264

NO

CREW PROCEDURES CHANGE REQUEST

INITIATED BY	ORGANIZATION	DATE
J. Rippey	CF24	9/15/69

CHANGE NUMBER	S/C EFFECTIVITY
ESD - 19	108 & Subs

DOCUMENT AFFECTED

TITLE	DOCUMENT NO.	PAGE NO.	BASIC OR CHANGE DATE	TIME OR STEP NO.
G & Subs ESD Final	MSC-CF-P-69-21		5/15/69	

DETAIL CHANGE IN EXACT WORDING

The attached entry and TLI procedures represent an update to the current Entry Summary Document. Since the revisions are primarily in arrangement the total ESD procedures are enclosed.

REASON:

The changes to the documented procedures reflect crew preference in arrangement and clarity as a result of continuing training sessions.

FACILITY FORM 602

N70-76294 (ACCESSION NUMBER)	(THRU)
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REMARKS:

☐ APPROVED ☐ DISAPPROVED	COORDINATOR'S SIGNATURE	DATE

FINAL DISPOSITION

☑ APPROVED ☐ DISAPPROVED	FCOD SIGNATURE	DATE SIGNED	SUSPENSE DATE
	[illegible]	9/22/69	

MSC Form 482 (Rev Jun 68) *(Previous editions are obsolete)*

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1		INITIAL STOWAGE COMPLETED
2		CMC & ISS START UP
3		SCS POWER UP
4		P51 - IMU ORIENTATION
5		LOAD DAP V48E 11102, 01111, PRO, PRO, PRO
6	-06:00h	LAST MCC DECISION
7	-05:35h	NO COMM - P52 & NAV SIGHTINGS
8		DON MAE WESTS & FOOT RESTRAINTS
9		ACTIVATE VHF FOR COMM CHECKS
10	-04:30h	P27 (SV,REFSMMAT), MNVR & ENTRY PAD UPDATES
11	-04:15h (__:__:___)	P52 - IMU REALIGN (OPTION 1)
12		P37 (NO COMM ONLY)
13		CABIN COLD SOAK (CREW OPTION)
14		ECS CKS O2 SUPPLY REFILL PGA verification, (if suited) ECS Monitor Ck (382)EVAP H20 CONT PRI vlv - AUTO EVAP H20 CONT SEC vlv - AUTO SUIT HEAT EXCH SEC GLY - FLOW
15		EPS CKS #1, 3, 4 (5 if req'd)

16		SPS CK (If req'd)
17		RCS CKS SM RCS Monit Ck CM RCS Monit Ck
18		C&W SYS CK
19		CMC SELF CK
20		DSKY COND LT TEST
21	-03:45h	MIDCOURSE MANEUVER P30 - EXT ΔV
	-03:15h	P40/41 - SPS/RCS THRUSTING
	-03:00h	MIDCOURSE (#7) BURN Key V66E
	-02:00h	LOGIC SEQUENCE CK (8) cb SECS LOGIC (2) - close (verify) cb SECS ARM (2) - close cb ELS (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 (2) - open
22		NO COMM NAV SIGHTINGS
23		MNVR TO SUPERCIRCULAR ENTRY ATT _____° PITCH V62E
23A		V49E
23B	F 06 22	DESIRED FINAL GMBL ANGLES (.01°) LOAD ENTRY ATT PAD ANGLES PRO

23C F 50 18 REQ MNVR TO FDAI RPY ANGLES (.01°)
(AUTO) SC CONT - CMC
BMAG MODE (3) - RATE 2
CMC MODE - AUTO
PRO
(MAN) SC CONT - SCS
MNVR to 23E

23D 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

23E F 50 18 REQUEST TRIM (.01°)
(TRIM) Go to 23C
(BYPASS) ENTR

S BD ANT - OMNI C

24 BORESIGHT & SXT STAR CHECK
OPT MODE - CMC
OPT ZERO - OFF

V41 N91E

F 21 92 SHAFT, TRUN (.01°,.001°)
Load SXTS angles

41 OPTICS DRIVE

CHECK SXT STAR
OPT ZERO - ZERO
CHECK BORESIGHT STAR (If avail)

25 -01:35h P52 - IMU REALIGN (OPTION 3)
Record gyro torquing angles
R _____
P _____
Y _____
If >1°, recycle P52
If confirmed, use SCS for EMS entry
OPTICS PWR - OFF

26(__:__:__) GDC ALIGN
If drift >10°/hr, change rate source

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27 -01:15h EMS ENTRY CHECK

EMS FUNC - OFF
(8) cb EMS (2) - close
EMS MODE - STBY
EMS FUNC - EMS TEST 1 (wait 5 sec)
EMS MODE - NORMAL (wait 10 sec)
Check ind lts - off
RANGE ind - 0.0
Slew hairline over notch in self-test pattern
EMS FUNC - EMS TEST 2 (wait 10 sec)
.05G lt - on (all others out)
EMS FUNC - EMS TEST 3
.05G lt - on
RSI lower lt - on (10 sec later)
Set RANGE counter to 58 nm±0.0
EMS FUNC - EMS TEST 4
.05G lt - on (all others out)
G-V trace within pattern to lwr rt corner @9G
RANGE ind counts down to 0±0.2
EMS FUNC - EMS TEST 5
.05G lt - on
RSI upper lt - on (10 sec later)
RANGE ind - 0.0
Scribe traces vertical line 9g to 0.22±0.1
ALIGN SCROLL TO ENTRY PATTERN (on 37K ft sec line)
EMS FUNC - RNG SET
G-V scroll assy traces vert. line 0.22g to 0±0.1
EMS MODE - STBY

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28 PRIMARY WATER EVAP ACTIVATION

GLY EVAP H20 FLOW - AUTO
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - AC1

29 SEC WATER EVAP ACTIVATION (if NO cold soak)

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 - 40 - 50.5°F
SUIT CKT HT EXCH - BYPASS 20 sec, OFF
ECS IND sel - PRIM

30 -01:10h 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)
UP TLM CM - BLOCK (verify)
(8) 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)

31 FINAL STOWAGE

OPTICS (except for deorbits)
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

32 -00:50m TERM. CM RCS PREHEAT

UP TLM CM - BLOCK (verify)
(101) CM RCS HTRS - OFF
CM RCS LOGIC - OFF
(8) cb CM RCS HTR (2) - open

33 SYSTEMS TEST PANEL CONFIGURATION

SYS TEST METER - 4B (BAT RLY BUS 3.4 - 4.1 vdc)

(101) CM RCS HTRS - OFF (verify)

WASTE H20 DUMP HTR - OFF

(101) URINE DUMP HTR - OFF

34 (100) LEB FLOOD & INTGL LIGHTING - OFF

35 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 *

(250) *cb PYRO A(B) seq A(B) - open *

cb PYRO A(B)BAT BUS A(B)TO PYRO

*mn BUS TIE - close *

(275) cb MNA BAT C - close

cb MNB BAT C - close

DC IND - MNB

PNL 8 - All cb's closed except:

EDS BAT (3) - open (verify)

PL VENT - open (verify)

FLOAT BAG (3) - open (verify)

SPS P&Y (4) - open (verify)

CM RCS HTRS (2) - open (verify)

DOCKING PROBE (2) - open (verify)

DIRECT ULLAGE (2) - open

36 (__:__:__) FINAL GDC DRIFT CK (if req'd)

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

37 CM RCS ACTIVATION

(8) SECS LOGIC (2) - on(up)
MSFN confirm GO for PYRO ARM (if poss)
SECS PYRO ARM (2) - ARM
CM RCS PRPLNT 1&2 - ON
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

38 -00:45m P27 & ENTRY PAD UPDATE

SUPERCIRCULAR ENTRY,
SPS DEORBIT ,
SM RCS/HYBRID DEORBIT,

SUPERCIRCULAR ENTRY

1 Set DET (up, to EI)

2 EMS INITIALIZATION

Scroll not on 37K:
EMS FUNCT - TEST 5
Slew scroll to 37K

EMS FUNCT - RNG SET
SET RNG TO PAD DATA RNG
EMS FUNC - Vo SET
Slew Scroll to Pad Data VIO
Do not go thru TEST 3 or 5
EMS MODE - STBY (verify)
EMS FUNC - ENTRY

3 RSI ALIGNMENT

FDAI SOURCE - ATT SET
ATT SET - GDC
EMS ROLL - on (up)
GDC ALIGN pb - push & hold
YAW THUMBWHEEL - Position RSI thru 45° & back to LIFT UP
GDC ALIGN pb - release
EMS ROLL - OFF
Align GDC to IMU

4 CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (Verify)
cb RCS LOGIC (2)-close (verify)
SC CONT - SCS
RCS TRANSFER - CM
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - MNB
cb SCS B/D ROLL, PITCH & YAW MNA (3) - open
TEST RING 2 THRUSTERS
cb SCS B/D ROLL, PITCH & YAW MNA (3) - close
cb SCS B/D ROLL, PITCH & YAW MNB (3) - open
TEST RING 1 THRUSTERS
cb SCS B/D ROLL, PITCH & YAW MNB (3) - close
RCS TRANS - SM

5 30:00m (-30:00) MN BUS TIE (2) - ON
TAPE RCDR - REWIND

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6 35:00m (-25:00) SEPARATION CK LIST

cb ELS BAT (2) - close (verify)
PRIM GLY TO RAD - BYPASS (pull)
REPRESS PKG vlv - FILL
O2 SM SUPPLY vlv - OFF
SURGE TK - ON (verify)
REPRESS PKG vlv - ON
CAB PRESS REL vlv (2) - NORM
ABORT SYS PRPLNT - RCS CMD (verify)
SM RCS SEC PRPLNT FUEL PRESS (4) - OPEN
VHF AM A&B - off (ctr)
HI GAIN ANT PWR - OFF
FC PUMPS (3) - OFF
FC 2 MN A&B - OFF
Verify Loads Balanced
S BD PWR AMP - LOW
S BD ANT OMNI - best
cb ECS RAD CONT/HTR (2) - open
cb WASTE H2O/URINE DUMP HTR (2) - open
cb RAD HTRS OVLD (2) - open
POT H2O HTR - OFF
GLY EVAP TEMP IN - MAN

7 MNVR TO CM/SM SEP R,P,Y ATT

SC CONT - SCS
CMC MODE - FREE
MNVR TO PAD ATT
R _____ (0°)
P _____ (265°)
Y _____ (0°)

41:00m (-19:00) P61 - ENTRY PREP

1 V37E 61E

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

2 F 06 61 IMPACT LAT, LONG, HDS UP/DN (+/-)
PRO (.01°,.01°,±00001)

3 F 06 60 GMAX,V400K,GAMMA EI (.01G,fps,.01°)
Record
GMAX _____
V400K _____
GAMMA EI _____
PRO

4 F 16 63 RTOGO (.1nm) _____ PAD _____
VIO (fps) _____ PAD _____
TFE(min-sec) _____
If NO COMM, Set RTOGO & VIO in EMS
& initialize
(ACCEPT) PRO
(RECYCLE TFE) V32E to 3

P62 - CM/SM SEP & PRE-ENTRY MNVR

5 F 50 25 00041 REQUEST CM/SM SEP
SC CONT - SCS/FREE
43:00m COMPARE PITCH ATT WITH PAD DATA _____
(within 5°)
If not ±5°,G&N NO GO
(-17:00) YAW - 45° OUT-OF-PLANE (LEFT) (315°)
RATE-HIGH
ATT DB-MIN
MAN ATT(3)-RATE CMD
BMAG MODE (3) - ATT1/RATE 2
MN BUS TIE (2) - ON (verify)
PRIM GLY TO RAD - BYPASS (verify)
EMS MODE - STBY (verify)
CM RCS LOGIC - on (up)
SECS LOGIC (2)-on(up)(verify)
SECS PYRO ARM (2) - on (up)

45:00m CM/SM SEP (2) - ON
(-15:00) If docking ring still on:
CSM/LM FNL SEP (2) - on(up)(verify)
MAN ATT (3) - MIN IMP
BMAG MODE (3) - RATE 2
C&W MODE - CM
(258°P) RCS TRNFR - CM
CM RCS MANF PRESS - 287-302 psia
CM RCS LOGIC - OFF

```
                    SECS PYRO ARM (2)-SAFE
                    Monitor VMA/B:
                      If <25 vdc go to EMERG
                      POWERDOWN
  50:00m            AUTO RCS SEL A/C ROLL (4) - OFF
  (-10:00)          cb SCS B/D ROLL PITCH & YAW MNB (3) - open
  (236°P)           AUTO RCS SEL CM 1(6)-MNA
                    YAW back to 0°
                    PITCH TO HORIZ TRACK ATT
                      ROLL - 0° (LIFT UP)
                      PITCH - 400K Horiz Mark (31.7°)
                      YAW - 0°
                    ATT DB - MAX
                    EMS DATA - Verify
                    EMS FUNC - ENTRY (verify)
                    EMS MODE - NORMAL
                    MAINT HORIZ TRK
                    MAN ATT (3) - RATE CMD
                PRO (Act ENTRY DAP)

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

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

                P63 - ENTRY INIT

8      06 64    G,VI,RTOGO                (.01G,fps,.1nm)
                    FDAI SCALE - 5/5
                    ROT CONTR PWR DIR (2) - MNA/MNB
                    TAPE RCDR - HBR/FWD
  58:00m            HORIZ CHECK
 (-02:00)           Pitch error needle goes toward
 (177°P)              zero approaching .05G time
                    If CMC is GO:
                      SC CONT - CMC/AUTO

                        * If DAP NO GO:   *
                        *    SC CONT - SCS*
                        *   FLY BETA      *
                        *If CMC NO GO:    *
                        *   SC CONT - SCS *
                        *   FLY EMS       *
```

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P64 - ENTRY POST .05G
(If no P64 at .05G ±5 sec, GNCS NO GO)

9 (158°P at 400K) RTOGO AT .05G AGREES WITH EMS-verify
(RRT=0:00) HORIZ CHECK
.05G lt - on (EMS START)

.05G time
(+0__:__)
(__:__:__)
(152°P at .05G)

* No EMS START within 3 sec: *
* EMS MODE - BACKUP/VHF RNG *

.05G sw - on (up)
EMS ROLL - on (up)

06 74 BETA, VI, G (.01°,fps,.01G)
NOTE: To monitor N68,
Key V16 N68E
Compare RSI & FDAI
If CMC or PAD cmds Lift DN,
MNVR Lift DN
EMS GO/NO GO
G-V Plot within limits
Monitor G-meter for
convergence with pad data (Do)
CMC is NO GO if commanding constant
90° command when g <5.4
Go to 13 (P67) or continue

P65 - ENTRY - UP CONT (VL>18K fps)

10 F 16 69 BETA (.01°) _____
DL (.01G) _____ PAD _____
VL (fps) _____ PAD _____

IF NO AGREEMENT:
*SC CONT - SCS *
*FLY EMS *

PRO

11 06 74 BETA,VI,G (.01°,fps,.01G)
(V<VL+500 fps & RDOT Neg) Go to 13

P66 - ENTRY - BALLISTIC (D<DL)

12 06 22 DESIRED GMBL ANGLES RPY (.01°)
Monitor horiz ±12° of 31.7° mark

P67 - ENTRY - FINAL PHASE (AUTO AT .2G)

13 06 66 BETA,CRSRNG ERR,DNRNG ERR
(.01°,.1nm,.1nm)
BETA will be ±15° until DN RNG ERR <-9nm
Monitor lift vector on RSI & FDAI
CM RCS: change rings when HE PRESS <1150 psia

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 FUNCT - OFF

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EARTH/POST LANDING

		Start Watch
RRT (06:36)	STEAM PRESS - pegged at 90K	(0:00)
50K'(07:32)	CABIN PRESS REL vlv (2) - BOOST/ENTRY	(00:56)
	SECS PYRO ARM (2) - ARM	
	Check Altimeter	

40K'(07:46)

```
*        CM UNSTABLE            *(1:10)
*RCS CMD - OFF                  *
* 40K' APEX COVER JETT PB-PUSH *
*DROGUE DEPLOY PB - PUSH (2 sec*
*after apex cover jett)         *
```

30K'

ELS LOGIC - on (up)
ELS - AUTO

24K'(08:18) RCS disable (auto) (01:42)

RCS CMD - OFF

Apex cover jett (auto)

APEX COVER JETT PB - PUSH

(WAIT 2 SECS)

Drogue parachutes deployed (auto)

DROGUE DEPLOY PB - PUSH

If Both Drogues Fail:

```
*ELS - MAN              *
*Stabilize CM           *
*5K' MAIN DPLY PB - PUSH*
*ELS - AUTO             *
```

23.5K' Cabin Pressure increasing (Drogues + 50s)

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

10K'(09:07) Main parachutes deployed (02:31)

MAIN DEPLOY PB - PUSH (within 1 sec)
VHF ANT - RECY
VHF AM A - SIMPLEX
VHF BCN - ON
DIRECT O2 - ON (if suited)

CABIN PRESS REL vlv (2) - CLOSE
CM RCS LOGIC - on (up)
CM PRPLNT - DUMP (burn audible)
Monitor CM RCS 1&2 for He press decrease
*NO BURN or PRESS DECREASE *
* USE BOTH RHC's *
*DO NOT FIRE PITCH JETS *
CM PRPLNT-PURGE (to zero He press)
*CM RCS He DUMP PB - PUSH *
*RHC (2) - 30 secs *
* NO PITCH *
STRUT LOCKS (4) - UNLOCK
If night landing:
cb FLOAT BAG #3, FLT/PL (1 cb)-close
PL BCN LT - HIGH

cb FLT & PL BAT BUS A,B,&BAT C (3)-close
cb FLT & PL MNA & B (2) - open
cb RAD HTR OVLD (2) - open (verify)
cb SPS P&Y (4) - open (verify)
cb BAT RELAY BUS (2) - open

3K' CABIN PRESS REL vlv (RH) - DUMP (after purge completed)

ELS AUTO (verify)
ELS LOGIC - ON (verify)
FLOOD Lts - POST LDG
CM RCS PRPLNT (2) - OFF

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

POSTLANDING
STABILIZATION, VENTILATION, COMMUNICATIONS

1 Stabilization after landing
cb MAIN REL PYRO (2) - close
MAIN RELEASE - on (up)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
DIRECT O2 - OFF (verify)

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No contact with recovery forces
*VHF AM A&B - off (ctr) *
*VHF AM RCV ONLY - A *
cb PL VENT - close
cb FLOAT BAG (3) - close
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
PL VENT vlv - UNLOCK (Pull)
Remove PL VENT Exh Cover
PL VENT - HIGH or LOW
PL DYE MARKER - ON (swimmer comm)
Release footstraps and restraints
cb MNA BAT BUS A & BAT C (2) - open
cb MNB BAT BUS B & BAT C (2) - open
cb FLT & PL BAT C - open
cb PYRO A SEQ A - open
cb PYRO B SEQ B - open
*EACH HR - CHECK DC VOLTS $\geq$ 27.5 V *
*If Not: *
* 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.

EGRESS PROCEDURES

CMP PL VENT - OFF
LMP cb Pnl 250 (all) - open

STABLE I
ALL Disconnect umbilicals
Neck dam on (if suited)
CMP Center couch - 270° position

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CDR,LMP	Armrests stowed
CDR	Connect raft to S/C, if desired, with green lanyard
	Connect raft white lanyards to suits inflate water wings when exiting
CMP	GN2 RATCHET HNDL - CW
	GN2 VLV HNDL - UNLATCH & PUSH (Outbd)
	Side Hatch opened
	ACTR HNDL SEL - N
	Egress with liferaft
LMP	Put hardware kit out
LMP,CDR	Egress

or C. STABLE II

LMP	cb CREW STA AUDIO (3) - open
ALL	Disconnect umbilicals
	Couch seat pans (3) - 170° position
	Neck dam on (if suited)
CMP	Arm rests stowed
	Survival kits removed from stowage
CDR	Connect life raft mainline to CDR or S/C
CMP	Connect first raft white lanyard to suit
CDR	Connect third raft white lanyard to suit
CMP	PRESSURE EQUALIZATION vlv - OPEN
CMP,LMP	Remove and stow hatch
CMP	Exit feet first with rucksacks; when clear of S/C inflate water wings and raft
LMP	Exit feet first; when clear of S/C inflate water wings
CDR	Exit feet first; when clear of S/C inflate water wings

POST LANDING COMMUNICATIONS

VHF ANT-RECY (verify)
VHF BCN - ON (verify)
If no contact with recovery forces perform VHF BEACON Check
MONITOR VHF BEACON transmission with VHF AM B Rcvr and/or Survival Transceiver
*VHF Beacon not operating *
connect Survival Transceiver to ant
cable conn P112 behind VHF ant access pnl and
*place radio in BCN mode *

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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)
COUCH LIGHTS - OFF
POSTLANDING VENT SYS: minimize use
SURV RADIO - plug into VHF BCN ANT cable conn P112 behind VHF ant access pnl & turn radio on in BCN mode

ENTRY EMERGENCY PROCEDURES

CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

1. Verify electrical power for pressurization
   - cb EPS BAT BUS (2) - close (Pnl 229)
   - cb PYRO A/B SEQ A/B (2) - close (Pnl 250)
   - cb SECS ARM (2) - close (Pnl 8)
   - SECS PYRO ARM (2) - ARM
   - SECS LOGIC (2) - on (up)
2. Cycle CM RCS - PRESS (Pnl 2)
3. Verify electrical power to CM RCS prplnt vlvs
   - cb EPS GRP 1&3 - close (Pnl 229)
   - cb SM RCS HTR A&B - close (Pnl 8)
   - cb RCS PRPLNT ISOL (2) - close
4. Cycle CM RCS PRPLNT 1&2 - on (up) (Pnl 2)
5. Open He & PRPLNT Crossfeed
   - cb EPS GRP 5 - close (Pnl 229)
   - cb RCS LOGIC (2) - close (Pnl 8)
   - CM RCS LOGIC - on (up) (Pnl 1)
   - CM PRPLNT - DUMP (momentarily, then OFF)

EMERGENCY POWERDOWN

(MN BUS voltage <26.0 vdc, no short verified)

	Amps
S BD PWR AMP - off (ctr)	4.35
SEC COOL EVAP - RESET for 58 sec, then OFF	4.26
SEC COOL PUMP - OFF	
SUIT COMPR (2) - OFF	8.44
DIRECT O2 vlv - ON (if suited)	
TAPE RCDR FWD - off (ctr)	1.69
POT H2O HTR - OFF	1.62
LIGHTS - (min req'd)	
cb G&N OPT (2) - open	3.1
ECS GLY PUMPS (2) - OFF	2.76 per pump
SCE PWR - off (ctr)	0.70
TELECOM GRP 1&2 - OFF	1.8
cb INSTR ESS (2) - open	1.10

Note: After 0.05G, cb G&N (all 10) - open

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BUS LOST RECONFIGURATION

A. Loss of MN BUS A
- FC 2 - MNB only
- FC 1 (MNA&B) - off (ctr) (on line for deorbit burn)
- INV 3 - MNB, AC1
- cb MNA BAT BUS A - open
- cb MNA BAT C - open
- cb MNB BAT C - closed
- cb BAT C BAT BUS A - closed
- AUTO RCS SEL (desired thrusters) - MNB
- FDAI SEL - 2
- RHC PWR DIR (2) - MNB
- BMAG MODE (3) - RATE 2

B. Loss of MN BUS B
- FC 2 - MNA only
- FC 3 (MNA&B) - off (ctr)(on line for deorbit burn)
- INV 3 - MNA, AC2
- cb MNB BAT C - open
- cb MNB BAT BUS B - open
- cb BAT C BAT BUS B - closed
- cb MNA BAT C - closed
- AUTO RCS SEL (desired thrusters) - MNA
- FDAI SEL - 1
- RHC PWR DIR 1 - MNA
- SCS ELEC PWR - ECA
- BMAG MODE (3) - RATE 1

C. Loss of BAT BUS A
- Prepare for two battery entry
- AUTO RCS SEL (desired thrusters) - MNB
- After CM/SM SEP
  - RCS TRNFR - CM (mom)
- At APEX COVER JETT
  - cb SCS CONTR/AUTO (2) - open

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D. Loss of BAT BUS B
  Prepare for two battery entry
  AUTO RCS SEL (desired thrusters) - MNA
  After CM/SM SEP
    RCS TRNFR - CM (mom)
  At APEX COVER JETT
    cb SCS CONTR/AUTO (2) - open

E. Loss of AC BUS 1
  AC INV 1 MNA - OFF
  BMAG MODE (3) - RATE 2
  FDAI SEL - 2
  SUIT COMPR 2 - AC2
  S BD NORM XPNDR - SEC
  S BD NORM PWR AMP - SEC
  ECS GLY PUMP 2 - AC 2
  G/N PWR - AC2

F. Loss of AC BUS 2
  AC INV 2 MNB - OFF
  FC PUMP 2&3 - AC1
  FDAI SEL - 1
  BMAG MODE (3) - RATE 1
  G/N PWR - AC1
  S BD NORM XPNDR - PRI
  S BD NORM PWR AMP - PRI

EMERGENCY SAFE OF APEX COVER JETT

If MSFN NO GO For Pyro Arm Indicates Apex
  Cover Jettison,
  SECS LOGIC (2) - OFF
  cb ELS (2) - open
  SECS LOGIC (2) - ON
If MSFN GO, Go To Step A
If Still Apex Cover Jettison,
  cb SECS LOGIC A - open
If MSFN GO, Go To Step B
If Still Apex Cover Jettison,
  cb SECS LOGIC A - close
  cb SECS LOGIC B - open
If MSFN GO, Go To Step C

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If Still Apex Cover Jettison,
ELS - MAN
ELS LOGIC - OFF
SECS LOGIC (2) - OFF
cb SECS LOGIC (2) - open
cb SECS ARM (2) - open
CMP To LEB
cb SEQ A&B PYRO A&B (2) - open (Pnl 250)
Verify PYRO BUS A&B voltage = 0
Use Tool E, (5/32 allen head) to remove closeout panel located beneath panels 276 & 277 (approx 10 fasteners on panel). Remove, or cut all wires to, connector marked "cut" with white tag (P545). Tape ends of any wires cut. Replace closeout panel.
cb SEQ A&B PYRO A&B - close
Verify PYRO BUS A&B voltage >35 vdc
cb ELS (2) - close
cb SECS LOGIC (2) - close
cb SECS ARM (2) - open (verify)
<u>DO NOT ARM PYRO BUSES</u>

Continue Normal Entry Except,

Perform CM RCS pressurization & CM/SM Separation together at which time ARM PYRO's in the following manner:
SECS PYRO ARM (B) - SAFE (verify)
SECS PYRO ARM (A) - ARM

To Jettison Apex Cover At 24K':
SECS PYRO ARM (B) - ARM

<u>STEP A</u>
cb ELS (2) - open (verify), close at or after apex cover jettison at 24K'
Continue normal entry

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STEP B
cb SECS LOGIC A - open (verify),
close at or after apex cover jettison
at 24K'
Continue normal entry

STEP C
cb SECS LOGIC B - open (verify), close
at or after apex cover jettison
at 24K'
Continue normal entry

FIRE/SMOKE IN CM DURING ENTRY

WARNING: CM water must not be used
to extinguish fire

1 CABIN FAN (2) - OFF (verify)

2 Monitor EPS indicators for excessive current.
Immediately remove power from affected bus.

3 ROT CONTR PWR DIRECT (2) - MNA/MNB
& maintain attitude if required.

4 If affected bus is:

MNA
AC INV 1 AC BUS 1 - OFF
AC INV 2 AC BUS 1 - on (up)
Set up for CM/RCS sys 2
AUTO RCS SEL A/C ROLL (4) - OFF
AUTO RCS SEL CM 1(6) - OFF
AUTO RCS SEL CM 2(6) - MNB
RCS dump is fuel rich

MNB
AC INV 2 AC BUS 2 - OFF
AC INV 1 AC BUS 2 - on (up)
RCS dump is oxidizer rich

5 CAB PRESS REL vlv (RH) - DUMP

6 Continue ENTRY

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ENTRY VEHICLE PREPARATION

1 INITIAL STOWAGE COMPLETED

2 CMC & ISS START UP

3 SCS POWER UP

4 P51 - IMU ORIENTATION

5 LOAD DAP
V48E 11102, 01111, PRO, PRO, PRO

6 DON MAE WESTS & FOOT RESTRAINTS

7 P27 (SV,REFSMMAT), MNVR
& ENTRY PAD UPDATES

8 CABIN COLD SOAK (CREW OPTION)

9 ECS CKS
O2 SUPPLY REFILL
PGA verification, (if suited)
ECS Monitor Ck
(382) EVAP H20 CONT PRI vlv - AUTO
EVAP H20 CONT SEC vlv - AUTO
SUIT HEAT EXCH SEC GLY - FLOW

10 EPS CKS #1, 3, 4 (5 if req'd)

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11 SPS CK (If req'd)

12 RCS CKS
SM RCS Monit Ck
CM RCS Monit Ck

13 C&W SYS CK

14 CMC SELF CK

15 DSKY COND LT TEST

16 LOGIC SEQUENCE CK
(8) cb SECS LOGIC (2) - close (verify)
cb SECS ARM (2) - close
cb ELS (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 (2) - open

17 P52 - IMU REALIGN (OPTION 3)

Record gyro torquing angles

R _____

P _____

Y _____

If >1°, recycle P52

If confirmed, use SCS for EMS entry

OPTICS PWR - OFF

18 GDC ALIGN

If drift >10°/hr, change rate source

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19 EMS ENTRY CHECK

EMS FUNC - OFF
(8) cb EMS (2) - close
EMS MODE - STBY
EMS FUNC - EMS TEST 1 (wait 5 sec)
EMS MODE - NORMAL (wait 10 sec)
Check ind lts - off
RANGE ind - 0.0
Slew hairline over notch in self-test pattern
EMS FUNC - EMS TEST 2 (wait 10 sec)
.05G lt - on (all others out)
EMS FUNC - EMS TEST 3
.05G lt - on
RSI lower lt - on (10 sec later)
Set RANGE counter to 58 nm$\pm$0.0
EMS FUNC - EMS TEST 4
.05G lt - on (all others out)
G-V trace within pattern to lwr rt corner @9G
RANGE ind counts down to 0$\pm$0.2
EMS FUNC - EMS TEST 5
.05G lt - on
RSI upper lt - on (10 sec later)
RANGE ind - 0.0
Scribe traces vertical line 9g to 0.22$\pm$0.1
ALIGN SCROLL TO ENTRY PATTERN (on 37K ft sec line)
EMS FUNC - RNG SET
G-V scroll assy traces vert. line 0.22g to 0$\pm$0.1
EMS MODE - STBY

20 EMS ΔV TEST (DEORBIT ONLY)

EMS FUNCT - ΔV SET/VHF RNG
SET ΔV ind to 1586.8 fps
EMS MODE - NORMAL
EMS FUNCT - ΔV TEST
SPS THRUST Lt - on/off (10 sec)
ΔV ind stops at -0.1 to -41.5
EMS MODE - STBY

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21 PRIMARY WATER EVAP ACTIVATION

GLY EVAP H20 FLOW - AUTO
GLY EVAP STM PRESS - AUTO
PRI ECS GLY PUMP - AC1

22 SEC WATER EVAP ACTIVATION (if NO cold soak)

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 - 40 - 50.5°F
SUIT CKT HT EXCH - BYPASS 20 sec, OFF
ECS IND sel - PRIM

23 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)
UP TLM CM - BLOCK (verify)
(8) 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

OPTICS (except for deorbits)
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

25 TERM. CM RCS PREHEAT

UP TLM CM - BLOCK (verify)
(101) CM RCS HTRS - OFF
CM RCS LOGIC - OFF
(8) cb CM RCS HTR (2) - open

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26 SYSTEMS TEST PANEL CONFIGURATION

SYS TEST METER - 4B (BAT RLY BUS 3.4-4.1 vdc)

(101) CM RCS HTRS - OFF (verify)

WASTE H20 DUMP HTR - OFF

(101) URINE DUMP HTR - OFF

(100) LEB FLOOD & INTGL LIGHTING - OFF

27 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 *

(250) *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

PNL 8 - All cb's closed except:

EDS BAT (3) - open (verify)

PL VENT - open (verify)

FLOAT BAG (3) - open (verify)

SPS P&Y (4) - open (verify)

CM RCS HTRS (2) - open (verify)

DOCKING PROBE (2) - open (verify)

DIRECT ULLAGE (2) - open

28 FINAL GDC DRIFT CK (if req'd)

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

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29 CM RCS ACTIVATION

(8) SECS LOGIC (2) - on(up)
MSFN confirm GO for PYRO ARM (if poss)
SECS PYRO ARM (2) - ARM
CM RCS PRPLNT 1&2 - ON
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

30 P27 & ENTRY PAD UPDATE

SPS DEORBIT,
SM RCS/HYBRID DEORBIT,

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SM RCS/HYBRID DEORBIT

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV

1 V37E 30E

2 F 06 33 GETI (hr,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 (.1nm,.1fps)
Record ΔV _____
(ACCEPT) PRO
(REJECT) Reselect P30 or P27. Load new param.

5 F 16 45 M,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
O2 SM SUPPLY vlv - OFF
SURGE TK - ON (verify)
REPRESS PKG vlv - ON
CAB PRESS REL vlv (2) - NORM
cb ELS (2) - close (verify)
cb SECS ARM (2) - close (verify)
cb SECS LOGIC (2) - close (verify)
ROT CONTR PWR NORM (2) - AC/DC
ABORT SYS PRPLNT - RCS CMD
SM RCS SEC PRPLNT (4) - OPEN
If docking ring still on:
CSM/LM FNL SEP (2) - on(up)(verify)
(Out of plane preferred)

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8 CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (verify)
cb RCS LOGIC (2) - closed (verify)
SC CONT - SCS
RCS TRANSFER - CM
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - MNB
cb SCS B/D ROLL,PITCH & YAW MNA(3)- open
TEST RING 2 THRUSTERS
cb SCS B/D ROLL,PITCH & YAW MNA(3)- close
cb SCS B/D ROLL,PITCH & YAW MNB(3)- open
TEST RING 1 THRUSTERS
cb SCS B/D ROLL,PITCH & YAW MNB(2)- close
RCS TRANSFER - SM

9 MNVR TO PAD BURN ATT

LOAD DAP
BMAG MODE (3) - RATE 2
SC CONT - CMC/AUTO
ATT DB - MIN
MAN ATT(3) - RATE CMD

10 V62E

11 V49E

12 F 06 22 DESIRED FINAL GMBL ANGLES (.01°)
LOAD MNVR PAD GMBL ANGLES
PRO

13 F 50 18 REQ MNVR TO FDAI RPY ANGLES (.01°)
(AUTO) PRO
(MAN) SC CONT - SCS
BMAG MODE (3) - RATE 2
MNVR To 15

14 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

15 F 50 18 REQ TRIM TO FDAI RPY ANGLES (.01°)
(TRIM) Go to 13
(BYPASS) ENTR

SPO 1 0 1569

16 CHECK BORESIGHT & SXT STARS
OPTICS PWR - on (up)
OPT MODE - CMC
OPT ZERO - OFF

17 V41 N91E

18 F 21 92 SHAFT,TRUN (.01°,.001°)
Load SXTS angles

19 41 OPTICS DRIVE
Check SXT STAR
OPT ZERO - ZERO
Check BORESIGHT STAR (if avail)

20 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

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

P41 - RCS THRUSTING
22 V37E 41E

23 F 50 18 REQ MNVR TO LCL HORIZ (HDS DN) (.01°)
(AUTO) BMAG MODE (3) - RATE 2
SC CONT - CMC/AUTO
PRO To 24

```
          (MAN/DAP) BMAG MODE (3) - RATE 2
                    SC CONT - CMC/HOLD
               V62E
                    MNVR To 25

24      06 18   AUTO MNVR TO FDAI RPY                (.01°)

25    F 50 18   REQ TRIM TO LCL HORIZ                (.01°)
                    ALIGN SC ROLL
          (AUTO TRIM)  PRO To 24
          (BYPASS)  ATT DB - MIN
                    RATE - LOW
                    MAN ATT (3) - RATE CMD
                    BMAG MODE (3) - ATT1/RATE 2
               ENTR

    55:00m
26      06 85   VGX,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 to ΔV Pad + 100=_____
                    EMS FUNC - ΔV
                    S BD ANT - OMNI C
                    SECS LOGIC (2) - ON
                    MSFN confirm Go for PYRO ARM
                    SECS PYRO ARM (2) - ARM
                    CM RCS LOGIC - ON (verify)

    59:25
27              DSKY BLANKS

    59:30
28      16 85   VG X,Y,Z (AVE G ON)                 (.1fps)
                    RHC's & THC - armed
                    LIMIT CYCLE - OFF
                    TAPE RCDR - CMD RESET/HBR
                    EMS MODE - NORMAL
```

```
    00:00
29   F 16 85   REQ NULL VG X,Y,Z                (.1fps)
                    BURN EMS ΔV CTR TO 100.0
                    RESET DET & COUNT UP

              If SM ONLY burn go to step 32

                    THC - locked
                    SC CONT - SCS/FREE
                    RATE - HIGH
                    PRIM GLY To RAD - BYPASS (verify)
                    MN BUS TIE (2) - ON (verify)

                    CM/SM SEP (2) - on (up)
                    MAN ATT(3)-MIN IMP
                    BMAG MODE(3)-RATE 2
                    C&W MODE - CM
                    RCS TRNFR - CM
                    CM RCS LOGIC - OFF
              Monitor VM A/B:
                    If <25 vdc, go to EMERG
                    POWER DOWN
              V63E

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

                    MAN ATT PITCH - ACCEL CMD
                    FDAI SCALE - 5/5
                    MNVR TO CM BURN ATT(NULL ERR NEEDLES)
                      R  0°
                      P
                      Y  0°

30            CM RCS BURN
                    RHC #1-Continuous Pitch Down
                    RHC #2-Module Pitch to null needles
                    BURN VGZ TO ZERO
                         * If only 1 RHC                 *
                         *   Pulse ± P=5° from retro att.*
                         *   Maintain rates <3°/sec      *
```

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```
31                BURN COMPLETION AT:
                       ΔV CTR= _________ or DET= _________

                  V82E

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

33    F 16 85     VGX,Y,Z                          (.1fps)
                  Read VG residuals to MSFN
            (HYBRID) PRO to 34

            (SM ONLY BURN)
                  PRO
      F 37        00E

EI-15:00          V37E 47E
      F 16 83     ΔVX,Y,Z                          (.1fps)
                       SC CONT - SCS/FREE
                       YAW left 45°
                       MAN ATT (PITCH) - RATE CMD
                       RATE - HIGH
                       PRIM GLY To RAD - BYPASS (verify)
                       MN BUS TIE (2) - ON (verify)

                       CM/SM SEP (2) - ON
                       MAN ATT(3)-MIN IMP
                       BMAG MODE(3)-RATE 2
                       C&W MODE - CM
                       RCS TRNFR - CM
                       CM RCS LOGIC - OFF
                       SECS PYRO ARM (2) - SAFE
                  PRO
                  Monitor VMA/B:
                       If <25 vdc go to EMERG
                       POWER DOWN
```

34 F 37 00E

PCM BIT RATE - LOW
ATT DB - MAX
EMS MODE - STBY
EMS FUNC - RNG SET

Go To EARTH ORBIT ENTRY,

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SPS DEORBIT

VEHICLE PREP COMPLETE

P30 - EXTERNAL ΔV

1 V37E 30E

2 F 06 33 GETI (hr,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 (.1nm,.1fps)
Record ΔV _____
(ACCEPT) PRO
(REJECT) Reselect P30 or P27. Load new param.

5 F 16 45 M,TFI,MGA (marks,min-sec,.01°)
*MGA -00002: If *
* IMU not aligned*
SET DET
PRO

F 37 00E

6 SEPARATION CK LIST
PRIM GLY TO RAD - BYPASS (pull)
REPRESS PKG vlv - FILL
02 SM SUPPLY vlv - OFF
SURGE TK-ON (verify)
REPRESS PKG vlv - ON
CAB PRESS REL vlv (2) - NORM
cb ELS (2) - close (verify)
cb SECS ARM (2) - close (verify)
cb SECS LOGIC (2) - close (verify)
ROT CONTR PWR NORM (2) - AC/DC
ABORT SYS PRPLNT - RCS CMD
SM RCS SEC PRPLNT (4) - OPEN

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7 CM RCS CHECK

AUTO RCS A/C ROLL (4) - OFF (verify)
cb RCS LOGIC (2) - closed (verify)
SC CONT - SCS
RCS TRANSFER - CM
AUTO RCS SEL (RING 1) - MNA
AUTO RCS SEL (RING 2) - MNB
cb SCS B/D ROLL,PITCH & YAW MNA(3)-open
TEST RING 2 THRUSTERS
cb SCS B/D ROLL,PITCH & YAW MNA(3)-close
cb SCS B/D ROLL,PITCH & YAW MNB(3)-open
TEST RING 1 THRUSTERS
cb SCS B/D ROLL,PITCH & YAW MNB(3)-close
RCS TRANSFER - SM
AUTO RCS A/C ROLL(4) - MNA

8 SPS THRUSTING PREP

CYCLE CRYO FANS
SPS GAUGING - AC1 (verify)
PUGS MODE - NORM (verify)
BMAG MODE (3) - RATE 2
ΔV CG - CSM
CMC MODE - FREE
AUTO RCS SEL (16) - MNA or MNB
(liftoff config)
SC CONT - CMC/AUTO

9		MNVR TO PAD BURN ATT V62E	
10		V49E	
11	F 06 22	DESIRED FINAL GMBL ANGLES LOAD MNVR PAD GMBL ANGLES PRO	(.01°)
12	F 50 18	REQ MNVR TO FDAI RPY ANGLES (AUTO) PRO (MAN) SC CONT - SCS MNVR to 14	(.01°)
13	06 18	AUTO MNVR TO FDAI RPY ANGLES	(.01°)
14	F 50 18	REQ TRIM TO FDAI RPY ANGLES (TRIM) Go to 12 (BYPASS) ENTR	(.01°)
15		BORESIGHT STAR CHECK	
16		V37E 40E OPT PWR - OFF	
17	F 50 18	REQUEST MNVR TO FDAI RPY ANGLES (AUTO) BMAG MODE (3) - RATE 2 SC CONT - CMC/AUTO PRO to 18 (MAN/DAP) BMAG MODE (3) - RATE 2 SC CONT - CMC/HOLD MNVR to 19 (MAN/SCS) SC CONT - SCS MNVR to 19	(.01°)
18	06 18	AUTO MNVR TO FDAI RPY ANGLES	(.01°)
19	F 50 18	REQUEST TRIM MNVR TO FDAI RPY ANGLES ALIGN S/C ROLL GDC ALIGN	(.01°)

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TVC CHECK & PREP

cb STAB CONT SYS (Pnl 8) - close
cb SPS (12) - close
SET ΔVC (verify)
EMS FUNCT - ΔV (verify)
MAN ATT (3) - RATE CMD
LIMIT CYCLE - ON
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
SCS TVC (2) - RATE CMD
ΔVCG - LM/CSM or CSM
TVC GMBL DRIVE P&Y - AUTO
+54:00m (-06:00) MN BUS TIE (2) - ON
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

TIG-5min HORIZ CHK - Horiz on 12° window mark (Limit +3° PGNCS GO/NO GO)
If NO GO set tw 180°, 180°, 0°
Track horiz with 24° window mark
At TIG-2 min Align GDC

55:00m (-05:00) PRIMARY TVC CHECK

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

SEC TVC CHECK

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

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```
                    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)    Go to step 17
          (BYPASS)  BMAG MODE (3) - ATT1/RATE 2 (verify)
                    ENTR

20   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

21     60 40   TFI, VG, ΔVM              (min-sec,.1fps)
                         *PROG ALM - TIG Slipped*
                         *V5N9E  01703          *
                         *KEY RLSE TO 21        *

                    FDAI SCALE - 5/5
                    LIMIT CYCLE - OFF
                    UPDATE DET

   58:00
 (-02:00)           ΔV THRUST A(B) - NORMAL
                    THC - ARMED
                    RHC (2) - ARMED
                    SPS He vlvs (2) - AUTO (verify)
                    TAPE RCDR - CMD RESET/HBR/FWD

   59:25
 (-00:35)      DSKY BLANKS

   59:30       (AVE G ON)
 (-00:30)           EMS MODE - NORMAL
```

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```
      06 40   TFI,VG,ΔVM                (min-sec,.1fps)
              CHECK PIPA BIAS <2fps for 5 sec

   59:XX      ULLAGE AS REQ
  (-00:XX)
                        *IF NO ULLAGE:       *
                        *DIR ULLAGE PB - PUSH*
                        *CONTROL ATT W/RHC   *

              MONITOR ΔVM (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 24
                       EXIT - V37E 00E

22  00:00      IGN       *IF SCS: THRUST PB - PUSH*

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

                        *F 97 40 SPS Thrust fail    *
                        *(RESTART) PRO to IGN       *
                        *(RECYCLE) ENTR to TIG-05sec*

                    SPS THRUST Lt - ON
   00:03            ΔV 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 - 175-195 psia
                     PUGS - BALANCED
```

```
                    *PROG ALARM          *
                    *V5N9E 01407 VG INC*
                    *THC - CW, FLY MTVC*
          ECO
                    *EMER SPS CUTOFF:      *
                    *  ΔV THRUST (2) - OFF*

23   F 16 40   TFC (STATIC), VG, ΔVM     (min-sec,.1fps)
                    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
                    MN BUS TIE (2) - OFF
          PRO

24   F 16 85   VG XYZ (CM)                        (.1fps)
                  NULL RESIDUALS (TEI & MCC)
                  RECORD ΔV COUNTER & RESIDUALS ΔVC _____
                     EMS FUNC - OFF             VGX _____
                     EMS MODE - STBY            VGY _____
                     LIMIT CYCLE - On
                     ATT DB - MAX
                     TRANS CONT PWR - OFF
                     ROT CONTR PWR DIRECT (2) - OFF
                     BMAG MODE (3) - RATE 2
                     cb SPS P1&P2 - open
                     TAPE RCDR - off (ctr)
                     PCM BIT RATE - LOW
          PRO

25   F 37      V82E

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

                    *R3-59B59HP >49.4 nm/35K ft*

          PRO
27   F 37      00E

28             When COMP ACTY lt not on continuously:
               V66E (If Lm S.V. not needed)
```

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EARTH ORBIT ENTRY

1 Verify CM/SM SEP ATT (SPS DEORB only)

R _____ (180°)
P _____
Y _____ (0°)

2 EMS INITIALIZATION

Scroll not on 37K:
*EMS FUNCT-TEST 5 *
Slew scroll to 37K

EMS FUNC - RNG SET (verify)
SET RNG TO PAD DATA RNG
EMS FUNC - Vo SET
Slew scroll to pad data VIO
Do not go thru TEST 3 or 5
EMS MODE - STBY (verify)
EMS FUNC - ENTRY

3 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

4 PWR REDUCT (SPS DEORB only)

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

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P61 - ENTRY PREP

5 V37E 61E
05 09 01427 - ROLL REVERSED
*05 09 01426 - IMU UNSAT *

6 F 06 61 IMPACT LAT, LONG, HDS UP/DN (+/-)
(.01°,.01°,
±00001)
PAD VALUES
LAT_____
LONG_____
HDS UP/DN_____
PRO

7 F 06 60 GMAX,V400K,GAMMA EI (.01G, fps,.01°)
Record
GMAX_____
V400K_____
GAMMA EI_____
PRO

8 F 16 63 RTOGO (.1nm) _____ PAD _____
VIO (fps) _____ PAD _____
TFE (min-sec)_____
NO COMM, SET RTOGO & VIO IN EMS &
INITIALIZE
(ACCEPT) PRO
(RECYCLE) V32E to 7

P62 - CM/SM SEP & PRE-ENTRY MNVR

For HYBRID DEORBIT, PRO to 10
9 F 50 25 00041 REQUEST CM/SM SEP
SC CONT - SCS/FREE
YAW - 45° out-of-plane (left for RCS,
right for SPS)
RATE - HIGH
ATT DB - MIN
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT1/RATE2
PRIM GLY to RAD - BYPASS (verify)
EMS MODE-STBY (verify)

```
                    SECS LOGIC (2) - on (up)
                    MSFN confirm GO for PYRO ARM
                    SECS PYRO ARM - ARM
                    MN BUS TIE (2) - ON (verify)

                    CM/SM SEP (2) - ON
                    If docking ring still on:
                      CSM/LM FNL SEP (2) - on(up)(verify)
                    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
                    SECS PYRO ARM - SAFE
                    Monitor VMA/B:
                      If <25vdc go to EMERG POWERDOWN
                                                Pg E/4-1
                    AUTO RCS SEL A/C ROLL (4) - OFF
                    AUTO RCS SEL CM 2(6) - OFF
                    AUTO RCS SEL CM 1(6) - MNA or MNB
                    YAW back to 0°
                    PITCH TO ENTRY ATT
                      ROLL 0° (LIFT UP)
                      PITCH - HORIZ on 29° MARK (400K)
                      YAW 0°
                    ATT DB - MAX
                    MAINTAIN HORIZ TRK
                    MAN ATT (3)-RATE CMD
                PRO (Act ENTRY DAP)

10                  EMS DATA - Verify
                    EMS FUNC - ENTRY (verify)
                    EMS MODE - NORMAL
     F 06 61    IMPACT LAT, LONG, HDS/DN
                                  (.01°,.01°,-00001)
                PRO

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

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P63 - ENTRY INIT

```
12      06 64   G,VI,RTOGO                (.01G,fps,.1nm)
                     FDAI SCALE - 50/15
                     ROT CONTR PWR DIR (2) - MNA/MNB
                     TAPE RCDR - HBR/FWD
                     HORIZ CK
                     Pitch error needle goes toward
                      zero approaching .05G time
                     If CMC is GO:
                       SC CONT - CMC/AUTO
                          *If DAP NO GO:  *
                          *  SC CONT - SCS*
                          *  FLY BETA     *
                          *If CMC NO GO:  *
                          *  SC CONT - SCS*
                          *  FLY EMS      *
                RCS Deorb:  Roll HDS UP
                TRACK HORIZ with 29° window mk
```

P64 - ENTRY POST .05G

```
13                   RTOGO AT .05G AGREES WITH EMS-verify
                     HORIZ CK
                     .05G Lt - on (EMS start)
   .05G time
   (+0__:__:__)          *No EMS start within 3 secs*
                         *EMS MODE - BACKUP/VHF RNG *
                     .05G sw - on (up)
                     EMS ROLL - on (up)
      06 74   BETA, VI, G              (.01°,fps,.01G)
                      NOTE: To monitor N68, Key V16 N68E
                     Compare RSI & FDAI
                     If CMC or PAD cmds Lift DN,
                       MNVR Lift DN
                     EMS GO/NO GO
                       G-V Plot within limits
                            Go To 17 (P67) or continue
```

P65 - ENTRY - UP CONT (VL>18K fps)

14 F 16 69 BETA (.01°) _____
DL (.01G) _____ PAD _____
VL (fps) _____ PAD _____
IF NO AGREEMENT:
*SC CONT - SCS *
*FLY EMS *
PRO

15 06 74 BETA, VI, G (.01°,fps,.01G)
(V<VL +500 fps & RDOT Neg) Go To 17

P66 - ENTRY - BALLISTIC (D<DL)

16 06 22 DESIRED GMBL ANGLES RPY (.01°)
Monitor horiz ±12° of 31.7° mark

P67 - ENTRY - FINAL PHASE (0.2G)

17 06 66 BETA,CRSRNG ERR,DNRNG ERR (.01°,.1nm,.1nm)
KEY VERB
Record DNRNG ERR _____
KEY RLSE
Limit: ±100nm from PAD DRE
Monitor lift vector on RSI & FDAI
CM RCS: change rings when He PRESS <1150 psia
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 FUNCT - OFF

Go To EARTHLANDING

EARTH/POST LANDING

		Start Watch
RRT (06:36)	STEAM PRESS - pegged at 90K	(0:00)
50K'(07:32)	CABIN PRESS REL vlv (2) - BOOST/ENTRY	(00:56)
	SECS PYRO ARM (2) - ARM	
	Check Altimeter	

40K'(07:46)

```
*        CM UNSTABLE              *(01:10)
*RCS CMD - OFF                    *
* 40K' APEX COVER JETT PB-PUSH    *
*DROGUE DEPLOY PB - PUSH (2 sec*
*after apex cover jett           *
```

30K'

```
ELS LOGIC - on (up)
ELS - AUTO
```

24K'(08:18) RCS disable (auto) (01:42)

```
*RCS CMD - OFF*

Apex cover jett (auto)
*APEX COVER JETT PB - PUSH*
(WAIT 2 SECS)
Drogue parachutes deployed (auto)
*DROGUE DEPLOY PB - PUSH*

If Both Drogues Fail:
*ELS - MAN              *
*Stabilize CM           *
*5K' MAIN DPLY PB - PUSH*
*ELS - AUTO             *
```

23.5K'

```
Cabin Pressure increasing (Drogues + 50s)
*If not increasing by 17K':     *
*CABIN PRESS REL vlv (RH) - DUMP*
```

10K'(09:07) Main parachutes deployed (02:31)

```
MAIN DEPLOY PB - PUSH (within 1 sec)
VHF ANT - RECY
VHF AM A - SIMPLEX
VHF BCN - ON
DIRECT O2 - ON (if suited)
```

CABIN PRESS REL vlv (2) - CLOSE
CM RCS LOGIC - on (up)
CM PRPLNT - DUMP (burn audible)
Monitor CM RCS 1&2 for He press decrease
*NO BURN or PRESS DECREASE *
* USE BOTH RHC's *
*DO NOT FIRE PITCH JETS *
CM PRPLNT-PURGE (to zero He press)
*CM RCS He DUMP PB - PUSH *
*RHC (2) - 30 secs *
* NO PITCH *
STRUT LOCKS (4) - UNLOCK
If night landing:
cb FLOAT BAG #3, FLT/PL (1 cb)-close
PL BCN LT - HIGH

cb FLT & PL BAT BUS A,B,&BAT C (3)-close
cb FLT & PL MNA & B (2) - open
cb RAD HTR OVLD (2) - open (verify)
cb SPS P&Y (4) - open (verify)
cb BAT RELAY BUS (2) - open

3K' CABIN PRESS REL vlv (RH) - DUMP (after purge completed)

ELS AUTO (verify)
ELS LOGIC - ON (verify)
FLOOD Lts - POST LDG
CM RCS PRPLNT (2) - OFF

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

POSTLANDING
STABILIZATION, VENTILATION, COMMUNICATIONS

1 Stabilization after landing
cb MAIN REL PYRO (2) - close
MAIN RELEASE - on (up)
SECS PYRO ARM (2) - SAFE
SECS LOGIC (2) - OFF
DIRECT O2 - OFF (verify)

No contact with recovery forces
*VHF AM A&B - off (ctr) *
*VHF AM RCV ONLY - A *
cb PL VENT - close
cb FLOAT BAG (3) - close
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
PL VENT vlv - UNLOCK (Pull)
Remove PL VENT Exh Cover
PL VENT - HIGH or LOW
PL DYE MARKER - ON (swimmer comm)
Release footstraps and restraints
cb MNA BAT BUS A & BAT C (2) - open
cb MNB BAT BUS B & BAT C (2) - open
cb FLT & PL BAT C - open
cb PYRO A SEQ A - open
cb PYRO B SEQ B - open
*EACH HR - CHECK DC VOLTS $\geq$ 27.5 V *
*If Not: *
* 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.

EGRESS PROCEDURES

CMP PL VENT - OFF
LMP cb Pnl 250 (all) - open

STABLE I
ALL Disconnect umbilicals
Neck dam on (if suited)
CMP Center couch - 270° position

CDR,LMP	Armrests stowed
CDR	Connect raft to S/C, if desired, with green lanyard
	Connect raft white lanyards to suits inflate water wings when exiting
CMP	GN2 RATCHET HNDL - CW
	GN2 VLV HNDL - UNLATCH & PUSH (Outbd)
	Side Hatch opened
	ACTR HNDL SEL - N
	Egress with liferaft
LMP	Put hardware kit out
LMP,CDR	Egress

or C. STABLE II

LMP	cb CREW STA AUDIO (3) - open
ALL	Disconnect umbilicals
	Couch seat pans (3) - 170° position
	Neck dam on (if suited)
CMP	Arm rests stowed
	Survival kits removed from stowage
CDR	Connect life raft mainline to CDR or S/C
CMP	Connect first raft white lanyard to suit
CDR	Connect third raft white lanyard to suit
CMP	PRESSURE EQUALIZATION vlv - OPEN
CMP,LMP	Remove and stow hatch
CMP	Exit feet first with rucksacks; when clear of S/C inflate water wings and raft
LMP	Exit feet first; when clear of S/C inflate water wings
CDR	Exit feet first; when clear of S/C inflate water wings

POST LANDING COMMUNICATIONS

VHF ANT-RECY (verify)
VHF BCN - ON (verify)
If no contact with recovery forces perform VHF BEACON Check
MONITOR VHF BEACON transmission with
VHF AM B Rcvr and/or Survival Transceiver
*VHF Beacon not operating *
connect Survival Transceiver to ant
cable conn P112 behind VHF ant access pnl 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)
COUCH LIGHTS - OFF
POSTLANDING VENT SYS: minimize use
SURV RADIO - plug into VHF BCN ANT cable conn P112 behind VHF ant access pnl & turn radio on in BCN mode

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ENTRY EMERGENCY PROCEDURES

CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

1. Verify electrical power for pressurization
   - cb EPS BAT BUS (2) - close (Pnl 229)
   - cb PYRO A/B SEQ A/B (2) - close (Pnl 250)
   - cb SECS ARM (2) - close (Pnl 8)
   - SECS PYRO ARM (2) - ARM
   - SECS LOGIC (2) - on (up)
2. Cycle CM RCS - PRESS (Pnl 2)
3. Verify electrical power to CM RCS prplnt vlvs
   - cb EPS GRP 1&3 - close (Pnl 229)
   - cb SM RCS HTR A&B - close (Pnl 8)
   - cb RCS PRPLNT ISOL (2) - close
4. Cycle CM RCS PRPLNT 1&2 - on (up) (Pnl 2)
5. Open He & PRPLNT Crossfeed
   - cb EPS GRP 5 - close (Pnl 229)
   - cb RCS LOGIC (2) - close (Pnl 8)
   - CM RCS LOGIC - on (up) (Pnl 1)
   - CM PRPLNT - DUMP (momentarily, then OFF)

EMERGENCY POWERDOWN

(MN BUS voltage <26.0 vdc, no short verified)

	Amps
S BD PWR AMP - off (ctr)	4.35
SEC COOL EVAP - RESET for 58 sec, then OFF	4.26
SEC COOL PUMP - OFF	
SUIT COMPR (2) - OFF	8.44
DIRECT O2 vlv - ON (if suited)	
TAPE RCDR FWD - off (ctr)	1.69
POT H2O HTR - OFF	1.62
LIGHTS - (min req'd)	
cb G&N OPT (2) - open	3.1
ECS GLY PUMPS (2) - OFF	2.76 per pump
SCE PWR - off (ctr)	0.70
TELECOM GRP 1&2 - OFF	1.8
cb INSTR ESS (2) - open	1.10

Note: After 0.05G, cb G&N (all 10) - open

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BUS LOST RECONFIGURATION

A. Loss of MN BUS A
- FC 2 - MNB only
- FC 1 (MNA&B) - off (ctr) (on line for deorbit burn)
- INV 3 - MNB, AC1
- cb MNA BAT BUS A - open
- cb MNA BAT C - open
- cb MNB BAT C - closed
- cb BAT C BAT BUS A - closed
- AUTO RCS SEL (desired thrusters) - MNB
- FDAI SEL - 2
- RHC PWR DIR (2) - MNB
- BMAG MODE (3) - RATE 2

B. Loss of MN BUS B
- FC 2 - MNA only
- FC 3 (MNA&B) - off (ctr)(on line for deorbit burn)
- INV 3 - MNA, AC2
- cb MNB BAT C - open
- cb MNB BAT BUS B - open
- cb BAT C BAT BUS B - closed
- cb MNA BAT C - closed
- AUTO RCS SEL (desired thrusters) - MNA
- FDAI SEL - 1
- RHC PWR DIR 1 - MNA
- SCS ELEC PWR - ECA
- BMAG MODE (3) - RATE 1

C. Loss of BAT BUS A
- Prepare for two battery entry
- AUTO RCS SEL (desired thrusters) - MNB
- After CM/SM SEP
  - RCS TRNFR - CM (mom)
- At APEX COVER JETT
  - cb SCS CONTR/AUTO (2) - open

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D. Loss of BAT BUS B
  Prepare for two battery entry
  AUTO RCS SEL (desired thrusters) - MNA
  After CM/SM SEP
    RCS TRNFR - CM (mom)
  At APEX COVER JETT
    cb SCS CONTR/AUTO (2) - open

E. Loss of AC BUS 1
  AC INV 1 MNA - OFF
  BMAG MODE (3) - RATE 2
  FDAI SEL - 2
  SUIT COMPR 2 - AC2
  S BD NORM XPNDR - SEC
  S BD NORM PWR AMP - SEC
  ECS GLY PUMP 2 - AC 2
  G/N PWR - AC2

F. Loss of AC BUS 2
  AC INV 2 MNB - OFF
  FC PUMP 2&3 - AC1
  FDAI SEL - 1
  BMAG MODE (3) - RATE 1
  G/N PWR - AC1
  S BD NORM XPNDR - PRI
  S BD NORM PWR AMP - PRI

EMERGENCY SAFE OF APEX COVER JETT

If MSFN NO GO For Pyro Arm Indicates Apex
  Cover Jettison,
  SECS LOGIC (2) - OFF
  cb ELS (2) - open
  SECS LOGIC (2) - ON
If MSFN GO, Go To Step A
If Still Apex Cover Jettison,
  cb SECS LOGIC A - open
If MSFN GO, Go To Step B
If Still Apex Cover Jettison,
  cb SECS LOGIC A - close
  cb SECS LOGIC B - open
If MSFN GO, Go To Step C

If Still Apex Cover Jettison,
ELS - MAN
ELS LOGIC - OFF
SECS LOGIC (2) - OFF
cb SECS LOGIC (2) - open
cb SECS ARM (2) - open
CMP To LEB
cb SEQ A&B PYRO A&B (2) - open (Pnl 250)
Verify PYRO BUS A&B voltage = 0
Use Tool E, (5/32 allen head) to remove closeout panel located beneath panels 276 & 277 (approx 10 fasteners on panel). Remove, or cut all wires to, connector marked "cut" with white tag (P545). Tape ends of any wires cut. Replace closeout panel.
cb SEQ A&B PYRO A&B - close
Verify PYRO BUS A&B voltage >35 vdc
cb ELS (2) - close
cb SECS LOGIC (2) - close
cb SECS ARM (2) - open (verify)
<u>DO NOT ARM PYRO BUSES</u>

Continue Normal Entry Except,

Perform CM RCS pressurization & CM/SM Separation together at which time ARM PYRO's in the following manner:
SECS PYRO ARM (B) - SAFE (verify)
SECS PYRO ARM (A) - ARM

To Jettison Apex Cover At 24K':
SECS PYRO ARM (B) - ARM

<u>STEP A</u>
cb ELS (2) - open (verify), close at or after apex cover jettison at 24K'
Continue normal entry

STEP B
cb SECS LOGIC A - open (verify),
close at or after apex cover jettison
at 24K'
Continue normal entry

STEP C
cb SECS LOGIC B - open (verify), close
at or after apex cover jettison
at 24K'
Continue normal entry

FIRE/SMOKE IN CM DURING ENTRY
WARNING: CM water must not be used
to extinguish fire

1 CABIN FAN (2) - OFF (verify)

2 Monitor EPS indicators for excessive current.
Immediately remove power from affected bus.

3 ROT CONTR PWR DIRECT (2) - MNA/MNB
& maintain attitude if required.

4 If affected bus is:
MNA
AC INV 1 AC BUS 1 - OFF
AC INV 2 AC BUS 1 - on (up)
Set up for CM/RCS sys 2
AUTO RCS SEL A/C ROLL (4) - OFF
AUTO RCS SEL CM 1(6) - OFF
AUTO RCS SEL CM 2(6) - MNB
RCS dump is fuel rich
MNB
AC INV 2 AC BUS 2 - OFF
AC INV 1 AC BUS 2 - on (up)
RCS dump is oxidizer rich

5 CAB PRESS REL vlv (RH) - DUMP

6 Continue ENTRY

TLI PREPARATION

GET = 1:50	Don Helmets & Gloves (CDR helmet visor)
	SUIT CKT RET vlv - CLOSE (push)
	XLUNAR - INJECT (verify)
CYI LOS	EDS PWR - on (up)
(TBD)	EMS FUNC - OFF (verify)
	EMS MODE - STBY
	EMS FUNC - ΔV SET/VHF RNG
	Set ΔV ind. to +1586.8 fps
	EMS MODE - NORMAL
	EMS FUNC - ΔV Test
	SPS THRUST lt - on/off (10 sec)
	ΔV ind stops at -0.1 to -41.5
	EMS MODE - STBY
	EMS FUNC - ΔV SET/VHF RNG
	Set ΔVC _____
	EMS FUNC - ΔV
TAN AOS (V)	GDC ALIGN
(TBD)	V48E, _____, _____
	Key V83E
	Set ORDEAL
	SECS PYRO ARM (2) - on (up)
SUNSET	TRANS CONTROL PWR - ON
(TBD)	ROT CONTR PWR NORMAL (2)-AC/DC (verify)
	ROT CONTR PWR DIRECT (2) - MNA/MNB
	LV IND/GPI - SII/SIVB (verify)
	LV GUID - IU (verify)
	cb DIRECT ULLAGE (2) - closed
	Set EVENT TIMER to 51:00
	Begin MONITOR For TB6

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TLI

TAN LOS	CMP to Couch
(TBD)	
(02:37:42)	
	TB 6 - SII SEP lt on (TIG-9 min, 38 sec)
	SII SEP lt out (38 sec later)
51:00	Start DET COUNTING UP
	SC CONT - SCS (verify)
	MONITOR LV TANK PRESS
CRO AOS	*ΔP > 36 psid (OXID > FUEL)*
(TBD)	*ΔP > 26 psid (FUEL > OXID)*
	*LOX TK PRESS >50 psia *
	EMERGENCY CSM/SIVB SEP pg5-1
	If FUEL <25, or OX <20,
	* Inhibit SIVB restart*
	UP TLM CM - BLOCK (verify)
	UP TLM IU - BLOCK (verify)
	ORDEAL - 300/LUNAR
	ORDEAL FDAI 1 - ORB RATE
	FDAI 2 - INERTIAL
57:00	Slew FDAI to PITCH = 14.0°
	V37E 47E (check bias) Record _____
	(Limit: 9.8 fps/min)
F 16 83	VX,Y,Z (.1fps)
58:00	N62E
F 16 62	VI,HDOT,HPAD (fps,fps,.1nm)
	MONITOR VI (_____) at ECO
	SCS TVC SERVO PWR #1 - AC1/MNA
	SCS TVC SERVO PWR #2 - OFF (verify)
	TAPE RCDR - FWD/RCD/HBR/CMD RESET
58:20	EMS MODE - NORMAL
58:36	SII SEP lt - on
	TLI Inhibit Signals will not
	* be honored after 59:42 *
CRO LOS	
(TBD)	
58:38	SIVB ULLAGE Begins
59:00	Slew FDAI to PITCH = 6.0°

59:42	SII SEP lt - out (TIG - 18 sec)
59:52	SIVB FUEL LEAD
59:55	SIVB ULLAGE discontinues
	Insure FDAI 1 PITCH = 2.0°
59:59	LV ENG 1 lt - on
	Start ORDEAL torquing
00:00	SIVB IGNITION (__:__:__GETI)
00:02	LV ENG 1 lt - out
	MONITOR THRUST & ATTITUDE ±45°/P,Y
	MONITOR LV TANK PRESS ±10°/sec P,Y
05:45	SIVB ECO (lt on) (BEGIN TB7)

```
*EMER SIVB CUTOFF AT 6 SEC       *
*  PAST BURN TIME IF VI ATTAINED*
*LV STAGE sw - SII/SIVB          *
*If still no ECO,                *
*  THC CCW & NEUTRAL in 1 sec    *
*If LV GUID - CMC,               *
*  LV STAGE sw-SII/SIVB on VI    *
```

MSFN AOS (TBD)	UP TLM IU - ACCEPT
	KEY VERB (freeze display)
	SIVB ATT HOLD 20 sec & BEGIN VENTING
	SIVB MNVR TO ORB RT (HDS DN) (.3°/sec)
	Record VI _____ & ΔVC _____
	HDOT_____
	HPAD_____ (Report)
	KEY RLSE
F 16 62	
	KEY RLSE
F 16 83	ΔVX,Y,Z (.1fps)
	SCS TVC SERVO PWR #1 - OFF
	PCM BIT RATE - LOW
	EMS MODE - STBY
	EMS FUNC - OFF
	SECS PYRO ARM (2) - SAFE
	FDAI #1 - INRTL
	PRO
F 37	
	00E

GDS AOS (__:___:__)	When CMC ACTY lt out, Key V66E (Trans CSM SV to LM storage) CMP to LH couch CDR to CTR couch WASTE STOWAGE VENT vlv - CLOSED HI GAIN ANT PWR - OFF (Verify) cb HI GAIN ANT FLT BUS - close cb HI GAIN ANT GRP 2 - close Time to begin MNVR to SEP ATT: _____ (15 min from SIVB ECO) T, D, & E,

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 TRANSCONTR - 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 TRANS CONTR - neutral then +X for 10 sec
SIVB/GPI 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) - OFF
SECS LOGIC (2) - OFF
cb SECS ARM (2) - open
cb EDS (3) - open

01:00 TRANS CONTR -X (8 to 10 sec)
V37E 00E
RATE - HIGH

MNVR TO RETRO ATT
R _____ (Block Data)
P _____ (Block Data)
Y _____ (Block Data)

RETRO UPDATE (NO COMM - use Block Data)

GETI	_____	0.05G	_____
ΔV	_____	GET DROGUE	_____
VC	_____	ENTRY R	_____
Δtb	_____	P	_____
GET 400K	_____	Y	_____

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

XX:XX
Set DET counting up to GETI
ALIGN HORIZ ON RET +1° MK
GDC ALIGN
EMS FUNC - ΔV SET/VHF RNG
SET ΔVc ABORT
EMS FUNCT - ΔV

TVC CHECK & PREP

cb STAB CONT SYS (Pnl 8) - close
cb SPS (12) - close
MAN ATT (3) - RATE CMD
LIMIT CYCLE - ON
ATT DB - MIN
RATE - LOW
TRANS CONT PWR - ON
SCS TVC (2) - RATE CMD
ΔVCG - LM/CSM or CSM
TVC GMBL DRIVE P&Y - AUTO
MN BUS TIE (2) - ON
(-06:00) 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

PRIMARY TVC CHECK

(-05:00) GMBL MOT P1-Y1 - START/ON (LMP Confirm)
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 Confirm)
SET GPI TRIM
Verify MTVC
THC NEUTRAL
Verify NO MTVC
Verify GPI returns to trim
ROT CONT PWR NORM (2) - AC/DC
ROT CONT PWR DIRECT (2) - MNA/MNB
FDAI SCALE - 5/5
LIMIT CYCLE - OFF
UPDATE DET

(-02:00) ΔV THRUST A(B) - NORMAL
V37E 47E
THC - ARMED
RHC (2) - ARMED
SPS He vlvs (2) - AUTO (verify)
TAPE RCDR - CMD RESET/HBR/FWD
(-00:30) EMS MODE - NORMAL

(-00:10) ULLAGE
00:00 THRUST ON PB - PUSH
SPS THRUST Lt - ON
00:03 ΔV THRUST B(A) - NORMAL
+X & THRUST ON PB - PUSH

MONITOR THRUSTING
Pc 95-105 psia
EMS COUNTING DOWN
SPS IN VLVS (4) - OPEN
SPS He vlvs tb-gray
SPS FUEL/OXID PRESS - 175-195 psia
PUGS - BALANCED

00:XX ECO

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   VG XYZ (CM)                          (.1fps)
                    RECORD                        ΔVC _____
                    EMS FUNC - OFF                VGX _____
                    EMS MODE - STBY               VGY _____
                    LIMIT CYCLE - On              VGZ _____
                    ATT DB - MAX
                    TRANS CONT PWR - OFF
                    ROT CONTR PWR DIRECT (2) - OFF
                    BMAG MODE (3) - RATE 2
                    cb SPS P1&P2 - open
                    TAPE RCDR - off (ctr)
                    PCM BIT RATE - LOW
              PRO
              F37 00E
                    V66E
              EMS ΔVc _________
              EMS MODE - STBY
              EMS FUNCT - OFF
```

Go to ENTRY PREP & SUPERCIRC ENTRY PROCEDURE

SEP 1 5 1969