19 pp Parker

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

* APOLLO 17

DECEMBER 6 LAUNCH

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THIS COPY BASELINE FOR
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CHANGE A
LM DATA CARD BOOK

INDEXING DATA

DATE	OPR	#	T	PGM	SUBJECT	SIGNATOR	LOC
10-10-72	MSC	00	R	APO	*	Mitchell	080-44D

PREPARED BY

481154

FLIGHT PLANNING BRANCH

CREW PROCEDURES DIVISION

MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

OCTOBER 10, 1972

APOLLO 17

LM DATA CARD BOOK

OCTOBER 10, 1972

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APOLLO 17

LM DATA CARD BOOK

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LM ACTIVATION CARD

PRIM EVAP ACTIVATION TIME	
: :	GET

DAP PAD	
+ +	LM WT (36744)N47
+ +	CSM WT(37831)
+ +	GMBL (00648)N48
+ +	(00646)

ED BATT VOLTAGE	
	BATT A
	BATT B
	GET

DOCKED P52 ALIGN	
	R_1 N93
	R_2
	R_3
	GET

V06 N20

LM	CSM	R	GET
		R1	___:___:___
		R2	(109: 12 : 00)
		R3	
		R1	___:___:___
		R2	(109: 22 : 00)
		R3	
		R1	___:___:___
		R2	(110: 22 : 00)
		R3	

S-BD			
P	(+125)	AOS	(108 47 04)
Y	(-22)		
P	(+9)	AOS	(110 41 08)
Y	(-37)		
P	(-34)	AOS	(112 35 41)
Y	(+54)		

UNDOCK/SEP GET (110 27 55)

AGS		
K FACTOR	(110 00 00)	
+ +	(+60458)	224
+ +	(+29364)	225
+ +	(+60366)	226
+ +	(+00643)	305
- -	(-33007)	662
- -	(-54455)	673
	(-00002)	540
	(+00007)	541
	(-00002)	542
	(+00000)	544
	(-00101)	545
	(-00023)	546

DATE 10/10/72

PAGE 1

ACTIVATION
PIPA/GYRO/DOI2

PIPA BIAS UPDATE

PBIASX	V21N01E 1452E PBIASX XXXXXE E
PBIASY	1454E PBIASY XXXXXE E
PBIASZ	1456E PBIASZ XXXXXE E

GYRO DRIFT COMPENSATION

NBDX	
NBDY	
NBDZ	

PROCEDURES

V25N01E 1460E NBDX XXXXXE NBDY XXXXXE NBDZ XXXXXE	V21N01E 1460E NBDX XXXXXE E 1461E NBDY XXXXXE E 1462E NBDZ XXXXXE

CSM CIRC

P76

+ 0 0 + 0 0	HRS (111) N33
+ 0 0 0 + 0 0 0	MIN (55) TIG
+ 0 + 0	SEC (22.67)
	ΔVX (+70.1) N84
	ΔVY (+0.0)
	ΔVZ (-2.4)

CSM HA/HP

CMC	LGC	V82
/	/	OPT 2

DOI-2

+ 0 0 + 0 0	HRS (112) N33
+ 0 0 0 + 0 0 0	MIN (00) TIG
+ 0 + 0	SEC (33.71)
	ΔVX (-9.4) N81
	ΔVY (0.0) LOCAL
	ΔVZ (+0.8) VERT
+ +	H_A (+60.0) N42
	H_p (+ 7.2)
+ +	ΔVR (+9.4)
X X X 0 X X X	BT (0:27)
X X X X X X	R (000) FDAI
X X X X X X	P (085) INER
+ +	TIG (120.6) AGS 373
	ΔVX AGS (-9.4)
	ΔVY AGS (0.0)
	ΔVZ AGS (+0.8)

DOI-2 RULES

1. RCS -X BURN LIMIT 30 SECONDS
2. IF 2-JET BURN REQ'D, AFTER 30 SECONDS, PITCH 180° AND COMPLETE WITH +X JETS

NO CSM CIRC

+	0	0				+	0	0				HRS TIME
+	0	0	0			+	0	0	0			MIN CLOSEST
+	0					+	0					SEC APPROACH
												RANGE
												RDOT
	0						0					Θ

PDI RULES

1. REQUIRE AUTO ULLAGE OR AUTO-ON (NO AUTO ULLAGE OR NO AUTO-ON CONSULT EMER CARD)
2. PDI +31 SEC: .MAX BURN TIME FOR PDI-2 OPPORTUNITY
   .MAX TIME WITHOUT FTP
3. LR GO'S: .ACCEPTED AND CONVERGED BY P64
   .ACCEPTED AND CONVERGED IN P63, LOST REGAINED IN P64 (DATA NOT ACCEPTED BY LGC: ΔH<1500')
   .ACCEPTED AND CONVERGING IN P63, CONVERGED IN P64 (DATA NOT ACCEPTED BY LGC: ΔH<1500')
4. NO LR ABORTS: .PGNS H<10000', NO 3-69
   .PGNS H<6000', WITH 3-69
5. NO PGNS: ABORT UNLESS AFTER HI GATE
6. THRUST: NO-GO IF GTC HAS NOT DECREASED TO 57% BY P64 +15 SEC
7. BINGO FUEL 1 MIN 31 SEC AFTER LOW LEVEL OR WHEN FUEL QTY <2% UNLESS LANDING IMMINENT

NOTE: FLASHING LR ALT OR VEL LTS PRECEDED BY STEADY LR LT WITH ALT LOCK-ON (<40K FT), CYCLE LR CB

NO PDI + 12

+	0	0				+	0	0				HRS (113) N33
+	0	0	0			+	0	0	0			MIN (01) TIG
+	0					+	0					SEC (08.20) E
												ΔVX (+107.9) N81
												ΔVY (+0.0) LV
												ΔVZ (-46.9) F
+						+						HA (+143.8) N42
												HP (+5.6)
+						+						ΔVR (+117.7)
X	X	X				X	X	X				BT (0:39)
X	X	X				X	X	X				R (000) FDAI
X	X	X				X	X	X				P (272) INER
+						+						TIG (+181.1) 373
												ΔVX (+107.9) N86
												ΔVY (0.0) AGS
												ΔVZ (-46.9)
+	0	0				+	0	0				HRS (113) N11
+	0	0	0			+	0	0	0			MIN (56) CSI
+	0					+	0					SEC (37.70) G
+	0	0				+	0	0				HRS (115) N37
+	0	0	0			+	0	0	0			MIN (37) TPI
+	0					+	0					SEC (08.20) H
+						+						ΔVX(98.0)NO DOI-2

PGNS			RESIDUALS			AGS	
			ΔVX	N85		ΔVX	500
			ΔVY			ΔVY	501
			ΔVZ			ΔVZ	502

CIRC/NO PDI +12
PDI1/PDI2 ABORT

PDI 1 ABORT CARD

PDI 1 PAD		
+ 0 0 : : + 0 0 : :	HRS (112)	N33
+ 0 0 0 . + 0 0 0 .	MIN (49)	PDI
+ 0 . + 0 .	SEC (37.70)	I
+ : + :	TIG(169.6)AGS 373	
X X : : X X : :	TGO(11:33)	N61
. .	X RANGE (+0.0)	
X X X . X X X .	R (000)	FDAI
X X X . X X X .	P (108)	AT TIG
X X X . X X X .	Y (290)	
	DEDA 231 IF ROD	

(0<PDI 1<10:00) ABORT PAD EARLY

LOG INSERTION GET = ___ ___ ___:___ ___:___ ___
+ 5 5 0 0
CSI GET = ___ ___ ___:___ ___:___ ___

+ 0 0 : : + 0 0 : :	HRS (115)	N37
+ 0 0 0 . + 0 0 0 .	MIN (37)	TPI
+ 0 . + 0 .	SEC (08.20)	J
+ : + :	TPI(337.1)AGS 275	

T1-1 (10:00<PDI 1<17:10) ABORT PAD LATE

LOG INSERTION GET = ___ ___ ___:___ ___:___ ___
+ 5 0 0 0
BOOST GET = ___ ___ ___:___ ___:___ ___
+ 1 0 0 0 0
HAM GET = ___ ___ ___:___ ___:___ ___
+ 5 0 0 0
CSI GET = ___ ___ ___:___ ___:___ ___

+ 0 0 : : + 0 0 : :	HRS (117)	N37
+ 0 0 0 . + 0 0 0 .	MIN (36)	TPI
+ 0 . + 0 .	SEC (03.70)	K
+ : + :	TPI(456.1)AGS 275	

T2-1(PDI 1 + 24:45 ___:___) ABORT PAD

LOG INSERTION GET = ___ ___ ___:___ ___:___ ___
+ 5 0 0 0
BOOST GET = ___ ___ ___:___ ___:___ ___
+ 3 0 0 0 0
HAM GET = ___ ___ ___:___ ___:___ ___
+ 5 0 0 0
CSI GET = ___ ___ ___:___ ___:___

+ 0 0 : : + 0 0 : :	HRS (113)	N33
+ 0 0 0 . + 0 0 0 .	MIN (14)	TIG
+ 0 . + 0 .	SEC (22.60)	L
+ : + :	TIG(194.4)AGS 373	
+ 0 0 : : + 0 0 : :	HRS (119)	N37
+ 0 0 0 . + 0 0 0 .	MIN (34)	TPI
+ 0 . + 0 .	SEC (59.10)	M
+ : + :	TPI(575.0)AGS 275	

N69 TARGET UPDATE

	ΔDN RNG
	ΔX RNG V25
	ΔRLS
	ΔDN RNG V21
	ΔDN RNG
	ΔX RNG V24
	ΔRLS V23

THROTTLE DOWN ___:___

T3-1 (1 REV) ABORT TIME

+ 0 0 : : + 0 0 : :	HRS (114)	N33
+ 0 0 0 . + 0 0 0 .	MIN (57)	TIG
+ 0 . + 0 .	SEC (30.00)	N
+ : + :	TIG(297.5)AGS 373	

PDI 2 ABORT CARD

PDI 2 PAD		
+ 0 0 ___ ___ ___	+ 0 0 ___ ___ ___	HRS (114) N33
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (43) PDI
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (09.70)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TIG(283.2)AGS 373
X X ___ ___ : ___	X X ___ ___ : ___	TGO(11:33) N61
___ ___ ___ ___ ___ .	___ ___ ___ ___ ___ .	X RANGE (+0.0)
X X X ___ ___ ___	X X X ___ ___ ___	R ( ) FDAI
X X X ___ ___ ___	X X X ___ ___ ___	P ( ) AT TIG
X X X ___ ___ ___	X X X ___ ___ ___	Y ( )
___ ___ ___ ___ ___ ___	___ ___ ___ ___ ___ ___	DEDA 231 IF RQD

(0<PDI 2<6:20) ABORT PAD EARLY		
LOG INSERTION GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 1 0 0 0 0		
BOOST GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 1 0 0 0 0		
HAM GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 1 0 0 0 0		
CSI GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 0 0 0 ___ ___	+ 0 0 ___ ___ ___	HRS (119) N37
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (34) TPI
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (59.10)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TPI(575.0)AGS 275

T1-2(6:20≤PDI 2≤15:40) ABORT PAD LATE		
LOG INSERTION GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 5 5 0 0		
CSI TIG = ___ ___ ___ : ___ ___ : ___ ___		
+ 0 0 ___ ___ ___	+ 0 0 ___ ___ ___	HRS (117) N37
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (36) TPI
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (03.70)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TPI(456.1)AGS 275

T2-2(PDI 2 + 22:19 ___ : ___) ABORT PAD		
LOG INSERTION GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 5 0 0 0		
BOOST GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 1 0 0 0 0		
HAM GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 5 0 0 0		
CSI GET = ___ ___ ___ : ___ ___ : ___ ___		
+ 0 0 ___ ___ ___	+ 0 0 ___ ___ ___	HRS (115) N33
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (05) TIG
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (29.00)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TIG(305.5)AGS 373
+ 0 0 ___ ___ ___	+ 0 0 ___ ___ ___	HRS (119) N37
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (34) TPI
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (59.10)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TPI(575.0)AGS 275

N69 TARGET UPDATE	
___ ___ ___ ___ ___ ___	ΔDN RNG
___ ___ ___ ___ ___ ___	ΔX RNG V25
___ ___ ___ ___ ___ ___	ΔRLS
___ ___ ___ ___ ___ ___	ΔDN RNG V21
___ ___ ___ ___ ___ ___	ΔDN RNG
___ ___ ___ ___ ___ ___	ΔX RNG V24
___ ___ ___ ___ ___ ___	ΔRLS V23
THROTTLE DOWN ___ : ___	

T3-2 (1 REV) ABORT TIME		
+ 0 0 ___ ___ ___	+ 0 0 ___ ___ ___	HRS (116) N33
+ 0 0 0 ___ ___	+ 0 0 0 ___ ___	MIN (51) TIG
+ 0 ___ ___ . ___	+ 0 ___ ___ . ___	SEC (00.00)
+ ___ ___ ___ ___ .	+ ___ ___ ___ ___ .	TIG(411.0)AGS 373

PDI2/PDI2 ABORT
LUNAR SURFACE

DATE 10/10/72

LUNAR SURFACE CARD

FIRST REV ACTIVITY

N20 (EMERGENCY LIFTOFF)
_____OG_____IG_____MG

P57, A/T 3, REFSMMAT
NO4 _____, _____ GRAV ERR
STAR _____ (N71)
NO5 _____ ANGLE DIFF
N93 _____ X
_____ Y
_____ Z

N20 (PARKING)
_____OG 0.00 IG_____MG

NO VOICE LGC CLOCK SYNCH
CST ZERO = : :
+(i)·(24) = : : (1)
Latest CST = : : (2)
+CST(Watch)= : : (3)
GET = : :

NOTES:
(1) i=1, 2, 3, -----
(2) Latest CST not exceeding NOM TIG for this REV
(3) Must be in 24 hour day

LM SHADOW LENGTH

GET	LENGTH (ft)
110	110
130	60
150	40
160	32
180	22

N43
LAT(+N) ___•___
LONG(+E) ___•___
ALT _____•

047 _____053 _____

544 _____ +5:02 _____
545 _____ _____
546 _____ _____

P57, A/T 3, LANDING SITE
NO4 _____, _____ GRAV ERR
ALIGN STAR _____ (N71)
NO5 _____ ANGLE DIFF
N93 _____ X
_____ Y
_____ Z

DATA STAR 1 _____
DATA STAR 2 _____
DATA STAR 3 _____
DATA STAR 4 _____

LIFT-OFF TABLE

NOMINAL = (M=2) (M=1) ~ (M=2) -2:30

REV	NEW TIG	NOM TIG	REV	NEW TIG	NOM TIG
15		116:56:11	32		150:32:16
16		118:54:47	33		152:30:51
17		120:53:22	34		154:29:27
18		122:51:58	35		156:28:02
19		124:50:34	36		158:26:38
20		126:49:09	37		160:25:13
21		128:47:46	38		162:23:48
22		130:46:20	39		164:22:24
23		132:44:56	40		166:20:59
24		134:43:32	41		168:19:34
25		136:42:07	42		170:18:09
26		138:40:43	43		172:16:45
27		140:39:18	44		174:15:20
28		142:37:54	45		176:13:55
29		144:36:29	46		178:12:30
30		146:35:05	47		180:11:05
31		148:33:40	48		182:09:40
			49		184:08:30
			50		186:07:05

LAUNCH PREP

P57, A/T 3, LANDING SITE
NO4 _____, _____ GRAV ERR
STAR _____ (N71)
NO5 _____ ANGLE DIFF
N 93 _____ X
_____ Y
_____ Z

P22 ACQ : : (185 : 54 : 00)

REV 50 TIG : : (188 : 03 : 15)

544 _____ +5:02 _____
545 _____ _____
546 _____ _____
377 _____ _____

K FACTOR : : (180 : 00 : 00)

047 _____
053 _____

PIPA BIAS UPDATE*

	PBIASX
	PBIASY
	PBIASZ

GYRO DRIFT UPDATE*

	NBDX
	NBDY
	NBDZ

*PROCEDURES ON PAGE 2

ABORT/ASCENT CARD

DATE 10/10/72

ASCENT RULES

UNDERBURN

ΔV(FPS)	TIME(SEC)	PGNS	AGS
<400	<20	NULL RESIDUALS	AUTO,A/H 15fps
>400	>20	A/H BURN HA,HP $\dot{H}$ CONTROL	AUTO,A/H 15fps

INSERTION

WITH VOICE-GROUND RECOMMENDS TRIM SOURCE AT T_{GO}= 1 MIN

- DIRECT ASCENT RNDZ
  TRIM X-AXIS ONLY TO <2 FPS AND STANDBY FOR TWEAK AT INSERTION ATTITUDE
- COELLIPTIC RNDZ
  TRIM X-AXIS ONLY TO <2 FPS AND STANDBY FOR TWEAK (10° OHW OR 257° FDAI)
- TWEAK AT INSERTION PLUS 3 MINUTES

FOR NO VOICE (TRIM TO <2 fps)

PGNS,AGS DIFFER <10FPS, TRIM ACTIVE SYSTEM
PGNS,AGS DIFFER >10FPS, TRIM SYSTEM WHICH AGREES WITH RR

ATT/RATE ERROR >10°/SEC , SWITCH GUIDANCE

T3 (1 REV) ABORT PAD

LOG INSERTION GET= ___ ___ ___:___:___
+ 5 0 0 0
CSI TIG= ___ ___ ___:___:___
+ 1 3 3 0 0
TPI TIG= ___ ___ ___:___:___

+	0	0				+	0	0				HRS (114) N33
+	0	0	0			+	0	0	0			MIN (57) TIG
+	0			•		+	0			•		SEC (30:00)

ONE REV LATE ___:___:___
(190 : 04 : 20)

LM ASCENT PAD

+	0	0				+	0	0				+	0	0				HRS (188) N33
+	0	0	0			+	0	0	0			+	0	0	0			MIN (03) TIG
+	0			•		+	0			•		+	0			•		SEC (14.64)
+					•	+					•	+					•	V(H) (5539.2)
+					•	+					•	+					•	V(V) (32.0)N76
	0				•		0				•		0				•	X RANGE(+0.0)*
+						+						+						047 (+37153)
+						+						+						053 (+07045)
+						+						+						224/226(+58624)
+						+						+						231 (+56906)
+					•	+					•	+					•	465 (+32.0)
+					•	+					•	+					•	373 L.O.(+483.2)
+	0	0				+	0	0				+	0	0				HRS (188) N37
+	0	0	0			+	0	0	0			+	0	0	0			MIN (57) TPI
+	0			•		+	0			•		+	0			•		SEC (32.30)
+						+						+						LM WT (10917)
+	0	0			•	+	0	0			•	+	0	0			•	HA (62.0) CSM
+	0	0			•	+	0	0			•	+	0	0			•	HP (62.0)
+						HA V82						+						HA 315
+						HP						+						HP 403

RESIDUALS

PGNS		AGS	
ΔVX	N85	ΔVX	500
ΔVY		ΔVY	501
ΔVZ		ΔVZ	502

*NOTE: LOAD 8 NM CROSSRANGE IF GREATER THAN 8 NM

ABORT/ASCENT
DIRECT TPI

PAGE 7

DIRECT TPI CARD

IF TWO OF THREE SOLUTIONS AGREE,
BURN PRIORITY SOLUTION.

PRIORITY OF SOLUTION: PGNS, AGS, CMC, CHARTS.
GUIDE VALUES: $\dot{X}$=3 fps, $\dot{Y}$=7 fps, $\dot{Z}$=9 fps

RR AGREES WITH VHF WHERE
$\Delta R = 0.01R + 0.5$ NM, ΔR IS ALWAYS $\geq$ 1 NM
RR DOES NOT AGREE WITH VHF,
MSFN ISOLATES FAILED SYSTEM.

APS FOR $\Delta V > 40$fps, DPS FOR $\Delta V > 6$fps(DPS FULL)

AGS RECOVERY FROM BAD RADAR MARKS, PAGE 9

TPI SOLUTIONS

		PGNS	AGS	CMC	CHARTS
TIG		N37	373	N37	
θ LOS	(+26.6)	N55	303	N55	
HP	(+46.7)	N58	402	N58	
ΔV TPI	(+76.5)		370		
ΔV TPF	(+31.7)**		371		
ΔVX		N81	450	N81*	ΔVX
ΔVY			451	*	
ΔVZ			452	*	ΔVZ

**{IF ΔV TPF>100 fps, OR 1 RCS LOST AND ΔV TPF>55 fps} DO TPI 2 PAGE 9

*CHANGE SIGN BIAS; ΔVX = -1.0, ΔVZ = +2.0

TPI PAD

+	0	0				+	0	0				HRS (188) N37
+	0	0	0			+	0	0	0			MIN (57) TPI
+	0			•		+	0			•		SEC (32.30)
R1(+00000), R2(+000.00), R3(+130.00)												N55
	0				•		0				•	ΔVX (+75.1) N81
	0				•		0				•	ΔVY (-0.3) LV
	0				•		0				•	ΔVZ (+14.7)
+	0			•		+	0			•		R(+36.74) N54 TPI
-	0				•	-	0				•	R(-101.7) TIG-5
X	X			•		X	X			•		BT(00:03)

TIG	N37	373	N37		
θ LOS	N55	303	N55		
HP	N58	402	N58		
ΔV TPI		370			
ΔV TPF**		371			
ΔVX	N81	450	N81*	ΔVX	
ΔVY		451	*		
ΔVZ		452	*	ΔVZ	

RESIDUALS

PGNS		AGS	
ΔVX	N85	ΔVX	500
ΔVY		ΔVY	501
ΔVZ		ΔVZ	502

AGS RECOVERY FROM BAD RADAR MARKS

PRE TPI

ASSUMED STEADY STATE BEFORE N49
411+0
✓ ANGLE, RANGE AND RANGE RATE
606R -XXXXX RANGE AND ANGLES USED IN LAST UPDATE
+00000 RANGE RATE USED IN LAST UPDATE
DO AN IMMEDIATE V47 FOR THE FOLLOWING:
1) LESS THAN 10 MIN OF TRACKING LEFT (AND ANOTHER AT TIG -5 MIN)
2) FOR θ,R, OR Ṙ GREATER THAN 5°, 5NM, OR 15FPS: ALSO REINITIALIZE FILTER, AND CONTINUE MANUAL UPDATING.

DON'T DO A V47 FOR THE FOLLOWING:
1) FOR θ,R, OR Ṙ LESS THAN 5°, 5NM, OR 15FPS: DO REINITIALIZE FILTER, AND CONTINUE MANUAL UPDATING.

POST TPI

N49 ON FIRST PGNCS UPDATE
1) DO NOT INCORPORATE INTO PGNCS, WAIT FOR SECOND UPDATE.
2) AT SECOND UPDATE:
IF N49 REPEATS: KEEP AGS AUTO UPDATING
IF N49 DOES NOT REPEAT: DO V47 AND NO UPDATES

N49 AFTER STEADY-STATE
DO V47 WITH NO FURTHER UPDATES

TPI 2 PROCEDURE

PERFORM MCC-1

PGNS

P34

LOG N37
+ 37

GET TPI 2 = [ ][ ][:][:][ ][.][ ]

N55 (ω_t) = $\frac{(\Delta V\ TPF)}{2}$ = [ ][ ][ ][.][ ]

V93

AGS

410 + 4

LOG TIG TPI
+ 370 (373)

GET TPI 2 = [ ][ ][ ][ ][.]

307 = $\frac{(\Delta V\ TPF)}{6}$ = [ ][ ][ ][ ][.]

417 + 1

411 + 1

CSI CARD

BURN RULES

IF TWO OF THREE SOLUTIONS AGREE
BURN PRIORITY SOLUTION.

PRIORITY OF SOLUTIONS: PGNS, AGS, CMC, CHARTS.

GUIDE VALUE: $\dot{X}$ = 3 fps.

RR AGREES WITH VHF WHERE
$\Delta R = 0.01R + 0.5$ NM, ΔR IS ALWAYS $\geq$ 1 NM
RR DOES NOT AGREE WITH VHF,
MSFN ISOLATES FAILED SYSTEM.

V90 < 5 fps - NO BURN

APS FOR ΔV>40fps, DPS FOR ΔV>6 fps (DPS FULL)

CSI PAD

+ 0 0 + 0 0	HRS(189) N11
+ 0 0 0 + 0 0 0	MIN(02) CSI
+ 0 + 0	SEC(38.40)
R1(+00001),R2(+026.60),R3(+130.00)	N55
+ 0 0 + 0 0	HRS(190) N37
+ 0 0 0 + 0 0 0	MIN(56) TPI
+ 0 + 0	SEC(06.60)
0 0	ΔVX(+54.8)N81
0 0	ΔVY(+0.0)LV
410+1, 605+00777, 416+1, 623+0	
+ +	373(542.6)
+ +	275(656.1)
0 0	ΔVX(+54.7)N86
0 0	ΔVY(+0.0)AGS
0 0	ΔVZ(+1.2)

CSI SOLUTIONS

	PGNS	AGS	CMC	CHARTS
ΔH (+15.0)	N75 _____	402 _____		
CSI/CDH(58:35)	_____	372 _____		
CDH/TPI(54:53)	_____			
ΔVX (ΔVG)	N81 _____	450 _____	N81* _____	ΔV _____
ΔVY	_____	263 _____	* _____	
CDH ΔVX(0.0)	N82 _____			
CDH ΔVX(0.0)	_____			

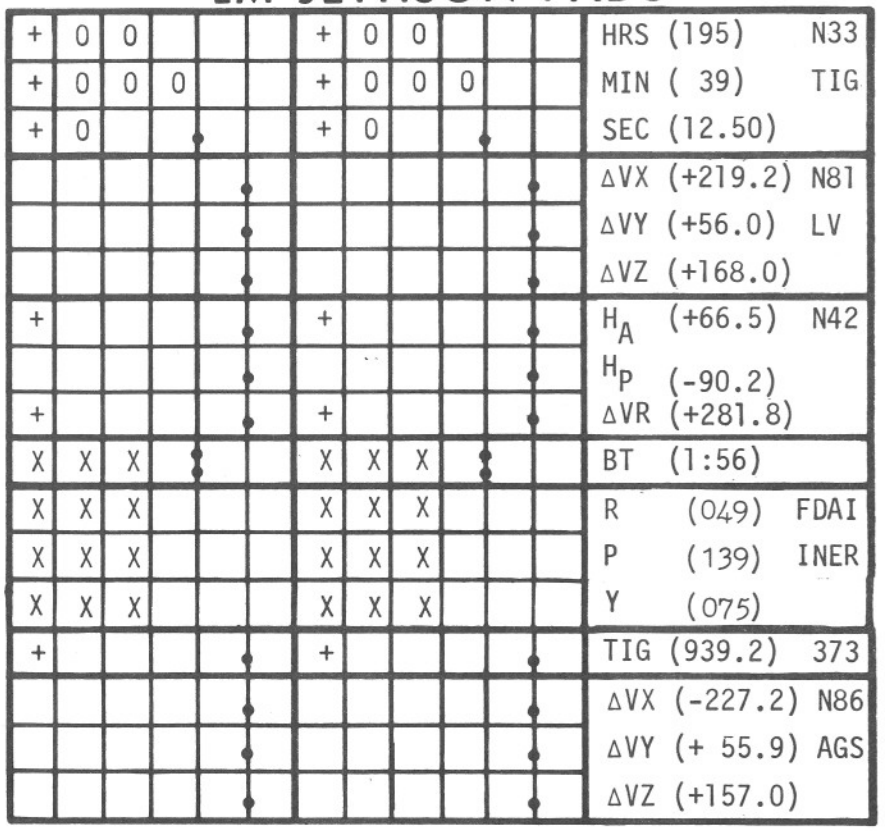
*CHANGE SIGN
BIAS; ΔVX = -1.0

ΔH	N75 _____	402 _____		
CSI/CDH	_____	372 _____		
CDH/TPI	_____			
ΔVX (ΔVG)	N81 _____	370 _____	N81* _____	ΔV _____
ΔVY	_____	263 _____	* _____	
CDH ΔVX	N82 _____			
CDH ΔVZ	_____			

RESIDUALS

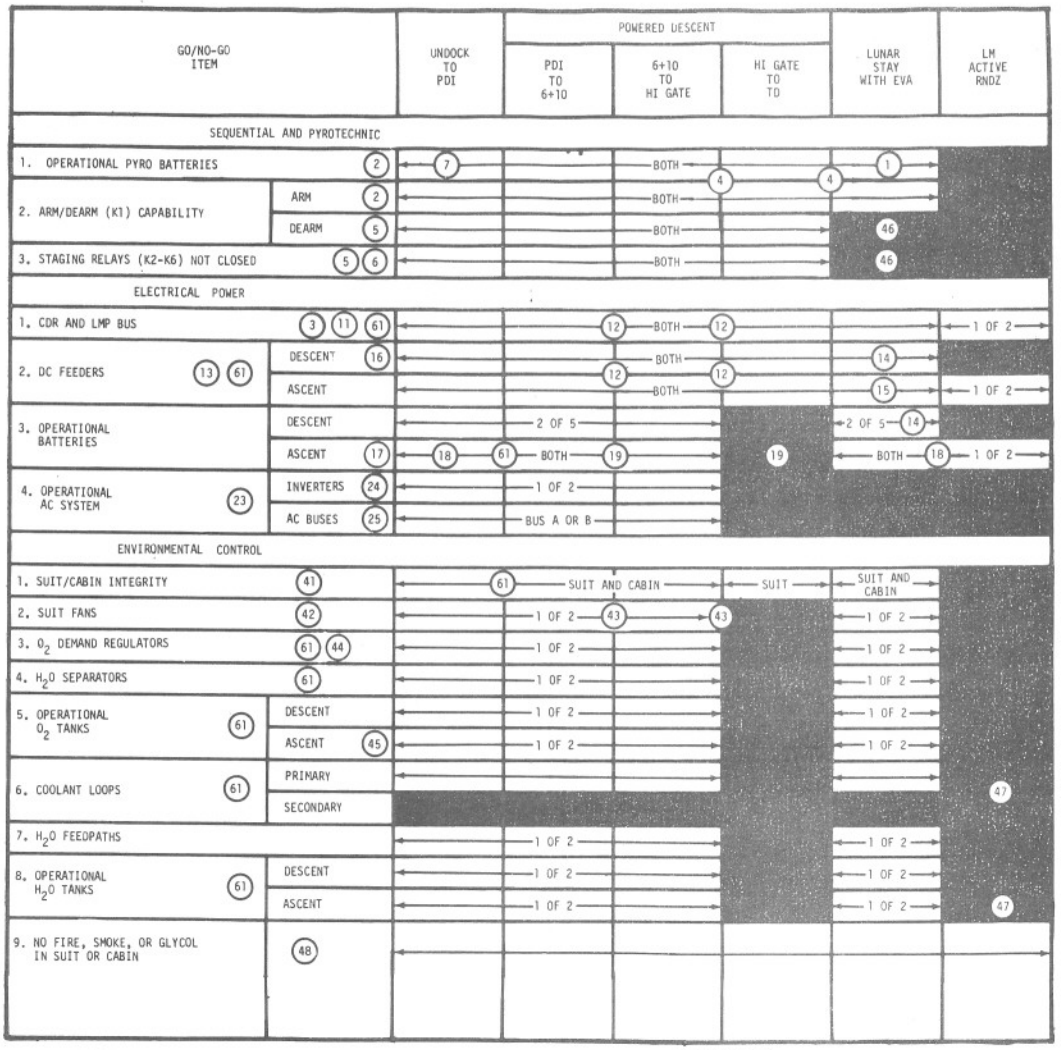
PGNS		AGS	
ΔVX	N85	ΔVX	500
ΔVY		ΔVY	501
ΔVZ		ΔVZ	502

LM JETTISON PADS



MISSION RULES
TELMU

LM TELMU MISSION RULES
9/1/72



LEGEND ■ NO REQUIREMENT

SPECIFIC RULES

IF NO-GO AT UNDOCKING
DO NOT UNDOCK
IF NO-GO UNDOCKED
NO-GO FOR CIRC
IF NO-GO AT CIRC OR PRE-PDI
NO-GO FOR PDI
IF NO-GO DURING POWERED DESCENT
ABORT/ABORT STAGE
IF NO-GO FOR LUNAR STAY
L/O NEXT BEST OPPORTUNITY
IF NO-GO FOR LM ACTIVE RENDZ
CSM ACTIVE RENDZ

DOCK ASAP FOR ALL NO-GO CONDITIONS EXCEPT:
PYRO
UNABLE TO DEARM SYSTEM*
STAGING RELAYS (K2 TO K6) FAILED CLOSED
ELECTRICAL
LOSS OF 1 ASCENT BATTERY (UNSTAGED)
LOSS OF AC POWER
ENVIRONMENTAL
LOSS OF DEMAND REGULATORS
LOSS OF PRIMARY COOLANT LOOP**
LOSS OF H_2O TANKS**

*ALTERNATE MISSION WITHIN STAGED RNDZ CAPABILITY MAY BE PERFORMED
**RETURN TO VICINITY OF CSM

NOTE: T_1 NO STAY CONDITIONS
NONE
T_2 NO STAY CONDITIONS
NONE

GENERAL NOTES

SEQUENTIAL AND PYROTECHNIC

LOSS OF A PYRO SYSTEM (MANUAL STAGING)

(1) A. NO DETECTABLE PYRO SYSTEM FAILURES WILL BE CAUSE FOR EVA TERMINATION.

B. WITH THE IMPENDING LOSS OF A PYRO SYSTEM(S) DUE TO A DEGRADING PYRO BATTERY OR BATTERIES, MANUAL STAGING USING BOTH SYSTEMS WILL BE PERFORMED PRIOR TO LOSS OF THE BATTERY OR BATTERIES.

C. IF ONLY A SINGLE PYRO SYSTEM REMAINS, MANUAL STAGING WILL BE DELAYED AS LONG AS POSSIBLE.

D. IF MANUAL STAGING ATTITUDE/DES GOX PRESSURE CONSTRAINTS CANNOT BE MET, MANUAL STAGING WILL NOT BE PERFORMED. THE DES GOX HIGH PRESSURE LINE WILL BE VENTED, IF NECESSARY, TO INSURE SAFE MANUAL STAGING.

(2) A. UNDOCKED STAGING WITH ONE PYRO SYSTEM WILL BE PERFORMED ONLY IF ABSOLUTELY NECESSARY TO MAINTAIN CREW SAFETY.

B. CSM RESCUE MAY BE REQUIRED DUE TO RCS REDLINES IF STAGING CANNOT BE ACCOMPLISHED.

(3) LOSS OF A DC BUS RESULTS IN LOSS OF ONE PYRO SYSTEM.

(4) FOR LOSS OF A PYRO SYSTEM AFTER LOSS OF DPS-TO-ORBIT CAPABILITY DURING POWERED DESCENT IT IS BETTER TO LAND. MANUALLY STAGE AND LIFTOFF NEXT BEST OPPORTUNITY.

K1-K2 FAILED CLOSED

(5) A. A FUNCTIONALLY CONFIRMED FAILED CLOSED K1 OR K2 RELAY IS CONSIDERED UNSAFE FOR THE VIBRATION/SHOCK ENVIRONMENT ASSOCIATED WITH LUNAR TOUCHDOWN. FOR UNSTAGED ORBITAL OPERATION, PLACE ONE ASCENT BATTERY ON THE BUS POWERING THE ACTIVE GUIDANCE SYSTEM. STAGE AS REQUIRED IN ORBIT.

B. IF UNABLE TO VERIFY VIA ONBOARD INST OR TM THAT A PYRO SYS IS DEARMED (FAILED ARMED OR DEARMED INDICATION) THEN: (1) PRIOR TO SHE PRESS THE DEARMED STATUS WILL BE VERIFIED ONLY THE FIRST TIME IT IS DEARMED. (2) FOR SHE PRESS THE DEARMED STATUS WILL BE VERIFIED ONLY FOR AN ARMED INDICATION, (3) AFTER TD THE DEARMED STATUS WILL NOT BE VERIFIED.

K2-K6 FAILURE

(6) A. PRIOR TO PDI, A K2 TO K6 FAILURE WILL BE CONFIRMED. CONFIRMATION WILL RESULT IN A PARTIAL OR COMPLETE STAGING SEQUENCE. HOWEVER, A STAGED ALTERNATE MISSION MAY BE PERFORMED.

B. AFTER PDI, THE FAILURE CANNOT BE CONFIRMED. THE LOGIC POWER B CB MUST REMAIN CLOSED DURING MAIN DESCENT PROPULSION BURNS TO MAINTAIN REDUNDANT ENGINE "ON" CAPABILITY. PRIOR TO ANY MASTER ARM, HOWEVER, THE CB MUST BE OPENED AS ARMING THE SYSTEM MAY STAGE THE LM.

PYRO BATTERY REDLINE

(7) IF THE PYRO BATTERY READING JUST PRIOR TO PDI INDICATES A DECREASE FROM THE VOLTAGE LEVEL READ AT ACTIVATION, THEN PDI WILL BE DELAYED BY ONE REV TO DETERMINE IF THE BATTERY IS CONTINUING TO DEGRADE.

ALTERNATE MISSIONS

(8) A. FOR ORBITAL ALTERNATE MISSIONS, IF INCOMPLETE STAGING OCCURS, THE MISSION MAY BE CONTINUED IF THE ASCENT AND DESCENT STAGES ARE RIGIDLY ATTACHED. IF THE LM STAGES ARE NON-RIGIDLY ATTACHED, THE LM SHOULD GO TO DRIFTING FLIGHT AND A CSM RESCUE INITIATED. CEVA WILL BE REQUIRED IF UNABLE TO DOCK.

B. THERE IS NO REQUIREMENT TO MAINTAIN A LM STAGING CAPABILITY FOR ORBITAL ALTERNATE MISSIONS.

LANDING GEAR

(9) IF UNABLE TO DEPLOY ONE OR MORE LANDING GEAR, A LANDING WILL NOT BE ATTEMPTED. DESCENT ENGINE BURNS WILL BE CONTINUED SINCE CONTROL PROBLEMS ARE NOT EXPECTED TO EXIST AND DAMAGE TO THE LANDING GEAR FROM THE BURN WILL NOT AFFECT ALTERNATE MISSIONS.

(10) RESERVED

ELECTRICAL POWER

BUSES

(11) A. LOSS OF EITHER DC BUS DURING DESCENT ENGINE BURNS RESULTS IN THROTTLING TO 10D PERCENT. IF ON INV 2, LOSS OF THE LMP BUS CAUSES THE ENGINE TO SHUT DOWN UNLESS EVG START PBI HAS BEEN PUSHED.

B. IF A DC BUS IS DETERMINED TO BE CRITICAL (LOSS OF THE BUS RESULTS IN A CATASTROPHIC SITUATION DUE TO OTHER SYSTEMS FAILURES), THE ASCENT BATTERIES WILL BE CONFIGURED SPLIT BUS ON BACKUP FEED PATHS (NORMAL FEED OFF) FOR ASCENT AND DESCENT IF TIME PERMITS.

FEEDERS

(12) DURING POWERED DESCENT WHEN TIME IS NOT AVAILABLE TO TROUBLESHOOT, A SHORT ON EITHER AN ASCENT OR DESCENT FEEDER WILL BE CONSIDERED LOSS OF A BUS AND THUS REQUIRE AN ABORT.

(13) A SHORTED ASCENT OR DESCENT DC FEEDER WILL ALWAYS BE REASON FOR ABORTING THE LANDING MISSION. ONE OPEN DESCENT FEEDER WILL NOT BE REASON FOR ABORTING THE LANDING MISSION.

ELECTRICAL POWER (CONT)

(14) FOR AN OPEN DESCENT FEEDER OR FOR THE LOSS OF THREE DESCENT BATTERIES ON THE SAME BUS, THE CROSSTIE BAL LOAD CIRCUIT BREAKERS WILL BE CLOSED ON THE LUNAR SURFACE AND THE MISSION CONTINUED WITHIN THE CONSUMABLES BUDGET.

(15) FOR A SHORTED ASCENT FEEDER ON THE LUNAR SURFACE, THE ASCENT BATTERIES WILL NOT BE CONNECTED UNTIL THE NOMINAL TIME TO MEED PRECONDITIONING REQUIREMENTS.

(16) FOR A SHORTED DESCENT FEEDER, THE ASCENT BATTERIES WILL BE PLACED ON NORMAL FEED WITH THE SHORT ISOLATED VIA THE DEADFACE RELAY. OPERATIONALLY, THIS RESULTS IN THE LOSS OF ALL REMAINING DESCENT ELECTRICAL ENERGY FOR CONSUMABLE CONSIDERATIONS. THE DESCENT BATTERIES THAT STILL HAVE AN OPERABLE FEED PATH WILL BE USED ONLY IF NECESSARY TO MAINTAIN CREW SAFETY.

BATTERIES

(17) IF THE ASCENT BATTERY OCV AT HOUSEKEEPING IS 37.2 OR 37.0 VDC AND AT ACTIVATION IS 36.5 THROUGH 35.3 VDC, THEN STOP ACTIVATION PROCEDURES AND GO INTO A HOLD STATUS CONSERVING LM CONSUMABLES UNTIL THE ASCENT BATTERY STATUS CAN BE DETERMINED.

(18) ASCENT BATTERY CONFIRMED LOST (ORBIT OR SURFACE-UNSTAGED). WHEN REMAINING ASCENT BATTERY REQUIRED:

1. GOOD BATTERY NORMAL AND BACKUP FEED PATHS
2. BUS CROSSTIE (100A) CB CLOSED
3. DESCENT BATTERIES OFF AT 5 SECOND INTERVALS
4. DES ECA CB'S (2) OPEN
5. ABORT STAGE-PUSH

(19) ASCENT BATTERY CONFIRMED LOST BY REVERSE CURRENT DURING POWERED DESCENT (REVERSE CURRENT ONLY ACCEPTABLE LOSS OF BATTERY CRITERIA).

PDI TO HI GATE	HI GATE TO TOUCHDOWN
1. PANEL 11 DES ECA CB-OPEN IF STAGING REQUIRED:	1. PANEL 11 DES ECA CB-OPEN 2. BUS CROSSTIE (100A) CB-CLOSED
2. BUS CROSSTIE (100A) CB-CLOSED 3. DESCENT BATS OFF AT 5 SEC INTERVALS 4. PANEL 16 DES ECA CB-OPEN 5. GOOD ASCENT BATTERY BACKUP FEED-ON 6. ABORT STAGE-PUSH	IF ABORT REQUIRED: 3. PANEL 16 DES ECA CB-OPEN 4. IF TIME PERMITS, GOOD ASCENT BAT BACKUP FEED-ON 5. IF TIME PERMITS, DESCENT BATS OFF AT 5 SEC INTERVALS 6. ABORT STAGE-PUSH

(20) BATTERY MANAGEMENT WILL BE PERFORMED ONLY DURING LUNAR STAY PERIODS. THE DESCENT BATTERY STATE OF CHARGE WILL BE KEPT AS EQUAL AS PRACTICAL.

(21) A BATTERY WILL NOT BE PUT ONLINE IF ITS OCV IS LESS THAN BUS VOLTAGE.

(22) THE ASCENT BATTERIES WILL BE PRECONDITIONED FOR:

A. ABORT STAGING WITH TWO ASCENT BATTERIES/SPLIT BUS OPERATION - BY REMOVING A MINIMUM OF 2.5 AMP HOURS FROM THE BATTERY ON THE LMP BUS (NORMALLY BATTERY 5) AND A MINIMUM OF 5 AMP HOURS FROM THE BATTERY ON THE CDR BUS (NORMALLY BATTERY 6) IMMEDIATELY PRIOR TO PDI. WITH THE LOSS OF A CELL, THE AFFECTED BAT WILL BE PRECONDITIONED BY REMOVING A TOTAL OF 10 AMP HOURS.

B. LUNAR L/O OR STAGING DURING COASTING FLIGHT WITH TWO ASCENT BATTERIES/SPLIT BUS OPERATION - BY REMOVING A MINIMUM OF 2.5 AMP HOURS FROM EACH ASCENT BATTERY IMMEDIATELY PRIOR TO DISCONNECTING THE LAST DESCENT BATTERY FROM EACH BUS.

C. LUNAR L/O OR STAGING DURING COASTING FLIGHT WITH ONE ASCENT BATTERY/TWO BUS OPERATION--BY REMOVING A MINIMUM OF 5 AMP HOURS FROM THE REMAINING ASCENT BATTERY IMMEDIATELY PRIOR TO DISCONNECTING THE LAST DESCENT BATTERY FROM THE BUSES.

AC POWER

(23) IF ON INV 2 OR AC BUS A IS LOST, PUSH ENGINE START PBI FOR ALL DPS BURNS.

(24) THE INVERTERS WILL BE SWITCHED FOR A VOLTAGE LESS THAN OR EQUAL TO 112 VAC OR A FREQUENCY GREATER THAN OR EQUAL TO 402 OR LESS THAN OR EQUAL TO 398 Hz TO TURN OFF THE INVERTER CAUTION LIGHT.

(25) AC BUS A IS REQUIRED IF THE RR IS REQUIRED.

GENERAL

(26) ELECTRICAL POWER WILL NEVER BE INTENTIONALLY APPLIED TO A SHORT TO HELP DETERMINE ITS LOCATION UNLESS THE FEEDER FAULT LIGHT HAS FAILED. A GOOD BUS WILL NEVER BE CROSSTIED INTO A SHORT OR POSSIBLE SHORT.

(27) THE BAL LOAD CROSSTIES (30 A) WILL BE OPEN FOR MAIN PROPULSION BURNS, STAGING, AND WHENEVER AGS IS IN THE OPERATE MODE WITH BOTH "AEA" CIRCUIT BREAKERS CLOSED. BOTH BUS CROSS TIES (100 A) WILL NOMINALLY NEVER BE CLOSED EXCEPT DURING DESCENT BATTERY LOW TAP TO HIGH TAP SWITCHOVER.

28 THE MISSION WILL BE CONTINUED AFTER LIFTOFF WITH THE LOSS OF OVERCURRENT PROTECTION. IF THIS PROTECTION IS LOST PRIOR TO LIFTOFF, A HOLD WILL BE CALLED.

A. IF OVERCURRENT PROTECTION IS LOST ON AN INDIVIDUAL DESCENT BATTERY, THE BATTERY WILL BE LEFT ON LINE EXCEPT FOR EVA IF POSSIBLE.

B. TO MONITOR CURRENT AND OBTAIN A CONSUMABLES TREND IF ALL DESCENT OVERCURRENT PROTECTION IS LOST, BOTH ASCENT BATTERIES WILL BE PARALLELED WITH THE DESCENT BATTERIES PERIODICALLY DURING ACTIVATION. DURING LUNAR SURFACE OPERATIONS WITH THE COMPUTERS OFF, THE ASCENT BATTERIES WILL BE TURNED ON ALONE FOR PERIODIC CURRENT MONITORING. FOR AN EVA, THE CDR AND LMP BUSES WILL BE SPLIT (THE CROSSTIE CIRCUIT BREAKERS ON PANEL 16 OPENED).

C. IF ONE OR BOTH ASCENT BATTERY NORMAL FEED CONTACTORS FAIL OPEN, THE SPACECRAFT WILL BE CONFIGURED WHEN ASCENT STAGE ONLY OPERATIONS ARE REQUIRED, USING THE BACKUP FEEDS ON BOTH ASCENT BATTERIES WITH THE CROSSTIES LEFT OPEN.

29 ANY REQUIREMENT FOR A NEXT BEST OPPORTUNITY LIFTOFF WILL BE CAUSE FOR TERMINATION OF AN EVA. ADDITIONALLY A CREWMAN WILL BE REQUIRED TO RETURN FROM AN EVA TO CORRECT A DESCENT BATTERY MALFUNCTION REQUIRING THE BATTERY TO BE TAKEN OFFLINE.

30 WHEN AGS IS IN THE OPERATE MODE MOMENTARILY CLOSE THE AEA C/B ON THE CDR BUS WHEN POWERING UP INV 2.

31 FOR ANY MISSION PLANNING CASE (NOMINAL, ALTERNATE, CONTINGENCY, EMERGENCY, ETC.) THE DESCENT BATS WILL BE CONSIDERED TO HAVE A MAXIMUM OF 415 AH AND THE DES COOLING VLV WILL NOT BE USED UNLESS THE DES BATS MUST BE RUN BEYOND 415 AH. IF, AND ONLY IF, THE DES BATS MUST BE RUN BEYOND 415 AH, THE VLV WILL BE CLOSED BASED ON DES BAT CAPABILITIES DETERMINED BY THE MISSION SIM ATP WITHOUT COOLING AND A MAXIMUM INTERNAL BATTERY TEMP OF 130° F.

32-40 RESERVED

ENVIRONMENTAL

SUIT/CABIN INTEGRITY

41 CREW WILL GO TO EGRESS MODE IF INSUFFICIENT O_2 IS AVAILABLE TO MAINTAIN CABIN PRESSURE. A MISSION PHASE WILL NOT INITIATED IF THIS CONDITION CAN BE ANTICIPATED.

SUIT FAN

42 RETAIN PLSS'S, IF POSSIBLE WHEN BOTH SUIT FANS ARE LOST, AND DO NOT DEPRESS CABIN OR STAGE WHILE UNDOCKED.

43 FOR LOSS OF BOTH SUIT FANS PLACE DEMAND REG B TO "DIRECT O_2" IMMEDIATELY OR REMOVE HELMETS. (HELMETS MUST BE REMOVED FOR STAGING.)

O_2 REGULATORS

44 DO NOT DEPRESS CABIN WITH LOSS OF BOTH DMD REGS.

O_2 TANKS

45 IF EITHER ASCENT O_2 TANK IS LESS THAN OR EQUAL TO 90 PERCENT, IT WILL BE REPLENISHED FROM THE DESCENT O_2 WHEN THE DESCENT TANK QUANTITY IS GREATER THAN OR EQUAL TO 35 PERCENT AND AS CLOSE TO STAGING AS POSSIBLE.

46 DESCENT OXYGEN TANK 2 WILL BE VENTED, IF NECESSARY, TO PROVIDE AN ACCEPTABLE LANDING ATTITUDE FOR AN INADVERTENT STAGING. IF INADVERTENT STAGING IS UNACCEPTABLE, LIFTOFF AT NEXT BEST OPPORTUNITY.

COOLANT LOOPS

47 CREW MAY ELECT TO REMOVE PGA'S FOR COOLING FOR LOSS OF BOTH COOLANT LOOPS OR LOSS OF BOTH ASCENT WATER TANKS.

CONTAMINATION

48 FOR CONTAMINATION IN THE CABIN OR SUIT LOOP (GLYCOL, FIRE, SMOKE, ETC.) THE CREW MAY ELECT TO DECOMPRESS THE CABIN OR PURGE THE SUIT LOOP.

GENERAL

49 OXYGEN PURGE SYSTEM AND PLSS CONSUMABLES WILL BE RESERVED FOR POSSIBLE CEVA AND WILL NOT BE CONSIDERED FOR LM GO/NO-GO'S OR REDLINES.

50 ANY REQUIREMENT FOR A NEXT BEST OPPORTUNITY LIFTOFF WILL BE CAUSE FOR TERMINATION OF EVA. ADDITIONALLY, A CREWMAN WILL BE REQUIRED TO RETURN FROM AN EVA TO CORRECT A FAILED OPEN DEMAND REGULATOR.

51-60 RESERVED

MISCELLANEOUS

61 WHERE ADVANTAGEOUS, THE DESCENT STAGE WILL BE RETAINED ALAP.

LM CONTROL MISSION RULES

9/1/72

GO/NO-GO CRITERIA

MISSION RULES
TELMU/CONTROL

GO/NO-GO ITEM	UNDOCK TO PDI	POWERED DESCENT: PDI TO 6+10	POWERED DESCENT: 6+10 TO HI GATE	POWERED DESCENT: HI GATE TO TD	LUNAR STAY W/EVA	LM ACTIVE RNDZ
GNC						
1. GUIDANCE STEERING — OPERATIONAL PGNS	←	←	→		(2) PGNS OR AGS	→
1. GUIDANCE STEERING — OPERATIONAL AGS	←	(1)	→			
2. 3-AXIS ATT CONT — PGNS RATE CMD OR PGNS AUTO	←	BOTH	→	(3)	BOTH (10)	PGNS OR AGS →
2. 3-AXIS ATT CONT — AGS RATE CMD (4)						
3. 3-AXIS TRANS (5)	+3 AXIS (17)					(18) 1 AXIS →
4. FDAI-ATT/RATES/ERR	←	CREW OPTION		→		
5. T/D 40 SEC OF 57 PERCENT GTC	←	←	→			
6. VHF RNG/CSM OPTICS	2 OF 3 →					
7. RR						
8. AOT						
9. LR	←	←	→			
10. DPS AUTO ON (5)						
11. REDNT APS ON (6)	←	→				
12. P&R GDA TRIM	←	(7) NO IMPINGEMENT CONSTRAINTS		→		
13. MAN THTL (8) (1 TTCA)	←	1 OF 2		→		
14. AUTO THTL						
DPS						
1. OPERATIONAL DPS	← (9)	→		→		
2. ADEQUATE PROP (12)	←	→		→		
3. FTP BLOWNDOWN CAPABILITY (12)	←	→	(11) 34% PQGS	→		
APS						
1. OPERATIONAL APS	←	←	←	←	→	APS NOT REQ FOR RNDZ
2. NO PROP LEAKS	←	←	←	←	IMMED L/O →	
3. NO HE LEAKS/ REDUNDANT PRESS PATH	←	←	←	←	(13)	
RCS						
1. OPERATIONAL RCS	←	A AND B →	←	A OR B →	A & B →	(18) A OR B →
2. RCS LEAKS (14)	←	NO LEAKS →	(15) ←	A OR B →	(15) NO LKS →	
3. NO IMPINGEMENT LIMITS EXCEEDED (16)	←	→		→		

LEGEND: NO REQUIREMENT

GENERAL NOTES

(1) LOSS OF AGS GUIDANCE STEERING IS ACCEPTABLE PROVIDED RDNT 3-AXIS ATT CONT EXISTS

(2) LOSS OF PGNS OR AGS GUIDANCE STEERING IS ACCEPTABLE PROVIDED RDNT 3-AXIS CONT EXISTS

(3) FOR SINGLE CONTROL MODE, LANDING IS CREW OPTION

(4) AGS RATE CMD MAY CONSIST OF 2 AXIS RATE CMD AND ONE DIRECT, I.E. ONE RATE GYRO FAILED

(5) NO AUTO ULLAGE PLUS NO AUTO START--PDI NO GO

(6) MANUAL IS MANDATORY PLUS EITHER PGNS AUTO OR AGS AUTO

(7) GDA WILL BE COMMANDED OFF--ABORT STAGE IF IMPINGEMENT LIMITS VIOLATED

(8) WORK-AROUND PROCEDURE EXISTS FOR MAXIMUM THRUST

(9) INHIBIT DPS BURNS

(10) ASCEND NEXT BEST OPPORTUNITY

(11) ABORT STAGE PRIOR TO INLET PRESSURES REACHING 150 PSIA

(12) ABORT, THEN ABORT STAGE AT DPS DEPLETION IF:

A. LOW LEVEL CONFIRMS INSUFFICIENT PROPELLANT TO LAND

B. Δ BETWEEN FUEL AND OXIDIZER QUANTITY IS GREATER THAN 10 PERCENT

C. PQGS READING 2 PERCENT AND NO VALID TIME ESTIMATE FROM LOW LEVEL

D. DPS PROPELLANT MARGIN PREDICTED LESS THAN MINUS 0.2 PERCENT AFTER ENTRY INTO P64 (CONFIRMED BY OTHER CUES)

(13) APS HELIUM SOURCE LEAK AFTER PRESSURIZATION REQUIRES IMMEDIATE LIFTOFF

(14) IF MANIFOLD PRESSURE LESS THAN 100 PSIA, AND LEAK UPSTREAM OF MAIN SOV, CROSSFEED FROM GOOD SYSTEM

(15) CONTINUE MISSION ONLY IF RCS BLOWDOWN CAPABILITY EXISTS TO MEET CONSUMABLE REDLINES

(16) ABORT STAGE AS SOON AS POSSIBLE

(17) CONTINUE MISSION AFTER CIRC

(18) LOSS OF SOME TRANSLATIONAL CAPABILITY REQUIRES HYBRID LM/CSM MANEUVERS DURING DOCKING PHASE

NOTE

1 T_1 NO STAY CONDITIONS:
- APS PROP LEAK
- RCS PROP LEAK (BOTH SYS)

2 T_2 NO STAY CONDITIONS:
- APS PROP LEAK
- RCS LEAK (BOTH SYS)

SPECIFIC RULES

IF NO-GO AT UNDOCKING
DO NOT UNDOCK

IF NO-GO UNDOCKED
NO GO FOR CIRC/DOCK

IF NO-GO AT CIRC OR PRE-PDI
NO GO FOR PDI/DOCK

IF NO-GO DURING POWERED DESCENT
ABORT
ABORT STAGE AT LOSS OF DPS CAPABILITY

IF NO-GO LUNAR STAY
L/O NEXT BEST OPPORTUNITY

IF NO-GO RENDEZVOUS
CSM ACTIVE RENDEZVOUS

EVA MISSION RULES

9/1/72

LUNAR SURFACE EVA

GO/NO-GO ITEM	IF NO-GO		NOTES
	TERMINATE EVA IMMEDIATELY	TERMINATE EVA	
PROPER VENTILATION	X		①
PLSS POWER	X		②
CONTAMINATION CONTROL	X		①
EMU PRESS INTEGRITY			③
A. PRESS <3.4 PSID	X		
B. 3.4 <PRESS <3.5 PSID		X	
THERMAL CONTROL		X	②
PRIMARY O_2 SUPPLY		X	③ ④
CRITICAL INSTRUMENTATION		X	
OPERATIONAL OPS		X	
OPERATIONAL PGA		X	

NOTES:

① ACTIVATE OPS: OPEN PGA PURGE VLV -- LOW FLOW.

② ACTIVATE BSLSS AND/OR OPS PURGE AS REQUIRED.

③ ACTIVATE OPS

④ IF EMU REG PRESS GREATER THAN 4.05 PSID, CLOSE POS SHUTOFF VLV AFTER ACTUATING OPS.

CMP EVA

GO/NO-GO ITEM	IF NO-GO	
	TERMINATE EVA ACTIVATE OPS AS REQUIRED	TERMINATE EVA
EMU PRESSURE INTEGRITY	X	
ADEQUATE O_2 FLOW (FROM SCU)	X	
CRITICAL INSTRUMENTATION		X

FCD 5-69.25.5B

COMMUNICATIONS/INSTRUMENTATION GO CRITERIA
9/1/72

GO/NO-GO ITEM	EARTH ORBIT		TLC			LUNAR ORBIT (BEFORE UNDOCKING)			UNDOCKING	CIRC/ DOI 2	POWERED DESCENT				LUNAR STAY			RENDEZVOUS LM ACTIVE	LUNAR ORBIT POST REND	POST DOCK	TEC
	CONT BOOST	CONT E.O.	TLI	TD&E	CONT TLC	LOI	CONT LOI	CONT L.O./DOI (5)	NOMINAL MISSION		PDI	PDI TO PDI +6:10	PDI+6:10 TO HI GATE	HI GATE TO T/D	STAY W/O EVA	2-MAN EVA	1-MAN EVA		CONT L.O.	LM JETT	CSM EVA
USB 2-WAY VOICE COMM		(1)	CSM			CSM OR LM		CSM OR LM (5)	CSM & LM	CSM	CSM AND LM				CSM /LM (3)	CSM /LM (3)	CSM /LM (3)		CSM	CSM	
VHF COMM LM/CSM									SIMPLEX OR DUPLEX	(9)											
VHF COMM LM (LCRU)/ EVA																SIMP (6)	SIMP (6)				
VHF COMM EVA/EVA																					
MSFN/EVA VOICE																(8)	(8)				
CRITICAL INSTRUMENTATION		CSM				CSM		CSM (7)	LM & CSM	CSM AND LM	CSM AND LM	(4) LM (4)		(4)	LM AND CSM			LM	CSM		
LM TELEMETRY									LBR OR HBR	LBR OR HBR	LBR OR HBR				LBR OR HBR						
CSM TELEMETRY		HBR OR LBR																			
CSM SCE																					

(1) VHF IS ACCEPTABLE
(2) RESERVED
(3) LM RELAY TO CSM IS ACCEPTABLE
(4) ADQUATE DATA TO MAKE FINAL GO/NO-GO TO CONTINUE POWERED DESCENT (TM OR ONBOARD DISPLAY)
(5) CSM AND LM COMM IS REQUIRED FOR DOI
(6) IF LM PROBLEM IS DEFINED, CONTINUE EVA PREP AND ACTIVATE LCRU ASAP
(7) CSM AND LM CRITICAL INST REQUIRED FOR DOI
(8) VOICE UPLINK TO EITHER CREWMAN, VOICE DOWNLINK FROM ONE CREWMAN OR TV
(9) VOICE CONFIRMATION OF CIRC MNVR IS MANDATORY FOR DOI 2

LEGEND: NO REQUIREMENT