



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

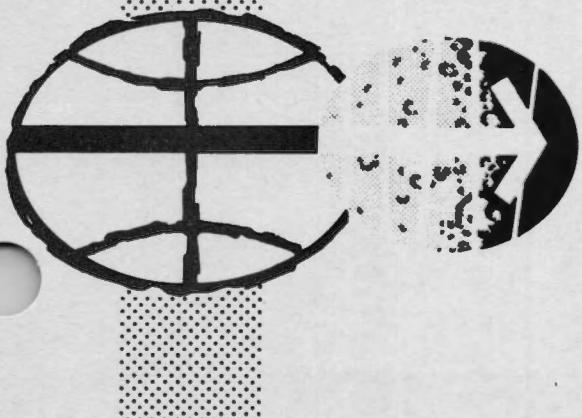
APOLLO 17

DECEMBER 7 LAUNCH

DO NOT DISCARD  
THIS COPY BASELINE  
FOR ALL LAUNCH DATES

CHANGE AA (T+24)  
**CSM LAUNCH  
CHECKLIST**

PREPARED BY  
FLIGHT PROCEDURES BRANCH  
CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER  
HOUSTON, TEXAS

NOVEMBER 22, 1972

APOLLO 17  
CSM LAUNCH CHECKLIST

NOVEMBER 22, 1972

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CSM LAUNCH CHECKLIST

DECEMBER 7 LAUNCH (T+24)

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Change B 11/14/72  
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LIFTOFF CONFIGURATIONPANEL 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  
SCS TVC YAW - AUTO  
SPS GMBL MOT PITCH (2) - OFF  
SPS GMBL MOT YAW (2) - OFF  
ΔV CG - LM/CSM  
ELS LOGIC - OFF (guarded)  
ELS AUTO - MAN  
CM RCS LOGIC - on (up)  
CM PRPLNT DUMP - OFF (guarded)  
CM PRPLNT PURG - off (down) (guarded)  
IMU CAGE - off (down) (guarded)  
EMS ROLL - OFF  
.05G sw - OFF

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BACK



COLOR \_\_\_\_\_

L  
1-2

LIFTOFF CONFIG

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

PANEL 2

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

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1-3

TWR JETT (2) - AUTO (down) (guarded)  
LV GUID - IU  
LV STAGE - off(down)(guarded)  
XLUNAR - INJECT  
MN REL - off(down)(guarded)  
MSN TMR HR, MIN, 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 FANS - OFF  
CRYO PRESS IND - SRG/3  
CRYO QTY IND - 2  
H2 HTRS (2) - AUTO  
O2 HTRS 1&2 - AUTO  
O2 HTR 3 - OFF  
H2 FANS 1&2 - OFF  
H2 FAN 3 - ON  
ECS IND sel - PRIM  
ECS RAD FLOW AUTO CONT - AUTO  
ECS RAD tb - gray  
ECS RAD FLOW PWR CONT - off (center)  
ECS RAD MAN SEL - RAD 1  
ECS RAD PRIM HTR - off (center)  
ECS RAD SEC HTR - OFF  
POT H2O HTR - OFF  
SUIT CKT H2O ACCUM AUTO - 1  
SUIT CKT H2O ACCUM ON - off (center)  
SUIT CKT HT EXCH - off (center)  
SEC COOL LOOP EVAP - off (center)  
SEC COOL LOOP PUMP - off (center)  
H2O QTY IND sw - POT  
GLY EVAP IN TEMP - MAN  
GLY EVAP STM PRESS AUTO - MAN  
GLY EVAP STM PRESS INCR - center  
GLY EVAP H2O FLOW - off (center)  
CAB TEMP - MAN  
CAB AUTO TEMP tw - max decr  
HI GAIN ANT TRACK - AUTO  
HI GAIN ANT BEAM - WIDE  
HI GAIN ANT PITCH POS - 0°

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L  
1-4

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 - gray  
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 - OFF  
FC 2 MN BUS B tb - bp  
FC 3 MN BUS B - center (on,up\*)  
FC 3 MN BUS B tb - gray  
MN BUS B RSET - center (RESET\*)  
DC IND sel - MNA  
BAT CHARGE - OFF  
SPS He vlv (2) - AUTO  
SPS He vlv tb (2) - bp  
SPS LINE HTRS - off (center)  
SPS PRESS IND sw - He  
S BD XPNDR - PRIM  
S BD PWR AMPL PRIM - PRIM  
S BD PWR AMPL HI - HIGH  
PWR AMPL tb - gray

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L  
1-5

S BD MODE VOICE - VOICE  
S BD MODE PCM - PCM  
S BD MODE RNG - RNG  
S BD AUX TAPE - off (center)  
S BD AUX TV - off (center)  
UP TLM DATA - DATA  
UP TLM CMD - NORM  
S BD ANT OMNI - B  
S BD ANT - OMNI  
VHF AM A - (center)  
VHF AM B - DUPLEX  
VHF AM RCV - off (center)  
VHF AM SQLCH tw (2) - noise threshold + 1 div  
VHF BCN - OFF  
VHF RNG - OFF  
S BD SQUELCH - ENABLE  
FC REACS v1v - LATCH  
H2 PURG LINE HTR - OFF  
TAPE RCDR PCM - PCM/ANLG  
TAPE RCDR RCD - RCD  
TAPE RCDR FWD - FWD  
TAPE MOTION tb - gray  
SCE PWR - NORM  
PMP PWR - NORM  
PCM BIT RATE - HI  
AC INV 1 - MNA  
AC INV 2 - MNB  
AC INV 3 - OFF  
INV 1 AC 1 - on (up)  
INV 2 AC 1 - OFF  
INV 3 AC 1 - OFF  
AC 1 RSET - center (RSET\*)  
INV 1 AC 2 - OFF  
INV 2 AC 2 - on (up)  
INV 3 AC 2 - OFF  
AC BUS 2 RSET - center (RSET\*)  
AC IND sel - BUS 20C

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PANEL 4

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



L  
1-6

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 (2) - on (up)  
BAT CHGR - AC1  
NONESS BUS - MNA  
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 ECS XDUCR PRESS GRP 2 MNA - open  
    cb WASTE H2O/UR DUMP HTR (2) - open

PANEL 6

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

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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)



L  
1-7

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 H2O on SUIT/CAB ΔP ind)  
(O2 flow - 0.6-0.8 lb/hr)

PANEL 8

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

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PANEL 9

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

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
1-8

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 - 90  
LTG - OFF  
MODE - HOLD/FAST  
SLEW - off (center)

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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



L  
1-9

PANEL 100

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

PANEL 101

SYS TEST (LH) - 5  
SYS TEST (RH) - B  
CM RCS HTRS - OFF  
WASTE H2O DUMP - HTR A  
UR 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

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PANEL 181

cb Panel 181 - all closed except:  
cb LOGIC PWR (2) - open  
CRYO 3 AC PWR - on (up)  
SM/AC PWR - on (up)  
DOOR JETT - off (down) (guarded)  
LOGIC PWR (2) - OFF (ctr)

PANEL 201

AC UTIL PWR - OFF

L  
1-10

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 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 O2 VAC ION PUMPS (2) - open

PANEL 230

MAP CAMR ON - STBY  
MAP CAMR ON tb - gray  
MAP CAMR TRACK - OFF  
MAP CAMR TRACK tb - gray  
LUNAR SOUNDER OPR - STBY  
LUNAR SOUNDER OPR tb - gray  
LUNAR SOUNDER HF ANT 1 - ctr  
LUNAR SOUNDER HF ANT 1 tb - gray  
LUNAR SOUNDER HF ANT 2 - ctr  
LUNAR SOUNDER HF ANT 2 tb - gray  
LUNAR SOUNDER HF ANT JETT - off (down)  
LUNAR SOUNDER HF ANT JETT tb - gray  
MAP CAMR IMAGE MTN - OFF  
LASER ALTM - OFF  
LUNAR SOUNDER RCDR - off (ctr)  
LUNAR SOUNDER RADAR - OFF  
LUNAR SOUNDER MODE - HF  
DATA SYS ON - OFF  
DATA SYS CAL - off (down)  
IR - OFF

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PAN CAMR SELF TEST - off (ctr)  
PAN CAMR STEREO - STEREO  
PAN CAMR MODE - STBY  
PAN CAMR OPR tb - gray  
PAN CAMR PWR - BOOST  
PAN CAMR V/h OVRD - off (ctr)  
UV SPECT - OFF

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 v1v - OFF

PANEL 252

BAT VENT v1v - VENT  
WASTE STOWAGE VENT v1v - 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 277

cb Panel 277 - all open  
SPS PRESS FUEL IND - 1  
SPS PRESS OXID IND - 1

PANEL 278

cb Panel 278 - all closed except:  
cb UPRT SYS COMPR (2) - open  
MAP CAMR/LASER EXP COVERS - ctr  
MAP CMR/LASER EXP COVERS tb - gray  
IR EXP COVER - ctr  
IR EXP COVER tb - gray  
UV EXP COVER - ctr  
UV EXP COVER tb - gray  
SM PWR SOURCE - FC2 (guarded)  
■ 02 TK 3 ISOL vlv - (ctr)(OPEN\*)  
02 TK 3 ISOL vlv tb - gray

PANEL 300

RH SUIT FLOW vlv - FULL FLOW

PANEL 301

LH 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

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L  
1-13

PANEL 306

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

PANEL 325

CAB PRESS RELF v1v (RH) - BOOST/ENTRY  
CAB PRESS RELF v1v (LH) - BOOST/ENTRY  
PRIM GLY TO RAD v1v - BYPASS (pull)

PANEL 326

REPRESS PKG v1v - ON  
SM O2 SUPPLY v1v - ON  
SURGE TK O2 v1v - ON  
GLY RSVR IN v1v - OPEN  
GLY RSVR BYPASS v1v - CLOSE  
GLY RSVR OUT v1v - OPEN

PANEL 350

CO2 CSTR DIVERT v1v - both (center)

PANEL 351

MAIN REG v1v (2) - OPEN  
H2O/GLY TK PRESS REG v1v - BOTH  
H2O/GLY TK PRESS RELF v1v - BOTH  
EMER CAB PRESS v1v - OFF  
CAB REPRESS v1v - OFF (CCW)

DATE 9/4/72

DATE

L  
1-14

PANEL 352

WASTE TK SERVICING vlv - CLOSE  
PRESS RELF vlv - RELF  
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)

DATE

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)

DATE 9/4/72

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)



L  
1-15

PANEL 600

EMER 02 v1v - CLOSE

PANEL 601

REPRESS 02 v1v - CLOSE

PANEL 602

REPRESS 02 RELF v1v - OPEN (CW)

PANEL 603

EVA STA 02 SUP - OFF

PANEL 604

SUIT PRESS ALARM - OFF

FWD HATCH

PRESS EQUAL v1v - CLOSE

ACTR HNDL sel - stow/check locked

SIDE HATCH

CAB PRESS DUMP v1v - 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

9/4/72

DATE

DATE

\* - last momentary position before liftoff.

L  
2-1

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

DATE 9/4/72

BOOST PREPARATION

BACK



COLOR \_\_\_\_\_

L  
2-2

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 v1v - 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  
FDI 2 Total att - no motion  
GDC ALIGN pb - release

DATE 9/4/72

L  
2-3
**SATURN BOOST 9/4/72**  
 DEC 6 LAUNCH

DET	$\Theta$	VI	H	H
00:00	90	1341	0	.0
:30	85	1397	286	.6
1	68	1867	786	3.2
1:30	50	3001	1454	8.7
2	35	5000	2160	17.6
a	2:19	29	6804	2688
	2:30	26	7782	2894
b	2:41	23	8966	3130
	3	23	9133	2758
	3:30	24	9664	2274
	4	22	10295	1853
	4:30	20	11024	1464
	5	18	11850	1109
	5:30	15	12776	793
	6	13	13811	518
	6:30	10	14965	290
	7	7	16257	117
	7:30	4	17708	10
	8	6	19127	-29
	8:30	1	20434	-10
	9	358	21795	38
c	9:20	355	22777	112
	9:30	355	22861	67
	10	350	23395	-5
	10:30	347	23957	-50
	11	344	24546	-64
	11:30	341	25163	-44
d	11:51	341	25599	-6

DATE 9/4/72

LAUNCH TRAJECTORY

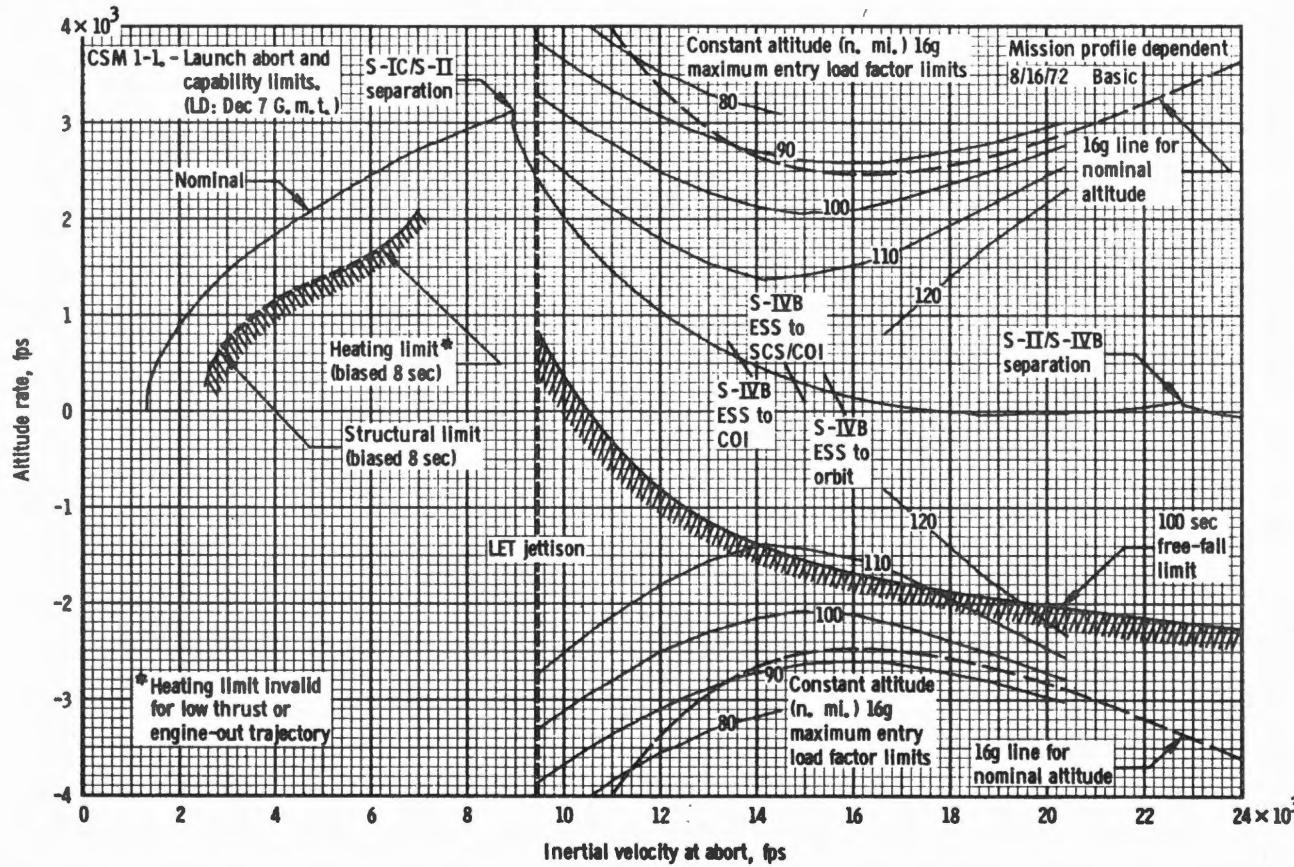
<sup>a</sup>Timebase 2 (S-IC center-engine +.01 sec)<sup>b</sup>Timebase 3 (S-IC outboard-engine cutoff +.01 sec)<sup>c</sup>Timebase 4 (S-II engine cutoff +.01 sec)<sup>d</sup>Timebase 5 (S-IVB guidance cutoff signal +.21 sec)

BACK

COLOR

L  
2-4

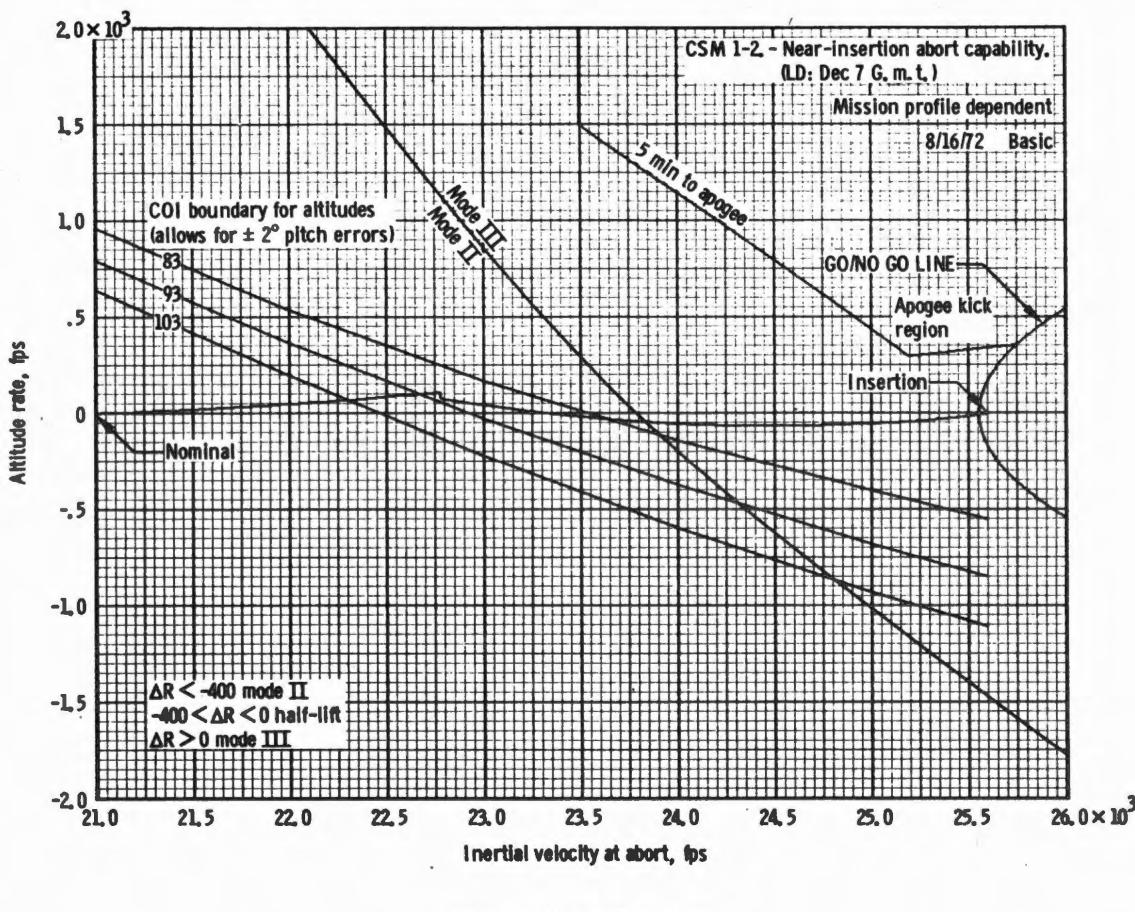
## LAUNCH ABORT LIMITS



Launch abort and capability limits.

DATE 9/4/72

DATE 9/4/72



NEAR INSERTION  
ABORT LIMITS

BACK



COLOR \_\_\_\_\_

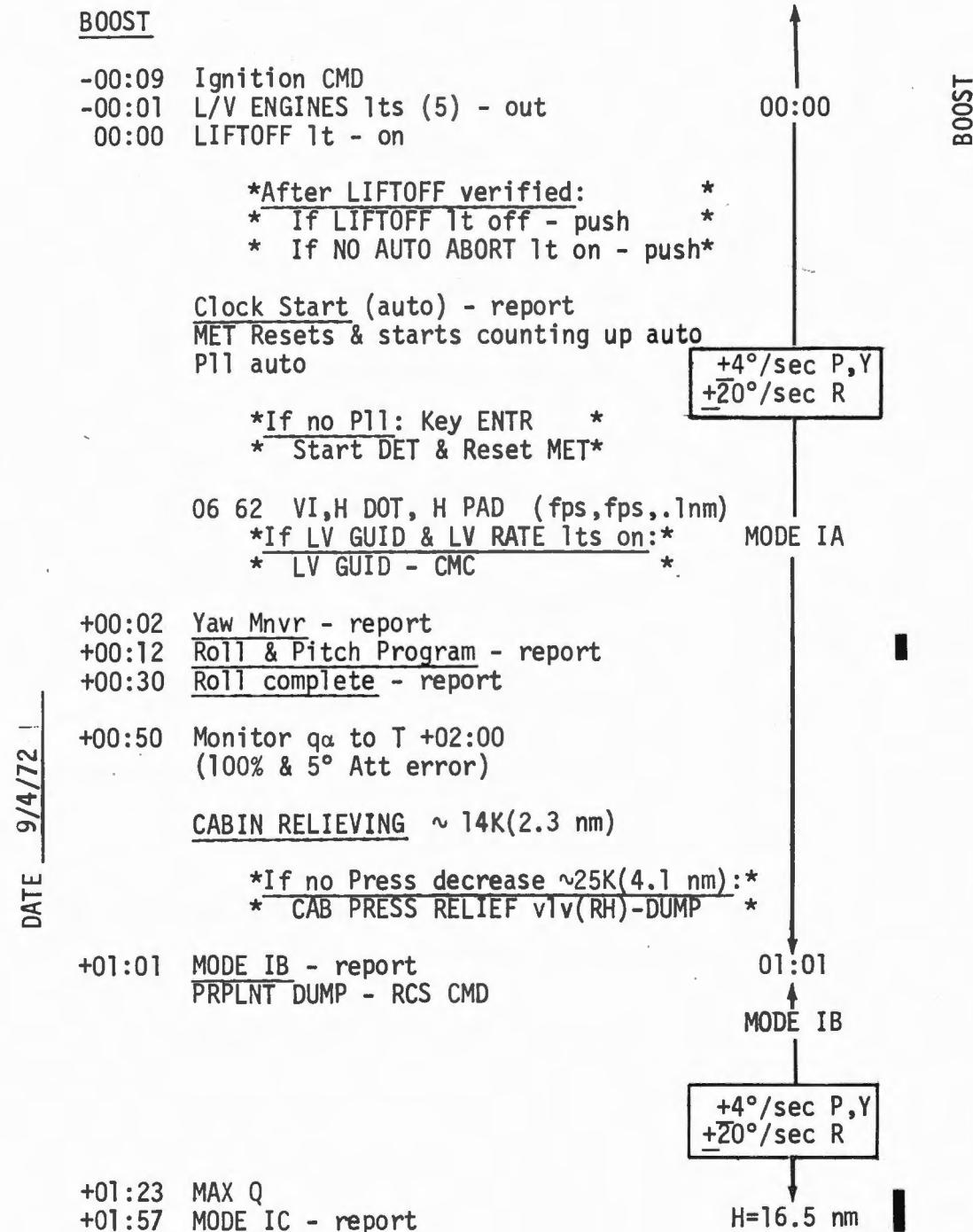
L  
2-6CSM 1-4.- Recommended manual EOI  
shutdown velocities.Mission independent  
4/15/71 Final

SHUTDOWN ALTITUDE, h (N. MI.)	INERTIAL VELOCITY, $V_i$ (fps)	ha/hp (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 9/4/72ALTITUDE vs  $V_i$ 

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.

L  
2-7



BACK



COLOR \_\_\_\_\_

L  
2-8

BOOST

- +02:00 EDS AUTO - OFF  
2 ENG OUT - OFF  
LV RATES - OFF  
LV RATE 1t disabled as IU failure cue  
V82E, N62E  
GO/NO GO FOR STAGING - report
- +02:19 INBOARD CUTOFF - (1t 5 on)  
LIFTOFF 1t - out
- +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
- +03:19 TWR JETT (2) - on (up) (TFF>1+20)  
\*NO TWR JETT, pg L/4-2 \*
- \*For MAN BOOSTER CONTROL:  
\* LV GUID - CMC \*  
\* Key V46E \*
- $\alpha/P_c$  sw -  $P_c$   
MAN ATT PITCH - RATE CMD  
Twr Jett & MODE II - Report  
GLY EVAP STEAM PRESS - AUTO  
GLY EVAP H2O FLOW - AUTO
- +03:22 Guidance Initiate - report (OECO +41sec)  
cb ELS/CM-SM SEP (2) - open
- +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 =  $-0.58^\circ$   
YAW =  $+1.90^\circ$

+9°/sec P,Y  
-20°/sec R

MODE IC

TWR JETT

MODE II

DATE 9/4/72

+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  
 +08:11 PU SHIFT  
 +08:30 GO/NO GO FOR STAGING - report  
 +08:36 Level sense arm \_\_\_\_\_  
 +09:17 Mode IV - Report  
     (VI ~ 22,685, H DOT ~ +104,  
     H ~ +94)  
 Report Status  
 +09:20 OECO (1ts on)  
 +09:21 SII Staging - 1ts out  
 +09:22 SIVB Ign Cmd - 1t on  
 +09:24 SIVB 65% - 1t out  
  
 +10:00 GO/NO GO FOR ORBIT - report  
     ~10:24  
     MODE III      MODE IV  
     ↓              ↓  
 +11:00 Report Status  
 +11:51 SECO (1t on) - report \_\_\_\_\_  
     (Begin TB5)  
  
     \*If LV G UID - CMC: \*  
     \* LV STAGE sw - SII/SIVB \*  
     \* SECO (1t on, begin TB5)\*  
  
     \*If no SECO (VI +100 fps): \*  
     \* THC-CCW & neutral in 1 sec \*  
  
 +12:01 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		

V37E 00E

When CMC ACTY lt out:

V66E

V45E

Verify DAP load, V48: R1 = 31102, R2 = 01111

V46E CSM WT \_\_\_\_\_

V83E (check e) P TRIM \_\_\_\_\_

PRO Y TRIM \_\_\_\_\_

US LOS

(00:15:44)

SM RCS Control of SIVB (APS module failed)

LV GUID - CMC

MAN ATT (ROLL) - MIN IMP

cb SECS ARM (2) - close

AUTO RCS SEL P&Y - OFF

AUTO RCS SEL A/C ROLL - MNB

AUTO RCS SEL B/D ROLL - MNA

RCS CMD - ON

BSE command BURN MODE ON

If successful: LV GUID - IU

Control PITCH & YAW with THC, ROLL with  
RHC

Allow SIVB to drift in PITCH (Gravity  
Gradient)

Control YAW within platform limits

Perform normal procedures except:

TB6-15min: Mnvr to R2 Align Att &  
set up ORDEAL Pitch = 0°

Hold R2 Align Att until Ignition

Null Ullage deviations with SM RCS

After TLI IGNITION: RCS CMD - OFF

AUTO RCS SEL (16) - MNA/MNB

MAN ATT (3) - RATE CMD

After TLI CUTOFF: LV GUID - CMC

MAN ATT (3) - ACCEL CMD

RCS CMD - ON

DATE 10/11/72



L/2-10A

## P30 MANEUVER EMERGENCY

DATE 9/4/72

DATE

COMMENTS	CM / RCS	PURPOSE
① EMS AV WILL COUNT FROM 100 TO 128.6 *	RCS/MAN	PROP/GUID
+ 6 7 0 1 8		WT N47
0 0 .NA		P TRIM N48
0 0 .NA		Y TRIM
+ 0 0 0 0 0		HRS GETI
+ 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		$\Delta V_z$
X X X 1 8 0		R
X X X 2 8 5		P
X X X 0 0 0		Y
+ NA.		$H_A$ N44
+ 0 0 5 0 .0		$H_p$
+ 0 0 9 0 .0		$\Delta V_t$
X X X 2 0 0		BT
X 0 0 0 0 0		$\Delta V_c$ *
X X X X NA		SXTS
+ NA. 0		SFT
+ NA. 0 0		TRN
X X X NA		BSS
X X NA.		SPA
X X X NA.		SXP
- 0 0 1 .3 1		LAT N61
- 1 5 9 .4 2		LONG
+ NA.		RTGO EMS
+ 2 5 6 9 7		VIO
≈ 0 0 1 : 1 2 : 4 4		GET 0.05G

L  
2-10B

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 v1v - OFF  
TVC SERVO PWR (2) - OFF  
DIRECT O2 v1v - 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
- DATE 9/4/72
- 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

INSERTION &amp; SYS CK

- 1 GMBL MTRS (4) - OFF (LMP confirm)  
 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 (verify)  
 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 v1v (2) - NORMAL/LATCHED  
 REPRESS PKG v1v - OFF  
 cb ECS XDUCR PRESS GRP 2 MNA - close  
 INSTALL COAS

## MONITOR LV TANK PRESS

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

DATE 10/11/72CYI AOS  
(00:16:44)

NOTE: Steps 2 thru 22 are not sequential

- 2 SM RCS HTRS (4) - PRIM  
 C/W - NORMAL  
 BPC JETT KNOB - 180° from BPC JETT  
 GN2 v1v HNDL - VENT (pull)  
 HATCH GEAR BOX - LATCH (verify)  
 ACTR HNDL SELECTOR - neutral
- 3 cb WASTE H2O/URINE DUMP HTRS (2) - close  
 FC REACS v1v - NORM  
 H2 PURGE LINE HTR - ON

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

5 SM RCS MONITORING CHECK

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

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

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 - ~ 0.7 lb/hr

If 4.7 < cabin press < 5.3:

O2 flow - 0.6 lb/hr to pegged hi

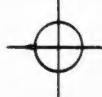
EMERG CABIN PRESS vlv - BOTH

SUIT CKT RET vlv - open (pull)

Remove helmet & gloves & stow in PGA bag

Unstow & mount TSB's (U1)

DATE 10/11/72

L  
2-1310 MAIN REG CHECK

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

11 SEC RAD LEAK CHECK

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

+20:00 12

ECS POST INSERTION CONFIGURATION

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 \*  
 DATE 9/4/72

ECS RAD tb - gray  
 GLY EVAP TEMP IN - AUTO  
 POT H2O HTR - MNA

DATE

13 PCM BIT RATE - LOW

CYI LOS (00:23:27) { UP TLM - CMD RSET, then NORM  
 { VHF AM A - SIMPLEX  
 { VHF AM B - off (ctr)



L  
2-14

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)

DATE 9/4/72

DATE

A-C VOLTS - 113 to 117 all phases

SUNRISE  
(00:31:36)

- DATE 9/4/72
- 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 PRESS IND sw (both) - 2  
FUEL & OXID PRESS ind - 170 to 195 psia  
SPS PRESS IND sw (both) - 1  
SPS ENG INJ VLVS (4) - CLOSE  
Check SPS OXID, FUEL QTY & UNBAL  
OXID FLOW VLV PRIM - PRIM  
SPS He VLV (1&2) - AUTO, tb - bp
- 18 GDC ALIGN ( : : )
- 19 UNSTOW SEQ CAMERA BRACKET & ORDEAL
- 20 MOUNT ORDEAL BOX & INITIALIZE

L  
2-16

21 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 - EVAP  
After 5 min:  
SEC EVAP TEMP OUT - 38-50.5°F  
SEC COOL LOOP EVAP - RSET 1 min,  
off (ctr)  
SEC COOL LOOP PUMP - off (ctr)  
ECS IND sw - PRIM

22 UNSTOW CAMERAS

DAC (T8,1/250,10) 12 fps, MAG AA (B3)  
Power cable (B3)  
18mm lens (B3)  
Rt. angle mirror (B3)  
(Assemble & mount in L.H. rendezvous  
window)

EL (f8,1/250,focus) 10fr, MAG NN (B3)  
Spotmeter  
(Stow in LMP TSB)

TV (ALC - PEAK, f44) (A1)  
Power cable (A1)  
Bracket (A1)  
Monitor & cable (A1)  
(Assemble, connect cables & hand to  
LMP)

23 OPTICS DUST COVER JETT

Install Optics eyepieces  
G/N PWR OPTICS - on (up)  
OPT ZERO - OFF, then ZERO (15 sec)  
OPT ZERO - OFF  
OPT MODE - MAN  
OPT COUPLING CONT - DIRECT  
OPT SPEED CONT - HI  
OHC - MAX RIGHT (Obs eject thru SCT)  
(SXT 40°, SCT 150° shaft angle)

DATE 10/11/72

24      IMU REFSMMAT REALIGN CHECK (P52)  
P52 - (PAD REFSMMAT)

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

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

N93:

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

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

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

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

If IMU is realigned,

Realign GDC (CDR)

OOE

RETICLE BRIGHTNESS - DIM

- CRO AOS 25 Increase S-BD volume  
(00:52:21) Two way S-BD VOICE Check  
CRO LOS Report GYRO torquing angles  
(00:57:44)  
HSK AOS  
(00:59:37)

26      SCS ATT REF COMP CHECK

V16 N20E

FDAC SELECT - 1

FDAC SOURCE - ATT SET

ATT SET - GDC

ATT SET dials - null FDAO 1 err needles

Key VERB when nulled (freeze display)

Record from DSKY:

R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_

Record from ATT SET dials:

R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_

FDAO SEL - 1/2

DATE 10/11/72

- 27 EXTEND DOCKING PROBE  
cb DOCK PROBE (2) - close (verify)  
DOCK PROBE EXTD/REL - EXTD/REL until  
full probe extension  
(DOCK PROBE tb - gray at full extension)
- | EXT      | RET  |
|----------|------|
| FULL EXT | Gray |
| FULL RET | BP   |
| PART EXT | BP   |
|          | Gray |
- DOCK PROBE EXTD/REL - RETRACT (tb-gray)

28 COPY TLI ABORT & P37 PADS

US LOS 29 P52 - IMU REALIGN (OPTION 3)  
(01:48:42) Stow Optics Eyepieces

CYI AOS  
(01:49:57)

CYI LOS VERIFY DSE TAPE MOTION  
(01:54:44) (LBR/RCD/FWD/CMD RESET)

SUNRISE  
(01:59:23)

CRO AOS  
(02:25:02)

CRO LOS  
(02:30:53)

SUNSET  
(02:49:34)

HAW AOS 30 SV UPDATES, COPY TLI PAD  
(02:50:15)

- 31 LOGIC SEQUENCE CK  
cb SECS ARM (2) - close  
Cue STDN  
HAW LOS SECS LOGIC (2) - on(up)  
(02:55:43) STDN confirm GO for PYRO ARM

DATE 10/11/72

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
2-19

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	BT
			•			ΔVC
+			+			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	YAW

DATE 9/4/72

DATE

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
2-20

P27 UPDATE

PURP	V		V		V	
GET	:	:	:	:	:	:
304 01	INDEX		INDEX		INDEX	
305 02						
306 03						
307 04						
310 05						
311 06						
312 07						
313 10						
314 11						
315 12						
316 13						
317 14						
320 15						
321 16						
322 17						
323 20						
324 21						
325 22						
326 23						
327 24						
N34	HRS	X	X	X		X
	MIN	X	X	X	X	X
NAV CHECK	SEC	X	X		X	
N43	LAT		0		0	
	LONG					
	ALT	+ 0			+ 0	

DATE

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## P30 MANEUVER

L/2-21

SET STARS

R ALIGN \_\_\_\_\_  
 P ALIGN \_\_\_\_\_  
 Y ALIGN \_\_\_\_\_

ULLAGE \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

HORIZON/WINDOW \_\_\_\_\_  
 \_\_\_\_\_

P37 FOR L/0+9

					PURPOSE
					PROP/GUID
+			WT	N47	
	0	0	P TRIM	N48	
	0	0	Y TRIM		
+	0	0	HRS	GETI	
+	0	0	MIN	N33	
+	0		SEC		
			$\Delta V_X$	N81	
			$\Delta V_Y$		
			$\Delta V_Z$		
X	X	X	R		
X	X	X	P		
X	X	X	Y		
+			$H_A$	N44	
			$H_P$		
+			$\Delta VT$		
X	X	X	BT		
X			$\Delta VC$		
X	X	X	SXTS		
+			SFT		
+		0	TRN		
X	X	X	BSS		
X	X		SPA		
X	X	X	SXP		
GETI		0	LAT	N61	
$\Delta VT$			LONG		
LONG	+		RTGO	EMS	
GET 400K	+		VIO		
			GET	0.05G	

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## P30 MANEUVER

## SET STARS

R ALIGN \_\_\_\_\_  
 P ALIGN \_\_\_\_\_  
 Y ALIGN \_\_\_\_\_

ULLAGE \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

HORIZON/WINDOW \_\_\_\_\_  
 \_\_\_\_\_

P37 FOR L/0+9

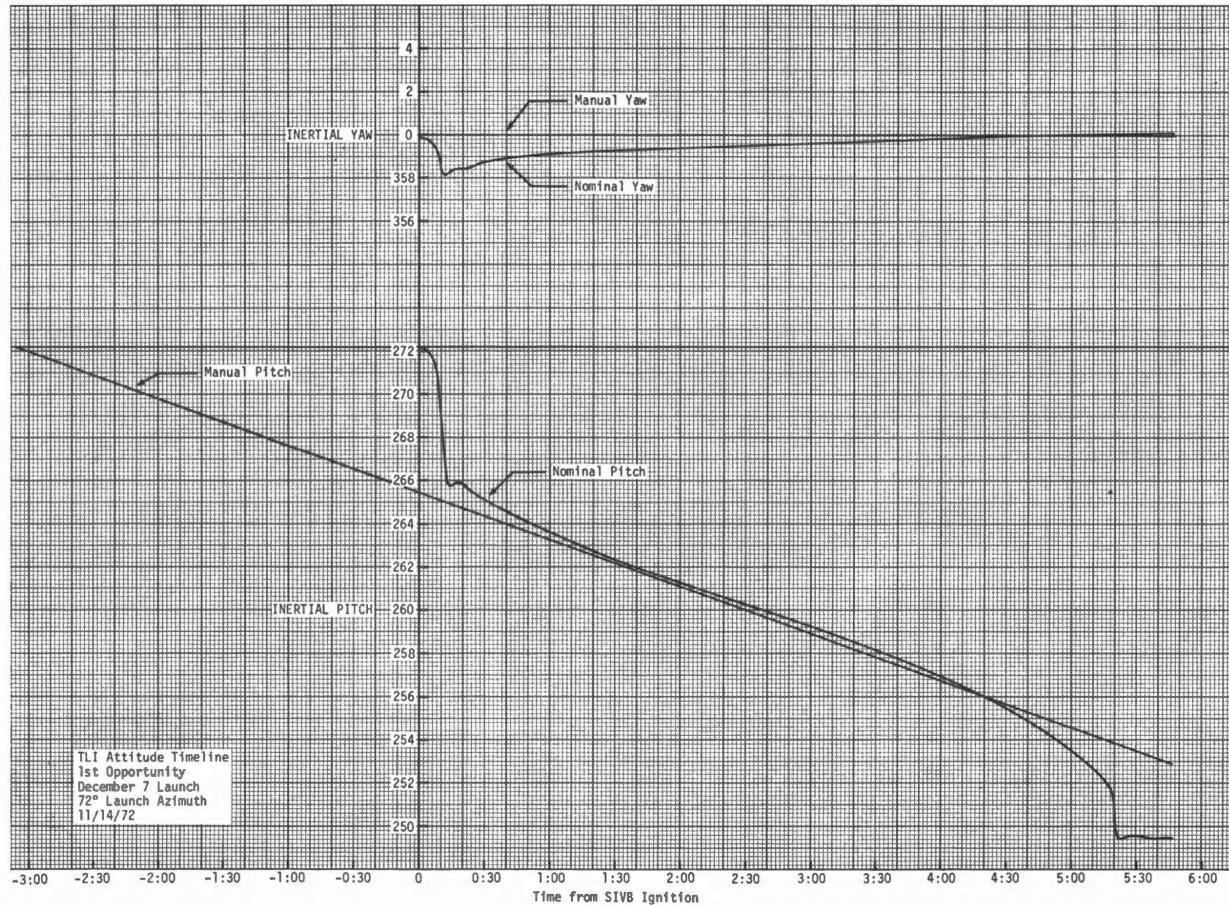
		PURPOSE	
		PROP/GUID	
+		WT	N47
0	0	P TRIM	N48
0	0	Y TRIM	
+	0	0	HRS GETI
+	0	0	MIN N33
+	0		SEC
ULLAGE		$\Delta V_X$	N81
		$\Delta V_Y$	
		$\Delta V_Z$	
X	X	X	R
X	X	X	P
X	X	X	Y
+			H <sub>A</sub> N44
			H <sub>P</sub>
+			$\Delta V_T$
X	X	X	BT
X			$\Delta V_C$
X	X	X	SXTS
+		0	SFT
+		0	TRN
X	X	X	BSS
X	X		SPA
X	X	X	SXP
GETI		0	LAT N61
$\Delta V_T$			LONG
X			RTGO EMS
X		+	VIO
GET 400K		+	GET 0.05G

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•	•	•	•
•	•	•	•
•	•	•	•
•	•	•	•

GETI  
 $\Delta V_T$   
 LONG  
 GET 400K

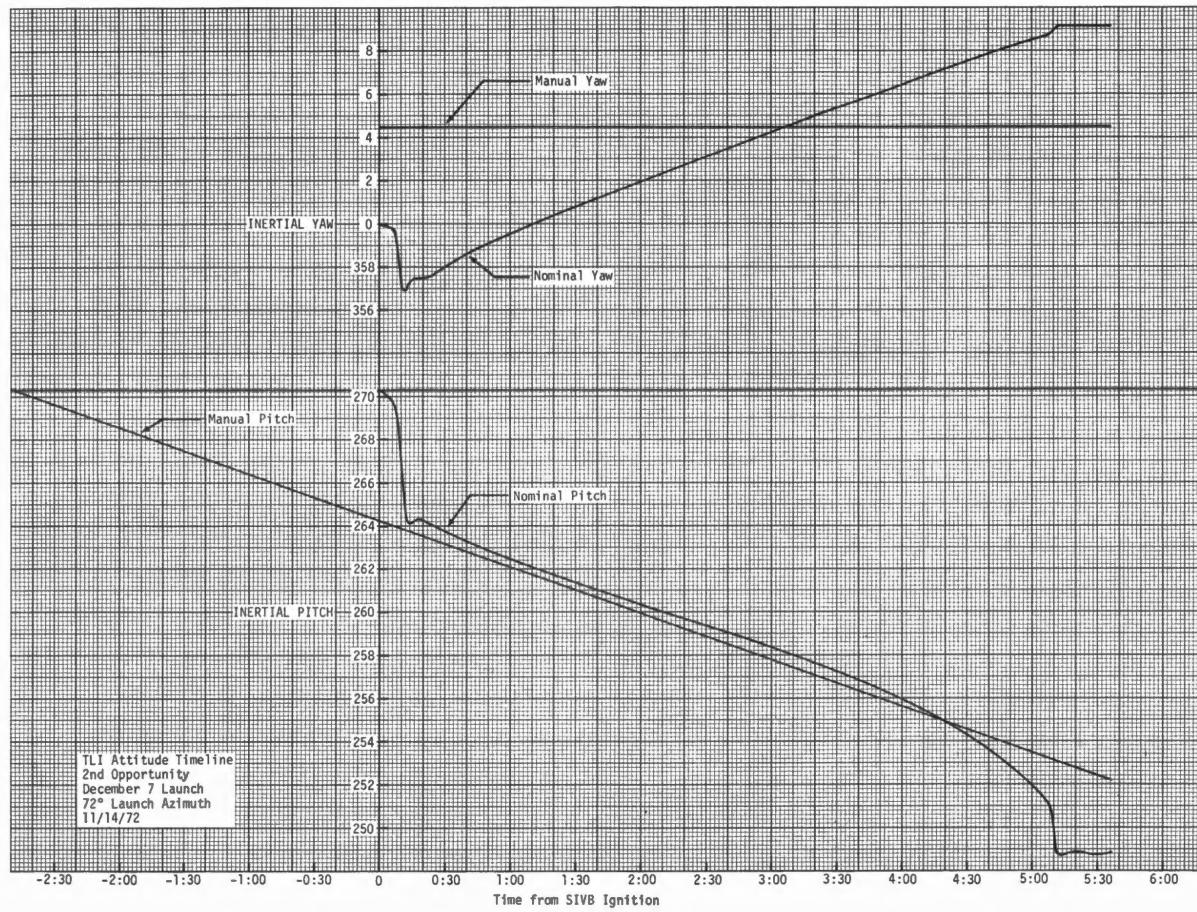
DATE 11/22/72



2-23 L

TLI ATT TIMELINE  
OPP 1

TL1 ATT TIMELINE  
OPP 2



2-24 L

COLOR

DATE 11/22/72

### NOMINAL SIVB TLI 1

DEC 7 LAUNCH

11/22/72

DET	$\theta$	$\Psi$	VI	$\dot{H}$	H
0:00	272	359.9	25605	-4	97
:30	265	358.7	26156	-15	97
1	264	359.1	26765	5	97
1:30	262	359.3	27401	77	97
2	261	359.4	28159	209	98
2:30	260	359.5	28964	418	99
3	259	359.6	29813	713	102
3:30	258	359.7	30710	1102	106
4	257	359.8	31661	1593	113
4:30	255	359.9	32674	2196	122
5	253	0.0	33759	2914	135
5:30	250	0.1	34933	3734	151
5:47	249	0.1	35648	4255	163

### MANUAL SIVB TLI 1

DEC 7 LAUNCH

11/22/72

DET	$\theta$	$\Psi$	VI	$\dot{H}$	H
0:00	265.5	0	25605	-4	97
:30	264.4	0	26156	-15	97
1	263.3	0	26765	5	97
1:30	262.2	0	27401	77	97
2	261.1	0	28159	209	98
2:30	260.0	0	28964	418	99
3	258.9	0	29813	713	102
3:30	257.8	0	30710	1102	106
4	256.7	0	31661	1593	113
4:30	255.6	0	32674	2196	122
5	254.6	0	33759	2914	135
5:30	253.5	0	34933	3734	151
5:47	252.2	0	35648	4255	163

2-25

TL1 TRAJECTORY  
OPP 1 NOM & MAN

TL1 TRAJECTORY  
OPP 2 NOM & MAN

## NOMINAL SIVB TLI 2

DEC 7 LAUNCH

11/22/72

DET	$\theta$	$\Psi$	VI	$\dot{H}$	H
0:00	270	359.9	25600	-5	98
:30	264	358.0	26225	-15	98
1	262	359.5	26931	15	98
1:30	261	0.8	27674	110	99
2	260	2.0	28455	278	100
2:30	259	3.1	29276	529	102
3	258	4.3	30141	869	105
3:30	257	5.4	31055	1308	110
4	256	6.4	32026	1855	118
4:30	254	7.5	33060	2514	129
5	252	8.5	34167	3290	143
5:30	249	9.1	35365	4160	161
5:36	249	9.1	35629	4361	166

## MANUAL SIVB TLI 2

DEC 7 LAUNCH

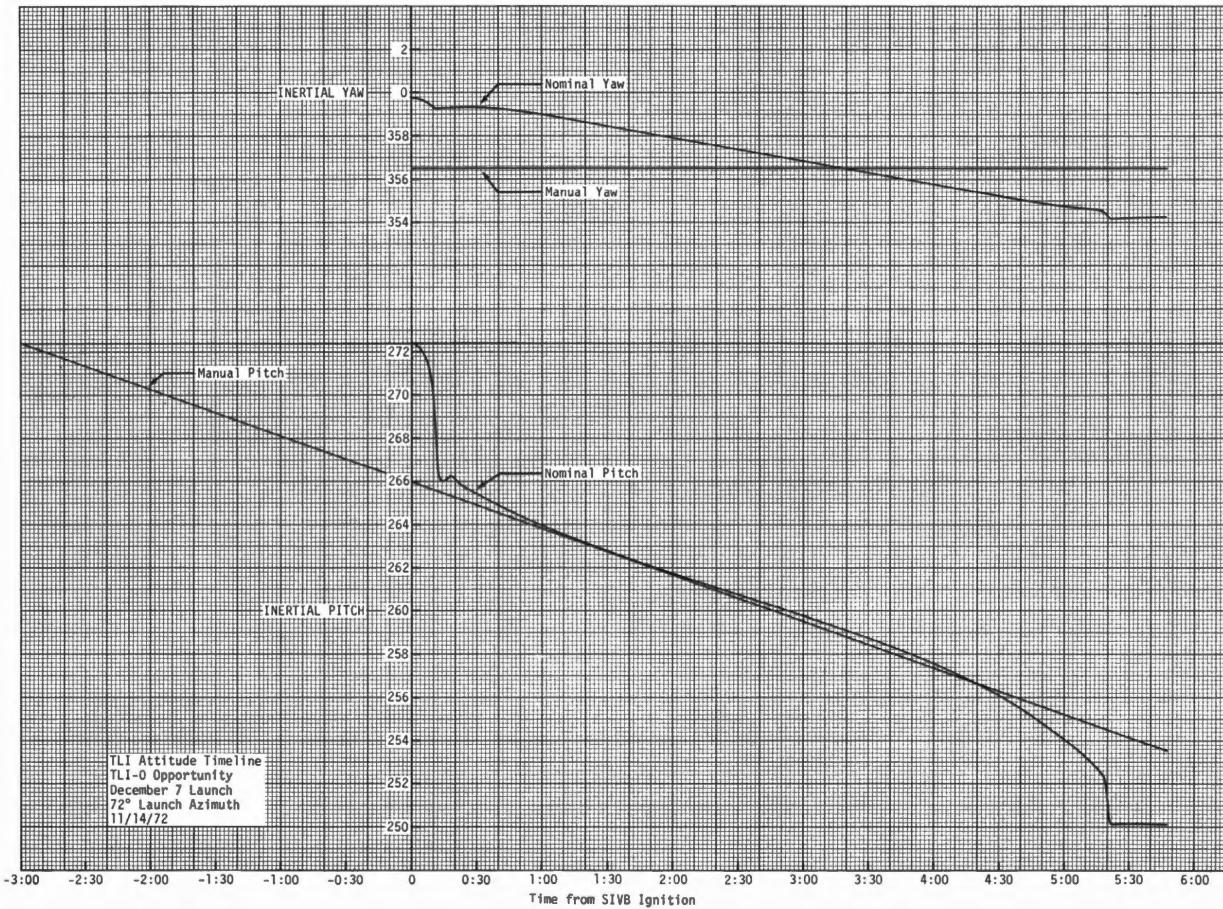
11/22/72

DET	$\theta$	$\Psi$	VI	$\dot{H}$	H
0:00	264.2	4.5	25600	-5	98
:30	263.2	4.5	26225	-15	98
1	262.1	4.5	26931	15	98
1:30	261.0	4.5	27674	110	99
2	259.9	4.5	28455	278	100
2:30	258.8	4.5	29276	529	102
3	257.8	4.5	30141	869	105
3:30	256.7	4.5	31055	1308	110
4	255.6	4.5	32026	1855	118
4:30	254.5	4.5	33060	2514	129
5	253.4	4.5	34167	3290	143
5:30	252.4	4.5	35365	4160	161
5:36	252.2	4.5	35629	4361	166

L  
2-26

DATE 11/22/72

DATE 11/22/72



2-26A

TL1 ATT TIMELINE  
OPP 0

TL1 TRAJECTORY  
OPP O NOM & MAN

**NOMINAL SIVB TLI 0**

DEC 7 LAUNCH(T+24) 11/22/72

<b>DET</b>	$\theta$	$\Psi$	<b>VI</b>	$\dot{H}$	<b>H</b>
0:00	272	359.7	25610	-3	95
:30	266	359.3	26161	-13	95
1	264	359.0	26768	8	95
1:30	263	358.5	27402	82	95
2	262	357.9	28160	216	96
2:30	261	357.4	28965	429	98
3	260	356.8	29813	727	100
3:30	259	356.3	30709	1121	105
4	258	355.7	31658	1617	112
4:30	256	355.2	32668	2225	121
5	254	354.7	33748	2948	134
5:30	250	354.2	34917	3774	150
5:47	250	354.2	35642	4307	162

**MANUAL SIVB TLI 0**

DEC 7 LAUNCH(T+24) 11/22/72

<b>DET</b>	$\theta$	$\Psi$	<b>VI</b>	$\dot{H}$	<b>H</b>
0:00	266.0	356.5	25610	-3	95
:30	264.9	356.5	26161	-13	95
1	263.8	356.5	26768	8	95
1:30	262.8	356.5	27402	82	95
2	261.7	356.5	28160	216	96
2:30	260.6	356.5	28965	429	98
3	259.5	356.5	29813	727	100
3:30	258.4	356.5	30709	1121	105
4	257.4	356.5	31658	1617	112
4:30	256.3	356.5	32668	2225	121
5	255.2	356.5	33748	2948	134
5:30	254.1	356.5	34917	3774	150
5:47	253.6	356.5	35642	4307	162

L  
2-26B

DATE 11/22/72

NASA — MSC

L  
2-27

TLI PREPARATION

US AOS  
(02:59:24)

XLUNAR - INJECT (verify)  
EDS PWR - on (up) (verify)  
Perform EMS ΔV TEST & NULL  
BIAS CHECK, pg G/2-5  
Set ΔVC  
EMS FUNC - ΔV  
GDC ALIGN  
V48E, 31102, 01111  
Key V83E  
Set ORDEAL - 90/EARTH  
SECS PYRO ARM (2) - ARM  
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 Load GET of TB6 PRO	(hrs,min,.01sec)
F 06 14	VC/O Load VC/O PRO	(fps)
06 95	TFI, VG, VI	(min-sec,fps,fps)

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TLI PREPARATION

TLI, NOMINAL & MANUAL

LV G UID - IU (verify)  
\*If LV G UID lt - on: \*  
\* LV G UID - CMC \*  
\* RHC PWR DIRECT (2) - OFF\*

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

SII SEP lt - out  
51:00 Start DET counting up  
(-09:00) \*If LV G UID - CMC: \*  
\* V16 N2OE \*  
\* MNVR to R2 Align = \_\_\_\_\_(278°)\*

MONITOR LV TANK PRESS SEQUENCE

Nominal LOX ~ 40 psia

Nominal LH2 ~ 31 psia

\*If ΔP > 36 psid (OXID > FUEL) or \*  
\*If ΔP > 26 psid (FUEL > OXID) or \*  
\*If LOX TK PRESS > 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 FDAO #1 to PITCH = 17°  
(-04:00) \*If LV G UID - CMC: \*  
\* Slew FDAO #1 to PITCH = 0° \*  
\* V16 N2OE \*  
\* Insure R2 Align = \_\_\_\_\_(278°)\*

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L  
2-29

57:10 : Insure FDAO #1 PITCH = 12°  
ORDEAL MODE - OPERATE/SLOW, IU or CMC  
(-02:50)

\*If LV GUD - CMC:  
\* MNVR to R2 Ign = \_\_\_\_\_ (271.5°)\*

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

58:36  
(-01:24)

SII SEP 1t - on  
\*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  
US LOS  
(03:20:58)  
59:42

SIVB ULLAGE Begins  
OMNI ANT - C  
SII SEP 1t - out (TIG - 18 sec)

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DATE

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	+45°/P,Y
MONITOR LV TANK PRESS	+10°/sec P,Y
*If LV GUID - CMC:	* +20°/sec R
* Fly PITCH = 0°	*
* YAW = _____(0°)	*

01:32 PU SHIFT  
 ACN AOS V16 N62E OMNI ANT - D  
 (03:26:31) KEY RLSE before ECO  
 05:46 SIVB ECO (1t on) (BEGIN TB7)

\*If no ECO at TFC = 0 + 1 sec \*  
 \* or updated BT + 1 sec \*  
 \* or EMS = -150 fps (CMC failed): \*  
 \* THC - CCW & NEUTRAL in 1 sec \*

Key VERB (freeze display)

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

05:56 LV ENG 1 lt - out (TB 7 + 10 sec)

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

08:17 SIVB MNVR TO ORB RT (HDS DN) (.3°/sec)

DATE

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(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
2-31

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

ACN LOS  
(03:46:27)

PRO

F 37

OOE

STDN AOS  
(03:49:01)

When CMC ACTY lt out,  
Key V66E  
CMP to LH couch  
CDR to CTR couch  
WASTE STOWAGE VENT vlv - CLOSE  
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

DATE 9/4/72

#### SATURN RATE CHANGE

V25 N1 E  
3310E, OE, 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

L  
3-1NORMAL SC/BOOSTER SEPARATIONS1 PRE CSM SEPARATION

DIRECT 02 v1v - OPEN until  
 CAB PRESS = 5.7, then close  
 cb DOCK PROBE (2) - close (verify)  
 COAS PWR - on  
 ALIGN GDC  
 \*If LV GUID - CMC: \*  
 \* Mnvr to SEP ATT \*  
 \* Do not reload DAP\*

SIVB MNVR ( : : )  
 SEP ( : : : )

Load RCS DAP  
 R1=11103, R2=01111

V46E

Load N17 (SEP) & N22 (EXTRACTION)  
 V63E (Monitor SIVB Mnvr) (TB7 + 15 min)

\*If error needles not nulled: \*  
 \* V60E (SIVB  $\pm 1.8^\circ$ db)\*  
 \* V16 N20E \*  
 \* R22 =  $300^\circ$  - R20 \*  
 \* P22 = P20 +  $180^\circ$  \*  
 \* Y22 =  $360^\circ$  - Y20 \*  
 \* R P Y \*  
 \*N20 \_\_\_\_\_ \*  
 \* \_\_\_\_\_ \*  
 \*N22 \_\_\_\_\_ \*  
 \* \_\_\_\_\_ \*  
 \*Load new Docking Attitude \*

DATE 11/14/722 CSM SEPARATION PREP

DOCK PROBE EXTD/REL - RETRACT (verify)  
 RCS TRNFR - SM (verify)  
 SM RCS PRPLNT tb (8) - gray (verify)  
 AUTO RCS SELECT (16) - MNA/MNB  
 Perform EMS NULL BIAS CHECK, pg G/2-5  
 Set  $\Delta V$ C to -100.0  
 EMS FUNC -  $\Delta V$   
 FDAI SCALE - 5/1  
 MAN ATT (3) - RATE CMD  
 LIMIT CYCLE - OFF (verify)  
 ATT DB - MIN  
 RATE - LOW

L  
3-2

TRANS CONT PWR - on (up) (verify)  
ROT CONT PWR NORMAL (2) - AC/DC (verify)  
ROT CONT PWR DIRECT (2) - MNA/MNB (verify)  
ATT SET tw - R=0°, P=180°, Y=0°

## Set up TV

Mount TV in R.H. rendezvous window  
S BD AUX TV - TV  
TV monitor power sw - ON  
Adjust monitor for proper picture  
Adjust lens aperture (f22), zoom and focus controls  
S BD AUX TV - off (center)

CMC MODE - FREE (verify)  
SC CONT - CMC  
BMAG MODE (3) - RATE 2 (verify)  
cb RCS LOGIC (2) - open  
TVC SERVO PWR #1 - AC1/MNA  
Set DET - 59:30  
FC REAC v1v - LATCH

3 CSM SEPARATION

V49E F 06 22 (EXTRACT ATT)  
THC - ARMED  
RHC #2 - ARMED  
cb SECS LOGIC (2) - closed (verify)  
cb SECS ARM (2) - closed (verify)  
SECS LOGIC (2) - on (up)(verify)  
RCS CMD - ON  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
SECS PYRO ARM (2) - ARM

\*If LV GUID - CMC:  
\* Insure rates nulled and \*  
\* yaw drifting towards 0° \*  
\* Load DAP 11103, 01111 \*  
\* V46E, V60E, V63E \*

GDC ALIGN  
EMS FUNC - ΔV (verify)  
EMS MODE - NORMAL

V62E

59:30 Start DET

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59:50 CMC MODE - AUTO  
59:58 Thrust +X and hold  
00:00 CSM/LV SEP pb - push, hold, and release  
LV TANK PRESS - full scale Low  
\*If No Separation:  
\* cb RCS LOGIC (2) - close \*  
\* THC - CCW (leave in detent) \*  
\* DET reset and counting up (auto) \*  
\* LV TK PRESS - full scale low (SEP ind)\*  
\* 00:03 THC - neutral \*

00:03 THC - release ( $\Delta V \sim .5$  fps)  
SM RCS PRPLNT tb (8)-gray (verify)  
SM RCS He tb (8)-gray (verify)  
SM RCS SEC PRPLNT FUEL PRESS (4) - CLOSE  
FC REAC vlv - NORM  
02 TK 3 ISOL vlv tb - gray (verify)

#### 4 CSM TRANSPOSITION

MAN ATT (PITCH) - ACCEL CMD  
00:15 Pitch up at  $.5^\circ/\text{sec}$   
When Pitch error needle positive,  
PRO F 50 18 OMNI ANT - B  
PRO 06 18  
MAN ATT (PITCH) - RATE CMD  
F 50 18 (completion of mnvr)  
ENTR  
Thrust +X(4 sec)( $\Delta V \sim .7$  fps)  
cb DIRECT ULLAGE (2) - open  
Load RCS DAP 11102, 01111  
S BD AUX TV - TV (90 sec delay)  
HI GAIN ANT TRACK - MAN  
HI GAIN ANT PWR - POWER  
Slew ANT to verify operation  
HGA angles:  $P = -42^\circ$ ,  $Y = +293^\circ$   
S BD ANT OMNI - HI GAIN  
HI GAIN ANT TRACK - REACQ  
TV TRANSMIT/STBY sw - TRANSMIT  
Start DAC

5 DOCKING

Stabilize & align CSM

BMAG MODE (3) - ATT 1/RATE 2

At capture:

PROBE EXTD/RETR tb-bp (A, pg S/2-11) malf. DOCK  
CMC MODE - FREE

2

Allow probe to damp S/C motions  
(approx 10 sec)

Align Pitch and Yaw with THC (<3°)  
(minimum possible)

DOCK PROBE RETRACT PRIM-1

\*If no RETRACT in 30 sec: PRIM-2 \*

\*If still no RETRACT: SEC-1 \*

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

cb DOCK PROBE (2) - open

EXT LTS - OFF (verify)

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

DAC/TV - off

S BD AUX TV - off (center)

6 POST DOCKING

RATE - HIGH

ATT DB - MAX

COAS PWR - OFF

cb RCS LOGIC (2) - open (verify)

TVC SERVO PWR #1 - OFF

THC,RHC - locked

EMS MODE - STBY

EMS FUNC - OFF

BMAG MODE (3) - RATE 2 (verify)

COUCHES - CDR-90°, CMP-0°, LMP-180°

LM PWR - OFF (verify)

TUNNEL LIGHTS - ON

O2 HTR 3 - AUTO

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- 7 EQUALIZE CM/LM PRESSURE (Decal) (pg S/2-4)
- 8 REMOVE TUNNEL HATCH (Decal) (pg S/2-5)
- 9 VERIFY DOCKING LATCHES (Decal) (pg S/2-10)
- 10 CONNECT LM UMBILICALS (Decal) (pg S/2-11)
- 11 INSTALL TUNNEL HATCH (Decal) (pg S/2-8)  
LM TUNL VENT vlv - LM/CM ΔP  
WASTE STOWAGE VENT vlv - VENT (verify)  
TUNNEL LIGHTS - OFF
- 12 PRE LM SEP & EJECTION
- cb SIVB/LM SEP (2) - close (verify)  
ΔV CG - LM/CSM (verify)  
EMS FUNC - ΔV SET/VHF RNG  
Slew ΔV ind to +100.0  
EMS FUNC - ΔV  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
DAC - 6 fps  
Load RCS DAP 21101, X1111  
Load N22 att (monitor APS mnvr, hatch window)  
270.0°, 129.8°, 4.3°  
V60E, V63E  
GDC ALIGN  
DET - RESET  
cb SECS ARM (2) - close (verify)  
Cue MSFN  
SECS LOGIC (2) - on (up)  
Obtain GO from MSFN  
SECS PYRO ARM (2) - ARM  
TVC SERVO PWR #1 - AC1/MNA  
TRANS CONTR PWR - on (up) (verify)  
RHC & THC - ARMED  
V37E 47E F 16 83 ΔVX,Y,Z (.1fps)  
EMS MODE - NORMAL  
Start DAC

13 LM SEP & EJECTION (\_\_\_\_:\_\_\_\_:\_\_\_\_)  
SIVB/LM SEP - on (up)  
00:00 Start DET  
CMC MODE - AUTO  
00:05 Thrust -X (3 sec)

14 POST LM EJECTION

PRO  
F37 OOE  
When CMC Acty lt out,  
Key V66E  
SECS PYRO ARM (2) - SAFE  
SECS LOGIC (2) - OFF  
cb SECS ARM (2) - open  
cb SIVB/LM SEP (2) - open  
02 TK 3 ISOL vlv tb - gray (verify)  
MAP CAMR ON - OFF  
PAN CAMR PWR - OFF  
SM/AC PWR - OFF  
LV/SPS IND sw - GPI  
TVC SERVO PWR (2) - OFF  
EMS MODE - STBY  
EMS FUNC - OFF  
TAPE RCDR - off (ctr)  
PCM BIT RATE - LOW  
Stop DAC  
AUTO RCS SEL AC ROLL or BD ROLL (4) - OFF  
02 HTR 3 - OFF

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MNVR TO SIVB VIEW ATT

V49E

13:00 GO/NO GO for S-IVB YAW mnvr

17:30 GO/NO GO for S-IVB EVASIVE mnvr

\*If NO APS EVASIVE at 23:00: \*  
 \* Thrust +X (6 sec) \*  
 \* Monitor SIVB thru Hatch Window \*

*Time from	Att for viewing SIVB	*		
*Ejection	after RCS EVASIVE mnvr*			
*(min:sec)	<u>Roll</u>	<u>Pitch</u>	<u>Yaw</u>	*
*				*
* 25:00	286.3°	114.1°	0.0°*	
*				*
* 30:00	270.0°	129.7°	358.1°*	

cb DIRECT ULLAGE (2) - open (verify)

TRANS CONT PWR - OFF

ROT CONTR PWR DIR (2) - OFF

RHC &amp; THC - LOCKED

REPRESS PKG vlv - OFF

cb 02 ISOL/AUX BAT - open

\*If no TLI:

* SIVB - CSM/LM SEP (Earth orbit)	*				
*	*				
*	Inertial Att	*			
* <u>min-sec</u>	<u>Event</u>	R	P	Y	*
*					*
*00:00	Ejection	298.4°	129.8°	319.3°*	*
*					*
*00:05	3 sec -X				*
*					*
*00:22	Mnvr	270.0°	129.8°	4.3°*	*
*					*
*03:00	6 sec -X				*

L  
4-1

## ABORT PROCEDURES

### MODE IA ABORT (00:00 to 01:01)

00:00 THC - CCW then NEUTRAL  
\*CM/SM SEP (2) - on (up)\*

00:14 **ELS - AUTO**  
\*ELS LOGIC - on (up)\*  
\*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 <alidade - DEPLOY MAINS  
>alidade - NO ACTION

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

Note: Alidade set for 3800 ft true altitude  
prior to Launch

Go to LANDING PHASE pg L/4-8

### MODE IB ABORT (01:01 to 16.5 nm)

00:00 THC - CCW then NEUTRAL  
\*CM/SM SEP (2)-on (up)\*

00:11 \*CANARD DEPLOY PB - PUSH\*

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

Go to LANDING PHASE pg L/4-8

DATE 9/4/72

MODE I

BACK



COLOR \_\_\_\_\_

L  
4-2

MODE IC ABORT  
(16.5 nm to TWR JETT)

00:00 THC - CCW then NEUTRAL  
 \*CM/SM SEP (2) - on (up)\*  
 \*RCS CMD - ON\*

00:11 \*CANARD DEPLOY PB - PUSH\*  
 \*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)  
 KEY RLSE to N44, Check HA

HA>32nm & PLAT GO	HA<32nm or PLAT NO GO
TWR JETT sw(2)-on(up) MAN PITCH - RATE CMD ENT ATT R0°, P135°, Y0° BMAG (3)- ATT1/RATE 2 EMS FUNC - ENTRY EMS MODE - NORMAL At .05G Lt, .05G sw - on (up) Fly Max Lift	CMD +5°/sec Pitch rate *If +Pitch rate too hi: * Roll 90° * Damp rate with yaw * Roll to HDS DN

θ (.05G)  
 GET DROGUE \_\_\_\_\_

MODE I

Go to LANDING PHASE pg L/4-8

DATE 9/4/72

LET FAILS TO JETTISON

LEGS CUT/NO MOTOR FIRE (pyro audible):  
 LES MOTOR FIRE PB - push  
 NO RESPONSE to 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)  
 TWR JETT (2) - on (up)  
 NO TWR JETT: continue to orbit  
 TWR JETT (2) - off (ctr)

MODE II RCS ABORT  
(TWR JETT to MODE III)

- 00:00 THC - CCW (4 sec min)  
\*If No BECO: Reset THC \*  
\* Req. RSO Shutdown \*  
\* Reset & start DET \*
- 00:03 \*CSM/LV SEP - PUSH\*  
\*RCS CMD - ON \*
- 00:05 THC - ARMED
- 00:05 THC - NEUTRAL, then +X
- 00:24 THC - +X OFF  
KEY RLSE to N44, Check TFF  
If TFF>2 min, Yaw 45° (LEFT) out-of-plane  
BMAG MODE (3) - ATT1/RATE 2  
cb MNA&B BAT C (2) - close  
cb ELS/CM-SM SEP (2) - close  
CM/SM SEP - on (up)  
CM RCS PRESS - on (up)  
RCS TRNFR - CM  
C&W MODE - CM  
Entry ATT - ( $R=0^\circ, P=120^\circ, Y=0^\circ$ ) (Compl by 1:40)  
cb CSM/LM FNL SEP (2) - close (pull lanyard) █  
CSM/LM FNL SEP (2) - on (up)  
EMS FUNC - ENTRY GET 300K \_\_\_\_\_  
EMS MODE - NORMAL θ (.05G) \_\_\_\_\_  
GET DROGUE \_\_\_\_\_
- At .05G lt - on  
.05G sw - on (up)  
EMS ROLL - on (up)  
Fly Max Lift  
N62E VI, HDOT, H

Go to LANDING PHASE pg L/4-8

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MODE III SPS ABORT  
 $(\Delta R = -400 \text{ NM to INSERTION})$

- 00:00 THC - CCW (4 Sec Min)  
 \*If No BECO: Reset THC \*  
 \* LV STAGE sw - SII/SIVB \*  
 \* Reset & start DET \*
- 00:03 \*CSM/LV SEP - PUSH\*  
 \*RCS CMD - ON \*
- THC - ARMED
- 00:05 THC - NEUTRAL, then +X  
 LV/SPS IND sw - GPI
- 00:24 THC - +X OFF  
 N50E  $\Delta R, HP, TFF$  (.1nm,min-sec)  
 BMAG MODE (3) - ATT1/RATE2  
 If  $\Delta R > 0$ :  
 MNVR to retro att ( $R=180^\circ, P=194^\circ, Y=0^\circ$ )  
 (Scribe on horiz, BEF, Hds up)  
 SCS TVC P&Y - AUTO (verify)  
 EMS MODE - NORMAL  
 $\Delta V$  THRUST A - NORMAL  
 02:05 DIRECT ULLAGE PB - PUSH  
 THRUST ON PB - PUSH  
 Burn to VC ( $\Delta R=0$ )  
 $\Delta V$  THRUST (2) - OFF  
 GETI (6999.9)  
 $\Delta V$   
 VC  
 $\theta$   
 $\Delta tb$   
 GET 300K  
 $\theta$  (.05G)  
 GET Drogue
- If TFF>2min, Yaw  $45^\circ$  (LEFT)  
 out-of-plane  
 cb MNA&B BAT C(2) - close  
 cb ELS/CM-SM SEP (2) - close  
 CM/SM SEP - on (up)  
 CM RCS PRESS - on (up)  
 RCS TRNFR - CM  
 C&W MODE - CM  
 Mnvr to entry att ( $R=0^\circ, P=105^\circ, Y=0^\circ$ )  
 (BEF, Hds Dn, Full Lift)  
 cb CSM/LM FNL SEP (2) - close (pull lanyard)  
 CSM/LM FNL SEP (2) - on (up)  
 Note TFF

L  
4-5

EMS MODE - STBY  
EMS FUNC - ENTRY  
EMS MODE - NORMAL  
At .05G lt - on  
.05G sw - on (up)  
EMS ROLL - on (up)  
At .2G lt - on  
Roll left 55° (R=305°, P=105°, Y=0°)  
Fly Half Lift

Go to LANDING PHASE pg L/4-8

MODE III, MODE IV

DATE 9/4/72

BACK



COLOR \_\_\_\_\_

MODE III, MODE IV

L  
4-6

■ MODE IV SPS TO ORBIT  
(VI ~ 22,685, HDOT ~ +104, H ~ +94)

00:00 THC - CCW (4 sec min)  
\*If No BECO: Reset THC \*  
\* LV STAGE sw - SII/SIVB \*  
\* Reset & start DET \*

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

THC - ARMED  
00:05 THC - NEUTRAL, then +X  
LV/SPS IND sw - GPI

00:24 THC - +X OFF

Perform PITCH PROFILE or FIXED ATTITUDE BURN:

PITCH PROFILE (AUTO TVC, tw trim)

BMAG MODE (3) - ATT1/RATE2

EMS MODE - NORMAL

SCS TVC (2) - AUTO (verify)

ΔV THRUST A - NORMAL

DIRECT ULLAGE PB - PUSH

<01:30 THRUST ON PB - PUSH

BMAG MODE (PITCH) - RATE 1

FLY HDOT with thumbwheel

\*Burn to (hp >70 nm +6 sec BT)\*

\* or (ha = 200 nm & +HDOT) \*

ΔV THRUST (2) - OFF

EMS MODE - STBY

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or FIXED ATTITUDE BURN (Scribe on horiz, SEF, Hds Dn)

BMAG MODE (3) - ATT1/RATE2 GETI

6999.9

EMS MODE - NORMAL

SCS TVC (2) - AUTO (verify)

ΔV

ΔV THRUST A - NORMAL

VC

DIRECT ULLAGE PB - PUSH

02:05 THRUST ON PB - PUSH

θ

BURN to VC (hp >70nm)

ΔV THRUST (2) - OFF

Δtb

EMS MODE - STBY



LANDING PHASE

L  
4-7

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

KEY RLSE

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

PRO

V37E OOE

When CMC ACTY lt out:

V66E

V45E

Load DAP, V48: R1=11102, R2=01111

V46E CSM WT

V83E (check e)

P TRIM

PRO

Y TRIM

US LOS  
(00:15:44)

Go to INSERTION CHECKLIST pg L/2-11

DATE 9/4/72

L  
4-8

LANDING PHASE (30K, DESCENDING)

LANDING PHASE

- 30K'    ELS LOGIC - on (up)  
ELS - AUTO
- 24K'    Twr jett (auto)  
          \*TWR JETT (2) - on (up) \*  
Apex cover jett (auto)  
          \*APEX COVER JETT PB - PUSH)\*  
          (wait 2 sec)
- Drogues deployed (auto)  
          \*DROGUE DPLY PB - PUSH\*
- 46 sec    \*If Both Drogues Fail: \*  
          \* ELS - MAN  
          \* STABILIZE CM (DIRECT RCS)  
          \* 5K' MAIN DPLY PB - PUSH  
          \* ELS - AUTO
- 23.5K' Cabin Pressure increasing  
          \*If not increasing by 17K': \*  
          \* CABIN PRESS REL vlv (RH) - DUMP\*
- CM RCS PRPLNT (2) - OFF
- 10K'    Main parachutes deployed  
MAIN DEPLOY PB - PUSH
- VHF ANT - RECY  
VHF AM A - SIMPLEX  
VHF BCN - ON
- \*If No Comm and abort occurred between\*  
\* 1:01 & 2:00 min or if land impact \*  
\* expected: \*  
\* Perform CM RCS Dump, pg L/4-9 \*

DATE 11/14/72

L  
4-9

- CABIN PRESS REL vlv (RH) - DUMP  
STRUT LOCKS (4) - UNLOCK  
(275) cb FLT & PL BAT BUS A,B,&BAT C (3) - close  
cb FLT & PL MNA & B (2) - open  
(5) cb BAT RLY BUS (2) - open  
cb RAD HTRS OVLD (2) - open  
(8) cb SPS P&Y (4) - open

ELS - AUTO (verify)  
ELS LOGIC - on (up) (verify)  
FLOOD Lts - POST LDG

- 800' CAB PRESS REL vlv (2) - CLOSE (latch off)  
DIRECT O2 vlv - OPEN (CCW)  
MN BUS TIE (2) - OFF

Go to POSTLANDING PROCEDURES, pg L/9-2

DATE 11/14/72

CM RCS DUMP

- CABIN PRESS REL vlv (2) - CLOSE  
CM RCS LOGIC - on (up)  
\*If main or pyro bus lost:  
\* Use RHC's for burn,  
\* not DUMP sw  
CM PRPLNT - DUMP (burn audible)  
MONITOR CM RCS 1&2 for He press decrease  
\*If no burn or press decrease:  
\* Use both RHC's  
\* DO NOT FIRE PITCH JETS  
CM PRPLNT - PURGE  
\*CM RCS He DUMP PB - PUSH \*  
\*RHC (2) - 30 secs, NO PITCH\*

PRE-TLI ABORT  
FROM ORBIT

PRE-TLI ABORT  
FROM ORBIT

L  
4-10

PRE-TLI ABORT FROM ORBIT

- 1      MNVR TO SEP ATT  
        LV GUID - CMC  
        Pitch SIVB to Hds up, BEF, 15°  
            window mk on horizon  
        Then, LV GUID - IU for orb rate
- 2      LOAD RCS DAP  
        R1 = 11102, R2 = 01111  
        V46E
- 3      DON MAE WESTS & FOOT RESTRAINTS
- 4      FINAL STOWAGE  
        ORDEAL  
        (377) GLY TO RAD SEC vlv - BYPASS (verify)  
            Verify EVA COUCH STRUT disengaged  
        (382) Cool pn1 installed  
            Y-Y struts (2) extended  
            Stow Data Box R-12  
            Attach both strut unlock lanyards  
            WASTE MGMT DRAIN vlv - OFF
- 5      PYRO BATT CK  
        (250) cb PYRO A SEQ A - close (verify)  
            cb PYRO B SEQ B - close (verify)  
            DC IND - PYRO BAT A(B)  
                \*If PYRO BAT A(B) < 35 vdc:  
                \* cb PYRO A(B) seq A(B) - open \*  
                \* cb PYRO A(B)BAT BUS A(B) TO \*  
                \* PYRO BUS TIE - close\*  
        (275) cb MNA BAT C - close  
            cb MNB BAT C - close  
            DC IND - MNB
- 6      SYSTEMS TEST PANEL CONFIGURATION  
        SYS TEST METER -5B (BAT RLY BUS  
            3.4-4.1 vdc)  
        (101) CM RCS HTRS - OFF (verify)  
            WASTE H2O DUMP HTR - OFF  
            URINE DUMP HTR - OFF  
        (100) LEB FLOOD & INTGL LIGHTING - OFF

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L  
4-11

7

CONFIGURE PNL 8

All cb's closed except:

DOCKING PROBE (2) - open (verify)  
CM RCS HTRS (2) - open (verify)  
FLOAT BAG (3) - open (verify)  
SECS ARM (2) - open (verify)  
ELS/CM-SM SEP (2) - open (verify)  
PL VENT - open (verify)

8

CM RCS ACTIVATION

cb SECS ARM(2) - close  
Cue MSFN  
SECS LOGIC (2) - on(up)  
MSFN confirm GO for PYRO ARM (if poss)  
SECS PYRO ARM (2) - ARM  
CM RCS PRPLNT 1&2 tb(2) - gray (verify)  
CM RCS PRESS - ON  
RCS IND sw - CM1, then 2  
He PRESS stabilizes at 3300-3500  
psia after 15 minutes.  
MANF PRESS 287-302 psia  
SECS PYRO ARM (2) - SAFE

9

Set DET (counting up to deorbit burn)

10

CSM/LV SEPARATION PREP

SM RCS PRPLNT tb (8) - gray (verify)  
AUTO RCS SELECT (16) - MNA/MNB  
Set ΔVC to -100.0  
EMS FUNC - ΔV  
FDAL SCALE - 5/1  
MAN ATT (3) - RATE CMD  
LIMIT CYCLE - OFF (verify)  
ATT DB - MIN  
RATE - LOW  
TRANS CONT PWR - on (up) (verify)  
ROT CONT PWR NORMAL (2) - AC/DC (verify)  
ROT CONT PWR DIRECT (2) - MNA/MNB (verify)  
CMC MODE - FREE (verify)  
SC CONT - CMC  
BMAG MODE (3) - RATE 2 (verify)  
cb RCS LOGIC (2) - close (verify)  
TVC SERVO PWR #1 - AC1/MNA  
FC REAC v1v - LATCH

DATE 9/4/72

DATE

L  
4-12

11

CSM/LV SEPARATION

THC - ARMED  
 RHC #2 - ARMED  
 cb SECS LOGIC (2) - closed (verify)  
 cb SECS ARM (2) - closed (verify)  
 SECS LOGIC (2) - on (up) (verify)  
 RCS CMD - ON  
 TAPE RCDR - HBR/RCD/FWD/CMD RESET  
 SECS PYRO ARM (2) - ARM  
 GDC ALIGN  
 EMS FUNC -  $\Delta V$  (verify)  
 EMS MODE - NORMAL

38:00 V37E 47E  
 39:50 CMC MODE - AUTO  
 39:58 Thrust +X and hold  
 40:00 CSM/LV SEP pb - push, hold, and release  
 (-20:00min) LV TANK PRESS - full scale Low

\*If No Separation:  
 \* THC - CCW (leave in detent) \*  
 \* DET reset and counting up (auto) \*  
 \* LV TK PRESS - full scale low (SEP ind)\*  
 \*00:03 THC - +X, neutral & hold \*  
 \*00:24 THC - release \*

~40:24 SM RCS PRPLNT tb(8) - gray (verify)  
 SM RCS He tb (8) - gray (verify)  
 SM RCS SEC PRPLNT FUEL PRESS (4) - CLOSE  
 FC REAC vlv - NORM  
 $\Delta V = 5$  fps  
 THC - release  
 SECS PYRO ARM (2) - SAFE  
 cb EDS (3) - open  
 PCM BIT RATE - LOW

DATE

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12

Go to SPS DEORBIT, pg L/8-1

\*If time permits, after mnvr to Burn Att: \*  
 \* Perform EMS ENTRY CHECK, pg L/5-2 & \*  
 \* EMS  $\Delta V$  TEST & NULL BIAS CHECK, pg G/2-5\*

L  
4-13

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

V37E 47E

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

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

(TLI+25min)

00:00            TRANS CONTR - CCW (4 sec)  
              DET RESET (verify)  
00:03            SIVB/CSM SEP  
              LV ENG 1 Lt - out  
              \*CSM/LV SEP PB - PUSH\*  
              \*RCS CMD-ON \*  
00:05            THC - ARMED  
              TRANS CONTR - NEUTRAL THEN +X  
              LV/SPS IND 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  
              TRANS CONTR PWR - OFF

MNVR TO RETRO ATT  
R \_\_\_\_\_ (Block Data)  
P \_\_\_\_\_ (Block Data)  
Y \_\_\_\_\_ (Block Data)

DATE 9/4/72

TLI 90 MIN ABORT

BACK



COLOR \_\_\_\_\_

L  
4-14

RETRO UPDATE (NO COMM - use Block Data)  
GETI \_\_\_\_\_ θ .05G \_\_\_\_\_

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

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

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

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close  
      cb SPS (12) - close  
      MAN ATT (3) - RATE CMD  
      LIMIT CYCLE - on (up)  
      ATT DB - MIN  
      RATE - LOW  
      SCS TVC (2) - RATE CMD  
      ΔV CG - CSM  
      TVC GMBL DRIVE P&Y - AUTO

(54:00)                  MN BUS TIE (2) - ON  
(-06:00)                  TAPE RCDR - HBR/RCD/FWD/CMD RESET  
                          SPS He v1vs (2) - AUTO (verify)  
                          Check N2A & N2B  
                          TVC SERVO PWR #1 - AC1/MNA  
                          TVC SERVO PWR #2 - AC2/MNB  
                          ROT CONTR PWR NORMAL (2) - AC  
                          ROT CONT PWR DIRECT (2) - OFF  
                          BMAG MODE (3) - ATT1/RATE2  
                          SC CONT - SCS  
                          RHC #2 - ARMED

DATE 9/4/72

TLI 90 MIN ABORT



L  
4-15

(55:00) PRIMARY TVC CHECK

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

SEC TVC CHECK

GMBL MOT P2-Y2 - START/ON (LMP Cnfrm)  
SET GPI TRIM  
Verify MTVC  
THC NEUTRAL  
Verify GPI returns to trim  
Verify NO MTVC  
ROT CONT PWR NORM (2) - AC/DC  
ROT CONT PWR DIRECT (2) - MNA/MNB  
FDAI SCALE - 5/1  
LIMIT CYCLE - OFF  
RATE - HIGH  
UPDATE DET

(59:00)  
(-01:00)

EMS MODE - NORMAL  
TRANS CONTR PWR - on (up)  
 $\Delta$ V THRUST A(B) - NORMAL  
V37E 47E  
THC - ARMED  
RHC (2) - ARMED

00:00 ULLAGE & THRUST ON PB - PUSH  
SPS THRUST Lt - ON  
00:03  $\Delta$ V THRUST B(A) - NORMAL  
ULLAGE & THRUST ON PB - PUSH

DATE

9/4/72

MONITOR THRUSTING

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

00:XX

ECO

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
4-16

ΔV THRUST A&B - OFF  
VERIFY THRUST OFF  
SPS INJ VLVS (4) - CLOSED  
SPS He vlvs tb (2) - bp  
GMBL MTRS (4) - OFF (LMP Confirm)  
TVC SERVO PWR 1&2 - OFF

19 F 16 83      ΔV XYZ (CM) (.1fps)  
RHC & THC - LOCKED  
TRANS CONTR PWR - OFF  
ROT CONTR PWR DIRECT (2) - OFF  
cb DIRECT ULLAGE (2) - open  
RECORD ΔV      ΔVC \_\_\_\_\_  
EMS FUNC - OFF      ΔVX \_\_\_\_\_  
EMS MODE - STBY      ΔVY \_\_\_\_\_  
PRO      ΔVZ \_\_\_\_\_  
ATT DB - MAX  
BMAG MODE (3) - RATE 2  
MN BUS TIE (2) - OFF  
TAPE RCDR - off. (ctr)  
PCM BIT RATE - LOW

F37 OOE  
When CMC ACTY lt out:  
V66E

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

DATE

DATE 9/4/72

L  
5-1

EARTH ORBIT ENTRY VEHICLE PREPARATION

EARTH ORBIT ENTRY  
VEHICLE PREP

- 1           INITIAL STOWAGE COMPLETED
- 2           CMC POWER UP pg G/2-2
- 3           IMU POWER UP pg G/2-1
- 4           SCS POWER UP pg G/2-4
- 5           P51 - IMU ORIENTATION pg G/6-1
- 6           LOAD DAP  
              V48E 11102, 01111, PRO, PRO, PRO
- 7           DON MAE WESTS & FOOT RESTRAINTS
- 8           (  :  :  )   P27 (SV,REFSMMAT), MNVR  
                          & ENTRY PAD UPDATES
- 9           ECS CKS  
              02 SUPPLY REFILL pg S/1-7  
              PGA verification, (if suited) S/1-14  
              ECS Monitor Ck pg S/1-5  
              (382) EVAP H2O CONT PRI v1v - AUTO  
              EVAP H2O CONT SEC v1v - AUTO  
              SUIT HEAT EXCH SEC GLY - FLOW
- 10          EPS CKS #1, 3, 4 (5 if req'd) pg S/1-2
- 11          SPS CK (If req'd) pg S/1-1
- 12          RCS CKS  
              SM RCS Monit Ck pg S/1-1  
              CM RCS Monit Ck pg S/1-1
- 13          C&W SYS CK pg S/1-20
- 14          CMC SELF CK pg G/2-3
- DATE 9/4/72

EARTH ORBIT ENTRY  
VEHICLE PREP

BACK



COLOR \_\_\_\_\_

L  
5-2

15

LOGIC SEQUENCE CK

- (8) cb SECS LOGIC (2) - close (verify)  
cb SECS ARM (2) - close  
cb ELS/CM-SM SEP (2) - close  
ELS LOGIC - on (up)  
ELS - AUTO  
Coordinate next 3 steps with MSFN  
SECS LOGIC (2) - on (up)  
MSFN confirm GO for PYRO ARM as req'd  
SECS LOGIC (2) - OFF  
cb SECS ARM (2) - open  
ELS LOGIC - OFF  
ELS - MAN  
cb ELS/CM-SM SEP (2) - open

16 (\_\_\_\_:\_\_\_\_) P52-IMU REALIGN pg G/6-2 (OPTION 3)

Record gyro torquing angles

R \_\_\_\_\_

P \_\_\_\_\_

Y \_\_\_\_\_

\*If >1°, recycle P52 \*

\*If confirmed, use SCS for\*

\* EMS entry

17

GDC ALIGN

If drift >10°/hr, change rate source

18

EMS ENTRY CHECK

- EMS FUNC - OFF  
(8) cb EMS (2) - close  
EMS MODE - STBY  
EMS FUNC - EMS TEST 1 (wait 5 sec)  
EMS MODE - NORMAL (wait 10 sec)  
Check ind 1ts - off  
RANGE ind - 0.0  
Slew hairline over notch  
in self-test pattern  
EMS FUNC - EMS TEST 2  
.05G 1t - on (all others out)  
Wait 10 sec  
EMS FUNC - EMS TEST 3  
.05G 1t - on  
RSI lower 1t - on (10 sec later)  
Set RANGE counter to 58 nm+0.0

DATE 9/4/72



L  
5-3

EMS FUNC - EMS TEST 4

.05G 1t - on (all others out)

G-V trace within pattern to lwr rt corner @9G

RANGE ind counts down to  $0.0 \pm 0.2$  nm

EMS FUNC - EMS TEST 5

.05G 1t - on

RSI upper 1t - on (10 sec later)

RANGE ind - 0.0

Scribe traces vertical line 9G to  $0.28 \pm 0.1$  G

ALIGN SCROLL TO ENTRY PATTERN (on 37K fps line)

EMS FUNC - RNG SET

G-V scroll assy traces vert. line 0.28G to  $0.0 \pm 0.1$  G

EMS MODE - STBY

19 Perform EMS  $\Delta V$  TEST & NULL  
BIAS CHECK, Pg G/2-5

20 PRIMARY WATER EVAP ACTIVATION  
GLY EVAP H2O FLOW - AUTO  
GLY EVAP STM PRESS - AUTO  
PRI ECS GLY PUMP - AC1 (verify)

21 SEC WATER EVAP ACTIVATION  
ECS IND sel - SEC  
SEC COOL LOOP PUMP - AC2  
GLY DISCH SEC PRESS - 39-51 psig  
SEC COOL LOOP EVAP - EVAP  
SEC GLY EVAP OUT TEMP - 38-50.5°F  
SUIT CKT HT EXCH - BYPASS 20 sec, OFF  
ECS IND sel - PRIM

22 SET UP CAMERA  
CM4/DAC/18/CEX - BRKT, MIR  
(T11, 1/250, 7) 12 fps, MAG GG

DATE 9/4/72

DATE

L  
5-423 (-01:00h) CM RCS PREHEAT

Note: If sys test mtr 5c,d,6a,b,c,d all read 3.9 vdc ( $28^{\circ}\text{F}$ ) or more, omit preheat

- (8) cb RCS LOGIC (2) - close
- CM RCS LOGIC - on (up)
- cb CM RCS HTRS (2) - close
- (101) CM RCS HTRS - ON (LMP Confirm)  
(20 min or til lowest rdg is 3.9 vdc) (Monitor Manf press for press drop)

24

FINAL STOWAGE

## ORDEAL

- (377) GLY TO RAD SEC vlv - BYPASS (verify)
- Verify EVA COUCH STRUT disengaged
- (382) Cool pn1 installed
- Y-Y struts (2) extended
- Stow Data Box R-12
- Attach both strut unlock lanyards
- Check for water in tunnel area
- Stow gas separator (A8)
- Stow C1 injector (R6)
- WASTE MGMT DRAIN vlv - OFF
- Remove & Stow URA, urine transfer hose and urine filter

DATE

## 25 (-40:00m)

TERM. CM RCS PREHEAT

- (101) CM RCS HTRS - OFF (LMP confirm)
- CM RCS LOGIC - OFF
- (8) cb CM RCS HTR (2) - open

DATE 9/4/72

26

PYRO BATT CK

- (250) cb PYRO A SEQ A - close (verify)
- cb PYRO B SEQ B - close (verify)
- DC IND - PYRO BAT A(B)
- \*If PYRO BAT A(B) < 35 vdc: \*
- \* cb PYRO A(B) seq A(B) - open \*
- \* cb PYRO A(B)BAT BUS A(B)TO \*
- \* PYRO BUS TIE - close\*
- (275) cb MNA BAT C - close
- cb MNB BAT C - close
- DC IND - MNB



L  
5-5

27

SYSTEMS TEST PANEL CONFIGURATION

SYS TEST METER - 5B (BAT RLY BUS  
3.4-4.1 vdc)

- (101) CM RCS HTRS - OFF (verify)  
WASTE H2O DUMP HTR - OFF  
URINE DUMP HTR - OFF
- (100) LEB FLOOD & INTGL LIGHTING - OFF

28

CONFIGURE PNL 8

All cb's closed except:

CM RCS HTRS (2) - open (verify)  
DOCKING PROBE (2) - open (verify)  
FLOAT BAG (3) - open (verify)  
SECS ARM (2) - open (verify)  
EDS BAT (3) - open (verify)  
ELS/CM-SM SEP (2) - open (verify)  
PL VENT - open (verify)

29

FINAL GDC DRIFT CK (if req'd)

\*If drift >10°/hr, Suspect GDC,\*  
\* Do not use RSI & FDAI #2 \*

30

CM RCS ACTIVATION

cb SECS ARM (2) - close  
Cue MSFN  
SECS LOGIC (2) - on(up)  
MSFN confirm GO for PYRO ARM(if poss)  
SECS PYRO ARM (2) - ARM  
CM RCS PRPLNT 1&2 tb(2)-gray(verify)  
CM RCS PRESS - on (up)  
RCS IND sw - CM1, then 2  
He PRESS stabilizes at 3300-3500  
psia after 15 minutes  
MANF PRESS 287-302 psia  
SECS PYRO ARM (2) - SAFE

DATE 9/4/72

DATE



L  
5-6

- 31 (Hybrid only) DOCKING RING JETTISON (if req'd)  
(Deorbit-20:00m) SECS PYRO ARM (2) - ARM  
YAW 45° out of plane  
cb CSM/LM FNL SEP (2) - close  
CSM/LM FNL SEP (2) - on (up)  
SECS PYRO ARM (2) - SAFE

32

P27 & ENTRY PAD UPDATE

HYBRID RCS DEORBIT & ENTRY, pg L/6-1  
SM RCS DEORBIT & ENTRY, pg L/7-1  
SPS DEORBIT & ENTRY, pg L/8-1

DATE

9/4/72  
DATE

## E.O. ENTRY UPDATE

E. O. ENTRY UPDATE					L/5-7
X	-	X	-		AREA
X X -	.	X X -	.		ΔV TAILOFF
X X X		X X X		R 0.05G	EMS
X X X		X X X		P 0.05G	
X X X		X X X		Y 0.05G	
+	.	+	.	RTGO	EMS
+	.	+	.	VIO	
X X	.	X X	.	RET 0.05G	
0	.	0	.	LAT	N61
	.		.	LONG	
X X	.	X X	.	RET 0.2G	
	.		.	DRE (55°)	N66
R R	/	R R	/	BANK AN	
X X	.	X X	.	RET RB	
X X	.	X X	.	RETBBO	
X X	.	X X	.	RETEBO	
X X	.	X X	.	RETDROG	
X X X		X X X		(90°/fps) CHART	
X X		X X		DRE (90°) UPDATE	
POST BURN					
X X X		X X X		P 0.05G	
+	.	+	.	RTGO	EMS
+	.	+	.	VIO	
X X	.	X X	.	RET 0.05G	
X X	.	X X	.	RET 0.2G	
	.		.	DRE ±100 nm	N66
R R	/	R R	/	BANK AN	
X X	.	X X	.	RETRB	
X X	.	X X	.	RETBBO	
X X	.	X X	.	RETEBO	SEC
X X	.	X X	.	RETDROG TO MAIN	

DATE 9/4/72

BACK



COLOR \_\_\_\_\_

E.O. ENTRY UPDATE

L/5-8				E. O. ENTRY UPDATE			
X	-	X	-	AREA			
X X -	.	X X -	.	$\Delta V$ TAILOFF			
X X X	.	X X X	.	R 0.05G EMS			
X X X	.	X X X	.	P 0.05G			
X X X	.	X X X	.	Y 0.05G			
+	.	+	.	RTGO EMS			
+	.	+	.	VIO			
X X	.	X X	.	RET 0.05G			
0	.	0	.	LAT N61			
	.		.	LONG			
X X	.	X X	.	RET 0.2G			
	.		.	DRE (55°) N66			
R R	/	R R	/	BANK AN			
X X	.	X X	.	RET RB			
X X	.	X X	.	RETBBO			
X X	.	X X	.	RETEBO			
X X	.	X X	.	RETDRDG			
X X X	.	X X X	.	(90°/fps) CHART			
X X	.	X X	.	DRE (90°) UPDATE			
POST BURN							

X X X	.	X X X	.	P 0.05G			
+	.	+	.	RTGO EMS			
+	.	+	.	VIO			
X X	.	X X	.	RET 0.05G			
X X	.	X X	.	RET 0.2G			
	.		.	DRE $\pm 100$ nm N66			
R R	/	R R	/	BANK AN			
X X	.	X X	.	RETRB			
X X	.	X X	.	RETBBO			
X X	.	X X	.	RETEBO SEC			
X X	.	X X	.	RETDRDG TO MAIN			

DATE 9/4/72

## EARTH ORBIT BLOCK DATA

L/5-9

DATE 9/4/72

E.O. BLOCK DATA

X X	X X	+	AREA
X X X	X X X	-	LAT
X X	X X	-	LONG
			GETI
X X X	X X X	-	$\Delta V_C$
X X	X X	+	AREA
X X X	X X X	-	LAT
X X	X X	-	LONG
			GETI
X X X	X X X	-	$\Delta V_C$
X X	X X	+	AREA
X X X	X X X	-	LAT
X X	X X	-	LONG
			GETI
X X X	X X X	-	$\Delta V_C$
X X	X X	+	AREA
X X X	X X X	-	LAT
X X	X X	-	LONG
			GETI
X X X	X X X	-	$\Delta V_C$
X X	X X	+	AREA
X X X	X X X	-	LAT
X X	X X	-	LONG
			GETI
X X X	X X X	-	$\Delta V_C$
			REMARKS:

BACK



COLOR \_\_\_\_\_

E.O. BLOCK DATA

L/5-10

## EARTH ORBIT BLOCK DATA

X X			X X		-	AREA
X X X		.	X X X		.	LAT
X X		.	X X		.	LONG
.	.	.	.	.	.	GETI
X X X	.	.	X X X	.	.	$\Delta V_C$
X X			X X		-	AREA
X X X	.	.	X X X	.	.	LAT
X X		.	X X		.	LONG
.	.	.	.	.	.	GETI
X X X	.	.	X X X	.	.	$\Delta V_C$
X X			X X		-	AREA
X X X	.	.	X X X	.	.	LAT
X X		.	X X		.	LONG
.	.	.	.	.	.	GETI
X X X	.	.	X X X	.	.	$\Delta V_C$
X X			X X		-	AREA
X X X	.	.	X X X	.	.	LAT
X X		.	X X		.	LONG
.	.	.	.	.	.	GETI
X X X	.	.	X X X	.	.	$\Delta V_C$
X X			X X		-	AREA
X X X	.	.	X X X	.	.	LAT
X X		.	X X		.	LONG
.	.	.	.	.	.	GETI
X X X	.	.	X X X	.	.	$\Delta V_C$
REMARKS:						

DATE 9/4/72

## P30 MANEUVER

L/5-11

DATE 9/4/72

SET STARS				PURPOSE
				PROP/GUID
R ALIGN	+			WT N47
P ALIGN	0 0	.		P TRIM N48
Y ALIGN	0 0	.		Y TRIM
	+ 0 0			HRS GETI
	+ 0 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
	+		.	$H_A$ N44
			.	$H_P$
	+		.	$\Delta V_T$
HORIZON/WINDOW	X X X	.	.	BT
	X		.	$\Delta V_C$
	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
	+		.	VIO
				GET 0.05G

P30 MNVR PAD

BACK



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L  
5-12

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DATE 9/4/72

P30 MNVR PAD



L  
6-1

HYBRID RCS  
DEORBIT & ENTRY

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV

- 1 V37E 30E
- 2 F 06 33 GETI (hrs,min,.01sec)  
(ACCEPT) PRO  
(REJECT) LOAD DESIRED GETI
- 3 F 06 81 ΔVX,Y,Z (LV) (.1fps)  
(ACCEPT) PRO  
(REJECT) LOAD DESIRED DATA
- 4 F 06 42 HA,HP,ΔV (REQ) (.1nm,.1nm,.1fps)  
Record ΔV  
(ACCEPT) PRO  
(REJECT) Reselect P30 or P27. Load new param.
- 5 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)  
\*MGA -00002: if \*  
\* IMU not aligned\*  
Set DET  
PRO
- 6 F 37 00E
- 7 SEPARATION CK LIST  
PRIM GLY TO RAD - BYPASS (Pull)  
REPRESS PKG vlv - FILL to 865-935,  
then ON  
O2 SM SUPPLY vlv - OFF  
SURGE TK - ON (verify)  
CAB PRESS REL vlv (2) - NORM  
cb SECS ARM (2) - close (verify)  
cb SECS LOGIC (2) - close (verify)  
ROT CONTR PWR NORM (2) - AC/DC  
ABORT SYS PRPLNT - RCS CMD (verify)  
SM RCS SEC PRPLNT FUEL PRESS (4)-OPEN

DATE 9/4/72

BACK



COLOR \_\_\_\_\_

HYBRID RCS  
DEORBIT & ENTRY

8

L  
6-2

CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (verify)  
cb RCS LOGIC (2) - closed (verify)  
SC CONT - SCS  
MAN ATT (3) - MIN IMP  
RCS TRNFR - CM  
AUTO RCS SEL (RING 1) - OFF  
AUTO RCS SEL (RING 2) - MNB  
TEST RING 2 THRUSTERS  
AUTO RCS SEL (RING 1) - MNA  
AUTO RCS SEL (RING 2) - OFF  
TEST RING 1 THRUSTERS  
AUTO RCS SEL (RING 2) - MNB  
RCS TRNFR - SM  
MAN ATT (3) - RATE CMD

9

RCS THRUSTING PREP

Load DAP  
BMAG MODE (3) - RATE 2  
SC CONT - CMC/AUTO

10

MNVR TO PAD BURN ATT (HDS DN)

V49E

R \_\_\_\_\_ (0°)  
P \_\_\_\_\_ (180°)  
Y \_\_\_\_\_ (0°)

11

PERFORM BORESIGHT & SXT STAR CHECK

V41 N91E

Stow optics eyepieces

12

V25 N17E

(.01°)

Load Pad Data GMBL Angles  
for CM BURN ATT  
ATT SET tw - SET  
to PAD DATA GMBL ANGLES  
for CM BURN ATT

DATE 9/4/72

L  
6-3

13

PWR REDUCTION

MN BUS TIE (2) - ON  
HI GAIN ANT PWR - OFF  
FC PUMPS (3) - OFF  
FC 2 MNA - OFF  
Verify loads balanced  
VHF AM (A&B) - off (ctr)  
(5) cb ECS RAD CONT/HTR (2) - open  
cb RAD HTRS OVLD (2) - open  
cb WASTE H2O/URINE DUMP HTR (2)-open  
POT H2O HTR - OFF  
GLY EVAP TEMP IN - MAN

14

P41 - RCS THRUSTING  
V37E 41E

15 F 50 18 REQ MNVR TO BURN ATT (HDS DN) (.01°)  
(AUTO) BMAG MODE (3) - RATE 2  
SC CONT - CMC/AUTO

PRO

16 06 18 AUTO MNVR TO FDAI RPY (.01°)

17 F 50 18 REQ TRIM (.01°)

ALIGN SC ROLL  
(AUTO TRIM) PRO  
ATT DB - MIN  
RATE - LOW  
BMAG MODE (3) - ATT1/RATE 2  
If long Lambert (P37) burn  
BMAG MODE (3) - RATE 2

ENTR

DATE 9/4/72

DATE

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L  
6-4

18 55:00m 06 85 VG X,Y,Z (.1fps)

RECHECK BORESIGHT STAR  
TRANS CONTR PWR - on (up)  
EMS MODE - STBY (verify)  
EMS FUNC -  $\Delta V$  SET/VHF RNG  
SET  $\Delta V$  for SM BURN =  $\Delta V$  pad +100.0  
EMS FUNC -  $\Delta V$   
S BD OMNI ANT - C  
Cue MSFN  
SECS LOGIC (2) - on (up)(verify)  
MSFN confirm Go for PYRO ARM (if poss)  
SECS PYRO ARM (2) - ARM  
CM RCS LOGIC - on (up)  
PRIM GLY TO RAD - BYPASS (verify)  
MN BUS TIE (2) - ON (verify)

19 59:25 DSKY BLANKS

20 59:30 16 85 VG X,Y,Z (AVE G ON) (.1fps)  
RHC's & THC - ARMED  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
EMS MODE - NORMAL

DATE

DATE 9/4/72

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6-5

00:00  
21 F 16 85

REQ NULL VG X,Y,Z (.1fps)  
BURN EMS  $\Delta V$  CTR TO 100  
RESET DET & COUNT UP

1 min

RATE - HIGH  
SC CONT - SCS  
(8) cb ELS/CM-SM SEP (2) - close

CM/SM SEP (2) - on (up)  
MAN ATT PITCH - ACCEL CMD  
V63E (N17, CM BURN ATT)

\*If CMC NO GO:  
\* FDAI SOURCE - ATT SET\*  
\* FDAI SEL - 1 or 2 \*  
\* ATT SET - GDC \*

C&W MODE - CM  
RCS TRNFR - CM

Monitor V MNA/B:

\*If <25 vdc, go to EMERG POWER DOWN\*  
MNVR TO CM BURN ATT(NULL ERR NEEDLES)

R  $0^\circ$   
( $\theta \sim 290$ ) P  $\underline{\hspace{2cm}}$  ( $\sim 110^\circ$  from SM BURN ATT)  
Y  $0^\circ$   
CM RCS LOGIC - OFF

DATE 9/4/72

22

CM RCS BURN  
FDIAI SCALE - 5/5  
RHC #1-Continuous Pitch Down  
RHC #2-Modulate Pitch to null needles  
BURN VGZ TO ZERO  
\* If only 1 RHC: \*  
\* Pulse + P=5° from retro att\*  
\* Maintain rates <3°/sec \*

23

BURN COMPLETION AT:

$\Delta V$  CTR= \_\_\_\_\_ or DET= \_\_\_\_\_

DATE

L  
6-6

24

V82E

F 16 44 HA,HP,TFF (.1nm,min-sec)

Check HP <40nm:  
If > Pad data, continue burn  
until < Pad

PRO

25 F 16 85 VG X,Y,Z (.1fps)

Read VG residuals to MSFN  
PRO

26 F 37 00E

When CMC ACTY lt out:

V66E

EMS FUNC - OFF

EMS MODE - STBY

MAN ATT (3) - MIN IMP

TRANS CONT PWR - OFF

B MAG MODE (3) - RATE 2

cb DIRECT ULLAGE (2) - open

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

THC - LOCKED

27

EMS INITIALIZATION

\*If scroll not on 37K:\*

\* EMS FUNC - TEST 5 \*

\* Slew scroll to 37K \*

EMS FUNC - RNG SET

Set RNG to PAD DATA RNG

EMS FUNC - Vo SET

Slew scroll to PAD DATA VIO

EMS MODE - STBY (verify)

EMS FUNC - ENTRY

Verify .05G lt filter is down

DATE

DATE 9/4/72

L  
6-7

28

RSI ALIGNMENT

FDAI SOURCE - ATT SET  
ATT SET - GDC  
EMS ROLL - on (up)  
GDC ALIGN PB - PUSH & HOLD  
YAW tw - Position RSI to LIFT DN  
GDC ALIGN PB - RELEASE  
EMS ROLL - OFF  
ALIGN GDC TO IMU

P61 - ENTRY PREP

29

V37E 61E (AVE G ON)

\*05 09 01427 - ROLL REVERSED\*  
\*05 09 01426 - IMU UNSAT \*

30 F 06 61

IMPACT LAT, LONG, HDS UP/DN (+/-)  
(.01°,.01°,+00001)

PAD VALUES

LAT \_\_\_\_\_

LONG \_\_\_\_\_

HDS UP +1

PRO

31 F 06 60

GMAX,V400K,GAMMA EI (.01G, fps,.01°)

\*N60 not valid for \*  
\* earth orbit Entry\*

PRO

32 F 16 63

RTOGO (.1nm)

PAD \_\_\_\_\_

VIO (fps)

PAD \_\_\_\_\_

TFE (min-sec)

\*RTOGO & VIO not valid for\*  
\* earth orbit Entry \*

(ACCEPT) PRO

(RECYCLE) V32E to 31 (TFE accuracy is ±1 min)

DATE 9/4/72

DATE

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
6-8

P62 - CM/SM SEP & PRE-ENTRY MNVR

33 F 50 25 00041 REQUEST CM/SM SEP

MNVR TO ENTRY ATT  
R 180° (Lift DN)  
P  
Y 0°  
MAINTAIN HORIZ TRACK

PRO (Act ENTRY DAP Att Hold)

34 F 06 61 IMPACT LAT, LONG, HDS UP  
( $.01^\circ$ ,  $.01^\circ$ , +00001)

PRO (CMC Guidance)

35 POSS 06 22 FINAL ATT DISP, RPY (.01°)  
(Only if X-axis beyond 45° of Vel vector)

P63 - ENTRY INIT

36 06 64 G,VI,RTOGO (.01G,fps,.1nm)

FDAI SCALE - 5/5  
ROT CONTR PWR DIR (2) - MNA/MNB(verify)  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
HORIZ CK  
Pitch error needle goes toward  
zero approaching .05G time

DATE

DATE 9/4/72

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
6-9

P64 - ENTRY POST .05G

37      06 74      BETA, VI, G      (.01°,fps,.01G)  
                          Start DAC

RTOGO AT .05G AGREES WITH EMS-verify  
HORIZ CK

.05G time  
(+0 : : )  
( : : : )

EMS MODE - BACKUP/VHF RNG  
.05 G Lt - on  
.05 G sw - on (up)  
EMS ROLL - on (up)

Track horiz with 9° window mk  
Maintain SCS control,  
Lift DN until 1G

Compare RSI & FDAI  
EMS GO/NO GO  
G-V Plot within limits

DATE 9/4/72

DATE

L  
6-10

P67 - ENTRY - FINAL PHASE (0.2G)

38 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°,.1nm,.1nm)  
(+ is north & long)  
KEY VERB  
Record DNRNG ERR \_\_\_\_\_  
KEY RLSE  
Limit: +100nm from PAD DRE  
Monitor lift vector on RSI & FDAI

If CMC is GO:

MAN ATT (3) - RATE CMD

SC CONT - CMC

\*If DAP NO GO:

\* SC CONT - SCS

\* Fly BETA

\*If CMC NO GO:

\* SC CONT - SCS

\* Fly EMS

\*

\*

\*

\*

\*

\*

\*If after 1G, both RCS ring

\* He press <1650 psia:

\* Roll 20°/sec & disable RCS\*

\* After peak G, enable RCS

\* & fly BETA = 90°

\*

\*

\*

\*

\*

39 F 16 67 RTGO,LAT,LONG (Vrel=1000fps)  
(.1nm,.01°,.01°)

SC CONT - SCS

RTGO NEG - LIFT UP

RTGO POS - LIFT DOWN

Monitor altimeter

Record LAT,LONG,& voice to RECY at 10K'

Record EMS RTGO

EMS MODE - STBY

EMS FUNC - OFF

Stop DAC

DAC - T8

DATE 9/4/72

Go To EARTH/POST LANDING pg L/9-1

L  
7-1

SM RCS DEORBIT & ENTRY

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV  
1 V37E 30E

- 2 F 06 33 GETI (hrs,min,.01sec)  
(ACCEPT) PRO  
(REJECT) LOAD DESIRED GETI
- 3 F 06 81 ΔVX,Y,Z (LV) (.1fps)  
(ACCEPT) PRO  
(REJECT) LOAD DESIRED DATA
- 4 F 06 42 HA,HP,ΔV (REQ) (.1nm,.1nm,.1fps)  
Record ΔV \_\_\_\_\_  
(ACCEPT) PRO  
(REJECT) Reselect P30 or P27. Load new param.
- 5 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)  
\*MGA -00002: if \*  
\* IMU not aligned\*  
Set DET  
PRO
- 6 F 37 OOE
- 7 SEPARATION CK LIST  
PRIM GLY TO RAD - BYPASS (Pull)  
REPRESS PKG vlv - FILL to 865-935,  
then ON  
O2 SM SUPPLY vlv - OFF  
SURGE TK - ON (verify)  
CAB PRESS REL vlv (2) - NORM  
cb SECS ARM (2) - close (verify)  
cb SECS LOGIC (2) - close (verify)  
ROT CONTR PWR NORM (2) - AC/DC  
ABORT SYS PRPLNT - RCS CMD (verify)  
SM RCS SEC PRPLNT FUEL PRESS (4)-OPEN

DATE 9/4/72

SM RCS  
DEORBIT & ENTRY

BACK



COLOR \_\_\_\_\_

L  
7-2

8

CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (verify)  
cb RCS LOGIC (2) - closed (verify)  
SC CONT - SCS  
MAN ATT (3) - MIN IMP  
RCS TRNFR - CM  
AUTO RCS SEL (RING 1) - OFF  
AUTO RCS SEL (RING 2) - MNB  
TEST RING 2 THRUSTERS  
AUTO RCS SEL (RING 1) - MNA  
AUTO RCS SEL (RING 2) - OFF  
TEST RING 1 THRUSTERS  
AUTO RCS SEL (RING 2) - MNB  
RCS TRNFR - SM  
MAN ATT (3) - RATE CMD

SM RCS  
DEORBIT & ENTRY

9

RCS THRUSTING PREP

Load DAP  
BMAG MODE (3) - RATE 2  
SC CONT - CMC/AUTO

10

MNVR TO PAD BURN ATT (HDS DN)

V49E

R \_\_\_\_\_ (0°)  
P \_\_\_\_\_ (180°)  
Y \_\_\_\_\_ (0°)

11

PERFORM BORESIGHT & SXT STAR CHECK

V41 N91E

Stow optics eyepieces

12

P41 - RCS THRUSTING

V37E 41E

13

F 50 18      REQ MNVR TO BURN ATT (HDS DN)      (.01°)

(AUTO)      BMAG MODE (3) - RATE 2

SC CONT - CMC/AUTO

PRO

14

06 18      AUTO MNVR TO FDAI RPY

(.01°)

DATE 9/4/72

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
7-3

15 F 50 18 REQ TRIM (.01°)  
ALIGN SC ROLL  
(AUTO TRIM) PRO  
ATT DB - MIN  
RATE - LOW  
BMAG MODE (3) - ATT1/RATE 2  
If long Lambert (P37) burn  
BMAG MODE (3) - RATE 2  
ENTR

16 06 85 55:00m VG X,Y,Z (.1fps)  
RECHECK BORESIGHT STAR  
TRANS CONTR PWR - on (up)  
EMS MODE - STBY (verify)  
EMS FUNC -  $\Delta V$  SET/VHF RNG  
SET  $\Delta V$  for SM BURN =  $\Delta V$  pad  
EMS FUNC -  $\Delta V$   
S BD OMNI ANT - C

17 59:25 DSKY BLANKS

18 16 85 59:30 VG X,Y,Z (AVE G ON) (.1fps)  
RHC's & THC - ARMED  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
EMS MODE - NORMAL

19 F 16 85 00:00 REQ NULL VG X,Y,Z (.1fps)  
BURN EMS  $\Delta V$  CTR TO ZERO

20 V82E

F 16 44 HA,HP,TFF (.1nm,min-sec)  
Check HP <40nm:  
If > Pad data, continue burn  
until < Pad  
PRO

DATE 9/4/72

DATE

L  
7-4

21 F 16 85 VG X,Y,Z (.1fps)  
Read VG residuals to MSFN  
PRO

22 F 37 00E  
When CMC ACTY lt out:  
V66E  
EMS FUNC - OFF  
EMS MODE - STBY  
MAN ATT (3) - MIN IMP  
TRANS CONT PWR - OFF  
SC CONT - SCS  
BMAG MODE (3) - RATE 2  
cb DIRECT ULLAGE (2) - open  
TAPE RCDR - off (ctr)  
PCM BIT RATE - LOW

23 EMS INITIALIZATION  
\*If scroll not on 37K:\*  
\* EMS FUNC - TEST 5 \*  
\* Slew scroll to 37K \*  
EMS FUNC - RNG SET  
Set RNG to PAD DATA RNG  
EMS FUNC - Vo SET  
Slew scroll to PAD DATA VIO  
EMS MODE - STBY (verify)  
EMS FUNC - ENTRY  
Verify .05G lt filter is down

24 RSI ALIGNMENT  
FDAI SOURCE - ATT SET  
ATT SET - GDC  
EMS ROLL - on (up)  
GDC ALIGN PB - PUSH & HOLD  
YAW tw - Position RSI to LIFT DN  
GDC ALIGN PB - RELEASE  
EMS ROLL - OFF  
ALIGN GDC TO IMU

25 MNVR TO CM/SM SEP ATT  
MAN ATT (3) - RATE CMD  
RATE - HIGH  
YAW left 45° from Burn Att (315°)  
BMAG MODE (3) - ATT 1/RATE 2

DATE

DATE 9/4/72

L  
7-5

26

PWR REDUCT

MN BUS TIE (2) - ON

HGA PWR - OFF

FC PUMPS (3) - OFF

FC 2 MNA - OFF

Verify loads balanced

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

(5) cb ECS RAD CONT/HTR (2) - open

cb RAD HTRS OVLD (2) - open

cb WASTE H2O/URINE DUMP HTR (2)-open

POT H2O HTR - OFF

GLY EVAP TEMP IN - MAN

P61 - ENTRY PREP

27

V37E 61E (AVE G ON)

\*05 09 01427 - ROLL REVERSED\*

\*05 09 01426 - IMU UNSAT \*

28 F 06 61

IMPACT LAT, LONG, HDS UP/DN (+/-)

(.01°,.01°,+00001)

PAD VALUES

LAT \_\_\_\_\_

LONG \_\_\_\_\_

HDS UP +1 \_\_\_\_\_

PRO

29 F 06 60

GMAX,V400K,GAMMA EI

(.01G, fps,.01°)

\*N60 not valid for \*

\* earth orbit Entry\*

PRO

30 F 16 63

RTOGO (.1nm)

PAD

VIO (fps)

PAD \_\_\_\_\_

TFE (min-sec)

\*RTOGO & VIO not valid for\*

\* earth orbit Entry \*

(ACCEPT) PRO

(RECYCLE) V32E to 29 (TFE accuracy is ±1 min)

DATE 9/4/72

DATE

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
7-6

P62 - CM/SM SEP & PRE-ENTRY MNVR

31 F 50 25 00041 REQUEST CM/SM SEP

cb ELS/CM-SM SEP (2) - close  
PRIM GLY TO RAD - BYPASS (verify)  
EMS MODE - STBY (verify)  
CM RCS LOGIC - on (up)  
Cue MSFN  
SECS LOGIC (2) - on (up)(verify)  
MSFN confirm GO for PYRO ARM (if poss)  
SECS PYRO ARM (2) - ARM  
MN BUS TIE (2) - ON (verify)

CM/SM SEP (2) - on (up)  
\*If docking ring still on: \*  
\* cb CSM/LM FNL SEP (2) - close\*  
\* CSM/LM FNL SEP (2) - on(up) \*  
MAN ATT(3) - MIN IMP  
BMAG MODE(3) - RATE 2  
C&W MODE - CM  
RCS TRNFR - CM  
CM RCS MANF PRESS - 287-302 psia  
CM RCS LOGIC - OFF  
Monitor V MNA/B:  
\*If <25vdc go to EMERG POWER DOWN\*

YAW back to  $0^\circ$   
MNVR to ENTRY ATT  
R  $180^\circ$  (Lift DN)  
P  
Y  $0^\circ$   
MAINTAIN HORIZ TRACK

DATE

DATE 9/4/72

PRO (Act ENTRY DAP Att Hold)

32 F 06 61 IMPACT LAT, LONG, HDS UP  
( $.01^\circ$ ,  $.01^\circ$ , +00001)

PRO (CMC Guidance)

33 POSS 06 22 FINAL ATT DISP, RPY  
(Only if X-axis beyond  $45^\circ$  of Vel vector) ( $.01^\circ$ )

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
7-7

P63 - ENTRY INIT

34 06 64 G,VI,RTOGO (.01G,fps,.1nm)  
FDAI SCALE - 5/5  
ROT CONTR PWR DIR (2)-MNA/MNB(verify)  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
HORIZ CK  
Pitch error needle goes toward  
zero approaching .05G time

P64 - ENTRY POST .05G

35 06 74 BETA, VI, G (.01°,fps,.01G)  
Start DAC

.05G time  
(+0 : )  
( : : )

RTOGO AT .05G AGREES WITH EMS-verify  
HORIZ CK

EMS MODE - BACKUP/VHF RNG  
.05 G Lt - on  
.05 G sw - on (up)  
EMS ROLL - on (up)

Track horiz with 9° window mk  
Maintain SCS control,  
Lift DN until 1G

Compare RSI & FDAI  
EMS GO/NO GO  
G-V Plot within limits

DATE 9/4/72

DATE

L  
7-8P67 - ENTRY - FINAL PHASE (0.2G)

36 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°,.1nm,.1nm)  
(+ is north & long)  
KEY VERB  
Record DNRNG ERR \_\_\_\_\_  
KEY RLSE  
Limit: +100nm from PAD DRE  
Monitor lift vector on RSI & FDAI

If CMC is GO:

MAN ATT (3) - RATE CMD  
SC CONT - CMC

\*If DAP NO GO:  
\* SC CONT - SCS  
\* Fly BETA  
\*If CMC NO GO:  
\* SC CONT - SCS  
\* Fly EMS

\*If after 1G, both RCS ring  
\* He press <1650 psia:  
\* Roll 20°/sec & disable RCS\*  
\* After peak G, enable RCS \*  
\* & fly BETA = 90° \*

37 F 16 67 RTOGO,LAT,LONG (Vrel=1000fps)  
(.1nm,.01°,.01°)

SC CONT - SCS  
RTOGO NEG - LIFT UP  
RTOGO POS - LIFT DOWN  
Monitor altimeter  
Record LAT,LONG,& voice to RECY at 10K'  
Record EMS RTGO  
EMS MODE - STBY  
EMS FUNC - OFF  
Stop DAC  
DAC - T8

DATE 9/4/72

DATE

Go To EARTH/POST LANDING pg L/9-1

L  
8-1

SPS DEORBIT & ENTRY

VEHICLE PREP COMPLETE (pg L/5-1 or pg L/4-10)

P30 - EXTERNAL ΔV

- 1 V37E 30E
- 2 F 06 33 GETI (ACCEPT) PRO (REJECT) LOAD DESIRED GETI (hrs,min.,.01sec)
- 3 F 06 81 ΔVX,Y,Z (LV) (ACCEPT) PRO (REJECT) LOAD DESIRED DATA (.1fps)
- 4 F 06 42 HA,HP,ΔV (REQ) Set ΔV counter (ACCEPT) PRO (REJECT) Reselect P30 or P27. Load new param. (.1nm,.1nm,.1fps)
- 5 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)  
\*MGA -00002: If \*  
\* IMU not aligned\*  
Set DET  
PRO
- 6 F 37 OOE
- 6 SEPARATION CK LIST  
PRIM GLY TO RAD - BYPASS (pull)  
REPRESS PKG v1v - FILL to 865-935,  
then ON  
O2 SM SUPPLY v1v - OFF  
SURGE TK - ON (verify)  
CAB PRESS REL v1v (2) - NORM  
cb SECS ARM (2) - close (verify)  
cb SECS LOGIC (2) - close (verify)  
ROT CONTR PWR NORM (2) - AC/DC  
ABORT SYS PRPLNT - RCS CMD (verify)  
SM RCS SEC PRPLNT FUEL PRESS (4)-OPEN

DATE 9/4/72

SPS DEORBIT & ENTRY

BACK



COLOR \_\_\_\_\_

L  
8-2

7

CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (verify)  
cb RCS LOGIC (2) - closed (verify)  
SC CONT - SCS  
MAN ATT (3) - MIN IMP  
RCS TRNFR - CM  
AUTO RCS SEL (RING 1) - OFF  
AUTO RCS SEL (RING 2) - MNB  
TEST RING 2 THRUSTERS  
AUTO RCS SEL (RING 2) - OFF  
AUTO RCS SEL (RING 1) - MNA  
TEST RING 1 THRUSTERS  
AUTO RCS SEL (RING 2) - MNB  
RCS TRNFR - SM  
MAN ATT(3) - RATE CMD

8

SPS THRUSTING PREP

SPS GAUGING - AC1 (verify)  
PUG MODE - as req'd  
Load DAP  
BMAG MODE (3) - RATE 2  
SC CONT - CMC/AUTO

SPS DEORBIT & ENTRY

9

MNVR TO PAD BURN ATT (HDS UP)  
V49E

R \_\_\_\_\_ ( $180^\circ$ )  
P \_\_\_\_\_  
Y \_\_\_\_\_ ( $0^\circ$ )

10

PERFORM BORESIGHT & SXT STAR CHECK

V41 N91E

Stow Optics eyepieces

DATE 9/4/72

11

V37E 40E

12

F 50 18 REQUEST MNVR TO FDAI RPY ANGLES ( $.01^\circ$ )  
(AUTO) BMAG MODE (3) - RATE 2  
SC CONT - CMC/AUTO  
PRO

13

06 18 AUTO MNVR TO FDAI RPY ANGLES ( $.01^\circ$ )

L  
8-3

14 F 50 18 REQUEST TRIM MNVR TO FDAI RPY ANGLES  
ALIGN S/C ROLL (.01°)  
GDC ALIGN

TVC CHECK & PREP

(8) cb STAB CONT SYS (all) - close  
cb SPS (12) - close  
Set ΔVC (verify)  
EMS FUNC - ΔV (verify)  
MAN ATT (3) - RATE CMD  
ATT DB - MIN  
RATE - LOW  
SCS TVC (2) - RATE CMD  
ΔV CG - CSM  
TVC GMBL DRIVE P&Y - AUTO  
MN BUS TIE (2) - ON  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
SPS He v1vs (2) - AUTO  
Check N2A & N2B  
TVC SERVO PWR #1 - AC1/MNA  
TVC SERVO PWR #2 - AC2/MNB  
ROT CONTR PWR NORMAL (2) - AC  
ROT CONT PWR DIRECT (2) - OFF  
BMAG MODE (3) - ATT1/RATE 2  
SC CONT - SCS  
RHC #2 - ARMED

+54:00m  
(-06:00)

DATE 9/4/72

55:00m  
(-05:00)

PRIMARY TVC CHECK

GMBL MOT P1-Y1-START/ON (LMP Confirm)  
Verify TRIM CONTROL & SET  
Verify MTVC  
\*IF SCS: SCS TVC (2) - AUTO\*  
SC CONT - CMC (SCS)  
THC - CW  
Verify NO MTVC

SEC TVC CHECK

GMBL MOT P2-Y2-START/ON (LMP Confirm)  
SET GPI TRIM  
Verify MTVC  
THC NEUTRAL  
Verify NO MTVC

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
8-4

Verify GPI returns to 0,0(CMC)  
or trim (SCS)

ROT CONT PWR NORM (2) - AC/DC

ROT CONT PWR DIRECT (2) - MNA/MNB

(TRIM) BMAG MODE (3) - RATE 2

PRO

BMAG MODE (3) - ATT1/RATE 2

ENTR

15 F 50 25 00204 GMBL TEST OPTION  
(ACCEPT) SC CONT - CMC (verify)  
PRO

Monitor GPI Response:

00,02,-02,00,02,-02,00, Trim

\*TEST FAIL: \*

\*SC CONT - SCS \*

\*SCS TVC(2) - AUTO\*

(REJECT) ENTR

16 06 40 TFI, VG,  $\Delta$ VM (min-sec,.1fps)  
\*PROG ALARM - TIG Slipped \*  
\*V5N9E 01703 \*  
\*KEY RLSE TO 16 \*  
\*Burn can't be slipped >70sec\*  
FDAI SCALE - 5/1  
RATE - HIGH  
UPDATE DET

DATE

TIG-3 min

HORIZ CHK - Horiz on 3° window mk  
(hds up)(Limit +3° GNCS GO/NO-GO)  
\*If NO GO, set tw 180°,180°,0° \*  
\* Track horiz with 7° window mk\*  
\* (hds up) \*  
\* At TIG-2 min, Align GDC \*

59:00  
(-01:00)

EMS MODE - NORMAL  
TRANS CONTR PWR - on (up)  
 $\Delta$ V THRUST A(B) - NORMAL  
THC - ARMED  
RHC (2) - ARMED

59:25  
(-00:35)

DSKY BLANKS

DATE 9/4/72

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
8-5

59:30  
(-00:30) (AVE G ON)

06 40 TFI, VG,  $\Delta$ VM (min-sec,.1fps)  
CHECK PIPA BIAS <2fps for 5 sec

59:XX  
(-00:XX) ULLAGE  
Horiz on 15° window mark (hds up)  
\*If no ULLAGE:  
\* DIR ULLAGE PB - PUSH\*  
\* Control Att with RHC\*

MONITOR  $\Delta$ VM (R3) COUNTING UP

59:55  
(-00:05)  
F 99 40 ENG ON ENABLE REQUEST  
(AUTO IGN) PRO AT TFI >0 Sec  
(BYPASS IGN) ENTR to 19 (prfrm switching in 18)  
EXIT - V37E OOE

17 00:00 IGN \*IF SCS: THRUST PB - PUSH\*

06 40 TFC, VG,  $\Delta$ VM (min-sec,.1fps,.1fps)  
\*F 97 40 SPS Thrust fail \*  
\* $\Delta$ V THRUST B(A) - NORMAL \*  
\*(CONT GUDI) PRO to 06 40 \*  
\*(RECYCLE) ENTR to TIG-05sec\*

DATE 9/4/72

00:03 SPS THRUST Lt - ON  
 $\Delta$ V THRUST B(A) - NORMAL  
\*IF SCS: +X & THRUST PB - PUSH\*  
MONITOR THRUSTING  
Pc 95-105 psia  
EMS COUNTING DOWN  
SPS INJ VLVS (4) - OPEN  
SPS He v1vs tb-gray  
SPS FUEL/OXID PRESS - 170-195 psia  
PUGS - BALANCED

00:XX ECO

DATE

(TRIM FRONT PAGE ON SOLID CROP MARKS: BACK PAGE ON DASH CROP MARKS.)

L  
8-6

18 F 16 40 TFC (STATIC), VG,  $\Delta$  VM (min-sec,.1fps)  
 $\Delta$ V THRUST A&B - OFF

VERIFY THRUST OFF

SPS INJ VLVS (4) - CLOSED

SPS He v1vs tb (2) - bp

GMBL MTRS (4) - OFF (LMP Confirm)

TVC SERVO PWR 1&2 - OFF

PRO

19 F 16 85 VG XYZ (CM) (.1fps)

NULL RESIDUALS

TRANS CONTR PWR - OFF

cb DIRECT ULLAGE (2) - open

cb SPS P & Y (4) - open

RECORD  $\Delta$ V COUNTER & RESIDUALS  $\Delta$ VC

EMS FUNC - OFF

VGX \_\_\_\_\_

EMS MODE - STBY

VGY \_\_\_\_\_

PRO

VGZ \_\_\_\_\_

B MAG MODE (3) - RATE 2

TAPE RCDR - off (ctr.)

PCM BIT RATE - LOW

20 F 37 V82E

21 F 16 44 HA,HP,TFF (.1nm,min-sec)

PRO

22 F 37 OOE

23 When COMP ACTY lt out:  
V66E

24 MNVR TO CM/SM SEP ATT

SC CONT - SCS

YAW right 45° from Burn Att (315°)

B MAG MODE (3) - ATT 1/RATE 2

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8-7

25

PWR REDUCT

HI GAIN ANT PWR - OFF

FC PUMPS (3) - OFF

FC 2 MNA - OFF

Verify loads balanced

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

(5) cb ECS RAD CONT/HTR (2) - open

cb RAD HTRS OVLD (2) - open

cb WASTE H2O/URINE DUMP HTR (2)-open

POT H2O HTR - OFF

GLY EVAP TEMP IN - MAN

P61 - ENTRY PREP

26

V37E 61E (AVE G ON)

\*05 09 01427 - ROLL REVERSED\*

\*05 09 01426 - IMU UNSAT \*

27 F 06 61

IMPACT LAT, LONG, HDS UP/DN (+/-)

(.01°, .01°, +00001)

PAD VALUES

LAT

LONG

HDS DN -1

PRO

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28 F 06 60

GMAX, V400K, GAMMA EI

(.01G, fps, .01°)

\*N60 not valid for \*

\* earth orbit Entry\*

PRO

29 F 16 63

RTOGO (.1nm)

VIO (fps)

TFE (min-sec)

PAD

PAD       

\*RTOGO & VIO not valid for\*

\* earth orbit Entry \*

(ACCEPT) PRO

(RECYCLE) V32E to 28 (TFE accuracy is ±1 min)

DATE

L  
8-8

P62 - CM/SM SEP & PRE-ENTRY MNVR

30 F 50 25 00041 REQUEST CM/SM SEP

cb ELS/CM-SM SEP (2) - close  
PRIM GLY TO RAD - BYPASS (verify)  
EMS MODE - STBY (verify)  
CM RCS LOGIC - on (up)  
Cue MSFN  
SECS LOGIC (2) - on (up) (verify)  
MSFN confirm GO for PYRO ARM (if poss)  
SECS PYRO ARM (2) - ARM  
MN BUS TIE (2) - ON (verify)

CM/SM SEP (2) - on (up)  
\*If docking ring still on: \*  
\* cb CSM/LM FNL SEP (2) - close\*  
\* CSM/LM FNL SEP (2) - on(up) \*  
MAN ATT(3) - MIN IMP  
BMAG MODE(3) - RATE 2  
C&W MODE - CM  
RCS TRNFR - CM  
CM RCS MANF PRESS - 287-302 psia  
CM RCS LOGIC - OFF  
Monitor V MNA/B:  
\*If <25vdc go to EMERG POWER DOWN\*

YAW back to 0°  
MNVR to ENTRY ATT  
R 0° (Lift UP)  
P Horiz on 29° mark(400K)  
Y 0°  
MAINTAIN HORIZ TRACK

PRO (Act ENTRY DAP Att Hold)

31 F 06 61 IMPACT LAT, LONG, HDS DN  
(.01°, .01°, -00001)

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8-9

EMS INITIALIZATION

\*If scroll not on 37K:  
\* EMS FUNC - TEST 5  
\* Slew scroll to 37K \*

EMS FUNC - RNG SET  
Set RNG TO PAD DATA RNG  
EMS FUNC - Vo SET  
Slew scroll to PAD DATA VIO  
EMS MODE - STBY (verify)  
EMS FUNC - ENTRY  
Verify .05G lt filter is down

RSI ALIGNMENT

FDAI SOURCE - ATT SET  
ATT SET - GDC  
EMS ROLL - on(up)  
GDC ALIGN PB - PUSH & HOLD  
YAW tw - Position RSI thru 45° &  
back to LIFT UP  
GDC ALIGN PB - RELEASE  
EMS ROLL - OFF  
Align GDC to IMU

PRO (CMC Guidance)

DATE 9/4/72      32 POSS 06 22 FINAL ATT DISP, RPY (.01°)  
(Only if X-axis beyond 45° of Vel vector)

P63 - ENTRY INIT

33        06 64      G,VI,RTGO      (.01G,fps,.1nm)  
                FDAI SCALE - 5/5  
                ROT CONTR PWR DIR (2)-MNA/MNB(verify)  
                TAPE RCDR - HBR/RCD/FWD/CMD RESET  
                HORIZ CK - 29° mark  
                Pitch error needle goes toward  
                zero approaching .05G time

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L  
8-10

P64 - ENTRY POST .05G

34      06 74      BETA, VI, G      (.01°,fps,.01G)  
Start DAC

RTOGO AT .05G AGREES WITH EMS-verify  
HORIZ CK - 29° mark

.05G time  
(+0 : )  
( : : )

EMS MODE - BACKUP/VHF RNG  
.05 G Lt - on  
.05 G sw - on (up)  
EMS ROLL - on (up)

If CMC is GO:

MAN ATT (3) - RATE CMD  
SC CONT - CMC

\*If DAP NO GO:

\* SC CONT - SCS

\* Fly BETA

\*If CMC NO GO:

\* SC CONT - SCS

\* Track horiz with 29°

\* window mk

\* Maintain Lift UP until .2G\*

\* Fly EMS

\* \* \* \* \*

Compare RSI & FDAI

\*If CMC or PAD cmds Lift DN,\*

\* MNVR Lift DN

EMS GO/NO GO

G-V Plot within limits

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L  
8-11

P67 - ENTRY - FINAL PHASE (0.2G)

35 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°,.1nm,.1nm)  
(+ is north & long)

KEY VERB

Record DNRNG ERR \_\_\_\_\_

KEY RLSE

Limit: +100nm from PAD DRE

Monitor lift vector on RSI & FDAO

- \*If after 1G, both RCS ring \*
- \* He press <1650 psia: \*
- \* Roll 20°/sec & disable RCS\*
- \* After peak G, enable RCS \*
- \* & fly BETA = 90° \*

36 F 16 67 RTGO,LAT,LONG (Vrel=1000fps)  
(.1nm,.01°,.01°)

SC CONT - SCS

RTGO NEG - LIFT UP

RTGO POS - LIFT DOWN

Monitor altimeter

Record LAT,LONG,& voice to RECY at 10K'

Record EMS RTGO

EMS MODE - STBY

EMS FUNC - OFF

Stop DAC

DAC - T8

Go To EARTH/POST LANDING pg L/9-1

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EARTH/POST LANDING

L  
9-1

- RRT Start Watch
- 90K'(  :) STEAM PRESS - pegged at ~ 90K (00:00)
- 50K'(  :) CABIN PRESS REL vlv (2) - BOOST/ENTRY(00:52)
- SECS PYRO ARM (2) - ARM (verify)
- Check Altimeter
- 40K'(  :) \*If CM unstable: \* (01:06)  
\* RCS CMD - OFF  
\* 40K' APEX COVER JETT PB-PUSH\*  
\* (wait 2 sec)  
\* DROGUE DEPLOY PB - PUSH
- 30K' ELS LOGIC - on (up) (01:24)  
ELS - AUTO
- Start DAC
- 24K'(  :) RCS disable (auto) (01:37)  
\*RCS CMD - OFF\*
- Apex cover jett (auto)  
\*APEX COVER JETT PB - PUSH\*  
(wait 2 sec)
- Drogue parachutes deployed (auto)  
\*DROGUE DEPLOY PB - PUSH\*
- \*If Both Drogues Fail: \*  
\* ELS - MAN  
\* Stabilize CM (DIRECT RCS)\*  
\* 5K' MAIN DPLY PB - PUSH \*  
\* ELS - AUTO \*
- 23.5K' Cabin Pressure increasing  
\*If not increasing by 17K': \*  
\* CABIN PRESS REL vlv (RH) - DUMP\*
- CM RCS PRPLNT (2) - OFF
- 10K'(  :) Main chutes deployed (Drogues +46 sec)(02:25)  
(Cab Press MAIN DEPLOY PB - PUSH  
= 10 psia)

EARTH/POST LANDING

L  
9-2

SURGE TK 02 vlv - OFF (if unsuited)  
REPRESS PKG vlv - OFF (if unsuited)

VHF ANT - RECY  
VHF AM A - SIMPLEX  
VHF BCN - ON  
CABIN PRESS REL vlv (RH) - DUMP  
Stow DAC  
STRUT LOCKS (4) - UNLOCK

If night landing:

cb FLOAT BAG #3, FLT/PL (1 cb) - close  
PL BCN LT - LOW

- (275) cb FLT & PL BAT BUS A,B,&BAT C (3) - close  
cb FLT & PL MNA & B (2) - open  
(5) cb BAT RLY BUS (2) - open  
cb RAD HTRS OVLD (2) - open (verify)  
(8) cb SPS P&Y (4) - open (verify)

ELS - AUTO (verify)  
ELS LOGIC - on (up) (verify)  
FLOOD Lts - POST LDG

800' CAB PRESS RELF vlv (2) - CLOSE (latch off)  
DIRECT 02 vlv - OPEN (CCW) (if suited)  
MN BUS TIE (2) - OFF

POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

- 1 Stabilization after landing  
(229) cb MAIN REL PYRO (2) - close  
MAIN RELEASE - on (up)  
SECS PYRO ARM (2) - SAFE  
SECS LOGIC (2) - OFF  
\*If no contact with recovery forces:  
\* VHF AM A&B - off (ctr) \*  
\* VHF AM RCV ONLY - A \*

\*If B SIMPLEX or A DUPLEX req'd  
\* Turn BCN off during Comm \*

NASA — MSC

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9-3

- (8) cb PL VENT - close  
cb FLOAT BAG (3) - close  
(278) 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 (night landing)  
PL VENT vlv - UNLOCK (Pull into detent)  
Remove PL VENT Exh Cover  
PL VENT - HIGH or LOW  
If dye marker req'd:

PL DYE MARKER - ON

Release restraints

- (275) cb MNA BAT BUS A & BAT C (2) - open  
cb MNB BAT BUS B & BAT C (2) - open  
cb FLT & PL BAT C - open  
(250) cb PYRO A SEQ A - open  
cb PYRO B SEQ B - open  
Verify voltage > 27.5 vdc  
\*If < 27.5 vdc: \*  
\* 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'd

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NOMINAL EGRESS & POWER DOWN

- PL VENT - OFF  
cb Pn1 250 (all) - open  
Charge hatch counterbalance  
Open side hatch (after collar installed)  
ACTR HNDL SEL - N  
GN2 vlv HNDL - VENT (pull)  
GN2 vlv HNDL - PRESS (push)  
Check Pressure Gauge (mid-white)  
\*repeat vent/press to obtain mid-white\*

L  
9-4

### UNAIDED EGRESS PROCEDURES

#### PREPARATION

Disconnect umbilicals  
Neck dams on (if suited)  
Configure couch(s) - 270°  
Armrests stowed  
Unstow survival kits  
Connect lanyards, (green to S/C, white to crew)

#### STABLE I

PL VENT - OFF  
cb Pn1 250 (all) - open  
Charge hatch counterbalance  
Open side hatch  
ACTR HNDL SEL - N  
GN2 vlv HNDL - VENT (pull)  
GN2 vlv HNDL - PRESS (push)  
Check Pressure Gauge (mid-white)  
\*repeat vent/press to obtain mid-white\*  
Remove raft from kit No. 2  
Put raft overboard & pull inflation lanyard  
Pass hardware kit to raft  
Egress, inflate life vest, board raft  
\*If no ventilation or CM O2 supply:  
\* Open side hatch, as req'd \*

#### STABLE II

PWR (3) - OFF  
SUIT PWR (3) - OFF  
PRESS EQUAL vlv - OPEN  
Remove & stow hatch  
Lower hardware rucksack down tunnel  
Exit feet first; when clear of S/C inflate  
water wings  
Remove life raft from kit No. 2 and inflate  
\*If no ventilation or CM O2 supply:  
\* Initiate egress within 2-1/2 hrs\*

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9-5

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 Trncvr (VOICE)

\*If VHF Beacon not operating:

\* Open VHF ant access pn1. Connect \*

\* Survival Trncvr cable conn J1 to \*

\* bcn ant cable conn P112 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)

POSTLANDING VENT SYS: minimize use

SURV RADIO - Open VHF ant access pn1.

Connect cable conn J1 to bcn ant

cable conn P112 and place radio in

BCN mode

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DATE

EMER  
1-1

EMERGENCY PROCEDURES  
(Flight copies only)

EMERGENCY PROCEDURES

See CSM SYSTEMS CHECKLIST

BACK



COLOR \_\_\_\_\_

EMER  
1-2

EMERGENCY PROCEDURES

See CSM SYSTEMS CHECKLIST