CONTINGENCY EVA

7/13/71

A CM PREP

1 C&R SUIT FLOW-OFF, Interconn (A-8)
2 Stow Hoses C-Tunnel, R-Tunnel Handstraps
3 Install EVA Stabilizer Strut
4 TSBs Instld R&L Grth Rng & LEB
5 Tool Kit (A-8) Jack Screws Open Snap to LH Girth Ring
6 Unstow EMU Maint Kit (A-8) Stow CDR TSB (Top PKT)
7 Hatch Cntrbal - Pull Pip Pin, Stow CDR TSB (Top PKT)
8 Pos MDC Ingress Bar as desired
9 Install MDC Bars (side A-8)
10 Stow A-9 btw Z-Z Struts

B CAB PREP

1 Depress tunnel, if docked
2 Stow Optics, COAS, Cameras, Bkt (TSB)
3 Set Up Comm Panels
4 Remove Hel Shld - PGA bag
5 Disconnect PGA BAG from couch, (4 places)
6 Remove ctr couch, stow under RH couch using 2 straps (R-5)
7 Close, Lock Marmon clamps
8 Unzip Fecal Bag (PGA Bag)
9 Disconnect PGA Bag stow under RH couch
10 Stow RHC 1 - F1
11 L&R Couch - Stow Couch Pans 0°
12 LH X-X Strut - Disconn/Tie Off
13 Stow in Jett Bag A9 contents & partition misc waste
14 Unstow B5 & B6
15 Pos JETT Bag, secure strings

C SYSTEM PREP FOR DEPRESS

1 Pnl 2, CABIN FANS - OFF
2 Pnl 325, CAB PRESS REL vlv (2) - NORMAL
3 Pnl 351, CAB REPRESS - OFF
4 Pnl 326, REPRESS PKG vlv - FILL
5 Pnl 602, REPRESS O2 865-935 psi
6 Pnl 600, EMERG O2 vlv - CLOSED
7 Pnl 601, REPRESS O2 vlv-CLOSED
8 Pnl 326, SURGE TK vlv-ON
9 Pnl 2, PRESS CRYO ind QTY - SRG/3
10 Pnl 2, 1/SRG ind 865-935 psi
11 Sel Cont Mode, Mnvr to EVT Att
12 Check LM Prep Status

D PLSS/COMM CK (if Reqd)

1 VHF AM A - DUPLEX
2 VHF AM B - OFF (Ctr) (Verify)
3 VHF RANGING-OFF (Verify)
4 Pnl 9, VHF AM - T/R
5 Verify Comm With:
2 PLSS-CDR(EVCS#1) Then
LMP (EVCS#2) - or
1 PLSS-EVCS #1 or #2

E PREP FOR DEPRESS

1 EXT LTS-RUN/EVA - on (Up)
2 EXT LTS-RNDZ/SPOT - Off (Ctr)
3 L O2 Hoses (R/R,B/B) - Locked
4 PGA FLOW DIV vlvs - as desired
5 PGA Zipper - Lock-Lock

CONTINGENCY CONTINUED

6 Helmet Feedport Cover Locked
7 Apply Anti-fog (EMU Kit, CDR TSB, Top Pkt) DRY
8 Don Helmet, Shield,& Gloves
9 Pnl 380, SUIT CKT RET vlv - CLOSE (Push)

10 Pnl 351, EMER CAB PRESS - OFF
11 Ck Conn-Hel, Glv, O2 Comm, Feedport

F PRESS INTEGRITY CK-DECAL - EVT

G CABIN DEPRESS-DECAL - EVT

H HATCH OPENING-DECAL - EVT
1 JETT: Bag, B5, B6
2 Station Keep at LM FWD Hatch

I AUTO RCS SEL-UNDOCKED Xfer:
1 PITCH A3 & C4 - OFF
2 Verify 1/2° Deadband
3 DOCKED-ALL (OFF)

J OPS/PURGE START TIMER

K CM INGRESS
(PROTECT RHC)
1 CDR Hd 1st, Face to MDC
2 Retrieve O2 Hoses
3 Secure Position
4 Manage Lifeline
5 LMP:Ft 1st, Face Up, In Ctr Couch
6 Back Off From LM

7 Conn Elec Umbs, Verify Comm
8 PLSS PRIM & AUX Feedwater vlv - CLOSE

L VAC XFER TO CM ECS
OPS (25 Min From OPS O2 ON)
1 SUIT FLOW vlv - OFF
2 Remove Interconn
3 Conn O2 Hoses R/R, B/B
4 PURGE vlv - CLOSE
5 SUIT FLOW vlv - Full Flow
6 OPS O2 vlv - OFF

PLSS/OPS
1 SUIT FLOW vlvs - OFF
2 Remove Interconn
3 Disconn PURGE vlv, OPS Hose
4 Conn Hoses R/R, B/B
5 SUIT FLOW vlv - FULL FLOW
6 O2, FAN, Pump - OFF

M HATCH CLOSING-DECAL (C/7-12)

N CABIN REPRESS-DECAL
Go to CSM CONTINGENCY C/L Page C/7-6,9,13

EMER CAB REPRESS

A. CMP on OPS (Umbil flow OFF)

Use EVT Cabin Repress decal, omit steps 3&4 (gross cabin leak check)

B. SURGE TANK Decreasing Rapidly

Hatch Dump Vlv - CLOSE
OPS O2 - OFF (Ver)
Discon OPS Hose from PGA
OPS O2 - ON
CABIN PRESS ~ 3 PSIA

P302 SUIT FLOW - OFF (Ver)
Remove CMP ECS Interconnect
Purge Vlv - Open, HI
P603 EVA Sta O2 - OFF
P604 SUIT PRESS ALARM - OFF

Discon PCV
When PGA Press zero (PSID)
Conn ECS to PGA R/R, B/B
P302 SUIT FLOW - FULL
Purge Vlv - CLOSE

P351 CABIN REPRESS Vlv - OPEN
Maintain 150 PSIA in Srg Tk
When Cabin PRESS >4.7,
CABIN REPRESS Vlv - CLOSE
EMER CAB PRESS - BOTH

7/13/71

CMP EVA MALFUNCTIONS

1. Cuff Gage <3.7 (Tone-ON 3.4-3.1)

OPS - ON

If cuff gage responds:

- Verify SCU & EVA Sta O2 - OPEN
- If Open:
  - PCV - Close, Purge Vlv - Hi
    - If cuff gage >4.0 and rising,
      - SCU - Close (PCV failed open)

If cuff gage does not respond:

PCV - Close momentarily (∿5 sec), then OPEN

If still no cuff gage response,

- OPS - OFF (Cuff gage failure)

If cuff gage increases,

- PCV - Close, Purge Vlv - Hi
  - If cuff gage >4.0 and rising,
    - SCU - Close (PCV failed open)

2. Cuff Gage >4.0

OPS - ON, SCU - CLOSE

Monitor cuff gage one minute max

If cuff gage responds:

- PCV - CLOSE
- Purge Vlv - Hi
- EVA Sta O2 - OFF
- (PCV failed closed)

If cuff gage does not respond:

- SCU - OPEN
- OPS - OFF
- (Cuff gage failed)

3. Tone - ON, Cuff gage 3.7-4.0

OPS - ON

Verify SCU & EVA Sta O2 - OPEN

If Open:

- Check EVA Panel gage
- If not normal, >500 or <100
  - SCU - CLOSE
  - PCV - CLOSE
  - Purge Vlv - Hi
- If normal, 500-100:
  - SUIT PRESS ALARM - OFF
  - (Warning system failure)

If Closed:

- Open valve

7/21/71

CMP EVA MALF-CONTD

4. LOSS OF COMM FROM EVA

Ver S-BD MODE VOICE sw not in RELAY
Pnl 10 Vox Sens - 9
Check Vol Thumbwheels
Pnl 10 MODE - INTERCOM/PTT
If Voice ok: (Pnl 10 Vox fail)
If Voice not ok:
Pnl 10 AUDIO CONT - BACKUP
If Voice ok:
(CMP Audio Center fail)
Pnl 9 - MODE VOX
Vox Sens - as reqd
Vol Thumbwheels - as reqd
If Voice not ok:
(Personal component failure)

5. EVA Cooling Inadequate, Cuff gage normal

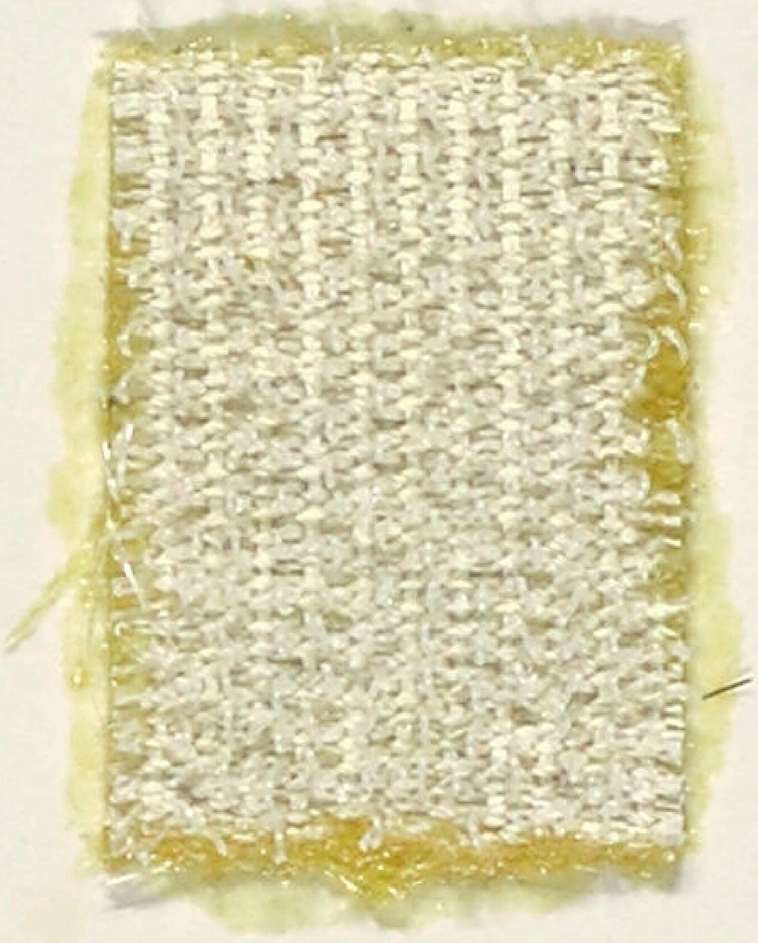
Check EVA panel gage
If low, <100 psi:
OPS - ON
SCU-CLOSE, PCV-CLOSE
Purge Vlv - Hi
EVA Sta O2 - OFF
(System leakage)
If high, >500 psi:
(Restriction in system)
Monitor cuff gage often
If normal, 500-100 psi:
(EVA working too hard or system leakage)
Monitor cuff gage often

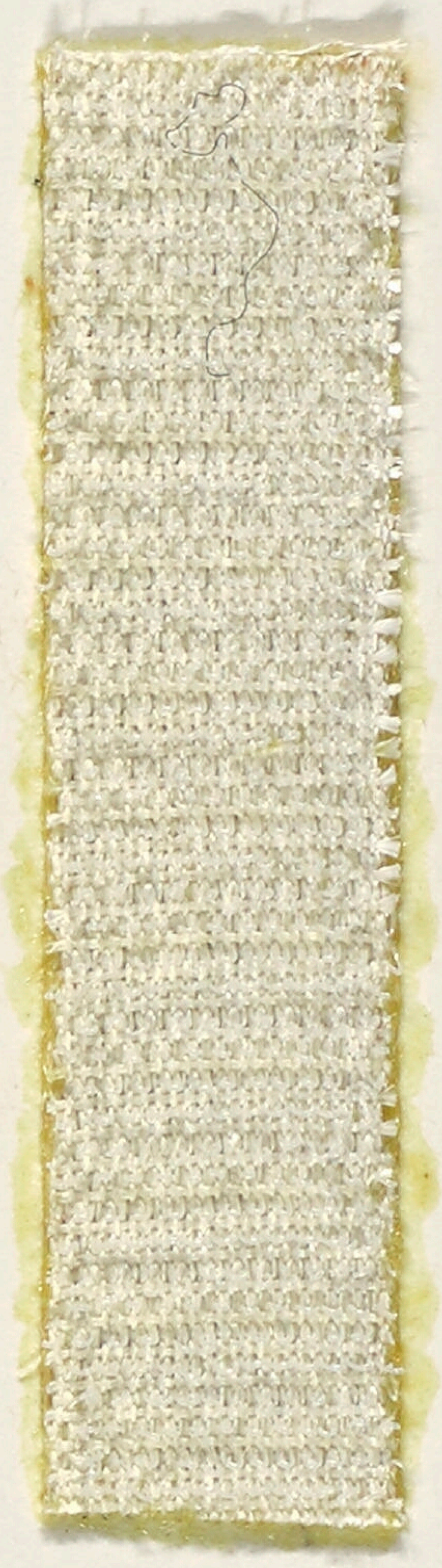
7/21/71

SATURN BOOST

7/1/71
JULY 26&27

DET	θ	VI	Ḣ	H
00:00	90	1341	0	.0
:30	86	1396	314	.7
1	68	1892	857	3.5
1:30	48	3123	1542	9.4
2	34	5226	2321	18.9
2:16	29	6763	2794	25.5
2:30	26	8073	3095	32.4
2:39	24	9014	3307	37.0
3	24	9222	2904	47.8
3:30	19	9763	2437	61.0
4	17	10424	1958	71.8
4:30	16	11191	1517	80.4
5	14	12063	1115	86.9
5:30	12	13041	757	91.5
6	9	14133	448	94.4
6:30	7	15351	193	96.0
7	5	16713	5	96.4
7:30	2	18244	-102	96.2
8	5	19709	-117	95.5
8:30	359	21016	-98	95.0
9	356	22439	-32	94.7
9:10	356	22918	10	94.7
9:30	353	23178	-56	94.6
10	350	23703	-108	93.1
10:30	348	24252	-125	93.5
11	346	24824	-101	93.0
11:30	345	25420	-33	92.6
11:39	345	25599	-1	92.6





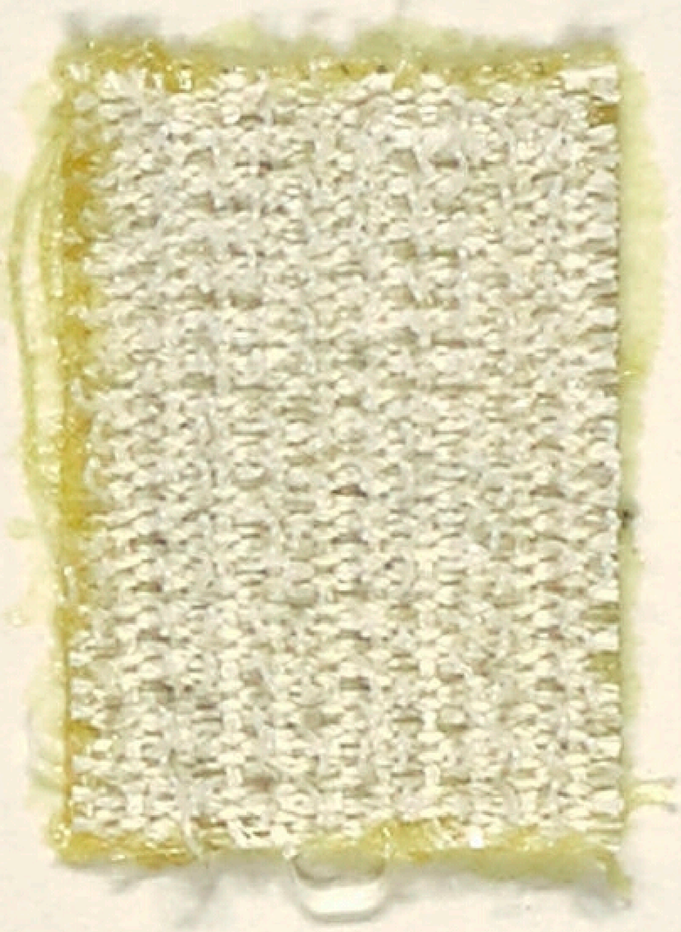
NOMINAL SIVB TLI 1

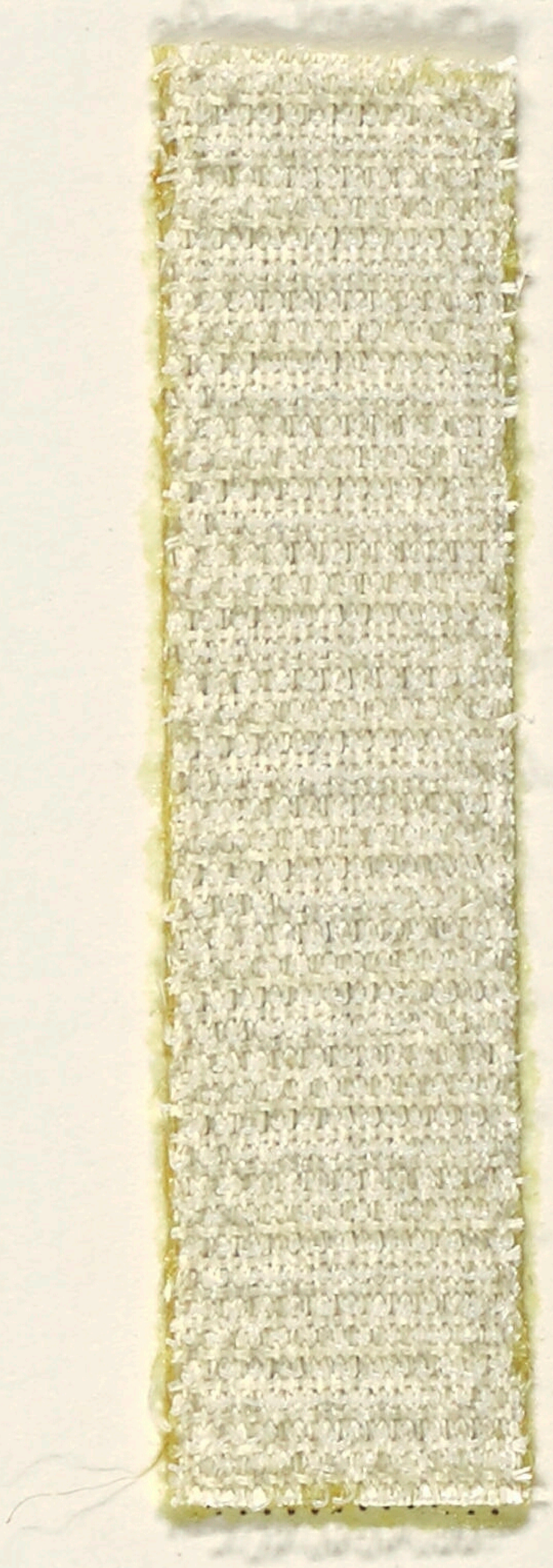
LAUNCH JULY 26, 1971

7/1/71

DET	θ	ψ	VI	$\dot{H}$	H
0:00	45	0.7	25599	10	97
:30	38	0.4	26018	.7	97
1	37	0.9	26614	6	97
1:30	36	1.0	27299	62	97
2	35	1.1	28023	184	98
2:30	34	1.1	28784	379	99
3	33	1.1	29584	655	102
3:30	32	1.2	30426	1018	106
4	31	1.2	31315	1478	112
4:30	29	1.3	32258	2040	120
5	27	1.3	33262	2710	132
5:30	25	1.4	34338	3487	147
6:03	22	1.4	35599	4426	168

7/2/71





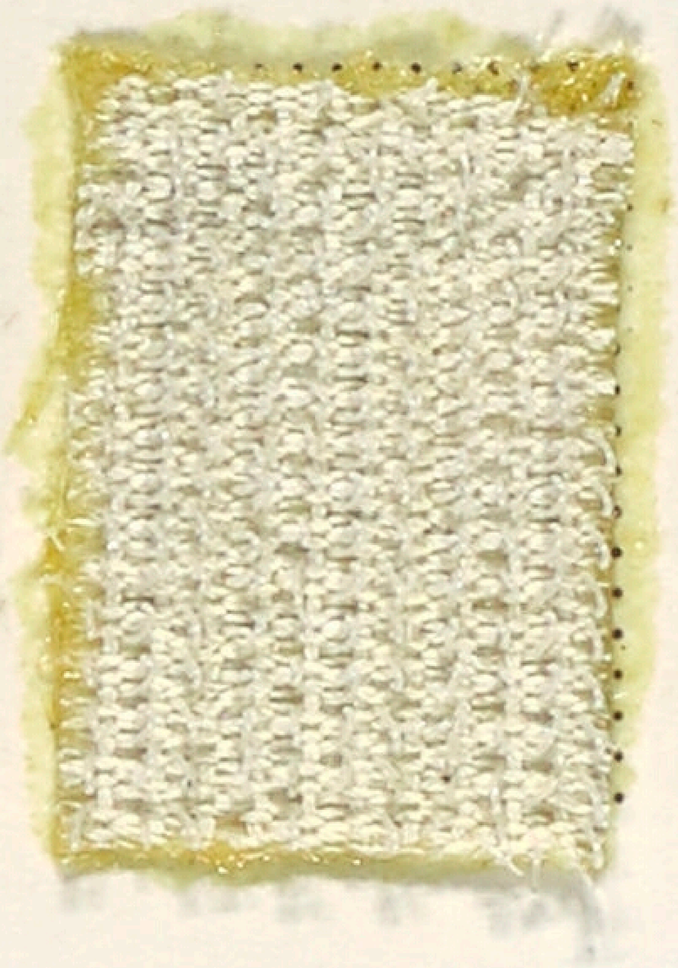
MANUAL SIVB TLI 2

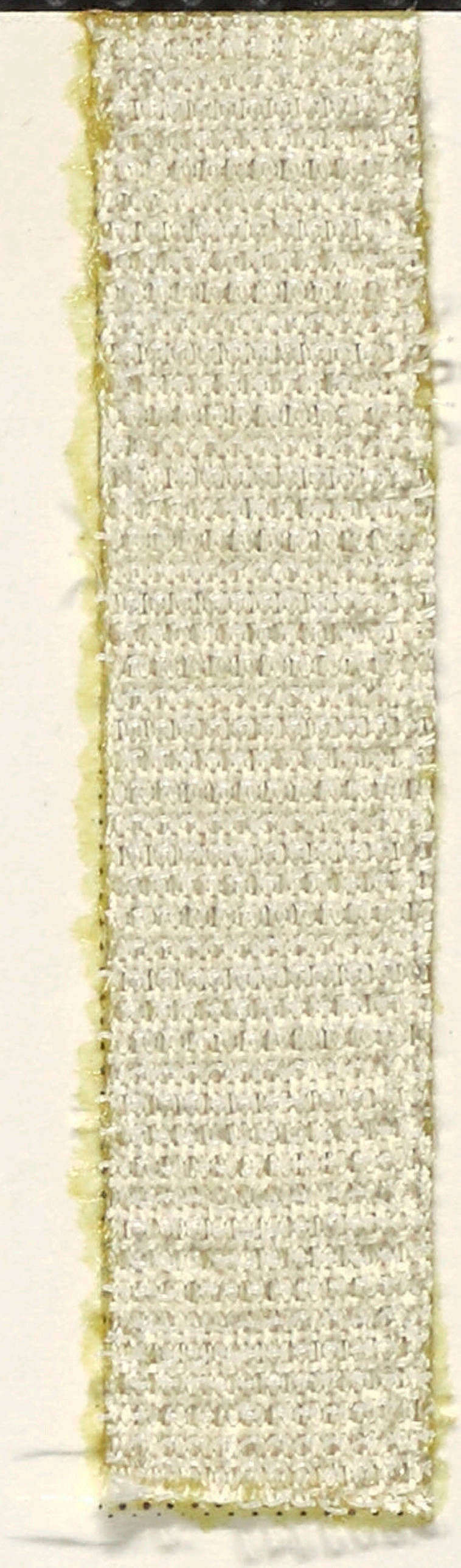
LAUNCH JULY 26, 1971

7/1/71

DET	θ	ψ	VI	Ḣ	H
0:00	37.7	358	25599	10	98
:30	36.7	358	26202	-4	98
1	35.6	358	26873	20	98
1:30	34.6	358	27572	106	99
2	33.5	358	28320	261	100
2:30	32.4	358	29099	493	101
3	31.4	358	29917	810	105
3:30	30.3	358	30779	1219	110
4	29.3	358	31690	1728	117
4:30	28.2	358	32658	2342	127
5	27.2	358	33691	3065	140
5:30	26.1	358	34800	3884	157
5:50	25.5	358	35591	4485	171

7/1/71





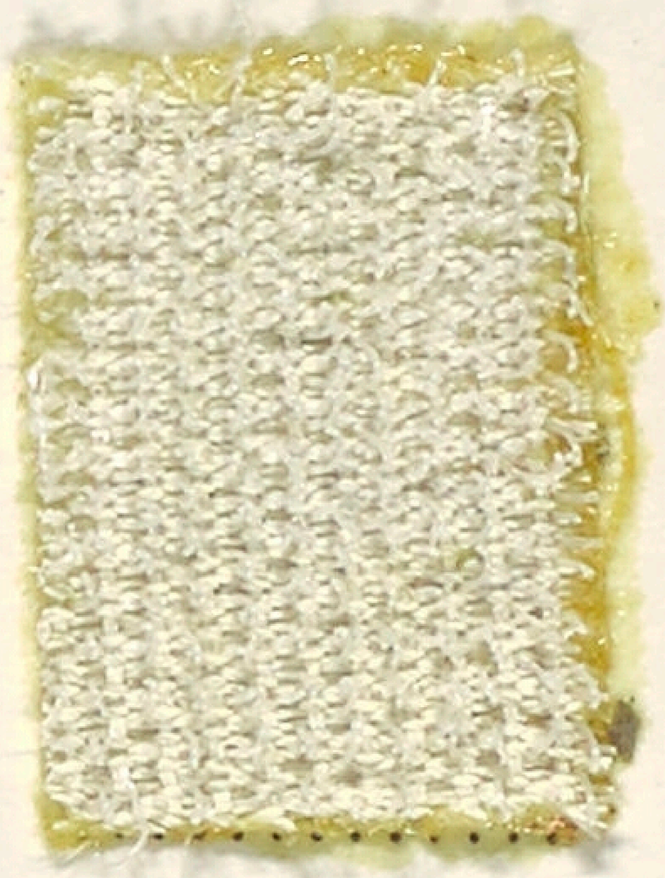
NOMINAL SIVB TLI 2

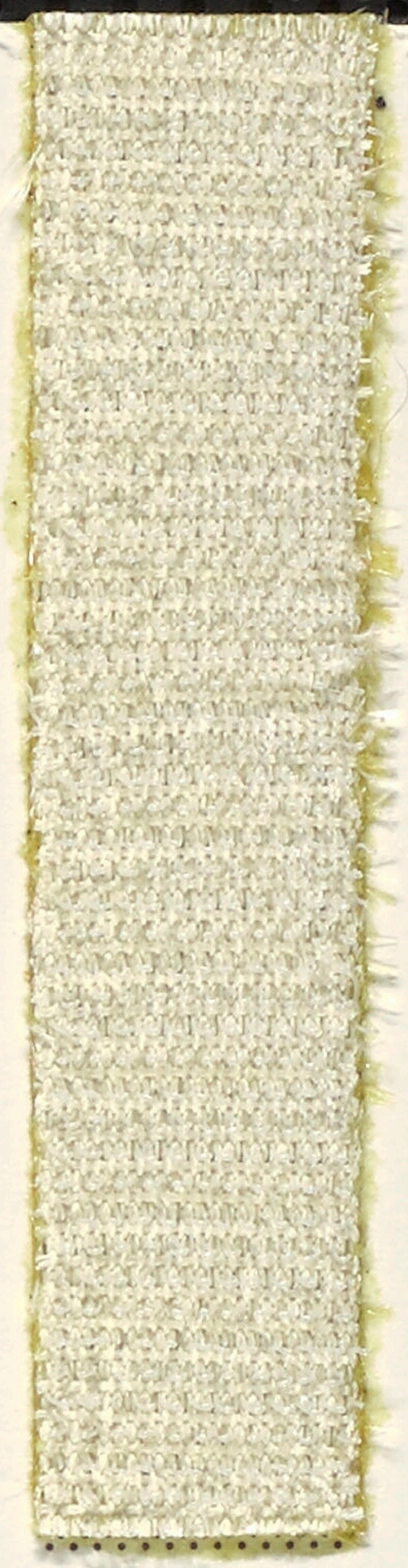
LAUNCH JULY 26, 1971

7/1/71

DET	θ	Ψ	VI	Ḣ	H
0:00	44	0.8	25594	10	98
:30	37	1.7	26202	-4	98
1:	36	1.3	26873	20	98
1:30	35	0.7	27579	106	99
2	34	0.0	28320	261	100
2:30	33	359.3	29099	493	101
3	32	358.7	29917	810	105
3:30	31	358.0	30779	1219	110
4	30	357.4	31690	1728	117
4:30	28	356.7	32658	2342	127
5	26	356.1	33691	3065	140
5:30	21	355.5	34800	3884	157
5:50	21	355.5	35591	4485	171

7/2/71





CDR BUS LOST	LMP BUS LOST
AGS, INV 2,	INV 1, SUIT FAN 1
SUIT FAN 2	LMP AUDIO CONT - BU
S-BD XMTR/RCVR-PRIM	S-BD PWR AMPL - SEC
CDR AUDIO CONT-BU	DN VOICE - BU, BIOMED-OFF
ACTIVATE SEC GLY LOOP	S-BD ANT - OMNI
SEE EPS 1, BLOCK 17	SEE EPS 1, BLOCK 28

7/1/71

5/10/71

EPS/ECS ABORTS

7/1/71

EPS ABORTS

UNCONTROLLED MAIN BUS SHORT
LOSS OF ALL SM PWR SOURCES & 1 BAT
LOSS OF BOTH AC BUSES DURING I & II

LOSS 2 OR 3 FC

ATTEMPT RECONNECT
EDS AUTO - OFF
USE BAT C & AUX

MN BUS SHORT >25a

EDS AUTO - OFF
USE BAT C, INV 3
PWR DN SHORTED BUS

LOSS 1 AC BUS OR INV

USE INV 3

LOSS 1 OR 2 BATS

EDS AUTO - OFF
USE BAT C
cb BAT BUS/MN BUS - OPEN

BAT BUS SHORT >22a

EDS AUTO - OFF
cb BAT BUS/MN BUS - OPEN
cb BAT C/MN BUS - CLOSE
IF SEP REQ: AUTO RCS
TVC GMBL DRIVE - 2
SPS GMBL MTR P2 & Y2 - START
SPS GMBL CNTL cb (4) - OPEN

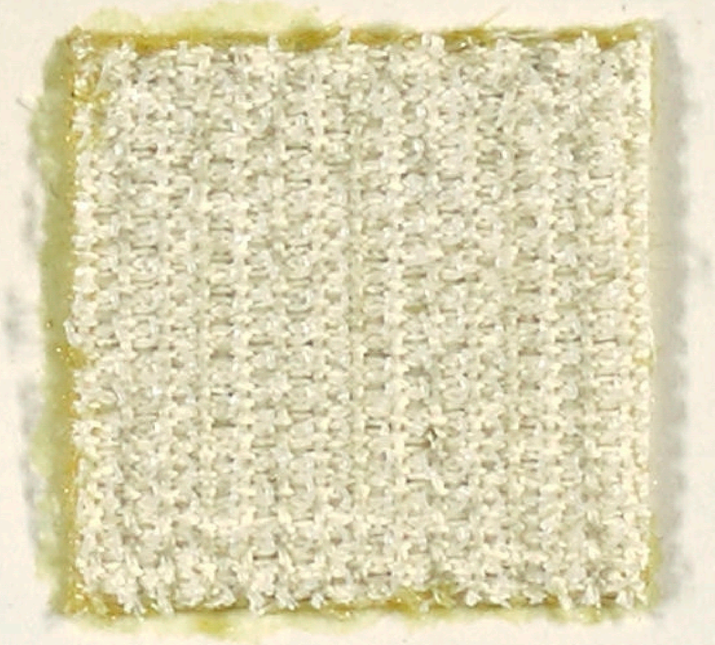
LOSS BAT RELAY BUS

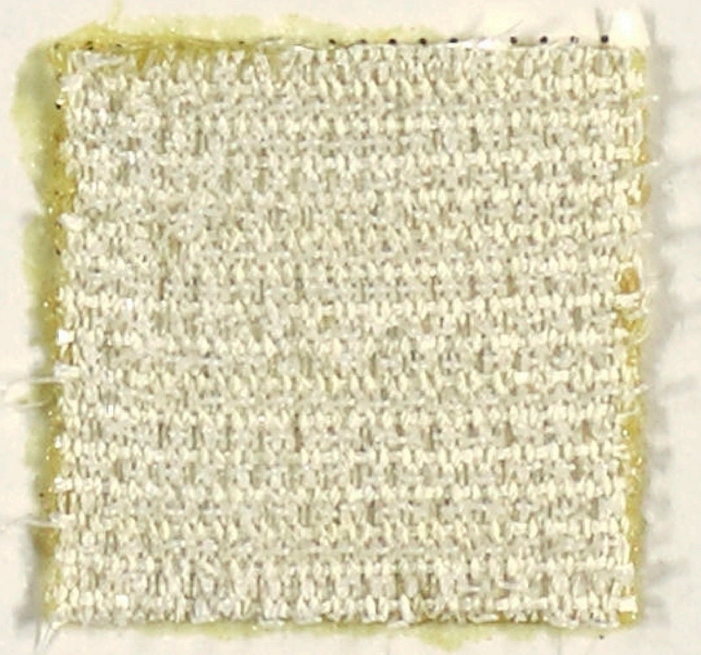
NO ACTION

ECS ABORTS

LOSS OF CABIN & SUIT PRESS
CABIN PRESS & SUIT O2
NOT SUFFICIENT

7/1/71





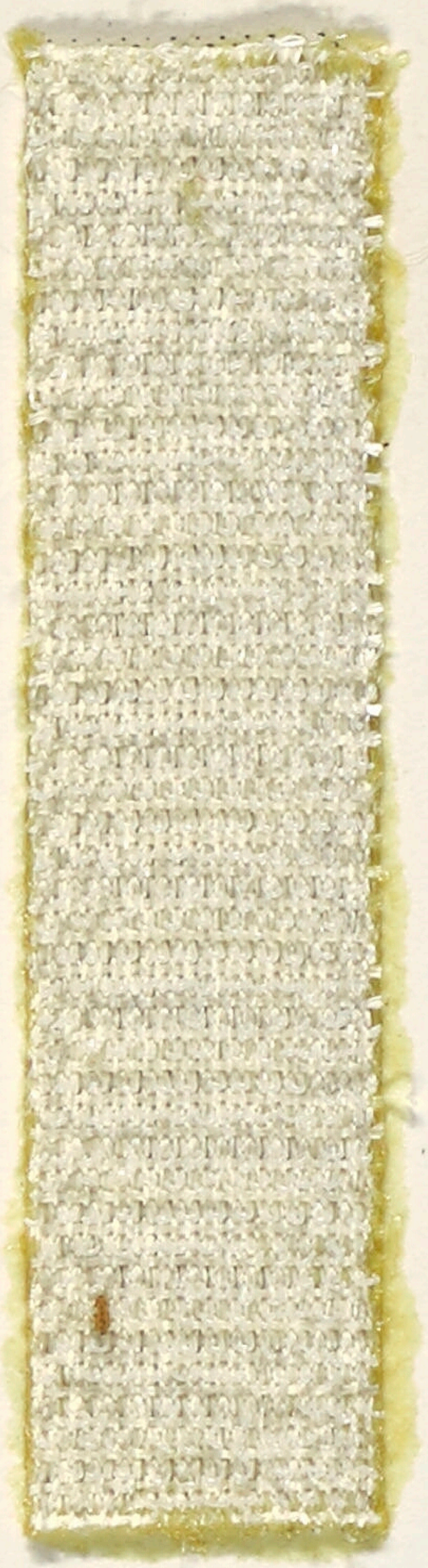
MANUAL SIVB TLI 1

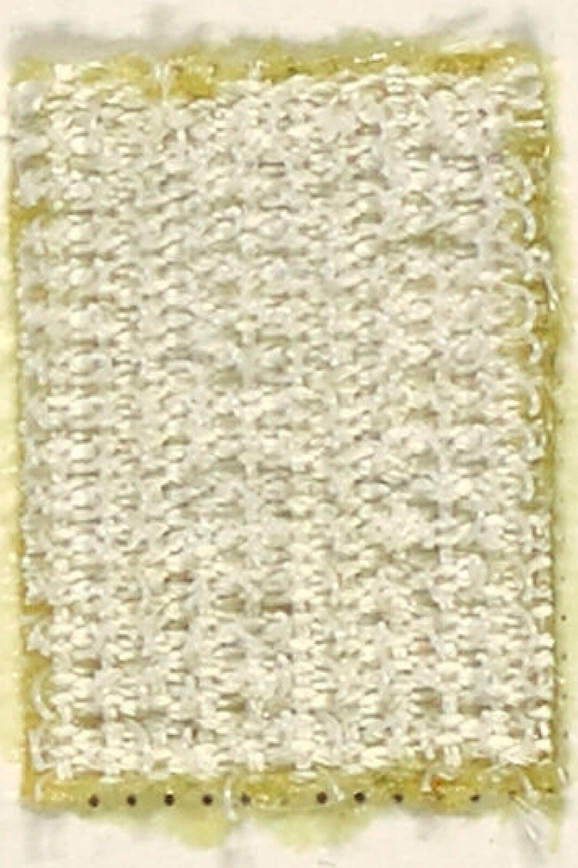
LAUNCH JULY 26, 1971

7/1/71

DET	θ	Ψ	VI	Ḣ	H
0:00	38.6	1	25599	10	97
:30	36.5	1	26018	.7	97
1	36.2	1	26614	6	97
1:30	35.0	1	27299	62	97
2	33.9	1	28023	184	98
2:30	32.7	1	28784	379	99
3	31.5	1	29584	655	102
3:30	30.4	1	30426	1018	106
4	29.2	1	31315	1478	112
4:30	28.0	1	32258	2040	120
5	26.8	1	33262	2710	132
5:30	25.7	1	34338	3487	147
6:03	24.8	1	35599	4426	168

7/1/71





CM EVA

7/13/71

Don helmet, lock
Don LEVA, verify
alginment, don comfort gloves
Don one glove, lock
Pnl 603, EVA Sta O2 - OFF
Don other glove, lock
Pnl 603, EVA Sta O2 - ON
Modulate off/on as
required to pressurize CMP
Cuff Gage 3.7 - 4.0 psig
Pnl 604, SUIT PRESS ALARM - ON
Verify EVA Warning Tone - off
Pnl 10, Adj CMP Master Vol,
if reqd
Pnl 351, EMER CAB PRESS - off

EVA WARNING TONE CHECK

CMP Monitor cuff gage, set PURGE
vlv - Hi, verify EVA warning
tone on at 3.1 - 3.4 psig,
then PURGE vlv - close
Verify EVA warning tone - off
PURGE vlv - lock, Hi, CDR
install pin
Verify flow & Cuff Gage reads
3.7 - 4.0 psig

CMP INTEGRITY CHECK

Pnl 603, EVA Sta O2 - OFF
Monitor cuff gage to verify
PCV closes

Monitor press decay
for 1 min, verify
decay < 0.8 psi.
(If suit press decays
0.3 to 0.8, reverify
helmet, wristrings,
outer zipper and all
connectors locked.)

EVA Warning tone - On (low flow)
Pnl 603, EVA Sta O2 - ON
Install O2 guard

Verify PGA press 3.7 - 4.0 psig
and stable
EVA Warning Tone - off
EVA Sta press gage 100 - 500 psi
Verify surge tk press > 750 psia

CABIN PRESS

Confirm GO for depress from Hou

NOTE: EVA warning tone may come on momentarily during depress

Side hatch dump vlv - open
O2 Hi Flow warning lt may
come on prior to cabin press
reg lock up
Close side hatch dump
vlv at 3.25 psia
O2 FLOW ind < 0.5 LB/HR
CDR/LMP verify suit
press 3.5 - 4.0 psia
Side hatch dump
vlv - open
Dump cabin to zero
CDR/LMP verify suit
press 3.5 - 4.0 psia (stable)
Verify HI O2 flow
warning lt - off
CMP verify CMP cuff gage
press 3.7 - 4.0 psid
EVA sta press gage 100 - 500 psi
No tone
Pnl 3, S-BD AUX TV - TV

HATCH OPENING

GN2 vlv handle - pull
Gage reads - min
Lock pin release knob - unlock
Lock pin indicator released
Gear box sel - Unlatch
Actr handle sel-U
Unstow ACTR handle, Unlock Hatch
ACTR handle SEL-L, Stow handle
Gear Box SEL
- latch
Lower visors
Open hatch

EVA OPERATIONS

Jettison jett bag
Egress
Install TV/DAC pole (align)
Adjust TV settings if required
Pnl 15, UTILITY PWR - ON
DAC - on Transfer to sim bay
  and enter foot restraints
LMP tend Umb (stop at mark)
CMP verify cuff gage 3.7-4.0 psig
Retrieve Pan Camera Cassette
  Remove hard and soft covers
  Attach hook and lock. Pull
  pip pin, squeeze handle and
  remove cassette
Transfer to hatch
LMP attach tether large hook
  to cassette and lock
Remove wrist tether hook, temp
  stow cassette.
CMP return to work station
CMP verify cuff gage 3.7-4.0 psig
Rest - inspect SIM BAY
Retrieve mapping camera cassette
  Remove hard and soft covers
  Attach hook and lock
  Squeeze handle and rotate
  Remove cassette
Transfer to hatch
LMP attach tether large hook to
  cassette and lock. Remove
  wrist tether hook, temp stow
  cassette. Rest at hatch
LMP move to LEB
S-BD AUX TV - OFF(CTR)
Pnl 15, UTIL PWR - OFF
CMP remove TV/DAC
Ingress

HATCH CLOSING

Close hatch
Verify position of pip pin brkt
Lock hatch
Verify lock pin dropped in
Stow ACTR handle
ACTR handle select-N
Gear box SEL-latch (verify)

CABIN REPRESS

Side hatch dump vlv - close
Pnl 326, REPRESS PKG vlv - OFF
Pnl 601, REPRESS O2 vlv - OPEN
  close at cabin press 1 psia
Cabin press ind-read & monitor
  for gross leakage (30 sec)
Pnl 601, REPRESS O2 - OPEN
  monitor repress O2 ind to zero
Cabin press approx 2 psia
Pnl 601, REPRESS O2 vlv - CLOSE
Allow CMP umb flow to bring
  cabin press up to 3.0 psia
CMP disconnect OPS O2
  hose and hold (direct
  into open volume)
OPS O2 - on
Monitor cabin press
  to 5.0 psia, then
  OPS O2 - OFF

POST EVA PROCEDURES

Pnl 351, EMER CAB PRESS - BOTH
CMP purge vlv - HI, pull pin,
  activate purge vlv
  (Place in CDR TSB, top pkt)
Pnl 603, EVA Sta O2 - OFF
Pnl 604, SUIT PRESS ALARM - OFF
When PGA press zero (psid) CMP
  pop glove, do not remove
  gloves
Pnl 603, EVA sta O2 - ON
Doff helmet with LEVA
Pnl 603, EVA sta O2 - OFF
CDR/LMP doff gloves, then helmets
Pnl 380, SUIT CKT RTN vlv - open
Verify Surge Tank press >400 psia
Pnl 326, REPRESS PKG vlv - FILL

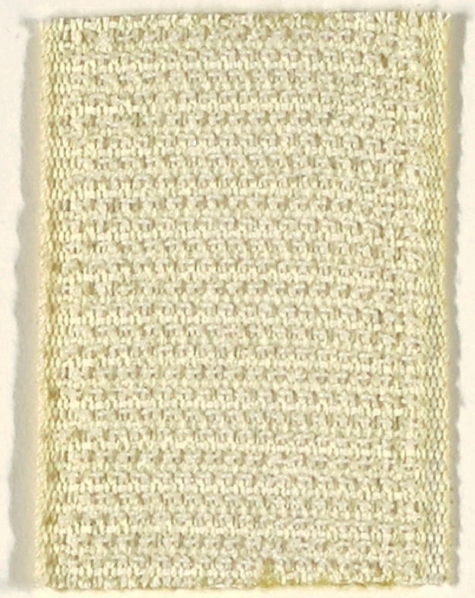
Go to CSM SYS
C/L pg S/3-17

ASC PRESS	He REGS CLOSE; MAINTAIN P>125,ΔP<10
DES REG	REG 1-CLOSE, 2-OPEN, MAINTAIN P>160
DES QTY	PRPT QTY-OFF,DES 1,LT OFF:GO,ON:<7%
CES AC	GUID CONT-PGNS,GYRO TEST-POS RT LT ON:LT FAIL,RATES NULL:(NO AGS CONT,RR-LGC ONLY,NO RATE NEEDLES), RATE OK:CYCLE CWEA:LT OFF:OK,ON:CES 13
CES DC	THR CMD(RT)<10:DECA GMBL-OPEN, THR CONT-MAN,N92(CLS IF NEED 100%) GUID CONT-PGNS,GYRO TEST-POS RT LT ON:LT FAIL,LT OFF:CYCLE CWEA LT OFF:CYCLE DECA GMBL TO UNLOCK THR CONT GO:LT ON, THR NOT MAX:GO(BUT NO THR,NO GMBL,NO AGS CONT,DPS TO 100%) (NO AUTO APS IGN) THR MAX:MSFN
AGS	GUID CONT-PGNS;412R:+1(30sec),O2 QTY RSET,LT OFF;GO;LT ON:MFP(NO AEA,ATT HOLD-OK,NO ATT DB)
LGC	GUID CONT-AGS(RESTART,DSKY BLANK; LGC FAIL-CB[11]AEA-CLOSE)
ISS	GUID CONT-AGS (PROG:ISS)(NO PROG:CWEA)
RCS TCA	IF STABLE,CYCLE CWEA,>2 tb RED:ISO SYS
RCS A REG	(165<MANIF PRESS<218):HI:GO,MON He, LO:IF <100,SOV,XFEED
CABIN	+ LO CAB PRESS:DUMP VLVS-CLS,PR A/B-EG
SUIT FAN	+ SUIT FAN COMP:CB 16 ΔP - OPEN + FLOW + SUIT PRESS = CWEA
DC BUS	+ BATT + DC FAULT + TB BP = FEED SHORT (IF 5:NO AGS;IF 6:NO PGNS + DC FAULT + TB BP = NORM FEED FAIL GO BKUP FEED:IF 5:NO AGS;IF 6:NO PGNS + NORM VOLTAGE = CWEA

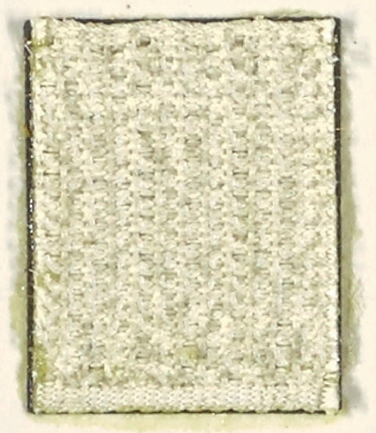
ASC HI REG	ASC He REGS (2):CLOSE, OPEN (1) WHEN P<220
ASC QTY	BT 10<,MAIN SOV-OPN,ASC FEED-CLS
INVERTER	+ VOLTS<112:CB AC BUS A/B INV 1: OPN:LT OFF:INV 1 FAIL
BATTERY	+ BATT FAULT = BATT FAIL (NONE = CWEA)
RNDZ RDR	RR:SLEW:IF RR LT OFF:CWEA,ON:NO TK LT FAIL,SEE NEXT STEP: + NO TRACK:RDR TEST,RR (15sec) OR CB RR:OPN (10sec), THEN SLEW
PRE AMPS	+ CES AC:NO ASA,RR LGC ONLY
ED RELAYS	MASTER ARM:OFF,STG RELAY RESET, CB LOGIC - OPEN
RCS	+ He >1700 CWEA, He <1400: SOV-CLS
HEATER	RR TEMP, S-BAND TEMP MON: CB's OPN IF LT ON
ECS	IF NO COMP LT ON:CWEA
O2 QTY	O2 QTY >10%:CWEA
GLYCOL	+ GLY TEMP >50 + SUIT TEMP >60: PRI EVAP FLO 1-CLS:PRI EVAP FLO 2:OPN IF NO TEMP DECR (5min):PRI EVAP FLO 1&2:CLS,H2O TK-SEC,GLY-SEC,CB GLY PUMP SEC-CLS,SEC EVAP FLO-OPN + GLY TEMP <50:CB GLY PUMP 1-OPN: GLY PRESS DECR:LEAK

STG SEQ LT OFF:AT PDI:MA-OFF,CB LGC(ON LT)-OPN MA-ON. AT IGN,SHe INOP:STOP:SHe OK,MA-OFF, LGC-CLS

7/1/71



5/10/71



ABORT - DPS

PGNS-ATT HOLD
THROTTLE-MAX
P70
MODE CONT-AUTO
TIG:ABORT

MANUAL

+ 0: 0°
14DP40AP:300°
PDI+( ):270°
PDI+( ):250°
SHUTDN=PDI( )

DES OVRD - ON, YAW RT 40°
31% DES REG - CLS, 160 - OPN,
10 SEC - CLS

ABORT STAGE - ASC

PGNS-ATT HOLD
P71,M/CONT-AUTO
TIG:ABORT STG
ENG ARM - ASC
START - PUSH
ASC FEED-OPEN
MAIN SOV-CLOSE
YAW RT 40°
PRPLNT QTY-OFF
PRPLNT T/P-ASC
He MON - ASC
ASC He SEL-BOTH
MASTER ARM - ON
THR - JETT

CB RR(2)-CLS
CABIN REPRESS
DES O2-CLOSE
#1 ASC O2-OPN
PRESS REG
A&B EGRESS
SUIT GAS
DIVERT-EGRESS
CAB GAS RET -
EGRESS
H2O SEL - ASC
DES H2O-CLOSE
ASC H2O-OPEN

INSERTION

500:MAIN SOV - OPEN
ASC FEED (2) - CLOSE
200:DES OVRD-OFF(X BUS LS)
ASC ARM-OFF(EX BUS LS)
(>30:DPS C.O. - AB STG)
0:ABORT/AB STG - RESET
STOP - PUSH
MODE CONT (2)-ATT HOLD
ARM - OFF
>400:ATT HOLD : 45x9
<400:ATT HOLD NUL N85
PGNS-AGS <10:NULL VGX
TWEAK:257°, 10° OHW, 2
CB RR(2) - CLOSE
RR-LGC P20 AUTO
V95 V80 (2.00/12.0)
SHFT/TRUN+5,RATE -5°/s
AUDIO ICS/PTT
✓INV 2,CB INV 1 - OPN
CB:LOGIC PWR-OPN
CAB FAN - CLOSE
V82 V83 V48 12012
ENG STOP - RESET

7/14/71

MANUAL STAGE

ASC BATT(2) - ON
DES BATTS - OFF
GUID - 11002 V77, P47
DEADBAND - MIN
ATT CONT (3) - MODE CONT
CB LOGIC PWR - CLOSE
MASTER ARM - ON
ASC He SEL - BOTH
He PRESS ASC - FIRE
-X:2 fps
STAGE - FIRE, +X:2 fps
NO PDI + 12 APS ABORT

7/1/71

SHUTDOWN	C.B.
(1) AUTO	
STOP	
ARM-OFF	
(2) STOP	
ARM-OFF	
(3) AUTO	
RESET ABT STG	

P30
P42 1706 - PRO
N86
N18(0,270,0)
He MON - ASC PRESS
MASTER ARM - ON
ASC He SEL - BOTH
He PRESS ASC-FIRE

PGNS	DESCENT	OVRD	ASCENT	AELD
AUTO	ARM + LGC	(1)	ARM + LGC ABORT STG + LGC	(1) (3)
MAN	ARM + START ARM + OVRD	(2) (2)	ARM + START	(2)
ABT	P60'S ONLY	(1)	P60'S,P70'SP12	(3)
A AUTO	ABORT+ULL	(1)	ABT STG + ULL	(3)
G MAN	ARM+START	(2)	ARM +START +ULL	
S	ARM+OVRD	(2)		(2)

(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 Δ.V SEC	.RX RD.T .θX	1/2P .EL C.EN	.AZ .EL	V.FWD HD.T H.	ΔH. HD.T H.	TG LP HD.T H.

67	68	69	72	74	75	76	77
LRX LRY LRZ	R.G TB V.I	DN. X. UP.	.TR .SH	TFI .YX .PX	Δ.H ΔT ΔT	V.H V.V X.R	TG VG.Y V.I

78	79	90	92	94	99
.RX RD.T TFI	.CR .SP POS	.YX YD.T P.SI	THR HD.T H.	VG.X HD.T H.	POS VE.L MR.

P76-CM
P77-LM

	PRE ASC/CSI	POST
W 49	+10000+100+15 +200+120	+2000+20+5 +80+50

7/1/71

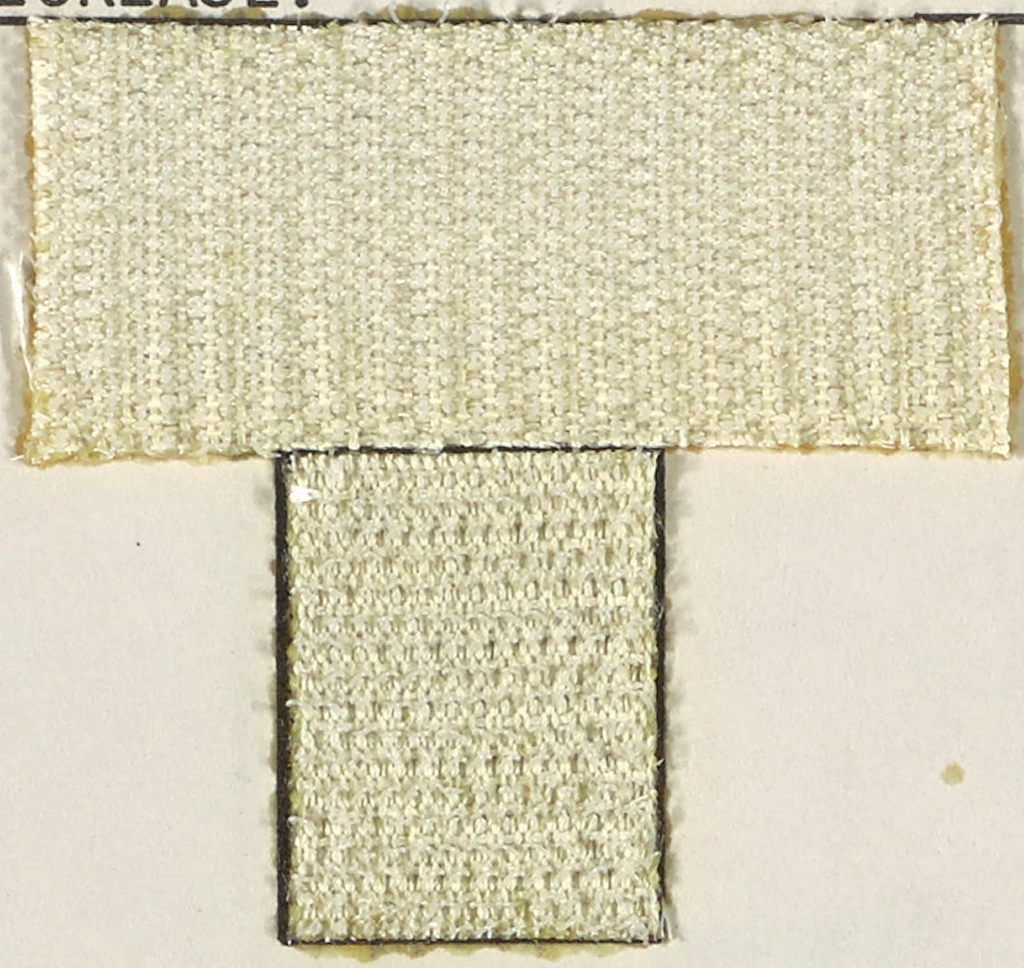
nm/ft	LM	CSM
400	1.64	1.68
200	1.94	2.02
100	2.22	2.26
50	2.42	2.48
25	2.60	2.67
12.5	2.74	2.83
6.25	2.86	2.94
3.12	2.94	3.02
2.0	3.00	3.05
6000	3.02	3.06
3000	3.04	3.08
1500	3.06	3.13
800	3.12	3.22

TIME NOUNS
11:CSI,13:CDH,37:TPI,16:EX.V,33:TIG

VEH	X	ACA	DB	RATE
[redacted]				
		0 4.	0 .3	0 .2
1 ASC	0 2-A	1 20.	1 1.	1 .5
2 DES	1 2-B	CSM.4	2 5.	2 2.
3 CSM	2 4-AB		PWR 1	3 10
	MIN	20/	.3/.4Y	5/10P
ASC	MAX	7.5	5.	30
	MIN	20	.3/.4Y	5/10P
DES	MAX	17	5.	10

RR NEEDLE OFFSET

PGNS NULL:ACCEPT N49 OR LOAD N05 BIAS
S:1700(up:load+); T:1702(Left:load+)
NO N05 DECREASE.



SV NEEDLE OFFSET

525 Side Lobe: Go Main, PRO
Main: Align COAS
RR Null: V67 10000, 10, 0
Accept N49, N05 Decreasing

7/1/71

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-DES/1

520:LR RUPT,GO
522:LR Δ POS,GO
523:LR NOT 2,GO
1107:AGS
1406:P66
1407:P66
1466:AGS

1410:AGS
(PGNS M THR)
2XXXX:AGS
3XXXX:RSET

-10:V25N69,P63, (0,111,310)
:V40N20
- 5:CB LR - CLOSE
- 4:FINAL TRIM, GO - NO GO
- 1:MASTER ARM, 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 AT(ER,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 BY 10K,169BY6K(AB)
→P64:NO LOCK BY 20 SEC(AB)
LOSS OF LOCK - GO
NO LR-LGC,ΔH<1500-GO
5:00 V24N69 SYS CK(NAV)
6:00 AUTO YAW AT 30K
7:00 TFI THR DOWN
7:28 THR<57% MCC ± 10 SEC
CMD +40 SEC + ATT CHG(AB)
P64 +15 SEC : (AB)
8:00 V23N69(RADIAL)
EVAL MAN CONT : PGNS-AUTO
8:20 N68:P64 AT TGO = 100(9:23)

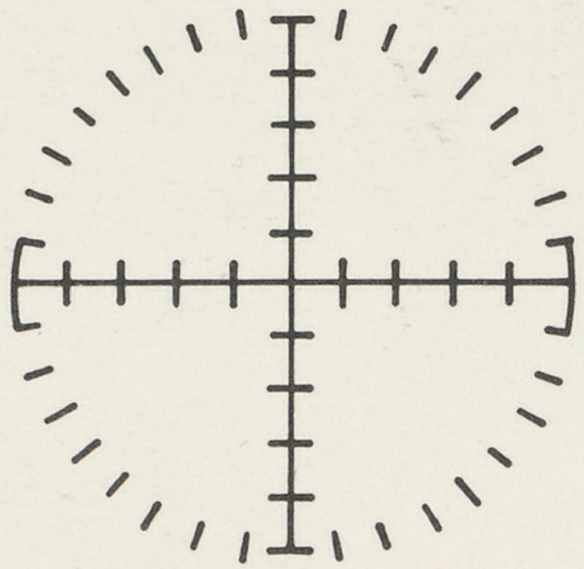
ABORT STG - PUSH
ENG ARM - ASC
STOP - RESET
START - PUSH

PGNS - ATT HOLD
AGS - AUTO
P71

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 (511)
SHe STEADY (DCR:MCC)
OX:20-40,FUEL:8,CLOSE

7/1/71

COAS BORESIGHT
LOG



5/10/71

POTENTIAL WEIGHT REDUCTIONS AT LUNAR LAUNCH

1. Wedge Bracket - .75 lbs.
2. Interim Stowage Shelf - 1.1 lbs.
3. Lens Brush - .1 lbs.
4. EMU Kit - .5 lbs.
5. Dust Caps (2 Ea) 1.0 lbs.
6. LM Utility Towels (2 Ea) - .8 lbs.
7. Tape Roll .5 lbs.
8. Tissue Dispensers - 2.8 lbs.
9. Med Kit
   Bio Med - .75 lbs.
10. Data File Clips
    Data File Clamps - .5 lbs.
11. ICG Harness
    LCG Harness -.5 lbs.
12. Flight Data File - 6.5 lbs.
    and flaps
13. LIOH Cartridge Container Assy - 1.8 lbs.
14. Inside Bag of Food Container - .9 lbs.
15. Ancillary Bag 1.4 lbs.

ACA ISOLATION

PERFORM ON BACKSIDE OF MOON

1. CB(11) STAB/CONT: ATT DIR CONT - Open
   : ATCA (PGNS) - Open
   COMM: CDR AUDIO - Open
   CB(16) COMM: S.E. AUDIO - Open
   STAB/CONT: ATCA(AGS) - Open
   ACA PROP (BOTH) - DISABLE
   ATTITUDE CONTROL SW's (3) - DIRECT

2. Disconnect PJ 709A (CDR) & PJ 709B (LMP)
   Disconnect PJ 708A (CDR) & PJ 708B (LMP)

3. Install ACA Shorting Plug on PJ 709A (CDR)
   Cover PJ 709B (LMP) with tape
   Install ACA Dust Cap on PJ 708A (CDR)
   Cover PJ 708B (LMP) with tape

4. RECONFIGURE:
   ATTITUDE CONTROL SW's (3) - MODE CONTROL
   CB(11) STAB CONT: ATCA(PGNS) - Close
   CB(16) STAB CONT: ATCA (AGS) - Close
   COMM: S.E. AUDIO - Close

DPS ABORT/INSERTION

	✓GUID SW
	ABORT PB - PUSH
	PGNS - ATT HOLD
	THROTTLE - UP
	V37E 70E
	MODE CONT(2)-AUTO
	YAW RT 40°
	623+1
	✓INVERTER
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

APS ABORT/INSERTION

	✓GUID SW
	ABORT STAGE PB-PUSH
	PGNS-ATT HOLD
	V37E 71E
	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
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

ABORT RULES

1 ATT & RATE LIMITS
- DPS >5° SEC
- APS >10° SEC

2 DPS SHUTDOWN
- <30 fps - STAGE & RCS
- >30 fps - ABORT STAGE

3 APS UNDER BURN

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

7/14/71

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
P00
STOP PB-RESET

✓GUID SW

DPS ABORT/APS INSERTION

✓GUID SW
ABORT PB - PUSH
PGNS - ATT HOLD
THROTTLE - UP
V37E 70E
MODE CONT(2)-AUTO
YAW RT 40°
623+1
31% DES REG-CLOSE
BURN DPS TO DEPLETION
ABORT STAGE PB-PUSH
V37E 71E
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
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

7/14/71

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%)
ΔV=0 STOP PB - PUSH
ENG ARM - OFF
ABORT PB - RESET

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 O2 - CLOSE
#1 ASC O2 - OPEN
H2O SEL - ASC
DES H2O - CLOSE
ASC H2O - OPEN

V48,11002

CHECK APS BURN

APS 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
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

APS
ALL PITCH RATES 5°/SEC

1:00	250/0	4:30	0/LV	8:00	0/LV
2:24	SD(FDAI)	5:10	300/36	8:40	300/36
2:36	SD(OHW)	6:22	270/10	12:06	270/14
		8:26	250/0	14:26	250/0
		8:51	SD	15:05	SD
1:30	0/LV	5:00	0/LV	8:30	0/LV
2:10	250/0	5:40	300/36	9:10	300/36
3:32	SD(FDAI)	7:08	270/10	13:00	270/14
3:52	SD(OHW)	9:20	250/0	15:02	250/0
		9:46	SD	15:50	SD
2:00	0/LV	5:30	0/LV	9:00	0/LV
2:40	300/0	6:10	300/36	9:40	300/36
3:10	250/0	7:54	270/12	13:54	270/14
4:24	SD(FDAI)	10:14	250/0	15:34	250/0
4:34	SD(OHW)	10:42	SD	16:31	SD
2:30	0/LV	6:00	0/LV	9:30	0/LV
3:10	300/0	6:40	300/36	10:10	300/36
4:00	250/0	8:44	270/14	14:30	270/14
5:18	SD	11:08	250/0	16:12	250/0
		11:37	SD	17:07	SD
3:00	0/LV	6:30	0/LV	10:00	0/LV
3:40	300/36	7:10	300/36	10:40	300/36
4:22	270/0	9:34	270/14	14:30	270/14
5:28	250/0	12:02	250/0	17:00	250/0
6:09	SD	12:33	SD	17:37	SD
3:30	0/LV	7:00	0/LV	10:30	0/LV
4:10	300/36	7:40	300/36	11:10	300/36
5:00	270/5	10:24	270/14	14:48	270/14
6:30	250/0	12:56	250/0	17:50	250/0
7:02	SD	13:28	SD	18:09	SD
4:00	0/LV	7:30	0/LV	11:00	*
4:40	300/36	8:10	300/36		USE
5:40	270/5	11:12	270/14		MANUAL
7:28	250/0	13:48	250/0		ASCENT
7:56	SD	14:19	SD		ANGLES

*ESTABLISH POSITIVE HDOT, THEN ABORT STAGE TO USE MANUAL ASCENT ANGLES

7/1/71

DPS/APS
ALL PITCH RATES 5°/SEC

1:00	250/0	4:30	0/LV	8:00	0/LV
2:26	SD(FDAI)	4:44	300/36	8:14	300/36
2:36	SD(OHW)	6:26	270/5	10:16	270/15
		7:32	250/0	14:30	250/0
		8:19	SD	14:43	SD
1:30	0/0	5:00	0/LV	8:30	0/LV
1:44	300/0	5:14	300/36	8:44	300/36
2:30	250/0	6:58	270/5	11:12	270/15
3:20	SD	8:20	250/0	15:18	250/0
		9:03	SD	15:31	SD
2:00	0/LV	5:30	0/LV	9:00	0/LV
2:14	300/36	5:44	300/36	9:14	300/36
3:00	300/0	7:34	270/10	12:10	270/16
3:18	250/0	9:04	250/0	16:04	250/0
4:16	SD	9:46	SD	16:18	SD
2:30	0/LV	6:00	0/LV	9:30	0/LV
2:44	300/36	6:14	300/36	9:44	300/36
3:46	300/0	8:04	270/11	12:56	270/16
4:02	250/0	9:50	250/0	16:44	250/0
5:12	SD	10:39	SD	16:58	SD
3:00	0/LV	6:30	0/LV	10:00	0/LV
3:14	300/36	6:44	300/36	10:14	300/36
4:34	270/0	8:34	270/11	13:16	270/16
5:10	250/0	11:04	250/0	17:32	SD
5:57	SD(FDAI)	11:47	SD		
6:06	SD(OHW)				
3:30	0/LV	7:00	0/LV	10:30	0/LV
3:44	300/36	7:14	300/36	10:44	300/36
5:24	270/0	9:06	270/14	13:48	270/16
5:54	250/0	12:26	250/0	18:05	SD
6:50	SD(FDAI)	12:53	SD		
7:02	SD(OHW)				
4:00	0/LV	7:30	0/LV	11:00	*
4:14	300/36	7:44	300/36		USE
5:56	270/0	9:38	270/14		MANUAL
6:38	250/0	13:38	250/0		ASCENT
7:34	SD(FDAI)	13:53	SD		ANGLES
7:40	SD(OHW)				

*ESTABLISH POSITIVE HDOT, THEN ABORT STAGE TO USE MANUAL ASCENT ANGLES

7/1/71