

BOOST PREPARATION

-20:00

Change X STABLE MEMBER AZIMUTH, if necessary:

```

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

```

```

AUTO RCS A/C ROLL (4) - OFF (verify)
AUTO RCS B/D ROLL B1 & B2 - MNA
AUTO RCS B/D ROLL D1 & D2 - MNB
AUTO RCS PITCH A3 & C4 - MNB
AUTO RCS PITCH C3 & A4 - MNA
AUTO RCS YAW B3 & D4 - MNA
AUTO RCS YAW D3 & B4 - MNB

```

-15:00

## CTE UPDATE VERIFICATION

```

DC IND sel - BAT C
DC VOLTS ind - 35-37.5 vdc
DC IND sel - MNA
FDAI-1 total att R=90+AZ, P=90, Y=0
FDAI SCALE - 5/5
RATE - HIGH
TRANS CONTR PWR - on(up) (verify)
RHC PWR DIRECT(2) - MNA/MNB
CMC MODE - FREE
BMAG MODE (3) - RATE 1
RHC #2 - ARMED

```

## ASTRO LAUNCH OPERATIONS VOICE CHECK

```

LMP S BD sw - OFF
CDR VHF AM sw - OFF
VOICE CHECK WITH MCCH
LMP S BD sw - T/R
CDR VHF AM sw - T/R
SPS THRUST - NORMAL (locked)
ΔV THRUST (2) - OFF
α/PC IND sw - α

```

BOOST PREPARATION

DATE 12/13/71

EDS AUTO - on (up)  
2 ENG OUT - AUTO  
LV RATES - AUTO  
RCS CMD - OFF  
TVC SERVO PWR #1 - AC1/MNA  
TVC SERVO PWR #2 - AC2/MNB

BOOST PREPARATION

-10:00 FC REAC vlv - LATCH

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

-04:10 L/V ENGINE 1ts (5) - on

-04:00 ASTRO LAUNCH OPERATIONS COMM CHECK

DSKY - Verify P02  
V75 (Do not ENTR)  
TAPE RCD FWD - FWD (tb-gray)

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

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

-1:00 PAD COMM (2) - OFF  
VHF AM VOL tw - increase to above  
normal listening level

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

DATE 12/13/71

**SATURN BOOST** 3/8/72  
 APR 16  
**DET  $\theta$  VI  $\dot{H}$  H**

00:00	90	1341	0	-.0
:30	85	1400	299	.6
1	68	1883	817	3.3
1:30	49	3044	1504	9.0
2	34	5087	2234	18.2
a 2:18	28	6783	2726	25.4
2:30	25	7902	2961	31.1
b 2:41	22	8976	3174	36.3
3	22	9164	2777	46.0
3:30	24	9702	2290	58.4
4	21	10341	1861	68.7
4:30	19	11079	1464	76.9
5	17	11914	1102	83.2
5:30	14	12852	778	87.8
6	12	13899	497	90.9
6:30	9	15067	263	92.8
7	6	16374	86	93.6
7:30	3	17842	-23	93.7
8	6	19262	-58	93.5
8:30	0	20618	-28	93.3
9	357	22003	21	93.2
c 9:18	355	22869	86	93.4
9:30	353	22998	36	93.5
10	350	23535	-40	93.5
10:30	347	24100	-66	93.3
11	344	24690	-69	92.9
11:30	342	25306	-36	92.6
d 11:44	342	25599	-1	92.6

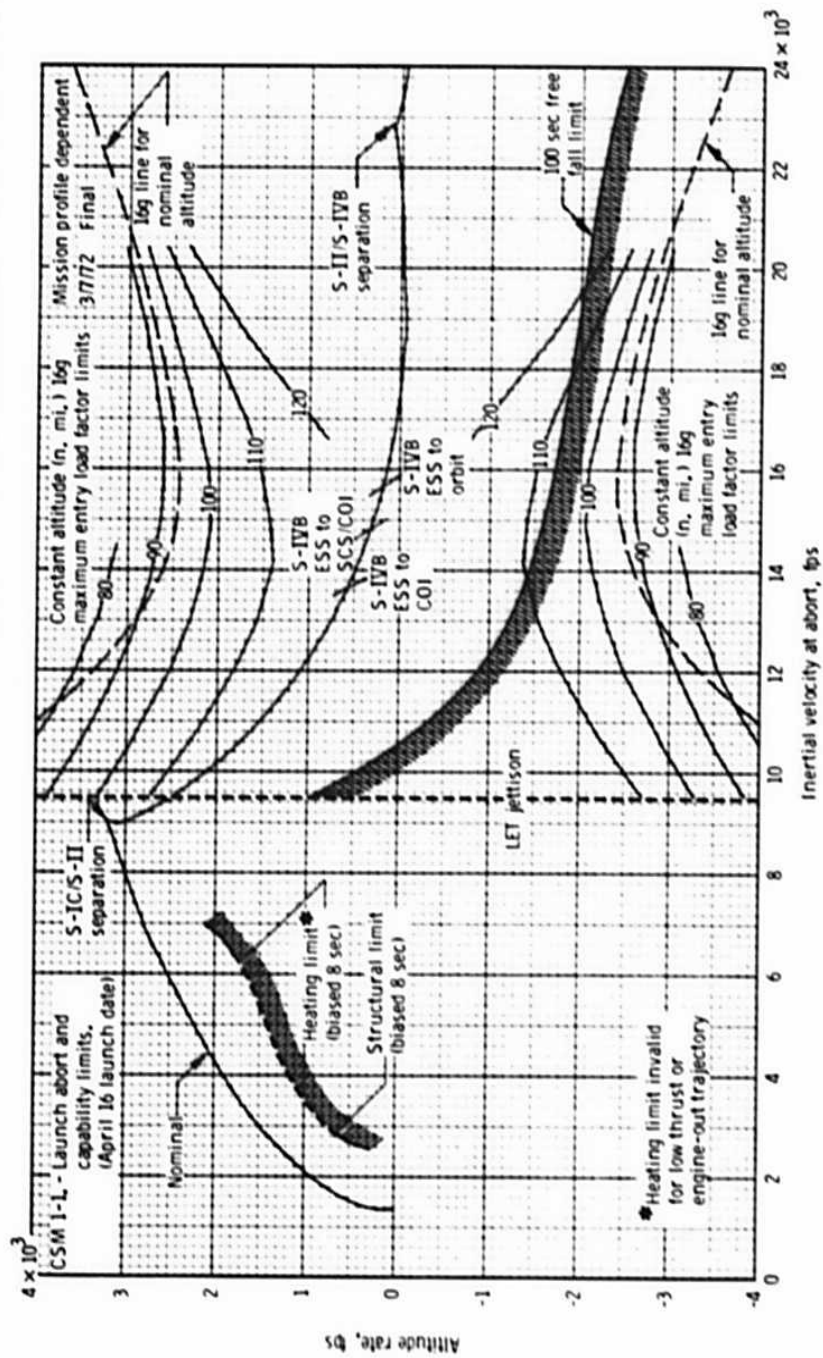
- a Timebase 2 (S-IC center-engine +.01 sec)  
 b Timebase 3 (S-IC outboard-engine cutoff +.01 sec)  
 c Timebase 4 (S-II engine cutoff +.01 sec)  
 d Timebase 5 (S-IVB guidance cutoff signal +.21 sec)

DATE 3/7/72

LAUNCH TRAJECTORY

# LAUNCH ABORT

L  
2-4

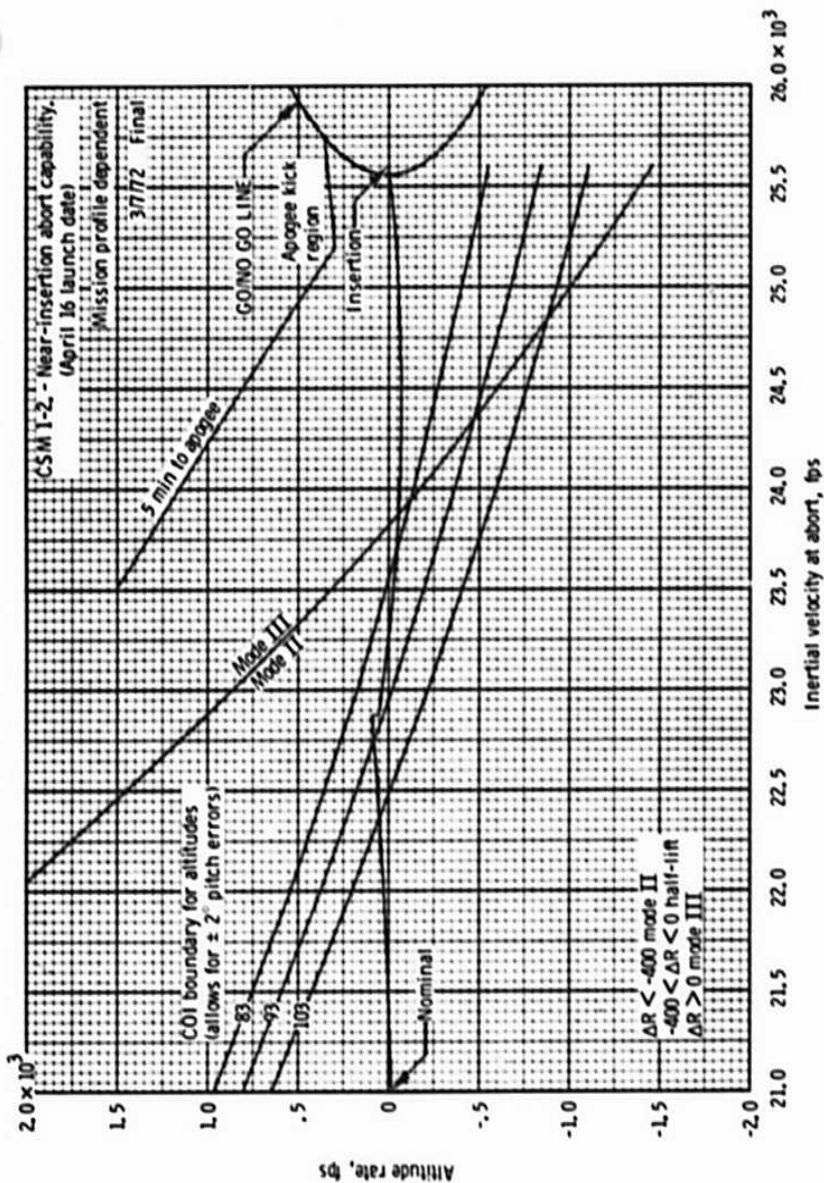


Launch abort and capability limits.

DATE 3/7/72



DATE 3/7/72

L  
2-5

Near-insertion abort capability.

NEAR  
INSERTION  
ABORT

CSM 1-4.- Recommended manual EOI  
shutdown velocities.Mission independent  
4/15/71 Final

SHUTDOWN ALTITUDE, h (N. MI.)	INERTIAL VELOCITY, $V_i$ (fps)	$h_a/h_p$ (N. MI.)
150	25291	150/90
145	25318	145/90
140	25344	140/90
135	25371	135/90
130	25398	130/90
125	25424	125/90
120	25451	120/90
115	25478	115/90
110	25505	110/90
105	25532	105/90
100	25559	100/90
95	25586	95/90
90	25613	90/90
85	25641	90/85
80	25668	90/80
75	25695	90/75
70	25723	90/70

DATE 12/13/71

NOTE: Insertion altitude defines cutoff velocity assuming  $h = 0$  and results in  $h = 90$  n mi ( $h_a$  or  $h_p$ )  $1/2$  rev. later, example: If  $h = 75$ ,  $V_i$  @ cutoff = 25,695 results in a 75/90 orbit.

BOOST

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

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

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

\*If no P11: Key ENTR \*  
 \* START DET & RESET MET\*

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

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

+00:50 Monitor  $q_\alpha$  to T +02:00  
 (100%, 5° Att error)

CABIN PRESSURE DECREASING ~14K(2.3 nm)

\*If no Press decrease ~25K(4.1 nm):\*  
 \* CAB PRESS RELIEF vlv(RH)-DUMP \*

+01:01 MODE IB - report  
 PRPLNT DUMP - RCS CMD

+01:21  
 +01:24 MAX Q  
 +01:57 MODE IC - report  
 +01:55

00:00

+4°/sec P,Y  
 +20°/sec R

MODE IA

01:01

MODE IB

+4°/sec P,Y  
 +20°/sec R

H=16.5 nm

BOOST

3/29/72  
 DATE 12/13/77

BOOST

+02:00 EDS AUTO - OFF  
2 ENG OUT - OFF  
LV RATES - OFF  
LV RATE 1t disabled as IU failure cue  
V82E, N62E

+9°/sec P,Y  
+20°/sec R

+02:18 GO/NO GO FOR STAGING - report  
INBOARD CUTOFF - (1t 5 on)

MODE IC

+02:39 CMC BOOST Polynomial ends  
+02:41 OUTBOARD CUTOFF - report (1ts on)

+02:42 SIC/SII STAGING (1ts off)

+02:43 SII Ign Command (1ts on)

SII SEP 1t - on

+02:44 SII 65% - 1ts out

+03:12 SII SEP 1t - out report

+03:18 TWR JETT (2) - on (up) (TFF>1+20)  
\*NO TWR JETT, pg L/4-2 \*

TWR JETT

\*For MAN BOOSTER CONTROL:\*

\* LV GUID - CMC \*

\* Key V46E \*

$\alpha$ /Pc sw - Pc

MAN ATT PITCH - RATE CMD

Twr Jett & MODE II - Report

GLY EVAP STEAM PRESS - AUTO

GLY EVAP H2O FLOW - AUTO

MODE II

+03:22 Guidance Initiate - report (OECO +41sec)

+03:52 Guidance Good

+04:00 Report Status

+05:00 Report Status

+05:55 SIVB to COI

+06:00 Report Status

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

Check GPI

LV/SPS IND - GPI (Momentarily)

PITCH = ~~0.47°~~ - 0.53°

YAW = +1.90°

DATE 3/7/72  
4/6/72

+06:15 OMNI ANT - D (AZ < 96°)  
          - C (AZ > 96°)  
+06:45 SIVB to orbit  
+07:00 Report Status  
+07:41 IECO (1t 5 - on)  
+08:00 Report Status  
+08:17 PU SHIFT  
+08:30 GO/NO GO FOR STAGING - report  
+08:34 Level sense arm \_\_\_\_\_  
+09:15 Mode IV - Report  
          (VI ~ 22,704, H DOT ~ +72,  
          H ~ +94)

Report Status  
+09:18 OECO (1ts on)  
+09:19 SII Staging - 1ts out  
+09:20 SIVB Ign Cmd - 1t on  
+09:22 SIVB 65% - 1t out  
  
+10:00 GO/NO GO FOR ORBIT - report

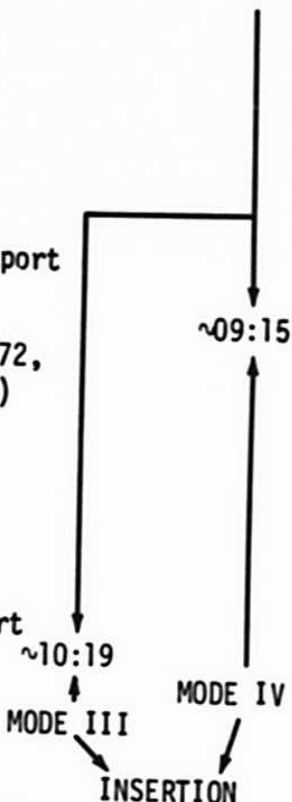
+11:00 Report Status  
+11:44 SECO (1t on) - report \_\_\_\_\_  
          (Begin TB5)

\*If LV GUID - CMC:                   \*  
\* LV STAGE sw - SII/SIVB \*  
\* SECO (1t on, begin TB5)\*

\*If no SECO (VI +100 fps):           \*  
\* THC-CCW & neutral in 1 sec \*  
  \*

+11:54 INSERTION - 1t out (TB5 + 10 sec)

Record VI \_\_\_\_\_ (fps)  
          H DOT \_\_\_\_\_ (fps)  
          H PAD \_\_\_\_\_ (.1nm)  
KEY RLSE  
Record HA \_\_\_\_\_ (.1nm)  
          HP \_\_\_\_\_ (.1nm)  
          TFF \_\_\_\_\_ (min-sec)  
PRO



DATE 3/7/72

L  
2-20

## P27 UPDATE

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

DATE 12/13/71

COMMENTS	CM		RCS		PURPOSE			
	R	C	S	MAN	PROP/GUID			
① EMS $\Delta V_c$ WILL COUNT FROM 100 TO 128.6 *	+	6	6	9	7	1	WT	N47
② TERMINATE BURN AT NBS $V_{1/2} = 0$ (R3) AND N44 $h_p < 45$ (R2) OR CM-RCS PRESS 1450 AND $h_p < 56$ (FOR CAPTURE)		0	0	NA			H	TRIM N48
		0	0	NA			Y	TRIM
	+	0	0	0	0	0	HRS	GET1
	+	0	0	0	4	0	MIN	N33
	+	0	0	0	0	0	SEC	
	-	0	0	8	7	9	$\Delta V_x$	N81
	+	0	0	0	0	0	$\Delta V_y$	
+	0	0	1	9	2	$\Delta V_z$		
③ GO TO SINGLE RING AFTER BURN	X	X	X	1	8	0	R	
	X	X	X	2	8	9	P	
	X	X	X	0	0	0	Y	
④ TRACK HORIZON (HEADS UP) WITH 9° WINDOW MARK	+			NA			H <sub>A</sub>	N44
	+	0	0	4	5	0	H <sub>P</sub>	
	+	0	0	9	0	0	$\Delta VT$	
⑤ R .05, $\approx 180$ P .05, $\approx 281$ Y .05, $\approx 000$	X	X	X	2	1	8	BT	
	X	0	0	0	0	0	$\Delta VC$	#
	X	X	X	X	NA		SXTS	
⑥ FLY LEFT DOWN (HEADS UP) TO 1g THEN ROLL	+		NA		0		SFT	
	+	NA		0	0		TRN	
	X	X	X	NA			BSS	
	X	X		NA			SPA	
⑦ PUR DOWN after Deorbit Burn	X	X	X	NA			SXP	
	-	0	0	1	5	1	LAT	N61
	-	1	5	9	5	4	LONG	
	+			NA			RTGO	EMS
	+	2	5	7	0	0	V10	
	0	0	1	1	2	5	2	GET 0.05G

DATE 3/7/72

CM RCS DEORBIT

(Inadvertent CM/SM SEP between HP>45nm &  
PYRO's SAFE)

- (275)      cb MNA BAT C - close  
            cb MNB BAT C - close  
            C&W MODE - CM  
            RCS TRNFR - CM

            \*If NO CM RCS PRESS, Go to EMER/1-16\*

- (326)      BMAG MODE (3) - ATT 1/RATE 2  
            O2 SM SUPPLY vlv - OFF  
            TVC SERVO PWR (2) - OFF  
            DIRECT O2 vlv - CLOSE  
            CM RCS LOGIC - OFF  
            Load RCS DAP, 11102, 01111, V46E  
            Perform P30, pg L/6-1  
            Load CM BURN ATT in N17, V63E  
            MNVR to CM BURN ATT

TIG -5 min      cb CSM/LM FNL SEP (2) - close  
                    CSM/LM FNL SEP (2) - on (up)  
                    V37E 41E

F 50 18      ENTR  
            06 85      Set  $\Delta VC = +100.0$   
59:25      DSKY BLANKS

59:30  
            16 85      TAPE RCDR - HBR/RCD/FWD/CMD RESET  
                    EMS MODE - NORMAL  
                    MAN ATT (PITCH) - ACCEL CMD

Go to step 22, pg L/6-5 & continue in C/L

00:00      CM RCS BURN

Perform single ring rolling Entry



INSERTION AND SYSTEMS CHECKS

- 1 GMBL MTRS (4) - OFF (LMP confirm)  
 EDS PWR - OFF  
 TVC SERVO PWR (2) - OFF  
 SECS PYRO ARM (2) - SAFE  
 SECS LOGIC (2) - OFF  
 cb SECS ARM (2) - open  
 cb DIRECT ULLAGE (2) - open  
 cb ELS/CM-SM SEP (2) - open  
 cb FLT/PL VENT - open  
 MN BUS TIE (2) - OFF(LMP)  
 EMS FUNC - OFF  
 TRANS CONT PWR - OFF  
 ROT CONTR PWR DIRECT(2) - OFF  
 BMAG MODE (3) - RATE 2  
 CM RCS LOGIC - OFF  
 LV STAGE sw - OFF (verify)  
 RHC #1 & #2 - LOCKED  
 CAB PRESS REL vlv (2) - NORMAL/LATCHED  
 REPRESS PKG vlv - OFF  
 DIRECT O2 vlv - CLOSE  
 cb ECS XDUCR PRESS GRP 2 MNA - close  
 INSTALL COAS

## MONITOR LV TANK PRESS

- \*If  $\Delta P > 36$  psid (OXID > FUEL) \*
- \*If  $\Delta P > 26$  psid (FUEL > OXID) \*
- \*If LOX TK PRESS > 50 psia \*
- \* EMERGENCY CSM/LV SEP pg EMER/1-1\*

DATE 3/7/72  
 CYI AOS  
 (00:16:46)

NOTE: Steps 2 thru 30 are not sequential

CMP 2

- 2 SM RCS HTRS (4) - PRIM  
 C/W - NORMAL  
 BPC JETT KNOB - 180° from BPC JETT  
 GN2 vlv HNDL - VENT (pull)  
 HATCH GEAR BOX - LATCH (verify)  
 ACTR HNDL SELECTOR - neutral
- 3 cb WASTE H2O/URINE DUMP HTRS (2) - close  
 FC REACS vlv - NORM  
 H2 PURGE LINE HTR - ON

4 MCCH - G/N Status  
Z Torquing angle \_\_\_\_\_

5 SM RCS MONITORING CHECK

CMP 2 SM RCS PRPLNT tb (8) - gray  
SM RCS He 1 & 2 tb (8) - gray  
SM RCS IND - He TK TEMP  
RCS IND sel - SM A, B, C, D  
PKG TEMP - 115°-175° F (C/W 75°-205°)  
He PRESS - 4100-4200 psia  
MANF PRESS - 192-207 psia (C/W 145-215 psia)  
He TK TEMP - 60°-90°F

6 CM RCS MONITORING CHECK

CMP 3 CM RCS PRPLNT tb (2) - gray  
RCS IND sw - CM 1,2  
He TEMP - 60°-90°F  
He PRESS - 4100-4200 psia  
MANF PRESS - 80-105 psia

7 C/W OPERATIONAL CHECK

C/W LAMP TEST - 1 (LH MA & 15 lts)  
C/W LAMP TEST - 2 (RH MA & 20 lts)  
C/W CSM - CM (CM RCS 1t (2) - on)  
C/W CSM - CSM (CM RCS 1t (2) - out)

8 CMP to LEB for MN REG CHECK

CMP 4 STRUT UNLOCK LANYARD (2) - STOW  
DRINKING WATER SUPPLY vlv - ON  
cb COAS/TUNL LTG MNB - close  
Unstow:  
Helmet bags (U1)  
Accessory bags (U1)  
Tool E (L2)

9 Confirm normal suit and cabin pressure

If cabin press > 5.3:

O2 flow - 0.2 lb/hr

If 4.7 < cabin press < 5.3:

O2 flow - pegged lo or hi, ~0.7 lb/hr stable

EMERG CABIN PRESS vlv - BOTH

SUIT CKT RET vlv - open (pull)

Install CM5 Window Cover

Remove helmet & gloves & stow in PGA bag

Unstow & mount TSB's (U1)

10 MAIN REG CHECK

CMP 5

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

11 SEC RAD LEAK CHECK

CMP 6

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

+20:00 12 ECS Post Insertion Config

GLY RSVR BYPASS vlv - OPEN  
GLY RSVR OUT vlv - CLOSE  
GLY RSVR IN vlv - CLOSE  
PRIM GLY ACCUM QTY 25-50%  
PRIM ACCUM FILL vlv - ON until 50-55%  
ECS RAD FLOW CONT - PWR  
PRIM GLY TO RAD vlv - NORMAL (push)  
ECS RAD HTR - PRIM 1 (LMP)  
ECS RAD TEMP PRIM OUT below PRIM IN  
\*If outlet temp after 5 min\*  
\* above INLET TEMP \*  
\*PRIM GLY TO RAD vlv - \*  
\* BYPASS (pull) \*  
\*Recheck in 10 min \*  
ECS RAD tb - gray  
GLY EVAP TEMP IN - AUTO  
POT H2O HTR - MNA

13 { PCM BIT RATE - LOW

CYI LOS  
(00:23:30)

{ UP TLM - CMD RSET, then NORM  
{ VHF AM A - SIMPLEX  
{ VHF AM B - off (ctr)

- 14 FC PURGE CHECK  
H2/O2 PURGE (6) - ON (monitor)  
Observe Flow rate inc  
Reset MA (as req'd)  
H2 PURGE LINE HTR - OFF

- 15 EPS MONITORING CHECK  
Cryogenic Pressure - Quantity Check  
H2 PRESS (3) - 225-260 psia  
O2 PRESS (3) - 865-935 psia  
SURGE TK PRESS - 865-935 psia  
CRYO FANS - OFF; ON as req'd

FC Power Plant Check  
FC HTRS(3) - on(up)  
FC RAD tb (3) - gray  
FC REAC tb (3) - gray  
FC IND sel - 1, 2, 3  
H2 FLOW - 0.03-0.15 lb/hr  
O2 FLOW - 0.25-1.2 lb/hr  
MOD SKIN TEMP - 390-440° F  
MOD COND EXH TEMP - 150-175° F  
FC pH HI tb - gray  
FC RAD TEMP LO tb - gray

D-C Voltage-Amperage Check  
MN BUS TIE (2) - OFF (verify)  
FC MNA tb - 1 & 2 gray, 3 bp  
FC MNB tb - 1 & 2 bp, 3 gray  
FC 1, 2, & 3 (check amps)  
MAIN BUS A, B, (26.5-31 vdc)  
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 5B (BAT RLY BUS - 3.4-4.1 vdc)

A-C VOLTS - 113 to 117 all phases

12/13/71  
DATE

- 16 ECS MONITORING CHECK  
 SUIT COMP ΔP - .3-.4 psid  
 O2 SURGE TANK PRESS - 865-935 psia  
 REPRESS O2 >865 psia  
 PRIM RAD tb - gray  
     \*If PRIM RAD tb - 2 \*  
     \* ECS RAD FLOW AUTO CONT - 1 until\*  
     \* tb gray, then AUTO \*  
 ECS RAD TEMP PRIM IN - 67-97° F  
 ECS RAD TEMP PRIM OUT - -20° to +63° F  
 PRIM GLY EVAP TEMP OUT - 38-50.5° F  
 PRIM GLY DISCH PRESS - 40-52 psig  
 SUIT TEMP - 45-55° F  
 SUIT PRESS/CABIN PRESS - 4.7-5.3 psia  
 PART PRESS CO2 < 7.6 mm Hg  
 POT H2O QTY - 10-100%  
 WASTE H2O QTY - 25-85%

- 17 SPS MONITORING CHECK  
 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  
 Check SPS OXID, FUEL QTY & UNBAL  
 OXID FLOW VLV PRIM - ~~PRIM~~ SEC (verify)  
 SPS He VLV (1&2) - AUTO, tb - bp

- 18 GDC ALIGN ( \_ : \_ : \_ )  
 19 UNSTOW SEQ CAMERA BRACKET & ORDEAL  
 20 MOUNT ORDEAL BOX & INITIALIZE

CMP7  
 AI UV MAG /  
 UV BKT / 21  
 UV LENS /  
 Times RT Grith Shelf

DATE 12/13/77  
 3/29/78



24 IMU REFSMMAT Realign Check (P52),  
P52 - (PAD REFSMMAT)

CMP 12

N71: \_\_\_ , \_\_\_

N05: \_\_\_ . \_\_\_

N93:

X \_\_\_ . \_\_\_

Y \_\_\_ . \_\_\_

Z \_\_\_ . \_\_\_

GET: \_\_\_ : \_\_\_ : \_\_\_

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

CRO AOS 25  
(00:52:21)  
CRO LOS  
(00:57:44)  
HSK AOS  
(00:59:37)

Increase S-BD volume  
Two way S-BD VOICE Check  
Report GYRO torquing angles

26

SCS ATT Ref Comp Check

SUNRISE  
(01:04:45)  
HSK LOS  
(01:05:13)  
  
(\_\_ : \_\_ : \_\_)

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:

US AOS  
(01:28:59)

R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_  
Record from ATT SET dials:  
R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_  
FDAI SEL - 1/2

DATE 3/7/72

- 27 EXTEND DOCKING PROBE  
 cb DOCK PROBE (2) - close (verify)  
 DOCK PROBE EXT/REL - EXT/REL until  
 full probe extension  
 (DOCK PROBE tb - gray at full extension)

	EXT	RET
FULL EXT	Gray	Gray
FULL RET	BP	BP
PART EXT	BP	Gray

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

- 28 COPY TLI, TLI ABORT, & P37 PADS

- 29 SV UPDATES (MCCH)

- 30 cb SECS ARM (2) - close  
 Cue MSFN  
 SECS LOGIC (2) - on(up)  
 MSFN confirm GO for PYRO ARM

US LOS  
 (01:48:42)

CYI AOS  
 (01:49:58)

CYI LOS  
 (01:54:46)

SUNSET  
 (01:55:08)

*UNSTOW: GEC ck VWP  
 sys ck - R12  
 R12  
 FLIGHT PLAN Z - R12  
 Updates - R12  
 DATA CARDS - MOC  
 STAR CHARTS - LEB  
 STORAGE LISTS - LEB*

VERIFY DSE TAPE MOTION  
 (LBR/RCD/FWD/CMD RESET)



TLI

X				X				TB6p
X	X	X		X	X	X		R
X	X	X		X	X	X		P TLI
X	X	X		X	X	X		Y
X	X	X		X	X	X		BT
								$\Delta VC'$
+				+				VI
X	X	X		X	X	X		R
X	X	X		X	X	X		P SEP
X	X	X		X	X	X		Y
X	X	X		X	X	X		R
X	X	X		X	X	X		P EXTRACTION
X	X	X		X	X	X		Y
X	X			X	X			R2 Align
X	X			X	X			R2 Ign
X	X			X	X			ORDEAL Start
X	X	X		X	X	X		YAW

DATE 12/13/71

L  
2-20

## P27 UPDATE

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

DATE 12/13/71

## P30 MANEUVER

L/2-21

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	MIN N33
				+	0		SEC
ULLAGE	___						$\Delta V_x$ N81
							$\Delta V_y$
							$\Delta V_z$
				X	X	X	R
				X	X	X	P
				X	X	X	Y
				+			H <sub>A</sub> N44
							H <sub>P</sub>
				+			$\Delta VT$
HORIZON/WINDOW	___			X	X	X	BT
				X			$\Delta VC$
				X	X	X	SXTS
				+			0 SFT
				+			0 0 TRN
				X	X	X	BSS
				X	X		SPA
P37 FOR L/0+8				X	X	X	SXP
					0		LAT N61
X							LONG
X				+			RTGO EMS
				+			VID
							GET 0.05G

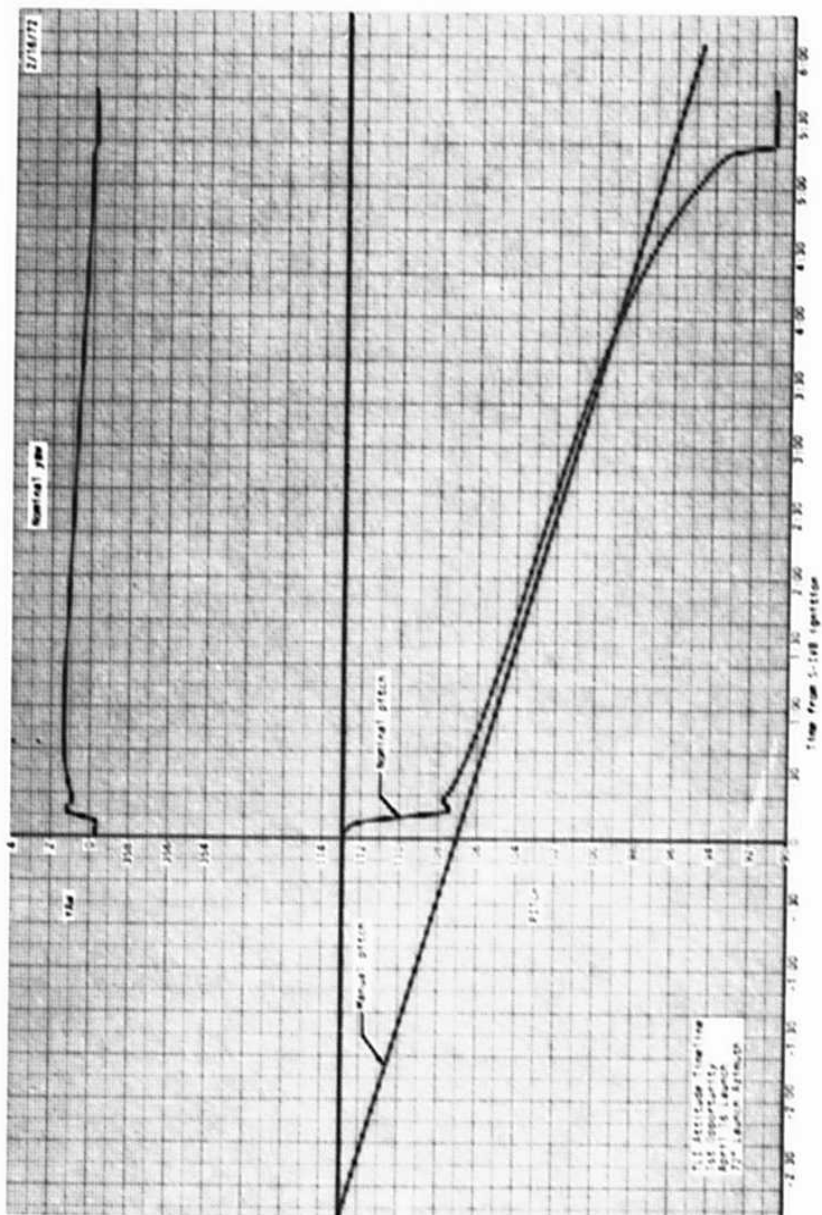
DATE 12/13/71

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	MIN N33
				+	0		SEC
ULLAGE	---						$\Delta V_X$ N81
							$\Delta V_Y$
							$\Delta V_Z$
				X	X	X	R
				X	X	X	P
				X	X	X	Y
				+			H <sub>A</sub> N44
							H <sub>P</sub>
				+			$\Delta VT$
HORIZON/WINDOW	---			X	X	X	BT
				X			$\Delta VC$
				X	X	X	SXTS
				+			SFT
				+			TRN
				X	X	X	BSS
				X	X		SPA
				X	X	X	SXP
P37 FOR L/0+8					0		LAT N61
X							LONG
X				+			RTGO EMS
				+			VIO
							GET 0.05G

DATE 12/13/71

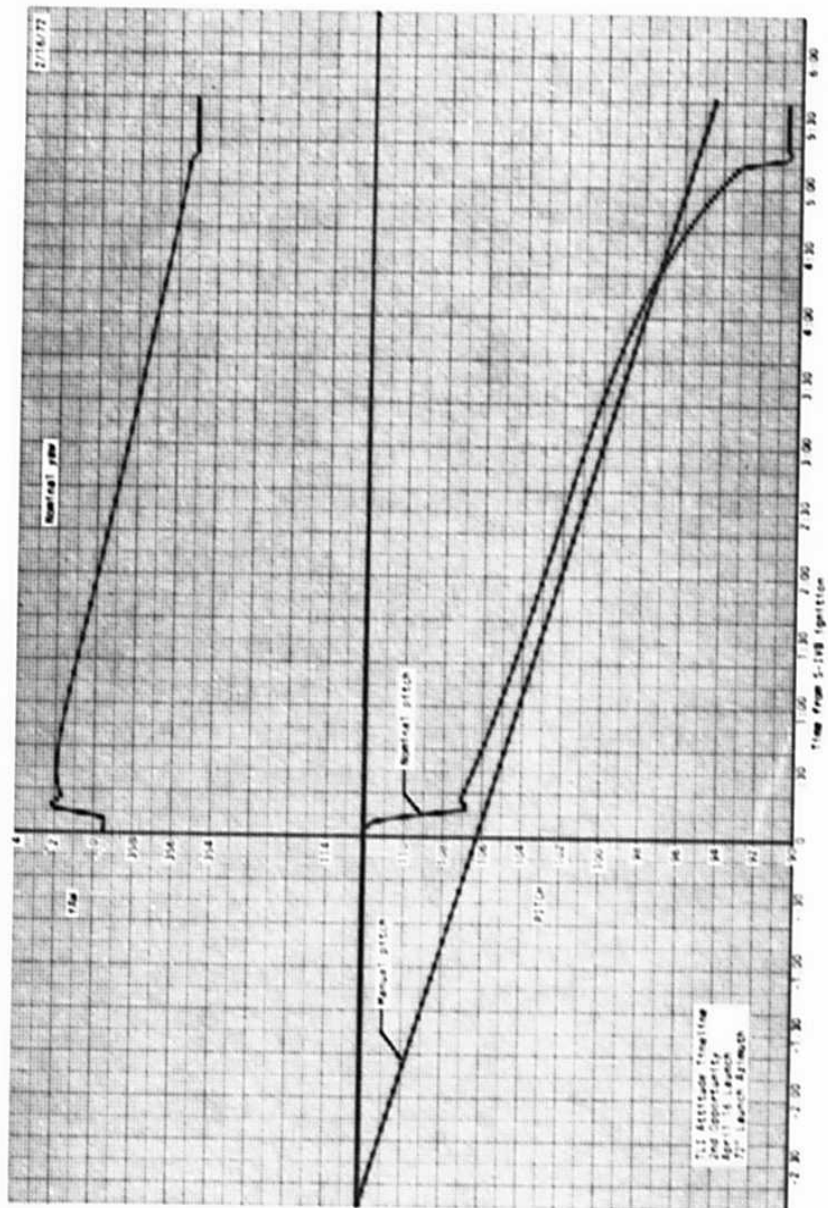
DATE 3/7/72

L  
2-23



TLI ATT TIMELINE  
OPP 1

TLI ATT TIMELINE  
OPP 2



L  
2-24

DATE 3/7/72

DATE 3/7/72**NOMINAL SIVB TLI 1**

LAUNCH APR 16		2/10/72			
DET	$\phi$	$\psi$	VI	H	H
0:00	113	359.7	25607	16	96
:30	107	1.2	26157	12	96
1	106	1.3	26801	41	96
1:30	104	1.2	27527	130	96
2	103	1.1	28289	290	97
2:30	102	0.9	29089	528	99
3	101	0.7	29931	852	103
3:30	100	0.6	30821	1271	108
4	99	0.4	31763	1792	115
4:30	97	0.2	32765	2422	126
5	95	0.1	33837	3164	139
5:30	91	359.9	34997	4000	157
5:44	91	359.9	35584	4440	167

**MANUAL SIVB TLI 1**

LAUNCH APR 16		2/10/72			
DET	$\phi$	$\psi$	VI	H	H
0:00	107.0	0.5	25607	16	96
:30	106.0	0.5	26157	12	96
1	105.7	0.5	26801	41	96
1:30	104.6	0.5	27527	130	96
2	103.5	0.5	28289	290	97
2:30	102.5	0.5	29089	528	99
3	100.9	0.5	29931	852	103
3:30	99.9	0.5	30821	1271	108
4	98.9	0.5	31763	1792	115
4:30	97.9	0.5	32765	2422	126
5	96.8	0.5	33837	3164	139
5:30	95.8	0.5	34997	4000	157
5:44	95.3	0.5	35584	4440	167

L  
2-25TLI TRAJECTORY  
OPP 1 NOM & MAN

**NOMINAL SIVB TLI 2**

LAUNCH APR 16 2/10/72

DET	Φ	Ψ	VI	H	H
0:00	112	359.6	25601	17	97
:30	107	1.9	26218	13	97
1	105	1.4	26916	51	97
1:30	104	0.7	27649	154	98
2	103	0.0	28417	330	99
2:30	102	359.2	29224	585	101
3	101	358.5	30074	929	105
3:30	98	357.7	30971	1369	111
4	98	357.0	31922	1912	119
4:30	97	356.3	32936	2566	130
5	94	355.7	34021	3331	144
5:30	91	355.1	35193	4185	163
5:39	91	355.2	35579	4480	169

**MANUAL SIVB TLI 2**

LAUNCH APR 16 2/10/72

DET	Φ	Ψ	VI	H	H
0:00	106.2	357	25601	17	97
:30	105.2	357	26218	13	97
1	104.2	357	26916	51	97
1:30	103.1	357	27649	154	98
2	102.1	357	28417	330	99
2:30	101.1	357	29224	585	101
3	100.0	357	30074	929	105
3:30	99.0	357	30971	1369	111
4	98.0	357	31922	1912	119
4:30	96.9	357	32936	2566	130
5	95.9	357	34021	3331	144
5:30	94.8	357	35193	4185	163
5:39	94.6	357	35579	4480	169



L  
2-27

TLI PREPARATION

CRO AOS  
(02:25:02)

CRO LOS  
(02:30:53)

XLUNAR - INJECT (verify)  
EDS PWR - on (up)  
Perform EMS  $\Delta V$  TEST & NULL  
BIAS CHECK, pg G/2-5  
Set  $\Delta VC$   
EMS FUNC -  $\Delta V$   
GDC ALIGN  
V48E, 31102, 01111  
Key V83E  
Set ORDEAL - 90/EARTH  
SECS PYRO ARM (2) - on (up)  
TRANS CONTROL PWR - ON  
ROT CONTR PWR NORMAL (2) - AC/DC (verify)  
ROT CONTR PWR DIRECT (2) - MNA/MNB  
SC CONT - SCS (verify)  
LV/SPS IND - SIVB (verify)  
cb DIRECT ULLAGE (2) - close  
Set DET - 51:00

P15 - TLI INITIATE/CUTOFF

V37E 15E

F 06 33 GET of TB6 (hrs,min,.01sec)  
Load GET of TB6  
PRO

F 06 14 VC/O (fps)  
Load VC/O  
PRO

06 95 TFI, VG, VI (min-sec,fps,fps)

DATE 3/7/72

TLI PREPARATION

L  
2-28TLI, NOMINAL & MANUAL

LV GUID - IU (verify)

\*If LV GUID 1t - on: \*

\* LV GUID - CMC \*

\* RHC PWR DIRECT (2) - OFF\*

TB6 UPLINK ACTY 1t - on  
 (-09:38) SII SEP 1t - on (TIG-09:38)  
 TB6 + 10sec UPLINK ACTY 1t - out

51:00 Start DET counting up  
 (-09:00) \*If LV GUID - CMC: \*  
 \* V16 N2OE \*  
 \* MNVR to R2 Align = \_\_\_\_ (113°)\*

MONITOR LV TANK PRESS SEQUENCE

Nominal LOX ~ 40 psia

Nominal LH2 ~ 31 psia

\*If  $\Delta P > 36$  psid (OXID > FUEL) \*\*If  $\Delta P > 26$  psid (FUEL > OXID) \*

\*If LOX TK PRESS &gt; 50 psia \*

\* EMERGENCY CSM/LV SEP pg EMER/1-1\*

ORDEAL FDAI #1 - ORB RATE

ORDEAL FDAI #2 - INERTIAL

ORDEAL MODE - HOLD/FAST

ORDEAL - 300/LUNAR

RHC #2 - ARMED

UP TLM CM - BLOCK (verify)

UP TLM IU - BLOCK (verify)

56:00 Slew FDAI #1 to PITCH = 17°  
 (-04:00) \*If LV GUID - CMC: \*  
 \* Slew FDAI #1 to PITCH = 0° \*  
 \* V16 N2OE \*  
 \* Insure R2 Align = \_\_\_\_ (113°)\*

DATE 3/7/72

57:00  
(-03:00)

Insure FDAI #1 PITCH = 13°  
ORDEAL MODE - OPERATE/SLOW, IU or CMC

\*If LV GUID - CMC: \*  
\* MNVR to R2 Ign = \_\_\_\_\_ (107°) \*

58:15 DSKY BLANKS

58:20 06 95 TFI, VG, VI (Ave G on) (min-sec, fps, fps)  
(-01:40)

SCS TVC SERVO PWR #1 - AC1/MNA  
SCS TVC SERVO PWR #2 - OFF (verify)  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
EMS MODE - NORMAL  
SII SEP 1t - on

58:36  
(-01:24)

\*If TLI Inhibit req'd: \*  
\* before 59:42 - XLUNAR INJECT - SAFE\*  
\* (recycle to TB5) \*  
\* 59:42-00:12 - LV STAGE - SII/SIVB \*  
\* (recycle to TB5) \*  
\* after 00:12 - LV STAGE - SII/SIVB \*  
\* (permanent inhibit)\*

58:38  
SUNRISE  
(02:32:29)  
59:42

SIVB ULLAGE Begins

SII SEP 1t - out (TIG - 18 sec)

DATE 3/7/72

L  
2-30

59:52 SIVB FUEL LEAD  
59:55 SIVB ULLAGE discontinues  
Insure FDAI #1 PITCH = 6°  
\*If LV GUID - CMC: \*  
\* FDAI #1 PITCH = 0°\*

59:59 LV ENG 1 lt - on

00:00 SIVB IGNITION (\_\_\_:\_\_\_:\_\_\_) GETI

00:02 LV ENG 1 lt - out

00:10 06 95 TFC, VG, VI (min-sec, fps, fps)

MONITOR THRUST & ATTITUDE

MONITOR LV TANK PRESS

\*If LV GUID - CMC: \*

\* Fly PITCH = 0° \*

\* YAW =      (+1°) \*

+45°/P,Y
+10°/sec P,Y
+20°/sec R

00:46

PU SHIFT

V16 N62E

KEY RLSE before ECO

05:44

SIVB ECO (1t on) (BEGIN TB7)

\*If no ECO at +2 sec and VI attained\*

\* or EMS = -200 fps (CMC failed): \*

\* THC - CCW & NEUTRAL in 1 sec \*

Key VERB (freeze display)

Record TFC \_\_\_\_\_  
VG \_\_\_\_\_  
VI \_\_\_\_\_  
ΔVC \_\_\_\_\_

05:54 LV ENG 1 lt - out (TB 7 + 10 sec)

F 16 95 KEY RLSE  
TFC (Static), VG, VI (min-sec, fps, fps)

08:26 SIVB MNVR TO ORB RT (HDS DN) (.3°/sec)

DATE 3/7/72  
4/6/72

L  
2-31

MSFN AOS  
(02:43:24)

SCS TVC SERVO PWR #1 - OFF  
PCM BIT RATE - LOW  
EMS MODE - STBY  
EMS FUNC - OFF  
SECS PYRO ARM (2) - SAFE  
FDAI #1 - INRTL  
RHC #2 - LOCKED

PRO  
F 37  
OOE

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

SATURN RATE CHANGE

V25 N1 E  
3310E, 0E, XXXE, YYYYYE

SIVB RATE		SAT RATE +1 address 3311	SAT RATE +2 address 3312
		XXX	YYYYY
.05°/sec	RPY	161	77616
.1	RPY	210	77567
.2	RPY	266	77511
*.3	RPY	344	77433
.3P,Y .5	R	476	77301

\*USE FOR TLI

DATE 3/7/72