CMP

APOLLO 8

ENTRY CHECKLIST

PART NO.	S/N
SKB32100024-301	1003

Visit changes
pg E-7, 9, 12
called up to crew
by MC at 109:15.
More changes by crew:
pg E-1, 7, 8, 9, 13

VEHICLE PREPARATION

1		INITIAL STOWAGE COMPLETED
2	~~-12:00h~~ (: :)	~~CABIN COLD SOAK pg S-16 (Supercrit Only)~~ Delete
3		CMC & ISS START UP pg G-14 (If req'd)
4		SCS POWER UP pg G-81 (If req'd)
5		P51 - IMU ORIENTATION pg G-55 (If req'd)
6		LOAD DAP (If req'd) V48E 11102, 01111, PRO, PRO, PRO
7	-05:00h	LAST MCC DECISION
8	-04:35h	NO COMM - P52 & NAV SIGHTINGS NOMINAL - P23/37 ONBOARD COMP
9	142:03:00 -04:	VHF - simplex A/B DON PGA'S & MAE WESTS
10	-03:30h	P27 (SV,REFSMMAT),VNVR & ENTRY PAD UPDATES

Basic Date ... Nov. 6, 1968
Changed ... Dec. 15, 1968

CSM 103

E-2(P)

P27 UPDATE

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

Nov 6, 1968
Dec. 4, 1968
Basic Date of Data Changed

Nov 6, 1968
Dec. 15, 1968
Basic Date of Data Changed

MANEUVER

E-3(P)

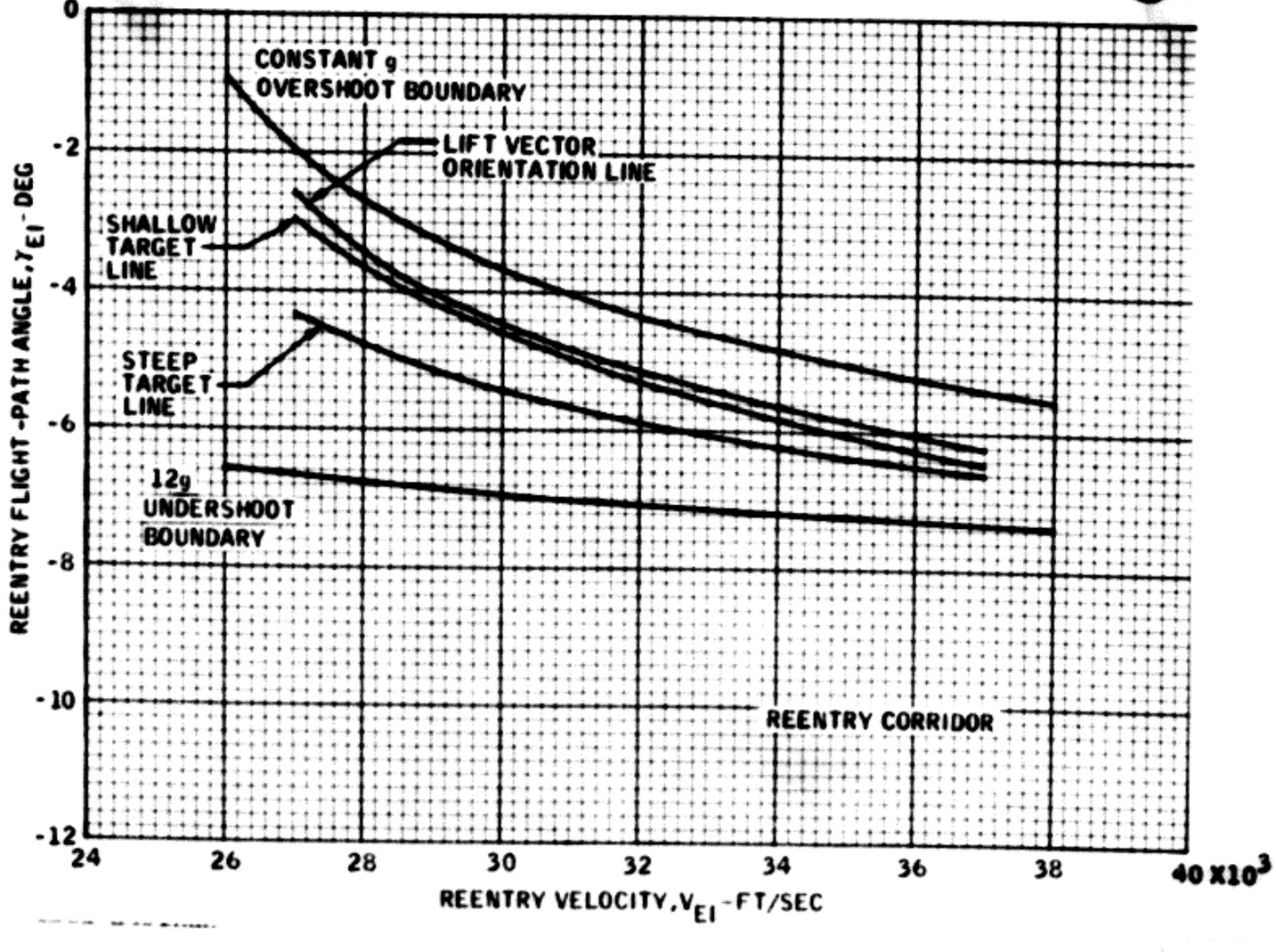
REMARKS		PURPOSE PROP/GUID
GDC ALIGN _____ SET	+	WT N47
R _____	0 0 .	P_{TRIM} N48
P _____	0 0 .	Y_{TRIM}
Y _____		
ULLAGE _____	+ 0 0	HRS GET I
HORIZ/WINDOW _____	+ 0 0 0	MIN N33
_____	+ 0 .	SEC
_____		
OTHER	.	ΔV_X N81
	.	ΔV_Y
	.	ΔV_Z
	X X X	R
	X X X	P
	X X X	Y
	+ .	H_A N44
	.	H_P
	+ .	ΔVT
	X X X .	BT
	X .	ΔVC
	X X X X	SXTS
	+ 0	SFT
	+ 0 0	TRN
	X X X	BSS
	X X	SPA
	X X X .	SXP
	0 .	LAT N61
	.	LONG
	+ .	RTGO EMS
	+	VIO
	: :	GET .05G

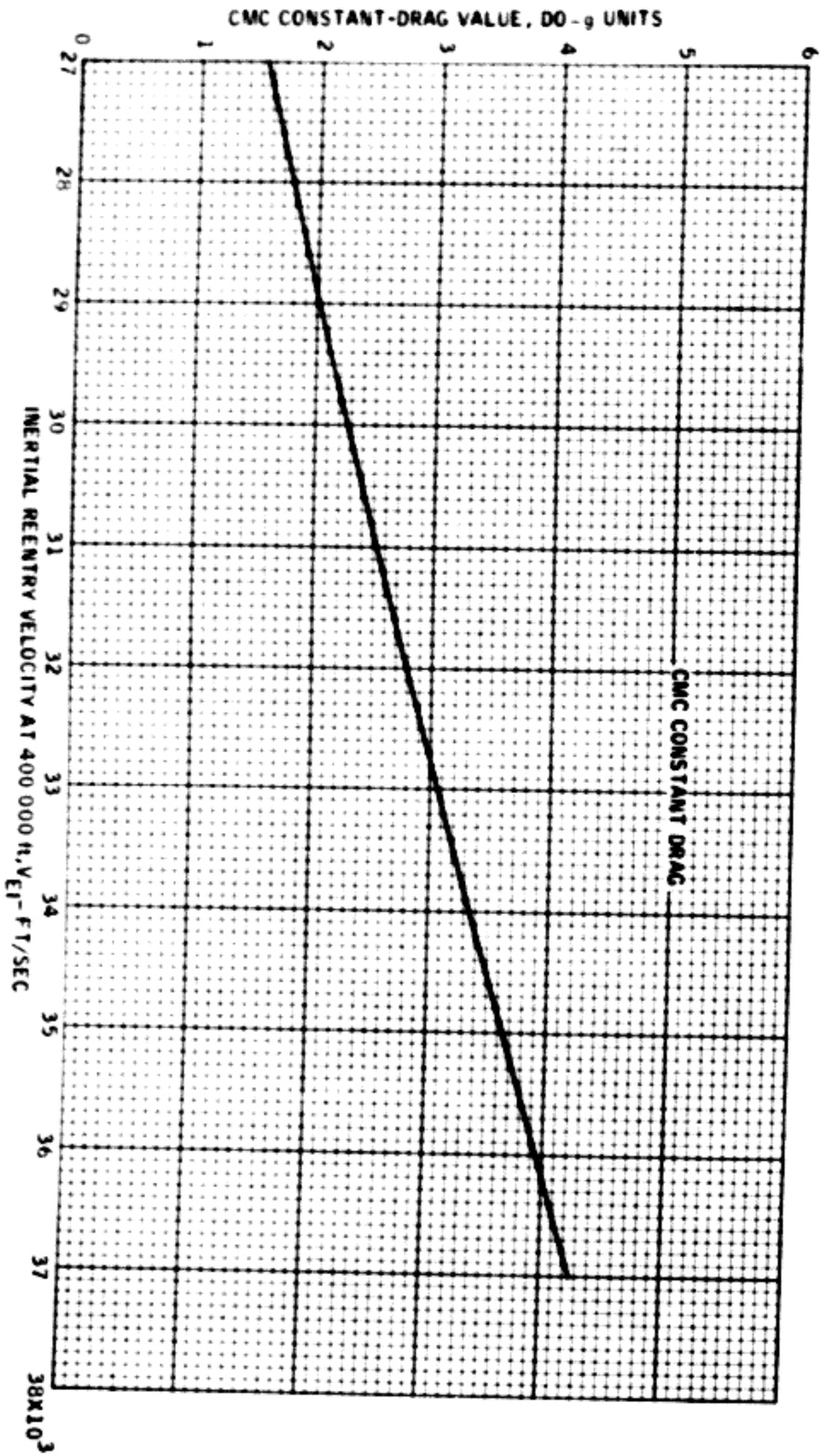
VEHICLE PREPARATION

E-4(P) *LUNAR* ENTRY

REMARKS

	AREA
X X X	R .05G
X X X	P .05G
X X X	Y .05G
: :	GET HOR
X X X	P CK
0 .	LAT N61
.	LONG
X X X .	MAX G
+	V_{400K} N60
- 0 0 .	T_{400K}
+ .	RTGO EMS
+	VIO
: :	RRT
X X :	RET .05G*
+ 0 0 .	D_L MAX* N69
+ 0 0 .	D_L MIN*
+	V_L MAX*
+	V_L MIN*
X X X	D_O
X X :	RET V_{CIRC}
X X :	RETBBO
X X :	RETEBO
X X :	RETDRO
X X X X	SXTS
+ . 0	SFT
+ . 0 0	TRN
X X X	BSS
X X ☐ .	SPA
X X X ☐ .	SXP
X X X X	LIFT VECTOR


CONSTANT g
OVERSHOOT BOUNDARY
LIFT VECTOR
ORIENTATION LINE
SHALLOW
TARGET
LINE
STEEP
TARGET
LINE
12g
UNDERSHOOT
BOUNDARY
REENTRY CORRIDOR
REENTRY FLIGHT-PATH ANGLE, γ_{EI} - DEG
REENTRY VELOCITY, V_{EI} - FT/SEC
0
-2
-4
-6
-8
-10
-12
24
26
28
30
32
34
36
38
40 X10^3



CHARTS

E-5 (P)

11	-03:15h (__:__:__)		P52 - IMU REALIGN pg G-56 (~~PREFERRED~~ ALIGNMENT)
12			P37 (NO COMM ONLY)
13			ECS CKS 02 SUPPLY REFILL pg S-12 ECS Monitor Ck pg S-5
14			EPS CKS #1 thru 4 (5 if req'd) pg S-3
15			SPS CK pg S-1 (If req'd)
16			RCS CKS SM RCS Monit Ck pg S-1 CM RCS Monit Ck pg S-1
17			C&W SYS CK pg S-17
18			CMC SELF CK pg G-70
19			DSKY COND LT TEST pg G-76
20	-02:45h		MIDCOURSE MANEUVER P30 - EXT ΔV
	-02:15h		P40/41 - SPS/RCS THRUSTING
	-02:00h		MIDCOURSE (#7) BURN
21			NO COMM NAV SIGHTINGS
22			MNVR TO ENTRY ATT (Supercirc only) V62E
23			V49E
24		F 06 22	DESIRED FINAL GMBL ANGLES (.01°) LOAD ENTRY ATT PAD ANGLES PRO

Basic Date Nov. 6, 1968
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25 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 27

26 06 18 AUTO MNVR TO FDAI RPY ANGLES (.01°)

27 F 50 18 REQUEST TRIM (.01°)
~~(AUTO~~(TRIM) ~~PRO to 26~~ Go To 25
(BYPASS) ENTR

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

29 V41 N91E

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

31 41 OPTICS DRIVE

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

32 -01:35h P52 - IMU REALIGN pg G-56
Record gyro torquing angles
R ______
P ______
Y ______
If >1°, recycle P52
If confirmed, use SCS for EMS entry

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

34 FINAL STOWAGE
OPTICS (except for Hybrid)
ORDEAL
SEC GLY TO RAD - BYPASS (verify)
Cool pnl installed
Y-Y struts (2) extended
Stow Data Box R-12
PNL 382 [illegible]

35 -01:20h CM RCS PREHEAT
RCS LOGIC cb (both) - CLOSE
CM RCS LOGIC - ON
Note: If sys test mtr 5c,d, 6a,b,c,d all read 3.9 vdc (28°F) or more, omit preheat
RCS CM HTRS cb(2) - close
UP TLM - BLOCK (verify)
CM RCS HTRS - ON (LMP Confirm)
(20 min or til lowest rdg is 3.9 vdc) (Monitor Fuel & Ox press for press drop)

WASTE H2O DUMP - OFF
UR DUMP HT - OFF
LEB LIGHTING - OFF

36 -01:00h **EMS CHECK**

- EMS FUNC - OFF
- EMS cb (both) - Close
- EMS MODE - STBY
- EMS FUNC - EMS TEST 1 (wait 5 sec)
- EMS MODE - AUTO (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 98 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

37 **ΔV TEST (Deorbit only)**

- EMS FUNC - ΔV SET
- SET ΔV ind to 1986.8 fps
- EMS MODE - AUTO
- EMS FUNC - ΔV TEST
  - SPS THRUST LT - on/off
  - ΔV ind stops at -20.8±20.7 (10 sec)
- EMS MODE - STBY

Basic Date: Jan. 6, 1968
Changed: Dec. 4, 1968

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38 (__:__:__) **FINAL GDC DRIFT CK (If req'd)**

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

39 -01:00h **TERM. CM RCS PREHEAT**

- UP TLM - BLOCK (verify)
- CM RCS HTRS - OFF (LMP Confirm)
- CM RCS LOGIC - OFF
- SYS TEST METER - 4A

PYRO CIRCUIT CK

- RCS LOGIC cb (both) - close (verify)
- MN BUS TIES (both) - AUTO
- RCS TRANS - CM
- PYRO A&B SEQ A&B (both) - open (verify)
- SECS ARM cb (both) - close
- SECS PYRO ARM (both) - SAFE
- PYRO A&B SEQ A&B (both) - close
- DC IND - PYRO A(B)
  - * If PYRO BAT A(B)<35 vdc
  - * PYRO A(B) SEQ A(B) cb - open
  - * PYRO A(B) BAT BUS A(B) To PYRO
  - * BUS TIE cb - close
- MNA BAT C cb - close
- MNB BAT C cb - close
- DC IND - MNB
- PNL 8 - All cb's closed except:
  - PL VENT - open
  - FLOAT BAG (3) - open
  - SPS GUAGING cb (both) - open
  - DOCKING PROBE cb (both) - open
  - DIRECT ULLAGE cb (both) - open
  - EDS PWR cb (2) - open

41 **SEQ TEST (MSFN Monit)**

- SECS LOGIC cb (both) - close (verify)
- SECS LOGIC (both) - on (up)
- ELS - AUTO
- ELS LOGIC - on (up)
- MSFN confirm GO for PYRO ARM
- ELS - MAN
- ELS LOGIC - OFF

Basic Date: Jan. 6, 1968
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41A CM RCS ACTIVATION (Supercirc only)

- SECS PYRO ARM (both) - ARM
- CM RCS PRPLNT 1&2 - ON, tb-gray
- CM RCS PRESS - ON
- SECS PYRO ARM (both) - SAFE
- RCS Ind sw - CM1, then 2
  - He PRESS 3300-3750 psia
  - FUEL & OX PRESS 285-302 psia
- SECS LOGIC (both) - OFF
- SECS ARM cb (both) - open

41B CM RCS CK (Supercirc only)

- SC CONT - SCS
- Test Thrusters
- SC CONT - CMC
- RCS TRANS - SM
- CM RCS LOGIC - on (up)

41C (Norm & Hybrid Deorb only)

- SECS LOGIC(both) - OFF
- SECS ARM cb(both) - open
- RCS TRANS - SM

42-00:45m P27 & ENTRY PAD UPDATE

Go to Entry Checklist

- Supercirc - Pg. E-10
- Hybrid - Pg. E-16
- Normal Deorbit - Pg. E-23

Basic Date Nov. 6, 1968
Changed Dec. 17, 1968

Basic Date 11/8/68
Changed 12/17/68

CSM 103

P27 UPDATE

PURP	V	V	V
GET	: :	: :	: :
304 01	INDEX	INDEX	INDEX
02			
03			
04			
05			
06			
07			
10			
11			
12			
13			
14			
15			
16			
17			
20			
21			
22			
23			
24			

N34	HRS	X X X	X X X
	MIN	X X X X	X X X X
NAV CHECK	SEC	X X .	X X .
N43	LAT	0 .	0 .
	LONG	.	.
	ALT	+ 0 .	+ 0 .

CHARTS

SUPERCIRCULAR ENTRY

HYBRID DEORBIT

EARTH ORBIT ENTRY UPDATE		
X -	X -	AREA
X X - .	X X - .	Δ V TO
X X X X X X X X X	X X X X X X X X X	R .05G P .05G Y .05G
+ +	+ +	RTGO EMS VIO
X X :	X X :	RET .05G
□ O . □ :	□ O . □ :	LAT N61 LONG
X X : □ .	X X : □ .	RET 0.2G DRE (55°) N66
R R / X X :	R R / X X :	BANK AN RET RB
X X : X X : X X :	X X : X X : X X :	RETBBO RETEBO RETDROG
X X X X X □	X X X X X □	(90°/fps) CHART DRE (90°) UPDATE
POST BURN		
X X X	X X X	R .05G
+ +	+ +	RTGO EMS VIO
X X :	X X :	RET .05G
X X : □ .	X X : □ .	RET 0.2G DRE ±100nm N66
R R / X X :	R R / X X :	BANK AN RETRB
X X : X X : X X :	X X : X X : X X :	RETBBO RETEBO RETDROG ±55sec to main

NOV 26, 1968

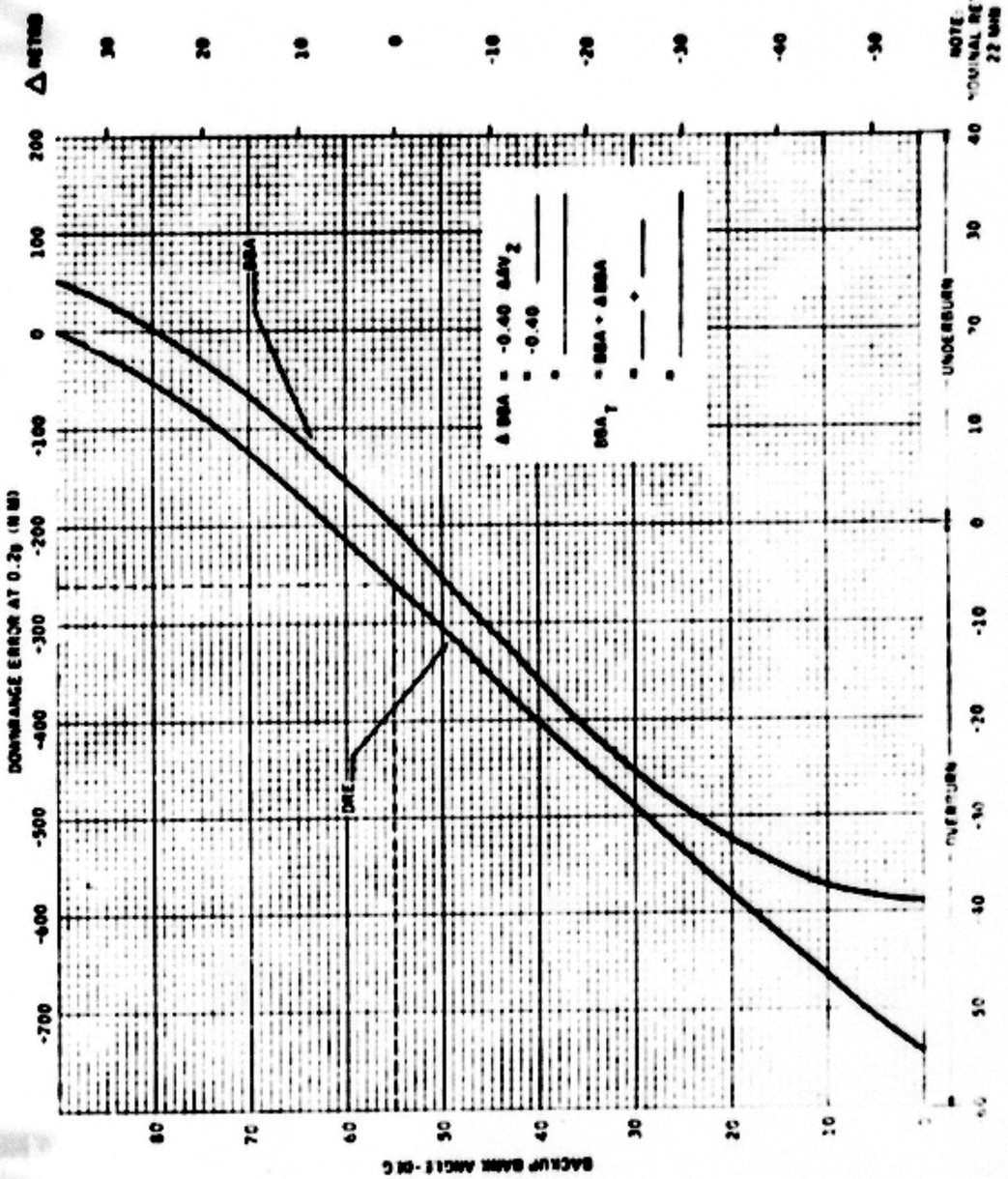
CHARTS

EARTH ORBIT ENTRY UPDATE		
X -	X -	AREA
X X - .	X X - .	Δ V TO
X X X X X X X X X	X X X X X X X X X	R .05G P .05G Y .05G
+ +	+ +	RTGO EMS VIO
X X :	X X :	RET .05G
□ O . □ :	□ O . □ :	LAT N61 LONG
X X : □ .	X X : □ .	RET 0.2G DRE (55°) N66
R R / X X :	R R / X X :	BANK AN RET RB
X X : X X : X X :	X X : X X : X X :	RETBBO RETEBO RETDROG
X X X X X □	X X X X X □	(90°/fps) CHART DRE (90°) UPDATE
POST BURN		
X X X	X X X	R .05G
+ +	+ +	RTGO EMS VIO
X X :	X X :	RET .05G
X X : □ .	X X : □ .	RET 0.2G DRE ±100nm N66
R R / X X :	R R / X X :	BANK AN RETRB
X X : X X : X X :	X X : X X : X X :	RETBBO RETEBO RETDROG +53sec to main

NOV 26, 1968

CHARTS

E-9C(P) ENTRY



Basic Date

Changed

ENTRY

REMARKS

	AREA
X X X	R 05G
X X X	P 05G
X X X	Y 05G
: :	GET HOR
X X X	P CK
☐ O ·	LAT N61
☐ ·	LONG
X X X ·	MAX G
±	V_{400K} N60
- O O ·	T_{400K}
± ·	RTGO EMS
±	VIO
: :	RRT
X X :	RET 05G*
± O O ·	D_L MAX* N69
± O O ·	D_L MIN*
±	V_L MAX*
±	V_L MIN*
X X X	D_0
X X ⋮	RET V_{CIRC}
X X :	RETBBO
X X :	RETEBO
X X :	RETDRO
X X X X	SXTS
± O	SFT
± · O O	TRN
X X X	BSS
X X ☐ ·	SPA
X X X ☐ ·	SXP
X X X X	LIFT VECTOR

SUPERCIRCULAR ENTRY

SUPERCIRCULAR ENTRY

1 SET DET (up, to EI)

2 EMS INITIALIZATION
- SET RNG TO PAD DATA RNG
- EMS FUNC - Vo SET
- Slew Scroll to Pad Data VIO
- 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
- R,P,Y THUMBWHEELS (3)-RESET (GDC) TO PRESENT GMBL ANGLES
- GDC ALIGN PB - PUSH

4

Basic Date Nov. 6, 1968
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5 DON HELMETS & GLOVES
- SUIT RTN AIR VLV - CLOSE (push)(Suited) open unsuited
- EMER CAB PRESS vlv - OFF (Suited) Y
- CMP to COUCH
- optics PWR - OFF

30:00m (-30:00) MN BUS TIE (both) - ON
TAPE RCDR - REWIND onboard

6 35:00m (-25:00) SEPARATION CK LIST
- GMBL MTRS(4) - START
- PRIM GLY TO RAD - BYPASS (PULL)
- 02 PLSS VLV - ON (FILL if unsuited)
- 02 SM SUPPLY VLV - OFF
- CAB PRESS REL VLV (both)-BOOST/ENTRY NORM if unsuited
- ELS cb (both) - CLOSE(verify)
- ABORT SYS PRPLNT - RCS CMD (verify)
- SM RCS PRIM & SEC PRPLNT A(BCD)-ON tb-gray
- VHF AM (both) - OFF
- VHF ANT - RECY
- HI GAIN ANT PWR - OFF
- FC Pumps (3) - OFF
- Verify single suit compr oper, loads balanced
- FC 2 MN A&B - OFF tb-bp
- S-BD PWR AMP - LOW
- ECS RAD CONT/HTR cb(both) - open
- STM/UR DUCT HTR cb (both) - open
- HTRS OVLD cb (both) - open
- POT H2O HTR - OFF
- SEC COOL LOOP EVAP - RESET (5 sec)
- PUMP - OFF
- CAB FAN (both) - OFF
- GLY EVAP TEMP IN - MAN

MNVR TO CM/SM SEP P, R ATT
- SC CONT - SCS
- CMC MODE - FREE
- MNVR TO PAD ATT

Basic Date Nov. 6, 1968
Changed Dec. 15, 1968

CSM 103

MNVR TO PAD ATT
R_____(0°)
P_____~~(120°)~~ ~265°
Y_____(0°)

7A 40:00m (-20:00)
SECS ARM cb (both) - close
SECS LOGIC (both) - on(up)
MSFN Confirm GO for PYRO ARM
SECS PYRO (both) - ARM

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

8 V37E 61E

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

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

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

11 F 06 63 RTOGO (.1nm)_____PAD_____
VIO (fps) _____PAD_____
TFE(min-sec)_____
Compare with MSFN for PGNS GO/NO GO
If NO COMM, set RTOGO & VIO in EMS & initialize
(ACCEPT) PRO
(RECALC) V32E to 11

P62 - CM/SM SEP & PRE-ENTRY MNVR

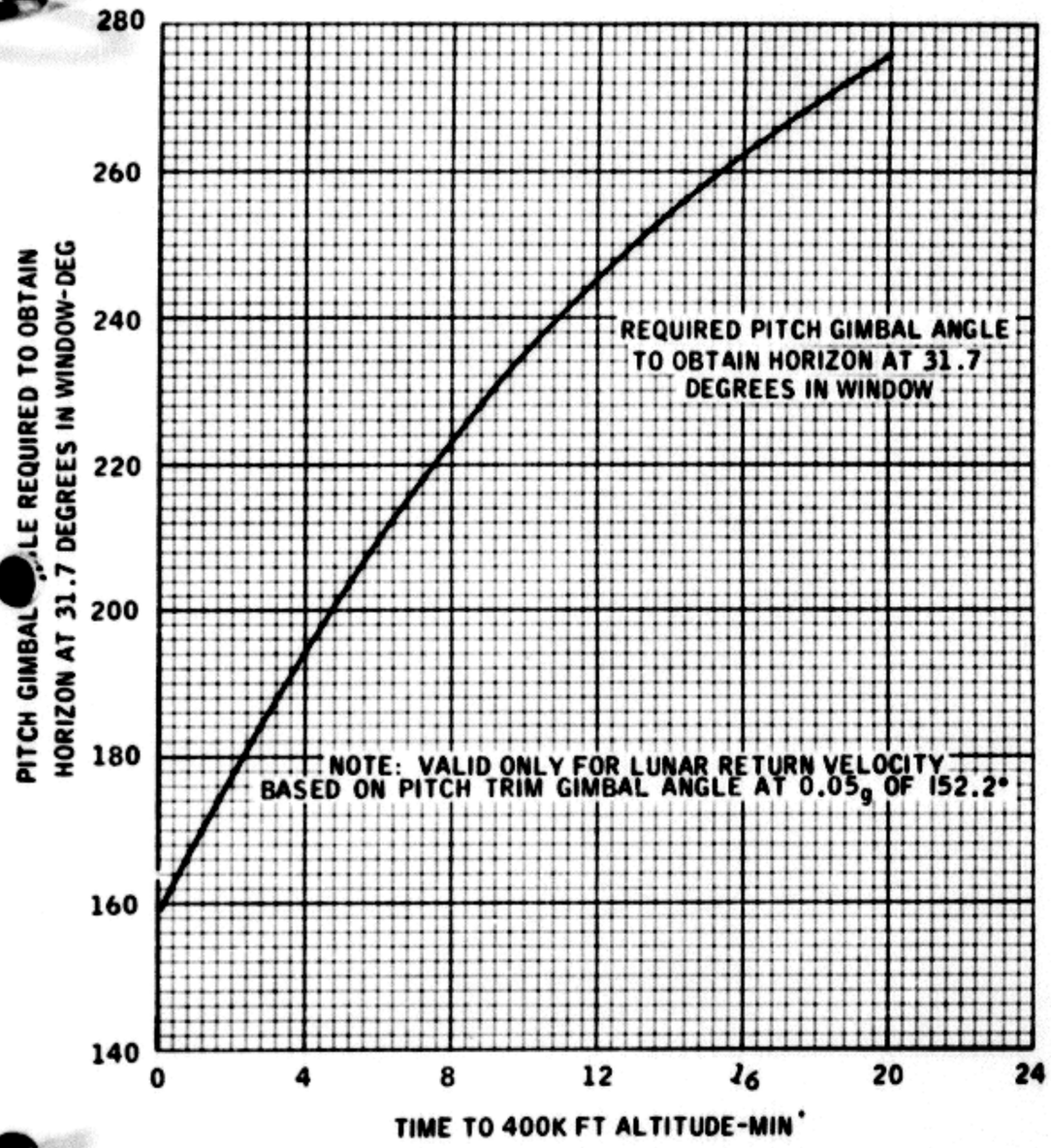
12 F 50 25 00041 REQUEST CM/SM SEP
SC CONT - SCS
CMC MODE - FREE

SUPERCIRCULAR ENTRY

Basic Date Nov 6, 1968
Changed Dec 15, 1968

CHARTS

HYBRID DEORBIT



160
120
80
40
0
-40
-80
-120
-160
±180
4
8
12
16
20
24
HOLD .05g TRIM
LU/HD
LU/HD
HOLD PRESENT TRIM
LU/HD
LU/HD
TOP OF WINDOW
31.7° SCRIBE
BOTTOM OF WINDOW
LD/HU
HOLD PRESENT TRIM
LD/HU
HOLD .05g TRIM
LD/HU
LD/HU
FIELD OF VISION
LD/HU LIFT-DOWN/HEADS-UP
LU/HD LIFT-UP/HEADS-DOWN
P63 LIMIT
NOTE: VALID ONLY FOR
LUNAR RETURN VELOCITY
ANGULAR DISPLACEMENT, ϕ, UF LOS TO HORIZON FROM X-BODY AXIS - DEG
TIME TO 400K FT ALTITUDE-MIN

General comment - Don't call extended verbs during PDI

43:00m (-17:00)		COMPARE PITCH ATT WITH PAD DATA (within 5°)
		YAW - 45° OUT-OF-PLANE(LEFT)
		RATE - HIGH
		ATT DB - MIN
		MAN ATT (3) - RATE CMD
		BMAG MODE (3) - ATT1/RATE2
		MN BUS TIES (both) - ON (verify)
		PRIM GLY TO RAD - BYPASS (verify)
		CM RCS LOGIC - ON (Verify)
45:00m (-15:00)		CM/SM SEP (both) - ON
		C&W MODE - CM
		RCS TRNFR - CM
		CM RCS FUEL & OX PRESS - 285-302 psia
		CM RCS LOGIC - OFF
		Monitor Vm A/B:
		If <25vdc go to EMERG
		POWERDOWN Pg EMG-3
50:00m (-10:00)		When Vm A/B>25VDC:
		SEC COOL LOOP PUMP - AC 1(2)
		EVAP - EVAP
		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 HORIZ TRACK ATT
		ROLL - 0° (LIFT UP)
		PITCH - 400K Horiz Mark (31.7°)
		YAW - 0°
		DEADBAND - MAX
		EMS DATA - Verify
		EMS FUNC - ENTRY (verify)
		EMS MODE - AUTO
		MAINTAIN HORIZ TRK
		SPS P&Y cb (4) - open
	PRO	(Act ENTRY DAP)
13 F 06 61		IMPACT LAT,LONG,HDS DN (.01°,.01°,-00001)
	PRO	
14 POSS 06 22		FINAL ATT DISP, RPY (.01°)
		(Only if X-axis beyond 45° of Vel vector)

Basic Date Nov. 6. 1968
Changed Dec. 15, 1968

SUPERCIRCULAR ENTRY

P63- ENTRY INIT

15 06 64 G, VI,RTOGO (.01G,fps,.1nm)

FDAI SCALE - 50/15
ROT CONTR PWR DIR (both) - MNA/MNB
TAPE RCDR - RCD/FWD
58:00m HORIZ CK ← CMD RESET/HORZ
(-02:00) Pitch error needle goes toward zero approaching .05G time
MAN ATT (3)- RATE CMD
If CMC is GO:
BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - AUTO

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

P64 - ENTRY POST .05G

16 RTOGO AT .05G AGREES WITH EMS-verify
.05G time .05G Lt - ON (EMS START)
(+0__:__)
(__:__:__)

* No EMS START within 3 sec: *
* EMS MODE - MAN *

.05G sw - on (up)
EMS ROLL - on (up)
06 68 BETA, VI, HDOT (.01°,fps,fps)
Compare RSI & FDAI
If CMC or PAD cmds Lift DN,
MNVR Lift DN
EMS GO/NO GO
G-V Plot within limits
Rng ctr dwn 60±7 during 10 sec period
Monitor G-meter for convergence with pad data (Do)
(V<27K fps) Go 20

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CHARTS

P65 - ENTRY - UP CONT (V>27K fps)

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

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

PRO

18 06 68 BETA,VI,HDOT (.01°,fps,fps)
(V<VL+500 fps & RDOT Neg) Go to 20

P66 - ENTRY - BALLISTIC (D<DL)

19 06 22 DESIRED CMBL ANGLES RPY (.01°)
Monitor horiz ±12° of 31.7° mark

P67 - ENTRY - FINAL PHASE (0.2G)

20 06 66 BETA,CRSRNG ERR,DNRNG ERR
(.01°,.1nm,.1nm)

KEY VERB
Record DNRNG ERR _____
KEY RLSE

Monitor lift vector on RSI & FDAI
F 16 67 RTOGO,LAT,LONG (Vrel=1000 fps)
(.1nm,.01°,.01°)
RTOGO NEG - LIFT UP
RTOGO POS - LIFT DOWN
Monitor altimeter

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HYBRID DEORBIT

G&N 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 GETI

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

SEPARATION CK LIST

7 PRIM GLY TO RAD - BYPASS (pull)
02 PLSS vlv - ON(FILL if unsuited)
02 SM SUPPLY vlv - OFF
CAB PRESS REL vlv (both) - BOOST/ENTRY
NORM if unsuited
ELS cb (both) - close

AUTO RCS SEL CM (12) - MNA or MNB
ROT CONTR PWR NORM 1&2 - AC/DC
ABORT SYS PRPLNT - RCS CMD
SM RCS PRIM PRPLNT (4) - ON,tb-gray
VHF AM (both) - OFF
VHF ANT - RECY

8 DON HELMETS & GLOVES
SUIT RTN AIR vlv - CLOSE(push)(suited)
EMER CAB PRESS vlv - OFF(suited)
CMP to Couch

9 MNVR TO PAD BURN ATT
LOAD DAP
BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - AUTO
DEADBAND - MIN
MAN ATT (3) - RATE CMD

10 V62E

11 V49E

12 F 06 22 DESIRED FINAL GMBAL 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 (TRIM) Go to 13 (BYPASS) ENTR	(.01°)
16			BORESIGHT & SXT STAR CHECK OPT MODE - CMC OPT ZERO - OFF	
17			V41 N91E	
18	F	21 92	SHAFT, TRUN Load SXTS angles	(.01°,.001°)
19		41	OPTICS DRIVE Check SXT STAR OPT ZERO - ZERO Check BORESIGHT STAR (If avail)	
20			V25 N17E Load Pad Data GMBL Angles for CM BURN ATT ATT SET TW - SET To PAD DATA GMBL ANGLES For CM BURN ATT	(.01°)
20A			AC PWR REDUCTION HGA PWR - OFF FC PUMPS (3) - OFF Verify single suit compr oper, loads balanced FC 2 MN A&B - OFF S-BD PWR AMP - LOW ECS RAD CONT/HTR cb(both) - open STM/UR DUCT HTR cb (both) - open HTRS OVLD cb (both) - open POT H2O HTR - OFF SEC COOL LOOP EVAP - RESET (58 sec) PUMP - OFF CAB FAN (both) - OFF GLY EVAP TEMP IN - MAN MN BUS TIE (both) - ON GMBL MTR (4) - START	

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			P41 - RCS THRUSTING	
21			V37E 41E	
22	F	50 18	REQ MNVR TO LCL HORIZ (HDS DN) (AUTO) BMAGS (3)-RATE 2 SC CONT - CMC CMC MODE - AUTO PRO to 23 (MAN/DAP) BMAGS (3)-RATE 2 SC CONT - CMC CMC MODE - HOLD V62E MNVR to 24	(.01°)
23		06 18	AUTO MNVR TO FDAI RPY	(.01°)
24	F	50 18	REQ TRIM TO LCL HORIZ ALIGN SC ROLL (AUTO TRIM) PRO to 23 (BYPASS) DEADBAND - MIN RATE - LOW MAN ATT (3) - RATE CMD BMAG MODE (3) - ATT1/RATE 2 ENTR	(.01°)
		55:00m		
25		06 85	VGX,Y,Z Recheck BORESIGHT STAR TRANS CONTR PWR - ON (up) EMS MODE - STBY (verify) EMS FUNC - ΔV SET SET ΔV for SM BURN _____ EMS FUNC - ΔV S-Bd ANT - OMNI C	(.1fps)
26		59:25	RHC's and THC - ARMED DSKY CLEARS	

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EARTH ORBIT ENTRY

```
     59:30
27   16 85  VG,X,Y,Z (AVE G ON)                          (.1fps)
            LIMIT CYCLE - OFF
            TAPE RCDR-CMD RSET/HBR/RCD/FWD
            FLT RCDR-RECORD
            EMS MODE-AUTO

     00:00
26 F 16 85  REQ NULL VGX, Y, Z                           (.1fps)
            BURN EMS ΔV CTR To ZERO
            If SM Only Burn - Go To Step 31
            THC - LOCKED
            SC CONT - SCS
            CMC MODE - FREE
            RATE - HIGH
            GLY To RAD - BYPASS (verify)
            SECS ARM cb(both) - close
            SECS LOGIC(both) - on (up)
            MSFN CONFIRM GO FOR PYRO ARM
            SECS PYRO ARM(both) - ARM
            CM RCS PRPLNT 1&2 - ON, tb-gray
            CM RCS PRESS - ON
            RCS Ind Sw - CM 1, then 2
               He PRESS 3300-3750 psia
               FUEL & OX PRESS 285-302 psia
            CM RCS LOGIC - on(up)
            MN BUS TIES(both) - ON (verify)
            CM/SM SEP(both) - on (up)
            C&W MODE - CM
            RCS TRANS - CM
            CM RCS LOGIC - OFF
            Monitor VM A/B:
               If <25 vdc,go to EMERG
               POWERDOWN Pg EMG-3
            When Vm A/B >25 vdc:
               SEC COOL LOOP PUMP - AC1(2)
                           EVAP - EVAP
            V63E                                          *
               * If CMC NO GO:                            *
               *   FDAI SOURCE - ATT SET*
               *   FDAI SELECT- 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 _____~285°
               Y _____0°
```

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```
            CM RCS BURN
29          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*

30          BURN COMPLETION AT:
            ΔV CTR= _____ or DET= _____

            V82E
31   F 16 44  HA,HP,TFF                          (.1nm,min-sec)
            Check HP:
              If > Pad data, continue burn
                until < Pad
            PRO

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

     F 37   00E

EI-15:00    V37E 47E
     F 16 83  ΔVX,Y,Z                                    (.1fps)
            SC CONT - SCS
            CMC MODE - FREE
            MAN ATT (PITCH) - RATE CMD
            RATE - HIGH
            GLY to RAD - BYPASS (verify)
            MN BUS TIE (both) - ON (verify)
            CM/SM SEP (both) - ON
            C&W MODE - CM
            RCS TRNFR - CM
            CM RCS LOGIC - OFF
            PRO
            Monitor Vm A/B:
              If <25vdc go to EMERG
              POWERDOWN Pg EMG-3
            When Vm A/B>25vdc:
              SEC COOL LOOP PUMP - AC 1(2)
                           EVAP - EVAP
```

Do steps bracketed on E-20

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33 F 37 OOE
FLT RCDR - OFF
TAPE RCDR - OFF
DEADBAND - MAX
EMS MODE - STBY
EMS FUNC - OFF

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CM 103

NORMAL 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 GETI

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 OOE

7 SEPARATION CK LIST
PRIM GLY TO RAD - BYPASS (pull)
02 PLSS v1v - ON (Fill if unsuited)
02 SM SUPPLY v1v - OFF
CAB PRESS REL v1v (both)-BOOST/ENTRY
NORM if unsuited
ELS cb(both) - close

AUTO RCS SEL CM(12) - MNA or MNB
ROT CONTR PWR NORM 1&2 - AC/DC
ABORT SYS PRPLNT - RCS CMD
SM RCS PRIM PRPLNT (4) - ON, tb-gray
VHF AM (both) - OFF
VHF ANT - RECY

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CM 103

8 **DON HELMETS & GLOVES**

SUIT RTN AIR vlv - CLOSE (push) (suited)
EMER CAB PRESS vlv - OFF (suited)
CMP to Couch

9 **SPS THRUSTING PREP**

MNESS BUS - MNB

CYCLE CYRO FANS

BMAG MODE (3) - RATE 2
ΔV CG - CSM
CMC MODE - FREE
AUTO RCS SEL (16) - As req'd for ullage

SC CONT - CMC
CMC MODE - AUTO
~~[illegible] cb (both) - open~~

10 **MNVR TO PAD BURN ATT**
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
MNVR to 15

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

15 F 50 18 REQ TRIM TO FDAI RPY ANGLES (.01°)
~~(AUTO)~~(TRIM) ~~PRO to 16~~ Go To 13
(BYPASS) ENTR
Boresight & SXT star ck (if avail)

16 V37E 40E
OPT PWR - OFF

Changed ______

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16 V 37E 40E (P40)

17 F 50 18 REQUEST MNVR TO FDAI RPY ANGLES (.01°)
(AUTO) BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - AUTO
PRO to 18
(MAN/DAP) BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - HOLD
MNVR to 19
(MAN/SCS) SC CONT - SCS
MNVR to 19

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

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

TVC CHECK & PREP

STAB CONT SYS cb (Pnl 8) - close
SPS cb (12) - close
DEADBAND - MIN
RATE - LOW
LIMIT CYCLE - ON
MAN ATT (3) - RATE CMD
BMAG MODE (3) - ATT1/RATE 2
ROT CONTR PWR DIRECT (both) - OFF
SCS TVC (2) - RATE CMD
If SCS, SCS TVC (2) - AUTO
* SC CONT - SCS *
TVC GMBL DRIVE P&Y - AUTO
MN BUS TIES (both) - ON
+54:00m (-06:00) TVC SERVO PWR 1 - AC1/MNA
2 - AC2/MNB
TRANS CONTR PWR - ON
ROT CONTR PWR NORMAL 2 - AC
RHC #2 - ARMED
TIG-6 min Horiz Ck. - Horiz on [illegible]° window mk (limit ±8°) ([illegible])
If No Go:
Set TVC 180, 180, 0
Track horiz with 28° window mk
At TIG-2min - ALIGN GDC

55:00m (-05:00)

PRIMARY TVC CHECK

GMBL MOT P1-Y1-START/ON(LMP confirm)
If SCS, verify Thumbwheel Trim
THC - CW
Verify NO MTVC

SEC TVC CHECK

GMBL MOT P2-Y2-START/ON (LMP confirm)
SET GPI TRIM
Verify MTVC
THC NEUTRAL
GPI returns to 0,0(CMC) or trim (SCS)
ROT CONT PWR NORM 2 - AC/DC
(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:
00,20,-20,00,02,0-2,00,Trim
*TEST FAIL: *
*SC CONT - SCS *
SCS TVC (2) - AUTO
(REJECT) ENTR

21 06 40 TFI,VG,ΔVM (min-sec,.1fps)
PROG ALM - TIG Slipped
*V5N9E 01703 *
*KEY RLSE to 21 *
ROT CONTR PWR DIRECT (both) - MNA/B
SPS He VLVS (both) - AUTO (verify)
LIMIT CYCLE - OFF
FDAI SCALE - 50/15
SPS P2,Y2 cb - open (for crit. burn)

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58:00 (-02:00)

ΔV THRUST A&B - NORMAL
THC - ARMED
RHC (both) - ARMED
TAPE RCDR - RECORD/STOP/HBR/FWD

59:25 (-00:35)

DSKY BLANKS

59:30 (-00:30)

(AVE G ON)
FLT RCDR - RECORD
EMS MODE - AUTO

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

59:XX (-00:XX)

ULLAGE AS REQ

*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
V34E - EXIT

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

06 40 TFC,VG,ΔVM (min-sec,.1fps,.1fps)
*F 97 40 SPS Thrust fail *
*(TERM) V34E EXIT *
*(RESTART) PRO To IGN *
(RECYCLE) ENTR To TIG-05 sec
SPS THRUST LITE - ON
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 A&B - 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 TB (2) - BP

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SPS P2,Y2 cb - closed(verify)
TVC SERVO PWR 1&2 - OFF
FLT RCDR - OFF
[redacted]
PRO

24 F 16 85 VG XYZ(CM) (.1fps)
NULL RESIDUALS
RECORD ΔV CTR & RESIDUALS
EMS FUNC - OFF
EMS MODE - STBY
BMAG MODE (3) - RATE 2
DEADBAND - MAX
TAPE RCDR - STOP
NONESS BUS - OFF
TRANS CONT PWR - OFF
PRO

25 F 37 V82E

26 F 16 44 HA,HP,TFF (.1nm,min-sec)
R3-59B59 HP >49.4 nm
PRO

27 F 37 00E

BURN STATUS REPORT

ATIC	VI
RT	HDOT
VGX	H
R	ΔVC
P	FUEL
Y	OXID
	UNBAL

REMARKS

EARTH ORBIT ENTRY

1 **CM RCS ACTIVATION** (Norm Deorb Only)
- SECS LOGIC(both) - on(up)
- SECS ARM cb(both) - close
- MSFN Confirm Go for PYRO ARM
- SECS PYRO ARM (both) - ARM
- CM RCS PRPLNT 1&2 - ON, tb-gray
- CM RCS PRESS - ON
- RCS Ind sw - CM1, Then 2
  - He PRESS 3300-3750 psia
  - FUEL & OX PRESS 285-302 psia

2 **Verify CM/SM SEP ATT**

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

2A **EMS INITIALIZATION**
- EMS FUNC - RNG SET
- SET RNG TO PAD DATA RNG
- EMS FUNC - Vo SET
- Slew scroll to pad data VIO
- EMS FUNC - ENTRY

2B **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
- R,P,Y TW (3) - RESET (GDC) TO PRESENT GMBL ANGLES
- GDC ALIGN PB - PUSH

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2C **PWR REDUCT** (Norm Deorb Only)
- HI GAIN ANT PWR - OFF
- FC Pumps (3) - OFF
- Verify single suit compr oper, loads balanced
- FC 2 MN A&B - OFF, tb-bp
- S-BD PWR AMP - LOW
- ECS RAD CONT/HTR cb(both) - open
- STM/UR DUCT HTR cb (both) - open
- HTRS OVLD cb (both) - open
- POT H20 HTR - OFF
- SEC COOL LOOP EVAP - RESET
  PUMP - OFF
- CAB FAN (both) - OFF
- GLY EVAP TEMP IN - MAN

P61 - ENTRY PREP

3 V37E 61E

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

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

PAD VALUES
LAT ____________
LONG ____________
HDS UP/DN ________

PRO

5 F 06 60 GMAX,V400K,GAMMA EI (.01G,fps,.01°)
Record
GMAX ________
V400K ________
GAMMA EI ______
PRO

6 F 06 63 RTOGO (.1nm) ________ PAD ________
VIO (fps) ________ PAD ________
TFE(min-sec) ________
Compare with MSFN for PGNS GO/NO GO
NO COMM, set RTOGO & VIO in EMS
& initialize

(ACCEPT) PRO
(RECALC V32E to 6

P62 - CM/SM SEP & PRE-ENTRY MNVR

7 F 50 25 00041 REQUEST CM/SM SEP
SC CONT - SCS
CMC MODE - FREE
YAW 45° out-of-plane (left for RCS,
Rt for SPS)
RATE - HIGH
DEADBAND - MIN
MAN ATT(3)-RATE CMD
BMAG MODE (3)-ATT 1/RATE 2
PRIM GLY to RAD - BYPASS (verify)

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CM RCS LOGIC - on(up) (verify)
MN BUS TIES(both) - ON (verify)
CM/SM SEP (both) - on(up)
C&W MODE - CM
RCS TRANS - CM
CM RCS FUEL PRESS - 285-302 psia
OX PRESS - 285-302 psia
CM RCS LOGIC - OFF
Monitor Vm A/B:
If <25vdc go to EMERG
POWERDOWN Pg EMG-3
When Vm A/B>25vdc:
SEC COOL LOOP PUMP - AC 1(2)
EVAP - EVAP
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 31.7° MARK (400K)
YAW 0°
DEADBAND - MAX
MAN ATT (PITCH) - ACCEL CMD
EMS DATA - Verify
EMS FUNC - ENTRY (verify)
EMS MODE - AUTO
MAINTAIN HORIZ TRK
PRO (Act ENTRY DAP)

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

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

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P63 - ENTRY INIT

10 06 64 G,VI,RTOGO (.01G,fps,.1nm)
FDAI SCALE - 50/15
ROT CONTR PWR DIR (both) - MNA/MNB
TAPE RCDR - HBR/RCD/FWD
FLT RCDR - ON
HORIZ CK
Pitch error needle goes toward
error approaching .05G time
MAN ATT (PITCH) - RATE CMD (5)
If CMC is GO:
BMAG MODE (3) - RATE 2
SC CONT - CMC
CMC MODE - 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

11 RTOGO AT .05G AGREES WITH EMS-verify
.05G time (+0__:__:__) EMS - MAN
Horiz Ck
Compare Pitch ATT @ .05G with PAD DATA
.05G sw - on(up)
EMS ROLL - on(up)
RCS Deorb: Roll Hds up
06 68 BETA, VI, HDOT (.01°,fps,fps)
Compare RSI & FDAI
If CMC or PAD cmds Lift DN,
MNVR Lift DN
EMS GO/NO GO
G-V Plot within limits
Rng ctr dwn 40+10 during 10sec period
Monitor G-meter for
convergence with pad data (Do)
(V<27K fps) Go To 15

P65 - ENTRY - UP CONT (V>27K fps)

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

13 06 68 BETA, VI, HDOT (.01°,fps,fps)
(V<VL +500 fps & RDOT Neg) Go To 15

P66 - ENTRY - BALLISTIC (D<DL)

14 06 22 DESIRED GMBL ANGLES RPY (.01°)
Monitor horiz ±12° of 31.7° mark

P67 - ENTRY - FINAL PHASE (0.2G)

15 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

F 16 67 RTOGO,LAT,LONG (Vrel=1000 fps)
(.1nm,.01°,.01°)
RTOGO NEG - LIFT UP
RTOGO POS - LIFT DOWN
Monitor altimeter

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CM 103

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CM 103

90K' STEAM PRESS-PEGGED
40K' CABIN PRESS REL vlv (both)-BOOST/ENTRY(Unsuited)
(90K+63S) * CM UNSTABLE *
* 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' RCS disable (auto)
(90k+92s) * RCS CMD - OFF *

Apex cover jett (auto)
* APEX COVER JETT PB - PUSH *
(WAIT 2 SECS)

Drogue parachutes deployed (auto)
* DROGUE DEPLOY PB - PUSH *

If Drogues Fail:
X ELS-MAN X
X RCS CMD-ON X
X Stabilize CM X
X 5k' MAIN DPLY PB-PUSH X
X ELS-AUTO X

23.5K' Cabin Pressure increasing (DROG +50s)
* If not increasing by 17K': *
* CABIN PRESS REL vlv (RH) - DUMP *

10K' Main parachutes deployed
(Pc = 10) MAIN DEPLOY PB - PUSH (within 1 sec)
FLOAT BAG 3 cb - close
VHF ANT - RECY
VHF AM(A) - SIMPLEX
VHF BCN - ON
PL BCN LT - ON HIGH, STROT LOCKS (both) - UNLOCK
Remove SIDE HATCH JACK SCREWS
CABIN PRESS RBL vlv(both)-CLOSE
DIRECT O2 - OPEN(CCW)
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 (both) - 30 secs *
* NO PITCH *
CABIN PRESS REL vlv (both) -BOOST/ENTRY
STRUT LOCKS (both) - UNLOCK

FLT & PL BAT BUS A,B,&BAT C cb(3)-CLOSE
FLT & PL MNA & B cb (2) - OPEN

EARTHLANDING

3K'

CABIN PRESS REL vlv(RH) - DUMP
FLOOD POST LDG
CM RCS PRPLNT (both) - OFF
ROT CONTR PWR DIRECT - OFF

800'

CAB PRESS RELV vlv - CLOSE (latch off)
MN BUS TIES (both) - OFF

+00:18m

LANDING
MAIN REL PYRO cb (both) - close
MAIN RELEASE - on(up)

Go to POSTLANDING

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POSTLANDING

STABILIZATION, VENTILATION, COMMUNICATIONS

1 Remove helmets
DIRECT O2 - CLOSE (CW)

2 Stabilization after landing
ELS - AUTO (verify)
MAIN REL PYRO cb (both) - close (verify)
MAIN RELEASE - on (up) (verify)
SECS PYRO (both) - SAFE
SECS LOGIC (both) - OFF
BAT RLY BUS cb (2) - OPEN
*No contact: *
*VHF AM A&B - OFF *
VHF AM RCV only - A
PL VENT cb - close
FLOAT BAG cb (3) - Close
UPRIGHT SYS COMPRESS cb(both)-close
If Stable II:
FLOAT BAG (3)- Fill Till 2 min after upright, then - OFF
VHF AM A/B & BCN-OFF while inverted
IF stabe I:
After 10 min Cooling Period
FLOAT BAG(3)-Fill 7 min, then OFF

3 Post Stabilization and Ventilation

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
MNA BAT BUS A & BAT C cb (2) - open
MNB BAT BUS B & BAT C cb (2) - open
FLT & PL BAT C cb - open

PYRO A SEQ A cb - OPEN
PYRO B SEQ B cb - OPEN
* EACH HR - CHECK D-C VOLTS 27.5 V *
* If Not: *
* FLT & PL-BAT BUS A&B cb (2) -OPEN*
* FLT & PL BAT C cb (2) - OPEN *
* GO TO LOW POWER CHECKLIST pg E-38*
Unstow and install PLV DISTRIB DUCT
Deploy grappling hook and line if req.

4 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 Survival Transceiver
* VHF Beacon not operating *
* connect Survival Transceiver to ANT*
* Cable and place radio in BCN mode *

LOW POWER CHECKLIST
VHF BCN - OFF
VHF (3) - RCV
FLOOD FIXED - OFF
VHF AM A&B - OFF (center)
VHF AM REC ONLY - A (verify)
COUCH LIGHTS - OFF
POSTLANDING VENT SYS: minimize use
SURV RADIO - plug into VHF BCN ANT cable
CONN & turn radio on in BCN mode

EARTHLANDING

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EMERGENCY

EGRESS PROCEDURES

STABLE I

Disconnect umbilicals
Neck dam on
CMP — Center couch - 270° position
CDR,LMP — Armrests folded
CDR — Connect raft to S/C, if desired, with green lanyard
Connect raft white lanyards to suits & inflate water wings when exiting
Hatch piston press vlv - Press (Inbd)
CMP — Side Hatch opened
CDR — PL VENT-OFF
CMP — Pnl 250 cbs(all)-open
Egress with liferaft
LMP — Put hardware kit out
LMP, CDR or C. — Egress

STABLE II

LMP — CB CREW STA AUDIO (3) - open
ALL — PWR (3) - OFF
SUIT PWR (3) - OFF
Remove helmets
Disconnect umbilicals
Release footstraps
Release restraint harness
Couch seat pans (3) - 170° position
CMP — Arm rests folded
Survival kits removed from stowage
CDR — Connect liferaft mainline to CDR or S/C
CMP — Connect first white lanyard from liferaft to suit
CDR — Connect third white lanyard from liferaft to suit
LMP — Connect rucksacks together to yellow lanyard on raft bag
CMP — PRESSURE EQUALIZATION vlv - OPEN
CMP,LMP — Remove and stow fwd 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

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E
EMG-1

FIRE/SMOKE IN CM DURING ENTRY

1 CABIN FANS - OFF

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

3 ROT CONTR PWR DIRECT (both) - 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
Set up for CM/RCS sys 2
AUTO RCS SEL A/C ROLL (4) - OFF
CM 1(6) - OFF
CM 2(6) - MNB
~~Follow normal~~ RCS dump ~~procedure~~ is fuel rich
using TBD deviations for a fuel
rich dump.

MNB:
AC INV 2 AC BUS 2 - OFF
AC INV 1 AC BUS 2 - ON
~~Follow normal~~ RCS dump ~~procedure~~ is oxid rich
~~using TBD deviations for an oxidizer~~
~~rich dump.~~

5 CAB PRESS RELF vlv (RH) - DUMP

6 Continue ENTRY

EMERGENCY

EARTHLANDING

Contamination in CM

1 Don O2 masks and/or PGA's immediately

2 Evaluate contamination level (isolate & correct source of contamination if possible) and proceed with one of the following steps:

a. Retain O2 masks or remain in suit and accept contamination level in cabin.

CAUTION

If in PGA's, adjust DIRECT O2 to maintain suit to cabin ΔP 0.38 psi.

b. Retain O2 masks and scrub cabin atmosphere through suit loop. If initially suited, establish partially suited or shirtsleeve configuration and don O2 masks.

CAUTION

Change LiOH cartridges after scrub completed.

c. Retain PGA's or don PGA's
Verify suit integrity (visually)
Perform Cabin Dump
Perform Cabin Repress

Contamination In Suit

1 SUIT COMPR 2 - AC1

2 SUIT COMPR 1 - OFF

3 DIRECT O2 vlv - OPEN (CCW) for 1 minute then close (cw)

If condition persists:

4 SUIT COMPR 2 - OFF

5 DIRECT O2 vlv - OFF

6 Doff helmet

7 Don emergency O2 masks

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EMERGENCY POWERDOWN

(After DC powerdown preceding CM/SM separation) NOTE: Use only after FC or BAT loss, no short verified, & main bus voltage <26.0 VDC

Powerdown the following components until bus voltage ≥26.5 VDC

O_2 HTRS (both)-OFF	11.0amp
NON ESS BUS-OFF	4.9
FLT QUAL RCDR-OFF	.74
GMBL MTRS(4) - OFF	
ECS RAD HTRS(both)-OFF	17.3
SM RCS HTRS A,B,C,D-OFF	2.86amp
H2 HTRS(both)-OFF	1.44
SPS LINE HTR-OFF	1.03
LIGHTS-Min reqd	-
CMC to STBY	2.0
V48E	
F04 46 Load 0 Left digit R1	
PRO,PRO,PRO, V46E	
F 50 25 00062 CMC PWR DN	
PRO-HOLD Until STBY Lt On	
G&N PWR-OFF	1.5
IMU PWR DN(STBY)	5.7
CMC MODE-FREE	
G&N IMU PWR-OFF	
S-Bd PWR AMP-OFF	3.53
TAPE RCDR - OFF	1.82
Power SCE-OFF	.65
TELECOM GRP 1&2-OFF	2.2
Configure for single inverter oper	
INSTRUM ESS MN A&B cb(both)-Open	5.54
SUIT COMPR-OFF	
DIR O2-ON(If Suited)	
GLY EVAP STM PRESS - MAN	
STM PRESS - INCR (58sec)	
H2O FLOW - OFF (ctr)	
ECS GLY PUMPS - OFF	

SMS RCS THRUSTER FAILED-ON

1 SC CONT To Alternate Source
2 ROT CONTR PWR DIRECT(both)-MN A/B
(control rates in direct)
3 AUTO RCS SEL-OFF (in affected axis)
4 DIRECT Ullage cb(both)-Open
5 If vehicle rates are still uncontrolled:
a. AUTO RCS SEL (16)-On
b. MAN ATT (3)-ACCEL CMD
c. ROT CONTR PWR DIRECT(both)-OFF
6 If rates are still uncontrolled:
SMS RCS Prplnt-OFF

CM RCS THRUSTER FAILED-ON

1 RCS CMD-OFF
2 If Thruster is still on:
a. CM AUTO RCS SEL 1-OFF
b. CM AUTO RCS SEL 2-ON
c. RCS CMD-ON
3 If Thruster is still on:ROT CONTR PWR DIRECT(2)-OFF
4 If Thruster is still on: CM RCS Prplnt 1-OFF
5 If Thruster is still on: CM RCS Prplnt 1-ON
CM RCS Prplnt 2-OFF

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CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

1 Verify Electrical power for pressurization
a. EPS BAT BUS A/B(both)cb-Close (Pnl 229)
b. PYRO A/B SEQ A/B cb(both)-Close (Pnl 250)
c. SECS ARM cb(both)-Close(Pnl 8)
d. SEC PYRO ARM(both)-ARM
e. SECS LOGIC(both) - ON
2 Cycle CM RCS - PRES
3 Verify ELEC PWR To CM RCS Prplnt vlvs
a. EPS GRP 1 & 3 cb-Close
b. RCS SM HTR - A & B cb-Close(Pnl6)
c. RCS Prplnt Isol cb(both)-Close(Pnl 8)
4 Cycle CM RCS Prplnt (2)-ON
5 OPEN He and Prplnt X-Feed
a. EPS GRP 5 cb-Close (Pnl 229)
b. RCS LOGIC cb-Close (Pnl 8)
c. CM RCS LOGIC - On(Up)
6 CM Prplnt - Dump momentarily then Off.

SPS ENGINE DOES NOT SHUT DOWN AUTOMATICALLY

1 ΔV THRUST A&B - OFF
2 THC - CW
3 CHECK SPS DIRECT ON - OFF
4 SPS PILOT vlv (2) CB's - OPEN (PNL 8)
5 EPS Group 5 CB's - OPEN (PNL 229)

MN BUS A(B) UNDERVOLTAGE LITE ON

1 CK MN Bus Voltage
2 If only one bus low with High FC Current, isolate and reconfig
3 If both busses low:
a. Use powerdown CKlist Pg.S EMG-5 if DC PRW reduct prior to sep has <u>not</u> been accomplished.
b. After DC PWR reduct use powerdown CKlist Pg. E EMG-3.

AC BUS 1(2) LIGHT ON WITH MN BUS A(B) UNDERVOLT AND/OR AC BUS 1(2) OVERLOAD

1 Turn OFF associated inverter within 5 sec.

CABIN PRES DECREASING

1 Cabin Relief Valve - Close
2 Cabin Relief Valve - Boost/Entry After Drogue Deployment

O_2 FLOW Hi LIGHT ON

1 Verify Hi Flow
2 If Cabin Pres is not decreasing:
  Surge Tank - OFF
  PLSS Fill vlv - OFF

SUIT COMPRESSOR FAILS WHILE SUITED

1 Select Redund Suit COMPR On Alternate Bus
2 Direct O_2 vlv - ON
3 When Feasible Remove Helmets

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EMERGENCY SAFE OF APEX COVER JETT

If No MSFN GO For Pyro Arm Indicates Apex Cover Jettision,
  SECS LOGIC (2)-OFF
  cb ELS (2)-open
  SECS LOGIC (2)-On
If MSFN GO, Go To Step A
If Still Apex Cover Jettision,
  cb SECS LOGIC A - open
If MSFN GO, Go To Step B
If Still Apex Cover Jettision,
  cb SECS LOGIC A - close
  cb SECS LOGIC B - open
If MSFN GO, Go To Step C
If Still Apex Cover Jettision,
  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)
  DO NOT ARM PYRO BUSES

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

STEP A
cb ELS(2) - open (verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

STEP B
cb SECS LOGIC A - open (verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

STEP C
cb SECS LOGIC B - open(verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

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

STEP A
cb ELS(2) - open (verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

STEP B
cb SECS LOGIC A - open (verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

STEP C
cb SECS LOGIC B - open(verify), close at or after apex cover jettision at 24K'
Continue Normal Entry

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