APOLLO 8

TLI PROCEDURES

PART NO.	S/N
SKB32100020-301	1004

	CDR	CMP	LMP

00:00

72.2° US TCY
90.2° US
108.2° US TASC TPRE

POST INSERTION CONFIG
SM/CM RCS/C&W CK

REMOVE HELMET & GLOVES

ECS POST INSERT CK		ECS POST INSERT CK

EPS PER MON
ECS MON CK
SPS PER MON
PUGS TEST
ECS REDUND
COMP CK
FC PURGE CK

GDC ALIGN

00:30

PRE TPRE

MOUNT ORDEAL

JETT OPTICS COVER

INSTALL COAS
COAS HORIZ CK

TCRO TCRO TCRO

HSK GWM

72.2° 90.2° 108.2°

01:00

OPTICS CK
&
IMU REALIGN
P52
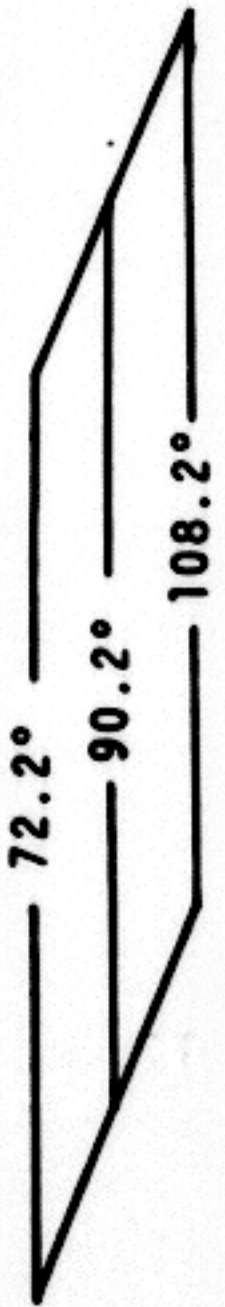
THAW TUS THAW TUS THAW TUS

01:30

CDR	CMP	LMP
		BACKUP COMM CK
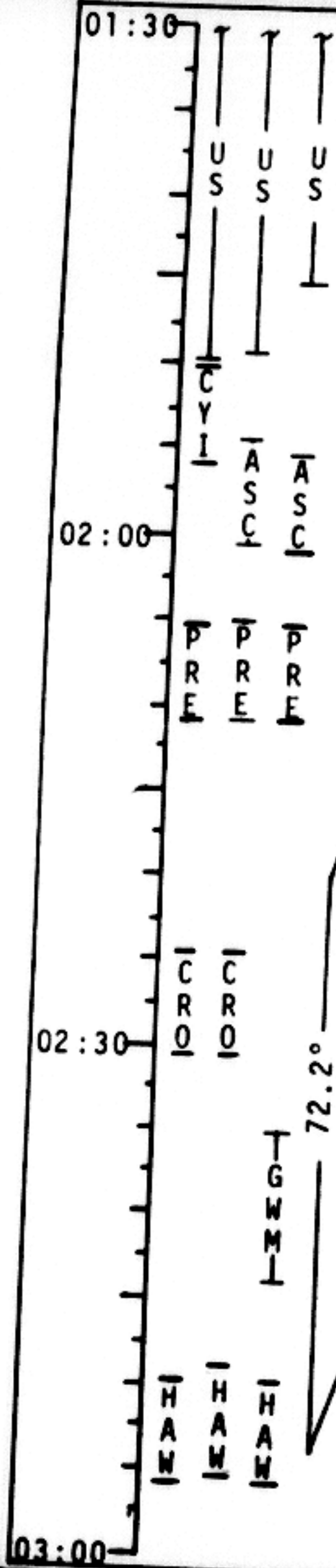
```
01:30 ─┐  ┬  ┬  ┬
        │  │  │  │
        U  U  U
        S  S  S
        │  │  │           SCS ATT REF
        │  │  │           COMP CK
        ─  │  │
        C  │  │
        Y  │  │                     BLOCK &
        I  │  │                     TLI UPDATE
        │  ─  ─
           A  A
           S  S
02:00 ─    C  C
           │  │
           P  P  P
           R  R  R
           E  E  E
           │  │  │
                              TLI PREP
                         EMS ΔV TEST
                         GO/NO GO FOR PRYO
                         ARM & TLI
        C  C  C
        R  R  R
        O  O  O
02:30 ─ │  │  108.2°      GDC ALIGN &
        │  │   │          DRIFT CK
        G  │  90.2°
        W  72.2°
        M
        │  │  │
        │  │  │           P47 - BURN ATT CK
        H  H  H
        A  A  A
        W  W  W           TLI
        │  │  │
                          SECO-S-IVB
03:00 ─┘                  INERTIAL
```

LAUNCH PREPARATION

-20:00   CTE UPDATE VERIFICATION
Change X STABLE MEMBER AZIMUTH, if necessary:
* *V78E
* *F 06 29   X SM AZ (.01°)
* *V21E
* *Load new Azimuth_____
* *PRO
* *GDC ALIGN, Pg L-8

-15:00   FDAI-1 - total att R=90+AZ, P=90, Y=0
BMAG MODE (3) - RATE 1
FDAI SCALE - 5/5
RATE - HIGH
RHC 2 - UNLOCK
     1 - UNLOCK
ROT CONT PWR DIRECT (both) - MNA/MNB
CMC MODE - FREE

TRANS CONTR PWR - on (up) (verify)
ASTRO LAUNCH OPERATIONS VOICE CHECK
VOICE CHECK WITH MCCH
S-bd VOL TW (CDR) - FULL DECR
~~PAD COMM OFF~~
ADJUST MASTER VOL CONTROLS
SPS THRUST - NORMAL
ΔV THRUST A&B - OFF
LV SPS INDα/PC - α
SII/SIVB/GPI - SII/SIVB

EDS AUTO - on (up)
ABORT LV RATE - AUTO
ABORT 2 ENG OUT - AUTO
Verify CM RCS PROP tb(both)-gray
RCS CMD - OFF
FC REACS vlv - LATCH

-10:00
-08:00   SCS TVC SERVO PWR 1 - AC1/MNA
-06:00   2 - AC2/MNB

-04:00   ASTRO LAUNCH OPERATIONS COMM CHECK

-03:00   DSKY - Verify P02
V75 (NO ENTR)

Basic Date Nov. 6, 1968
Changed Dec. 11, 1968

LAUNCH PREP

~~JG REACT - LV - LATCH~~
TAPE RCD FWD - FWD
TAPE MOTION - bp

-02:00
-01:15   GLY RAD PRI - PULL (BYPASS)

-01:15   MN BUS TIES (both) - ON
-01:00   PAD COMM (2) - OFF
-00:45   FLT RCDR - RCD
GDC ALIGN PB - PUSH & HOLD
R=90+AZ, P=90, Y=0
FDAI 2 Total att - NO MOTION
GDC ALIGN PB - REL

LAUNCH-INSERTION

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

         * 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 ENTER *
         * START DET & RESET MET *

         06 62   VI,H DOT, H PAD (fps,fps,.1nm)

+00:02   Yaw Mnvr - report   MODE IA
+00:11   Roll & Pitch Program - report
+00:28   Roll complete - report

+00:42   MODE IB - report   00:42
         PRPLNT DUMP - RCS CMD
+00:50   Monitor α to T +02:00
         (100%, 6° Att error)
         * LV Guid & LV Rate lts ON *
         * 00:50 - 01:25 ABORT   *

CABIN PRESSURE DECREASING (~14K)

         * NO PRESSURE DECREASE by 25K *
         * CAB PRESS RELIEF vlv (RH) - *
         *   DUMP   *
         * IF NO RESULTS: *
         *   HATCH REL vlv - OPEN   *   MODE IB
         *   CLOSE at 8 psia   *

+01:17   MAX Q
+01:50   MODE IC - report (R3 = 16.5NM)   1:50

$+4°/sec$ P,Y
$+\overline{20}°/sec$ R

$+4°/sec$ P,Y
$+\overline{20}°/sec$ R

```
+02:00  EDS AUTO - OFF
        2 ENG OUT - OFF
        L/V RATES - OFF
        a/Pc sw - Pc
        GO/NO GO FOR STAGING - report        MODE IC
+02:05  INBOARD CUTOFF - (lt 5 on)
        LIFTOFF LIGHT - OUT
+02:31  OUTBOARD CUTOFF - report (lts 1,2,3,4 on)
+02:32  SIC/SII STAGING (lts off)
+02:33  SII Ign Command (lts on)              02:33
        SII SEP lt - on
+02:36  SII 65% - lts out
        FDAI Scale - 50/10
        GMBL Mot (4) - START - ON (LMP Confirm)
        Check GPI
          SII/SIVB/GPI - GPI (Momentarily)  +9°/sec P,Y
          PITCH = -1.61                      +20°/sec R
          YAW   = +1.33

+03:00  SII SEP LITE - OUT report            MODE IC

+03:07  TWR JETT (both) - on(up) (TFF>1+20)   3:07
          *NO TWR JETT                    *
           *LES MOT FIRE Pb - PUSH        *
           *No response go to pg EMG-4 *
        MAN ATT (3) - ACCEL CMD
        RCS CMD - ON
        SECS ARM cb (both) - open
        Twr Jett & MODE II - Report
        GLY EVAP STEAM PRESS - AUTO
        GLY EVAP H2O FLOW - AUTO
                                             MODE II
        Guidance Initiate - report (OECO +44sec)
+03:53  Guidance Good
+04:00  Report status
+05:00  Report Status
+05:53  SIVB to Orbit   Level Sense Arm 08:05
+06:00  Report Status
+06:15  OMNI ANT-D  (AZ<96°)
+07:00  Report Status
+08:00  Report Status
+08:20  GO/NO GO FOR STAGING - report
```

LAUNCH PREP

Basic Date Nov. 6, 1968
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LAUNCH PARAMETERS

Time	VI(FPS)	$\dot{H}$(FPS)	H,pad (nm)
00:20	1366	+212	
00:40	1567	+529	0.4
01:00	2060	+949	1.5
01:20	2872	+1449	3.9
01:40	4103	+1991	7.9
02:00	5780	+2553	13.5
02:20	7679	+3033	21.0
02:40	8936	+3117	30.4
03:00	9262	+2795	40.7
03:20	9637	+2505	50.5
03:40	10056	+2505	59.5
04:00	10525	+2245	67.1
04:20	11042	+1987	74.3
04:40	11608	+1737	80.0
05:00	12225	+1498	85.9
05:20	12894	+1267	90.0
05:40	13618	+1049	94.1
06:00	14401	+ 847	97.2
06:20	15248	+ 666	99.6
06:40	16164	+ 506	101.5
07:00	17158	+ 371	102.9
07:20	18211	+ 265	104.0
07:40	19137	+ 170	104.6
08:00	20130	+ 61	105.0
08:20	21197	+ 12	105.2
		+ 37	105.2

LAUNCH PARAMETERS-cont'd

:	:	· 117	105.5
4:00	.637	· .6	106.0
4:10	2825	· .6	106.0
9:20	3016	· .67	106.0
9:30	3211	· 105	105.8
9:40	3408	· 136	105.5
9:50	3608	· 158	105.2
10:00	3811	· 180	105.0
10:10	24017	· 187	104.5
10:20	24225	· 190	104.3
10:30	24436	· 185	104.0
10:40	24650	· 165	103.5
10:50	24866	· 149	103.3
11:00	25083	· 102	103.2
11:10	25304	· 59	103.2
11:20	25527	· 7	103.2
11:21	25565	0	103.3

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Figure: Abort plot — Altitude Rate vs. Inertial Velocity at Abort

Y-axis: ALTITUDE RATE, FT/SEC
X-axis: INERTIAL VELOCITY AT ABORT, FT/SEC X 10³

Y-axis values: 1200, 1000, 800, 600, 400, 200, 0, -200, -400, -600, -800, -1000

X-axis values: 23.0, 23.4, 23.8, 24.2, 24.6, 25.0, 25.4, 25.8, 26.2

Labels on chart:
- INERTIAL VELOCITY - 23500 FT/SEC
- COI BOUNDARY* FOR ALTITUDE - 108, 103, 98
- 2-MIN 05-SEC TO APOGEE
- MODE III
- MODE II
- NOMINAL TRAJECTORY
- INSERTION
- GO/NO GO LINE INSTANTANEOUS PERIGEE ALTITUDE - 75 N M

ΔR < -368 = MODE II
-368 < ΔR ≤ 0 = HALF LIFT
ΔR > 0 = MODE III

*COI BOUNDARIES ALLOW FOR PITCH ERROR OF ±5 DEG

(side text) Basic Date Nov. 6, 1968
CSM
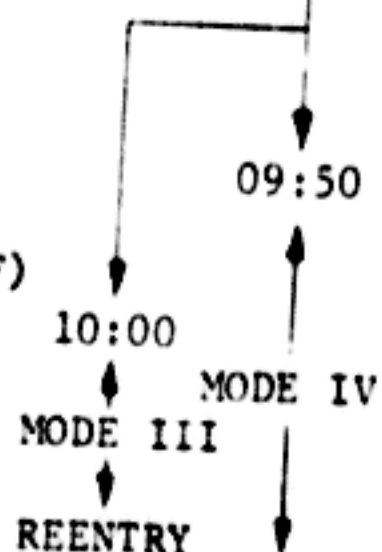LAUNCH PREP
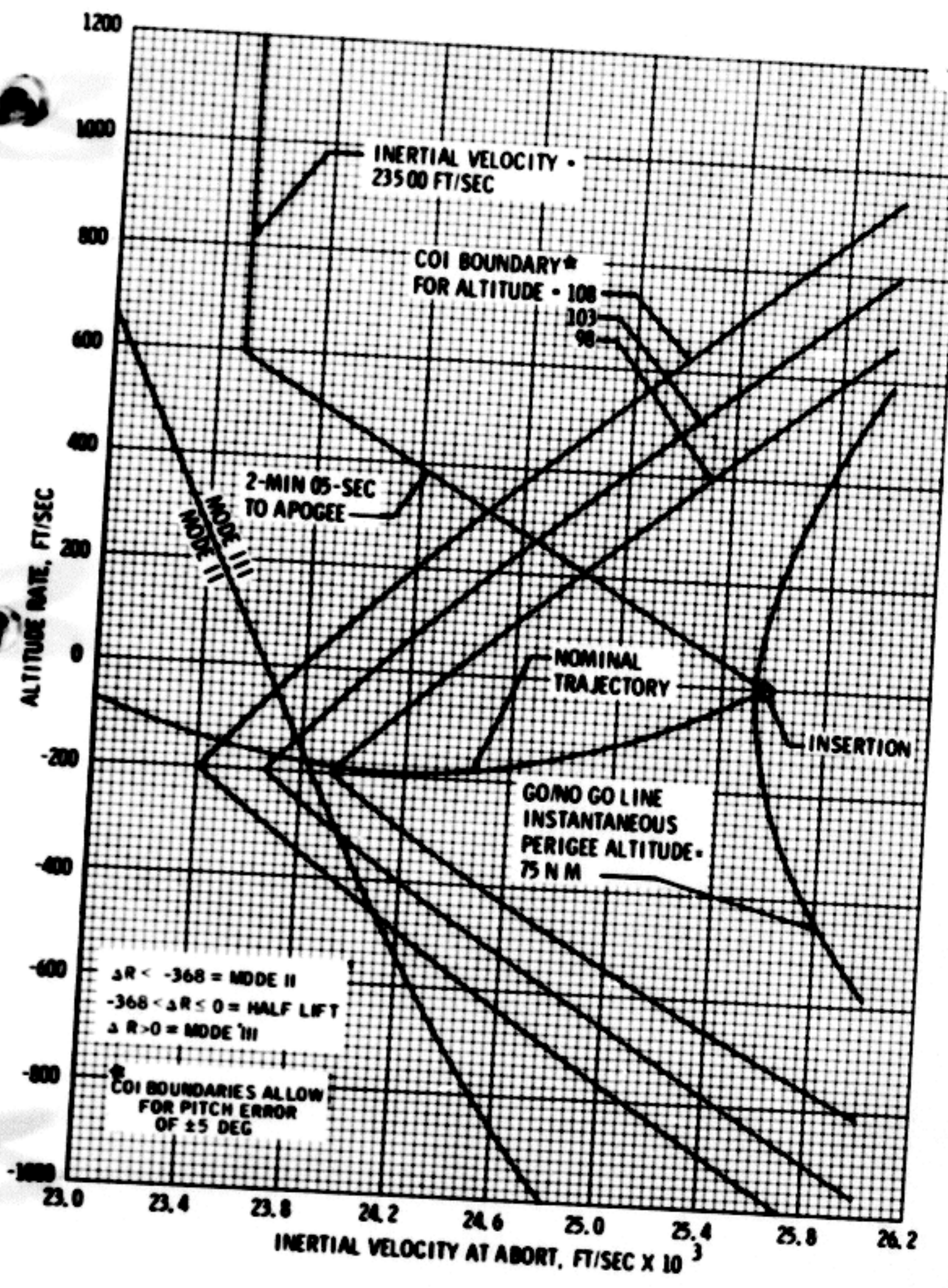
```
+08:40   SII Cutoff - lts on
+08:41   SII Staging - lts off
+08:45   SIV Ign Cmd - lt on
+08:46   SIV 65% - lt off
+09:00   Report Status
+09:50   Mode IV - Report
         (VI~23,600, H DOT~0)
         V82E N50E - F 16 50   (ΔR,HP,TFF)
+10:00   GO/NO GO FOR ORBIT - report

+11:21   SECO (lt on) - report
         (Begin TB5)
             * If no SECO,                    *
             * THC CCW & neutral in 1 sec     *
             * or SII/SIVB sw LV STAGE        *
+11:31   INSERTION - lt off (TB5 + 10 sec)

         GMBL MTRS (4) - OFF (LMP Confirm)
         MN BUS TIES (both) - OFF (LMP)
         TVC SERVO PWR (both) - OFF
         FLT RCDR - OFF (LMP)

         KEY RLSE

             Record  HA_____    (.1nm)
                     HP_____    (.1nm)
                     TFF_____   (min-sec)
         PRO
             Record  VI_____    (fps)
                     H DOT_____ (fps)
                     H PAD_____ (.1nm)

         V37E 00E
         V66E (transfer SV into LM memory)
         V48E 31102,01111 PRO,PRO,PRO
         V46E
         V83E (check θ)        CSM Wt   63531
         PRO                   P TRIM   -1.61
                               Y TRIM   +1.33
```

09:50

10:00   MODE IV

MODE III   MODE IV

REENTRY

BDA LOS
(__:__:__)

POST-INSERTION CHECKLIST

CDR   1   CMP Unstow Checklist
- ELS - MAN (verify)
- CM RCS LOGIC - OFF
- CAB PRESS REL vlv (both) - NORMAL/LATCHED
- PLSS vlv - OFF
- SECS ARM cb (both) - open (verify)
- FLOAT BAG cb (3) - open
- ELS BAT cb (both) - open
- PL VENT cb - open
- DIR O2 - OFF (CW)
- TRANS CONT PWR - OFF
- ROT CONTR PWR DIRECT - OFF

MONITOR LV TANK PRESS
- $\Delta P < 36$ psid (OXID > FUEL)
- $\Delta P < 26$ psid (FUEL > OXID)
    - * EMERGENCY CSM/LV SEP pg EMG-5 *

CMP
- SM RCS HTRS (4) - PRIM
- CM RCS PRPLNT (both) - OFF
- CM RCS PRPLNT tb (both) - bp
- C/W function - NORMAL
- HATCH GEAR BOX - LATCH
- ACTR HNDL SELECTOR - neutral

LMP
- STM/UR DUCT HTR cb (both) - close
- TLM INPUTS - LOW
- FC REACS vlv - NORM
- H2 PURGE LINE HTR - ON
- LMP Unstow Checklist

SYS VERIF & MONIT can be
   started at this time

2   SM RCS Ck (CMP)

3   CM RCS Ck (CMP)

POST-INSERTION

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4   C & W Ck (CMP)

5   CMP to LEB for MN REG Ck
- PYRO A&B SEQ A&B cb (both) - open
- SECS LOGIC (both) - OFF

6   SUIT CKT RET vlv - open (pulled) (CDR)
- Remove Helmets & Gloves
- DIRECT ULLAGE cb (both) - open
- Panel 278 cb 1 & 2 - open (LMP)

7   SEC RAD LEAK Ck (CMP & LMP)

+20:00   8   ECS Post insertion Config
- Gly RSVR BYPASS vlv - OPEN (CCW)
- Gly RSVR OUT vlv - CLOSE (CW)
- Gly RSVR IN vlv - CLOSE (CW)
- ECS RAD FLOW CONT - PWR
- PRIM GLY TO RAD vlv - NORMAL (push)
    - LMP note PRIM ACCUM QTY
- ECS RAD HTR - PRIM 1
    - 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

DRINKING WATER SUPPLY vlv - ON (CCW)

CYI LOS
(__:__:__)

TAN AOS (V)
(__:__:__)

TAN LOS
(__:__:__)

SYS VERIFICATION & MONITORING

1   EPS Per Verif (LMP)

2   ECS MON Ck (LMP)

TLI PREP

3 SPS Monit Ck (LMP)

4 GDC ALIGN
   ATT SET TW - IMU angles on FDAI 1
   FDAI SELECT - 1
   FDAI SOURCE - ATT SET
   ATT SET - IMU
   ATT SET TW - null FDAI 1 err needles
   ATT SET - GDC
   GDC ALIGN PB - push until needles null
   Record Drift ____, ____, ____
   BMAG MODE (3) - RATE 2

5 UNSTOW CAMERA BRACKET & ORDEAL (CDR)

6 MOUNT ORDEAL BOX & Initialize

7 ECS REDUNDANT COMPONENT CK, (LMP)

8 FC PURGE CHECK, (LMP)

9 UNSTOW CAMERAS (CMP)

SUNSET   10 OPTICS DUST COVER JETT (CMP)
(__:__:__)

CRO AOS 11 MCCH - G/N STATUS
(__:__:__)   X Torquing Angle _____

         12 IMU REFSMMAT Realign Check (P52), (CMP)
               If IMU is realigned,
               Realign GDC (CDR)
CRO LOS   00E
(__:__:__)   V46E
               G/N PWR OPTICS - OFF
HSK AOS (S)   S-Bd VOL - UP
(__:__:__)

HSK LOS
(__:__:__)

SUNRISE   S-Bd VOL - DN
(__:__:__)

POST-INSERTION

+01:20:00 13 BACKUP COMM CHECK (LMP)
US AOS
(__:__:__)

         14 SCS ATT Ref Comp Ck
               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 ATT SET dials:
               R___,P___,Y___

US AOS
(__:__:__)15 COPY TLI PAD

BDA LOS
(__:__:__)

TLI						
X	:	:	X	:	:	TB6p (Lt out)
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
		•			•	ΔVC'
+			+			VI
X	X	X	X	X	X	R SEP
X	X	X	X	X	X	P SEP
X	X	X	X	X	X	Y SEP

CYI AOS
(__:__:__) 16 SV UPDATES (MCCH)

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TLI PREP

POST-INSERTION

TLI PREP

MANEUVER

TLI +90 SPS / G&N	TLI +4 hrs SPS / G&N	PURPOSE PROP/GUID
+ 6 3 5 3 1	+ 6 3 5 3 1	WT N47
− 0 0 1.6 1	− 0 0 1.6 1	P TRIM N48
+ 0 0 1 3 3	+ 0 0 1 3 3	Y TRIM
+ 0 0	+ 0 0	HRS GETI
+ 0 0 0	+ 0 0 0	MIN N33
+ 0	+ 0	SEC
•	•	ΔV_X N81
•	•	ΔV_Y
		ΔV_Z
X X X	X X X	R
X X X	X X X	P
X X X	X X X	Y
+ N/A •	+ N/A •	H_A N44
		H_P
+	+	ΔVT
X X X • •	X X X • •	BT
X	X	ΔVC
X X X X N/A	X X X X N/A	SXTS
+ 0	+ 0	SFT
+ 0 0	+ 0 0	TRN
X X X	X X X	BSS
X X	X X	SPA
X X X	X X X	SXP
0 •	0 •	LAT N81
		LONG
+ •	+ •	RTGO EMS
+ •	+ •	VIO
• •	• •	GET .05G

CYI LOS
(__:__:__)

SUNSET
(__:__:__)

TAN AOS
(__:__:__)

TAN LOS
(__:__:__)

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P27 UPDATE

PURP	V			V	
GET	• : • : •	• : • : •		• : • : •	• : • : •
304 01	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 •	

TLI PREP

XLUNAR - Inject (verify)
EDS PWR - on(verify)

EMS FUNC - Off (verify)
EMS MODE - STBY
EMS FUNC - ΔV SET
EMS MODE - AUTO
Set ΔV ind. to +1586.8 fps
EMS FUNC sw - ΔV Test
  SPS THRUST LITE - on/off
  ΔV ind. stops at -20.8±20.7 (10 sec)

EMS MODE - STBY
EMS FUNC - ΔV SET
Set ΔVC _____
EMS Funct. - ΔV

GDC ALIGN
FDAI Scale - 5/1
FDAI Select - 1/2

CRO AOS
(__:__:__)

SECS LOGIC cb (both) - Close (verify)
SECS ARM cb (both) - open (verify)

TRANS CONTROL PWR -ON
ROT CONTR PWR NORMAL(both) - AC/DC(verify)
                DIRECT(both) - MNA/MNB
LV/SPS Ind. - SII/SIVB (verify)
LV GUID. - IU (verify)
DIRECT ULLAGE cb (both) - closed

Set EVENT TIMER to 51:00
Begin MONITOR For TB6
SECS LOGIC (both) - on(up)
PYRO A&B SEQ A&B cb (both) - close

CRO LOS
(__:__:__)

CMP to Couch

TLI PREP

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CSM 103

CSM 103

(02:41:00)

Inhib →

51:00

Inhib →

57:00

F 16 83
58:00

F 16 62

58:20
58:36

58:38
59:42

59:52
59:55
59:59
(02:50:31)
00:00
00:02
SUNRISE
(__:__:__)

TB 6 - SII SEP Lite ON (TIG-9 min, 38 sec)

FDAI #2 ORB RATE at 180, 0, 0

SII SEP LITE OUT
Start DET COUNTING UP
SC CONT - SCS (verify)
MONITOR LV TANK PRESS
  ΔP < 36 psid (OXID > FUEL)
  ΔP < 26 psid (FUEL > OXID)
     EMERGENCY CSM/LV SEP pg EMG-5
UP TLM CM - BLOCK verify
UP TLM IU - BLOCK (verify)

V37E 47E (check bias) Record _____
V46E   (Limit: 9.8 fps/min)
ΔVX,Y,Z   (.1fps)
N62E
VI, HDOT, HPAD   (fps,.1nm,fps)
MONITOR VI (   ) at ECO.
     SCS TVC SERVO PWR 1 - AC1/MNA
                       2 - OFF
     START TAPE RCDR
        HBR,RECORD,FWD,CMD RESET, tb-bp
     FLT RCDR - RECORD
     EMS MODE - Auto
SII SEP lite - ON
  * TLI Inhibit Signals will not *
  *   be honored after 59:42   *
SIVB ULLAGE Begins
SII SEP lite Off (TIG - 18 sec)
SIVB FUEL LEAD
SIVB ULLAGE discontinues
LV ENG 1 lite-on

SIVB IGNITION (__:__:__GETI)
LV ENG 1 lite-Off
MONITOR THRUST & ATTITUDE +45° P,Y
MONITOR LV TANK PRESS   +10°/sec P,Y

05:17 SIVB ECO (lt On) (BEGIN TB7)
                        *EMER SIVB CUTOFF AT 6 SEC   *
                        PAST BURN TIME IF VI ATTAINED
                        * THC CCW & NEUTRAL IN 1 SEC *
                        * or SII/SIVB sw - LV STAGE *

HAW AOS
(__:__:__) KEY VERB (freeze display)
           ECO + 10 sec - lt off

           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 ΔV X,Y,Z   (.1fps)
              Record ΔVX _____
                    ΔVY _____
HAW LOS
(__:__:__)   ΔVZ _____
                    ΔVC _____

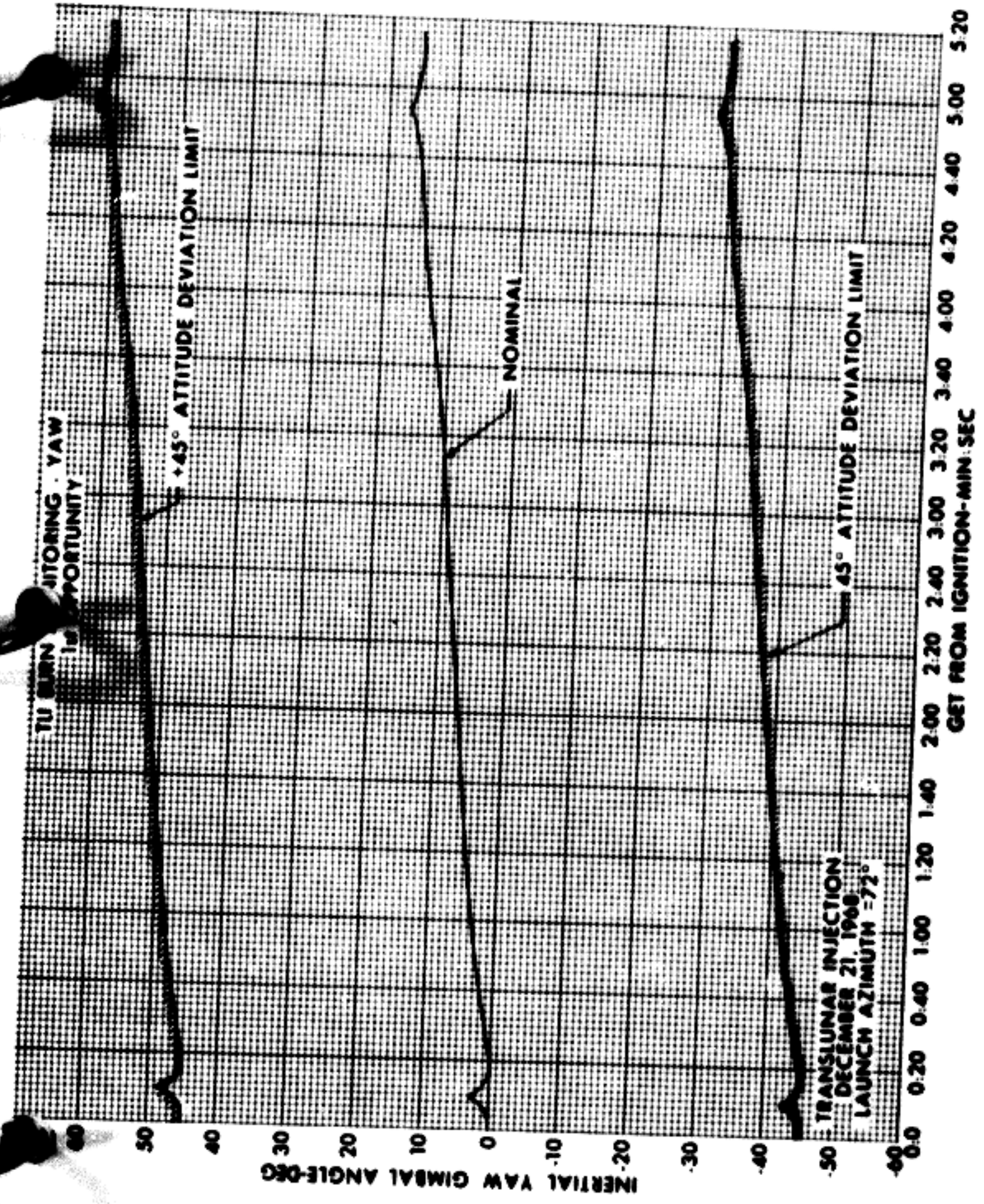   FLT RCDR - OFF
           TAPE RCDR - STOP
           EMS MODE - STBY
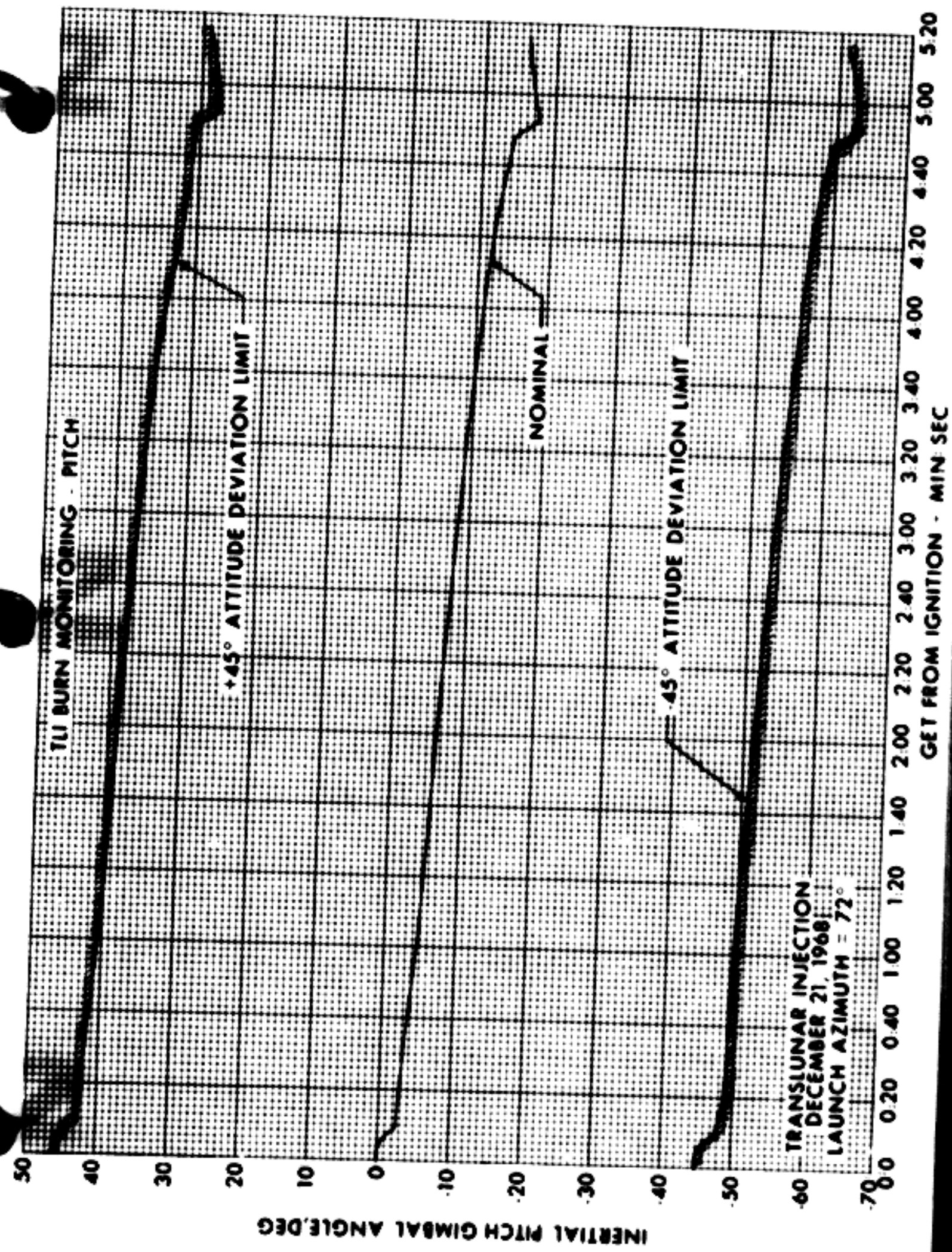   EMS FUNC - OFF

           PRO

           Start Battery Charge(BATT B), Pg S-4

TLI PREP

Basic Date Nov. 6, 1968
Changed Dec. 11, 1968

C 103

INERTIAL YAW GIMBAL ANGLE-DEG
GET FROM IGNITION-MIN:SEC
+45° ATTITUDE DEVIATION LIMIT
NOMINAL
-45° ATTITUDE DEVIATION LIMIT
TRANSLUNAR INJECTION
DECEMBER 21, 1968
LAUNCH AZIMUTH =72°

TRANSLUNAR INJECTION
DECEMBER 21, 1968
LAUNCH AZIMUTH =72°

TLI BURN MONITORING - YAW
2nd OPPORTUNITY

+45° ATTITUDE DEVIATION LIMIT

NOMINAL

45° ATTITUDE DEVIATION LIMIT

INERTIAL YAW GIMBAL ANGLE-DEG

GET FROM IGNITION-MIN-SEC

TLI BURN MONITORING - PITCH

+45° ATTITUDE DEVIATION LIMIT

NOMINAL

-45° ATTITUDE DEVIATION LIMIT

TRANSLUNAR INJECTION
DECEMBER 21, 1968
LAUNCH AZIMUTH = 72°

GET FROM IGNITION - MIN-SEC

INERTIAL PITCH GIMBAL ANGLE, DEG

```
┌─────────────────────────────────────────┐
│           BURN STATUS REPORT             │
├──────────────────────┬──────────────────┤
│ _____ ΔTIG        │ _____ VI       │
│ _____ BT          │ _____ HDOT     │
│ _____ VGX         │ _____ H        │
│ _____ R           │ _____ ΔVC      │
│ _____ P           │ _____ FUEL     │
│ _____ Y           │ _____ OXID     │
│                      │ _____ UNBAL    │
├──────────────────────┴──────────────────┤
│ REMARKS                                  │
│                                          │
│                                          │
│                                          │
│                                          │
│                                          │
│                                          │
│                                          │
│                                          │
└──────────────────────────────────────────┘
```

Premature Shutdown:
  HA >60K nm - Lunar orb flyby (depend on
                      ΔV req'd)
     >22K nm - 2 phasing mnvrs to semi-
             synch orb. Dir entry
     > 4K nm - Hi alt orb fol by deboost
             to HA=400nm
     < 4K nm - Either hi or low alt,
             depend on ldmks

F 37
08:00
GDS AOS
(03:07:0)

OOE

CMP TO LEB

PRE-SEPARATION
LOAD RCS DAP
V48E 11103 PRO,PRO,PRO
V46E
LOAD N22, Dock Att ___,___,___(V62)

(03:11:00)
SIVB CLOSE VENTS
& MNVRS TO SEP ATT ___,___,___(1°/sec)

CS 103

Prepare Camera Equip for SIVB photo
AUTO RCS SEL (16) - MNA/MNB (verify)
SCS TVC SERVO PWR 1 AC1/MNA (verify)
                  2 - OFF (verify)

SC CONT - CMC
CMC MODE - AUTO
BMAG MODE (3) - RATE 2 (verify)

DET Reset 58:00 (count up)
HAND Controllers - Armed
ATT Deadband - MIN
Rate - Low
GET SEP ___:___:___

SEPARATION
  V60E
  V63E

(03:19:00)
  58:00
  59:30   DET START
            FLT RCDR - RECORD
            TAPE RCDR - STOP/HBR/FWD
  59:50   EMS FUNC - ΔV
            EMS MODE - AUTO
            MAN ATT(3) - RATE CMD

(03:21:00)
  00:00   TRANS CONT - CCW, +X & HOLD

  00:03   LV TANK PRESS ind(4) - 0 (CSM/LV SEP)

  00:08   TRANS CONT - NEUT & +X OFF

          ★ NO SEP: ★
          ★   SECS ARM cb(both) - close   ★
          ★   TRANS CONT - +X & HOLD   ★
          ★   CSM/LV SEP PB - push   ★
               SECS ARM cb(both) - open

            TVC SERVO PWR 1 - OFF

Basic Date ___ Nov. 6, 1968 Changed
Basic Date ___ Dec. 13, 1968 Changed

TRANSPOSITION

1   V62E
      00:20   V49E

2   F 06 22   DESIRED FINAL GMBL RPY ANGLES   (.01°)
                 PRO

3   F 50 18   REQUEST MNVR TO FDAI RPY ANGLES   (.01°)
    00:30   (AUTO) PRO
               (MAN) SC CONT - SCS
                      MNVR To 5
                      ★ If mnvr not started 30 sec ★
                      ★   after SEP: ★
                      ★   THC -X 2.5 sec (.5 fps) ★

4   06 18   AUTO MNVR TO FDAI RPY ANGLES   (.01°)
    00:45   FLT RCDR - OFF

5   F 50 18   REQ TRIM   (.01°)
               (TRIM) - Go to 3
               (BYPASS) - BMAG MODE(3)-ATT1/RATE2
                 ENTR

6   TRANS CONT - Null opening rate

               EDS PWR - OFF
               ~~TAPE RCDR~~ - STOP/LBR/FWD
               NONESS BUS - OFF
               EDS cb (3) - open
               SPS P1&2, Y1&2, cb (4) - open

               Hi Gain Ant Activation

               HGA FLT BUS cb - close
                   GROUP 2 cb - close
                   TRACK - MAN
                   PWR - on(up)

               CMP to LEB
                 PYRO A&B SEQ A&B cb(both) - open
                 SECS LOGIC (both) - OFF

Conduct SIVB Photography

(03:36:00)   <u>CSM Evasive Maneuver</u>

1   MNVR to Local Vert (+X towards earth)
         Maintain SIVB in CDR's window

2   V37E 47E
 F 16 83 ΔVX,Y,Z   (.1fps)
         THC -X 1.5 fps (15 sec)

3   PRO
 F 37   00E

4   V66E

Basic Date Nov. 6, 1968
Changed   Dec. 13, 1968

Basic Date Nov. 6, 1968
Changed   Nov. 27, 1968

CSM 103

PAD EMERGENCY PROCEDURES

<u>RAPID HATCH OPENING</u>
1   Actr handle rel - push or squeeze   Side Hatch

2   Actr handle - operate (until hatch is unlatched)
                 * If hatch fails to open   *
                 *   GN2 change knob (both) - CW *
                 *   GN2 vlv handle - unlock and *
                 *   push (outboard)   *

<u>FIRE IN CM DURING BOOST</u>
1   CABIN FAN (both) - OFF

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 RELF vlv (RH) - DUMP

4   ABORT using appropriate mode

FIRE/SMOKE IN CM DURING ENTRY

1 CABIN FAN (both) - OFF

2 Monitor EPS indicators for excessive current.
   Immediately remove power from affected bus.

3 ROT CONTR PWR DIRECT (both) - 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
      Set up for CM/RCS sys 2
         AUTO RCS SEL A/C ROLL (4) - OFF
                      CM 1(6) - OFF
                      CM 2(6) - MNB
      ~~Follow normal~~ RCS dump ~~procedure~~ is fuel rich
      ~~using TBD deviations for a fuel~~
      ~~rich dump.~~
   MNB:
      AC INV 2 AC BUS 2 - OFF
      AC INV 1 AC BUS 2 - ON
      ~~Follow normal~~ RCS dump ~~procedures~~ is oxid rich
      ~~using TBD deviations for an oxidiz~~er
      ~~rich dump.~~

5 CAB PRESS RELF vlv (RH) - DUMP

6 Continue ENTRY

Basic Date Nov. 6, 1968
Changed Nov. 27, 1968

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CSM 103

CSM 103

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 $\Delta P > 0.38$ psi.

   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 (CCW) for 1 minute
   then close (CW)

If condition persists:

4 SUIT COMPR 2 - OFF

5 DIRECT O2 vlv - OFF

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 ABRT SYS TWR JETT switches
  cb SECS ARM (2) - close (verify)
  cb SECS LOGIC (2) - close (verify)
  cb EDS (3) - close (verify)
  SECS LOGIC (both) - on (up) (verify)
  SECS PYRO ARM (2) - ARM (verify)
  EDS PWR - on (up) (verify)
  ABRT SYS TWR JETT (both) - on (up) (verify)

Basic Date Nov. 6, 1968
Changed Nov. 27, 1968

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CSM 103

EMERGENCY CSM/LV SEPARATION

COASTING

  LV XLUNAR - SAFE
  SECS LOGIC(both) - on(up)
  PYRO A&B SEQ A&B cb(both) - close
  ROT CONTR PWR DIRECT (both) - MNA/MNB
  SC CONT - SCS
  BMAG MODE(3) - ATT1/RATE2
  SCS TVC SERVO PWR 1 - AC1/MNA
               2 - AC2/MNB
      (Continue through thrusting)

THRUSTING

00:00   TRANS CONTR - CCW(4sec) & +X
  MAN ATT(3) - RATE CMD
00:04   TRANS CONTR - NEUTRAL & +X
    * NO SEP:
    * SECS ARM cb(both) - close *
    * TRANS CONT +X & HOLD *
    * CSM/LV SEP PB - PUSH & HOLD *
    * SECS ARM cb(both)-open *
  MN BUS TIE (both) - ON
  GMBL MTRS(4) - ON (LMP Confirm)
  ΔV THRUST A - NORMAL
  THRUST ON PB - PUSH
  TRANS CONTR +X - RELEASE
  ΔV THRUST A&B - OFF when clear

EMERGENCY POWER DOWN

NOTE: Use only after FC or BAT loss, no
short verified, & main bus voltage
<26.0 VDC.

Powerdown the following components
until bus voltage >26.5 VDC:

02 HTRS (both)-OFF	11.0 amps
Non ESS Bus-OFF	4.9
FLT RCDR-OFF	.74
GMBL MTRS P2,Y2-OFF	10.0
S-BD PWR AMP-OFF	3.53
FC PUMPS (3)-OFF	3.3 ea.
H2 HTRS(both)-OFF	1.44
CAB FANS (both)-OFF	1.94
LIGHTS-Min req'd	-
CMC to STDBY	2.0

    V48E
    F 04 46 Load 0 Left digit R1
    PRO,PRO,PRO, V46E
    F 50 25 00062 CMC PWR DN
    PRO- HOLD until STBY lt on

G&N PWR - OFF	1.5
IMU PWR DN (STBY)	5.7
CMC MODE - FREE	-
G&N IMU PWR-OFF	-
ECS GLY PUMPS -OFF	2.77
ECS RAD CONT/HTR cb(both)OPEN	2.69
TAPE RCDR - OFF	1.82
POWER SCE-OFF	.65
VHF/AM A-OFF	1.0
TELECOM GRP 1&2-OFF	2.2
INSTRUM ESS MN A&B cb(both)OPEN	5.54
SUIT COMPR(both)-OFF	8.4
DIR O2-ON	

NOTE: 2-1 Entry possible powered down,
however items may be desired if
bus voltage permits.

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Basic Date
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BUS LOSS PROCEDURES

MN A (B) Lost
    EDS AUTO - OFF
    MN B(A) BAT C cb - close
    INV 1(2) MN A(B) - OFF
    INV 3 MN B(A) - AC1(2)
    FC 2 MN A(B) - OFF
        MN B(A) - ON
    FC 1(3) - OFF
    FDAI SELECT 2(1)
    TVC GMBL DR 2(1)
    BMAG MODE - RATE 2 (RATE 1)
    S/C Roll Info RSI (FDAI #1 roll bug)
    If Aborting With SPS: ΔV THRUST B(A)-ON
    If CM/SM Sep is required:
        RCS TRNFR - SM
        RCS AUTO Select. D1,D2,A3,C4,D3,B4-
        MN B or OFF
    After Sep:
        RCS TRNFR - CM

BAT BUS A(B) LOST
    EDS AUTO - OFF
    MN A(B) To BAT C cb - Close
    If CM/SM Sep is required:
        RCS TRNFR - SM
        AUTO RCS Select-D1,D2,A3,C4,D3,B4-
        MN B or OFF
    At Apex Cover Jett - SCS CONTR/AUTO
        cb(both) - open

AC1 (2) Lost
    INV 1(2) MN A(B) - OFF
    INV 3 MN A(B)-AC1(2)
    If AC Bus problem persist:
        S-Bd PWR AMP - SEC (Pri)
        S-Bd XPNDR - SEC (Pri)
        BMAG MODE - RATE 2(RATE 1)
        FDAI SELECT 2(1)
        TVC SERVO PWR 1-AC2/MNB(2-AC1/MNA)

SM RCS Thruster(s) Fails On
1. RCS CMD - OFF
2. ROT CONTR PWR DIRECT (both) - OFF
3. SCS DIRECT ULL cb(2) - Open
4. If SM RCS prplnt qty still decreases:
   SM RCS prplnt vlv - OFF (affected quad)

SMJC - Fires Prematurely
1. MNA - OFF; if jet firing stops, reconfigure
   AC1 MNA is lost until CM/SM sep.
2. If jets still fire:
   MNA - ON
   AC1 - ON
   MNB - OFF; reconfigure AC2. MNB lost
   until CM/SM sep.
3. If jets still fire:
   SM RCS prplnt vlvs (4) - OFF

SM RCS A(B)(C)(D) C&W Light On
1. He 1&2 - Off (affected quad)

Cabin Pres. Less Than 5psia And Decreasing
1. Cabin pres. relief vlv(both) - Closed
2. Don HELMETS AND GLOVES
3. If not suited and in other than 100% O_2
   atmosphere utilize O_2 mask.

Hi O_2 Flow Light On
1. Verify Hi flow indication
2. CK for decreasing surge tank pres.
3. If surge tank is decreasing And Cab press norm:
   Surge Tank - Off

Suit Compressor Fails While Suited
1. Select redund suit compr on alternate bus
2. Direct O_2 vlv - On
3. When feasible remove helmets

Basic Date Nov. 6, 1968
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Prim EVAP Out Temp High (Approaching 60°)

1. ECS IND SEL. - SEC
2. SEC COOL Loop Pump - AC 1(2)
3. SEC Cool Loop EVAP - EVAP

MN Bus A(B) Undervolt Light On
1. Check bus voltages.
2. If FC 1(2)(3) current is higher than normal
   & Bus voltage low: Isolate affected bus
3. Reconfigure Bus loads.

AC Bus 1 (2) Light On In Conjuction With MN BUS
   A(B) Undervolt and/or AC Bus 1(2) Overload
1. Turn off associated inverter within 5 seconds

FC 1 (2)(3)FH HI
1. FC 1 (2)(3) Pumps - OFF
2. POT H_2O Inlet vlv - Close

ABORT PROCEDURES

MODE IA ABORT
(00:00 to 00:42) (10K)

00:00   TRANS CONTR - NEUTRAL
                              CM/SM SEP (both) - on (up)

00:14   ELS - AUTO
        ELS LOGIC - on (up)
        TWR JETT (both) - on (up)
        APEX COVER JETT PB-PUSH
        DROGUE DEPLOY PB-PUSH
        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 A-6

MODE IB ABORT
(00:42 to 16.5 nm) (1:50)

00:00   TRANS CONTR - 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 A-6

MODE IC ABORT
(16.5 nm to TWR JETT) (01:50 - 03:07)

00:00 TRANS CONTR - NEUTRAL
CM/SM SEP (both) - on (up)

RCS CMD - ON

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

00:14 S/C PLATFORM GO/NO GO (Excessive Rates)

GO	NO GO
TWR JETT sw(2)-on(up)	Estab. +5°/SEC
MAN PITCH - RATE CMD	pitch rate
ENT ATT R0°,P135°,Y0°	EXCESSIVE + PITCH RATES
BMAG - ATT1/RATE 2	
EMS FUNC - ENTRY	*ROLL 90° *
EMS MODE - AUTO	*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 - EMG-4

GO TO LANDING PHASE pg A-6

MODE II RCS ABORT
(TWR JETT to MODE IV) (03:07 - 09:50)

00:00 TRANS CONTR - CCW (4 Sec. Min.)+X & HOLD
No BECO-Reset THC,Req.Range CMD
*Reset & start JET
00:03 CSM/LV SEP * NO SEP:
* SECS ARM cb (both) - close
* CSM/LV SEP - PUSH

MAN ATT(3) - RATE CMD
00:05 TRANS CONTR - NEUTRAL +X
*EXCESSIVE RATES: *
* ΔV THRUST A -NORMAL *
* SPS THRUST - DIRECT ON *
*When Rates Damped: *
* ΔV THRUST A&B (2) - OFF *
* SPS THRUST - NORMAL *

00:24 TRANS CONTR +X OFF
Entry ATT - (R=0°,P=120°,Y=0°)(Compl by 1:40)
V82E - NOTE TFF
If TFF>2 min, Yaw 45° (LEFT) out-of-plane
BMAGS (3) - ATT1/RATE 2
SECS ARM cb (both) - close GET 400K
CM/SM SEP - on (up) θ(.05G) _____
CM RCS - PRESS GET DROGUE _____
RCS TRNFR - CM
RCS CMD - ON
C&U MODE - CM
EMS FUNC - ENTRY
EMS MODE - AUTO

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

GO TO LANDING PHASE pg A-6

MODE III SPS ABORT
($\Delta R = -368$ NM to INSERTION) (10:00 - 11:21)

00:00   TRANS CONTR - CCW (4 Sec Min)+X & HOLD
                        *NO BECO - RESET THC,   *
                        *   SII/SIVB sw-LV STAGE*
                        *Reset & start DET   *
00:03   CSM/LV SEP   * NO SEP: *
                      *   SECS ARM cb (both) - close   *
                      *   CSM/LV SEP PB - PUSH   *
                      * AFTER SEP: *
                      *   SECS ARM cb (both) - open *
        MAN ATT (3) - RATE CMD
00:05   TRANS CONTR - NEUTRAL & +X
        SIVB/GPI Sw - GPI
                      *EXCESSIVE RATES: *
                      * ΔV THRUST A-NORMAL   *
                      * SPS THRUST - DIRECT   *
                      *When Rates Damped: *
                      * ΔV THRUST A&B(2)-OFF   *
                      * SPS THRUST - NORMAL   *

00:24   TRANS CONTR +X OFF
        KEY V82E N50E ΔR,HP,TFF   (.1nm,min-sec)
        If $\Delta R > 0$:
            MNVR to retro att (R=180°,P=194°,Y=0°)
            (Scribe on horiz, BEF. Hds up)
            BMAG MODE(3)-ATT1/RATE2
            EMS - AUTO   RATE-LOW   GETI _____
            ΔV THRUST A -NORMAL   3999.9
01:50   Start Ullage (+X) ΔV _____
02:05   THRUST ON PB - PUSH   VC _____
        Burn to VC ($\Delta R=0$) Δtb _____
RATE- ΔV THRUST A&B - OFF   GET 400K _____
HIGH   If TFF>2min,Yaw (RT)45° θ(.05G) _____
        out-of-plane   GET Drogue _____
        SECS ARM cb (both) - close Entry R _____
        CM/SM SEP - on (up)   P _____
        CM RCS PRESS - on (up)   Y _____
        RCS TRANSFER - CM
        RCS CMD - ON
        C&W MODE - CM

        Mnvr to entry att (R=0°),P=105°,Y=0°)
          (BEF, Hds Dn, Full Lift)
        Note TFF
        EMS Func - ENTRY
        EMS MODE - AUTO
        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 A-6

Basic Date Nov. 6, 1968
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LANDING PHASE

MODE IV   10 MIN.

TLI 90 MIN ABORT

MODE I   MODE III   MODE II

LANDING PHASE (30K, DESCENDING)

30K' ELS cb (both - close (verify)
      ELS LOGIC - on (up)
      ELS - AUTO
      RCS CMD - OFF
24K' Twr jett (auto)
                    TWR JETT (both) - on (up)
      Apex cover jett (auto)
                    *APEX COVER JETT PB-PUSH) *
      (WAIT 2 SECS)
      Drogues deployed (auto)
                    DROG DPLY PB-PUSH
        If Drogues Fail:
                    *   ELS - MAN   *
                    *   RCS CMD - ON   *
                    * STABILIZE CM   *
                    5K' MAIN DPLY PB - PUSH
                    * ELS - AUTO   *

23.5K' Cabin Pressure increasing
                    *If not increasing by 17K':   *
MODE 1A   *CABIN PRESS REL vlv (RH)-DUMP *

10K' Main parachutes deployed (DROG+50 sec)
          MAIN DEPLOY PB - PUSH (within 1 sec)
          VHF ANT - RECV
          VHF AM (A) - SIMPLEX
          VHF BCN - ON
      RCS DUMP
          CABIN PRESS REL vlv-(both)-CLOSE
          DIRECT O2 - OPEN (CCW)
          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
          STRUT LOCKS-UNLOCK

LANDING PHASE

MODE I

MODE III

MODE II

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

3K'   CABIN PRESS REL **vlv (RH) - DUMP**
      FLOOD LT - POST LDG
      CM RCS PRPLNT (both) - OFF
      ROT CONTR PWR DIRECT - OFF

800' CAB PRESS RELV vlv - CLOSE (latch off)
      MN BUS TIES (both) - OFF

+00:18m LANDING
      MAIN REL PYRO cb (both) - close
      MAIN REL - on (up)

      GO TO POSTLANDING A-8

MODE IV   10 MIN

TLI 90 MIN ABORT

POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

1 Remove helmets
  DIRECT O2 - CLOSE (CW)

2 Stabilization after landing
  ELS - AUTO (verify)
  MAIN REL PYRO cb (both) - close (verify)
  MAIN RELEASE - on (up) (verify)
  SECS PYRO (both) - SAFE
  SECS LOGIC (both) - OFF
  BAT RLY BUS cb (2) - OPEN
        *No contact: *
        *VHF AM A & B - OFF *
        VHF AM RCV only - A
  PL VENT cb - close
  FLOAT BAG cb (3) - Close
  UPRIGHT SYS COMPRESS cb (both) - 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
3 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
  MNA BAT BUS A & BAT C cb (2) - open
  MNB BAT BUS B & BAT C cb (2) - open
  FLT & PL BAT C cb - open

MODE I

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CSM 103

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PYRO A SEQ A cb - OPEN
PYRO B SEQ B cb - OPEN
    * EACH HR - CHECK D-C VOLTS 27.5 V *
    * If Not: *
    *   FLT & PL-BAT BUS A&B cb (2) -OPEN*
    *   FLT & PL BAT C cb (2) - OPEN   *
    *   GO TO LOW POWER CHECKLIST pg E-38*
Unstow and install PLV DISTRIB DUCT
Deploy grappling hook and line if req.

4 Post Landing Communications
  VHF ANT-RECV (verify)
  VHF BCN - ON (verify)
    If no contact with recovery forces
      perform VHF BEACON Check
  MONITOR VHF BEACON transmission
    with Survival Transceiver
    * VHF Beacon not operating   *
    * connect Survival Transceiver to ANT*
    * Cable and place radio in BCN mode *

LOW POWER CHECKLIST
  VHF BCN - OFF
  VHF (3) - RCV
  FLOOD FIXED - OFF
  VHF AM A & B - OFF (center)
  VHF AM REC ONLY - A (verify)
  COUCH LIGHTS - OFF
  POSTLANDING VENT SYS: minimize use
  SURV RADIO - plug into VHF BCN ANT cable
  CONN & turn radio on in BCN mode

EGRESS PROCEDURES

STABLE I

	Disconnect umbilicals
	Neck dam on
CMP	Center couch - 270° position
CDR,LMP	Armrests folded
CDR	Connect raft to S/C, if desired, with green lanyard
	Connect raft white lanyards to suits & inflate water wings when exiting
	Hatch piston press vlv - Press (Inbd)
CMP	Side Hatch opened
CDR	PL VENT-OFF
CMP	Pnl 250 cbs(all)-open
	Egress with liferaft
LMP	Put hardware kit out
LMP, CDR or C.	Egress

STABLE II

LMP	CB CREW STA AUDIO (3) - open
ALL	PWR (3) - OFF
	SUIT PWR (3) - OFF
	Remove helmets
	Disconnect umbilicals
	Release footstraps
	Release restraint harness
	Couch seat pans (3) - 170° position
CMP	Arm rests folded
	Survival kits removed from stowage
CDR	Connect liferaft mainline to CDR or S/C
CMP	Connect first white lanyard from liferaft to suit
CDR	Connect third white lanyard from liferaft to suit
LMP	Connect rucksacks together to yellow lanyard on raft bag
CMP	PRESSURE EQUALIZATION vlv - OPEN
CMP,LMP	Remove and stow fwd 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

MODE IV SPS TO ORBIT
(VI=23,600 HDOT ~ -150 to INSERTION)

00:00	TRANS CONT - CCW (4 Sec Min) +X & HOLD
	*NO BECO-RESET THC. *
	* SII/SIVB sw-LV STAGE*
	*RESET & START DET *
00:03	CSM/LV SEP * NO SEP: *
	* SECS ARM cb (both) - close *
	* CSM/LV SEP PB - PUSH *
	* AFTER SEP: *
	* SECS ARM cb (both) - open *
	MAN ATT(3) - RATE CMD
00:05	TRANS CONTR - NEUTRAL +X
	SIVB/GPI Sw - GPI
	*EXCESSIVE RATES: *
	* ΔV THRUST A - NORMAL. *
	* SPS THRUST - DIRECT *
	*When Rates Damped: *
	* ΔV THRUST A&B(2)-OFF *
	* SPS THRUST - NORMAL *
00:24	TRANS CONTR - +X OFF
	Mnvr to Insertion Att (R=180°,P=347°,Y=0°)
	(Before 01:50)
	(Scribe on horiz, SEF, Hds Dn)
	~~BMAG(3)-ATT1/RATE2~~ Rate-Low
	ENS MODE - AUTO

Time	Action		Value
	ΔV THRUST A- NORMAL	GETI	_____
01:50	Start Ullage (+X)		3999.9
02:05	THRUST ON PB - PUSH	ΔV	_____
	Burn to VC (hp>75 nm)	VC	_____
	ΔV THRUST A&B - OFF	Δtb	_____
	GMBL MTRS (4) - OFF		

GO TO INSERTION (+11:31) pg L-5

TLI 10 MIN ABORT

00:00	TRANS CONTR - CCW (4 sec) & +X
	DET RESET (verfiy)
00:03	* NO SEP:
	* SECS ARM cb (both) - close
	* CSM/LV SEP PB - PUSH
	* AFTER SEP:
	* SECS ARM cb (both) - open
	MAN ATT(3) - RATE CMD
00:05	TRANS CONTR - neutral then +X for
	10 sec
	SIVB/GPI sw - GPI
	*Excessive rates:
	* ΔV THRUST A -NORMAL
	* SPS THRUST - DIRECT
	*When rates damped:
	* ΔV THRUST A&B(2) - OFF
	* SPS THRUST - NORMAL
	MNA BAT C cb - close
	MNB BAT C cb - close
00:14	TRANS CONTR +X - OFF
	V37E 00E
	PITCH UP to LOCAL VERT (+X axis
	toward the earth)
	RATE - LOW
	BMAG MODE (3) - ATT 1/RATE 2
01:00	TRANS CONTR -X (8 to 10 sec)
	RATE - HIGH
	MNVR TO RETRO ATT
	R_____ (180°)
	P_____ (199°)
	Y_____ (0°)

Basic Date Nov. 6, 1968 Changed Dec. 15, 1968

Basic Date Nov. 6, 1968 Changed Dec. 15, 1968

RETRO UPDATE

GETI _____		0.05G _____	
3999.9			
ΔV _____		GET DROGUE _____	
VC _____		ENTRY P _____	
Δtb _____		R _____	
GET 400K _____		Y _____	

ALIGN HORIZ ON RET +1° MK
GMBL CHECK (Time Permitting)
MN BUS TIE (both) - ON
GMBL MTRS(4) - ON (LMP Confirm)
SPS P2,Y2 cb - open
RATE - LOW
EMS MODE - STBY
EMS FUNC - ΔV SET
SET ΔV from chart
EMS FUNC - ΔV
EMS MODE - AUTO

09:45	ΔV THRUST A - NORMAL
	V37E 47E (THRUST MONITOR)
	F 16 83 ΔVX,Y,Z
	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 A&B - OFF
	Report cutoff
	SPS P2, Y2 cb - close
	GMBL MTRS(4) - OFF (LMP Confirm)

TRANS CONT PWR - OFF
TVC SERVO PWR (both) - OFF
MN BUS TIE (both) - OFF
SPS P1&2, Y1&2 cb - open

F 37   OOE

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 10
pg E-1(P).

TLI 90 MIN ABORT
Go to EMERG SEP pg EMG-5
then to SPS THRUSTING PROCEDURES.

Basic Date Oct. 6, 1968
Changed - Dec. 15, 1968

Basic Date Oct. 6, 1968
Changed — Dec. 15, 1968

TLI 90 MIN ABORT   MODE III   MODE II
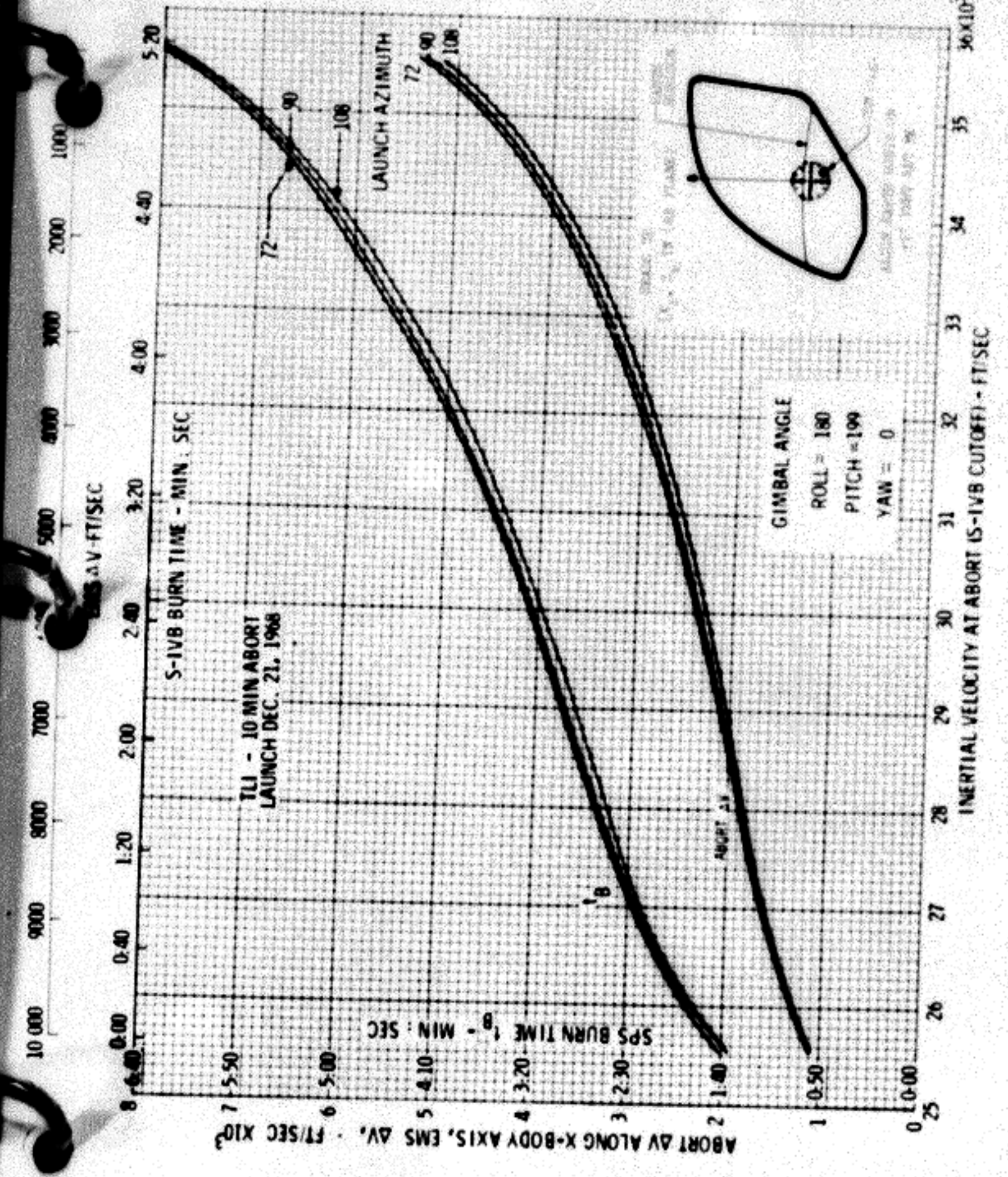
SCS GMBL CK

STAB CONT SYS cb (Pnl 8) - close
SPS cb (12) - close
ROT CONTR PWR DIRECT (both) - OFF
SCS TVC (both) - AUTO
TVC GMBL DRIVE P&Y- AUTO
MN BUS TIES (both) - ON
TVC SERVO PWR 1 - AC1/MNA
                2 - AC2/MNB
TRANS CONTR PWR - ON
ROT CONTR PWR NORMAL 2 - AC
RHC #2 - ARMED

PRIMARY TVC CHECK
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 pos
ROT CONT PWR NORM 2 - AC/DC

TLI- 10 MIN ABORT
LAUNCH - DEC. 21, 1968

LAUNCH AZIMUTH

INERTIAL VELOCITY AT ABORT (S -IVB CUTOFF) - FT/SEC

TIME FROM SPS ABORT CUTOFF TO REENTRY ALTITUDE , TAR, - HR

S-IVB BURN TIME - MIN :SEC

EMS ΔV- FT/SEC