

APOLLO 16

**CSM LAUNCH CHECKLIST**

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APOLLO 16  
CSM LAUNCH CHECKLIST

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PREPARED BY:

Dennis L. Bentley  
DENNIS L. BENTLEY  
BOOK MANAGER

APPROVED BY:

C. C. Thomas  
C. C. THOMAS, CHIEF  
GUIDANCE & CONTROL PROCEDURES SECTION  
CREW PROCEDURES DIVISION

It is requested that any organization having comments, questions, or suggestions concerning this document contact Dennis L. Bentley, Systems Procedures Branch, CG221, Building 4, room 253, telephone 483-2651.

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LIFTOFF CONFIGURATIONPANEL 1

EMS FUNC -  $\Delta V$   
EMS MODE - STBY  
GTA - off (down)  
EMS GTA COVER - Secure  
CMC ATT - IMU  
FDI SCALE - 5/5  
FDI SEL - 1/2  
FDI 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)  
 $\Delta V$  THRUST (2) - OFF (guarded)  
SCS TVC PITCH - AUTO  
SCS TVC YAW - AUTO  
SPS GMBL MOT PITCH (2) - OFF  
SPS GMBL MOT YAW (2) - OFF  
 $\Delta V$  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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a/Pc IND sw - a  
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 v1v - 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

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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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~~ SEC  
PUG MODE - ~~NORM~~ PRIM  
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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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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SPS GAUGING - AC1  
TELCOM GRP 1 - AC1  
TELCOM GRP 2 - AC2  
GLY PUMPS - 1 - AC1

SUIT COMPR 1 - AC1  
SUIT COMPR 2 - OFF  
cb Panel 4 - all closed

PANEL 5

FC1 PUMPS - AC1  
FC2 PUMPS - AC2  
FC3 PUMPS - AC2  
G/N PWR - AC1  
MN BUS TIE (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

PANEL 7

EDS PWR - on (up)  
SCS TVC SERVO PWR #1 - AC1/MNA  
SCS TVC SERVO PWR #2 - AC2/MNB  
FDAA/GPI PWR - BOTH  
LOGIC 2/3 PWR - on (up)

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SCS ELEC PWR - GDC/ECA

SCS SIG CONDR/DR BIAS 1 - AC1

SCS SIG CONDR/DR BIAS 2 - AC2

BMAG PWR (2) - ON

DIRECT 02 vlv - OPEN (CCW) (>2 in H<sub>2</sub>O on SUIT/CAB ΔP ind)  
(02 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

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)

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

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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

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

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  
GAMMA RAY BOOM DPLY - off (ctr)  
GAMMA RAY BOOM DPLY tb - gray  
GAMMA RAY BOOM JETT - off (down)  
GAMMA RAY BOOM JETT tb - gray  
MASS SPECT BOOM DPLY - off (ctr)  
MASS SPECT BOOM DPLY tb - gray  
MASS SPECT BOOM JETT - off (down)  
MASS SPECT BOOM JETT tb - gray  
MAP CAMR IMAGE MTN - OFF  
LASER ALTM - OFF  
GAMMA RAY EXP - OFF  
MASS SPECT EXP - OFF  
MASS SPECT ION SOURCE - OFF  
DATA SYS ON - OFF  
DATA SYS CAL - off (down)  
GAMMA RAY GAIN - ctr  
MASS SPECT MULT - LO  
MASS SPECT DSCRM - HI

PAN CAMR SELF TEST - off (ctr)

PAN CAMR STEREO - STEREO

α RAY/X DR - α OFF

SUB SAT - off (ctr)

SUB SAT tb - gray

PAN CAMR MODE - STBY

PAN CAMR OPR tb - gray

PAN CAMR PWR - BOOST

~~PAN CAMR EXPOSURE - OFF~~ PAN CAMR V/h OVRD - OFF(ctr)

X RAY - 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 vlv - OFF

### PANEL 252

BAT VENT vlv - CLOSED

WASTE STOWAGE VENT vlv - VENT

### PANEL 275

cb Panel 275 - all closed except:

cb MNA BAT C - open

cb MNB BAT C - open

cb FLT/PL BAT BUS A - open

cb FLT/PL BAT BUS B - open

cb FLT/PL BAT C - open

### PANEL 276

cb Panel 276 - all closed

### PANEL 277

cb Panel 277 - all open

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PANEL 278

cb Panel 278 - all closed except:  
  cb UPRT SYS COMPR (2) - open  
MAP CAMR/LASER EXP COVERS - ctr  
MAP CAMR/LASER EXP COVERS tb - gray  
ALPHA/X-RAY EXP COVERS - ctr  
ALPHA/X-RAY EXP COVERS tb - gray  
SM PWR SOURCE - FC2 (guarded)  
02 TK 3 ISOL vlv - off (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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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 vlv (RH) - BOOST/ENTRY  
CAB PRESS RELF vlv (LH) - BOOST/ENTRY  
PRIM GLY TO RAD vlv - BYPASS (pull)

PANEL 326

REPRESS PKG vlv - ON  
SM 02 SUPPLY vlv - ON  
SURGE TK 02 vlv - ON  
GLY RSVR IN vlv - OPEN  
GLY RSVR BYPASS vlv - CLOSE  
GLY RSVR OUT vlv - OPEN

PANEL 350

CO2 CSTR DIVERT vlv - both (center)

PANEL 351

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

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PANEL 352

WASTE TK SERVICING v1v - CLOSE  
PRESS RELF v1v - RELF  
POT TK IN v1v - OPEN  
WASTE TK IN v1v - AUTO

PANEL 375

SURGE TK PRESS RELF v1v - open (CW)

PANEL 376

PLVC - NORMAL (up)

PANEL 377

GLY TO RAD SEC v1v - BYPASS (CCW)

PANEL 378

PRIM GLY ACCUM v1v - open (CCW)

PANEL 379

PRIM ACCUM FILL v1v - OFF (CW)

PANEL 380

O2 DEMAND REG v1v - BOTH  
SUIT TEST v1v - OFF  
SUIT CKT RET v1v - close (push)

PANEL 382

SUIT HT EXCH PRIM GLY v1v - FLOW (CCW)  
SUIT FLOW RELF v1v - OFF  
PRIM GLY EVAP IN TEMP v1v - MIN (CCW)  
SUIT HT EXCH SEC GLY v1v - FLOW (CCW)  
SEC EVAP H2O CONT v1v - AUTO (CW)  
PRIM EVAP H2O CONT v1v - AUTO (CW)  
H2O ACCUM v1v (2) - RMTE (CCW)

PANEL 600

EMER 02 vlv - CLOSE

PANEL 601

REPRESS 02 vlv - CLOSE

PANEL 602

REPRESS 02 RELF vlv - OPEN (CW)

PANEL 603

EVA STA 02 SUP - OFF

PANEL 604

SUIT PRESS ALARM - OFF

FWD HATCH

PRESS EQUAL vlv - CLOSE

ACTR HNDL sel - stow/check locked

SIDE HATCH

CAB PRESS DUMP vlv - close (CW)

GEAR BOX sel - LATCH

ACTR HANDLE sel - UNLATCH

LOCK PIN REL KNOB - LOCK

LOCK PIN ind - flush

GN2 VLV HANDLE - outboard

BPC JETT KNOB - toward BPC JETT

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\* - last momentary position before liftoff.

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  
 a/PC IND sw - a

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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  
FDAI 2 Total att - no motion  
GDC ALIGN pb - release

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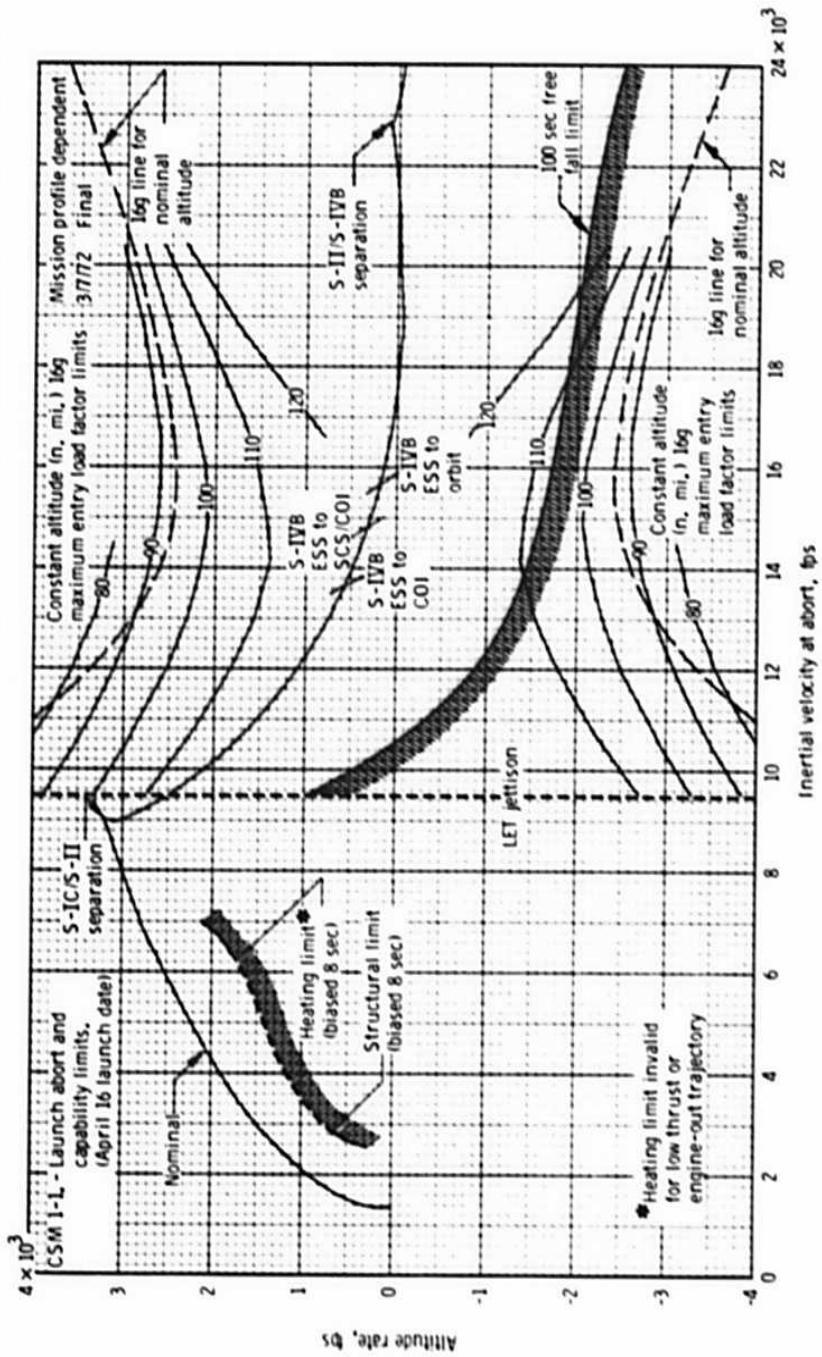
**SATURN BOOST**      3/8/72  
 APR 16

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

DATE 3/7/72<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)

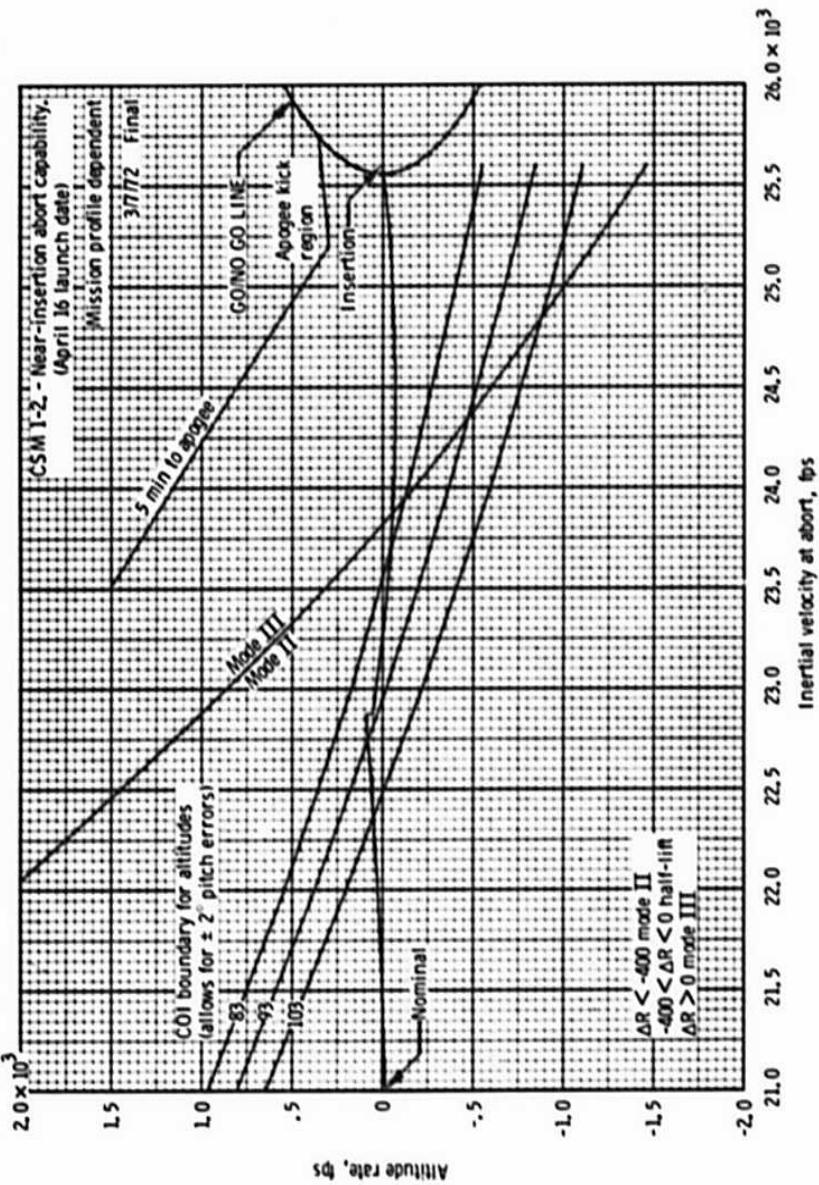
LAUNCH TRAJECTORY

## LAUNCH ABORT

L  
2-4

Launch abort and capability limits.

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Near-insertion abort capability.

CSM 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

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

BOOST

-00:09 Ignition CMD  
-00:01 L/V ENGINES 1ts (5) - out  
00:00 LIFTOFF 1t - on

00:00

- \*LIFTOFF VERIFIED:  
\* If LIFTOFF 1t off - push \*  
\* If NO AUTO ABORT 1t on - push\*

Clock Running (auto) - report

MET Resets & starts counting up auto  
P11 auto

+4°/sec P,Y  
+20°/sec R

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

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

MODE IA

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

+00:50 Monitor q<sub>a</sub> to T +02:00  
(100%, 5° Att error)

CABIN PRESSURE DECREASING ~14K(2.3 nm)

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

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

01:01

MODE IB

+4°/sec P,Y  
+20°/sec R

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

H=16.5 nm

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BOOST

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

$+9^\circ/\text{sec}$  P,Y  
 $\pm 20^\circ/\text{sec}$  R

■+02:18 GO/NO GO FOR STAGING - report  
INBOARD CUTOFF - (lt 5 on)  
 LIFTOFF lt - 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 lt - on  
 +02:44 SII 65% - 1ts out

MODE IC

+03:12 SII SEP lt - out report

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

TWR JETT

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

$\alpha/P_c$  sw -  $P_c$   
 MAN ATT PITCH - RATE CMD  
Twr Jett & MODE II - Report  
 GLY EVAP STEAM PRESS - AUTO  
 GLY EVAP H2O FLOW - AUTO

MODE II

+03:22 Guidance Initiate - report (OECO +41sec)  
 +03:52 Guidance Good  
 +04:00 Report Status  
 +05:00 Report Status  
 +05:55 SIVB to COI  
 +06:00 Report Status

GMBL MOT (4) - START - ON (LMP Confirm)  
 Check GPI  
 LV/SPS IND - GPI (Momentarily)  
 PITCH =  $-0.47^\circ - 0.53^\circ$   
 YAW =  $+1.90^\circ$

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3/7/72

+06:15 OMNI ANT - D (AZ < 96°)  
           - C (AZ > 96°)

+06:45 SIVB to orbit

+07:00 Report Status

+07:41 IECO (1t 5 - on)

+08:00 Report Status

+08:17 PU SHIFT

+08:30 GO/NO GO FOR STAGING - report

+08:34 Level sense arm \_\_\_\_\_

+09:15 Mode IV - Report  
           (VI ~ 22,704, H DOT ~ +72,  
           H ~ +94)

+09:18 Report Status

+09:19 OECO (1ts on)

+09:19 SII Staging - 1ts out

+09:20 SIVB Ign Cmd - 1t on

+09:22 SIVB 65% - 1t out

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

+11:00 Report Status

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

~09:15

~10:19

MODE III      MODE IV

↓                ↓

INSERTION

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

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

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

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

L  
2-20

## P27 UPDATE

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

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COMMENTS	CM	RCS	PURPOSE
	RCS/MAN	PROP/GUID	
① EMS OV will count from 100 to 128.6 %	+ 6 6 9 7 1	V.T N47	
	0 0 .NA	" 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	ΔV X N81	
	+ 0 0 0 0.0	ΔV Y	
	+ 0 0 1 9.2	ΔV Z	
② TERMINATE BURN AT N85 $\psi_B = 0$ (R3) AND N44 $hp < 45$ (R2)	X X X 1 8 0	R	
OR CM-RCS PRESSURE 1450 AND $hp < 56$ (FOR CAPTURE)	X X X 2 8 9	P	
	X X X 0 0 0	Y	
③ GO TO SINGLE RING AFTER BURN	+ NA .	H A N44	
	+ 0 0 4 5.0	H P	
	+ 0 0 9 0.0	ZVT	
	X X X 2.1 8	BT	
	X 0 0 0 0.0	ΔVC *	
	X X X .X NA	SXTS	
	+ NA . 0	SFT	
	+ NA . 0 0	TRN	
④ TRACK HORIZON (HEADS UP) WITH 9° WINDOW MARK	X X X NA	BSS	
	X X NA .	SPA	
	X X X NA .	SXP	
⑤ R .05g ≈ 180	- 0 0 1.5 1	LAT N61	
P .05g ≈ 281	- 1 5 9.5 4	LONG	
Y .05g ≈ 000	+ NA .	RTGO EMS	
⑥ FLY LEFT DOWN (HEADS UP)	+ 2 5 7 0 0	V10	
To 1g THEN ROLL	0 0 1 1 2 5 2	GET 0.05G	
⑦ PWR Down after Deorbit Burn			

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\*  
BMAG MODE (3) - ATT 1/RATE 2  
(326) 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  
  
Go to step 22, pg L/6-5 & continue in C/L  
00:00 CM RCS BURN  
  
Perform single ring rolling Entry

INSERTION AND SYSTEMS CHECKS

- 1 GMBL MTRS (4) - OFF (LMP confirm)  
 EDS PWR - OFF  
 TVC SERVO PWR (2) - OFF  
 SECS PYRO ARM (2) - SAFE  
 SECS LOGIC (2) - OFF  
 cb SECS ARM (2) - open  
 cb DIRECT ULLAGE (2) - open  
 cb ELS/CM-SM SEP (2) - open  
 cb FLT/PL VENT - open  
 MN BUS TIE (2) - OFF(LMP)  
 EMS FUNC - OFF  
 TRANS CONT PWR - OFF  
 ROT CONTR PWR DIRECT(2) - OFF  
 BMAG MODE (3) - RATE 2  
 CM RCS LOGIC - OFF  
 LV STAGE sw - OFF (verify)  
 RHC #1 & #2 - LOCKED  
 CAB PRESS REL v1v (2) - NORMAL/LATCHED  
 REPRESS PKG v1v - OFF  
 DIRECT O2 v1v - CLOSE  
 cb ECS XDUCR PRESS GRP 2 MNA - close  
 INSTALL COAS

## MONITOR LV TANK PRESS

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

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(00:16:46)

NOTE: Steps 2 thru 30 are not sequential

- CMP 2
- 2 SM RCS HTRS (4) - PRIM  
 C/W - NORMAL  
 BPC JETT KNOB - 180° from BPC JETT  
 GN2 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  
CMP 2 SM RCS IND - He TK TEMP  
 RCS IND sel - SM A, B, C, D  
 PKG TEMP - 115°-175° F (C/W 75°-205°)  
 He PRESS - 4100-4200 psia  
 MANF PRESS - 192-207 psia (C/W 145-215 psia)  
 He TK TEMP - 60°-90°F

6 CM RCS MONITORING CHECK

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

7 C/W OPERATIONAL CHECK

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

8 CMP to LEB for MN REG CHECK

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

9 Confirm normal suit and cabin pressure

If cabin press > 5.3:  
 O2 flow - 0.2 lb/hr  
 If 4.7 < cabin press < 5.3:  
 O2 flow - pegged lo or hi, ~0.7 lb/hr stable  
 EMERG CABIN PRESS vlv - BOTH  
 SUIT CKT RET vlv - open (pull)  
 Install CM5 Window Cover  
 Remove helmet & gloves & stow in PGA bag  
 Unstow & mount TSB's (U1)

10 MAIN REG CHECKCMP 5

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

11 SEC RAD LEAK CHECKCMP 6

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

+20:00 12

ECS Post Insertion Config

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

ECS RAD tb - gray

GLY EVAP TEMP IN - AUTO

POT H2O HTR - MNA

13 PCM BIT RATE - LOWCYI LOS  
(00:23:30)

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

14 FC PURGE CHECK

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

15 EPS MONITORING CHECK

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

## FC Power Plant Check

FC HTRS(3) - on(up)  
FC RAD tb (3) - gray  
FC REAC tb (3) - gray  
FC IND sel - 1, 2, 3

H2 FLOW - 0.03-0.15 lb/hr  
O2 FLOW - 0.25-1.2 lb/hr  
MOD SKIN TEMP - 390-440° F  
MOD COND EXH TEMP - 150-175° F  
FC pH HI tb - gray  
FC RAD TEMP LO tb - gray

## D-C Voltage-Amperage Check

MN BUS TIE (2) - OFF (verify)

FC MNA tb - 1 & 2 gray, 3 bp

FC MNB tb - 1 & 2 bp, 3 gray

FC 1, 2, & 3 (check amps)

MAIN BUS A, B, (26.5-31 vdc)

BAT BUS A, B, & BAT C (31.5-38 vdc < 3 amp)

PYRO BAT A, B (36.5 - 37.5 vdc)

DC IND sel - MNB

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

A-C VOLTS - 113 to 117 all phases

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

- 17 SPS MONITORING CHECK
- SPS PRPLNT TK TEMP ind - +45 to +75° F  
 \*IF<45°F, SPS LINE HTRS - A \*  
 \*IF>75°F, SPS LINE HTRS - off (ctr)\*  
 SPS PRESS IND sw - He, N2A, & N2B  
 SPS PRPLNT TK PRESS ind  
 He 3900 psia max  
 N2A 2900 psia max  
 N2B 2900 psia max  
 SPS PRESS IND sw - He  
 FUEL & OXID PRESS ind - 170 to 195 psia  
 SPS ENG INJ VLVS (4) - CLOSE  
 Check SPS OXID, FUEL QTY & UNBAL  
 OXID FLOW VLV PRIM - ~~PRIM~~ SEC(verify)  
 SPS He VLV (1&2) - AUTO, tb - bp

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

CMP7

A1 UV MAG /  
 UV GKT /  
 UV LENS /

Timer RT Grinl. Shelf

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

CMP II 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)

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

CMP 9 TV (ALC - PEAK, f44) (A1)  
 Power cable (A1)  
 Bracket (A1)  
 Monitor & cable (A1)  
 (Assemble, connect cables & hand to LMP)

23 OPTICS DUST COVER JETT

CMP 9 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 3/7/72

24 IMU REFSMMAT Realign Check (P52),  
P52 - (PAD REFSMMAT)CMP 12

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

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

N93:

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

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

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

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

If IMU is realigned,  
Realign GDC (CDR)

OOE

RETICLE BRIGHTNESS - DIM

Stow Optics Eyepieces

3/7/72

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

HSK AOS  
 (00:59:37)

26 SCS ATT Ref Comp Check  
 SUNRISE V16 N2OE  
 (01:04:45) FDAI SELECT - 1  
 HSK LOS FDAI SOURCE - ATT SET  
 (01:05:13) ATT SET - GDC  
 (\_\_\_\_\_) ATT SET dials - null FDAO 1 err needles  
 Record from DSKY:  
 US AOS Key VERB when nulled (freeze display)

(01:28:59) R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_  
 Record from ATT SET dials:  
 R \_\_\_\_\_, P \_\_\_\_\_, Y \_\_\_\_\_  
 FDAO SEL - 1/2

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

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

28 COPY TLI, TLI ABORT, & P37 PADS29 SV UPDATES (MCCH)

## 30 cb SECS ARM (2) - close

Cue MSFN

SECS LOGIC (2) - on(up)

MSFN confirm GO for PYRO ARM

US LOS

■(01:48:42)

UNSTOW: GEC ck VWP

SYS c/l - R12

R12

FLIGHT PLAN I - R12

Updates - R12

DATA CARDS - MOC

STAR CHARTS - LEB

STORAGE LISTS - LEB

CYI LOS

■(01:54:46)

VERIFY DSE TAPE MOTION

(LBR/RCD/FWD/CMD RESET)

SUNSET

■(01:55:08)

DATE 3/7/72

DATE 12/13/71

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

L  
2-20

## P27 UPDATE

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

DATE 12/13/71

## P30 MANEUVER

L/2-21

DATE 12/13/71

SET STARS					PURPOSE
		PROP/GUID			
R ALIGN	- - - - -	+	0	0	WT N47
P ALIGN	- - - - -		0	0	P TRIM N48
Y ALIGN	- - - - -	+	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
	- - - - -	+	.	.	$H_A$ N44
	- - - - -		.	.	$H_P$
	- - - - -	+	.	.	$\Delta V_T$
HORIZON/WINDOW	- - - - -	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
P37 FOR L/048					
X	•	GETI	0	.	LAT N61
X	•	$\Delta V_T$	.	.	LONG
X	•	LONG	+	.	RTGO EMS
	•	GET 400K	+	.	VIO
	•			.	GET 0.05G

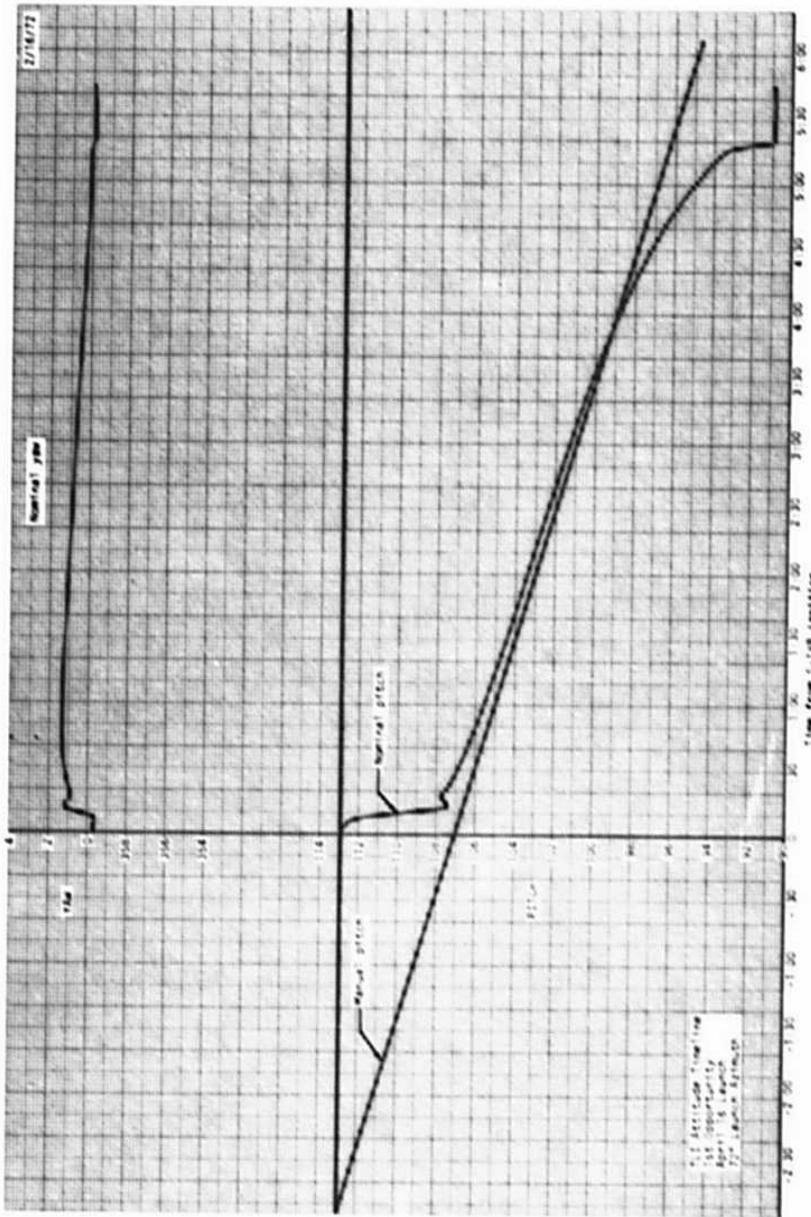
## P30 MANEUVER

SET STARS						PURPOSE
R ALIGN	— — —	+	0	0	.	PROP/GUID
P ALIGN	— — —	0	0	.	WT N47	
Y ALIGN	— — —	+	0	0	P TRIM N48	
		+	0	0	Y TRIM	
ULLAGE	— — —	+	0	0	HRS GETI	
		+	0	0	MIN N33	
		+	0	.	SEC	
HORIZON/WINDOW	— — —	X	X	X	$\Delta V_x$ N81	
		X	X	X	$\Delta V_y$	
		X	X	X	$\Delta V_z$	
P37 FOR L/0+8	— — —	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	
		+	—	0	SFT	
		+	—	0	TRN	
		X	X	X	BSS	
		X	X	—	SPA	
		X	X	X	SXP	
		X	X	X	LAT N61	
		X	—	0	LONG	
		X	—	+	RTGO EMS	
		—	—	+	VIO	
		—	—	—	GET 0.05G	
		—	—	—	GET 0.05G	

DATE 12/13/71

DATE 3/7/72

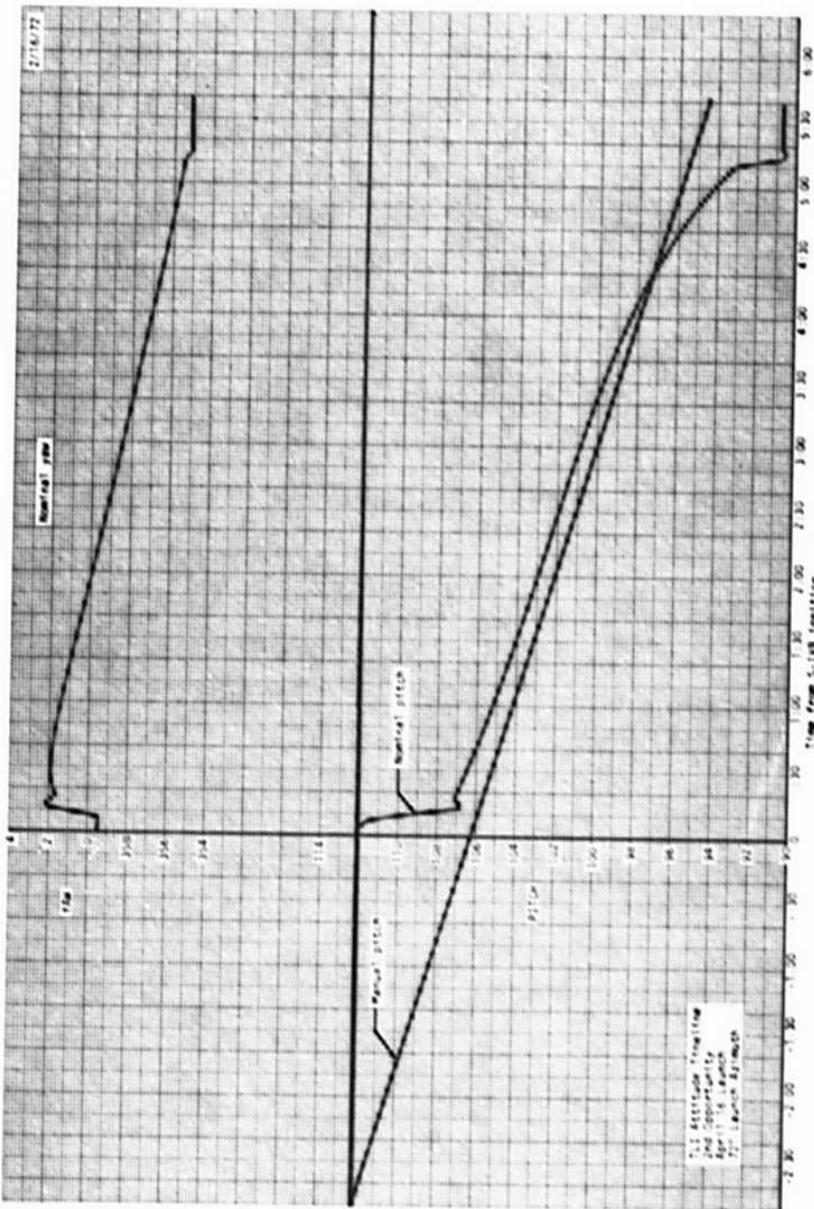
L  
2-23



TLI ATT TIMELINE  
OPP 1

TLI ATT TIMELINE  
OPP 2

L  
2-24



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

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

**MANUAL SIVB TLI 1**

	LAUNCH APR 16	2/10/72	DET	$\Theta$	$\Psi$	VI	$\dot{H}$	H
0:00			0:00					
				107.0	0.5	25607	16	96
			:30	106.0	0.5	26157	12	96
			1	105.7	0.5	26801	41	96
			1:30	104.6	0.5	27527	130	96
			2	103.5	0.5	28289	290	97

TLI TRAJECTORY  
OPP 2 NOM & MAN

NOMINAL SIVB TLI 2					
LAUNCH APR 16 2/10/72					
DET	$\Theta$	$\Psi$	$\nabla$	$\dot{\nabla}$	H
0:00	112	359.6	25601	17	97
:30	107	1.9	26218	13	97
1	105	1.4	26916	51	97
1:30	104	0.7	27649	154	98
2	103	0.0	28417	330	99
2:30	102	359.2	29224	585	101
3	101	358.5	30074	929	105
3:30	98	357.7	30971	1369	111
4	98	357.0	31922	1912	119
4:30	97	356.3	32936	2566	130
5	94	355.7	34021	3331	144
5:30	91	355.1	35193	4185	163
5:39	91	355.2	35579	4480	169

MANUAL SIVB TLI 2					
LAUNCH APR 16 2/10/72					
DET	$\Theta$	$\Psi$	$\nabla$	$\dot{\nabla}$	H
0:00	106.2	357	25601	17	97
:30	105.2	357	26218	13	97
1	104.2	357	26916	51	97
1:30	103.1	357	27649	154	98
2	102.1	357	28417	330	99
2:30	101.1	357	29224	585	101
3	100.0	357	30074	929	105
3:30	99.0	357	30971	1369	111
4	98.0	357	31922	1912	119
4:30	96.9	357	32936	2566	130
5	95.9	357	34021	3331	144
5:30	94.8	357	35193	4185	163
5:39	94.6	357	35579	4480	169

TLI PREPARATION

XLUNAR - INJECT (verify)  
 EDS PWR - on (up)  
 Perform EMS ΔV TEST & NULL  
 BIAS CHECK, pg G/2-5  
 CRO AOS (02:25:02) Set ΔVC  
 EMS FUNC - ΔV  
 GDC ALIGN  
 CRO LOS (02:30:53) V48E, 31102, 01111  
 Key V83E  
 Set ORDEAL - 90/EARTH  
 SECS PYRO ARM (2) - on (up)  
 TRANS CONTROL PWR - ON  
 ROT CONTR PWR NORMAL (2) - AC/DC (verify)  
 ROT CONTR PWR DIRECT (2) - MNA/MNB  
 SC CONT - SCS (verify)  
 LV/SPS IND - SIVB (verify)  
 cb DIRECT ULLAGE (2) - close  
 Set DET - 51:00

P15 - TLI INITIATE/CUTOFF  
V37E 15EDATE 3/7/72

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)

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 N20E \*  
\* MNVR to R2 Align = \_\_\_\_\_(113°)\*

MONITOR LV TANK PRESS SEQUENCE

Nominal LOX ~ 40 psia

Nominal LH2 ~ 31 psia

\*If ΔP > 36 psid (OXID > FUEL) \*  
\*If ΔP > 26 psid (FUEL > OXID) \*  
\*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 FDAI #1 to PITCH = 17°  
(-04:00) \*If LV G UID - CMC:  
\* Slew FDAI #1 to PITCH = 0° \*  
\* V16 N20E \*  
\* Insure R2 Align = \_\_\_\_\_(113°)\*

57:00  
(-03:00)

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

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

58:15

DSKY BLANKS

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

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

58:36  
(-01:24)

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

58:38  
SUNRISE  
(02:32:29)

SIVB ULLAGE Begins

59:42

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

59:52 SIVB FUEL LEAD  
 59:55 SIVB ULLAGE discontinues  
 Insure FDAI #1 PITCH =  $6^\circ$   
 \* If LV GUDI - CMC: \*  
 \* FDAO #1 PITCH =  $0^\circ$ \*

59:59 LV ENG 1 lt - on

00:00 SIVB IGNITION (\_\_\_\_:\_\_\_\_:\_\_\_\_) GETI  
 00:02 LV ENG 1 lt - out  
 00:10 06 95 TFC, VG, VI (min-sec,fps,fps)

MONITOR THRUST & ATTITUDE  
 MONITOR LV TANK PRESS  
 \* If LV GUDI - CMC: \*  
 \* Fly PITCH =  $0^\circ$  \*  
 \* YAW = \_\_\_\_ ( $\pm 10^\circ$ ) \*  
 PU SHIFT  
 V16 N62E  
 KEY RLSE before ECO  
 05:44 SIVB ECO (1t on) (BEGIN TB7)

+45°/P,Y
+10°/sec P,Y
+20°/sec R

\*If no ECO at +2 sec and VI attained\*  
 \* or EMS = -200 fps (CMC failed): \*  
 \* THC - CCW & NEUTRAL in 1 sec \*

Key VERB (freeze display)

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

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

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

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

DATE 3/7/72  
4/6/72

L  
2-31

MSFN AOS  
(02:43:24)

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

PRO

F 37

00E

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

DATE 3/7/72

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

NORMAL SC/BOOSTER SEPARATIONS1 PRE CSM SEPARATION

DIRECT 02 vlv - 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

OMNI ANT-C

Load N17 (SEP) &amp; 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° - R20 \*

\* P22 = P20 + 180° \*

\* Y22 = 360° - Y20 \*

\* R P Y \*

\*N20 \*

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

\*N22 \*

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

\*Load new Docking Attitude \*

MOON

OUT

CMU1

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  $\Delta$ VC to -100.0EMS FUNC -  $\Delta$ V

FDATI 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  
3/30/72  
DATE

**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

- 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 (verify hatch integrity)  
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 Z<sub>min</sub> +123, Y<sub>min</sub> -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 ΔVX,Y,Z  
EMS MODE - NORMAL (.1fps)  
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, ~~V67A~~ MINUR ASAP AFTER 30 SEC

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

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) Roll Pitch Yaw \*  
 \* 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 v1v - OFF  
 cb O2 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 \*

## ABORT PROCEDURES

## MODE IA ABORT

(00:00 to 01:01)

00:00 TRANS CONTR - CCW then NEUTRAL

\*CM/SM SEP (2) - on (up)\*

**ELS - AUTO**

00:14 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 &lt;alidade - DEPLOY MAINS

&gt;alidade - NO ACTION

00:28 If &lt;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 TRANS CONTR - CCW then NEUTRAL

\*CM/SM SEP (2)-on (up)\*

**ELS - AUTO**

00:11 CANARD DEPLOY - PUSH

00:14 ELS LOGIC - on (up)

RCS CMD - ON

Go to LANDING PHASE pg L/4-8

MODE IC ABORT  
 (16.5 nm to TWR JETT)

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

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

S/C PLATFORM GO/NO GO (Excessive Rates)  
 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	Estab. +5°/SEC pitch rate EXCESSIVE + PITCH RATES  *ROLL 90° * *USE YAW THRUSTERS TO * *CONTROL RATE * *ROLL BACK TO HEADS DN*

θ (.05G)  
 GET DROGUE

Go to LANDING PHASE pg L/4-8

DATE 12/13/71

LET FAILS TO JETTISON

LEGS CUT/NO MOTOR FIRE (pyro audible)  
 LES MOTOR FIRE PB - push  
 NO RESPONSE to ABORT SYS TWR JETT switches  
 cb SECS ARM (2) - close (verify)  
 cb SECS LOGIC (2) - close (verify)  
 cb EDS (3) - close (verify)  
 SECS LOGIC (2) - on (up) (verify)  
 SECS PYRO ARM (2) - on (up) (verify)  
 EDS PWR - on (up) (verify)  
 ABORT SYS TWR JETT (2) - on (up) (verify)  
 NO TWR JETT - continue to orbit  
 ABORT SYS TWR JETT (2) - off (ctr)

MODE II RCS ABORT  
(TWR JETT to MODE III)

- 00:00 TRANS CONTR - CCW (4 sec min)  
 \*If No BECO: Reset THC\*  
 \* Req. RSO Shutdown \*  
 \* Reset & start DET \*
- 00:03 \*CSM/LV SEP - PUSH\*  
 \*RCS CMD - ON \*
- THC - ARMED
- 00:05 TRANS CONTR - NEUTRAL THEN +X
- 00:24 TRANS CONTR +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  
 CM/SM SEP - on (up)  
 CM RCS PRESS - on (up)  
 RCS TRNFR - CM  
 C&W MODE - CM  
 Entry ATT - (R=0°,P=120°,Y=0°) (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 @ (.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  
(ΔR= -400 NM to INSERTION)

- 00:00 TRANS CONTR - 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 TRANS CONTR - NEUTRAL THEN +X  
 LV/SPS IND sw - GPI
- 00:24 TRANS CONTR +X OFF  
 N50E ΔR,HP,TFF (.1nm,min-sec)  
 BMAG MODE (3) - ATT1/RATE2  
 If ΔR>0:  
 MNVR to retro att (R=180°,P=194°,Y=0°)  
 (Scribe on horiz, BEF, Hds up)  
 SCS TVC P&Y - AUTO (verify)  
 EMS MODE - NORMAL GETI  
 ΔV THRUST A - NORMAL (6999.9)  
 02:05 DIRECT ULLAGE PB - PUSH ΔV  
 THRUST ON PB - PUSH VC  
 Burn to VC (ΔR=0) θ  
 ΔV THRUST (2) - OFF Δtb  
 GET 300K \_\_\_\_\_  
 θ (.05G) \_\_\_\_\_  
 GET Drogue \_\_\_\_\_
- If TFF>2min, Yaw 45° (LEFT)  
 out-of-plane  
 cb MNA&B BAT C(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°,P=105°,Y=0°)  
 (BEF, Hds Dn, Full Lift)  
 cb CSM/LM FNL SEP (2) - close (pull lanyard)  
 CSM/LM ENL SEP (2) - on (up)  
 Note TFF

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EMS MODE - STBY  
EMS FUNC - ENTRY  
EMS MODE - NORMAL  
At .05G 1t - on  
.05G sw - on (up)  
EMS ROLL - on (up)  
At .2G 1t - on  
Roll left 55°  
Fly Half Lift

Go to LANDING PHASE pg L/4-8

**MODE IV SPS TO ORBIT**

(VI ~ 22,704, HDOT ~ +72, H ~ +94)

00:00 TRANS CONT - CCW (4 sec min)

\*If No BECO: Reset THC \*

\* LV STAGE sw - SII/SIVB\*

\* Reset &amp; start DET \*

00:03 \*CSM/LV SEP - PUSH\*

\*RCS CMD - ON \*

THC - ARMED

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

00:24 TRANS CONTR - +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

&lt;01:30 THRUST ON PB - PUSH

BMAG MODE (PITCH) - RATE 1

FLY HDOT with thumbwheel

\*Burn to (hp &gt;70 nm +6 sec BT)\*

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

ΔV THRUST (2) - OFF

EMS MODE - STBY

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

BMAG MODE (3) - ATT1/RATE2 GETI

EMS MODE - NORMAL 6999.9

SCS TVC (2) - AUTO (verify) ΔV

ΔV THRUST A - NORMAL VC

DIRECT ULLAGE PB - PUSH

02:05 THRUST ON PB - PUSH Δ

BURN to VC (hp &gt;70nm) Δtb

ΔV THRUST (2) - OFF

EMS MODE - STBY

L  
4-7

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

KEY RLSE

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

V37E OOE

When CMC ACTY lt out:

V66E

V45E

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

V46E

V83E (check e)

PRO

CSM WT

P TRIM

Y TRIM

\_\_\_\_\_

US LOS  
(00:15:12)

Go to INSERTION CHECKLIST pg L/2-11

DATE 12/13/71

LANDING PHASE

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\*  
 \*If Both drogues Fail: \*  
 \* ELS - MAN \*  
 \* STABILIZE CM \*  
 \* 5K' MAIN DPLY PB - PUSH\*  
 \* ELS - AUTO \*

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

10K'      Main parachutes deployed  
 MAIN DEPLOY PB - PUSH (within 1 sec)  
 DIRECT O2 vlv - OPEN (verify)  
 VHF ANT - RECY  
 VHF AM A - SIMPLEX  
 VHF BCN - ON

\*If No Comm and abort occurred between \*  
 \* 61-8-75 sec or if land impact expected: \*  
 \* Perform CM RCS DUMP, pg L/4-9 \*

1:01 & 2:00 min

3/29/72  
3/29/72

DATE

- CABIN PRESS REL v1v (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

3K' CM RCS PRPLNT (2) - OFF

FLOOD Lts - POST LDG

ELS - AUTO (verify)

ELS LOGIC - on (up) (verify)

800' CAB PRESS REL v1v (2) - CLOSE (latch off)

MN BUS TIE (2) - OFF

COMMAND + E - YAW (1sec) (Direct RCS)

Go to POSTLANDING PROCEDURES, pg L/9-2

### CM RCS DUMP

CABIN PRESS REL v1v (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\*

DATE  
3/29/72  
+2413424

PRE-TLI ABORT  
FROM ORBIT

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

PRE-TLI ABORT  
FROM ORBITDATE 12/13/71

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  $\Delta$ VC 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  
 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 vlv - LATCH

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 \*

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  
 ~40:24  $\Delta V = 5$  fps  
 THC - release  
 SECS PYRO ARM (2) - SAFE  
 cb EDS (3) - open  
 PCM BIT RATE - LOW

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\*

DATE 12/13/71

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            OOE  
                   RATE - HIGH  
                   TRANS CONTR PWR - OFF

MNVR TO RETRO ATT

R \_\_\_\_\_ (Block Data)  
 P \_\_\_\_\_ (Block Data)  
 Y \_\_\_\_\_ (Block Data)

DATE 12/13/71

L  
4-14RETRO UPDATE (NO COMM - use Block Data)  
GETI \_\_\_\_\_ e .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 vlv (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 12/13/71

(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  
 $\Delta$ V THRUST B(A) - NORMAL  
ULLAGE & THRUST ON PB - PUSH

00:03

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

DATE 12/13/71

00:XX

ECO

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 00E  
When CMC ACTY lt out:  
V66E

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

DATE 12/13/71

## EARTH ORBIT ENTRY VEHICLE PREPARATION

DATE 3/7/72

- 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 T1102, 01111, PRO, PRO, PRO
- 7           DON MAE WESTS & FOOT RESTRAINTS
- 8    (  :  :  )   P27 (SV,REFSMMAT), MNVR  
& ENTRY PAD UPDATES
- 9           ECS CKS  
O2 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 vlv - AUTO  
EVAP H2O CONT SEC vlv - 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

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 &gt;1°, recycle P52 \*

\*If confirmed, use SCS for\*

\* EMS entry

17

GDC ALIGN

If drift &gt;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 lts - off  
RANGE ind - 0.0  
Slew hairline over notch  
in self-test pattern  
EMS FUNC - EMS TEST 2 (wait 10 sec)  
.05G lt - on (all others out)  
EMS FUNC - EMS TEST 3  
.05G lt - on  
RSI lower lt - on (10 sec later)  
Set RANGE counter to 58 nm ±0.0

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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  $0+0.2$   
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  
 $0.28+0.1$   
ALIGN SCROLL TO ENTRY PATTERN (on  
37K ft/sec line)  
EMS FUNC - RNG SET  
G-V scroll assy traces vert. line  
 $0.28g$  to  $0+0.1$   
EMS MODE - STBY

- 19 Perform EMS  $\Delta V$  TEST & NULL  
BIAS CHECK, Pg G/2-5
- 20 PRIMARY WATER EVAP ACTIVATION  
GLY EVAP H<sub>2</sub>O 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

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## 23 (-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) *(NOTE: IF MANF PRESS*

*Drop-Burst Disc Rupture, CM RCS HTRS-OFF, CM ISO VLV - CLOSED, CONTACT MANF)*

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

## 25 (-00:40m) TERM. CM RCS PREHEAT

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

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

27

SYSTEMS TEST PANEL CONFIGURATIONSYS TEST METER - 5B (BAT RLY BUS  
3.4-4.1 vdc)

- (101) CM RCS HTRS - OFF (verify)  
WASTE H<sub>2</sub>O 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 - CMI, then 2  
He PRESS stabilizes at 3300-3500  
psia after 15 minutes  
MANF PRESS 287-302 psia  
SECS PYRO ARM (2) - SAFE

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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

## E. O. ENTRY UPDATE

L/5-7

X	-	X	-	AREA
XX -		XX -		$\Delta V$ TAILOFF
XXX		XXX		R 0.05G EMS
XXX		XXX		P 0.05G
XXX		XXX		Y 0.05G
+		+		RTGO EMS
+		+		VIO
XX		XX		RET 0.05G
0		0		LAT N61
				LONG
XX		XX		RET 0.2G
				DRE (55°) N66
RR	X	RR	X	BANK AN
XX		XX		RET RB
XX		XX		RETBB0
XX		XX		RETEBO
XX		XX		RETDR0G
XXX		XXX		(90°/fps) CHART
XX		XX		DRE (90°) UPDATE

## POST BURN

XXX		XXX		P 0.05G
+		+		RTGO EMS
+		+		VIO
XX		XX		RET 0.05G
XX		XX		RET 0.2G
				DRE $\pm 100$ mm N66
RR	X	RR	X	BANK AN
XX		XX		RETRB
XX		XX		RETBB0
XX		XX		RETEBO
XX		XX		SEC RETDR0G TO MAIN

DATE 12/13/71

## E.O. ENTRY UPDATE

L/5-8

## E. O. ENTRY UPDATE

X	-	X	-	AREA
XX -	.	XX -	.	ΔV TAILOFF
XXX		XXX		R 0.05G EMS
XXX		XXX		P 0.05G
XXX		XXX		Y 0.05G
+	.	+	.	RTGO EMS
+	.	+	.	VIO
XX	.	XX	.	RET 0.05G
0		0		LAT N61
				LONG
XX	.	XX	.	RET 0.2G
				DRE (55°) N66
RR	/	RR	/	BANK AN
XX	.	XX	.	RET RB
XX	.	XX	.	RETBBO
XX	.	XX	.	RETEBO
XX	.	XX	.	RETDROG
XXX		XXX		(90°/fps) CHART
XX		XX		DRE (90°) UPDATE

## POST BURN

XXX		XXX		P 0.05G
+	.	+	.	RTGO EMS
+	.	+	.	VIO
XX	.	XX	.	RET 0.05G
XX	.	XX	.	RET 0.2G
				DRE ±100 nm N66
RR	/	RR	/	BANK AN
XX	.	XX	.	RETRB
XX	.	XX	.	RETBBO
XX	.	XX	.	RETEBO
XX	.	XX	.	RETDROG SEC
				TO MAIN

DATE 12/13/71

## EARTH ORBIT BLOCK DATA

L/5-9

X X	X X	I-4	AREA
X X X	X X X +	20.2	LAT
X X	X X -	148.0	LONG
:	00 1:03:58		
X X X	X X X 242.7		GETI $\Delta V_C$
X X	X X	2-1	AREA
X X X	X X X +	33.4	LAT
X X	X X -	067.0	LONG
:	00 1:21:53		
X X X	X X X 242.7		GETI $\Delta V_C$
X X	X X	2-4	AREA
X X X	X X X +	20.9	LAT
X X	X X -	148.0	LONG
:	00 2:36:00		
X X X	X X X 242.7		GETI $\Delta V_C$
X X	X X	3-4	AREA
X X X	X X X +	29.6	LAT
X X	X X -	148.0	LONG
:	00 4:08:50		
X X X	X X X 242.7		GETI $\Delta V_C$
X X	X X	4-4	AREA
X X X	X X X +	33.3	LAT
X X	X X -	148.0	LONG
:	00 5:41:30		
X X X	X X X 242.7		GETI $\Delta V_C$

REMARKS: 1) ROLL 90°(RIGHT) ENTRY

2) SEP. BURN 20 MIN PRIOR TO DEORBIT

3) USE 15° LINE 4) DO NOT USE 2-1 FOR  
LAUNCH AZIMUTHS > 88°

5) DO NOT USE I-4 FOR LAUNCH AZIMUTHS &lt; 88°

DATE  
16/12  
+2/13/71

E.O. BLOCK DATA

L/5-10

## EARTH ORBIT BLOCK DATA

E.O. BLOCK DATA

DATE 12/13/71

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:					

## P30 MANEUVER

L/5-11

DATE 12/13/71

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
	+	$H_P$	
HORIZON/WINDOW		$\Delta V_T$	
	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

L  
5-12

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DATE 12/13/71

## HYBRID RCS DEORBIT &amp; ENTRY

VEHICLE PREP COMPLETEP30 - 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

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

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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

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

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

DATE 12/13/71

- 55:00m  
18 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)
- 59:25  
19 DSKY BLANKS
- 59:30  
20 16 85 VG X,Y,Z (AVE G ON) (.1fps)  
RHC's & THC - ARMED  
TAPE RCDR - HBR/RCD/FWD/CMD RESET  
EMS MODE - NORMAL

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00:00

21 F 16 85 REQ NULL VG X,Y,Z (.1fps)

BURN EMS  $\Delta V$  CTR TO 100  
RESET DET & COUNT UP

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)

1 min

\*If CMC NO GO: \*

\* FDAI SOURCE - ATT SET\*

\* FDAI SEL - 1 or 2 \*

\* ATT SET - GDC \*

C&amp;W MODE - CM

RCS TRNFR - CM

Monitor V MNA/B:

\*If &lt;25 vdc, go to EMERG POWER DOWN\*

MNVR TO CM BURN ATT(NULL ERR NEEDLES)

R  $0^\circ$ (θ ~290) P  $_____$  ( $\sim 110^\circ$  from SM BURN ATT)Y  $0^\circ$ 

CM RCS LOGIC - OFF

22

CM RCS BURN

FDAI 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 &lt;3°/sec \*

23

BURN COMPLETION AT:

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

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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

OOE

When OMC ACTY lt out:

V66E

EMS FUNC - OFF

EMS MODE - STBY

MAN ATT (3) - MIN IMP

TRANS CONT PWR - OFF

BMAG 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 12/13/71

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 3/7/72

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 ( $.01^\circ$ )  
(Only if X-axis beyond 45° of Vel vector)P63 - ENTRY INIT

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

L  
6-9

P64 - ENTRY POST .05G

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

RTGO 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 12/13/71

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 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 3/7/72

## SM RCS DEORBIT &amp; ENTRY

VEHICLE PREP COMPLETEP30 - 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.

SM RCS  
DEORBIT & ENTRYDATE 12/13/71

- 5 F 16 45 MARKS,TFI,MGA (marks,min-sec,.01°)  
 \*MGA -00002: if \*  
 \* IMU not aligned\*

Set DET  
PRO

- 6 F 37 OOE

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

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

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

11

PERFORM BORESIGHT & SXT STAR CHECKV41 N91E

Stow optics eyepieces

12

P41 - RCS THRUSTINGV37E 41E

13

F 50 18    REQ MNVR TO BURN ATT (HDS DN)    ( $.01^\circ$ )  
(AUTO)    BMAG MODE (3) - RATE 2  
            SC CONT - CMC/AUTO  
            PRO

14

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

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 55:00m 06 85 VG X,Y,Z (.1fps)  
RECHECK BORESIGHT STAR  
TRANS CONTR PWR - on (up)  
EMS MODE - STBY (verify)  
EMS FUNC - ΔV SET/VHF RNG  
SET ΔV for SM BURN = ΔV pad  
EMS FUNC - ΔV  
S BD OMNI ANT - C
- 17 59:25 DSKY BLANKS
- 18 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
- 19 00:00 F 16 85 REQ NULL VG X,Y,Z (.1fps)  
BURN EMS ΔV 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 12/13/71

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

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 3/7/72

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

PRO (Act ENTRY DAP Att Hold)

32 F 06 61 IMPACT LAT, LONG, HDS UP  
(.01°,.01°,+00001)

PRO (CMC Guidance)

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

DATE 12/13/71

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

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 12/13/71

P67 - 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

★

★

★

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★

★

\*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 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 3/7/72

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

## SPS DEORBIT &amp; ENTRY

VEHICLE PREP COMPLETE (pg L/5-1 or pg L/4-10)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)  
 Set ΔV counter  
 (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
- 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 12/13/71

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

9

MNVR TO PAD BURN ATT (HDS UP)  
V49E

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

10

PERFORM BORESIGHT & SXT STAR CHECKV41 N91E

Stow Optics eyepieces

11

V37E 40E

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

13 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

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 (a11) - 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)

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

DATE 12/13/71

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

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

59:00 EMS MODE - NORMAL  
(-01:00) TRANS CONTR PWR - on (up)  
 $\Delta$ V THRUST A(B) - NORMAL  
THC - ARMED  
RHC (2) - ARMED

59:25 (-00:35) DSKY BLANKS

DATE 3/7/72

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 Tprfrm switching in 18)  
EXIT - V37E 00E

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\*

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 vlvs tb-gray

SPS FUEL/OXID PRESS - 170-195 psia

PUGS - BALANCED

00:XX ECO

DATE 12/13/71

- 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 vlvs 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 \_\_\_\_\_  
BMAG 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°)  
BMAG MODE (3) - ATT 1/RATE 2

DATE 12/13/71

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

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)

PAD

VIO (fps)

PAD

TFE (min-sec)

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

(ACCEPT) PRO

(RECYCLE) V32E to 28 (TFE accuracy is ±1 min)DATE 3/7/72

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  $0^\circ$   
MNVR to ENTRY ATT  
R  $0^\circ$  (Lift UP)  
P Horiz on  $29^\circ$  mark(400K)  
Y  $0^\circ$   
MAINTAIN HORIZ TRACK

PRO (Act ENTRY DAP Att Hold)

DATE 12/13/7131 F 06 61 IMPACT LAT, LONG, HDS DN  
( $.01^\circ$ ,  $.01^\circ$ , -00001)

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 It 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 3/7/72

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,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 - 29° mark  
 Pitch error needle goes toward  
 zero approaching .05G time

L  
8-10

P64 - ENTRY POST .05G

34 06 74 BETA, VI, G

(.01°,fps,.01G)  
Start DAC

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

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

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

DATE 3/7/72

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 & FDAI

\*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 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

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

DATE 3/7/72

## EARTH/POST LANDING

RRT

90K'(  :) STEAM PRESS - pegged at ~ 90K Start Watch (00:00)  
 50K'(  :) CABIN PRESS REL vlv (2) - BOOST/ENTRY(00:52)  
 SECS PYRO ARM (2) - ARM (verify)  
 Check Altimeter

40K'(  :) \*If CM unstable:  
 \* 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 \*  
 \* 5K' MAIN DPLY PB - PUSH\*  
 \* ELS - AUTO \*

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

10K'(  :) Main chutes deployed (Drogues +46 sec)(02:25)■  
 (Cab Press MAIN DEPLOY PB - PUSH (within 1 sec)  
 = 10 psia)

DATE 3/7/72

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)

3K' CM RCS PRPLNT (2) - OFF

ELS AUTO (verify)

ELS LOGIC - on (up) (verify)

FLOOD Lts - POST LDG

800' CAB PRESS RELF vlv (2) - CLOSE (latch off)

MN BUS TIE (2) - OFF

COMMAND + E - YAW (1 Sec) (Direct RCS)

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 \*

- (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 DISTRIBUT DUCT  
 Deploy grappling hook and line if req'd

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\*

UNAIDED EGRESS PROCEDURESPREPARATION

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 Pnl 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\*

POST LANDING COMMUNICATIONS

VHF ANT - RECY (verify)

VHF BCN - ON (verify)

\*If no contact with recovery forces:\*

\* Perform VHF BEACON Check \*

MONITOR VHF BEACON transmission with

VHF AM B Rcvr and/or Survival Transceiver(voice)

\*If VHF Beacon not operating: \*

\* Open VHF ant access pn1. Connect \*

\* Survival Transceiver 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&amp;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

DATE 3/29/72  
+2/+3/74

EMERGENCY CSM/LV SEPARATION

**IF POWERED FLT**

TRANS CONTR - CCW (4 SEC)

MN BUS TIES - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

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

GMBL MTRS (4) - ON

ΔV THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5 SEC) - THEN ΔV THRUST (2) - OFF

LV

**IF COASTING FLT**

cb SECS ARM (2) (Pn1 8) - CLOSE

SECS LOGIC (2) - ON

SECS PYRO ARM (2) - ARM

ROT CONTR PWR DIR (2) - MNA/MNB

SC CONT - SCS

SEPARATE FROM LV AS APPLICABLE -

IF BEFORE DOCKING, THC CCW (4 SEC)

IF DOCKED, UMBIL NOT CONNECTED,  
CSM/LM FINAL SEP (2) - ON

IF DOCKED, UMBIL CONNECTED, *cb SECS arm close (verity)*  
SIVB/LM SEP - ON

TRANSLATE AWAY FROM LV & MANEUVER TO BURN ATTITUDE

$\Delta$ VCG - CSM OR LM/CSM AS APPLICABLE

MN BUS TIE (2) - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

B MAG MODE (3) - ATT1/RATE 2

GMBL MTRS (4) - ON

$\Delta$ V THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5) SEC - THEN  $\Delta$ V THRUST (2) - OFF

SUIT COMPRESSOR LITE - CLOSED SUIT LOOP

SWITCH TO OTHER COMPRESSOR ON OTHER BUS  
SEE ECS 9

02 FLOW HI + RAPID LOSS OF SURGE TK PRESS  
+ CABIN PRESS <4.6 PSI

CABIN PRESS RELF v1vs (2) - CLOSE  
✓TUNNEL EQUALIZATION v1v - CLOSED  
REPRESS PKG v1v - ON (WHEN SURGE TK PRESS <150 PSI)  
✓EMERG CABIN PRESS REGS - BOTH  
DON SUITS

CONTAMINATION IN CM

DON 02 MASKS

CONTAMINATION IN CLOSED SUIT LOOP

CHANGE TO OTHER SUIT COMPR  
DIRECT 02 v1v - FULL OPEN THEN ADJUST FOR SUIT  
TO CABIN ΔP OF 2 IN OF H<sub>2</sub>O

**IF CONDITION PERSISTS**

SUIT COMPR (2) - OFF  
DOFF HELMETS  
DIRECT 02 v1v - CLOSE  
DON 02 MASKS

FIRE/SMOKE IN CM

MONITOR DC FOR HI CURRENT - REMOVE POWER  
FROM ASSOCIATED INVERTER  
IF CURRENT REMAINS HI - REMOVE POWER FROM  
ASSOCIATED DC BUS  
IF CLOSED SUIT LOOP, SWITCH SUIT COMPR TO GOOD AC BUS  
IF HELMET OFF, SUIT COMPR (2) - OFF  
RECONFIGURE INVERTER 3 ON LOST AC BUS  
VERIFY RCS CONTROL POWER CONFIGURATION  
IF HELMETS [DON 02 MASKS  
OFF] USE FIRE EXTINGUISHER OR H<sub>2</sub>O GUN (OPTIONAL)  
IF CLOSED SUIT LOOP [USE FIRE EXTINGUISHER OR H<sub>2</sub>O GUN (OPTIONAL)  
✓ EMERG CABIN PRESS REGS - OFF  
IF FIRE PERSISTS - DUMP CABIN]

G&N CRITICAL BURNS

**IF NO START OR ISS LITE + PROG LITE  
IF CMC LITE, PROG ALARM 1407 OR EARLY CUTOFF**

SCS TVC (2) - AUTO  
SC CONT - SCS  
✓ ATTITUDE  
SPS THRUST - DIRECT (MOMENTARY), IF REQ'd

**IF ABNORMAL DYNAMICS**

THC CW, control rates by MTVC  
After SHUTDOWN, AUTO RCS (16) - OFF

SCS CRITICAL BURN

**IF NO START OR EARLY CUTOFF**

SPS THRUST - DIRECT (MOMENTARY)

**IF RATE NEEDLE HARDOVER & FDAIs DIVERGE OPPOSITE**

BMAG MODE (3) - RATE 1  
THC - CW, use MTVC

**IF ABNORMAL DYNAMICS IN AUTO MODE**

THC - CW, use MTVC  
BMAG MODE (3) - RATE 2

**IF ABNORMAL DYNAMICS IN MTVC MODE**

THC - CW  
IF PROBLEM PERSISTS, SHUTDOWN  
AUTO RCS (16) - OFF

SPS

**IF NO CUTOFF AFTER ΔV THRUST (BOTH) - OFF**

cb SPS PILOT VLVS - open

**IF EMS & N40 (R3) STILL COUNTING AFTER SHUTDOWN**

SC CONT - SCS

TRANS CONT PWR - OFF

cb DIR ULLAGE (2) - open

IF CONDITION PERSISTS, AUTO RCS SEL (16) - OFF

SM RCS PRPLNT (AFFECTED QUAD) - OFF

**SPS PRESS LITE**

CONTINUE CRITICAL BURN

**IF FUEL & OX PRESS (BOTH) > 200 PSI**

SPS HE v1vs (2) - OFF, THEN CONTROL MANUALLY  
BETWEEN 170-200 PSI

**IF FUEL/OX ΔP > 20 PSI**

SPS HE v1vs (2) - ON

IF CONDITION PERSISTS, SPS HE v1vs(2)-OFF(Until  $P_c < 70$ )

**G&C (COASTING, ENTRY)**

**CMC LITE**

SC CONT - SCS

SEE G&N 5

**ISS LITE + PROG ALARM LITE**

SC CONT - SCS

SEE G&N 6

## EMERGENCY POWER DOWN

CAUTION: USE BATTERIES ONLY WHEN MAIN BUS VOLTS &lt; 24.5

## CONFIGURE FOR USE OF AUX BATTERY

FUEL CELL 2 MNA & MNB (2) - OFF  
 cb CRYO O2 ISOL/AUX BAT - CLOSE (Pn1 226)  
 SM PWR SOURCE - AUX BAT (mom) (Pn1 278)  
 O2 TANK 3 ISOL - CLOSE ( $\sqrt{TB-bp}$ ) (Pn1 278)  
 FUEL CELL 2 MN A(B) - as desired

INSURE DSE IS RECORDING	DC AMPS
IF UNSUITED, SUIT COMP (2) - OFF	4.0
FC PUMPS (3) - OFF (Until $T_{skin} > 475^{\circ}\text{F}$ )	8.7 TOTAL
cb G&N OPTICS MNA & MNB (2) - OPEN (Pn1 5)	3.1
G&N PWR (AC) - OFF (Pn1 5)	0.9
O2 HTRS (3) - OFF (CTR)	17.0
H2 HTRS (2) - OFF (CTR)	1.4 EA
H2 FANS (3) - OFF (CTR)	1.0
C/W NORMAL - ACK	
LM PWR - RESET - OFF	15.0 MAX
ECS RAD HTRS (2) - OFF	17.2 EA
POT H2O HTR - OFF	1.6 MAX
SM RCS HTRS (4) - OFF	3.3 MAX
HGA PWR - OFF	2.9
LIGHTS - Min Rreqd	5.3 MAX
EXT LTS - OFF	4.6
NON ESS BUS - OFF (SPS Burn-Damage SIM CAM)	4 - 6
VHF RANGING - OFF	1.4
S BD AUX TV - OFF (CTR)	5.3
SPS LINE HTR - OFF (CTR)	6.2 (A/B)
RNDZ XPNDR PWR - OFF or HEATER (Pn1 100)	3.0
SIG CONDR/DRIVER BIAS PWR (2) - OFF	
SECURE ONE BMAG	2.6
SELECT SINGLE JET CONTROL	
EMS FUNC - OFF	
RHC PWR DIRECT (2) - OFF	
THC PWR - OFF	
CONFIGURE FOR SINGLE INVERTER OPERATION	
TURN OTHER INVERTER OFF	4.0 MAX
BAT CHGR - OFF	
NOTE MISSION TIME	
cb TIMERS (2) - OPEN (Pn1 229)	
AC INVERTER (9) - OFF	
CM RCS HTRS - OFF	
ISOLATE FAILED FC's from MAIN BUSES	

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ECS POWER DOWN	3.7 TOTAL
ECS GLY PUMP sel - OFF (ISS LIMIT 2.5 HRS)	2.6
ECS RAD FLOW CONT PWR - off (CTR)	0.7
GLY EVAP TEMP IN - MAN	
ECS RAD HTRS (2) - OFF	
GLYCOL EVAP H2O FLOW - OFF	~0.1
GLYCOL EVAP STEAM PRESS - MAN	~0.2

COMM POWER DOWN	13.0 TOTAL
IF VOICE DESIRED	
UP TLM CMD RESET - RESET then OFF	
S-BD AUX TAPE - DN VOICE BU	
S-BD MODE PCM - OFF	
PCM BIT RATE - HIGH	
S-BD PWR AMP - OFF (CTR)	4.0
TAPE RCDR - OFF (CTR)	1.6
SCE PWR - OFF (CTR)	0.7
cb INSTR ESS MNA & MNB (2) - OPEN (Pn1 5)	4.9
TELCOM GRP 1 & 2 (2) - OFF	1.6

CMC/IMU POWER DOWN	6.0 IMU
COMPLETE ALIGNMENT TRANSFER	
CMC MODE - FREE	PROVIDES CMC MIN IMP
cb G&N IMU MNA & MNB (2) - OPEN (Pn1 5)	
V37E06E	3.0 CMC
F V50 N25, 00062, CMC PWR DN	
PRO, HOLD (~5 SEC) UNTIL STBY LT - ON	

SCS POWER DOWN	6.0
ACCEPTABLE S/C ATTITUDE	
BMAG PWR (2) - OFF	
FDAI/GPI PWR - OFF	PROVIDES MIN IMP
SCS ELECTRONICS PWR - ECA	(REQUIRES AC1 & MNB)
ORDEAL PWR & LIGHTING - OFF	
cb SCS LOGIC BUS (4) - OPEN (Pn1 8)	2.0
SCS ELECTRONICS PWR - OFF	
RHC PWR NORM (2) - OFF	

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LAUNCH BUS LOSS

**MN BUS A LOST - LAUNCH**

EDS AUTO/OFF - OFF  
TVC GMBL DR (P,Y) - 2  
SCS TVC (P,Y) - RATE CMD  
BMAG MODE (3) - RATE 2  
FDAI SEL - 2  
cb SPS PITCH 2 & YAW 2 (Pn1 8) - OPEN  
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNB  
AC INV 3 AC 1 - ON  
AC INV 1 AC 1 - OFF  
A11 F/C MNA - OFF  
ALL F/C MNB - MNB (BEFORE CM/SM SEP)  
cb MNA BAT BUS A (Pn1 275) - OPEN  
cb MNB BAT C (Pn1 275) - CLOSED

**MN BUS B LOST - LAUNCH**

EDS AUTO/OFF - OFF  
TVC GMBL DR (P,Y) - 1  
SPS TVC (P,Y) - RATE CMD  
BMAG MODE (3) - RATE 1  
FDAI SEL - 1  
cb SPS PITCH 1 & YAW 1 (Pn1 8) - OPEN  
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNA  
AC INV 3 AC 2 - ON  
AC INV 2 AC 2 - OFF  
A11 F/C MNB - OFF  
A11 F/C MNA - MNA (BEFORE CM/SM SEP)  
cb MNB BAT BUS B (Pn1 275) - OPEN  
cb MNA BAT C (Pn1 275) - CLOSED

**AC BUS 1 LOST - LAUNCH**

B MAG MODE (3) - RATE 2  
FD A I SEL - 2  
TVC SERVO PWR 1 - AC2/MNB  
SCS TVC PITCH, YAW - RATE CMD

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC

**AC BUS 2 LOST - LAUNCH**

/B MAG MODE (3) - RATE 1  
FD A I SEL - 1  
TVC SERVO PWR 2 - AC1/MNA  
MTVC WITH THUMBWHEELS (MODE III OR IV)

AC INV 2 MNB - OFF  
/SUIT COMPR - AC 1  
/ECS GLY PUMP - AC 1

**BAT BUS A LOST - LAUNCH**

EDS AUTO/OFF - OFF  
AUTO RCS SEL (RING 1) - OFF  
IF BUS LOST BEFORE GMBL MTRS ON  
TVC GMBL DR (P,Y) - 2  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(AFTER SEC GIMBAL MOTORS ON)  
cb MNA BAT C (Pn1 275) - CLOSED

**BAT BUS B LOST - LAUNCH**

EDS AUTO/OFF - OFF  
AUTO RCS SEL (RING 2) - OFF  
IF BUS LOST BEFORE GMBL MTRS ON  
TVC GMBL DR (P,Y) - 1  
cb SPS P1 & Y1 (Pn1 8) - OPEN  
(AFTER PRI GIMBAL MOTORS ON)  
cb MNB BAT C (Pn1 275) - CLOSED

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SPS BURN BUS LOSS**MN BUS A LOST - SPS BURN**

TVC GMBL DR (P,Y) - 2  
■ SCS TVC (P,Y) - RATE CMD  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)

FDAI SEL - 2

/FDIA SOURCE - CMC

RHC PWR DIRECT 2 - MNB

BMAG MODE (3) - RATE 2

/ΔV THRUST B - NORM

AUTO RCS SEL - MNB

AC INV 3 - MNB

AC INV 3 AC 1 - ON

AC INV 1 AC 1 - OFF

A11 F/C MNA - OFF

ALL F/C MNB - MNB

cb MNA BAT BUS A (Pn1 275) - OPEN

**MN BUS B LOST - SPS BURNS**

SCS TVC (P,Y) - RATE CMD  
TVC GMBL DR (P,Y) - 1  
cb SPS P1 & Y1 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)

FDAI SEL - 1

/FDIA SOURCE - CMC

RHC PWR DIRECT 1 - MNA

BMAG MODE (3) - RATE 1

/ΔV THRUST A - NORM

AUTO RCS SEL - MNA

AC INV 3 - MNA

AC INV 3 AC 2 - ON

AC INV 2 AC 2 - OFF

A11 F/C MNB - OFF

A11 F/C MNA - MNA

cb MNB BAT BUS B (Pn1 275) - OPEN

**AC BUS 1 LOST - SPS BURNS**

TVC SERVO PWR 1 - AC2/MNB  
SCS TVC (P&Y) - RATE CMD  
BMAG MODE (3) - RATE 2  
FDAI SEL - 2  
✓FDAI SOURCE - CMC

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC  
SPS GAUGING - AC 2

**AC BUS 2 LOST - SPS BURNS**

TVC SERVO PWR 2 - AC1/MNA  
BMAG MODE (3) - RATE 1  
SCS TVC (P&Y) - AUTO  
ΔVCG - LM/CSM  
MTVC WITH TRIM THUMBWHEELS (SCS BURN ONLY)  
FDAI SEL - 1  
✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF  
✓SUIT COMPR - AC 1  
✓ECS GLY PUMP - AC 1

**BAT BUS A LOST - SPS BURNS**

TVC GMLB DR (P,Y) - 2  
(IF BUS LOST BEFORE GMLB MTRS ON)  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMLB MTRS ON)  
cb MNA BAT C (Pn1 275) - CLOSED

**BAT BUS B LOST - SPS BURNS**

TVC GMLB DR (P,Y) - 1  
(IF BUS LOST BEFORE GMLB MTRS ON)  
cb SPS P1 & Y1 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMLB MTRS ON)  
cb MNB BAT C (Pn1 275) - CLOSED

ENTRY BUS LOSS**MN BUS A LOST - ENTRY**

BMAG MODE (3) - RATE 2  
FDAL SEL - 2  
✓FDAL SOURCE - CMC  
AUTO RCS SEL (12) - MNB (ONLY IF BUS LOST AFTER SM SEP)

AC INV 3 - MNB  
AC INV 3 AC 1 - ON  
AC INV 1 AC 1 - OFF  
A11 F/C MNA - OFF  
ALL F/C MNB - MNB (BEFORE CM/SM SEP)  
cb MNA BAT BUS A (Pn1 275) - OPEN  
cb MNB BAT C (Pn1 275) - CLOSED

**MN BUS B LOST - ENTRY**

BMAG MODE (3) - RATE 1  
FDAL SEL - 1  
✓FDAL SOURCE - CMC  
AUTO RCS SEL (12) - MNA (ONLY IF BUS LOST AFTER SM SEP)

AC INV 3 - MNA  
AC INV 3 AC 2 - ON  
AC INV 2 AC 2 - OFF  
A11 F/C MNB - OFF  
A11 F/C MNA - MNA (BEFORE CM/SM SEP)  
cb MNB BAT BUS B (Pn1 275) - OPEN  
cb MNA BAT C (Pn1 275) - CLOSED

**AC BUS 1 LOST - ENTRY**

BMAG MODE (3) - RATE 2  
FDAL SEL - 2  
✓FDAL SOURCE - CMC

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC

**AC BUS 2 LOST - ENTRY**

BMAG MODE (3) - RATE 1  
FDAI SEL - 1  
✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF  
✓SUIT COMPR - AC 1  
✓ECS GLY PUMP - AC 1

**BAT BUS A LOST - ENTRY**

cb SCS B/D ROLL, P&Y (MNA) (3) (Pn1 8)  
Before CM/SM SEP - OPEN  
After RCS transfer to CM - CLOSE  
cb SCS CONTR/AUTO (2) (Pn1 8) - OPEN  
(AFTER APEX COVER JET)  
cb MNA BAT C (Pn1 275) - CLOSED

**BAT BUS B LOST - ENTRY**

cb SCS B/D ROLL, P&Y (MNB) (3) (Pn1 8)  
Before CM/SM SEP - OPEN  
After RCS transfer to CM - CLOSE  
cb SCS CONTR/AUTO (2) (Pn1 8) - OPEN  
(AFTER APEX COVER JET)  
cb MNB BAT C (Pn1 275) - CLOSED

ALL FC'S DISCONNECTED - POWERED FLT  
ATTEMPT FC RECONNECT (ONE BUS AT A TIME)

**IF RECONNECT NOT SUCCESSFUL**

FC 1 - MN B  
FC 2 - MN B  
FC 3 - MN A

**IF STILL NO SUCCESS**

SCE PWR - AUX  
EDS AUTO/OFF - OFF  
cb MNA BAT C (Pn1 275) - CLOSED  
cb MNB BAT C (Pn1 275) - CLOSED

AC BUS OVERLD + AC BUS + MN BUS UNDER V LITES  
AFFECTED AC BUS - OFF (REASON - AC BUS SHORT)

FC 1 (2,3) LITE

VERIFY FC 1 (2,3) REAC tb - gray

**IF tb BP**

FC 1 (2,3) REAC v1v - OPEN (up)

**IF tb STILL BP & REAC FLOW ~0**

OPEN CIRCUIT FC 1 (2,3)

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12/9/7

SM RCS THRUSTER FAILED ON

B MAG MODE (3) - RATE 2  
CHG TO OTHER SC CONT MODE  
ROT CONT PWR DIR (2) - MNA/MNB  
STOP SPACECRAFT RATES WITH DIRECT RCS  
AUTO RCS SEL (16) - OFF

**IF CONDITION PERSISTS**

AUTO RCS SEL (16) - ON (AS REQ'D)  
MAN ATT (3) - ACCEL CMD  
STOP SPACECRAFT RATES  
cb SCS DIR ULL (2)(Pn1 8) - open  
ROT CONT PWR DIR (2) - OFF

**IF CONDITION PERSISTS**

NEUTRALIZE RHC  
SM RCS PRPLNT (AFFECTED QUAD) - OFF

SM RCS LITE

SM RCS HE (2) - CLOSE  
SEE RCS 1

SM RCS QUAD SECURE

SM RCS He 1 & 2 (AFFECTED QUAD) (2) - CLOSE  
SM RCS PRIM PRPLNT (AFFECTED QUAD) - CLOSE  
Fire one jet in affected quad - 2 sec continuously  
AUTO RCS SELECT (AFFECTED QUAD) (4) - OFF (except BOOST)

CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

CM RCS

**IF NO PRESSURIZATION**

/cb EPS BAT BUS (2) (Pn1 229) - CLOSE  
/cb PYRO A/B SEQ A/B (2) (Pn1 250) - CLOSE  
/cb SECS ARM (2) (Pn1 8) - CLOSE  
/SECS PYRO ARM (2) - ARM  
/SECS LOGIC (2) - ON  
CM RCS - PRESS

**IF NO RCS PRPLNT FEED**

/cb EPS GRP 1 & 3 (Pn1 229) - CLOSE  
/cb SM RCS HTR A&B (Pn1 8) - CLOSE  
/cb RCS PRPLNT ISOL (2) (Pn1 8) - CLOSE  
CM RCS PRPLNT - ON

**IF STILL NO FEED**

cb EPS GRP 5 (Pn1 229) - CLOSE  
cb RCS LOGIC (2) (Pn1 8) - CLOSE  
CM RCS LOGIC - ON  
CM PRPLNT - DUMP MOMENTARILY, THEN OFF

V05 N09 ALARM CODES

- 00110 Mark reject has been entered but ignored  
Continue
- 00113 No inbits (chan 16)  
Continue: if alarm recurs use MDC DSKY.
- 00114 More marks made than desired  
Continue
- 00115 V41 N91 keyed with OPTICS MODE not in CMC  
OPTICS MODE - CMC and OPTICS ZERO - OFF
- 00116 Optics switch altered before 15 sec zero time elapsed  
OPTICS ZERO - ZERO (15 sec).
- 00117 V41 N91 keyed but CMC has reserved OCDU (from start of gimbal test in P40 until termination of TVC functional allocation of the "optics" CDU Driving Output)  
V41 N91 not yet available
- 00120 Optics torque has been requested but optics have not been zeroed since last FRESH START or RESTART  
OPTICS ZERO - OFF then ZERO (15 sec).
- 00121 In 0.05 sec following mark, an ICDU changed by more than 0.033°  
Repeat MK.
- (m)00205 PIPA saturated  
Use SCS control (G&N 12).
- 00206 The IMU zero routine has been entered with both the GMBL LOCK 1t and NO ATT 1t on  
Coarse align to 0,0,0 Reselect V40E.
- (m)00207 ISS turn-on request not present for 90 sec  
Redo IMU turn on (G&N 12).  
The IMU is not operating  
Redo IMU turn on. If alarm recurs perform fresh start (V36E).  
Consult MSFN. (G&N 12).

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## ALARM CODES

- (m)00211 Coarse align error  
If P51(3)/52(4) in progress record gyro  
torquing angles and perform fine align  
check in P52(4)  
Otherwise, see G/1-24. (G&N 12).
- (m)00212 PIPA fail, but PIPA is not being used  
PIPA BIAS check (G&N 6/8).
- (m)00213 IMU not operating with turn-on request  
See 00210
- 00214 Program using IMU when turned OFF  
See 00210 or exit program.
- (m)00217 IMU coarse align or pulse torque  
difficulty has occurred  
If code 211 also, perform 211 cure only  
Reinitiate current program.  
If alarm recurs, terminate use of  
ISS (G&N 12).
- 00220 IMU orientation unknown  
Align or if aligned set REFSMMAT flag
- 00401 Desired middle gimbal angle is excessive  
Call N22 - maneuver if MGA < 85° or  
realign IMU.
- 00402 Second MINKEY pulse torque must be done.
- 00404 Target out of view (90 deg test)  
(G/3-7,3-11,6-3,7-16)
- 00405 Acceptable star pair is not available  
(G/6-3,6-6)
- 00406 Rend navigation not operating  
Select P20 Opt. 0 or 4 or continue.
- 00421 W-matrix overflow  
Notify MSFN but continue.  
W-matrix automatically reinitialized at  
next mark.
- 00600 No solution on first iteration in P31 or  
P32/72  
(G/4-6,4-8)
- 00601 Post CSI Perigee/lune alt <85nm/ 5.8nm  
(G/4-6, 4-8)
- 00602 Post CDH Perigee/lune alt <85nm/ 5.8nm  
(G/4-6, 4-8)
- 00603 Time from TIG (CSI) to TIG (CDH)  
<10 min  
(G/4-6, 4-8)

- 00604 Time from TIG (CDH) to TIG (TPI)  
<10 min  
(G/4-6,4-8)
- 00605 Number of iterations exceeds loop maximum  
(G/4-6,4-8,4-15,4-16)
- 00606 ΔV (CSI) has been >1000 fps for last two iterations  
(G/4-6,4-8)
- 00611 No TIG for given ELEV angle  
(G/4-10,4-12)
- 00612 State vector in wrong sphere of influence at TIG  
(G/4-15)
- 00613 Reentry angle out of limits  
(G/4-16)
- (m)00777 ISS warning caused by PIPA fail  
(G&N 6).
- 01102 CMC self test error  
(G/2-3)
- (m)01105 Downlink too fast  
Rset. If alarm recurs DOWNLINK FAILURE.  
(G&N 12).
- (m)01106 Uplink too fast  
Rset. If alarm recurs UPLINK FAILURE.  
(G&N 12).
- (m)01107 Phase table failure-assume erasable memory is destroyed  
If Comm:  
1. V74 CMC DOWNLINK  
2. P27 As Necessary.  
3. V48 As Necessary (V46).  
4. Reestablish REFSMMAT via P51 As Necessary.  
If FRESH START recurs,  
CMC FAILURE (SSR-3).  
If no Comm, pg G/9-1
- 01301 Arcsin or arccos input is greater than one  
Notify MSFN, continue.
- (m)01407 VG increasing  
(G&N 12).
- 01426 IMU unsatisfactory  
Realign or use SCS.

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- 01427 IMU reversed  
Note FDAI operation is inverted.
- 01520 V37 request not permitted at this time  
Wait till COMP ACTY lt.  
not on continuously - reselect V37 or if  
P62-67, select P00 and then desired  
program.
- 01600 Overflow in drift test  
This is gnd test alarm only.
- 01601 Bad IMU torque abort  
See 01600
- 01703 Insufficient time for integration.  
TIG slipped  
(G/5-3,5-16)
- (m)03777 ISS warning caused by ICDU fail  
(G&N 6)
- (m)04777 ISS warning caused by ICDU & PIPA fail  
(G&N 6)
- (m)07777 ISS warning caused by IMU fail  
(G&N 6)
- (m)10777 ISS warning caused by IMU & PIPA  
fail (G&N 6)
- (m)13777 ISS warning caused by IMU & ICDU fail  
(G&N 6)
- (m)14777 ISS warning caused by IMU,ICDU & PIPA  
fail  
(G&N 6)
- \*\*20430 Orbital integration has been  
terminated to avoid possible  
infinite loop.  
Notify MSFN.  
Probable S.V. uplink required
- \*\*20607 No solution to conic subroutine  
Reselect program.
- \*\*20610 Alt at specified TIG in P37 < 400K ft  
Reselect P37 and decrease TIG.
- \*\*21204 Negative or zero time waitlist call.  
If ave-g or ext. vb. on, continue.  
Otherwise reselect program.
- \*\*21206 Second job attempts to go to sleep via  
keyboard and display program  
See 21204.

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- \*\*21210 Second attempt is made to stall  
Reselect program  
Do not attempt use of IMU while CMC is  
using it.
- \*\*21302 SQRT called with negative argument  
See 21204
- \*\*21501 Keyboard and display alarm during  
internal use  
See 21204
- \*\*21502 Illegal flashing display  
See 21204
- \*\*21521 P01 selected and P11 has already been  
performed  
Select correct program
- \*31104 Delay routine busy  
Reselect extended verb or continue with  
program.  
Notify MSFN.
- \*31201 Executive overflow - no vac area  
Reselect Extended Verb and/or Continue  
Program.
- \*31202 Executive overflow - no core sets  
See 31201
- \*31203 Waitlist overflow - too many tasks  
See 31201
- \*31211 Illegal interrupt of extended verb  
Reselect extended verb after optics  
marking is completed.  
(m) - Malf procedure indicated
- \*\*(2xxxx) - Generates restart (no lt), F37 (POODOO)  
\*(3xxxx) - Restart (no lt) and program  
continues (i.e. attempted  
recovery)(BAILOUT)
- NOTE - All \*\*alarms act as \*type if  
they occur when Ave-g is on or  
display type extended verb  
is active.

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