



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

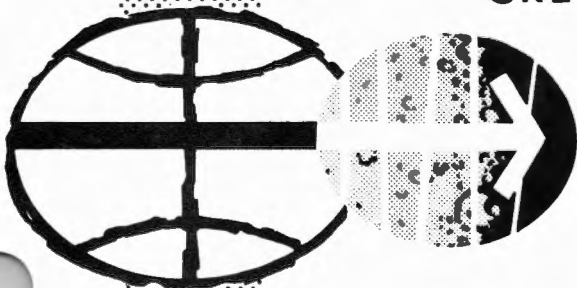
APOLLO 17
DECEMBER 6 LAUNCH

DO NOT DISCARD
THIS COPY BASELINE FOR
ALL LAUNCH DATES

BASIC
CSM LAUNCH
CHECKLIST

PREPARED BY

FLIGHT PROCEDURES BRANCH
CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

SEPTEMBER 4, 1972

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

APOLLO 17
CSM LAUNCH CHECKLIST

SEPTEMBER 4, 1972

PREPARED BY: Dennis L. Bentley
DENNIS L. BENTLEY
BOOK MANAGER

APPROVED BY: Paul C. Kramer
PAUL C. KRAMER, CHIEF
FLIGHT PROCEDURES BRANCH
CREW PROCEDURES DIVISION

It is requested that any organization having comments, questions, or suggestions concerning this document contact Dennis L. Bentley, Flight Procedures Branch, CG42, Building 4, room 256, telephone 483-3291.

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes should be submitted to the Apollo Flight Data File Manager, T. W. Holloway, CG5, Building 4, room 230, telephone 483-4271.

Distribution of this document is controlled by Flight Data File Manager, T. W. Holloway, Flight Planning Branch, Crew Procedures Division.

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

i

CSM LAUNCH CHECKLIST

LIST OF EFFECTIVE PAGES

Basic 9/4/72

PAGE	DATE	PAGE	DATE
i	9/4/72	2-14	9/4/72
ii	9/4/72	2-15	9/4/72
iii	9/4/72	2-16	9/4/72
1-1	9/4/72	2-17	9/4/72
1-2	9/4/72	2-18	9/4/72
1-3	9/4/72	2-19	9/4/72
1-4	9/4/72	2-20	9/4/72
1-5	9/4/72	2-21	9/4/72
1-6	9/4/72	2-22	9/4/72
1-7	9/4/72	2-23	9/4/72
1-8	9/4/72	2-24	9/4/72
1-9	9/4/72	2-25	9/4/72
1-10	9/4/72	2-26	9/4/72
1-11	9/4/72	2-27	9/4/72
1-12	9/4/72	2-28	9/4/72
1-13	9/4/72	2-29	9/4/72
1-14	9/4/72	2-30	9/4/72
1-15	9/4/72	2-31	9/4/72
2-1	9/4/72	3-1	9/4/72
2-2	9/4/72	3-2	9/4/72
2-3	9/4/72	3-3	9/4/72
2-4	9/4/72	3-4	9/4/72
2-5	9/4/72	3-5	9/4/72
2-6	9/4/72	3-6	9/4/72
2-7	9/4/72	3-7	9/4/72
2-8	9/4/72	4-1	9/4/72
2-9	9/4/72	4-2	9/4/72
2-10	9/4/72	4-3	9/4/72
2-10A	9/4/72	4-4	9/4/72
2-10B	9/4/72	4-5	9/4/72
2-11	9/4/72	4-6	9/4/72
2-12	9/4/72	4-7	9/4/72
2-13	9/4/72	4-8	9/4/72

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

ii

LIST OF EFFECTIVE PAGES (CONT)

PAGE	DATE	PAGE	DATE
4-9	9/4/72	6-9	9/4/72
4-10	9/4/72	6-10	9/4/72
4-11	9/4/72	7-1	9/4/72
4-12	9/4/72	7-2	9/4/72
4-13	9/4/72	7-3	9/4/72
4-14	9/4/72	7-4	9/4/72
4-15	9/4/72	7-5	9/4/72
4-16	9/4/72	7-6	9/4/72
5-1	9/4/72	7-7	9/4/72
5-2	9/4/72	7-8	9/4/72
5-3	9/4/72	8-1	9/4/72
5-4	9/4/72	8-2	9/4/72
5-5	9/4/72	8-3	9/4/72
5-6	9/4/72	8-4	9/4/72
5-7	9/4/72	8-5	9/4/72
5-8	9/4/72	8-6	9/4/72
5-9	9/4/72	8-7	9/4/72
5-10	9/4/72	8-8	9/4/72
5-11	9/4/72	8-9	9/4/72
5-12	9/4/72	8-10	9/4/72
6-1	9/4/72	8-11	9/4/72
6-2	9/4/72	9-1	9/4/72
6-3	9/4/72	9-2	9/4/72
6-4	9/4/72	9-3	9/4/72
6-5	9/4/72	9-4	9/4/72
6-6	9/4/72	9-5	9/4/72
6-7	9/4/72	EMER/1-1 . .	(SYS C/L)
6-8	9/4/72	EMER/1-2 . .	(SYS C/L)

CONTENTS

	Page
1. LIFTOFF CONFIGURATION	1-1
2. BOOST - INSERTION - TLI	2-1
Boost Preparation (T -20:00)	2-1
Boost	2-7
Insertion & Systems Checks	2-11
TLI Preparation	2-27
TLI, Nominal & Manual	2-28
Saturn Rate Change	2-31
3. NORMAL SC/BOOSTER SEPARATIONS	3-1
4. ABORTS (LAUNCH & TLI)	4-1
MODE I A	4-1
MODE I B	4-1
MODE I C	4-2
MODE II	4-3
MODE III	4-4
MODE IV	4-6
Landing Phase	4-8
Pre-TLI	4-10
TLI +90 Min	4-13
5. EARTH ORBIT ENTRY VEHICLE PREP	5-1
6. HYBRID RCS DEORBIT & ENTRY	6-1
7. SM RCS DEORBIT & ENTRY	7-1
8. SPS DEORBIT & ENTRY	8-1
9. EARTH/POST LANDING	9-1
10. EMERGENCY PROCEDURES	EMER/1-1
11. CREW LOG	

DATE 9/4/72

DATE

L
1-1

LIFTOFF CONFIGURATION

PANEL 1

EMS FUNC - ΔV
EMS MODE - STBY
GTA - off (down)
EMS GTA COVER - Secure
CMC ATT - IMU
FDAI SCALE - 5/5
FDAI SEL - 1/2
FDAI SOURCE - CMC
ATT SET - GDC
MAN ATT ROLL - RATE CMD
MAN ATT PITCH - ACCEL CMD
MAN ATT YAW - RATE CMD
LIM CYCLE - OFF
ATT DBD - MIN
RATE - HIGH
TRANS CONTR PWR - on (up)
RHC PWR NORM (2) - AC/DC
RHC PWR DIR (2) - MNA/MNB
SC CONT - SCS
CMC MODE - FREE
BMAG MODE ROLL - RATE 1
BMAG MODE PITCH - RATE 1
BMAG MODE YAW - RATE 1
SPS THRUST - NORMAL (lock)
 ΔV THRUST (2) - OFF (guarded)
SCS TVC PITCH - AUTO
SCS TVC YAW - AUTO
SPS GMBL MOT PITCH (2) - OFF
SPS GMBL MOT YAW (2) - OFF
 ΔV CG - LM/CSM
ELS LOGIC - OFF (guarded)
ELS AUTO - MAN
CM RCS LOGIC - on (up)
CM PRPLNT DUMP - OFF (guarded)
CM PRPLNT PURG - off (down) (guarded)
IMU CAGE - off (down) (guarded)
EMS ROLL - OFF
.05G sw - OFF

DATE 9/4/72

LIFTOFF CONFIG

BACK

COLOR _____

L
1-2

LIFTOFF CONFIG

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

PANEL 2

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

DATE 9/4/72

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

L
1-3

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

DATE 9/4/72

DATE

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

L
1-4

HI GAIN ANT YAW POS - 180°
HI GAIN ANT PWR - OFF
HI GAIN ANT SERVO ELECT - PRIM

PANEL 3

VHF ANT - SM LEFT
SPS ENG INJ VLV ind (4) - CLOSE
FC RAD (3) - center (NORMAL*)
FC RAD (3) tb - gray
FC HTRS (3) - on (up)
FC IND sel - 2
SPS QTY TEST - off (center)
OXID FLOW VLV INCR - NORM
OXID FLOW VLV PRIM - PRIM
PUG MODE - NORM
FC PURG (3) - OFF
FC REAC (3) - center (on,up*)
FC REAC tb (3) - gray
FC 1 MN BUS A - center (on,up*)
FC 1 MN BUS A tb - gray
FC 2 MN BUS A - center (on,up*)
FC 2 MN BUS A tb - gray
FC 3 MN BUS A - OFF
FC 3 MN BUS A tb - bp
MN BUS A RSET - center (RESET*)
FC 1 MN BUS B - OFF
FC 1 MN BUS B tb - bp
FC 2 MN BUS B - OFF
FC 2 MN BUS B tb - bp
FC 3 MN BUS B - center (on,up*)
FC 3 MN BUS B tb - gray
MN BUS B RSET - center (RESET*)
DC IND sel - MNA
BAT CHARGE - OFF
SPS He vlv (2) - AUTO
SPS He vlv tb (2) - bp
SPS LINE HTRS - off (center)
SPS PRESS IND sw - He
S BD XPNDR - PRIM
S BD PWR AMPL PRIM - PRIM
S BD PWR AMPL HI - HIGH
PWR AMPL tb - gray

DATE

DATE 9/4/72

L
1-5

S BD MODE VOICE - VOICE
S BD MODE PCM - PCM
S BD MODE RNG - RNG
S BD AUX TAPE - off (center)
S BD AUX TV - off (center)
UP TLM DATA - DATA
UP TLM CMD - NORM
S BD ANT OMNI - B
S BD ANT - OMNI
VHF AM A - (center)
VHF AM B - DUPLEX
VHF AM RCV - off (center)
VHF AM SQLCH tw (2) - noise threshold + 1 div
VHF BCN - OFF
VHF RNG - OFF
S BD SQUELCH - ENABLE
FC REACS vlv - 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

PANEL 4

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

DATE 9/4/72

DATE

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

L
1-6

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

PANEL 5

FC1 PUMPS - AC1
FC2 PUMPS - AC2
FC3 PUMPS - AC2
G/N PWR - AC1
MN BUS TIE (2) - on (up)
BAT CHGR - AC1
NONESS BUS - MNA
INT INTGL LT - as desired
INT FLOOD LT - OFF, full dim or full bright
INT FLOOD LT DIM - 1
INT FLOOD LT FIXED - OFF
cb Panel 5 all closed except:
 cb INST NONESS - open
 cb ECS XDUCR PRESS GRP 2 MNA - open
 cb WASTE H2O/UR DUMP HTR (2) - open

PANEL 6

MODE - INTERCOM/PTT
PWR - AUDIO/TONE
PAD COMM - OFF
INTERCOM - T/R
S BD - T/R
VHF AM - T/R
AUDIO CONT - NORM
SUIT PWR - on (up)
tw settings - as desired

DATE

9/4/72
DATE

PANEL 7

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

L
1-7

SCS ELEC PWR - GDC/ECA
SCS SIG CONDR/DR BIAS 1 - AC1
SCS SIG CONDR/DR BIAS 2 - AC2
BMAG PWR (2) - ON
DIRECT 02 vlv - OPEN (CCW) (>2 in H2O 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)

PANEL 9

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

DATE 9/4/72

DATE

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

L
1-8

AUDIO CONT - NORM
SUIT PWR - on (up)
VHF RNG - NORM
tw settings - as desired

PANEL 10

MODE - INTERCOM/PTT
PWR - AUDIO/TONE
PAD COMM - OFF
INTERCOM - T/R
S BD - T/R
VHF AM - T/R
AUDIO CONT - NORM
SUIT PWR - on (up)
tw settings - as desired

PANEL 12

LM TUNL VENT vlv - LM/CM Δ P

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

DATE

9/4/72
DATE

L
1-9

PANEL 100

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

PANEL 101

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

PANEL 122

OPT ZERO - ZERO
OPT TELTRUN - SLAVE TO SXT
OPT COUPLING - DIRECT
OPT MODE - MAN
OPT SPEED - LO
COND LAMPS - ON
UP TLM - ACCEPT

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

DATE 9/4/72

DATE

DATE

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

L
1-10

PANEL 225

cb Panel 225 - all closed except:
cb HI GAIN ANT FLT BUS - open
cb HI GAIN ANT GRP 2 - open

PANEL 226

cb Panel 226 - all closed except:
cb COAS/TUNL LTG MNB - open

PANEL 227

SCI PWR - OFF

PANEL 229

cb Panel 229 all closed except:
cb MAIN REL PYRO (2)- open
cb 02 VAC ION PUMPS (2) - open

PANEL 230

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

DATE

DATE 9/4/72

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

L
1-11

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

PANEL 250

cb Panel 250 - all closed except:
cb PYRO A TIE TO BAT BUS A - open
cb PYRO B TIE TO BAT BUS B - open
cb BAT C TO BAT BUS A - open
cb BAT C TO BAT BUS B - open

PANEL 251

WASTE MGMT OVBD DRAIN 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
SPS PRESS FUEL IND - 1
SPS PRESS OXID IND - 1

DATE 9/4/72

DATE

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

L
1-12

PANEL 278

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

DATE

DATE 9/4/72

L
1-13

PANEL 306

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

PANEL 325

CAB PRESS RELF 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 O2 SUPPLY vlv - ON
SURGE TK O2 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)

DATE 9/4/72

DATE

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

L
1-14

PANEL 352

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

PANEL 375

SURGE TK PRESS RELF vlv - open (CW)

PANEL 376

PLVC - NORMAL (up)

PANEL 377

GLY TO RAD SEC vlv - BYPASS (CCW)

PANEL 378

PRIM GLY ACCUM vlv - open (CCW)

PANEL 379

PRIM ACCUM FILL vlv - OFF (CW)

PANEL 380

02 DEMAND REG vlv - BOTH
SUIT TEST vlv - OFF
SUIT CKT RET vlv - close (push)

PANEL 382

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

DATE

DATE 9/4/72

L
1-15

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

* - last momentary position before liftoff.

DATE 9/4/72

DATE

L
2-1

BOOST PREPARATION

-20:00

Change X STABLE MEMBER AZIMUTH, if necessary:

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

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

BOOST PREPARATION

-15:00

CTE UPDATE VERIFICATION

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

ASTRO LAUNCH OPERATIONS VOICE CHECK

LMP S BD sw - OFF
CDR VHF AM sw - OFF

VOICE CHECK WITH MCCH

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

DATE 9/4/72

BACK

COLOR _____

L
2-2

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

BOOST PREPARATION

-10:00 FC REAC vlv - LATCH

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

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

-04:00 ASTRO LAUNCH OPERATIONS COMM CHECK

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

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

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

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

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

DATE 9/4/72

L
2-3

SATURN BOOST 9/4/72 DEC 6 LAUNCH

	DET	Θ	VI	H	H
	00:00	90	1341	0	.0
	:30	85	1397	286	.6
	1	68	1867	786	3.2
	1:30	50	3001	1454	8.7
	2	35	5000	2160	17.6
a	2:19	29	6804	2688	25.2
	2:30	26	7782	2894	30.2
b	2:41	23	8966	3130	35.8
	3	23	9133	2758	44.8
	3:30	24	9664	2274	57.2
	4	22	10295	1853	67.4
	4:30	20	11024	1464	75.5
	5	18	11850	1109	81.9
	5:30	15	12776	793	86.5
	6	13	13811	518	89.8
	6:30	10	14965	290	91.7
	7	7	16257	117	92.7
	7:30	4	17708	10	93.0
	8	6	19127	-29	92.9
	8:30	1	20434	-10	92.8
	9	358	21795	38	92.9
c	9:20	355	22777	112	93.1
	9:30	355	22861	67	93.3
	10	350	23395	-5	93.4
	10:30	347	23957	-50	93.3
	11	344	24546	-64	93.0
	11:30	341	25163	-44	92.7
d	11:51	341	25599	-6	92.6

DATE 9/4/72

LAUNCH TRAJECTORY

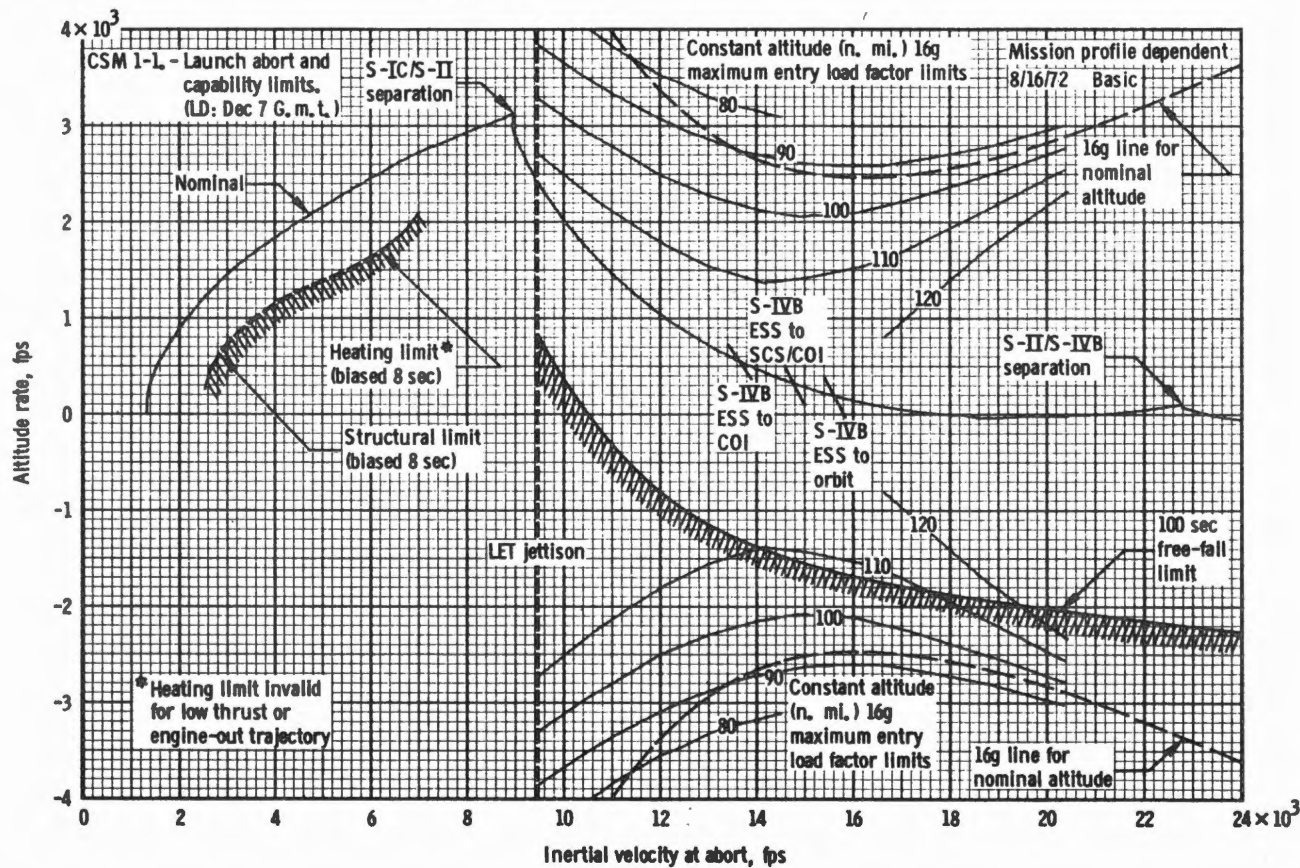
^aTimebase 2 (S-IC center-engine +.01 sec)

^bTimebase 3 (S-IC outboard-engine cutoff +.01 sec)

^cTimebase 4 (S-II engine cutoff +.01 sec)

^dTimebase 5 (S-IVB guidance cutoff signal +.21 sec)

LAUNCH ABORT LIMITS



Launch abort and capability limits.

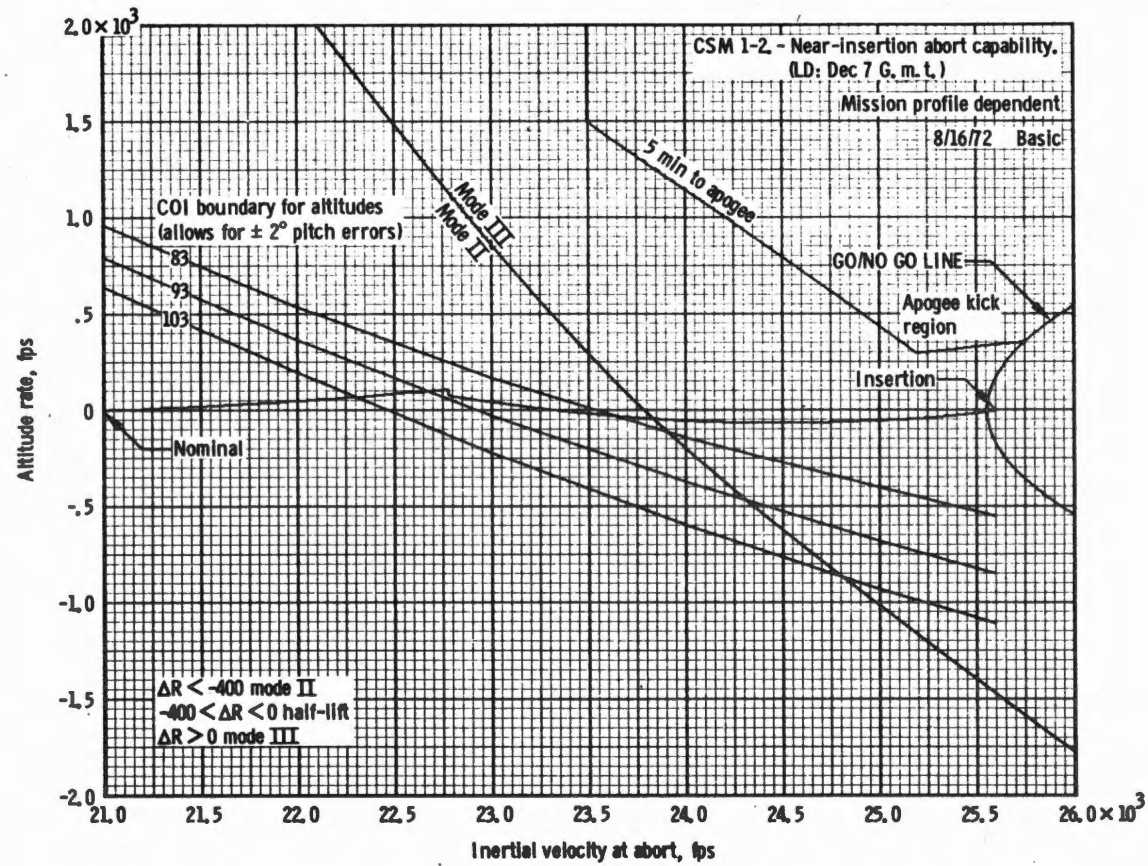
DATE 9/4/72

BACK

COLOR

L
2-4

DATE 9/4/72



2-5 L

Near-insertion abort capability.

NEAR INSERTION
ABORT LIMITS

BACK

COLOR _____

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

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

DATE 9/4/72

ALTITUDE vs V_i

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

L
2-7

BOOST

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

*After LIFTOFF verified: *
* If LIFTOFF lt off - push *
* If NO AUTO ABORT lt on - push*

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

*If no P11: Key ENTR *
* Start DET & Reset MET*

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

+4°/sec P,Y
+20°/sec R

MODE IA

+00:02 Yaw Mnvr - report
+00:12 Roll & Pitch Program - report
+00:30 Roll complete - report

+00:50 Monitor qα to T +02:00
(100% & 5° Att error)

CABIN RELIEVING ~ 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

H=16.5 nm

+01:23 MAX Q
+01:57 MODE IC - report

DATE 9/4/72

BOOST

BACK

COLOR _____

L
2-8

BOOST

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

+9°/sec P,Y
+20°/sec R

GO/NO GO FOR STAGING - report

MODE IC

+02:19 INBOARD CUTOFF - (1t 5 on)

LIFTOFF 1t - out

+02:39 CMC BOOST Polynomial ends

+02:41 OUTBOARD CUTOFF - report (1ts on)

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

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

SII SEP 1t - on

+02:44 SII 65% - 1ts out

+03:12 SII SEP 1t - out report

+03:19 TWR JETT (2) - on (up) (TFF>1+20)

*NO TWR JETT, pg L/4-2 *

TWR JETT

For MAN BOOSTER CONTROL:

* LV GUID - CMC *

* Key V46E *

α /Pc sw - Pc

MAN ATT PITCH - RATE CMD

Twr Jett & MODE II - Report

GLY EVAP STEAM PRESS - AUTO

GLY EVAP H2O FLOW - AUTO

MODE II

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

cb ELS/CM-SM SEP (2) - open

+03:52 Guidance Good

+04:00 Report Status

+05:00 Report Status

+05:55 SIVB to COI

+06:00 Report Status

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

Check GPI

LV/SPS IND - GPI (Momentarily)

PITCH = -0.58°

YAW = +1.90°

DATE 9/4/72

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

L
2-9

+06:15 OMNI ANT - D (AZ < 96°)
 - C (AZ > 96°)
+06:45 SIVB to orbit
+07:00 Report Status
+07:41 IECO (1t 5 - on)
+08:00 Report Status
+08:11 PU SHIFT
+08:30 GO/NO GO FOR STAGING - report
+08:36 Level sense arm _____
+09:17 Mode IV - Report
 (VI ~ 22,685, H DOT ~ +104,
 H ~ +94)

Report Status
+09:20 OECO (1ts on)
+09:21 SII Staging - 1ts out
+09:22 SIVB Ign Cmd - 1t on
+09:24 SIVB 65% - 1t out

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

+11:00 Report Status
+11:51 SECO (1t on) - report _____
 (Begin TB5)

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

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

+12:01 INSERTION - 1t out (TB5 + 10 sec)

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

DATE 9/4/72

DATE

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

L
2-10

V37E 00E

When CMC ACTY 1t out:

V66E

V45E

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

V46E

CSM WT

V83E (check θ)

P TRIM

PRO

Y TRIM

US LOS
(00:15:44)

SM RCS Control of SIVB (APS module failed)

LV GUID - CMC

MAN ATT (ROLL) - MIN IMP

cb SECS ARM (2) - close

AUTO RCS SEL P&Y - OFF

AUTO RCS SEL A/C ROLL - MNB

AUTO RCS SEL B/D ROLL - MNA

RCS CMD - ON

BSE command BURN MODE ON

If successful: LV GUID - IU

Control PITCH & YAW with THC, ROLL with
RHC

Allow SIVB to drift in PITCH (Gravity
Gradient)

Control YAW within platform limits

Perform normal procedures except:

TB6-15min: Mnvr to TLI Att &

set up ORDEAL, pg L/2-28

Hold TLI Att until Ignition

Null Ullage deviations with SM RCS

After TLI IGNITION: RCS CMD - OFF

AUTO RCS SEL (16) - MNA/MNB

MAN ATT (3) - RATE CMD

After TLI CUTOFF: LV GUID - CMC

MAN ATT (3) - ACCEL CMD

RCS CMD - ON

DATE

DATE 9/4/72

L/2-10A

P30 MANEUVER **EMERGENCY**

COMMENTS	CM / RCS					PURPOSE
	RCS / MAN					PROP/GUID
① EMS ΔV_z WILL COUNT FROM 100 TO 128.6 *	+	6	7	0	1	WT N47
		0	0	NA		P _{TRIM} N48
② TERMINATE BURN AT NB5 $\frac{1}{2} g_s = 0$ (R3) AND N44 $h_p < 50$ (R2) OR CM/RCS PRESS ≤ 1250 AND $h_p < 61$ (FOR CAPTURE)		0	0	NA		Y _{TRIM}
	+	0	0	0	0	HRS GETI
	+	0	0	0	4	MIN N33
	+	0	0	0	0	SEC
	-	0	0	8	7.9	ΔV_x N81
	+	0	0	0	0	ΔV_y
	+	0	0	1	9.2	ΔV_z
	X	X	X	1	8	R
	X	X	X	2	8	P
	X	X	X	0	0	Y
③ GO TO SINGLE RING AFTER BURN	+			NA		H _A N44
	+	0	0	5	0.0	H _p
	+	0	0	9	0.0	ΔV_T
	X	X	X	2	0	BT
	X	0	0	0	0.0	ΔV_C *
	X	X	X	X	NA	SXTS
	+		NA		0	SFT
	+	NA		0	0	TRN
	X	X	X	NA		BSS
	X	X		NA		SPA
④ TRACK HORIZON (HEADS UP) WITH 9° WINDOW MARK	X	X	X	NA		SXP
	-	0	0	1	3	LAT N61
	-	1	5	9	4	LONG
	+			NA		RTGO EMS
	+	2	5	6	9	VIO
	+	2	5	6	9	7
⑤ R .05g ≈ 180 P .05g ≈ 279 Y .05g ≈ 000	~	0	0	1	1	GET 0.05G
⑥ FLY LEFT DOWN (HEADS UP) TO 1g THEN ROLL						

DATE 9/4/72

DATE

L
2-10B

CM RCS DEORBIT

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

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

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

(326) BMAG MODE (3) - ATT 1/RATE 2
 02 SM SUPPLY vlv - OFF
 TVC SERVO PWR (2) - OFF
 DIRECT 02 vlv - CLOSE
 CM RCS LOGIC - OFF
 Load RCS DAP, 11102, 01111, V46E
 Perform P30, pg L/6-1
 Load CM BURN ATT in N17, V63E
 MNVR to CM BURN ATT

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

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

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

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

00:00 CM RCS BURN

Perform single ring rolling Entry

DATE

DATE 9/4/72

L
2-11

INSERTION AND SYSTEMS CHECKS

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

MONITOR LV TANK PRESS

CYI AOS
(00:16:44)

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

NOTE: Steps 2 thru 30 are not sequential

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

INSERTION & SYS CK

DATE 9/4/72

BACK

COLOR _____

L
2-12

INSERTION & SYS CK

- 4 MCCH - G/N Status
Z Torquing angle _____
- 5 SM RCS MONITORING CHECK
SM RCS PRPLNT tb (8) - gray
SM RCS He 1 & 2 tb (8) - gray
SM RCS IND - He TK TEMP
RCS IND sel - SM A, B, C, D
PKG TEMP - 115°-175° F (C/W 75°-205°)
He PRESS - 4100-4200 psia
MANF PRESS - 192-207 psia (C/W 145-215 psia)
He TK TEMP - 60°-90°F
- 6 CM RCS MONITORING CHECK
CM RCS PRPLNT tb (2) - gray
RCS IND sw - CM 1,2
He TEMP - 60°-90°F
He PRESS - 4100-4200 psia
MANF PRESS - 80-105 psia
- 7 C/W OPERATIONAL CHECK
C/W LAMP TEST - 1 (LH MA & 15 lts)
C/W LAMP TEST - 2 (RH MA & 20 lts)
C/W CSM - CM (CM RCS 1t (2) - on)
C/W CSM - CSM (CM RCS 1t (2) - out)
- 8 CMP to LEB for MN REG CHECK
STRUT UNLOCK LANYARD (2) - STOW
DRINKING WATER SUPPLY vlv - ON
cb COAS/TUNL LTG MNB - close
Unstow:
Helmet bags (U1)
Accessory bags (U1)
Tool E (L2)
- 9 CONFIRM NORMAL SUIT and CABIN PRESSURE
If cabin press > 5.3:
O2 flow - 0.2 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)
Remove helmet & gloves & stow in PGA bag
Unstow & mount TSB's (U1)

DATE 9/4/72

L
2-13

10 MAIN REG CHECK

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

11 SEC RAD LEAK CHECK

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

+20:00 12 ECS POST INSERTION CONFIGURATION

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

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

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

DATE 9/4/72

DATE

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

L
2-14

14 FC PURGE CHECK

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

15 EPS MONITORING CHECK

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

FC Power Plant Check

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

D-C Voltage-Amperage Check

MN BUS TIE (2) - OFF (verify)
FC MNA tb - 1 & 2 gray, 3 bp
FC MNB tb - 1 & 2 bp, 3 gray
FC 1, 2, & 3 (check amps)
MAIN BUS A, B, (26.5-31 vdc)
BAT BUS A, B, & BAT C (31.5-38 vdc < 3 amp)
PYRO BAT A, B (36.5 - 37.5 vdc)
DC IND sel - MNB
SYS TEST 5B (BAT RLY BUS - 3.4-4.1 vdc)

A-C VOLTS - 113 to 117 all phases

DATE

9/4/72

DATE

SUNRISE
(00:31:36)



L
2-15

16 ECS MONITORING CHECK

SUIT COMP ΔP - .3-.4 psid
02 SURGE TANK PRESS - 865-935 psia
REPRESS 02 >865 psia
PRIM RAD tb - gray
 *If PRIM RAD tb - 2 *
 * ECS RAD FLOW AUTO CONT - 1 until *
 * tb gray, then AUTO *
ECS RAD TEMP PRIM IN - 67-97° F
ECS RAD TEMP PRIM OUT - -20° to +63° F
PRIM GLY EVAP TEMP OUT - 38-50.5° F
PRIM GLY DISCH PRESS - 40-52 psig
SUIT TEMP - 45-55° F
SUIT PRESS/CABIN PRESS - 4.7-5.3 psia
PART PRESS CO2 < 7.6 mm Hg
POT H2O QTY - 10-100%
WASTE H2O QTY - 25-85%

17 SPS MONITORING CHECK

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

DATE 9/4/72

DATE

18 GDC ALIGN (__:__:__)

19 UNSTOW SEQ CAMERA BRACKET & ORDEAL

20 MOUNT ORDEAL BOX & INITIALIZE

L
2-16

21 SECONDARY GLYCOL LOOP CHECK

ECS IND sw - SEC
SEC COOL LOOP PUMP - AC1
GLY DISCH SEC PRESS - 39-51 psig
ACCUM SEC QTY IND - 30-55%
SEC COOL LOOP - EVAP
After 5 min:
SEC EVAP TEMP OUT - 38-50.5°F
SEC COOL LOOP EVAP - RSET 1 min,
off (ctr)
SEC COOL LOOP PUMP - off (ctr)
ECS IND sw - PRIM

22 UNSTOW CAMERAS

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

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

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

23 OPTICS DUST COVER JETT

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

SUNSET
■(01:21:48)

9/4/72

DATE

DATE

L
2-17

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

N71: _ _ , _ _

N05: _ _ _ . _ _

N93:
X _ _ . _ _

Y _ _ . _ _

Z _ _ . _ _

GET: _ _ : _ _ : _ _

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

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

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

26

SCS ATT REF COMP CHECK

V16 N20E

FDAI SELECT - 1

FDAI SOURCE - ATT SET

ATT SET - GDC

ATT SET dials - null FDAI 1 err needles

Key VERB when nulled (freeze display)

Record from DSKY:

R _ _ , P _ _ , Y _ _

Record from ATT SET dials:

R _ _ , P _ _ , Y _ _

FDAI SEL - 1/2

9/4/72

DATE

HSK LOS
(01:05:11)

(_ : _ : _)

US AOS
(01:28:59)

DATE

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

L
2-18

27 EXTEND DOCKING PROBE

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

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

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

28 COPY TLI, TLI ABORT, & P37 PADS

29 SV UPDATES (MCCH)

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

US LOS
(01:48:42)

CYI AOS
(01:49:57)

CYI LOS
(01:54:44)

SUNRISE
(01:59:23)

CRO AOS
(02:25:02)

CRO LOS
(02:30:53)

SUNSET
(02:49:34)

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

DATE

DATE 9/4/72

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

L
2-19

TLI

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

DATE 9/4/72

DATE

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

L
2-20

P27 UPDATE

DATE

DATE 9/4/72

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

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

P30 MANEUVER

L/2-21

SET STARS					PURPOSE					
					PROP/GUID					
					+					WT N47
^R ALIGN _____ ^P ALIGN _____ ^Y ALIGN _____						0	0	.		^P TRIM N48 ^Y TRIM
						0	0	.		
										+
					+	0	0	0		MIN N33
					+	0		.		SEC
ULLAGE _____								.		ΔV_X N81 ΔV_Y ΔV_Z
								.		
								.		
					X	X	X			R P Y
					X	X	X			
					X	X	X			
					+			.		H_A N44 H_P
								.		
					HORIZON/WINDOW _____					+
X	X	X	:							
										X
					X	X	X	X		SXTS
					+			.	0	
										+
P37 FOR L/0+8					X	X	X			BSS SPA SXP
					X	X			.	
					X	X	X		.	
GETI ^X ^X LONG GET 400K						0		.		LAT N61 LONG RTGO EMS VIO
								.		
					+			.		
					+					GET 0.05G

DATE 9/4/72

DATE

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

L/2-22

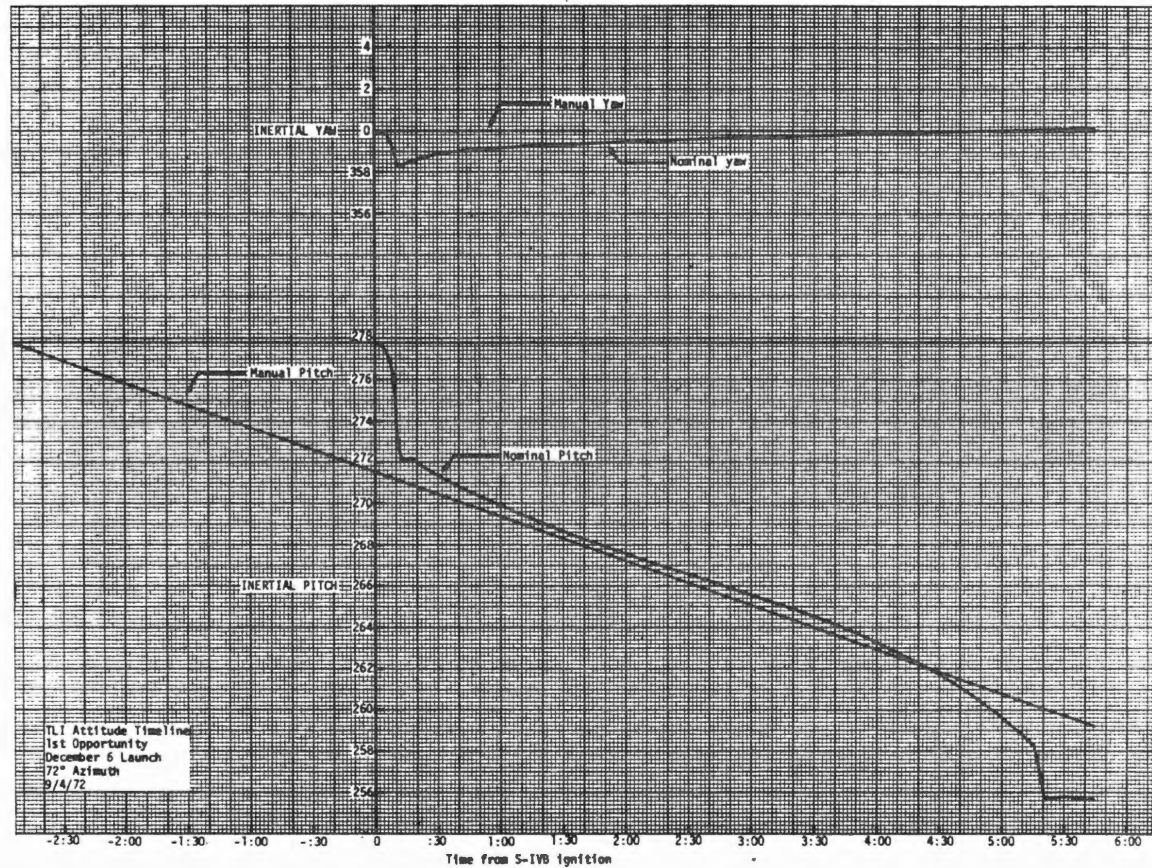
P30 MANEUVER

SET STARS R ALIGN _____ P ALIGN _____ Y ALIGN _____										PURPOSE
										PROP/GUID
				+						WT N47
					0	0				P _{TRIM} N48
						Y _{TRIM}				
	+	0	0			HRS GETI				
	+	0	0	0		MIN N33				
	+	0				SEC				
ULLAGE _____						ΔV_X N81				
						ΔV_Y				
						ΔV_Z				
	X	X	X			R				
	X	X	X			P				
	X	X	X			Y				
	+					H _A N44				
						H _P				
	+					ΔVT				
HORIZON/WINDOW _____	X	X	X			BT				
	X					ΔVC				
	X	X	X	X		SXTS				
	+				0	SFT				
	+				0 0	TRN				
	X	X	X			BSS				
P37 FOR L/0+8	X	X				SPA				
	X	X	X			SXP				
						LAT N61				
X					ΔVT	LONG				
X					LONG	RTGO EMS				
					GET _{400K}	VIO				
						GET 0.05G				

DATE _____

DATE 9/4/72

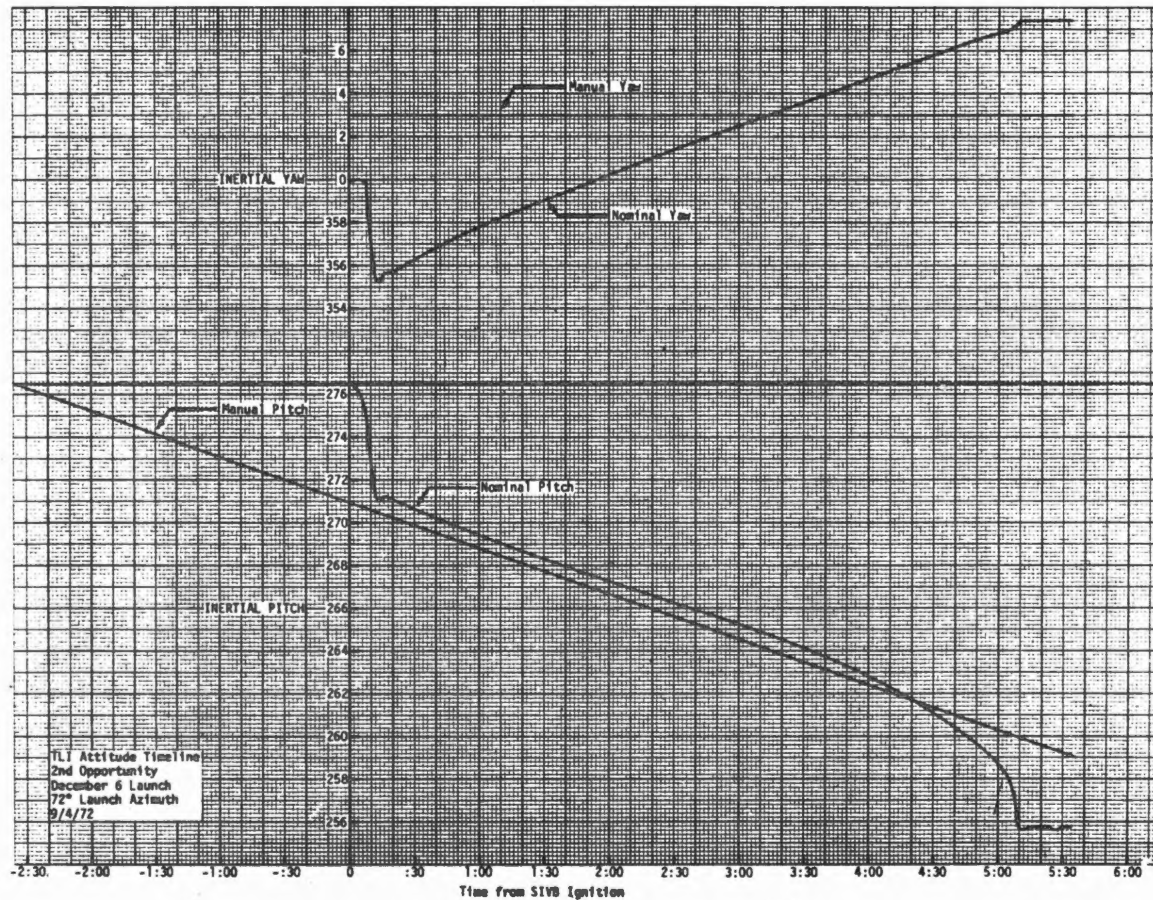
DATE 9/4/72



2-23

TLI ATT TIMELINE
OPP 1

TLI ATT TIMELINE OPP 2



TLI Attitude Timeline
2nd Opportunity
December 6 Launch
72° Launch Azimuth
9/4/72

DATE 9/4/72

BACK

COLOR

L
2-24

DATE 9/4/72

NOMINAL SIVB TLI 1

DEC 6 LAUNCH

9/4/72

DET	Θ	Ψ	VI	$\dot{H}$	H
0:00	278	0.	25603	-4	97
:30	271	358.8	26155	-11	97
1	270	359.2	26764	15	97
1:30	269	359.3	27400	94	97
2	268	359.5	28157	234	98
2:30	267	359.6	28961	453	100
3	266	359.7	29810	757	103
3:30	264	359.8	30705	1156	107
4	263	359.9	31654	1658	114
4:30	262	0.	32665	2270	124
5	260	0.1	33748	2997	137
5:30	256	0.1	34920	3824	154
5:46	256	0.1	35575	4306	164

MANUAL SIVB TLI 1

DEC 6 LAUNCH

9/4/72

DET	Θ	Ψ	VI	$\dot{H}$	H
0:00	271.5	0	25603	-4	97
:30	270.4	0	26155	-11	97
1	269.4	0	26764	15	97
1:30	268.3	0	27400	94	97
2	267.2	0	28157	234	98
2:30	266.1	0	28961	453	100
3	265.0	0	29810	757	103
3:30	264.0	0	30705	1156	107
4	263.0	0	31654	1658	114
4:30	261.9	0	32665	2270	124
5	260.8	0	33748	2997	137
5:30	259.7	0	34920	3824	154
5:46	259.1	0	35575	4306	164

2-25

TLI TRAJECTORY
OPP 1 NOM & MAN

TLI TRAJECTORY
OPP 2 NOM & MAN

NOMINAL SIVB TLI 2

DEC 6 LAUNCH

9/4/72

DET	Θ	Ψ	VI	$\dot{H}$	H
0:00	277	0.1	25598	-5	99
:30	271	356.3	26222	-11	99
1	269	357.7	26928	26	99
1:30	268	359.0	27670	129	99
2	267	0.2	28451	306	100
2:30	266	1.4	29272	565	102
3	265	2.5	30137	915	106
3:30	264	3.6	31051	1364	111
4	263	4.7	32023	1920	119
4:30	261	5.8	33057	2590	130
5	259	6.8	34165	3374	145
5:30	256	7.4	35365	4252	164
5:35	256	7.4	35564	4404	167

MANUAL SIVB TLI 2

DEC 6 LAUNCH

9/4/72

DET	Θ	Ψ	VI	$\dot{H}$	H
0:00	271.0	3	25598	-5	99
:30	269.9	3	26222	-11	99
1	268.8	3	26928	26	99
1:30	267.8	3	27670	129	99
2	266.7	3	28451	306	100
2:30	265.6	3	29272	565	102
3	264.6	3	30137	915	106
3:30	263.5	3	31051	1364	111
4	262.4	3	32023	1920	119
4:30	261.4	3	33057	2590	130
5	260.3	3	34165	3374	145
5:30	259.2	3	35365	4252	164
5:35	259.1	3	35564	4404	167

DATE 9/4/72

BACK

COLOR

2-26

L
2-27

TLI PREPARATION

HAW AOS
(02:50:15)

XLUNAR - INJECT (verify)
EDS PWR - on (up) (verify)
Perform EMS ΔV TEST & NULL
BIAS CHECK, pg G/2-5

Set ΔV
EMS FUNC - ΔV
GDC ALIGN
V48E, 31102, 01111
Key V83E

HAW LOS
(02:55:43)

Set ORDEAL - 90/EARTH
SECS PYRO ARM (2) - ARM
TRANS CONTROL PWR - ON

US AOS
(02:59:24)

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

TLI PREPARATION

P15 - TLI INITIATE/CUTOFF
V37E 15E

DATE 9/4/72

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)

BACK

COLOR _____

TLI, NOMINAL
& MANUAL

L
2-28
TLI, NOMINAL & MANUAL

LV GUID - IU (verify)

*If LV GUID 1t - on: *

* LV GUID - CMC *

* RHC PWR DIRECT (2) - OFF*

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

51:00 SII SEP 1t - out
(-09:00) Start DET counting up
*If LV GUID - CMC: *
* V16 N2OE *
* MNVR to R2 Align = _____ (278°)*

MONITOR LV TANK PRESS SEQUENCE

Nominal LOX ~ 40 psia

Nominal LH2 ~ 31 psia

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

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

*If LOX TK PRESS > 50 psia: *

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

ORDEAL FDAI #1 - ORB RATE
ORDEAL FDAI #2 - INERTIAL
ORDEAL MODE - HOLD/FAST
ORDEAL - 300/LUNAR
RHC #2 - ARMED

UP TLM CM - BLOCK (verify)
UP TLM IU - BLOCK (verify)

56:00 Slew FDAI #1 to PITCH = 17°
(-04:00) *If LV GUID - CMC: *
* Slew FDAI #1 to PITCH = 0° *
* V16 N2OE *
* Insure R2 Align = _____ (278°)*

DATE 9/4/72

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

L
2-29

57:10 :
(-02:50)

Insure FDAI #1 PITCH = 12°
ORDEAL MODE - OPERATE/SLOW, IU or CMC

*If LV GUID - CMC: *
* MNVR to R2 Ign = (271.5°)*

58:15 DSKY BLANKS

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

SCS TVC SERVO PWR #1 - AC1/MNA
SCS TVC SERVO PWR #2 - OFF (verify)
TAPE RCDR - HBR/RCD/FWD/CMD RESET
EMS MODE - NORMAL
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
US LOS
(03:20:58)
59:42

SIVB ULLAGE Begins

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

DATE 9/4/72

DATE

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

L
2-30

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

59:59 LV ENG 1 1t - on

00:00 SIVB IGNITION (____:____:____) GETI

00:02 LV ENG 1 1t - out

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

MONITOR THRUST & ATTITUDE

MONITOR LV TANK PRESS

*If LV GUID - CMC: *

* Fly PITCH = 0° *

* YAW = ____ (0°) *

+ 45° /P,Y

+ 10° /sec P,Y

+ 20° /sec R

01:32

ACN AOS

(03:26:31)

05:46

PU SHIFT

V16 N62E

KEY RLSE before ECO

SIVB ECO (1t on) (BEGIN TB7)

*If no ECO at TFC = 0 + 1 sec *

* or updated BT + 1 sec *

* or EMS = -150 fps (CMC failed): *

* THC - CCW & NEUTRAL in 1 sec *

Key VERB (freeze display)

Record TFC

VG

VI

Δ VC

DATE

9/4/72

DATE

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

KEY RLSE

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

08:26 SIVB MNVR TO ORB RT (HDS DN) ($.3^{\circ}$ /sec)

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

L
2-31

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

ACN LOS
(03:46:27)

PRO

F 37

OOE

STDN AOS
(03:49:01)

When CMC ACTY 1t out,
Key V66E

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

DATE 9/4/72

SATURN RATE CHANGE

V25 N1 E
3310E, 0E, XXxE, YYYYYE

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

*USE FOR TLI

DATE

L
3-1

NORMAL SC/BOOSTER SEPARATIONS

1 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

SIVB MNVR (: :)

*If LV GUID - CMC: *

SEP (: :)

* Mnvr to SEP ATT *

* Do not reload DAP*

Load RCS DAP

R1=11103, R2=01111

V46E

OMNI ANT-C

Load N17 (SEP) & N22 (EXTRACTION)

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

*If error needles not nulled: *

* V60E (SIVB +1.8°db) *

* V16 N20E *

* R22 = 300° - R20 *

* P22 = P20 + 180° *

* Y22 = 360° - Y20 *

* R P Y *

*N20 _____ *

* _____ *

*N22 _____ *

* _____ *

*Load new Docking Attitude *

2 CSM SEPARATION PREP

DOCK PROBE EXTD/REL - RETRACT (verify)

RCS TRNFR - SM (verify)

SM RCS PRPLNT tb (8) - gray (verify)

AUTO RCS SELECT (16) - MNA/MNB

Perform EMS NULL BIAS CHECK, pg G/2-5

Set ΔVC to -100.0

EMS FUNC - ΔV

FDAI SCALE - 5/1

MAN ATT (3) - RATE CMD

LIMIT CYCLE - OFF (verify)

ATT DB - MIN

RATE - LOW

DATE 9/4/72

NORM SC/BOOSTER SEP

BACK

COLOR _____

NORM SC/BOOSTER SEP

L
3-2

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

Set up TV

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

CMC MODE - FREE (verify)
SC CONT - CMC
BMAG MODE (3) - RATE 2 (verify)
cb RCS LOGIC (2) - open
TVC SERVO PWR #1 - AC1/MNA
Set DET - 59:30
FC REAC 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
V62E

59:30 Start DET

DATE 9/4/72

L
3-3

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

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

4 CSM TRANSPOSITION

MAN ATT (PITCH) - ACCEL CMD
00:15 Pitch up at $.5^\circ/\text{sec}$
When Pitch error needle positive,
PRO F 50 18 OMNI ANT - B
PRO 06 18
MAN ATT (PITCH) - RATE CMD
F 50 18 (completion of mnvr)
ENTR
Thrust +X(4 sec)($\Delta V \sim .7$ fps)
cb DIRECT ULLAGE (2) - open
Load RCS DAP 11102, 01111
S BD AUX TV - TV (90 sec delay)
HI GAIN ANT TRACK - MAN
HI GAIN ANT PWR - POWER
Slew ANT to verify operation
HGA angles: $P = -14^\circ$, $Y = +287^\circ$
S BD ANT OMNI - HI GAIN
HI GAIN ANT TRACK - REACQ
TV TRANSMIT/STBY sw - TRANSMIT
Start DAC

DATE 9/4/72

DATE

L
3-4

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)

DATE

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

02 HTR 3 - AUTO

DATE 9/4/72

L
3-5

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

LM TUNL VENT vlv - LM/CM ΔP
WASTE STOWAGE VENT vlv - VENT (verify)
TUNNEL LIGHTS - OFF

- 12 PRE LM SEP & EJECTION

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

ΔV CG - LM/CSM (verify)

EMS FUNC - ΔV SET/VHF RNG

Slew ΔV ind to +100.0

EMS FUNC - ΔV

TAPE RCDR - HBR/RCD/FWD/CMD RESET

DAC - 6 fps

Load RCS DAP 21101, X1111

Load N22 att (monitor APS mnvr, hatch window)

90.0°, 131.9°, 354.3°

V60E, V63E

GDC ALIGN

DET - RESET

cb SECS ARM (2) - close (verify)

Cue MSFN

SECS LOGIC (2) - on (up)

Obtain GO from MSFN

SECS PYRO ARM (2) - ARM

TVC SERVO PWR #1 - AC1/MNA

TRANS CONTR PWR - on (up) (verify)

RHC & THC - ARMED

V37E 47E F 16 83 $\Delta V_{X,Y,Z}$

(.1fps)

EMS MODE - NORMAL

Start DAC

DATE 9/4/72

DATE

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

L
3-6

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 00E

When CMC Acty 1t out,

Key V66E

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

cb SECS ARM (2) - open

cb SIVB/LM SEP (2) - open

02 TK 3 ISOL vlv tb - gray (verify)

MAP CAMR ON - OFF

PAN CAMR PWR - OFF

SM/AC PWR - OFF

LV/SPS IND sw - GPI

TVC SERVO PWR (2) - OFF

EMS MODE - STBY

EMS FUNC - OFF

TAPE RCDR - off (ctr)

PCM BIT RATE - LOW

Stop DAC

AUTO RCS SEL AC ROLL or BD ROLL (4) - OFF

02 HTR 3 - OFF

DATE

DATE 9/4/72

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

L
3-7

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 68.9° 112.0° 0.0° *
* *
* 30:00 90.0° 131.7° 0.4° *

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

DATE 9/4/72

*If no TLI: *
* SIVB - CSM/LM SEP (Earth orbit) *
* *
* Inertial Att *
*min-sec Event R P Y *
* *
*00:00 Ejection 298.4° 131.9° 39.3° *
* *
*00:05 3 sec -X *
* *
*00:22 Mnvr 90.0° 131.9° 354.3° *
* *
*03:00 6 sec -X *

DATE

L
4-1

ABORT PROCEDURES

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

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

00:14 **ELS - AUTO**
ELS LOGIC - on (up)
TWR JETT (2) - on (up)
APEX COVER JETT PB - PUSH
00:16 *DROGUE DEPLOY PB - PUSH*
00:18 *CM RCS He DUMP PB - PUSH*
Monitor altimeter
If <alidade - DEPLOY MAINS
>alidade - NO ACTION

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

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

Go to LANDING PHASE pg L/4-8

MODE IB ABORT (01:01 to 16.5 nm)

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

00:11 *CANARD DEPLOY PB - PUSH*

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

Go to LANDING PHASE pg L/4-8

DATE 9/4/72

MODE I

BACK

COLOR _____

L
4-2

MODE IC ABORT
(16.5 nm to TWR JETT)

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

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

S/C PLATFORM GO/NO GO (Excessive Rates)
KEY RLSE to N44, Check HA

HA>32nm & PLAT GO

HA<32nm or PLAT NO GO

TWR JETT sw(2)-on(up)
MAN PITCH - RATE CMD
ENT ATT R0°, P135°, Y0°
BMAG (3)- ATT1/RATE 2
EMS FUNC - ENTRY
EMS MODE - NORMAL
At .05G Lt,
.05G sw - on (up)
Fly Max Lift

CMD +5°/sec Pitch rate
If +Pitch rate too hi:

* Roll 90°	*
* Damp rate with yaw	*
* Roll to HDS DN	*

θ (.05G) _____
GET DROGUE _____

Go to LANDING PHASE pg L/4-8

LET FAILS TO JETTISON

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

MODE I

DATE 9/4/72

L
4-3

MODE II RCS ABORT
(TWR JETT to MODE III)

00:00 THC - CCW (4 sec min)
*If No BECO: Reset THC *
* Req. RSO Shutdown *
* Reset & start DET *

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

THC - ARMED

00:05 THC - NEUTRAL, then +X

00:24 THC - +X OFF
KEY RLSE to N44, Check TFF
If TFF > 2 min, Yaw 45° (LEFT) out-of-plane
BMAG MODE (3) - ATT1/RATE 2
cb MNA&B BAT C (2) - close
cb ELS/CM-SM SEP (2) - close
CM/SM SEP - on (up)
CM RCS PRESS - on (up)
RCS TRNFR - CM
C&W MODE - CM
Entry ATT - (R=0°, P=120°, Y=0°) (Comp1 by 1:40)
CSM/LM FNL SEP (2) - on (up)
EMS FUNC - ENTRY GET 300K _____
EMS MODE - NORMAL θ (.05G) _____
GET DROGUE _____

At .05G lt - on
.05G sw - on (up)
EMS ROLL - on (up)
Fly Max Lift
N62E VI, HDOT, H

Go to LANDING PHASE pg L/4-8

DATE 9/4/72

MODE II, MODE III

BACK

COLOR _____

L
4-4MODE III SPS ABORT
($\Delta R = -400$ NM to INSERTION)

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

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

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

00:24 THC - +X OFF
 N5OE ΔR , HP, TFF (.1nm,min-sec)
 BMAG MODE (3) - ATT1/RATE2
 If $\Delta R > 0$:

MNVR to retro att ($R=180^\circ$, $P=194^\circ$, $Y=0^\circ$)
 (Scribe on horiz, BEF, Hds up)

SCS TVC P&Y - AUTO (verify)

EMS MODE - NORMAL GETI
 ΔV THRUST A - NORMAL (6999.9)

02:05 DIRECT ULLAGE PB - PUSH

THRUST ON PB - PUSH

Burn to VC ($\Delta R=0$) ΔV THRUST (2) - OFF

ΔV _____
 VC _____
 θ _____
 Δtb _____
 GET 300K _____
 θ (.05G) _____
 GET Drogue _____

DATE 9/4/72

If TFF > 2min, Yaw 45° (LEFT)

out-of-plane

cb MNA&B BAT C(2) - close

cb ELS/CM-SM SEP (2) - close

CM/SM SEP - on (up)

CM RCS PRESS - on (up)

RCS TRNFR - CM

C&W MODE - CM

Mnvr to entry att ($R=0^\circ$, $P=105^\circ$, $Y=0^\circ$)

(BEF, Hds Dn, Full Lift)

CSM/LM FNL SEP (2) - on (up)

Note TFF

MODE II, MODE III

L
4-5

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° (R=305°,P=105°,Y=0°)
Fly Half Lift

Go to LANDING PHASE pg L/4-8

DATE 9/4/72

MODE III, MODE IV

BACK

COLOR _____

MODE III, MODE IV

L
4-6

MODE IV SPS TO ORBIT

(VI ~ 22,685, HDOT ~ +104, H ~ +94)

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

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

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

00:24 THC - +X OFF

Perform PITCH PROFILE or FIXED ATTITUDE BURN:

PITCH PROFILE (AUTO TVC, tw trim)

BMAG MODE (3) - ATT1/RATE2
EMS MODE - NORMAL
SCS TVC (2) - AUTO (verify)
 ΔV THRUST A - NORMAL
DIRECT ULLAGE PB - PUSH
<01:30 THRUST ON PB - PUSH
BMAG MODE (PITCH) - RATE 1
FLY HDOT with thumbwheel
Burn to (hp >70 nm +6 sec BT)
* or (ha = 200 nm & +HDOT) *
 ΔV THRUST (2) - OFF
EMS MODE - STBY

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	θ	_____
	BURN to VC (hp >70nm)		
	ΔV THRUST (2) - OFF	Δtb	_____
	EMS MODE - STBY		

DATE 9/4/72

DATE 9/4/72

L
4-7

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

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

V37E 00E
When CMC ACTY 1t out:
V66E
V45E
Load DAP, V48: R1=11102, R2=01111
V46E CSM WT _____
V83E (check e) P TRIM _____
PRO Y TRIM _____

US LOS
(00:15:44)

Go to INSERTION CHECKLIST pg L/2-11

LANDING PHASE

BACK

COLOR _____

L
4-8

LANDING PHASE (30K, DESCENDING)

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

LANDING PHASE

46 sec

*If Both Drogues Fail: *
* ELS - MAN *
* STABILIZE CM (DIRECT RCS) *
* 5K' MAIN DPLY PB - PUSH *
* ELS - AUTO *

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

CM RCS PRPLNT (2) - OFF

10K' Main parachutes deployed
MAIN DEPLOY PB - PUSH
DIRECT 02 vlv - OPEN (verify)
VHF ANT - RECY
VHF AM A - SIMPLEX
VHF BCN - ON

If No Comm and abort occurred between
* 1:01 & 2:00 min or if land impact *
* expected: *
* Perform CM RCS Dump, pg L/4-9 *

DATE 9/4/72

L
4-9

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

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

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

Go to POSTLANDING PROCEDURES, pg L/9-2

CM RCS DUMP

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

DATE 9/4/72

PRE-TLI ABORT
FROM ORBIT

BACK

COLOR _____

L
4-10

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 pnl 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

DATE 9/4/72

L
4-11

7

CONFIGURE PNL 8

All cb's closed except:
DOCKING PROBE (2) - open (verify)
CM RCS HTRS (2) - open (verify)
FLOAT BAG (3) - open (verify)
SECS ARM (2) - open (verify)
ELS/CM-SM SEP (2) - open (verify)
PL VENT - open (verify)

8

CM RCS ACTIVATION

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

9

Set DET (counting up to deorbit burn)

10

CSM/LV SEPARATION PREP

SM RCS PRPLNT tb (8) - gray (verify)
AUTO RCS SELECT (16) - MNA/MNB
Set ΔV to -100.0
EMS FUNC - ΔV
FDAI SCALE - 5/1
MAN ATT (3) - RATE CMD
LIMIT CYCLE - OFF (verify)
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - on (up) (verify)
ROT CONT PWR NORMAL (2) - AC/DC (verify)
ROT CONT PWR DIRECT (2) - MNA/MNB (verify)
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

DATE 9/4/72

DATE

L
4-12

11

CSM/LV SEPARATION

THC - ARMED
RHC #2 - ARMED
cb SECS LOGIC (2) - closed (verify)
cb SECS ARM (2) - closed (verify)
SECS LOGIC (2) - on (up) (verify)
RCS CMD - ON
TAPE RCDR - HBR/RCD/FWD/CMD RESET
SECS PYRO ARM (2) - ARM
GDC ALIGN
EMS FUNC - ΔV (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
 $\Delta V = 5$ fps
THC - release
SECS PYRO ARM (2) - SAFE
cb EDS (3) - open
PCM BIT RATE - LOW

~40:24

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 ΔV TEST & NULL BIAS CHECK, pg G/2-5*

DATE 9/4/72

DATE

L
4-13

TLI 90 MIN ABORT

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

V37E 47E

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

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

(TLI+25min)

00:00

TRANS CONTR - CCW (4 sec)

DET RESET (verify)

00:03

SIVB/CSM SEP

LV ENG 1 Lt - out

CSM/LV SEP PB - PUSH

*RCS CMD-ON *

00:05

THC - ARMED

TRANS CONTR - NEUTRAL THEN +X

LV/SPS IND sw - GPI

00:14

TRANS CONTR +X - OFF

PITCH UP to LOCAL VERT (+X axis
toward the earth)

RATE - LOW

BMAG MODE (3) - ATT1/RATE 2

EDS PWR - OFF

SECS PYRO ARM (2) - SAFE

SECS LOGIC (2) - OFF

cb SECS ARM (2) - open

cb EDS (3) - open

01:00

TRANS CONTR +X (8 to 10 sec)

V37E OOE

RATE - HIGH

TRANS CONTR PWR - OFF

MNVR TO RETRO ATT

R _____ (Block Data)

P _____ (Block Data)

Y _____ (Block Data)

DATE 9/4/72

TLI 90 MIN ABORT

BACK

COLOR _____

L
4-14

RETRO UPDATE (NO COMM - use Block Data)

GETI _____ θ .05G _____

ΔV _____

VC _____

Δtb _____

GET 400K _____

GET DROGUE _____

ENTRY R _____

P _____

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 ΔV_c 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)

(-06:00)

MN BUS TIE (2) - ON

TAPE RCDR - HBR/RCD/FWD/CMD RESET

SPS He vlvs (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

TLI 90 MIN ABORT

DATE 9/4/72

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

L
4-15

(55:00) PRIMARY TVC CHECK
(-05:00) GMBL MOT P1-Y1 - START/ON (LMP Cnfrm)
Verify TRIM CONTROL & SET
Verify MTVC
SCS TVC (2) - AUTO
THC - CW
Verify NO MTVC

SEC TVC CHECK

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

(59:00)
(-01:00)

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

00:00 ULLAGE & THRUST ON PB - PUSH
SPS THRUST Lt - ON
00:03 ΔV THRUST B(A) - NORMAL
ULLAGE & THRUST ON 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 9/4/72

DATE

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

L
4-16

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

19 F 16 83

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

F37 00E
When CMC ACTY 1t out:
V66E

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

DATE _____

DATE 9/4/72

L
5-1

EARTH ORBIT ENTRY VEHICLE PREPARATION

EARTH ORBIT ENTRY
VEHICLE PREP

DATE 9/4/72

- 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
02 SUPPLY REFILL pg S/1-7
PGA verification, (if suited)S/1-14
ECS Monitor Ck pg S/1-5
(382) EVAP H2O CONT PRI 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

BACK

COLOR _____

EARTH ORBIT ENTRY
VEHICLE PREP

L
5-2

15

LOGIC SEQUENCE CK

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

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

Record gyro torquing angles

R _____

P _____

Y _____

*If >1°, recycle P52 *

If confirmed, use SCS for

* EMS entry *

17

GDC ALIGN

If drift >10°/hr, change rate source

18

EMS ENTRY CHECK

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

DATE 9/4/72



L
5-3

EMS FUNC - EMS TEST 4
.05G 1t - on (all others out)
G-V trace within pattern to lwr rt corner @9G
RANGE ind counts down to 0.0+0.2nm
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+0.1G
ALIGN SCROLL TO ENTRY PATTERN (on 37K fps line)
EMS FUNC - RNG SET
G-V scroll assy traces vert. line 0.28G to 0.0+0.1G
EMS MODE - STBY

19

Perform EMS ΔV TEST & NULL
BIAS CHECK, Pg G/2-5

20

PRIMARY WATER EVAP ACTIVATION

GLY EVAP H2O FLOW - AUTO
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - AC1 (verify)

21

SEC WATER EVAP ACTIVATION

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

22

SET UP CAMERA

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

DATE 9/4/72

DATE

L
5-4

- 23 (-01:00h) CM RCS PREHEAT
Note: If sys test mtr 5c,d,6a,b,c,d
all read 3.9 vdc (28°F) or more,
omit preheat
(8) cb RCS LOGIC (2) - close
CM RCS LOGIC - on (up)
cb CM RCS HTRS (2) - close
(101) CM RCS HTRS - ON (LMP Confirm)
(20 min or til lowest rdg is
3.9 vdc) (Monitor Manf
press for press drop)

- 24 FINAL STOWAGE
ORDEAL
(377) GLY TO RAD SEC vlv - BYPASS (verify)
Verify EVA COUCH STRUT disengaged
(382) Cool pnl 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 (-40:00m) 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

DATE

9/4/72
DATE

L
5-5

27

SYSTEMS TEST PANEL CONFIGURATION

- SYS TEST METER - 5B (BAT RLY BUS
3.4-4.1 vdc)
(101) CM RCS HTRS - OFF (verify)
WASTE H2O DUMP HTR - OFF
URINE DUMP HTR - OFF
(100) LEB FLOOD & INTGL LIGHTING - OFF

28

CONFIGURE PNL 8

- All cb's closed except:
CM RCS HTRS (2) - open (verify)
DOCKING PROBE (2) - open (verify)
FLOAT BAG (3) - open (verify)
SECS ARM (2) - open (verify)
EDS BAT (3) - open (verify)
ELS/CM-SM SEP (2) - open (verify)
PL VENT - open (verify)

29

FINAL GDC DRIFT CK (if req'd)

- *If drift $>10^{\circ}/\text{hr}$, Suspect GDC,*
* Do not use RSI & FDAI #2 *

30

CM RCS ACTIVATION

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

DATE 9/4/72

DATE

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

L
5-6

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

- 32 P27 & ENTRY PAD UPDATE

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

DATE

DATE 9/4/72

DATE 9/4/72

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

E.O. ENTRY UPDATE

BACK

COLOR _____

E.O. ENTRY UPDATE

L/5-8										E. O. ENTRY UPDATE											
X						X						AREA									
X	X	-				X	X	-				ΔV TAILOFF									
X	X	X				X	X	X				R 0.05G EMS									
X	X	X				X	X	X				P 0.05G									
X	X	X				X	X	X				Y 0.05G									
+						+						RTGO EMS									
+						+						VIO									
X	X					X	X					RET 0.05G									
	0						0					LAT N61									
												LONG									
X	X					X	X					RET 0.2G									
												DRE (55°) N66									
R	R		/			R	R		/			BANK AN									
X	X					X	X					RET RB									
X	X					X	X					RETBBO									
X	X					X	X					RETEBO									
X	X					X	X					RETDROG									
X	X	X				X	X	X				(90°/fps) CHART									
X	X					X	X					DRE (90°) UPDATE									
POST BURN																					
X	X	X				X	X	X				P 0.05G									
+						+						RTGO EMS									
+						+						VIO									
X	X					X	X					RET 0.05G									
X	X					X	X					RET 0.2G									
												DRE ± 100 nm N66									
R	R		/			R	R		/			BANK AN									
X	X					X	X					RETRB									
X	X					X	X					RETBBO									
X	X					X	X					RETEBO									
X	X					X	X					RETDROG TO MAIN SEC									

DATE 9/4/72

DATE 9/4/72

EARTH ORBIT BLOCK DATA												L/5-9
X	X						X	X			-	AREA
X	X	X					X	X	X			LAT
X	X						X	X				LONG
												GETI
X	X	X					X	X	X			ΔV_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			ΔV_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			ΔV_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			ΔV_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			ΔV_C
REMARKS:												

E.O. BLOCK DATA

BACK

COLOR _____

E.O. BLOCK DATA

L/5-10 EARTH ORBIT BLOCK DATA											
X	X					X	X			—	AREA
X	X	X				X	X	X			LAT
X	X					X	X				LONG
											GETI
X	X	X				X	X	X			ΔV_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			ΔV_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			ΔV_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			ΔV_C
REMARKS:											

DATE 9/4/72

P30 MANEUVER

L/5-11

DATE 9/4/72

SET STARS								PURPOSE	
								PROP/GUID	
+								WT N47	
R ALIGN	—	—	—	0	0	.	.	P TRIM N48	
P ALIGN	—	—	—	0	0	.	.	Y TRIM	
Y ALIGN	—	—	—	+	0	0		HRS GETI	
				+	0	0	0	MIN N33	
				+	0		.	SEC	
ULLAGE	—						.	ΔV_X N81	
—	—						.	ΔV_Y	
—	—						.	ΔV_Z	
				X	X	X		R	
				X	X	X		P	
				X	X	X		Y	
				+			.	H _A N44	
							.	H _p	
				+			.	ΔVT	
HORIZON/WINDOW	—			X	X	X	.	BT	
—	—			X			.	ΔVC	
—	—			X	X	X	X	SXTS	
				+			.	SFT 0	
				+		.	0	TRN 0	
				X	X	X		BSS	
				X	X		.	SPA	
				X	X	X	.	SXP	
OTHER	—				0		.	LAT N61	
—	—						.	LONG	
—	—			+			.	RTGO EMS	
				+				VIO	
						.	.	GET 0.05G	

P30 MNVR PAD

BACK

COLOR _____

L
5-12

THIS PAGE INTENTIONALLY BLANK

DATE 9/4/72

P30 MNVR PAD

L
6-1

HYBRID RCS DEORBIT & ENTRY

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV

V37E 30E

1

2 F 06 33 GETI (hrs,min,.01sec)
(ACCEPT) PRO
(REJECT) LOAD DESIRED GETI

3 F 06 81 ΔVX,Y,Z (LV) (.1fps)
(ACCEPT) PRO
(REJECT) LOAD DESIRED DATA

4 F 06 42 HA,HP,ΔV (REQ) (.1nm,.1nm,.1fps)
Record ΔV _____
(ACCEPT) PRO
(REJECT) Reselect P30 or P27. Load new param.

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

Set DET

PRO

6 F 37 00E

7

SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (Pull)

REPRESS PKG vlv - FILL to 865-935,
then ON

02 SM SUPPLY vlv - OFF

SURGE TK - ON (verify)

CAB PRESS REL vlv (2) - NORM

cb SECS ARM (2) - close (verify)

cb SECS LOGIC (2) - close (verify)

ROT CONTR PWR NORM (2) - AC/DC

ABORT SYS PRPLNT - RCS CMD (verify)

SM RCS SEC PRPLNT FUEL PRESS (4)-OPEN

DATE 9/4/72

HYBRID RCS
DEORBIT & ENTRY

BACK

COLOR _____

HYBRID RCS
DEORBIT & ENTRY

8

L
6-2

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

9

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

10

MNVR TO PAD BURN ATT (HDS DN)
V49E
R _____ (0°)
P _____ (180°)
Y _____ (0°)

11

PERFORM BORESIGHT & SXT STAR CHECK
V41 N91E
Stow optics eyepieces

12

V25 N17E (.01°)
Load Pad Data GMBL Angles
for CM BURN ATT
ATT SET tw - SET
to PAD DATA GMBL ANGLES
for CM BURN ATT

DATE 9/4/72

L
6-3

13

PWR REDUCTION

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

14

P41 - RCS THRUSTING
V37E 41E

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

PRO

16 06 18 AUTO MNVR TO FDAI RPY (.01°)

17 F 50 18 REQ TRIM (.01°)

ALIGN SC ROLL
(AUTO TRIM) PRO

ATT DB - MIN

RATE - LOW

BMAG MODE (3) - ATT1/RATE 2

If long Lambert (P37) burn

BMAG MODE (3) - RATE 2

ENTR

DATE 9/4/72

DATE

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

L
6-4

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

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

19 59:25 DSKY BLANKS

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

DATE

DATE 9/4/72

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

L
6-5

00:00
21 F 16 85

REQ NULL VG X,Y,Z (.1fps)

BURN EMS ΔV 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)

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

C&W MODE - CM
RCS TRNFR - CM

Monitor V MNA/B:

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

R 0°
($\theta \sim 290$) P 0° ($\sim 110^\circ$ from SM BURN ATT)
Y 0°

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 <3°/sec *

23

BURN COMPLETION AT:

ΔV CTR= _____ or DET= _____

DATE 9/4/72

DATE

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

L
6-6

24 V82E
F 16 44 HA,HP,TFF (.1nm,min-sec)

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

PRO

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

Read VG residuals to MSFN
PRO

26 F 37 00E

When CMC ACTY lt out:

V66E

EMS FUNC - OFF

EMS MODE - STBY

MAN ATT (3) - MIN IMP

TRANS CONT PWR - OFF

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

DATE 9/4/72

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

L
6-7

28

RSI ALIGNMENT

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

P61 - ENTRY PREP

29

V37E 61E (AVE G ON)

05 09 01427 - ROLL REVERSED

*05 09 01426 - IMU UNSAT *

30 F 06 61

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

PAD VALUES

LAT _____

LONG _____

HDS UP +1

PRO

31 F 06 60

GMAX, V400K, GAMMA EI (.01G, fps, .01°)

*N60 not valid for *

* earth orbit Entry*

PRO

32 F 16 63

RTOGO (.1nm)

PAD _____

VIO (fps)

PAD _____

TFE (min-sec)

RTOGO & VIO not valid for

* earth orbit Entry *

(ACCEPT) PRO

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

DATE 9/4/72

DATE

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

L
6-8

P62 - CM/SM SEP & PRE-ENTRY MNVR

33 F 50 25 00041 REQUEST CM/SM SEP

MNVR TO ENTRY ATT
R 180° (Lift DN)

P

Y 0°

MAINTAIN HORIZ TRACK

PRO (Act ENTRY DAP Att Hold)

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

PRO (CMC Guidance)

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

P63 - ENTRY INIT

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

FDAI SCALE - 5/5

ROT CONTR PWR DIR (2) - MNA/MNB(verify)

TAPE RCDR - HBR/RCD/FWD/CMD RESET

HORIZ CK

Pitch error needle goes toward
zero approaching .05G time

DATE

DATE 9/4/72

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

L
6-9

P64 - ENTRY POST .05G

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

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

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

EMS MODE - BACKUP/VHF RNG

.05 G Lt - on

.05 G sw - on (up)

EMS ROLL - on (up)

Track horiz with 9° window mk

Maintain SCS control,

Lift DN until 1G

Compare RSI & FDAI

EMS GO/NO GO

G-V Plot within limits

DATE 9/4/72

DATE

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

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

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

L
7-1

SM RCS DEORBIT & ENTRY

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV
V37E 30E

- 1
- 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

SM RCS
DEORBIT & ENTRY

DATE 9/4/72

- 6 F 37 00E

7 SEPARATION CK LIST

PRIM GLY TO RAD - BYPASS (Pull)
REPRESS PKG vlv - FILL to 865-935,
then ON
02 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

BACK

COLOR _____

L
7-2

8

CM RCS CHECK

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

9

RCS THRUSTING PREP

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

10

MNVR TO PAD BURN ATT (HDS DN)

V49E

R _____ (0°)
P _____ (180°)
Y _____ (0°)

11

PERFORM BORESIGHT & SXT STAR CHECK

V41 N91E

Stow optics eyepieces

12

P41 - RCS THRUSTING

V37E 41E

13

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

14

06 18 AUTO MNVR TO FDAI RPY (.01°)

SM RCS
DEORBIT & ENTRY

DATE 9/4/72

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

L
7-3

15 F 50 18 REQ TRIM (.01°)

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

ENTR

55:00m
16 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

59:25
17 DSKY BLANKS

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

00:00
19 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 9/4/72

DATE

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

L
7-4

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

22 F 37 OOE

When CMC ACTY 1t 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 1t filter is down

24

RSI ALIGNMENT

FDAI SOURCE - ATT SET

ATT SET - GDC

EMS ROLL - on (up)

GDC ALIGN PB - PUSH & HOLD

YAW tw - Position RSI to LIFT DN

GDC ALIGN PB - RELEASE

EMS ROLL - OFF

ALIGN GDC TO IMU

25

MNVR TO CM/SM SEP ATT

MAN ATT (3) - RATE CMD

RATE - HIGH

YAW left 45° from Burn Att (315°)

BMAG MODE (3) - ATT 1/RATE 2

DATE

DATE 9/4/72

L
7-5

26

PWR REDUCT

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

P61 - ENTRY PREP

27

V37E 61E (AVE G ON)

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

28 F 06 61

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

PAD VALUES

LAT _____
LONG _____
HDS UP +1

PRO

29 F 06 60

GMAX, V400K, GAMMA EI (.01G, fps, .01°)

*N60 not valid for *
* earth orbit Entry*

PRO

30 F 16 63

RTOGO (.1nm) PAD _____
VIO (fps) PAD _____
TFE (min-sec)

RTOGO & VIO not valid for
* earth orbit Entry *

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

DATE 9/4/72

DATE

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

L
7-6

P62 - CM/SM SEP & PRE-ENTRY MNVR

31 F 50 25 00041 REQUEST CM/SM SEP

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

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

YAW back to 0°
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 (.01°)
(Only if X-axis beyond 45° of Vel vector)

DATE

DATE 9/4/72

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

L
7-7

P63 - ENTRY INIT

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

P64 - ENTRY POST .05G

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

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

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

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

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

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

DATE 9/4/72

DATE

L
7-8

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

*If after 1G, both RCS ring

* He press <1650 psia:

* Roll 20°/sec & disable RCS*

* After peak G, enable RCS

* & fly BETA = 90°

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

SC CONT - SCS

RTOGO NEG - LIFT UP

RTOGO POS - LIFT DOWN

Monitor altimeter

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

Record EMS RTGO

EMS MODE - STBY

EMS FUNC - OFF

Stop DAC

DAC - T8

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

DATE 9/4/72

DATE

L
8-1

SPS DEORBIT & ENTRY

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

P30 - EXTERNAL ΔV

- 1 V37E 30E
- 2 F 06 33 GETI (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 00E

DATE 9/4/72

- 6 SEPARATION CK LIST
PRIM GLY TO RAD - BYPASS (pull)
REPRESS PKG vlv - FILL to 865-935,
then ON
02 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

SPS DEORBIT & ENTRY

BACK

COLOR _____

L
8-2

7

CM RCS CHECK

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

8

SPS THRUSTING PREP

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

9

MNVR TO PAD BURN ATT (HDS UP)
V49E

R _____ (180°)
P _____
Y _____ (0°)

10

PERFORM BORESIGHT & SXT STAR CHECK

V41 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°)

SPS DEORBIT & ENTRY

DATE 9/4/72

L
8-3

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

TVC CHECK & PREP

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

+54:00m
(-06:00)

DATE 9/4/72

55:00m
(-05:00)

PRIMARY TVC CHECK

GMBL MOT PT-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

DATE

SEC TVC CHECK

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

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

L
8-4

Verify GPI returns to 0,0(CMC)
or trim (SCS)
ROT CONT PWR NORM (2) - AC/DC
ROT CONT PWR DIRECT (2) - MNA/MNB
(TRIM) BMAG MODE (3) - RATE 2
PRO
BMAG MODE (3) - ATT1/RATE 2
ENTR

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

Monitor GPI Response:
00,02,-02,00,02,-02,00, Trim
*TEST FAIL: *
*SC CONT - SCS *
SCS TVC(2) - AUTO

(REJECT) ENTR

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

DATE

TIG-3 min

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

59:00
(-01:00)

EMS MODE - NORMAL
TRANS CONTR PWR - on (up)
ΔV THRUST A(B) - NORMAL
THC - ARMED
RHC (2) - ARMED

59:25
(-00:35)

DSKY BLANKS

DATE 9/4/72

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

L
8-5

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

06 40 TFI, VG, Δ 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 Δ VM (R3) COUNTING UP

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

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

06 40 TFC, VG, Δ VM (min-sec, .1fps, .1fps)

*F 97 40 SPS Thrust fail *
* Δ V THRUST B(A) - NORMAL *
*(CONT GUID) PRO to 06 40 *
(RECYCLE) ENTR to TIG-05sec

00:03 SPS THRUST Lt - ON
 Δ 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 9/4/72

DATE

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

L
8-6

18 F 16 40 TFC (STATIC), VG, Δ VM (min-sec,.1fps)
 Δ 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 Δ V COUNTER & RESIDUALS Δ 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 1t 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

DATE 9/4/72

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

L
8-7

25

PWR REDUCT

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

P61 - ENTRY PREP

26

V37E 61E (AVE G ON)

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

27 F 06 61

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

PAD VALUES

LAT _____

LONG _____

HDS DN -1

PRO

28 F 06 60

GMAX, V400K, GAMMA EI (.01G, fps, .01°)

*N60 not valid for *
* earth orbit Entry*

PRO

29 F 16 63

RTOGO (.1nm)

VIO (fps)

TFE (min-sec)

PAD _____

PAD _____

RTOGO & VIO not valid for
* earth orbit Entry *

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

DATE 9/4/72

DATE

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

L
8-8

P62 - CM/SM SEP & PRE-ENTRY MNVR

30 F 50 25 00041 REQUEST CM/SM SEP

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

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

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

PRO (Act ENTRY DAP Att Hold)

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

DATE

DATE 9/4/72

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

L
8-9

EMS INITIALIZATION

If scroll not on 37K:

* EMS FUNC - TEST 5 *

* Slew scroll to 37K *

EMS FUNC - RNG SET

Set RNG TO PAD DATA RNG

EMS FUNC - Vo SET

Slew scroll to PAD DATA VIO

EMS MODE - STBY (verify)

EMS FUNC - ENTRY

Verify .05G lt filter is down

RSI ALIGNMENT

FDAI SOURCE - ATT SET

ATT SET - GDC

EMS ROLL - on(up)

GDC ALIGN PB - PUSH & HOLD

YAW tw - Position RSI thru 45° &
back to LIFT UP

GDC ALIGN PB - RELEASE

EMS ROLL - OFF

Align GDC to IMU

PRO (CMC Guidance)

DATE 9/4/72

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

P63 - ENTRY INIT

DATE

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

DATE

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

L
8-10

P64 - ENTRY POST .05G

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

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

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

EMS MODE - BACKUP/VHF RNG

.05 G Lt - on

.05 G sw - on (up)

EMS ROLL - on (up)

If CMC is GO:

MAN ATT (3) - RATE CMD

SC CONT - CMC

*If DAP NO GO: *

* SC CONT - SCS *

* Fly BETA *

*If CMC NO GO: *

* SC CONT - SCS *

* Track horiz with 29° *

* window mk *

* Maintain Lift UP until .2G* *

* Fly EMS *

Compare RSI & FDAI

If CMC or PAD cmds Lift DN,

* MNVR Lift DN *

EMS GO/NO GO

G-V Plot within limits

DATE _____

DATE 9/4/72 _____

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

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 9/4/72

DATE

EARTH/POST LANDING

L
9-1

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

40K' (RRT) *If CM unstable: * (01:06)
* RCS CMD - OFF *
* 40K' APEX COVER JETT PB-PUSH*
* (wait 2 sec) *
* DROGUE DEPLOY PB - PUSH *

30K' ELS LOGIC - on (up) (01:24)
ELS - AUTO

Start DAC

24K' (RRT) RCS disable (auto) (01:37)
RCS CMD - OFF

Apex cover jett (auto)
APEX COVER JETT PB - PUSH
(wait 2 sec)
Drogue parachutes deployed (auto)
DROGUE DEPLOY PB - PUSH

*If Both Drogues Fail: *
* ELS - MAN *
* Stabilize CM (DIRECT RCS)*
* 5K' MAIN DPLY PB - PUSH *
* ELS - AUTO *

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

CM RCS PRPLNT (2) - OFF

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

DATE 9/4/72

EARTH/POST LANDING

BACK

COLOR _____

L
9-2

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

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

STRUT LOCKS (4) - UNLOCK

If night landing:

- cb FLOAT BAG #3, FLT/PL (1 cb) - close
- PL BCN LT - LOW
- (275) cb FLT & PL BAT BUS A,B,&BAT C (3) - close
- cb FLT & PL MNA & B (2) - open
- (5) cb BAT RLY BUS (2) - open
- cb RAD HTRS OVLD (2) - open (verify)
- (8) cb SPS P&Y (4) - open (verify)

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

800' CAB PRESS RELF vlv (2) - CLOSE (latch off)
MN BUS TIE (2) - OFF

POSTLANDING
STABILIZATION, VENTILATION, COMMUNICATIONS

- 1 Stabilization after landing
- (229) cb MAIN REL PYRO (2) - close
 - MAIN RELEASE - on (up)
 - SECS PYRO ARM (2) - SAFE
 - SECS LOGIC (2) - OFF
 - *If no contact with recovery forces:*
 - * VHF AM A&B - off (ctr) *
 - * VHF AM RCV ONLY - A *
 - *If B SIMPLEX or A DUPLEX req'd *
 - * Turn BCN off during Comm *

DATE 9/4/72

EARTH/POST LANDING

L
9-3

- (8) cb PL VENT - close
cb FLOAT BAG (3) - close
(278) cb UPRIGHT SYS COMPRESS (2) - close
If Stable II:
 FLOAT BAG(3) - FILL till 2 min after
 upright, then - OFF
 VHF AM A/B & BCN - OFF while inverted
If Stable I:
 After 10 Min Cooling Period,
 FLOAT BAG (3) - FILL 7 min, then OFF

2

Post Stabilization And Ventilation

- PL BCN LT - BCN LT LOW (night landing)
PL VENT vlv - UNLOCK (Pull into detent)
Remove PL VENT Exh Cover
PL VENT - HIGH or LOW
If dye marker req'd:
 PL DYE MARKER - ON
Release restraints
(275) cb MNA BAT BUS A & BAT C (2) - open
 cb MNB BAT BUS B & BAT C (2) - open
 cb FLT & PL BAT C - open
(250) cb PYRO A SEQ A - open
 cb PYRO B SEQ B - open
Verify voltage > 27.5 vdc
 *If < 27.5 vdc: *
 * cb FLT & PL-BAT BUS A&B (2) -open*
 * cb FLT & PL BAT C (1) - close *
 * GO TO LOW POWER CHECKLIST *
Unstow and install PLV DISTRIB DUCT
Deploy grappling hook and line if req'd

NOMINAL EGRESS & POWER DOWN

- PL VENT - OFF
cb Pnl 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

DATE 9/4/72

DATE

L
9-4

UNAIDED EGRESS PROCEDURES

PREPARATION

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

STABLE I

PL VENT - OFF
cb 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*

DATE

DATE 9/4/72

L
9-5

POST LANDING COMMUNICATIONS

VHF ANT - RECY (verify)

VHF BCN - ON (verify)

If no contact with recovery forces:

* Perform VHF BEACON Check *

MONITOR VHF BEACON transmission with

VHF AM B Rcvr and/or Survival Trncvr (VOICE)

*If VHF Beacon not operating:

* Open VHF ant access pnl. Connect *

* Survival Trncvr cable conn J1 to *

* bcn ant cable conn P112 and place radio*

* in BCN mode *

LOW POWER CHECKLIST

VHF BCN - OFF

VHF AM (3) - RCV

FLOOD LTS - OFF

VHF AM A&B - off (ctr)

VHF AM RCV ONLY - A (verify)

POSTLANDING VENT SYS: minimize use

SURV RADIO - Open VHF ant access pnl.

Connect cable conn J1 to bcn ant

cable conn P112 and place radio in

BCN mode

DATE 9/4/72

DATE _____

EMER
1-1

EMERGENCY PROCEDURES
(Flight copies only)

See CSM SYSTEMS CHECKLIST

EMERGENCY PROCEDURES

BACK

COLOR _____

EMER
1-2

EMERGENCY PROCEDURES

See CSM SYSTEMS CHECKLIST