Confirm)
00:04 TRANS CONTR - NEUTRAL & +X
ΔV THRUST A - NORMAL
THRUST ON PB - PUSH
TRANS CONTR +X - RELEASE
ΔV THRUST (2) - OFF when clear

FIRE/SMOKE IN CM (CREW SUITED)

WARNING: CM water must not be used to extinguish fire

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

FIRE IS OUT

CSM 107 & SUBS Basic Date APRIL 15, 1969
Changed JUNE 6, 1969

5 Remove smoke from cabin per "Contamination in CM" procedures before removing helmets

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)

WARNING: CM water must not be used to extinguish fire

1 CAB FAN (2) - OFF (verify)

2 SUIT COMPR (2) - OFF

3 Monitor EPS for excessive current and remove power from affected bus

4 Don emergency 02 masks

5 Use fire extinguishers as appropriate

FIRE IS OUT

6 Remove smoke from cabin per "Contamination in CM" procedure before removing 02 masks

FIRE PERSISTS - DON SUITS and DUMP CABIN

7 Don PGA's except helmets and verify 02 connectors (Use 02 masks as long as possible)

8 DIRECT 02 vlv - OPEN
Purges suit circuit of smoke and fumes

9 Don helmet

10 SUIT FLOW vlv (3) - SUIT FULL FLOW

11 SUIT COMPR 1 (2) - AC1 (AC2)

12 DIRECT 02 vlv - CLOSE

13 EMER CAB PRESS vlv - OFF

14 Visually check suit integrity

15 CAB PRESS REL (RH) - DUMP to 3.0 psia
then to BOOST ENTRY

16 Verify Suit pressure holding >3.5 psia

17 CAB PRESS REL (RH) - DUMP
and/or CAB PRESS DUMP vlv - OPEN

18 CAB PRESS ind 0.0 psia for 6 min.

19 CAB PRESS REL (RH) - NORMAL

20 CAB PRESS DUMP vlv - CLOSE

Basic Date April 15, 1969
Changed June 1, 1969
CSM 107 & SUBS

21 Do not repress cabin until fire source is removed

FIRE/SMOKE IN CM DURING ENTRY

WARNING: CM water must not be used to extinguish fire

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
RCS dump is fuel rich

MNB:

AC INV 2 AC BUS 2 - OFF
AC INV 1 AC BUS 2 - on (up)
RCS dump is oxidizer rich

5 CAB PRESS REL vlv (RH) - DUMP

6 Continue ENTRY

LAUNCH EMERGENCY POWER DOWN

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

	Amps
O2 HTRS (2) - off (ctr)	11.05

If GET > 2 min
EDS AUTO - OFF
2 ENG OUT - OFF

Basic Date April 15, 1969
Changed June 1, 1969
C 107 & SUBS

LV RATES - OFF	
cb MNA BAT C - close	
cb MNB BAT C - close	
S BD PWR AMP - off (ctr)	4.35
FC PUMPS (3) - OFF	9.34
H2 HTRS (2) - off (ctr)	1.43
LIGHTS (min req'd)	
TAPE RCDR FWD - off (ctr)	1.69
*GMBL MTRS P2, Y2 - OFF	10.00
TVC GMBL DR (P&Y)-1	
IMU PWR DN (STBY)	6.50
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	2.76
cb ECS RAD CONT/HTR (2) - open	2.69
PWR SCE - off (ctr)	0.65
TELECOM GRP 1&2 - OFF	1.76
cb INSTR ESS MNA&B - open	4.80

*Crew Option

BUS LOST RECONFIGURATION MN A

A. Loss of MN BUS A
   - EDS ~~AUTO - OFF~~
   - FC 2 - MNB only
   - FC 1 (MNA&B) - off (ctr)
   - cb MNB BAT C - closed
   - cb MNA BAT BUS A - open
   - INV 3 - MNB, AC1
   - SCS TVC PITCH & YAW - RATE CMD
   - FDAI SEL - 2
   - TVC GMBL DRIVE PITCH & YAW - 2

Basic Date April 15, 1969
Changed June 1, 1969
CSM 107 & SUBS

BMAG MODE (3) - RATE 2
RHC PWR DIR (2) - MNB
AUTO RCS PITCH, YAW, & B/D ROLL (12) - MNB
Insertion Checklist
FC 1 - MNB (if req'd to maintain MNB voltage)
SUIT H2O ACCUM - AUTO 2
RAD FLOW AUTO CONT - 2

B. Loss of MN BUS B MN B
EDS AUTO - OFF
FC 2 - MNA only
FC 3 (MNA&B) - off (ctr)
cb MNA BAT C - closed
cb MNB BAT BUS B - open
INV 3 - MNA, AC2
TVC GMBL DRIVE PITCH & YAW - 1
RHC PWR DIR 1 - MNA
AUTO RCS PITCH, YAW, & B/D ROLL (12) - MNA
Insertion Checklist
FC 3 - MNA (if req'd to maintain MNA voltage)
ECS RAD HTR - PRIM 2

C. Loss of BAT BUS A BAT BUS A
EDS AUTO - OFF
cb MNA BAT C - closed
TVC GMBL DRIVE PITCH & YAW - 2 (if bus lost prior to GMBL MTR turn on)
AUTO RCS PITCH, YAW, & B/D ROLL (12) - MNB
Insertion Checklist
After attempting to restore bus
MN BUS TIE BAT B/C - on (up)
cb MNA BAT C - open
cb MNA BAT BUS A - open
cb MNB BAT C - open
cb MNB BAT BUS B - open
For subsequent main bus ties
cb MNA BAT C - closed
cb MNB BAT BUS B - closed
cb PYRO A SEQ A - open
ECS RAD HTR - PRIM 2

Basic Date April 15, 1969
Changed June 1, 1969
CSM 107 & SUBS

D. Loss of BAT BUS B BAT BUS B
- EDS AUTO - OFF
- cb MNB BAT C - closed
- TVC GMBL DRIVE PITCH & YAW - 1 (if bus lost prior to GMBL MTR turn on)
- AUTO RCS PITCH, YAW, & B/D ROLL (12) - MNA
- Insertion Checklist
  - MN BUS TIE BAT A/C - on (up)
  - cb MNA BAT C - open
  - cb MNA BAT BUS A - open
  - cb MNB BAT C - open
  - cb MNB BAT BUS B - open
  - For subsequent main bus ties
    - cb MNB BAT C - closed
    - cb MNA BAT BUS A - closed
  - cb PYRO B SEQ B - open
  - ECS RAD HTR - PRIM 1

E. Loss of AC BUS 1 AC-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 ϕA only)
- SCS TVC (P&Y) - RATE CMD
- Insertion Checklist
  - S BD NORM XPNDR - SEC
  - S BD NORM PWR AMP - SEC
  - FC PUMP 1 - AC2
  - ECS GLY PUMP - AC2
  - BMAG 1 PWR - OFF
  - G&N PWR - AC2
  - SIG COND/BIAS PWR 1 - AC2
  - Maintain GLY EVAP TEMP INLET temp above 40°F
  - ECS RAD FLOW CONT - 2

F. Loss of AC BUS 2 AC-2
- AC INV 2 MNB - OFF
- TVC SERVO PWR #2 - AC1/MNA (loss of ϕA only)
- SCS TVC (P&Y) - AUTO
- ΔV CG - LM/CSM
- Control SPS with trim wheels

Basic Date April 15, 1969
Changed June 1, 1969
CSM 107 & SUBS

Insertion Checklist
FC PUMP (2&3) - AC1
BMAG 2 PWR - OFF
FDAI SEL - 1
SIG COND/BIAS PWR 2 - AC1
Activate SEC COOL LOOP
Shut down PRIM EVAP

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
O2 & 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 Busses. Select single inverter operation.

Pnl 5
cb RAD HTR OVLD (2) - open

Pnl 7
LOGIC 2/3 PWR - OFF
FDAI/GPI PWR - OFF
ELEC PWR - OFF

Basic Date April 15, 1969
Changed June 1, 1969
107 & SUBS

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

Basic Date April 15, 1969
Changed June 27, 1969
CSM 107 & SUBS

Pad Bat C = 37.5 V
then decreased to 35 V
— Don't know when or why —

Pre TLI:

BAT A 31.5 V
B 31.4 V
C 34.5 V

R1 C 1 23 amps
" 2 22 "
" 3 23 "

MN A 29.5 V
" B "

Pyro A 37.5 V
1 B "

Basic Date APRIL 15, 1969
Changed
CSM 107 & SUBS
CREW LOG

TIME	REMARKS

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