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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

(JULY 26 LAUNCH)

* APOLLO 15

LM-10

BASIC

LM CUE

CARDS

INDEXING DATA

DATE	OPR	#	T	PGM	SUBJECT	SIGNATOR	LOC
6/10/71	MSC	00	Q	APD	*	WILKINS	080-13A

PREPARED BY

FLIGHT DATA SECTION

FLIGHT PLANNING BRANCH

CREW PROCEDURES DIVISION



MANNED SPACECRAFT CENTER
HOUSTON, TEXAS

MAY 10, 1971

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

APOLLO 15

LM CUE CARDS

MAY 10, 1971

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DATE

DATE

LM CUE CARDS

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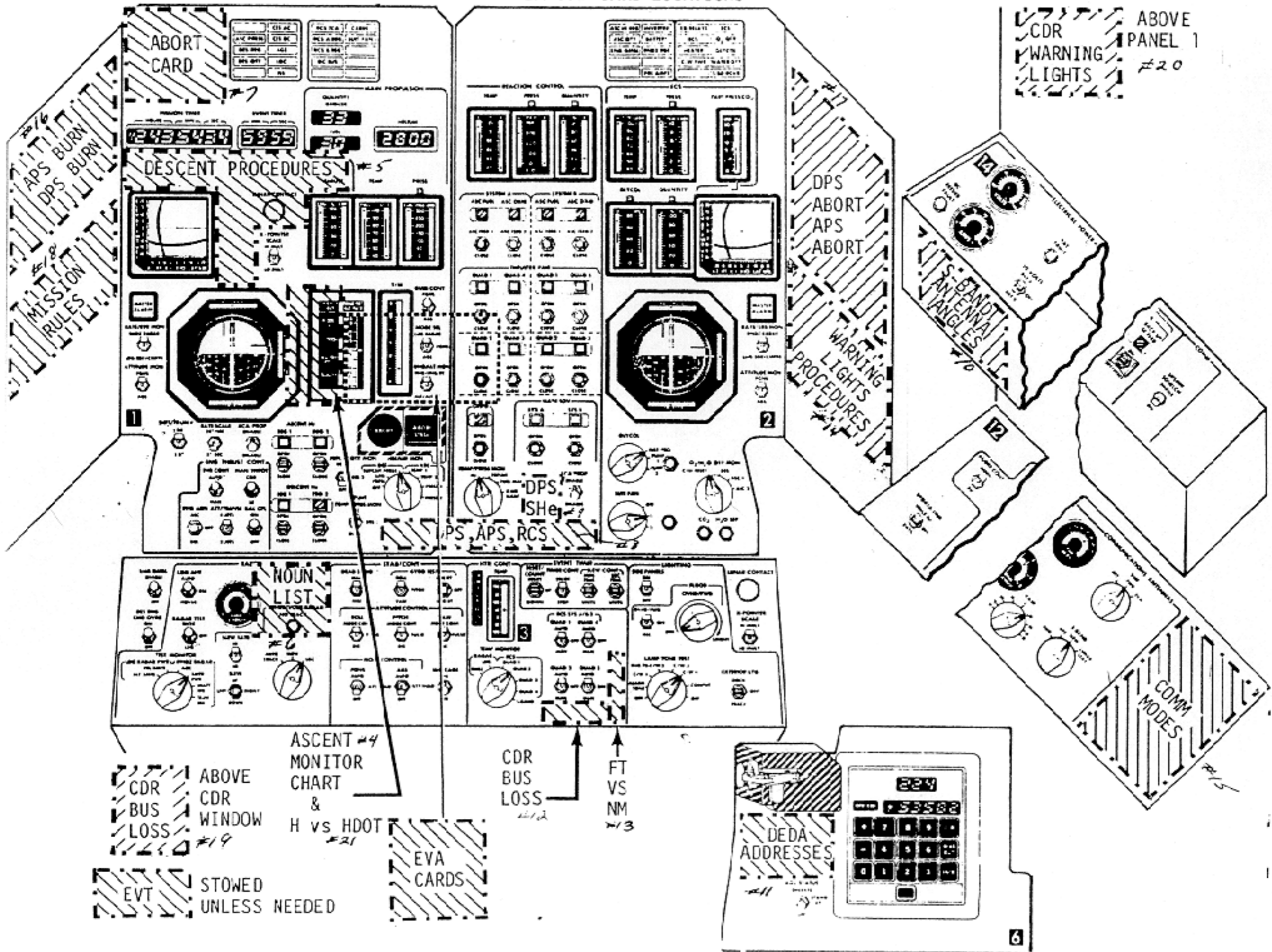
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NOTE: These pages also serve as a table of contents.

5/10/71

LM CUE CARD LOCATIONS



ABOVE PANEL 1
 CDR WARNING LIGHTS #20

CDR BUS LOSS #19
 ABOVE CDR WINDOW

ASCENT #4
 MONITOR
 CHART
 &
 H vs HDOT #21

EVA CARDS

EVT STOWED UNLESS NEEDED

CDR BUS LOSS #12
 FT VS NM #13

DEDA ADDRESSES

224

53582

6

F13

B13

ft	nm
500	= 0.08
1000	= 0.16
1500	= 0.25
2000	= 0.33
2500	= 0.41
3000	= 0.49
3500	= 0.58
4000	= 0.66
4500	= 0.74
5000	= 0.82
5500	= 0.91
6000	= 0.99
6500	= 1.07
7000	= 1.15
7500	= 1.23
8000	= 1.32
8500	= 1.40
9000	= 1.48
9500	= 1.56



5/10/71

5/10/71

F10

B10

S-BAND
ANTENNA ANGLES
DESCENT REFSMMAT

PAGE 2

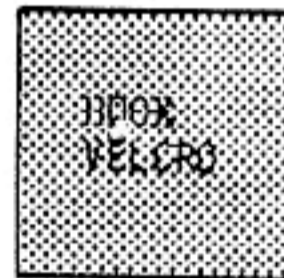
YAW=0°

IGA
(PITCH)

ANTENNA

P Y

72	-63	0
53	-60	10
38	-55	20
26	-49	30
17	-42	40
8	-35	50
1	-28	60
-6	-21	70
-13	-14	80
-20	-7	90
-26	-1	100
-34	5	110
-41	11	120
-50	16	130
-58	20	140
-68	23	150
282	25	160
271	26	170
261	26	180
251	24	190
241	21	200
232	17	210
223	12	220
215	7	230
208	1	240
201	-6	250
194	-12	260
188	-19	270
181	-26	280
174	-33	290
166	-40	300
156	-47	310
145	-53	320
131	-59	330
113	-62	340
93	-64	350



5/10/71

5/10/71

DEDA ADDRESSES

Vi	433		V16N78 R/RDOT
HDOT	367(360 UPDATE)		V16N92 %THROT/HDOT/H
H	337(223 UPDATE)		V21N69 ΔRLS
Ha	315		
Hp	403	AUTO	MAN
Y	211(-)(100Ft)	417+1	
YDOT	270,263	411+1	411+0
R	317	621 R	415+1
RDOT	440	606+R NEXT	316 E R
θ	277	-RDOT NEXT	503 E RDOT
		411+0 STOP	

PAGE 3

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5/10/71



F8

DPS	APS	RCS
TEMP/PRESS MON >30 PSI @ PDI HELIUM NOM >1000<1150 PSI PRE PDI	TEMP PRESS MON >78 PSI OX >114 PSI FU 40 - 90°F ΔT<10°F NOM HELIUM NOM PRESS 3125 PSI	He >1400 PSI PRPLNT PRESS >100 PSI TEMP 40 - 100°F FUEL/OXID MANF PRESS >100 PSI ΔP <80 PSI QUAD TEMP >119°F (25 MIN TO FIRING)

5/10/71

5/10/71

H00K
 VEL CR0
 1/8 SHIM

H00K
 VEL CR0
 1/8 SHIM

F12

CDR BUS LOST

LMP BUS LOST

AGS, INV 2, SUIT FAN 2
S-BD XMTR/RCVR-PRIM
S-BD PWR AMPL-PRIM
CDR AUDIO CONT-BU
ACTIVATE SEC GLY LOOP
SEE EPS 1, BLOCK 17

INV 1, SUIT FAN 1
LMP AUDIO CONT - BU
S-BD PWR AMPL - SEC
DN VOICE - BU, BIOMED - OFF
S-BD ANT - OMNI
SEE EPS 1, BLOCK 28

5/10/71

HEX
VELGR

812

5/10/71

F9

DPS PRE PRESS RNG		
	FUEL	OXID
TEMP	50°-75°	50°-75°
PRESS	70-122	41-78

SHe PRESS RNG	
TIME	PRESS
LOI ABORT	610-1130
DPS PRESS (106:20)	725-1320

5/10/71



5/10/71

B9

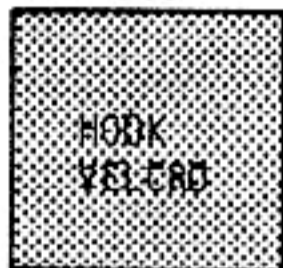
F15

LM COMM MODES

COMM BASIC CONFIGURATION	PRIOR TO DOCKING	PREP FOR UNDOCKING	LM RELAY WITH VHF RING	CSM RELAY	LUNAR STAY	PLSS/EVCS WITH TV (EVA)	PLSS/EVCS WITH LCRU (EVA)
CB 11 ALL COMM CLOSED							
PNL 8 AUDIO SWITCHES							
S-BD T/R - T/R				REC			
ICS T/R - T/R							
RELAY ON/OFF - OFF							
MODE - ICS/PTT			VOX			VOX	VOX
AUDIO CONT - NORM							
VHF A - T/R					OFF	OFF	OFF
VHF B - OFF	RCV	RCV	RCV	REC	RCV		
VOX SENS - MAX INCR							
CB 16 ALL COMM CLOSED							
CB 16 TV - OPEN						CLOSED	OPEN
PNL 14 UPSQU - AS DES	ENABLE	ENABLE	ENABLE	OFF	OFF*	ENABLE	ENABLE
PNL 12 UPDATA LNK-OFF							
PNL 12 AUDIO SWITCHES							
S-BD T/R - T/R			RCV	REC			
ICS T/R - T/R							
RELAY ON/OFF - OFF			ON			ON	ON
MODE - ICS/PTT			VOX			VOX	VOX
AUDIO CONT - NORM							
VHF A - T/R					OFF		
VHF B - OFF	RCV	RCV	RCV	REC	RCV	RCV	RCV
VOX SENS - MAX INCR							
PNL 12 COMM SWITCHES							
S-BD MODULATE - PM						FM	PM
S-BD XMTR/RCVR - SEC							
S-BD PWR AMPL - PRIM							OFF
S-BD VOICE - VOICE							
S-BD PCM - PCM							
S-BD RNG - OFF/RESET		RANGE			AS REQ		
VHF A XMTR - VOICE	VOICE/RNG		VOICE OR VOICE/RNG	VOICE/RNG	OFF		
VHF A RCVR - ON			OFF	OFF			
VHF B XMTR - OFF				OFF	OFF		
VHF B RCVR - OFF	ON	ON	ON	ON		ON	ON
SQUELCH VHF A - NORM						N+1 1/2	N+1 1/2
SQUELCH VHF B - NORM						N+1 1/2	N+1 1/2
TLM BIOMED - AS REQ	RIGHT	LEFT	OFF			OFF	OFF
TLM PCM - HI		LO					
RECORDER - OFF	AS DES	AS DES	AS DES	AS DES	AS DES	ON	ON
PNL 12 COMM ANTENNAS							
TRACK MODE - AUTO					AS REQ	SLEW	SLEW
PITCH CONT - COMP &							
YAW CONT - COMP &							
S-BD SEL - SLEW					AS REQ	SLEW	SLEW
VHF SEL - AFT OR FWD					AFT	EVA	EVA

*DURING EVA - ENABLE.

B15



LOSS OF COMM (PDI)

- 1 VERIFY STANDARD COMM CONFIG
- 2 S-BD SIG STR LOW (<3.0)-REACQ WITH STEERABLE
- 3 STILL NO COMM(SIG STR LOW<3.0)-SELECT BEST OMNI
- 4 STILL NO COMM
DN VOICE BU, BIOMED - OFF (HOT MIKE)
- 5 STILL NO COMM
S-BD: XMTR/RCVR - PRIM AND PWR AMPL - SEC
- 6 60 SEC, STILL NO COMM
VOICE and FM
- 7 60 SEC, STILL NO COMM
CSM RELAY

PM

S-BD AUDIO (BOTH) - OFF
NOTIFY CSM TO CONFIG FOR RELAY

LOSS OF COMM (EVA)

- 1 CK COMM CBs
- 2 SEL ALT S-BD XMTR/RCVR
- 3 IF SIG STR METER < 3.9,
SEL STEERABLE ANT
- 4 CONFIG FOR CDR RELAY:
AUDIO (LMP) AUDIO (CDR)
RELAY-OFF RELAY-ON
VHF A-OFF VHF A-T/R
VHF B-OFF VHF B-RCV
IF COMM OK, PLSS MODE-AR
- 5 CONFIG LM TO B/U EVA MODE
XMTR A-OFF
XMTR B-VOICE
AUDIO (CDR)
VHF A-RCV
VHF B-T/R
PLSS MODE-A(CDR), B(LMP)
- 6 S-BD - DN VOICE BU
- 7 UPDATA LINK - VOICE BU
- 8 VHF ANT-AFT

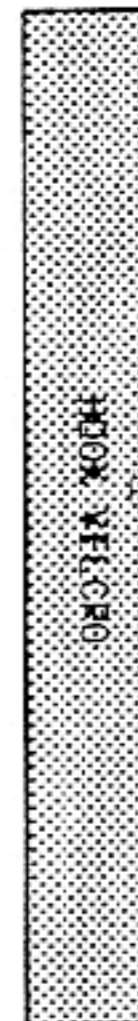
LM COORD	STER ANT	
	PITCH	YAW
+X	90	-45
-X		
+Y	90	45
-Y		
+Z	0	0
-Z	180	0



B4

	F4				
TFI	θ	H	HDOT	OHW	He
:30	308	1.8	91	40	28
1:	305	5.1	124	38	26
1:30	302	9.2	151	36	25
2:	299	14.0	170	34	23
2:30	296	19.4	183	32	21
3:	292	25.0	189	29	20
3:30	289	30.7	190	27	18
4:	285	36.3	184	25	17
4:30	281	41.7	173	22	15
5:	278	46.6	156	19	14
5:30	273	51.0	135	17	12
6:	269	54.7	109	14	11
6:30	265	57.5	81	11	10
7:	260	59.5	50	8	8

LPD LOCAL HORIZONTAL = 8.5°

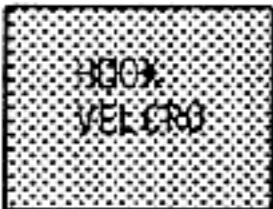


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B6

F6



(DPS)-ASCENT
 (DECA GMBL AC-CLSD)
 S/C CB's(AEA)-CLSD
 (16)DISP OVRD-CLSD
 (THR AUTO-CDR)
 ATT TRANS-4 JETT
 BAL CPL - ON
 (ENG GMBL - ENABLE)
 (DES OVRD - OFF)
 AB/AB STG - RESET
 DB - MIN, RATE - 25
 ATT CONT(3) - MODE
 MODE CONT(2) - AUTO
 STOP(2) - RESET
 TTCA-(THR/-MIN)-JETT

49	54	55	56	60	63	64		
.ΔR	.RX	1/2P	.AZ	V.FWD	ΔH.	TG LP		
Δ.V	RD.T	.EL	.EL	HD.T	HD.T	HD.T		
SEC	.θX	C.EN		H.	H.	H.		
67	68	69	72	74	75	76	77	
LRX	R.G	DN.	.TR	TFI	Δ.H	V.H	TG	
LRZ	TB	X.	.SH	.YX	ΔT	V.V	VG.Y	
	V.I	UP.		.PX	ΔT	X.R	V.I	
78	79	90	92	94	99	TIME		
.RX	.CR	.YX	THR	VG.X	POS	NOUNS		
RD.T	.SP	YD.T	HD.T	HD.T	VE.L	11:CSI		
TFI	POS	P.SI	H.	H.	MR.	13:CDH		
	PRE ASC/CSI			POST			37:TPI	
W	+10000+100+15			+2000+20+5			16:EX.V	
49	+200+120			+80+50			33:TIG	
LM CSM				525:SIDE LOBE-V32				RR NULL-REINIT
400 nm 1.64 1.68				MAIN-ALIGN COAS				N05 INCR-
200 nm 1.94 2.02				PGNS NULL(N49)-V32				REINIT
100 nm 2.22 2.26				VEH	X	ACA	DB	RATE
50 nm 2.42 2.48				CUT OUT				
25 nm 2.60 2.67								
12.5 nm 2.74 2.83						0 4.	0 .3	0 .2
6.25 nm 2.86 2.94				1 ASC	0 2-A	1 20.	1 1.	1 .5
3.12 nm 2.94 3.02				2 DES	1 2-B	CSM.4	2 5.	2 2.
2.0 nm 3.00 3.05				3 CSM	2 4-AB		PWR 1	3 10
6000 ft 3.02 3.06					MIN	20/	.3/.4Y	5/10P
3000 ft 3.04 3.08				ASC	MAX	7.5	5.	30
1500 ft 3.06 3.13					MIN	20	.3/.4Y	5/10P
800 ft 3.12 3.22				DES	MAX	17	5.	10

F5

V57:ENABLE LR
 58:DISABLE LR
 59:LR TO POS 2
 68:TERM TERRAIN

N60:V FWD,HDOT,H
 63:ΔH,HDOT,H
 64:TR/LPD,HDOT,H
 68:RNG,TG,VI
 92:THR,HDOT,H
 94:VGX,HDOT,H

214:AGS
 402:AGS (IF 4 TIMES)
 500:LR DES/1
 511:LR-HVR,N63 FOR
 ΔΔH NONE LR DES
 520:LR RUPT,GO
 522:LR Δ POS,GO
 523:LR NOT 2,GO
 1107:AGS | 1410:AGS
 1406:P66 | (PGNS MAN
 1407:P66 | THR)
 1466:AGS
 2XXXX:AGS 3XXXX:RSET

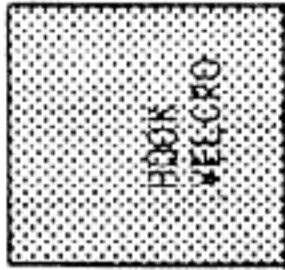
-10:V25N69,P63, (0,111,310)
 :V40N20
 - 5:CB LR - CLOSE
 - 4:FINAL TRIM, GO - NO GO
 - 1:MASTER ARM - ON,MODE - PGNS
 -:30 ENG ARM - DES
 -:07 ULLAGE (+X MANUAL)
 :00 104:28:55 (11 + 03)
 :02 (NO IGN - START)
 :05 DES OVRD - ON,MA - OFF
 THR>80,T/W>1.6,N68VI>18
 :26 THR UP(TTCA-UP BY 31:)(AB)
 1:00 ✓AGS ATT (ERR,RATE<5,
 SHe INCR)
 2:00 V21N69 SYS CK
 3:00 YAW R to ~ 0°
 ΔH OK > 10 SEC:V57 (V58)
 ALT: 30 25 20 15 10
 ΔH: 17 15 12 8 7000
 CONV, THEN OUT →P64
 NO LOCK OR 169 BY 6K(AB)
 →P64:NO LOCK BY 20 SEC(AB)
 LOSS OF LOCK - GO
 5:00 V24N69 SYS CK
 5:30 TFI THR DOWN
 6:00 AUTO YAW AT 30K
 7:28 THR<57% MCC ± 10 SEC
 CMD +40 SEC + ATT CHG(AB)
 P64 +15 SEC : (AB)
 8:00 V23N69
 EVAL MAN CONT : PGNS-AUTO
 8:20 N68:P64 AT TGO = 100(9:23)

ENG STOP - PUSH
 ENG ARM - OFF
 PRO
 DES OVRD - OFF
 PGNS - ATT HOLD
 AGS - AUTO
 PROP/TEMP MON - ASC,
 THEN DES
 ASC He MON - 1, 2
 CB LR - OPEN
 SHe STEADY (DCR:MCC)
 OX:20-40,FUEL:8,CLOSE

5/10/71

ABORT STG - PUSH | PGNS - ATT
 ENG ARM - ASC | HOLD
 STOP - RESET | AGS - AUTO
 START - PUSH | P71

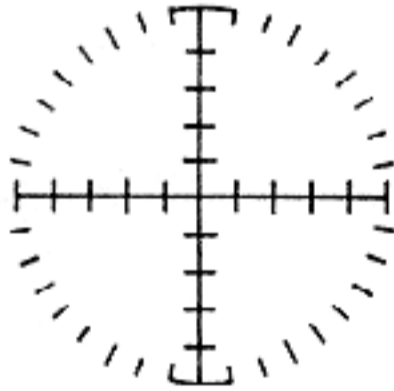
B5



5/10/71



COAS BORESIGHT
LOG



ABORT - DPS	MANUAL	INSERTION
GUID SW -	+ 0: 0°	500:MAIN SOV - OPEN
MODE CONT - AUTO	+20:300°	ASC FEED (2) - CLOSE
ENG ARM - DES	PDI+():270°	200:DES OVRD - OFF
THROTTLE - MAX	PDI+():250°	(EXCEPT BUS LOSS)
<u>TIG:ABORT</u>	SHUTDN=PDI()	ASC ARM - OFF
DES OVRD - ON		(EXCEPT BUS LOSS)
YAW RT 40°		(>30:DPS C.O.-AB STG)
31% DES REG - CLOSE TO 160		0:ABORT/AB STG - RESET
ABORT STAGE - ASC		STOP - PUSH
GUID SW -	BAT 1,3 - OFF	MODE CONT (2)-ATT HOLD
MODE CONT-AUTO	CABIN REPRESS	ARM - OFF
<u>TIG:ABORT STG</u>	DES O2-CLOSE	>400:ATT HOLD :45X9°
ENG ARM - ASC	#1 ASC O2-OPN	<400:ATT HOLD NUL N85
START - PUSH	PRESS REG	PGNS-AGS <10:NULL VGX
ASC FEED-OPEN	A&B EGRESS	TWEAK:257°,10° OHW, 2
MAIN SOV-CLOSE	SUIT GAS	CB RR(2) CLOSE
YAW RT 40°	DIVERT-EGRESS	RR-LGC P20 AUTO
PRPLNT QTY-OFF	CAB GAS RET -	V95 V80 (2.0/12.0)
PRPLNT T/P-ASC	EGRESS	
He MON - ASC	H2O SEL - ASC	
ASC He SEL-BOTH	DES H2O-CLOSE	
MASTER ARM - ON	ASC H2O-OPEN	
THR - JETT		

5/10/71

He PRESS ASC - FIRE
ASC He SEL - BOTH
MASTER ARM - ON
He MON - ASC PRESS
N18(0,270,0)

N86
P42 1706 - PRO
P30

NO PDI + 12 APS ABORT
STAGE - FIRE, +X:2 fps
-X:2 fps

He PRESS ASC - FIRE
ASC He SEL - BOTH
MASTER ARM - ON

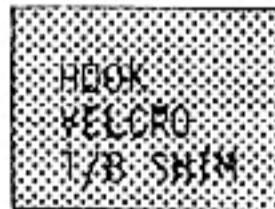
MODE CONT - ATT HOLD
ATT CONT (3) - MODE CONT
DEADBAND - MIN

GUID - 11002 V77, P47
DES BATTS - OFF
ASC BATT(2) - ON

MANUAL STAGE



5/10/71



F16

PAGE 14

DPS BURN

CB(11) DECA GMBL AC - CLOSED
CB(16) DISP/ENG OVRD LOGIC - CLOSED
CB(11&16) STAB/CONT (ALL) - CLOSED
EXCEPT CB(11) AEA - OPEN

RATE SCALE PDI - 25°/SEC

THR CONT - MAN/CDR
- PDI AUTO/CDR

ATT/TRANSL - 4 JETS
BAL CPL - ON
ENG GMBL - ENABLE
DES ENG CMD OVRD - OFF
ABORT/ABORT STAGE - RESET
DEADBAND - MIN
ATT CONT(3) - MODE CONT

MODE CONT PDI PGNS - AUTO
AGS - AUTO

STOP PB (2) - RESET
TTCA (2) - THROT/Min PDI LMP TTCA-SOFT STOP

FOR PDI GO TO TIMELINE BOOK

-2:00 400+1

-1:00 MASTER ARM - ON (1st BURN)

- :30 ENG ARM - DES

FOR AGS BURN ABORT PB - PUSH (T=0 FOR AGS)

-:07.5 ULLAGE (MANUAL FOR AGS)

- :05 PRO

+ :01 DES He REG (1) - OPEN (>31%)
TFC-10 DES He REG (2) - CLOSE (<86%)
 $\Delta V=0$ STOP PB - PUSH
ENG ARM - OFF
ABORT PB - RESET

5/10/71

NO PDI+12 APS ABORT

ASSUMPTIONS:

PDI CHECKLIST COMPLETE TO TIG.
DPS INOPERATIVE.

V37E 30E

LOAD NO PDI+12 PAD

V37E 42E

01706 ALARM, PRO

N86

410+5, LOAD ΔV

370 R

N18 R, P, Y (0, 270, 0)

SET DET

He MON - ASC PRESS

MASTER ARM - ON

ASC He SEL - BOTH

✓CB(11&16)

ED LOGIC PWR(2)-CLOSED

He PRESS ASC - FIRE

DES 02 - CLOSE

#1 ASC 02 - OPEN

H20 SEL - ASC

DES H20 - CLOSE

ASC H20 - OPEN

V48,11002

CHECK APS BURNAPS BURN

CB(16)

DISP/ENG OVRD LOGIC - CLOSED

CB(11&16) AEA AND DECA PWR AND

STAB/CONT (ALL) - CLOSED

EXCEPT

CB(11) AEA AND DECA PWR AND

CB(16) DES ENG OVRD - OPEN

CB(16) EPS:

CROSS TIE BAL LOADS - OPEN

RATE SCALE - 25°/SEC

ATT/TRANSL - 4 JETS

BAL CPL - ON

DEAD BAND - MIN

ABORT/ABORT STAGE - RESET

ATT CONT(3) - MODE CONT

MODE CONT - ASCENT - PGNS - AUTO

AGS - AUTO

STOP PB (2) - RESET

TTCA (2) JETS

-2:00 400+1

AGS/PGNS

-1:00 MASTER ARM - ON

RCS STAGE

-:14 MANUAL ULLAGE

-:10 STAGE-FIRE

-:10 ABORT STAGE PB - PUSH(T=0 FOR AGS)

ENG ARM - ASC

-:05 PRO

:00 ENG ON

+:01 ENG START - PUSH

200 fps ENG ARM - OFF

0 fps ABORT STAGE - RESET

STOP PB - PUSH

DPS ABORT/INSERTION

APS ABORT/INSERTION

✓GUID SW
 THROTTLE-UP
 ABORT PB-PUSH
 MODE CONT(2)-AUTO
 YAW RT 40°
 623+1
 ✓INVERTER
 V16N85 (500R)
 31% DES He REG (2)-CLOSE
 200fps DES ENG CMD OVRD-OFF
 (UNLESS CDR BUS LOSS)
 TFC-10 DES He REG (2) -Close (<86%)
 STANDBY TO COPY GET
 0fps STOP PB - PUSH
 DET - STOP
 GET
 MODE CONT-ATT HOLD
 ENG ARM-OFF
 ABORT (STAGE)-RESET
 STOP PB - RESET
 ΔV 404,5,6=0 470R

✓GUID SW
 ABORT STAGE PB-PUSH
 MODE CONT(2)-AUTO
 ENG ARM-ASC
 START PB-PUSH
 ASC FEED(2)-OPEN + (UNLESS
 MAIN SOV-CLOSE + BUS LOSS)
 YAW RT 40°
 623+1
 CABIN REPRESS - CLOSE
 DES O2-CLOSE, #1 ASC O2-OPEN
 PRESS REGS A&B - EGRESS
 SUIT GAS DIV - EGRESS
 CABIN GAS RETURN - EGRESS
 H2O SEL-ASC
 DES H2O-CLOSE, ASC H2O - OPEN
 PROP TEMP/PRESS-ASC
 He MON-ASC
 ✓XFEED
 ✓INVERTERS
 THROTTLE/JETS-JETS
 V16N85 (500R)
 MAIN SOV-OPEN +
 ASC FEED(2)-CLOSE +
 ENG ARM-OFF (UNLESS BUS LOSS)
 STANDBY TO COPY GET
 ABORT STAGE-RESET
 STOP PB-PUSH
 DET-STOP
 GET
 MODE CONT-ATT HOLD
 ΔV 404,5,6=0 470R

ABORT RULES

1	ATT & RATE LIMITS DPS >5° SEC APS >10° SEC	500fps	
2	DPS SHUTDOWN <30 fps - STAGE & RCS >30 fps - ABORT STAGE	200fps	
3	APS UNDER BURN	0fps	
	PGNS		AGS
	<400 NULL RESIDUALS		AUTO, A/H 15FPS
	>400 A/H BURN Ha, Hp, HDOT		
4	INSERTION WITH VOICE-GROUND RECOMMENDS TRIM SOURCE AT TGO ~ 1 MIN TRIM TO <2fps (AGS X AXIS ONLY) AND STANDBY FOR TWEAK AT INSERTION +2 MINUTES(10° OHW OR 257° FDAI)		
5	NO VOICE AGS & PGNS <10fps TRIM ACTIVE SYSTEM AGS & PGNS >10fps TRIM SYSTEM THAT AGREES WITH RR		

STAGING

ASC BATT (2)-ON(PRECONDITION)
 DES BATTs-OFF
 MODE CONT (2)-ATT HOLD
 DEADFACE
 ✓GUID SW (IF PGNS: DAP 11002, V77)
 ATT CONT (3)-MODE CONT
 BAL CPL-ON
 DEAD BAND-MIN
 P47, 404,5,6=0 470R
 HELIUM MON-✓ ASC PRESS
 MASTER ARM-ON
 ASC He SEL-BOTH
 ✓CB ED LOGIC PWR (2)-CLOSED
 He PRESS ASC-FIRE
 STOP PB-PUSH
 -X TRANS 2 fps
 STAGE-FIRE
 +X TRANS 2 fps
 CB(11&16) ED LOGIC PWR (2)-OPEN
 CABIN REPRESS-CLOSE
 DES O2-CLOSE, #1 ASC O2-OPEN
 H2O SEL-ASC
 DES H2O-CLOSE, ASC H2O-OPEN
 PRESS REG A&B-EGRESS
 SUIT GAS DIV-EGRESS
 CABIN GAS RETURN-EGRESS
 ATT/TRANSL-2 JETS
 POO
 STOP PB-RESET

 ✓GUID SW

DPS ABORT/APS INSERTION

✓GUID SW
 THROTTLE-UP
 ABORT PB-PUSH
 MODE CONT (2)-AUTO
 YAW RT 40°
 623+1
 31% DES REG-CLOSE
 BURN DPS TO DEPLETION
 ABORT STAGE PB-PUSH
 ENG ARM-ASC
 START PB-PUSH
 ASC FEED(2)-OPEN + (UNLESS
 MAIN SOV-CLOSE+ BUS LOSS)
 CABIN REPRESS-CLOSE
 DES O2-CLOSE, #1 ASC O2-OPEN
 H2O SEL-ASC
 DES H2O-CLOSE, ASC H2O-OPEN
 PRESS REGS A&B-EGRESS
 SUIT GAS DIVERter-EGRESS
 CABIN GAS RETURN-EGRESS
 PROP TEMP/PRESS-ASC
 He MON-ASC
 ✓XFEED
 ✓INVERTER
 THROTTLE/JET-JETS
 CB(11) RR(2) - CLOSED
 V16N85 (500R)
 500fps MAIN SOV-OPEN +
 ASC FEED (2) - CLOSE +
 200fps ENG ARM-OFF (UNLESS BUS LOSS)
 STANDBY TO COPY GET
 0fps ABORT STAGE-RESET
 STOP PB-PUSH
 DET-STOP
 GET
 MODE CONT-ATT HOLD
 ΔV 404,5,6=0 470R

ALARM CODES (PDI)

CODES	DEFINITION	ACTION
00214	LGC USING IMU WHEN POWER TURNED OFF	GUID CONT - AGS
00402 (4 TIMES)	DAP STEERING LOST	GUID CONT - AGS
00511	NEITHER OR BOTH LR ANT POSITION DISCRETES PRESENT	LDG ANT - HOVER, NO ΔH (N63) UPDATE (10 SEC): LDG ANT - DES
01107	PHASE TABLE DISCREPANCY	GUID CONT-AGS (LAND MANUALLY IF DESIRED)
RECURRING 01406	TGO COMP FAIL (P64)	NO GUIDANCE, SWITCH TO P66 OR SWITCH TO AGS
RECURRING 01410	DES GUIDANCE EQUATIONS OVERFLOW (P64)	NO GUIDANCE, SWITCH TO P66 OR SWITCH TO AGS
01412	NON CONVERGING P63 TIG	MSFN UPLINK NEW S.V. & TARGET
01466	INSUFFICIENT THROTTLE SERVICING (P66)	IF RECURS, MAN THR & ATT HOLD (or AGS)
01703	TIG SLIPPED DUE TO INTEGRATION	IF LARGE IGNITION DELAY-DO NOT BURN PDI IF SMALL IGNITION DELAY-MANUALLY THROTTLE UP AT DET N+26
2XXXX	ALL POODOO'S (EXCEPT 21406)	GUID CONT - AGS
21406	BAD RETURN FROM TIME TO TGT RTN (P63)	MSFN UPLINK NEW S.V. & RECALL P63
RECURRING 3XXXX	ALL SOFTWARE RESTARTS (BAILOUT)	CONTINUE-INSURE NO UNSAFE CONDITION DEVELOPS.
N49	RMAX VMAX <.3nm; 2.0fps	1. IF STEADY STATE-RESET 2. REJECT FIRST MARK THEN ACCEPT NEXT COUPLE OF MARKS AND MONITOR FOR NEXT CONVERGENCE >2.0nm OR 12.0fps PRIOR TO CSI OR >.8nm OR 5.0fps AFTER CSI CONSIDERED EXCESSIVE
F97N63	LGC THINKS ENG FAILED	PRO TO SET ΔV MON. DO NOT ENTER BECAUSE IT WILL SLIP TIG IF RECURRING, NO GUIDANCE

MISSION RULES NO-GO'S

	PRE PDI	PDI TO PDI +6+10	PDI +6+10 TO HI GATE	HI GATE TO TD		
PAGE 19	EPS	ONE DC BUS ONE DESCENT FEEDER SHORTED ONE ASCENT FEEDER SHORTED 4 DESCENT BATS ONE ASCENT BAT BOTH INVERTERS AC BUS A AND B	ABORT ABORT ABORT ABORT ABORT ABORT ABORT	ABORT ABORT ABORT ABORT ABORT ABORT ABORT	ABORT ABORT ABORT GO GO GO GO	
	ED	ONE PYRO SYSTEM ARMED ONE PYRO SYSTEM DEARMED ONE STAGING RELAY CLOSED ONE PYRO SYSTEM BATTERY	ABORT ABORT ABORT ABORT	ABORT GO ABORT GO	ABORT GO ABORT GO	
	B18	ECS	CABIN PRESS <4.4 SUIT LEAK BOTH SUIT FANS BOTH DEMAND REGS BOTH H2O SEPS BOTH DESCENT O2 TANKS BOTH ASC O2 TANKS PRI OR SEC COOLANT LOOP PRI OR SEC H2O FEED BOTH DESCENT H2O TANKS BOTH ASC H2O TANKS	ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT	ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT ABORT	GO ABORT GO GO GO GO GO GO GO GO
		G&C	PGNS GUID STEER 3 AXIS ATT CONT PGNS RATE CMD & PGNS AUTO AGS RATE CMD 2 ACA AUTO +X & AUTO DPS IGNITION 2 FDAI-ATT/RATE/ERR LR REDNT APS ON P & R GDA TRIM (IMPING CONST VIOL) MANUAL THROTTLE (2 TTCA) & AUTO THROT	ABORT	ABORT	GO
				ABORT ABORT ABORT GO OPTION ABORT ABORT ABORT ABORT	ABORT ABORT ABORT GO OPTION ABORT GO ABORT ABORT	OPTION OPTION OPTION GO OPTION GO ABORT ABORT
				ABORT ABORT	ABORT ABORT	ABORT ABORT
				ABORT ABORT ABORT	ABORT ABORT ABORT	OPTION GO GO
				ABORT ABORT ABORT	ABORT ABORT ABORT	OPTION GO GO
ABORT ABORT ABORT				ABORT ABORT ABORT	OPTION GO GO	
ABORT ABORT ABORT				ABORT ABORT ABORT	OPTION GO GO	
ABORT ABORT ABORT				ABORT ABORT ABORT	OPTION GO GO	
ABORT ABORT ABORT				ABORT ABORT ABORT	OPTION GO GO	
DPS	PROP LEAK (ΔQ FU/OX > 10%) FU OR OX INLET/ULLAGE < 160 BINGO/2%			ABORT ABORT	ABORT ABORT	ABORT ABORT ABORT
APS	PROP LEAK FU/OX INLET PRESS < 62, > 220 APS HE 1 OR 2 DECREASING	ABORT ABORT ABORT	ABORT ABORT ABORT	ABORT ABORT ABORT		
RCS	HE/PROP LEAK PROP LEAK (DOWNSTREAM OF MAIN) FU/OX MNFLD A OR B PRESS < 100	ABORT ABORT	ABORT ABORT	GO GO		

5/10/21

ABNORMAL VEHICLE DYNAMICS

Use ACA Hardover to Stabilize Vehicle
 If RCS TCA LT ON-CB QUAD TCA - OPEN
 GUID CONT-AGS, MODE CONT-ATT HOLD, ATT CONT(3)-MODE CONT,
 V77E (PGNS ONLY)
 If Not Stabilized-CB(11) STAB/CONT:ATT DIR CONT-OPEN
 If Not Stabilized-TTCA/TRANSL(2) - DISABLE, DEADBAND - MAX
 If Not Stabilized-ACA PROP(2) - DISABLE

RAPID IMU REALIGN

- 1) AGS INERTIAL FDAI TO 0°, 0°, 0°
 - 2) V41 N20E, E, E, E,
 - 3) V40 N20 0°, 0°, 0° ON AGS FDAI, ENTR
 WAIT 11 SEC.
 - 4) P51E, PRO, P00E
 - 5) V25N07E, 77E, 10000E, 1E
 - 6) PERFORM P52, OPTION 3 (AUTO OPTICS ARE GOOD)
- NOTE: FOR TEMPORARY LOSS OF CDR'S BUS, UPDATE
 LGC CLOCK WITH V55 TO COMPLETE RECOVERY.

LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)
DC BUS BATTERY W&C LTS: CDR X-POINTER THRUST	CDR BUS FAILURE	(DPS GOES TO 100% And GDA LOCKED) GUIDE CONT - AGS, SUIT FAN - 2, CDR AUDIO CONT - BU, S-BD-XMTR/RCVR & PWR AMPL - PRIM, INV 2, Activate Sec Glycol Loop <u>TO START DPS:</u> DES ENG CMD OVRD - ON <u>TO STOP DPS:</u> DES ENG CMD OVRD - OFF, ENG ARM - OFF <u>TO START APS:</u> AGS Auto ON <u>TO STOP APS:</u> AGS Auto OFF, ABORT STAGE - Reset UNSTAGED (M45) STAGED (M47)
DC BUS BATTERY W&C LTS: LMP X-POINTER, PROP PRESS RCS PRESS, QTY ECS PRESS, GLYCOL, QTY	LMP BUS FAILURE	(DPS GOES TO 100% And GDA LOCKED) GUID CONT - PGNS, SUIT FAN - 1, LMP AUDIO CONT - BU, PWR AMPL - SEC, INV 1 <u>TO START APS/DPS:</u> ENG START - PUSH <u>TO STOP APS/DPS:</u> ENG STOP - PUSH UNSTAGED (M45) STAGED (M47)
ASC PRESS	Either He Press<2775psi (Before Staging)	IF APS NOT PRESSURIZED - CONSULT MSFN, GO TO MAL PROC APS-1 IF APS PRESSURIZED - CLOSE ASC He REG 1 & 2: MONITOR ASC He PRESS; IF BOTH <2775 AND DECREASING - IMMEDIATE LIFTOFF MONITOR FUEL/OXID PRESS; IF EITHER DECREASING - IMMEDIATE LIFTOFF (M37)
DES REG	220 psi>He Press>260psi	DES He REG 1 - CLOSE, DES He REG 2 - OPEN Monitor TEMP/PRESS, Maintain FUEL & OXID>160psi (M31)
CES AC	ATCA AC Out of Tolerance	GUID CONT - PGNS, GYRO TEST - POS RT. <u>If Light Stays ON</u> , CWEA Fail. Poss Loss of AGS Control, FDAI Rate Needles Unreliable,RR Usable In LGC Mode Only. (M27)
CES DC	ATCA DC Out of Tolerance	GUID CONT - PGNS, GYRO TEST - POS RT. <u>If Lt Stays ON</u> , CWEA Fail, If Lt OFF - Cycle CWEA CB, If Lt Stays OFF, Cycle DECA GMBL AC CB To Unlock Throttle. If Lt Reappears: Poss GDA Lock-up, DPS To 100%, No AGS Attitude Control (M27)
AGS	AGS Power Supply Out of Tolerance,AGS Heater Failed ON,AGS Self Test Failed	GUID CONT - PGNS. If PGNS Unavailable: MODE CONT (AGS) - ATT HOLD, AGS RATE CMD OK, But NO ATT HOLD (Free Drift). 412R, Self Test. (M17)

LIGHT	MEANING	IMMEDIATE ACTION (POSSIBLE OPERATIONAL IMPLICATIONS)	
LGC	LGC Power, Scaler, or Counter Fail	GUID CONT - AGS. Poss No Auto Eng Shutdown. If RESTART Lt ON, LGC Fail. CB(11) AEA - CLOSE	(M10)
SS	IMU, ICDU or PIPA (Thrusting) FAIL	GUID CONT - AGS. Pos No Auto Eng Shutdown. IF PROG Lt NOT On, CWEA Fail. CB(11) AEA - CLOSE	(M9)
RCS TCA	One Or More Thrusters Fail Off, Collinear Thrusters Firing Simultaneously	If Stable, Recycle CWEA. If Unstable (or unusual thruster activity) Affected CB QUAD TCA - Open, LGC THR PAIR CMDS - DISABLE During ullage (PDI), if RCS TCA lite and quad flag comes on: Pull CB for 1st flag. If 2nd flag appears, pull CB, DISABLE and reclose 1st CB	(M42)
RCS A REG RCS B REG	165psi>Reg Press>218psi	Monitor MANF PRESS, When <100psi: Bad System MAIN SOV - CLOSE, CRSFD - OPEN	(M42)
ASC HI REG	Manf Press>220psi	ASC He REG 1 & 2 CLOSE, When <220psi, Open Each REG Separately.	(M38)
ASC QTY	<10 Sec Burn Time	MAIN SOV (2) - OPEN, ASC FEED 2 (2) - CLOSE	(M38)
ENG GMBL	GMBL Cmd/Response Discrepancy	ENGN GMBL - OFF. If Lt Still ON: ENG GMBL - ENABLE (CWEA FAIL)	(M25)
INVERTER	AC VOLTS <112 398>FREQ>402	Check AC VOLTS & FREQ. Switch to INV - 2. Bus A&B BUS TIE INV 1 (2) - OPEN (INV 1 Feeder Short). BUS B: BUS TIE INV 2 - OPEN (BUS B Short) BUS A&B: BUS TIE INV 1 (2) - CLOSE. Select INV 1. BUS A: BUS TIE INV 2 - OPEN (INV 2 Feeder Short). BUS A: BUS TIE INV 1 - OPEN (BUS A Short, Lt Stays ON; Close BUS B: BUS TIE INV 2 Before Selecting INV 2).	(M49)
BATTERY	BATT OVERTEMP REV CURRENT >10A OVERCURRENT	UNSTAGED: Check All BATS VOLTS, AMPS & TB's If VOLTS, AMPS OK: Faulty BAT - OFF Then ON If VOLTS, AMPS NOT OK: Faulty BAT - OFF, CB (11&16) CROSS TIE BAL LOADS - CLOSE STAGED: Check BAT 5, 6 VOLTS, AMPS & TB'S If VOLTS, AMPS NOT OK: CB (11&16) CROSS TIE BUS - CLOSE Faulty BAT: NORMAL FEED - OFF, Good BAT: BACKUP FEED - ON	(M48) (M48)
STAGE RELAY	ED Relays K1 To K6 CLOSE With MASTER ARM - OFF	BEFORE PDI: Do NOT Set MASTER ARM-ON, STAGE RELAY - RESET, Appropriate LOGIC POWER CB - OPEN AFTER PDI: Do NOT Set MASTER ARM - ON, STAGE RELAY - RESET If STAGE SEQ RELAYS Lt Still ON: ASC He PRESS - FIRE, Monitor ASC Fuel/Oxid Press. If APS Pressurizes, ABORT	(M73)
STAGE SEQ RELAY LT. OFF AT PDI	Possible Relay Fail	AT PDI: MASTER ARM - OFF, Open LOGIC PWR CB On System Which Had SEQ LT - ON, MASTER ARM - ON. At Ignition Monitor DPS SHe And FUEL/OXID PRESS. SHe Tank Inoperative: STOP PB - PUSH, ENG ARM - OFF. SHe Tank OK: MASTER ARM - OFF, LOGIC PWR CB - CLOSE	(M73)
RCS	A OR B He Press<1700	Monitor He PRESS & RCS QUANTITY. Affected Sys:LGC THR PAIR CMDS (4)-DISABLE, MAIN SOV - CLOSE, CB(11 or 16) QUAD TCA (4) - Open. Monitor MANF PRESS Go to Mal Proc RCS 1	(M41)

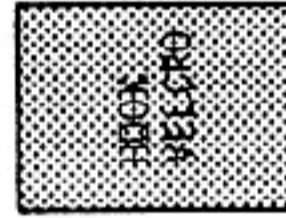
F21		B21	
H	HDOT 5/10/71		
7000	162.0		
6000	157.0		
5000	135.0		
4000	112.0		
3000	90.0		
2000	62.0		
1000	33.0		
500	16.0		
400	13.0		
300	9.0		
200	5.0		

F20

ASC PRESS	ASC He REGS CLOSE; MAINTAIN P>125, ΔP<10	ASC HI REG	ASC He REGS (2):CLOSE, OPEN (1) WHEN P<220
DES REG	REG 1-CLOSE, 2-OPEN, MAINTAIN P>160	ASC QTY	BT <10 SEC
DES QTY	<5.8%		
CES AC	GUID CONT-PGNS, GYRO TEST - POS RT (LT ON: CWEA)(NO AGS CONT, RR - LGC ONLY, NO RATE NEEDLES	INVERTER	+ VOLTS<112:CB AC BUS A/B INV 1: OPEN:LT OFF:INV 1 FAIL
CES DC	GUID CONT-PGNS, GYRO TEST - POS RT (LT ON: CWEA) LT OFF: CYCLE CWEA; LT OFF: CYCLE DECA GMBL TO UNLOCK THR CONT(NO THR, NO GMBL, NO AGS D.B., DPS TO 100%)(PGNS + AGS AUTO APS IGN LOST)	BATTERY	+ BATT FAULT - BATT FAIL (NONE = CWEA)
AGS	GUID CONT-PGNS (412R)(NO AEA, ATT HOLD - OK, NO ATT D.B.)	RNDZ RDR	+ NO TRACK:RDR TEST, RR (15 SEC) OR CB RR:OPEN (10 SEC), THEN SLEW (2 SEC)
LGC	GUID CONT-AGS (RESTART, DSKY BLANK: LGC FAIL - CB [11] AEA - CLOSE)	PRE AMPS	RR:SLEW:IF RR LT OFF:CWEA, ON:NO TK LT FAIL
ISS	GUID CONT-AGS (PROG:ISS)(NO PROG: CWEA)	ED RELAYS	+ CES AC:NO ASA, RR LGC ONLY + CB ATCA - CYCLE DECA GMBL
RCS TCA	IF STABLE, CYCLE CWEA	RCS	MASTER ARM:OFF, STG RELAY RESET, CB LOGIC - OPEN
RCS A REG	(165<MANIF PRESS<218): HI: GO, MON He, LO: IF <100, SOV, XFEED	HEATER	+ He >1700:CWEA, He <1400: SOV- CLOSED
DC BUS	+ BATT + DC FAULT + TB BP = FEED SHORT (IF BATT 5:NO AGS; IF BATT 6:NO PGNS) + DC FAULT + TB BP = NORM FEED FAIL GO BKUP FEED:5 TB:NO AGS, 6 TB:NO PGNS + NORM VOLTAGE = CWEA	ECS	RR TEMP, S-BAND TEMP MON: CB'S OPEN IF LT ON
CABIN	+ LO CABIN PRESS:DUMP VLVS-CLOSE, PRESS A/B-EGRESS	O2 QTY	IF NO COMP LT ON:CWEA
SUIT FAN	+ SUIT FAN COMP:CB 16 ΔP - OPEN + FLOW + SUIT PRESS = CWEA	GLYCOL	O2 QTY >10%:CWEA
			+ GLY TEMP >50 + SUIT TEMP >60: PRI EVAP FLO 1 - CLOSED:PRI EVAP FLO 2:OPEN IF NO TEMP DECR (5 MIN):PRI EVAP FLO 1&2:CLOSE, H2O TK-SEC, GLY-SEC, CB GLY PUMP SEC-CLOSE, SEC EVAP FLO-OPEN + GLY TEMP <50:CB GLY PUMP 1 - OPEN: GLY PRESS DECR:LEAK
			STG SEQ LT OFF:AT PDI:MA-OFF, CB LGC(ON LT)-OPEN MA-ON. AT IGN, SHe INOP:STOP;SHe OK, MA-OFF, LGC-CLOSE

5/10/71

B20



LGC + DC BUS + BATT

GUID CONT - AGS
DES ENG OVRD - ON
CDR AUDIO - BU
GLYCOL - SEC
SUIT FAN - 2
DPS MANUAL - OFF
(ARM, OVRD, STOP)

START (MAN)
GASTA
THRUST, TAPE
RCS - FEED A
RR, LR
INV 1
DIR, PULS, +X

CES DC + DC BUS + BATT

GUID CONT - PGNS
SUIT FAN - 1
LMP AUDIO - BU
INV - 1
ABT STG:
ENG ARM - ASC
MAN START, MAN STOP

DES OVRD
AUTO THROT, TH CMD
AUTO IGN, AUTO OFF
RATE NEEDLES
RCS - FEED B, XFD
RR SLEW, AUTO TRACK
INV 2

AC-A

CB BUS TIE A (2) - OPEN
RR - LGC
LMP FDAI - AGS
GDA
GASTA
CDR FDAI
TAPE HDOT/RDOT

AC-B

CB BUS TIE B (2) - OPEN
CDR FDAI - PGNS
DEDA
FDAI - AGS
LMP - FDAI

5/10/73

12/01/75

