

NORMAL SC/BOOSTER SEPARATIONS1 PRE CSM SEPARATION

DIRECT O2 vlv - OPEN until

CAB PRESS = 5.7, then close

cb DOCK PROBE (2) - close (verify)

COAS PWR - on

ALIGN GDC

SIVB MNVR ( : : )  
SEP ( : : )

\*If LV GUID - CMC: \*

\* Mnv to SEP ATT \*

\* Do not reload DAP\*

Load RCS DAP

R1=11103, R2=01111

V46E

OMNI ANT-C

Load N17 (SEP) &amp; N22 (EXTRACTION)

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

\*If error needles not nulled: \*

\* V60E (SIVB +1.8°db) \*

\* V16 N20E \*

\* R22 = 300° - R20 \*

\* P22 = P20 + 180° \*

\* Y22 = 360° - Y20 \*

\* R P Y \*

\*N20 \_\_\_\_\_ \*

\* \_\_\_\_\_ \*

\*N22 \_\_\_\_\_ \*

\* \_\_\_\_\_ \*

\*Load new Docking Attitude \*

Moon  
out  
CMD

NORM SC/BOOSTER SEP

DATE 12/13/71

2 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 ΔVC to -100.0

EMS FUNC - ΔV

FDAI 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)  
 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 vlv - 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

59:30 Start DET

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

V62E  
 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 =  $-8^\circ$ , Y =  $+294^\circ$   
 S BD ANT OMNI - HI GAIN  
 HI GAIN ANT TRACK - REACQ  
 TV TRANSMIT/STBY sw - TRANSMIT  
 Start DAC

3/29/72  
 37772  
 DATE

5 DOCKING

Stabilize &amp; align CSM

BMAG MODE (3) - ATT 1/RATE 2

At capture:

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

- 7 EQUALIZE CM/LM PRESSURE (Deca1) (pg S/2-4)
- 8 REMOVE TUNNEL HATCH (Deca1) (pg S/2-5)
- 9 VERIFY DOCKING LATCHES (Deca1) (pg S/2-10)
- 10 CONNECT LM UMBILICALS (Deca1) (pg S/2-11)
- 11 INSTALL TUNNEL HATCH (Deca1) (pg S/2-8)

LM TUNL VENT vlv - LM/CM  $\Delta P$  (verify hatch integrity)  
TUNNEL LIGHTS - OFF

12 PRE LM SEP & EJECTION

**cb SIVB/LM SEP (2) - close (verify)**

$\Delta V$  CG - LM/CSM (verify)

EMS FUNC -  $\Delta V$  SET/VHF RNG

Slew  $\Delta V$  ind to +100.0

EMS FUNC -  $\Delta V$

TAPE RCDR - HBR/RCD/FWD/CMD RESET

DAC - 6 fps

Load RCS DAP 21101, X1111,  $LOAD P_{min} + 1.25, Y_{min} - 0.12$

Load N22 att (monitor APS mnvr, hatch window)

90.0°, 325.5°, 355.9°

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  $\Delta V_{X,Y,Z}$

(.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 OMC Acty 1t out,  
Key V66E, **V49 MINVR ASAP AFTER 30 SEC**  
SECS PYRO ARM (2) - SAFE  
SECS LOGIC (2) - OFF  
cb SECS ARM (2) - open  
cb SIVB/LM SEP (2) - open  
O2 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  
O2 HTR 3 - OFF

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	74.3°	310.3°	0.0°*
* 30:00	90.0°	325.4°	2.1°*

cb DIRECT ULLAGE (2) - open (verify)  
 TRANS CONT PWR - OFF  
 ROT CONTR PWR DIR (2) - OFF  
 RHC & THC - LOCKED  
 REPRESS PKG vlv - OFF  
 cb 02 ISOL/AUX BAT - open

\*If no TLI: \*  
 \* SIVB - CSM/LM SEP (Earth orbit) \*  
 \* \* \* \* \*  
 \* Inertial Att \*  
 \* min-sec Event R P Y \*  
 \* \* \* \* \*  
 \*00:00 Ejection 301.2° 325.5° 40.9° \*  
 \* \* \* \* \*  
 \*00:05 3 sec -X \*  
 \* \* \* \* \*  
 \*00:22 Mnvr 90.0° 325.5° 355.9° \*  
 \* \* \* \* \*  
 \*03:00 6 sec -X \*

DATE 3/7/72