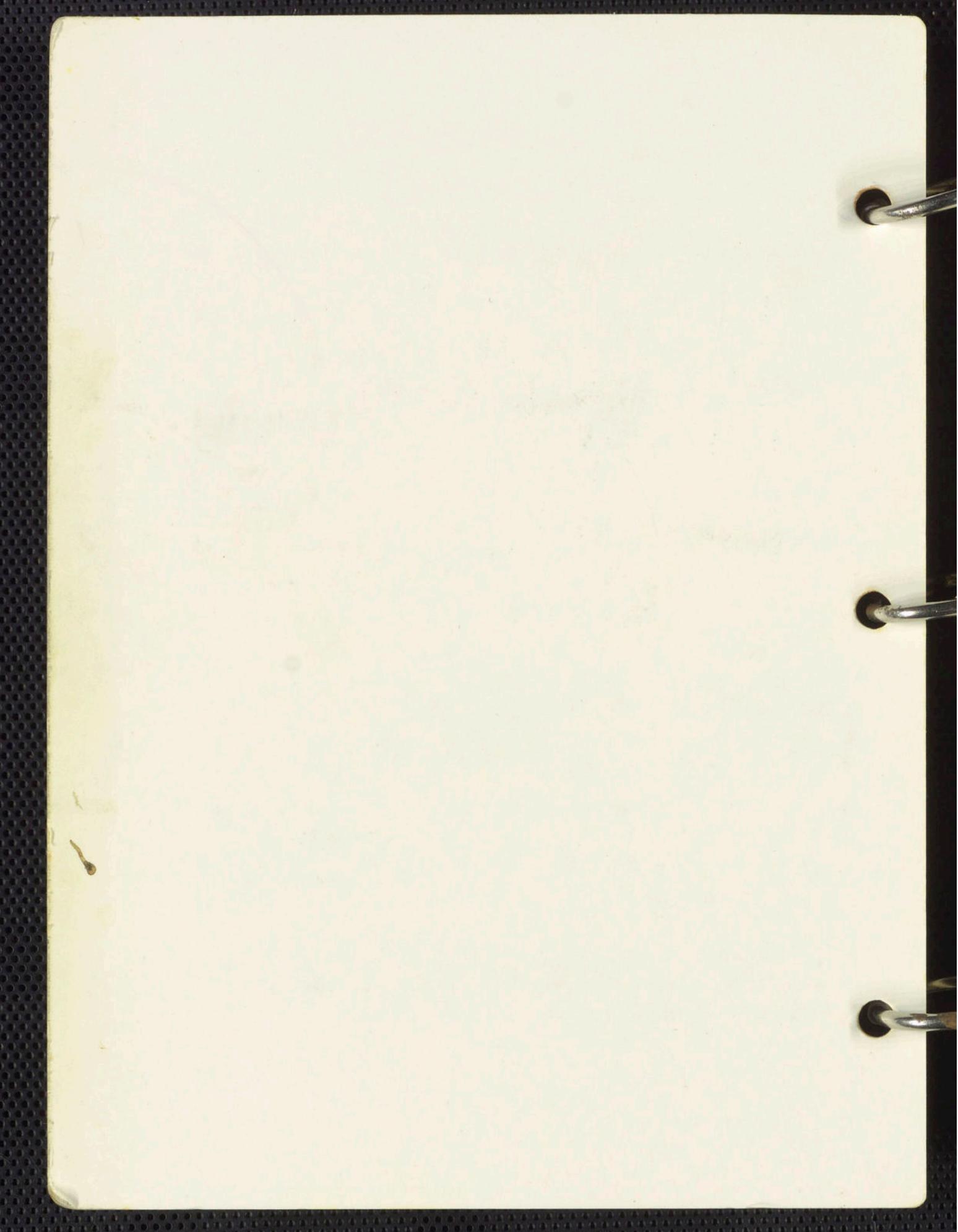


APOLLO 15

**CSM SYSTEMS  
CHECKLIST**

| PART NO.        | S/N  |
|-----------------|------|
| SKB32100115-311 | 1001 |



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SYSTEMS MANAGEMENT

LM INTERFACE

CM EVA

DATE OF APEX  
COVER JETT

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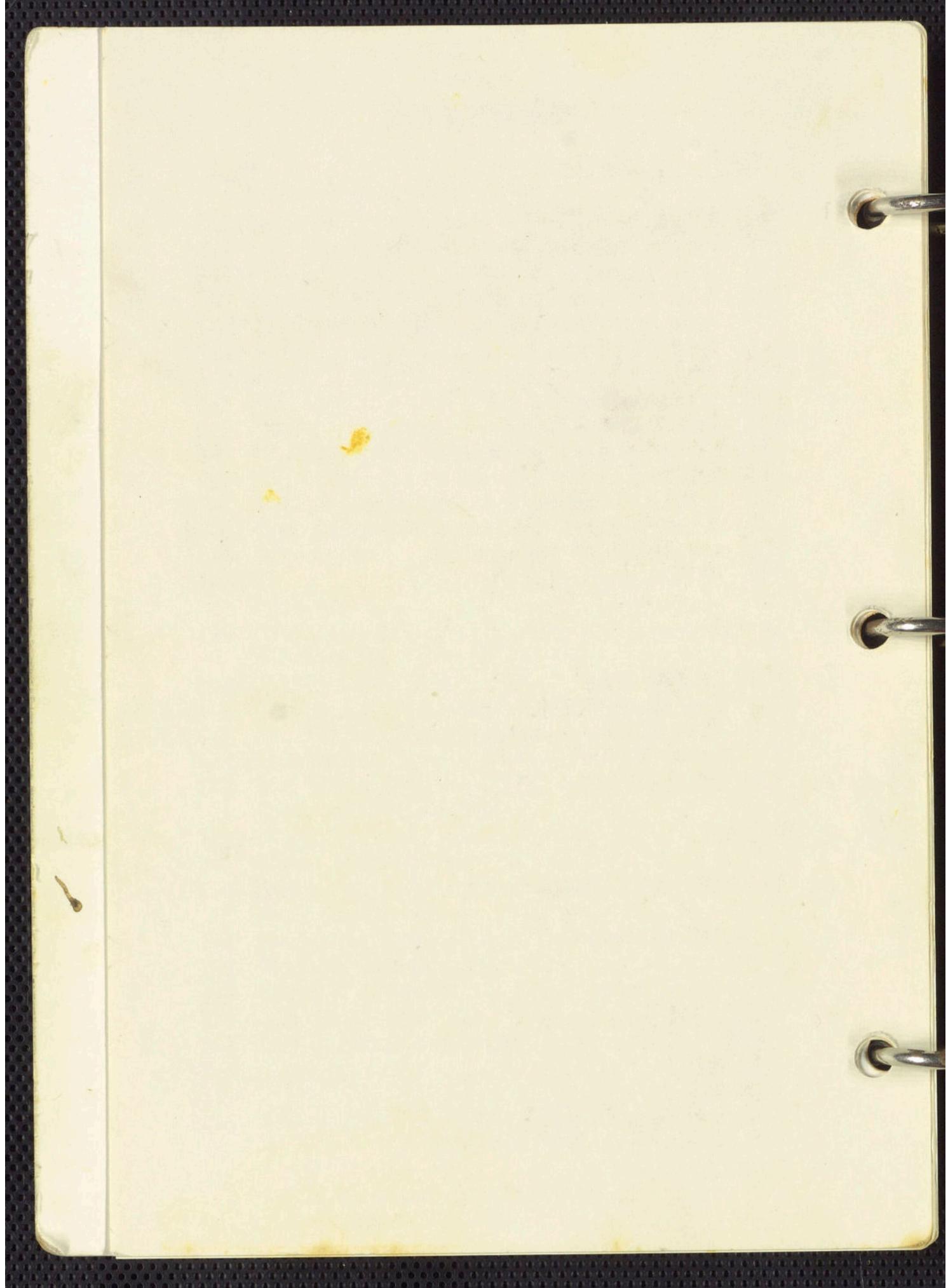
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SYSTEMS MANAGEMENT

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT



DATE 5/12/71

S  
1-1

## SYSTEMS MANAGEMENT

### PROPULSION SYSTEM

#### 1 SPS MONITORING CHECK

SPS PRPLNT TK TEMP ind - +45 to +75°F

\*IF<45°F, SPS LINE HTRS - A

\*IF>75°F, SPS LINE HTRS - off (ctr)\*

SPS PRESS IND sw - He, N2A, & N2B

SPS PRPLNT TK PRESS ind

He 3900 psia max 1400

N2A 2900 psia max

N2B 2900 psia max

SPS PRESS IND sw - He

FUEL & OXID PRESS ind - 170 to 195 psia

SPS ENG INJ VLVS (4) - CLOSE

SPS OXID, FUEL & UNBAL QTY

OXID FLOW VLV PRIM - PRIM

SPS He VLV (1&2) - AUTO, tb - bp

#### 2 SM RCS MONITORING CHECK

SM RCS PRPLNT tb (8) - gray

SM RCS He 1 & 2 tb (8) - gray

SM RCS IND - He TK TEMP

RCS IND sel - SM A, B, C, D

PKG TEMP - 115°-175°F (C/W 75°-205°)

He PRESS - record 3900 3800 4000 3900 3200

MANF PRESS - 178-192 psia (C/W 145-215 psia)

He TK TEMP - record 79 62 72 78 65, 57, 75, 68

PRPLNT QTY - record 87 88 88 87 58, 55, 56, 56

When MANF PRESS <150 psia

RCS SEC FUEL PRESS A (B, C, D) - OPEN

#### 3 CM RCS MONITORING CHECK

CM RCS PRPLNT tb (2) - gray

RCS IND sw - CM 1,2

He TEMP - 60-90°F

He PRESS - 4100-4200 psia 4000

MANF PRESS - 80-105 psia

SYSTEMS MANAGEMENT

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

EPS SYSTEM1 Cryogenic Pressure - Quantity Check

CRYO PRESS IND - 1/2

CRYO H2 PRESS ind (2) - 225-260 psia

CRYO O2 PRESS ind (2) - 865-935 psia

CRYO PRESS IND - SRG/3

CRYO H2 PRESS 3 ind - 225-260 psia

CRYO O2 PRESS ind (2) - 865-935 psia

CRYO QTY IND - 2

CRYO H2 QTY ind (2) - record

24, 22

CRYO O2 QTY ind (2) - record

40, 40

CRYO QTY IND - 3

CRYO H2 QTY 3 ind - record

30

CRYO O2 QTY 3 ind - record

40

2 FC Power Plant Check

FC HTRS (3) - on (up)

FC RAD tb (3) - gray

FC REACT tb (3) - gray

FC IND sel - 1, 2, 3

H2 FLOW - 0.03-0.15 lb/hr

O2 FLOW - 0.25-1.2 lb/hr

MOD SKIN TEMP - 390-440°F

MOD COND EXH TEMP - 150-175°F

FC pH HI tb - gray

FC RAD TEMP LO tb - gray

3 D-C Voltage-Amperage Check

MN BUS TIE (2) - OFF (verify)

FC MNA tb - 1 &amp; 2 gray, 3 bp

FC MNB tb - 1 bp, 2 bp, &amp; 3 gray

FC 1, 2, &amp; 3 (RECORD AMPS) 20, 20, 26

MAIN BUS A, B, (26.5-31 vdc - Record) 29, 29

BAT BUS A, B, &amp; BAT C (31.5-38 vdc &lt; 3 amp)

PYRO BAT A, B (36.5 - 37.5 vdc)

DC IND sel - MNB

SYS TEST 5B (BAT RLY BUS - 3.4-4.1 vdc)

SYS TEST 7A (BAT COMPT PRESS - &lt;1.5 vdc)

(NA until 1st Vent)

\*If &gt;1.5: BAT VENT vlv -\*

\*VENT (to ~0) then CLOSED\*

If LM PWR - CSM

SYS TEST (2) - 7D (LM PWR - 0.5-3.2 vdc)

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4 A-C VOLTS - 110 to 120 three phase avg.

5 Battery Charging BAT A(B,C)

MAIN BUS TIE A/C (B/C) - OFF

cb BAT BUS A & B PYRO BUS TIE - open (verify)

cb BAT C BAT BUS A & B - open (verify)

cb BAT RLY BUS BAT A(B) - open

DC IND sel - BAT CHARGER

BAT CHARGE - A(B,C)

DC VOLTS - 37.5-39.5 vdc

BAT CHARGE - OFF at 39.5 vdc or 100% recharge

cb BAT RLY BUS BAT A(B) - closed

SYS TEST - 7A (BAT COMPT PRESS - <1.5)

\*If >1.5: BAT VENT vlv -\*

\*VENT (to ~0) then CLOSED\*

SYS TEST - 5B

6 Fuel Cell Power Plant Purging

A O2 PURGING

FC IND sw - 1(2,3)

FC PURGE 1(2,3) - 02 (2 min)

FC FLOW - 02 Flow incr 0.6 lb/hr

M/A FC 1(2,3) - On/RSET

FC PURGE - 1(2,3) - OFF

B H2 PURGING

H2 PURGE LINE HTR - ON, 20 min prior to purge

FC IND sw - 1(2,3)

FC PURGE 1(2,3) - H2 (1 min, 20 sec)

FC H2 FLOW - Flow incr 0.67 lb/hr

(will exceed C/W limit)

M/A FC 1(2,3) - On/RSET

FC PURGE - 1(2,3) - OFF

After 10 minutes:

H2 PURGE LINE HTR - OFF

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CM EVA

SAFE OF APEX  
COVER JETT

STOWAGE

LM INTERFACE

7 FUEL CELL SHUTDOWN (APPLICABLE FC)

FC REAC - OFF

FC HTRS - OFF

FC PUMPS - OFF

cb FC PUMPS AC - open

AT Tskin &lt;200° F

H<sub>2</sub> PURGE LINE HTR - ON (for 20 min)FC PURGE - O<sub>2</sub> (~~TIL O<sub>2</sub> PRESS = N<sub>2</sub> PRESS~~)FC PURGE - H<sub>2</sub> (~~TIL PRESS STABILIZES~~)<sup>(AFTER O<sub>2</sub> PRESS</sup> STABILIZES)FC PURGE - OFF<sup>(AFTER H<sub>2</sub> PRESS STABILIZES)</sup>H<sub>2</sub> PURGE LINE HTR - OFF

cb FC RAD/REACS - open

8 FUEL CELL SWITCHING

PRIOR TO DISCONNECTING, INSURE THAT AT LEAST

ONE FUEL CELL IS POWERING EACH MAIN BUS

Possible MA &amp; FC DISCONNECT It

9 INVERTER CHANGEOVER

A One inverter on each AC bus at all times (if available)

B If all three AC bus ties for the same bus are on, inverter power to that bus may be lost

C When switching DC power on inverter 3, pause in OFF position

10 CRYO MANUAL FAN OPERATION

CRYO FANS - ON (seq at 1 sec intervals for 1 min each)

- a. Prior to every SPS or SIVB ΔV
- b. Presleep
- c. Postsleep
- d. Pre LM Extraction

CAUTION

If CRYO PRESS It on, do not turn off fan until It extinguishes

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ECS PERIODIC VERIFICATION1 ECS MONITORING CHECKCABIN  $\Delta P$  - -1 to -3.5 in. H<sub>2</sub>OO<sub>2</sub> FLOW - 0.2-0.45 lb/hr (after changeover)

CRYO PRESS IND - SRG/3

O<sub>2</sub> SURGE TANK PRESS - 865-935 psiaREPRESS O<sub>2</sub> >865 psia

PRIM RAD tb - gray

\*If PRIM RAD tb - 2

\* ECS RAD FLOW AUTO CONT - 1 until \*

\* tb gray, then AUTO \*

ECS RAD TEMP PRIM IN - 67-97°F

ECS RAD TEMP PRIM OUT - -20° to +63°F (-20° to  
97°F for lunar orb)PRIM GLY EVAP TEMP OUT - 38-50.5°F ~~55~~

PRIM GLY DISCH PRESS - 40-52 psig

SUIT TEMP - 45-70°F w/o evap; 45-55°F with evap

CABIN TEMP - 70-80°F

SUIT PRESS/CABIN PRESS- 4.7-5.3 psia

PART PRESS CO<sub>2</sub> < 7.6 mm HgSUIT COMP  $\Delta P$  - 0.3-0.4 psid

PRIM GLY ACCUM QTY 30-65%

\*If &lt;30% - PRIM ACCUM FILL vlv - \*

\* ON (Until 40-55%) \*

POT H<sub>2</sub>O QTY - 10-100%WASTE H<sub>2</sub>O QTY - 15-85%

\*If &gt;85% - Dump\*

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2 ECS PERIODIC REDUNDANT COMPONENT CK

## Suit Compressor

Sw to other compr

SUIT COMPR  $\Delta P$  ind - 0.3-0.4 psidMain O<sub>2</sub> Regulators

MAIN REG B vlv - close

EMER CABIN PRESS sel - 1

PUSH TO TEST PB - PUSH (O<sub>2</sub> FLOW INC)

MAIN REG B vlv - open

MAIN REG A vlv - close

EMER CABIN PRESS sel - 2

PUSH TO TEST PB - PUSH (O<sub>2</sub> FLOW INC)

MAIN REG A vlv - open

EMER CABIN PRESS sel - BOTH (OFF if all suited)

STOWAGE

LM INTERFACE

CM EVA

SHUT OFF AREA  
COVER JETT

## Secondary Glycol Loop

Open cool atten panel (If req'd)

EVAP H2O CONT SEC vlv - AUTO

ECS IND sw - SEC

SEC COOL LOOP PUMP - AC 1 (AC 2)

GLY DISCH SEC PRESS - 39-51 psig

ACCUM SEC QTY IND - 30-55%

SEC COOL LOOP EVAP - EVAP

After 5 min

SEC EVAP TEMP OUT - 38-50.5°F

SEC COOL LOOP EVAP - RESET for 1 min minimum,  
then off (ctr)

SEC COOL LOOP PUMP - off (ctr)

ECS IND sw - PRIM

3 CO2 ABSORBER FILTER REPLACEMENT

Open CO2 Canister attenuation pn1

CAUTIONConnect ground wire when re-  
moving or replacing filter  
from canister or stowage

CO2 CSTR DIVERT vlv - up (or dn)

CAUTIONApply pressure to latching  
handle to allow pressure  
interlock pin to withdraw  
otherwise latching handle  
may not disengage

CANISTER MANUAL BLEED vlv - PRESS

COVER LATCHING HANDLE - UNLOCK

Replace used filter

COVER LATCHING HANDLE - LOCK

CO2 CSTR DIVERT vlv - ctr

Close CO2 Canister attenuation pn1

SHIM Stowage - B5 &amp; B6

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S  
1-7

4 DEBRIS SCREEN CHECK

Check SUIT RET AIR vlv screen  
SUIT RET AIR vlv - CLOSE (push)  
Clean screens  
SUIT RET AIR vlv - OPEN (pull)

5 CM O2 SUPPLY REFILL

CRYO PRESS IND - SRG/3  
SURGE TANK PRESS >400 psia  
CAB REPRESS vlv - OFF  
REPRESS O2 vlv - CLOSE  
REPRESS PKG vlv - FILL  
SURGE TANK PRESS - 865-935 psia  
CRYO PRESS IND - 1/2  
REPRESS PKG vlv - OFF

6 DOFFING PGA

EMER CABIN PRESS vlv - BOTH  
SUIT RET AIR vlv - OPEN (pull)  
Install hose screen on return hose  
PWR - OFF  
SUIT PWR - OFF for disconnect  
AUDIO CONT - NORM  
SUIT FLOW vlv - CABIN FLOW (for unsuited crewman)  
(FULL FLOW for 3 unsuited)

7 DONNING PGA (with helmet & gloves)

SUIT PWR - OFF (for comm cable connect)  
PWR - OFF  
AUDIO CONT - NORM  
Connect supply and return hoses to PGA  
Connect Comm Control Head to PGA  
SUIT FLOW vlv - FULL FLOW (for suited crewman)  
SUIT RET AIR vlv - CLOSE (push)  
EMERG CABIN PRESS vlv - OFF (if all suited)

8 PARTIAL SUIT CKLIST

EMER CAB PRESS vlv - BOTH  
SUIT CKT RET vlv - OPEN (pull)  
Reverse O2 umbilicals  
Before disconnecting umbilical from head set:  
SUIT PWR - OFF  
POWER - OFF  
AUDIO CONT - NORM

STOWAGE

LM INTERFACE

CM EVA

SAFE UF APEX  
COVER JETT

9 URINE DUMP MODES  
USING UTS

## A PGA URINE COLL BAG DUMP

Connect Urine transfer hose & filter  
to urine feces QD

Remove cap from PGA thigh QD

Connect urine transfer hose to thigh QD

WASTE MGT OVBD DRAIN vlv - DUMP

Disconnect urine transfer hose from PGA

Replace cap on PGA thigh QD

Connect UTS to urine transfer hose/filter QD

UTS vlv - OPEN

Purge dump line 2-5 minute

WASTE MGT OVBD DRAIN vlv - OFF

UTS vlv - CLOSED

Disconnect hose & stow

## B UTS (Collection)

Obtain UTS & verify vlv - CLOSED

Attach UTS - open vlv - Perform task

UTS vlv - CLOSED

Disconnect UTS & stow

## C UTS/Urine Bag (Collection/Transfer)

Obtain UTS & verify vlv - CLOSED

Attach UTS - open vlv - Perform task

UTS vlv - CLOSED

Connect UTS to Urine Bag

~~UTS vlv - OPEN~~

Roll UTS Bag to transfer urine

~~UTS vlv - CLOSED~~, when transfer complete

Disconnect UTS from Urine Bag & stow

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## D UTS (Dump)

BAT VENT vlv - CLOSED (verify)

UTS vlv - CLOSED (verify)

Connect UT hose/high cap filter/WMS filter  
to urine/feces QD

Attach UTS to T Adapter

WASTE MGT OVBD DRAIN vlv - DUMP

When UTS Bag Empty, USS vlv - OPEN

Purge lines 2-5 minute

WASTE MGT OVBD DRAIN vlv - OFF

UTS vlv - CLOSED

Stow UTS & Hose

### USING URINE RECEPTACLE ASSY (URA)

Connect urine line filter to urine transfer hose.

Connect urine transfer hose/filter to urine feces QD

Connect Urine Receptacle/Plenum Assy to urine transfer hose

URA vlv - VENT

Remove receptacle cover

WASTE MGT OVBD DRAIN vlv - DUMP

NOTE: Direct water stream parallel to honeycomb to prevent splash-back.

Avoid acceleration to URA during use.

Remove last drop by touching screen at top of URA.

Perform task

Flush screen and honeycomb with water gun (10 sec max)

Replace receptacle cover after liquid has cleared from URA

URA vlv - VENT (2-5 min)

URA vlv - CLOSE

Stow Urine Receptacle/Plenum Assy for next use with urine transfer hose connected and WASTE MGT OVBD DRAIN vlv - DUMP

For stowage prior to entry:

WASTE MGT OVBD DRAIN vlv - OFF

Remove and stow URA, urine transfer hose, and urine filter

### DUMPING URINE STORAGE BAG

Connect high capacity urine filter to urine storage bag (side marked "in").

Connect urine hose adapter (tethered to hose) to urine transfer hose

Connect urine storage bag/filter to urine hose adapter

Connect urine line filter to urine transfer hose

Connect urine transfer hose/filter to urine/feces QD

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

WASTE MGT OVBD DRAIN vlv - DUMP  
Purge urine transfer hose  
Disconnect urine storage bag/filter  
from urine transfer hose  
Disconnect urine hose adapter from urine  
transfer hose  
Purge 2-5 min  
Reconnect urine hose adapter to urine  
transfer hose  
WASTE MGT OVBD DRAIN vlv - OFF

10 CABIN PRESSURIZATION

- A NORMAL, ~21 min  
CAB PRESS REL vlv (2) - NORMAL (latch on)  
REPRESS PKG vlv - FILL  
CRYO PRESS IND - SRG/3  
REPRESS O2 vlv - OPEN  
\*IF SURGE TANK PRESS decreases to 150 psia:  
\* REPRESS O2 vlv - CLOSE  
CAB PRESS ind - ~3.0 psia (1 min)  
REPRESS PKG vlv - OFF  
CAB REPRESS vlv - OPEN (CW), Adjust to maintain  
>150 psia in SURGE TANK  
REPRESS O2 PRESS ind - ~0 psia  
REPRESS O2 vlv - CLOSE  
CAB PRESS = 4.7-5.3 psia  
CAB REPRESS vlv - OFF
- B ALTERNATE, ~48 min  
CAB PRESS REL vlv (2) - NORMAL (Safety latch on)  
EMER CAB PRESS vlv - BOTH  
CAB REPRESS vlv - OPEN  
MONITOR SURGE TANK PRESS  
At 150 psia on SURGE TANK:  
EMER CAB PRESS vlv - OFF  
CAB REPRESS vlv - Adj to 150 psia on SURGE TK  
WHEN CAB PRESS >4.7  
CRYO PRESS IND - 1/2  
CAB REPRESS vlv - OFF

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11 SUIT CKT/PGA INTEGRITY CHECK

A SUIT CKT/PGA CHECK Common:

Verify unsuited umbillicals interconnected  
and SUIT FLOW vlv - OFF  
DIRECT O2 vlv - close (CW)  
SUIT PRESS - 4.7-5.3 psia  
O2 FLOW - 0.2-0.4 lb/hr

CAUTION

SUIT TEST vlv should remain  
in the PRESS position until  
suit circuit pressure is sta-  
bilized to preclude seal scarring.  
If repositioning of SUIT TEST  
v lv from PRESS is required prior  
to suit pressure and O2 flow  
stabilization, perform the  
following:

- a. O2 DEMAND REG vlv - OFF
- b. Allow 15 sec (min)  
stabilization time
- c. Reposition SUIT TEST vlv -  
DEPRESS or OFF as applicable
- d. When suit pressure stabilized,  
O2 DEMAND REG vlv - BOTH

SUIT TEST vlv - PRESS (DIR O2 - OPEN,

At 4.0 psig, DIR O2 - OFF)

O2 FLOW - 1.0 lb/hr (pegged)

O2 FLOW HI lt - on

M/A - ON, Reset

When SUIT PRESS ind 1.5-2.0 psig > CAB PRESS ind  
SUIT CKT RET vlv - open then close

SUIT PRESS - 8.8-9.8 psia

PGA PRESS - 4.1-4.5 psig

For SUIT CKT CHECK Continue to B.

For PGA CHECK continue to C.

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B SUIT CKT CHECK Continued:

O2 FLOW HI lt - out

Allow O2 flow to stabilize 15 sec

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

O2 flow will remain below 0.97 lb/hr  
(gage must not be pegged)  
for 30 sec after stabilization

SUIT TEST vlv - DEPRESS  
O2 FLOW - 0.2-0.4 lb/hr  
SUIT PRESS - slightly > CAB PRESS  
SUIT TEST vlv - OFF  
O2 DEMAND REG vlv - BOTH (verify)

C PGA CHECK Continued:

WARNING

SUIT FLOW vlv(s) may remain in OFF position for no longer than one minute or asphyxiation may result. If all SUIT FLOW vlv's are closed simultaneously the suit compressors must be shut off to prevent compressor damage due to suit loop deadheading.

SUIT FLOW vlv - OFF  
Monitor for <0.5 psi/min decay  
SUIT FLOW vlv - SUIT FULL FLOW  
SUIT TEST vlv - DEPRESS  
O2 FLOW HI lt - out  
O2 FLOW - 0.2-0.4 lb/hr  
SUIT PRESS - slightly > CAB PRESS  
SUIT TEST vlv - OFF

12

CM PRESSURE DUMP

EMER CABIN PRESS vlv - OFF (verify)  
CAB REPRESS vlv - OFF (verify)  
SUIT CKT RET vlv - CLOSED (verify)  
CABIN FANS (2) - OFF (verify)  
DIRECT O2 vlv - close (CW)  
CAB PRESS REL vlv (RH) - DUMP (latch off)  
CABIN PRESS - 3.0-3.25 psia  
CAB PRESS REL vlv (RH) - BOOST/ENTRY  
O2 FLOW - 0.24 lb/hr  
SUIT PRESS - 3.5-4.0 psia  
CAB PRESS REL vlv (RH) - DUMP  
CABIN PRESS - 0.0 psia (within 6 min)  
CAB PRESS REL vlv (2) - NORMAL (latch on)

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**13 SUIT CKT H<sub>2</sub> PURGE**

DIRECT O2 vlv - OPEN for 1 min  
O2 FLOW - 1.0 lb/hr (pegged)  
O2 FLOW HI lt - on  
MASTER ALARM pb/lit (3) - on, push  
DIRECT O2 vlv - close (CW)  
O2 FLOW HI lt - out  
O2 FLOW - 0.2 lb/hr

**14 CABIN COLD SOAK****ACTIVATE**

SUIT HT EXCH SEC GLY vlv - FLOW  
EVAP H<sub>2</sub>O CONT SEC vlv - AUTO  
GLY TO RAD SEC vlv - BYPASS (verify)  
SUIT CKT HT EXCH - BYPASS (20sec), then off (ctr)  
ECS IND sel - SEC  
SEC COOL LOOP PUMP - AC2  
GLY DISCH SEC PRESS - 39-51 psig  
SEC ACCUM QTY - 30-55%  
SEC COOL LOOP EVAP - EVAP  
SEC GLY EVAP OUT TEMP - 38-50.5°F  
ECS IND - PRIM  
PRIM ECS RAD OUT TEMP - >-20°F  
\*IF <-20°F, DEACTIVATE\*

**DEACTIVATE**

SUIT CKT HT EXCH - ON (20 sec), then off (ctr)  
SEC COOL LOOP EVAP - RESET 1 min, then off (ctr)  
SEC COOL LOOP PUMP - off (ctr)  
EVAP H<sub>2</sub>O CONT SEC vlv - OFF (AUTO for ENTRY)

**15 ACTIVATE PRIMARY EVAP**

GLY EVAP H<sub>2</sub>O FLOW - AUTO  
GLY EVAP STM PRESS - AUTO

**DEACTIVATE PRIMARY EVAP**

GLY EVAP H<sub>2</sub>O FLOW - off (ctr)  
GLY EVAP STM PRESS AUTO - MAN  
GLY EVAP STM PRESS INCR - INCR for 1 min

**PRIM EVAP RESERVICE**

GLY EVAP STM AUTO - MAN  
GLY EVAP STM INCR - INCR  
for 1 min

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

Wait 15 min  
GLY EVAP H2O FLOW - ON  
for 2 min, then AUTO  
GLY EVAP STM AUTO - AUTO

16 ACTIVATE SEC EVAP

SEC EVAP H2O CONT - AUTO  
SEC COOL LOOP EVAP - EVAP  
SEC COOL LOOP PUMP - AC1

DEACTIVATE SEC EVAP

SEC COOL LOOP EVAP - RESET for 1 minute  
SEC EVAP H2O CONT - OFF  
SEC COOL LOOP PUMP - OFF

17 POTABLE WATER CHLORINATION

POT TK IN vlv - OPEN (verify)

Check WASTE TK qty; if <15%,  
no chlorination if evaporators operating.

Check POT TK qty; if >90°,  
withdraw 8 oz of water

Unstow chlorination unit

Remove chlor port cap

Attach needle assembly to injection port

Insert chlorine ampoule into casing

Connect knob assembly & rotate (CW) until  
piston contacts ampoule

Install ampoule assembly on needle assembly  
(push & turn CW)

Rotate knob (CW) until ampoule is empty  
(3 times for half empty if H2O quantity <50%)

Disconnect ampoule assembly from needle  
assembly

Rotate knob CCW & stow used ampoule

Repeat above steps with buffer ampoule

Wait 10 min & remove ampoule of H2O

Replace chlor port cap

Stow chlorination unit

Do not drink for 30 min

DATE 6/19/7118 WASTE WATER TANK DRAIN

BAT VENT vlv - CLOSED (verify)

H2O QTY IND - WASTE

WATER CONT PRESS REL vlv - DUMP A

S  
1-15

Monitor WASTE H2O QTY ind - decreasing  
If reqd to dump to 0%

POT TK IN vlv - open (verify)  
WASTE TK IN vlv - AUTO (verify)

When WASTE H2O QTY ind - 15%

WATER CONT PRESS REL vlv - 2

19 SIDE HATCH URINE/WATER DUMP

Remove Dump Nozzle Conn Cover

Remove Plug & Stow

Withdraw Wire Guard & Wires from slot

Install Male QD on Dump Nozzle

Install Female QD on Waste Tank Service Port

Connect cable to heater connector (crew option)

UTIL PWR - OFF

Connect cable to utility outlet

UTIL PWR - ON

Connect Urine Dump Hose to Dump Nozzle QD

Connect other end of UT hose to Female QD on  
Waste Tank Service Port (as req)

Dump Waste Water/Urine

If Waste Water Dump:

WASTE TANK SERV vlv - OPEN

until WASTE H2O QTY ind 15%, then CLOSE

Disconnect UT hose from UTS/Waste Servicing Tank  
and Purge

Disconnect UT Hose from Dump Nozzle & stow

UTIL PWR - OFF (verify)

Disconnect Cable from heater & outlet & stow

Install plug & dump nozzle connector

CABIN WATER REMOVAL

20 WATER COLLECTION

Connect urine transfer hose-filter to urine/feces QD  
Disconnect "T" adapter QD from urine transfer hose

~~Connect Cab Purge QD to Urine Transfer Hose~~

WASTE MGT OVBD DRAIN vlv - DUMP

Collect water

After collection complete:

Purge for 2-5 min

WASTE MGT OVBD DRAIN vlv - OFF

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

- 21 WATER/GAS SEPARATOR SERVICING  
Remove separator from stowage  
Attach separator to water pistol  
Trigger water pistol in short pulses until water  
is observed at separator outlet port  
Wait 10 minutes  
CAUTION - Membrane can be damaged by pencils,  
screwdrivers, and other pointed objects  
Separator may be used on water pistol or on food  
prep unit as needed

- 22 PRE LOI SEC GLY LOOP CHECK  
ECS IND sw - SEC  
SEC GLY TO RAD vlv - NORM  
SEC COOL LOOP PUMP - AC1  
GLY DISCH SEC PRESS - 39-51 psia  
ACCUM SEC QTY ind - 30-55%  
SEC EVAP TEMP OUT - decreases  
(verifies flow)  
SEC COOL LOOP PUMP - off (ctr)  
SEC GLY TO RAD vlv - BYPASS  
ECS IND sw - PRIM

- 23 CONTAMINATION CONTROL  
Note: If water is to be collected,  
use water collection procedure.  
Unstow vac cleaner & components  
AC UTIL PWR - OFF (verify)  
Assemble components & connect pwr cable  
AC UTIL PWR - on (up)  
Vac cleaner pwr sw - ON  
Vacuum/brush CM interior with special  
attention to the following:  
Transfer tunnel wall and top hatch surfaces  
Open B5 and B6 cover and clean compartment  
and SRC bags surfaces  
Open A5 and clean compartment and CSC bag and  
film cassette bags surfaces  
Open R13 and clean compartment and film  
magazine bag surface  
Open food containers and clean compartment  
and helmet stowage bags surfaces  
PGA bag surfaces

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Move vacuum cleaner brush into all potential "dead air" pockets to ensure thorough mixing of CM atmosphere.

Vac cleaner pwr sw - OFF

AC UTIL PWR - OFF

Disconnect pwr cable & disassemble components

Stow vac cleaner & components

#### C/W OPERATIONAL CHECKS

##### 1 C/W SYSTEM OPERATIONAL CHECK

C/W LAMP TEST - 1 (LH MA & 15 lts)

C/W LAMP TEST - 2 (RH MA & 20 lts)

C/W CSM - CM (CM RCS 1t (2) - on)

C/W CSM - CSM (CM RCS 1t (2) - out)

##### 2 ACKNOWLEDGE/RESET MASTER ALARM INDICATION

A Normal mode

MA tone/lt (3) - on

MA pb/lt (1) - push

MA tone/lt (3) - out

applicable C/W lt remains on

B Acknowledge mode (C/W NORM in ACK)

MA tone/lt (3) - on

MA pb/lt (1) - push & hold

MA tone/lt (3) - out

applicable C/W lt remains on for malfunction indication

MA pb/lt - release

applicable C/W lt - out

##### 3 MASTER ALARM TONE HEADSET CONTROL

A Inhibit tone (PWR - AUDIO)

B Permit tone (PWR - AUDIO/TONE)

##### 4 C/W TONE BOOSTER ASSEMBLY

A Installation

UTIL PWR - OFF

Install connector

Position sensor over MA lt

UTIL PWR - on (up)

Install beeper on

LH (RH) girth shelf

B Operational Check

C/W LAMP TEST - 1(2) (hold)

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SAFE OF APEX  
COVER JETT

CM EVA

L.M. INTERFACE

STOWAGE

TELECOMM PROCEDURES1 HI-GAIN ANTENNA OPERATIONA ACTIVATION

cb HI-GAIN ANT FLT BUS - closed  
cb HI-GAIN ANT AC GRP 2 - closed  
HI-GAIN ANT TRACK - MAN  
HI-GAIN ANT SERVO ELEC - PRIM  
HI-GAIN ANT BEAM - WIDE  
HI-GAIN ANT PITCH POS - -52°  
HI-GAIN ANT YAW POS - 270°  
HI-GAIN ANT PWR - POWER

B ACQUISITION

Request pointing angles from MCC or go  
to V64 HI-GAIN ANTENNA POINTING procedures

Verify required coordinates within full  
coverage region

- \*If required coordinates are in scan warning\*
- \* limit zone or skin reflection zone, one \*
- \* of the following may be done:
- \*a. Change CSM attitude to provide antenna \*
- \* coordinates in the full coverage region \*
- \*b. In attitude hold condition, operate in \*
- \* medium beam and manual mode.
- \*c. Use OMNI's

HI-GAIN ANT TRACK - MAN  
HI-GAIN ANT BEAM - WIDE  
HI-GAIN ANT PITCH & YAW POS (2) - Set reqd coord

- \*If in earth orbit, S BD NORM PWR AMPL HI -\*
- \* off (ctr) \*

S BD ANT - HI GAIN

HI-GAIN ANT S BD ANT ind - > 1/2 scale

HI-GAIN ANT TRACK - AUTO or REACQ

HI-GAIN ANT BEAM - as reqd depending on range

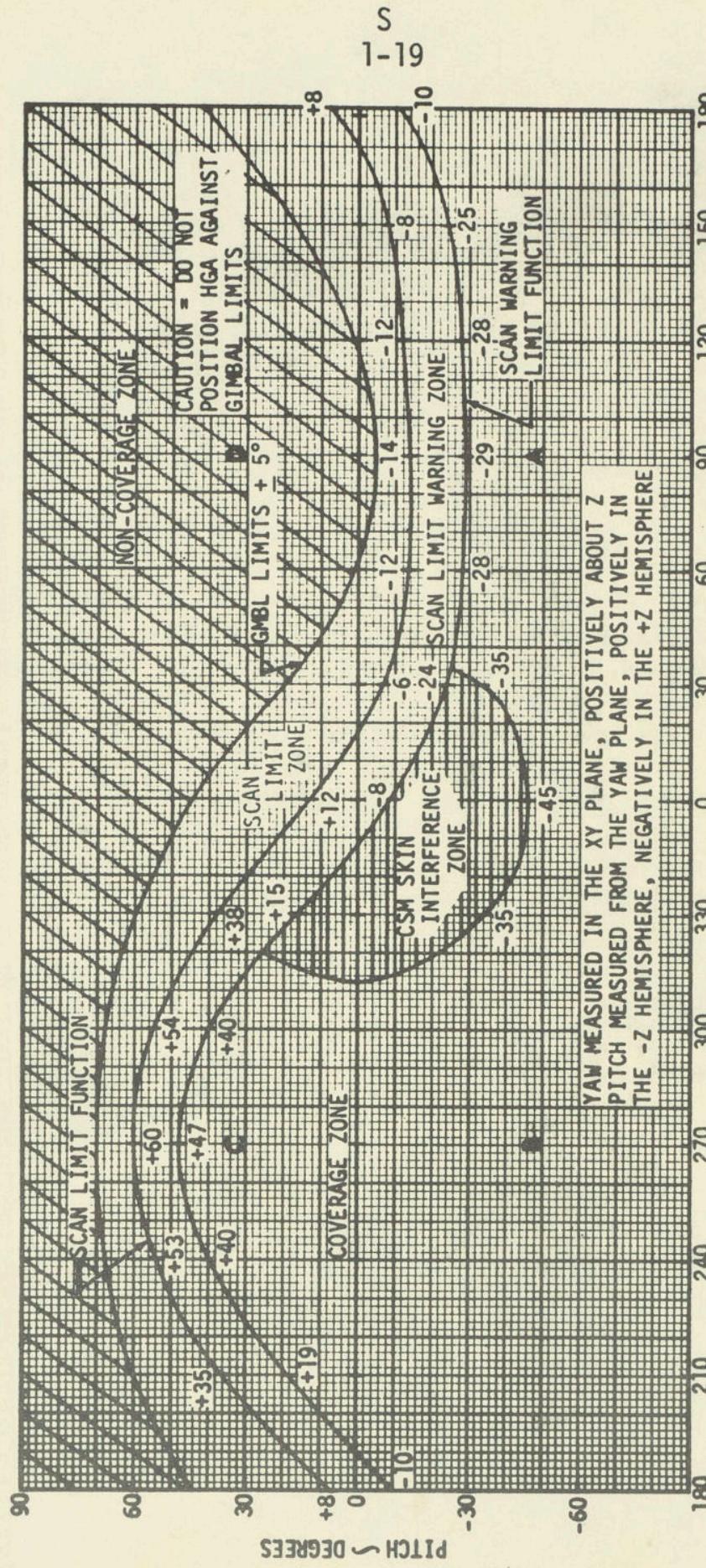
HI-GAIN ANT S BD ANT ind - > 1/2 scale

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C STOWING (OMNI Operations)

HI-GAIN ANT TRACK - MAN  
HI-GAIN ANT BEAM - WIDE  
HI-GAIN ANT PITCH POS - -52°  
HI-GAIN ANT YAW POS - 270°

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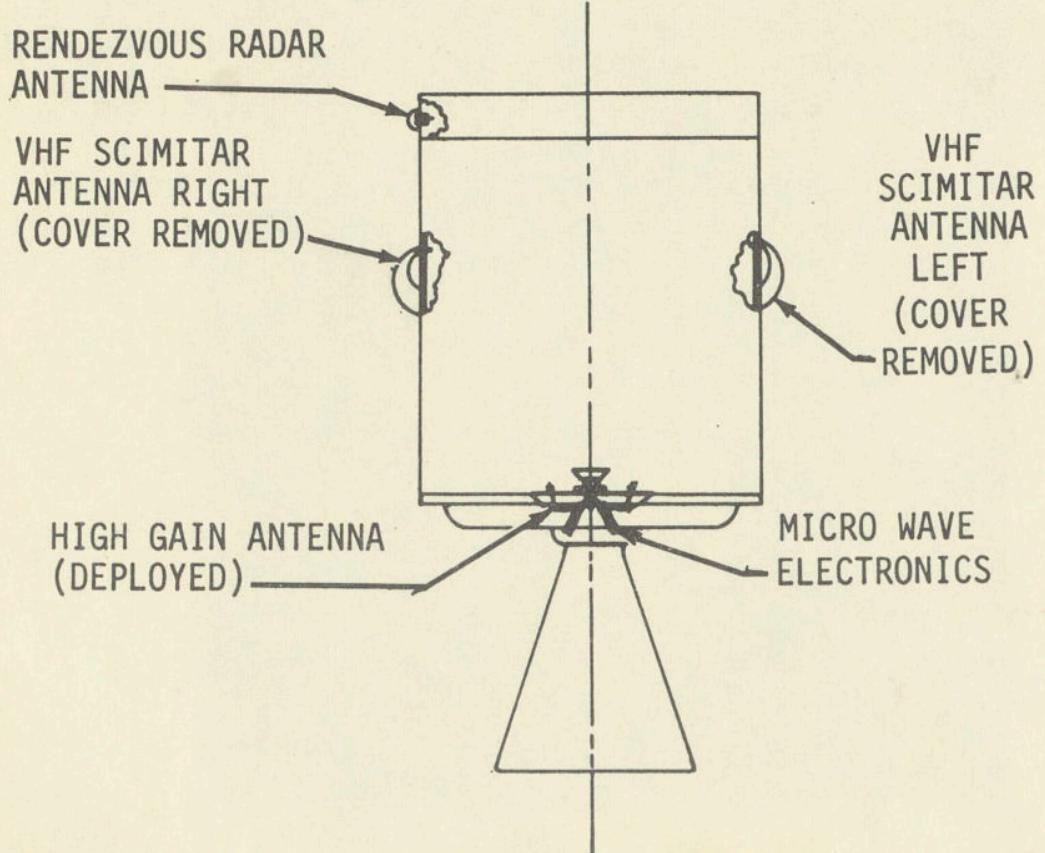
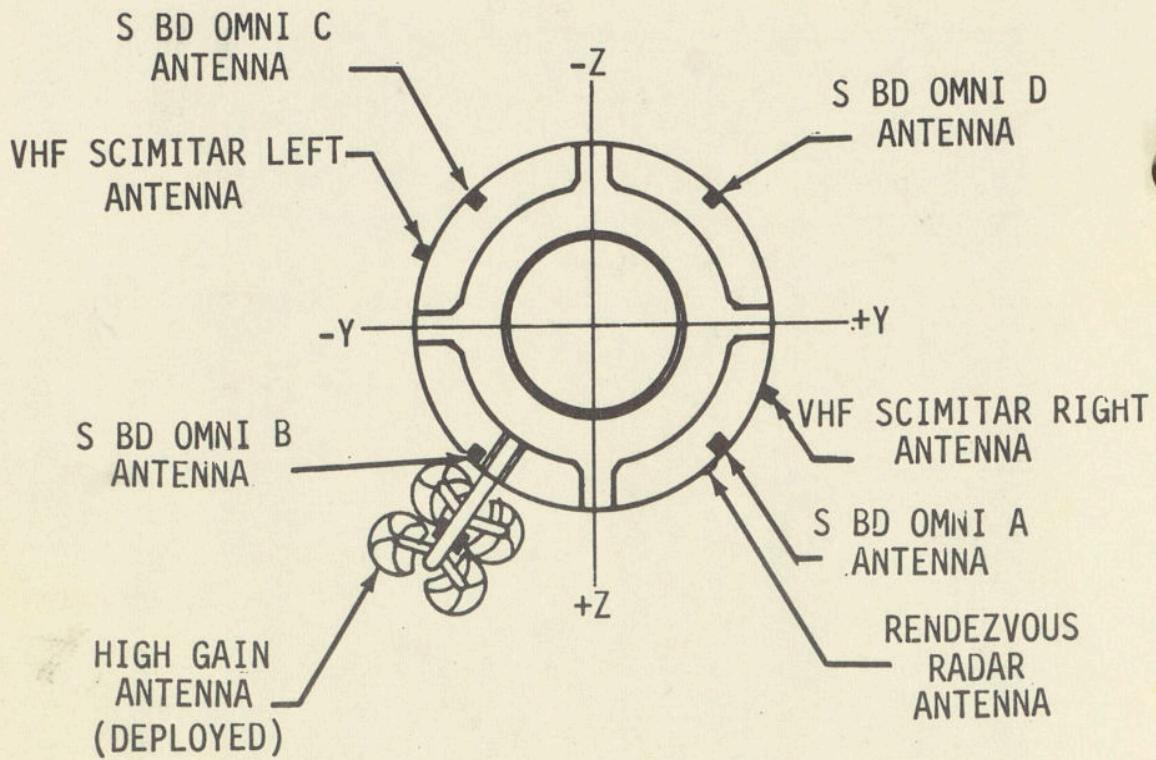
YAW MEASURED IN THE XY PLANE, POSITIVELY ABOUT Z  
PITCH MEASURED FROM THE YAW PLANE, POSITIVELY IN  
THE -Z HEMISPHERE, NEGATIVELY IN THE +Z HEMISPHERE

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COVER JETT

CM EVA

LM INTERFACE

STOWAGE



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2 TV CAMERA OPERATION (COLOR)

Unstow TV camera, monitor, camera cable, and monitor cable

Verify monitor power sw is in off position

Transmit/Standby sw - STANDBY

TV camera ALC sw - AVG

Set focus to 4ft, zoom control to 25, aperture control to f/44

Connect monitor cable to camera and to monitor (arrow-to-arrow)

S BD AUX TAPE - off (ctr) or DN VOICE BU

Verify S BD AUX TV - off (ctr)

Connect TV camera cable to TV camera and s/c

S BD AUX TV - TV

TV monitor power sw - ON

Rotate monitor brightness and contrast controls until monitor picture is properly adjusted

Adjust cabin lighting to full max

By using monitor, adjust camera lens aperture, zoom control, and focus control

When TV transmission to MSFN is desired:

Transmit/Standby sw - XMITT

(xmsn will begin immediately)

When TV operation is completed: S BD AUX TV - off (ctr)

Disassemble and stow TV camera, monitor, and cables

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

3 VHF RANGING OPERATION

VHF AM A - off (ctr)  
VHF AM B - DUPLEX  
VHF RNG - on (up)  
P20 operating  
V87E, TRACKER 1t - on  
EMS FUNC -  $\Delta V$  SET/VHF RNG  
EMS MODE - BACKUP/VHF RNG

CAUTION

No VHF voice transmission for  
~12 sec after VHF RNG - RESET

VHF RNG - RESET (1 sec min)  
EMS RANGE ind - BBBB00  
P20 operating, TRACKER 1t - out  
EMS RANGE ind - BXXX XX

V83E (if desired)

R1 = RANGE  
R2 = RANGE RATE  
R3 =  $\theta$

V85E (if desired)

R1 = RANGE  
R2 = RANGE RATE  
R3 =  $\emptyset$

4 RNDZ XPNDR ACTIVATION & SELF TEST

cb RNDZ XPNDR FLT BUS - close (verify)

RNDZ XPNDR - HTR for 24 min  
(1 min if self test only)

RNDZ XPNDR - PWR

SYS TEST (lh) - XPNDR

SYS TEST (rh) - A (RRT XMTR OUT PWR)

SYS TEST ind - >1 vdc

SYS TEST (rh) - B (RRT AGC SIG)

RNDZ XPNDR - TEST (hold)

SYS TEST ind - >1 vdc

RNDZ XPNDR - OPERATE

SYS TEST ind - 0 - 4.5 vdc

SYS TEST (rh) - C (RRT FREQ LOCK)

SYS TEST ind - <.8 vdc unlocked, >4 vdc locked

SYS TEST - 5B (BAT RLY BUS)

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DATE

5 TAPE RECORDER OPERATION

1 RECORD VOICE/TM

PWR - AUDIO/TONE

MODE - INTERCOM/PTT

SUIT PWR - ON

INTERCOM T/R - T/R

PCM BIT RATE - as desired

TAPE RCDR RCD - RCD

TAPE RCDR FWD - FWD

2 DUMP OPERATION

S-BD AUX TAPE - TAPE

TAPE RCDR PCM - PCM/ANLG (CSM DATA DUMP)

- LM PCM (LM DATA DUMP)

TAPE RCDR REC - PLAY

TAPE RCDR FWD - STOP then RWD

On MSFN Cue

TAPE RCDR FWD - FWD

On MSFN Cue

TAPE RCDR FWD - STOP then RWD

TAPE RCDR RCD - RCD

If LUNAR ORBIT PHASE (On MSFN Cue):

TAPE RCDR FWD - FWD

If COAST PHASE (On MSFN Cue):

S-BD AUX TAPE - OFF

TAPE RCDR FWD - OFF

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

## 6 COMM MODES

AWAKE CONFIGURATION

S BD XPNDR - PRIM  
S BD PWR AMPL - PRIM  
S BD PWR AMPL HI - HI  
S BD MODE VOICE - VOICE  
S BD MODE PCM - PCM  
S BD RNG - RNG  
S BD AUX TAPE - off (ctr)  
S BD AUX TV - SCI (TLC - off (ctr))  
UP TLM DATA - DATA  
UP TLM CMD - NORM  
VHF AM A - off (ctr)  
VHF AM B - off (ctr)  
VHF RCV ONLY - off (ctr)  
VHF RNG - OFF  
TAPE RCDR PCM - PCM/ANLG  
TAPE RCDR RCD - RCD  
TAPE RCDR FWD - FWD  
SCE PWR - NORM  
PMP PWR - NORM  
PCM BIT RATE - HIGH (TLC - LOW)  
S BD SQUELCH - OFF  
HI GAIN ANT PWR - PWR  
HI GAIN ANT TRACK - MAN  
HI GAIN ANT BEAM - WIDE  
HI GAIN ANT SERVO ELEC - PRIM  
DATA SYS ON - ON (TLC - OFF)

ASLEEP CONFIGURATION (AWAKE deltas)

S BD SQUELCH - ENABLE  
S BD NORM MODE VOICE - off (ctr)

1 HI GAIN OPERATION:  
TLC/TEC: P,Y = +40,270 (ROLL RIGHT)  
P,Y = -40, 90 (ROLL LEFT)  
LUNAR ORB: P,Y = +25,185  
HI GAIN ANT BEAM - NARROW  
HI GAIN ANT TRACK - REACQ  
S BD ANT - HI GAIN

2 OMNI OPERATIONS: (LUNAR ORB - N/A)  
S BD ANT - OMNI  
S BD ANT OMNI - B  
TAPE RCDR FWD - off (ctr)

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For the following mission phases select the AWAKE  
CONFIGURATION plus the specified deltas:

A VHF RANGING, VOICE

VHF AM B - DUPLEX

VHF RNG - on (up)

B VHF LM-CSM VOICE DATA

VHF AM A - SIMPLEX

VHF RCV ONLY - B DATA

C CONTINGENCY

VHF AM A - SIMPLEX

VHF AM B - SIMPLEX

D RELAY MODE (LM VOICE TO MSFN)

Voice Relay (With VHF Ranging)

MODE - VOX (Pn1 10)

VOX SENS tw - 5

S BD - OFF

INTERCOM - OFF

VHF AM - T/R

AUDIO CONT - BU

MODE - VOX (Pn1 9)

VOX SENS tw - as req

S BD MODE VOICE - RELAY

VHF AM B - DUPLEX

VHF RNG - on (up)

Voice Relay (With LM LBR PCM record)

MODE - VOX (Pn1 10)

VOX SENS tw - 5

S BD - OFF

INTERCOM - OFF

VHF AM - T/R

AUDIO CONT - BU

MODE - VOX (Pn1 9)

VOX SENS tw - as req

S BD MODE VOICE - RELAY

VHF AM A - SIMPLEX

VHF RCV ONLY - B DATA

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

S  
1-26PRESLEEP CHECKLIST

- CREW STATUS REPORT (MEDICATION) ~~✓~~ ✓  
ONBOARD READOUTS ✓  
CYCLE H<sub>2</sub> FANS (3) ✓  
✓ CHLORINATE POTABLE WATER  
VERIFY:  
WASTE MGT OVBD DRAIN vlv - OFF  
WASTE STOW VENT vlv - CLOSED  
OPTICS ZERO - ZERO  
G&N POWER OPTICS - OFF  
EMERGENCY CABIN PRESS - BOTH  
SURGE TANK O<sub>2</sub> vlv - ON  
REPRESS PKG O<sub>2</sub> vlv - OFF  
CABIN PRESS RELF vlv (RH/LH) - NORMAL  
PRESS EQUAL vlv - CLOSE  
LM TUNNEL VENT vlv - LM/CM ΔP (LM on)  
- OFF (LM off)

Note: After EVA, use OPS O<sub>2</sub> (instead of  
DIRECT O<sub>2</sub>) to press cabin to 5.7 psia  
(See OPS QUICK BLEED DOWN, C/2-26.)  
When OPS O<sub>2</sub> depleted, stow OPS with  
OPS O<sub>2</sub> vlv - ON (open).

DIRECT O<sub>2</sub> vlv - open (CCW) (At 5.7 psia - CLOSE)  
"E" MEMORY DUMP  
CONFIGURE COMMUNICATIONS (S/1-24)

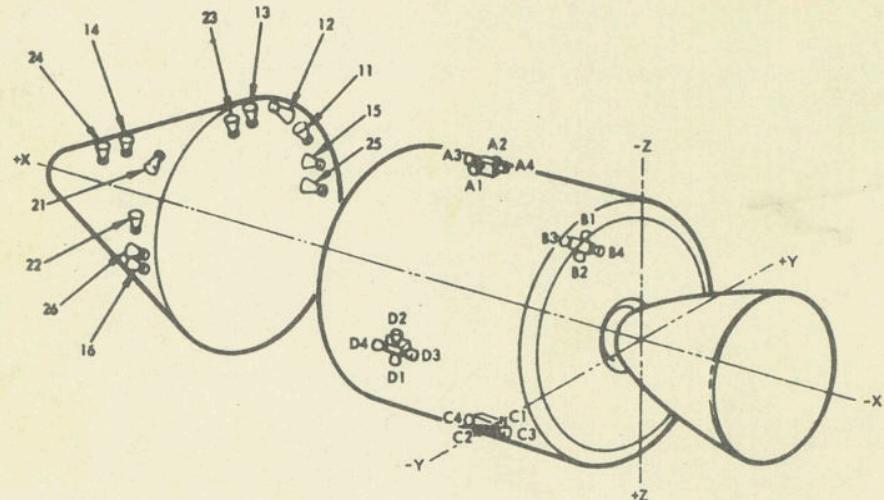
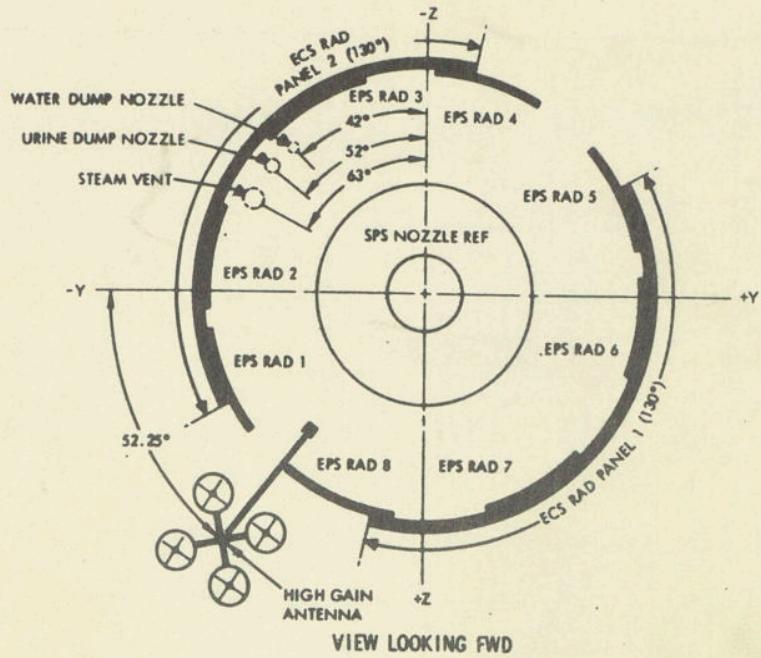
POSTSLEEP CHECKLIST

- CREW STATUS REPORT (SLEEP & RADIATION)  
CONSUMABLES UPDATE  
CYCLE H<sub>2</sub> FANS (3)  
CONFIGURE COMMUNICATIONS (S/1-24)

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S  
1-27

DATE 3/15/71



RCS Engine, Vent, and Radiator Locations

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

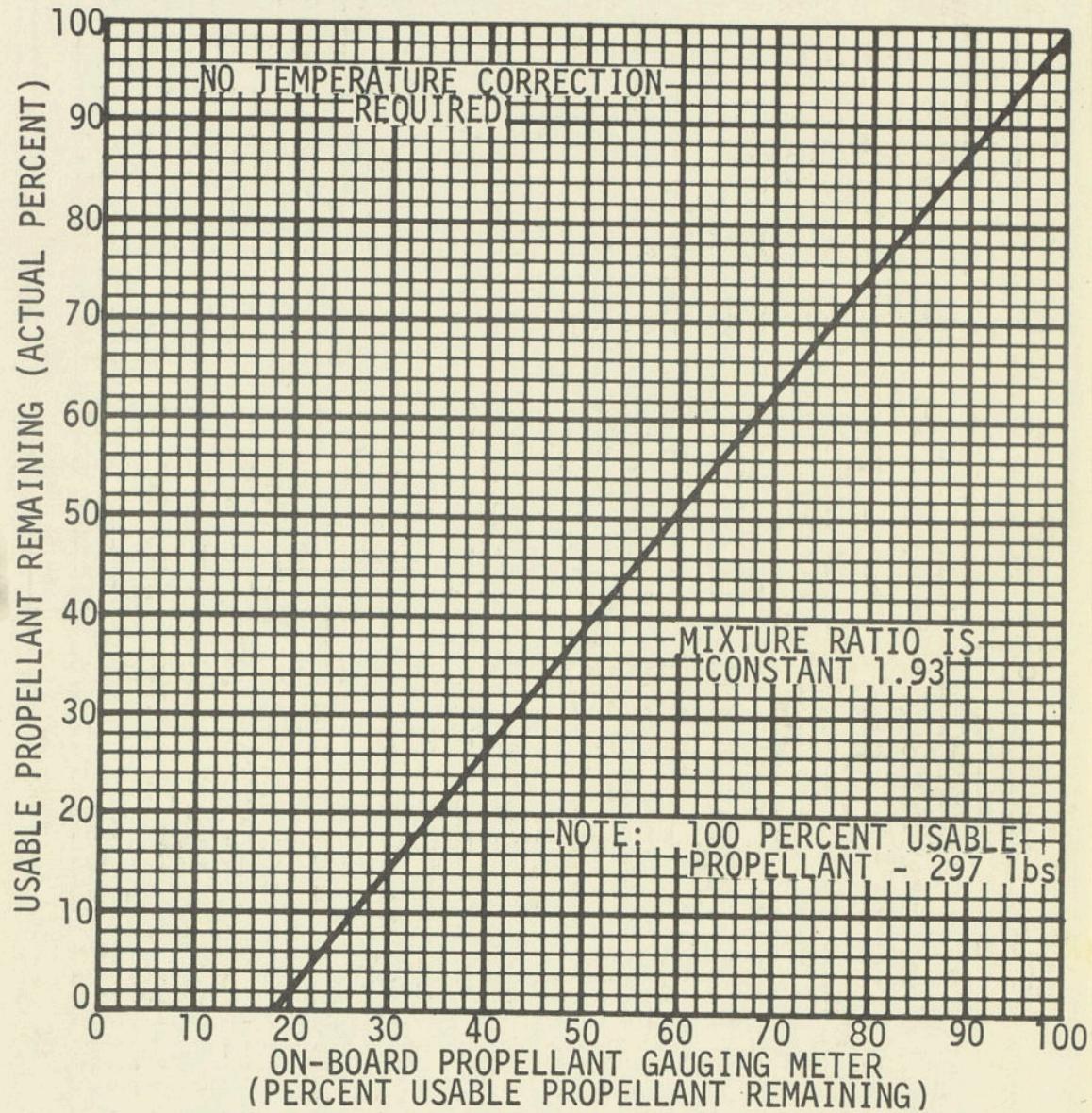
## System Test Indicator Conversion Chart

| SYSTEMS TEST Indicator Display | Cryo 02 Htr Temp (°F) | O2, H2 Pressure (psia)       | EPS Rad Out Temp (°F) | CM-RCS Oxid V1v Temp (°F) | LM Power (amps) | SPS Temp (°F) | Battery Compartment Manifold Pressure (psia) | Battery Relay Bus (vdc) |
|--------------------------------|-----------------------|------------------------------|-----------------------|---------------------------|-----------------|---------------|--|-------------------------|
| 0.0                            | -300                  | 0 0                          | -50                   | -50                       | 0               | 0             | 0.00   | 0                       |
| 0.2                            | -264                  | 3 3                          | -36                   | -46                       | 0.4             | 8             | 0.80   | 1.8                     |
| 0.4                            | -228                  | 6 6                          | -22                   | -42                       | 0.8             | 16            | 1.60   | 3.6                     |
| 0.6                            | -192                  | 9 9                          | -8                    | -38                       | 1.2             | 24            | 2.40   | 5.4                     |
| 0.8                            | -156                  | 12 12                        | +6                    | -34                       | 1.6             | 32            | 3.20   | 7.2                     |
| 1.0                            | -120                  | 15 15                        | +20                   | -30                       | 2.0             | 40            | 4.00   | 9.0                     |
| 1.2                            | -84                   | 18 18                        | +34                   | -26                       | 2.4             | 48            | 4.80   | 10.8                    |
| 1.4                            | -48                   | 21 21                        | +48                   | -22                       | 2.8             | 56            | 5.60   | 12.6                    |
| 1.6                            | -12                   | 24 24                        | +62                   | -18                       | 3.2             | 64            | 6.40   | 14.4                    |
| 1.8                            | +24                   | 27 27                        | +76                   | -14                       | 3.6             | 72            | 7.20   | 16.2                    |
| 2.0                            | +60                   | 30 30                        | +90                   | -10                       | 4.0             | 80            | 8.00   | 18.0                    |
| 2.2                            | +96                   | 33 33                        | +104                  | -6                        | 4.4             | 88            | 8.80   | 19.8                    |
| 2.4                            | +132                  | 36 36                        | +118                  | -2                        | 4.8             | 96            | 9.60   | 21.6                    |
| 2.6                            | +168                  | 39 39                        | +132                  | +2                        | 5.2             | 104           | 10.40  | 23.4                    |
| 2.8                            | +204                  | 42 42                        | +146                  | +6                        | 5.6             | 112           | 11.20  | 25.2                    |
| 3.0                            | +240                  | 45 45                        | +160                  | +10                       | 6.0             | 120           | 12.00  | 27.0                    |
| 3.2                            | +276                  | 48 48                        | +174                  | +14                       | 6.4             | 128           | 12.80  | 28.8                    |
| 3.4                            | +312                  | 51 51                        | +188                  | +18                       | 6.8             | 136           | 13.60  | 30.6                    |
| 3.6                            | +348                  | 54 54                        | +202                  | +22                       | 7.2             | 144           | 14.40  | 32.4                    |
| 3.8                            | +384                  | 57 57                        | +216                  | +26                       | 7.6             | 152           | 15.20  | 34.2                    |
| 4.0                            | +420                  | 60 60                        | +230                  | +30                       | 8.0             | 160           | 16.00  | 36.0                    |
| 4.2                            | +456                  | 63 63                        | +244                  | +34                       | 8.4             | 168           | 16.80  | 37.8                    |
| 4.4                            | +492                  | 66 66                        | +258                  | +38                       | 8.8             | 176           | 17.60  | 39.6                    |
| 4.6                            | +528                  | 69 69                        | +272                  | +42                       | 9.2             | 184           | 18.40  | 41.4                    |
| 4.8                            | +564                  | 72 72                        | +286                  | +46                       | 9.6             | 192           | 19.20  | 43.2                    |
| 5.0                            | +600                  | 75 75                        | +300                  | +50                       | 10.0            | 200           | 20.00  | 45.0                    |
| SYS TEST set                   | 1A,1B,1C              | (O2)1D,2A,2B<br>(H2)2C,2D,3A | 3B,3C,3D              | 5C,5D,6A<br>6B,6C,6D      | 7D              | 5A            | 7A   | 5B                      |

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Minus Two-Sigma SM RCS On-Board Propellant  
Gauging Meter Correction Nomograph

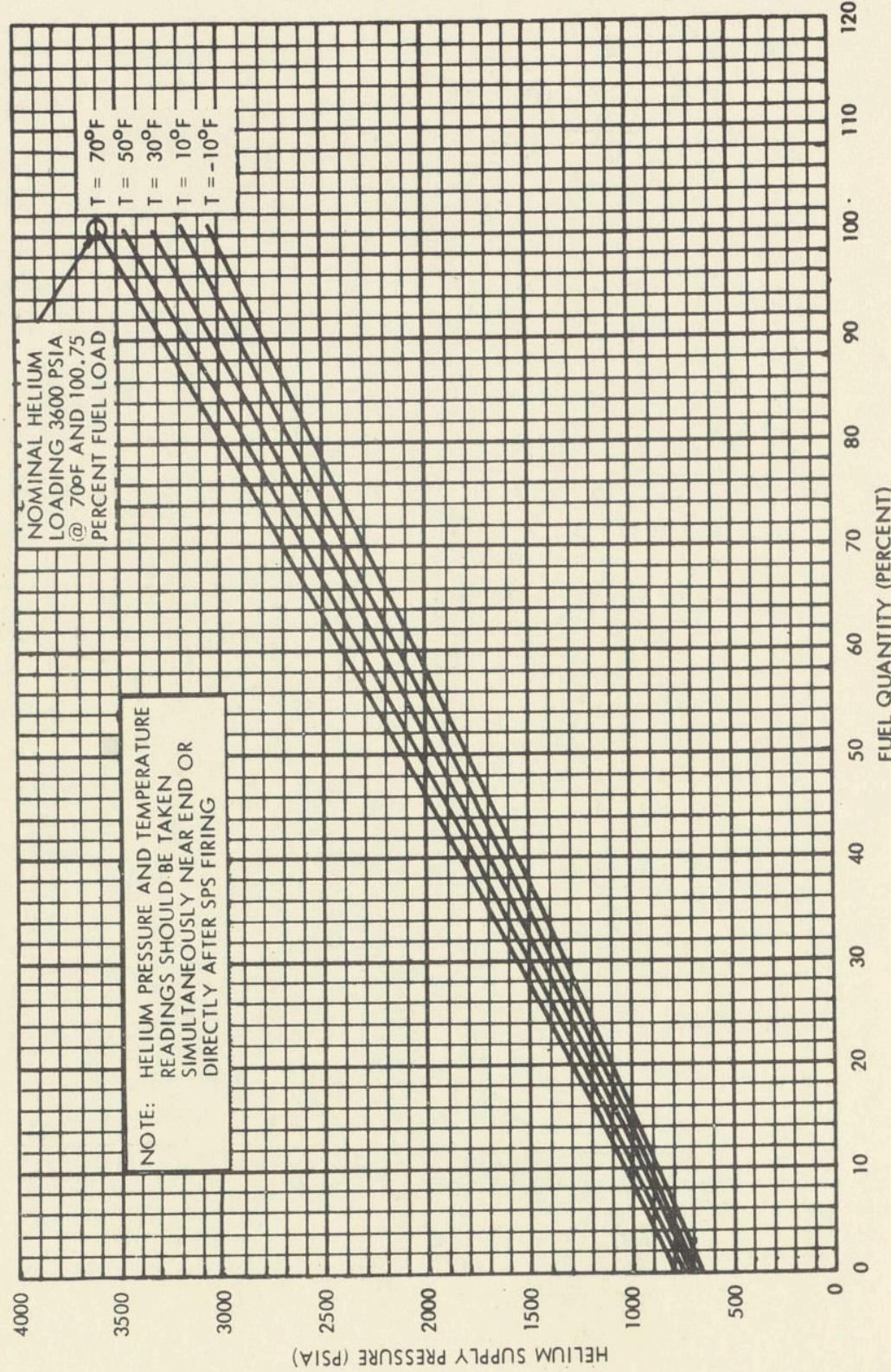
STOWAGE

LM INTERFACE

CM/EVA

SAFE OF APEX  
COVER JETT

## SPS Propellant Nomograph

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SIM EXPERIMENTS1 SIM EXPTS PREP1 BASIC CONFIGURATION

AUTO RCS SELECT - OFF (Pn1 8)  
except A1,C2,(or D1,B2) A3,C4,B3,D4  
cb SCS CONTR DIR 1 MNB - open  
cb SCS CONTR DIR 2 MNA - open  
RHC PWR DIR (2) - MNA/MNB (Pn1 1)  
PCM BIT RATE - HIGH (Pn1 3)  
NON ESS BUS - MNA (Pn1 5)  
cb SCI EQUIP (3) - close  
EXP COVERS tb (2) - gray (Pn1 278)  
cb EXP COVERS DEPLOY - close  
EXP COVERS (2) - off (ctr)  
A11 tb's on Pn1 230 - gray  
MAP CAM ON - STBY  
MAP CAM TRACK - off (ctr)  
GAMMA RAY BOOM DPLY - off (ctr)  
GAMMA RAY BOOM JETT - off (down)  
MASS SPEC BOOM DPLY - off (ctr)  
MASS SPECT BOOM JETT - off (down)  
IMAGE MTN - OFF  
LASER ALTM - OFF  
GAMMA RAY EXP - ON  
MASS SPEC EXP - STBY  
MASS SPEC ION SOURCE - OFF  
DATA SYS ON - ON  
DATA SYS CAL - off (down)  
GAMMA RAY GAINSTEP - shield on (ctr)  
MASS SPEC MULT - LOW  
MASS SPEC DSCRM - HIGH  
PAN CAM SELF TEST - HTRS  
PAN CAM STEREO - per flt plan  
 $\alpha$  RAY/X DR -  $\alpha$  ON  
SUBSAT EXTEND/LAUNCH - off (ctr)  
PAN CAM MODE - STBY  
PAN CAM PWR - off (ctr)  
PAN CAM EXPOSURE - normal (ctr)  
X-RAY - STBY

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STOWAGE

LM INTERFACE

CM/EVA

SAFE OF APEX  
COVER JETT

cb SM SECTOR 1 AC 2 (3) - close (Pn1 181)  
SM/AC PWR - ON  
cb LOGIC PWR (2) - close  
LOGIC PWR (2) - DPLY/RETR  
DOOR JETT - off (down and guarded)

2 SCIENTIFIC DATA SYSTEM PREP (Pn1 3)  
PCM BIT RATE - HIGH  
DATA SYS ON - ON

Data system shutdown (as reqd)  
DATA SYS ON - OFF

3 SIM DOOR JETT  
Verify:  
MAP CAM IMAGE MTN - OFF  
MAP CAM TRACK - OFF (tb-gray)  
 $\alpha$  RAY/X DR -  $\alpha$  OFF  
SUBSAT EXTEND/LAUNCH - OFF (tb-gray)  
DATA SYS ON - ON  $\leftarrow$  S BD AUX TV - SCI  
PAN CAM PWR - ON (for 2 min on MSFN cue)  
- BOOST

MAP CAM ON - OFF  
FC REACS VALVES - LATCH (Pn1 3)

SM/AC PWR - OFF  
cb LOGIC PWR (2) - close  
LOGIC PWR (2) - JETT

Go/no go for sim door jett (cue MSFN)  
DOOR JETT - DOOR JETT

Begin Door Jett photo seq, DAC - ON (30 sec)

DOOR JETT - off (dwn)

LOGIC PWR (2) - off (ctr)

SM/AC PWR - ON

FC REACS VALVES - NORM

SM RCS PRPLNT tb (8) - gray (verify) (Pn1 2)

SM RCS He tb (8) - gray (verify)

SM RCS SEC PRPLNT FUEL PRESS (4) - close

MAP CAM ON - STBY

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**4 EXPERIMENT TIEDOWN RELEASE**

NONESS BUS - MNA  
 $\alpha$  RAY/X DR -  $\alpha$  OFF (verify)  
SUBSAT EXT/LAUNCH - off (ctr) (verify)  
SM/AC PWR - on (up)  
LOGIC PWR (2) - JETT  
DOOR JETT - on (up) - off (down)  
LOGIC PWR (2) - DPLY/RETR

**2 SUBSATELLITE LAUNCH**

Retr booms and map cam  
Close expt covers  
Mnvr to launch att  
EXT/LAUNCH - OFF (verify)  
AUTO RCS SEL (10) - OFF  
except A1, C2, (or D1, B2), A3, C4, B3, D4  
Damp rates for 5 min  
LOGIC PWR (2) - JETT  
Verify SIM pyros armed (MSFN)  
At launch time (per MSFN),  
CMC - FREE  
SUBSAT - EXTEND/LAUNCH (tb-bp  $\sim \frac{1}{2}$  sec - gray)  
CMC - AUTO  
SUBSAT - RETRACT (tb-bp  $\sim \frac{1}{2}$  sec-gray)-off(ctr)  
LOGIC PWR (2) - OFF

**3 ALPHA PARTICLE SPECTROMETER**

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**1 COVER OPEN**

LOGIC PWR (2) - DPLY/RETR  
ALPHA/X-RAY EXP COVERS - OPEN (tb-bp 2 or 3  
sec-gray) - off (ctr)

**2 ACTIVATION**

NONESS BUS - MNA  
 $\alpha$  RAY/X DR -  $\alpha$  ON

**3 TERMINATION**

$\alpha$  RAY/X DR -  $\alpha$  OFF

**4 COVER CLOSE**

LOGIC PWR (2) - DPLY/RETR  
ALPHA/X-RAY EXP COVERS - CLOSE (tb-bp 2 or 3  
sec - gray) - off (ctr)

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

4 X-RAY SPECTROMETER

- 1 SOLAR MONITOR DOOR RELEASE  
SUBSAT EXTEND/LAUNCH - off (ctr)(verify)  
LOGIC PWR (2) - JETT  
X RAY/X DR - X DR OPEN - OFF  
LOGIC PWR (2) - OFF
- 2 COVER OPEN  
LOGIC PWR (2) - DPLY/RETR  
ALPHA/X-RAY EXP COVERS - OPEN (tb-bp 2 or 3 sec - gray) - off (ctr)
- 3 WARMUP  
NONESS BUS - MNA  
X-RAY - STBY (per MSFN)
- 4 ACTIVATION  
X-RAY - ON
- 5 TERMINATION  
X-RAY - STBY
- 6 COVER CLOSE  
LOGIC PWR (2) - DPLY/RETR  
ALPHA/X-RAY EXP COVERS - CLOSE (tb-bp 2 or 3 sec - gray) - off (ctr)

5 GAMMA RAY SPECTROMETER

- 1 BOOM DEPLOY  
cb SCS CONTR/DIRECT 1 MNB - open (verify)  
2 MNA - open (verify)  
LOGIC PWR (2) - DPLY/RETR  
GAMMA RAY BOOM DPLY - DPLY (tb-gray ~10 sec - bp ~150 sec - gray)  
\*If tb - bp >180 sec \*  
\*GAMMA RAY BOOM DPLY - OFF\*  
GAMMA RAY BOOM DPLY - OFF

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2 ACTIVATION

NONESS BUS - MNA

GAMMA RAY GAIN - shield on (ctr)

GAMMA RAY EXP - ON

GAMMA RAY GAIN - STEP or SHLD OFF (per MSFN)

3 TERMINATION

GAMMA RAY EXP - OFF

4 BOOM RETRACT

LOGIC PWR (2) - DPLY/RETR

GAMMA RAY BOOM DPLY - RETR (tb-bp ~180 sec-gray)

\*If tb - bp >210 sec \*

\*GAMMA RAY BOOM DPLY - OFF\*

GAMMA RAY BOOM DPLY - OFF

To verify retr (optional),

GAMMA RAY BOOM DPLY - DPLY (until tb goes bp)

GAMMA RAY BOOM DPLY - RETR, (tb-bp-gray) - OFF

5 BOOM JETTISON

SUBSAT EXTEND/LAUNCH - off (ctr)(verify)

LOGIC PWR (2) - JETT

GAMMA RAY BOOM DPLY - off (ctr) (verify)

GAMMA RAY BOOM JETT - JETT (mom) (tb - gray)

LOGIC PWR (2) - DPLY/RETR

6 MASS SPECTROMETER

1 BOOM DEPLOY

cb SCS CONTR/DIRECT 1 MNB - open (verify)

2 MNA - open (verify)

LOGIC PWR (2) - DPLY/RETR

MASS SPEC BOOM DPLY - DPLY (tb-gray ~10 sec -

bp ~ 150 sec - gray)

\*If tb - bp >180 sec \*

\*MASS SPEC BOOM DPLY - OFF\*

MASS SPEC BOOM DPLY - OFF

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

2 OUTGASSING

NONESS BUS - MNA  
MASS SPEC EXP - ON

CAUTION

Boom must be fully extended  
to perform outgassing.

MASS SPEC ION SOURCE - STBY

3 ACTIVATION

MASS SPEC MULT - LOW (verify)  
MASS SPEC DSCRM - HIGH (verify)  
MASS SPEC EXP - ON (verify)  
MASS SPEC ION SOURCE - ON  
MASS SPEC MULT - HIGH or LOW (per MSFN)  
MASS SPEC DSCRM - LOW or HIGH (per MSFN)

4 TERMINATION

MASS SPEC ION SOURCE - OFF  
MASS SPEC EXP - STBY

5 BOOM RETRACTCAUTION

Wait 5 min after step 4.

LOGIC PWR (2) - DPLY/RETR  
MASS SPEC BOOM DPLY - RETR(tb-bp ~ 165 sec-gray)

\*If tb - bp >195 sec \*

\*MASS SPEC BOOM DPLY - OFF\*

MASS SPEC BOOM DPLY - OFF

To verify retr (optional),

LOGIC PWR (2) - DPLY/RETR

MASS SPEC BOOM DPLY - DPLY (until tb goes bp)

MASS SPEC BOOM DPLY - RETR (tb-bp-gray) - OFF

6 BOOM JETTISON

SUBSAT EXTEND/LAUNCH - off (ctr)(verify)

LOGIC PWR (2) - JETT

MASS SPEC BOOM DPLY - off (ctr) (verify)

MASS SPEC BOOM JETT - JETT (tb - gray)

LOGIC PWR (2) - DPLY/RETR

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7 PANORAMIC CAMERA

1 BOOST MODE - (SPS MNVRS)

NONESS BUS - MNA  
PAN CAM PWR - BOOST  
After SPS mnvr,  
PAN CAM PWR - off (ctr)

2 TEMP CONTROL

SM/AC PWR - on (up)  
PAN CAM SELF TEST - HTRS  
To turn htrs off,  
PAN CAM SELF TEST - OFF

3 STANDBY (ENABLE TM)

Data sys prep complete (verify)  
SM/AC PWR - ON  
PAN CAM MODE - STBY (verify)  
PAN CAM PWR - PWR (tb-bp 2 sec - gray)  
PAN CAM SELF TEST - HTRS (as reqd)  
To turn stby off,  
PAN CAM PWR - OFF

4 FILM CYCLE (5 FRAMES)

Standby mode on (Step 3 complete)  
Verify cam temps in limits (MSFN)  
PAN CAM SELF TEST - SELF TEST (mom)  
(tb-bp ~30 sec - gray)

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JET

5 OPERATION

Verify cam temps in limits (MSFN)  
Retr booms (as reqd)  
For off nadir photos, establish att  
PAN CAM MODE - STBY (verify)  
PAN CAM PWR - PWR (tb-bp 2 sec - gray)  
PAN CAM STEREO - STEREO or MONO (per flt pln)  
PAN CAM EXPOSURE - OFF  
PAN CAM MODE - OPR (tb-bp 2 sec - gray)  
\*If tb-bp persists - out of film or\*  
\* hdwr failure  
\*PAN CAM MODE - STBY  
PAN CAM EXPOSURE - INCR or DECR (per MSFN)

6 TERMINATION

PAN CAM MODE - STBY  
Lens stow (if reqd) (Step 7)  
1 min after MODE - STBY,  
PAN CAM PWR - OFF

7 LENS STOW

If in MSFN coverage  
PAN CAM MODE - STBY  
Wait 1 min  
PAN CAM PWR - OFF (On MSFN Cue)

If not in MSFN coverage  
PAN CAM MODE - STBY (2 min prior to SS  
terminator)

Wait 1 min  
PAN CAM PWR - OFF

8 MAPPING CAMERA/LASER ALTIMETER1 STANDBY (SPS MNVRS AND WARMUP)

NONESS BUS - MNA  
SM/AC PWR - on (up)  
MAP CAM ON - STBY (If ON, pause at OFF 30 sec)  
Note: MAP CAM tb may be bp during warmup  
MAP CAM IMAGE MTN - OFF (tb-bp ~4 sec-gray)

Standby off,  
MAP CAM ON - OFF

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2 FILM CYCLE

MAP CAM ON - STBY  
MAP CAM tb - gray (verify)  
MAP CAM ON - ON (2 min) - OFF (30 sec) - STBY

3 COVER OPEN

LOGIC PWR (2) - DPLY/RETR  
MAP CAM/LASER EXP COVERS - OPEN (tb-bp  
2 or 3 sec - gray) - off (ctr)

4 DEPLOYMENT

Verify cover open  
LOGIC PWR (2) - DPLY/RETR  
MAP CAM TRACK - EXTEND (tb-bp ~4 min-gray)-OFF

5 OPERATION

LASER ALTM - ON  
(prior to map cam on per MSFN Cue)  
MAP CAM ON - STBY  
MAP CAM tb - gray (verify)  
MAP CAM IMAGE MTN - ON (tb-bp ~4 sec-gray)  
MAP CAM ON - ON  
MAP CAM IMAGE MTN - INCR (mom) (per MSFN)  
Note: tb-bp 57-61NM  
bp+1 54-57NM  
bp+2 <54NM  
bp+3 65-125NM  
bp+4 61-65NM

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6 TERMINATION

MAP CAM ON - OFF (30 sec) - STBY  
MAP CAM IMAGE MTN - OFF (tb-bp ~4 sec - gray)  
LASER ALTM - OFF

7 RETRACTION

LOGIC PWR (2) - DPLY/RETR  
MAP CAM TRACK - RETRACT (tb-bp ~4 min-gray)-OFF

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

8 COVER CLOSE

Verify steps 6 & 7 complete.

LOGIC PWR (2) - DPLY/RETR

MAP CAM/LASER EXP COVERS - CLOSE

(tb-bp 2 or 3 sec - gray) - off (ctr)

9 LASER ALTIMETER1 COVER OPEN

See Map Cam Cover Open (8.3)

CAUTION

Laser AltM must not be  
operated with cover closed.

2 OPERATION

Verify map cam cover open

NONESS BUS - MNA

SM/AC PWR - on (up)

LASER ALTM - ON

3 TERMINATION

LASER ALTM - OFF

4 COVER CLOSE

See Map Cam Cover Close (8.8)

10 SIM POWER DOWN1 SIM PWR DOWN - VENTING or [SPS Burn]

NOTE: This is a nominal power down procedure during which the gamma ray and alpha particle experiments and the data system remain on and the pan camera, mapping camera, X-ray and mass spectrometer experiments remain in a standby or heater mode. [during SPS Burns the gamma ray, alpha particle, x-ray and mass spectrometer experiments will be off.]

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LOGIC PWR (2) - DPLY/RETR (verify)  
MAP CAM TRACK - RETRACT  
(tb-bp ~4 min - gray) - OFF  
MAP CAM ON - STBY (If ON, pause at OFF 30 sec)  
MAP CAM IMAGE MTN - OFF  
LASER ALTM - OFF  
GAMMA RAY EXP - ON [during SPS Burn - OFF]  
MASS SPEC ION SOURCE - OFF  
MASS SPEC EXP - STBY [during SPS Burn - OFF]  
DATA SYS ON-ON [during SPS Burn - OFF]  
PAN CAM MODE - STBY  
Verify lens stow per MSFN  
PAN CAM PWR - OFF [if SPS burn expected-BOOST]  
PAN CAM SELF TEST - HTRS  
 $\alpha$  RAY/X DR -  $\alpha$  ON [during SPS Burn -  $\alpha$  OFF]  
X-RAY - STBY [during SPS Burn - OFF]  
5 min after ION SOURCE - OFF,  
GAMMA RAY BOOM DPLY - RETR [SPS only]  
(tb-bp ~180 sec - gray) - off (ctr)  
MASS SPEC BOOM DPLY - RETR  
(tb-bp ~165 sec - gray) - off (ctr)  
After LASER ALTM - OFF and MAP CAM retracted,  
MAP CAM/LASER EXP COVERS - CLOSE  
(tb-bp ~3 sec - gray) - off (ctr)  
ALPHA/X-RAY EXP COVERS - CLOSE  
(tb-bp ~3 sec - gray) - off (ctr)  
LOGIC PWR (2) - OFF  
S-BD AUX TV - SCI [during SPS Burn - off (ctr)]  
If booms are fully retracted:  
AUTO RCS SELECT - as desired  
cb SCS CONTR/DIRECT 1 MNB - close  
2 MNA - close

2 SIM PWR DOWN (MIN PWR)

Step 10 (NOMINAL SIM PWR DOWN) complete  
for SPS burn

PAN CAM SELF TEST - off (ctr)

If no SPS burn expected,

MAP CAM ON - OFF

PAN CAM PWR - OFF

SM/AC PWR - OFF

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JET

11 SIM EQUIPMENT BUS LOSS LIST

- 1 AC BUS 2  
PAN CAMERA  
LASER ALTIMETER
- 2 MAIN BUS (A or B)  
PAN CAMERA (A)  
MAPPING CAMERA (B)  
LASER ALTIMETER (B)  
Cover Operation & tb:  
    MAPPING CAMERA (A)  
    LASER ALTIMETER (A)  
    ALPHA/X-RAY (A)  
Extend & Retract Function & tb:  
    MAPPING CAMERA (A)  
    MASS SPECTROMETER BOOM (A)  
    GAMMA RAY SPECTROMETER BOOM (B)  
    SUBSATELLITE (B)  
    SOLAR MONITOR DOOR Deploy (B)
- 3 LOGIC BUS (A or B)  
Cover Operation & tb:  
    MAPPING CAMERA (A)  
    LASER ALTIMETER (A)  
    ALPHA/X-RAY (A)  
Extend & Retract Function & tb:  
    MAPPING CAMERA (A)  
    MASS SPECTROMETER BOOM (A)  
    GAMMA RAY SPECTROMETER BOOM (B)
- 4 JETTISON BUS (A or B)  
Extend & Retract Function & tb:  
    SUBSATELLITE (B)  
    SOLAR MONITOR DOOR Deploy (B)
- 5 EXPERIMENT BUS (1, 2 or 3)  
PANORAMIC CAMERA (1)  
MASS SPECTROMETER (1)  
MAPPING CAMERA (2)  
GAMMA RAY SPECTROMETER (2)  
LASER ALTIMETER (2)  
ALPHA PARTICLE/X-RAY SPECTROMETER (3)

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## LM INTERFACE

IVT TO LM (CHECKOUT, TLC)

At 2 hours prior to IVT to LM:

TUNL VENT vlv - LM/CM ΔP

Verify LM/CM ΔP  $\geq$  2.7 psid

\*LM/CM ΔP &lt; 2.7 psid \*

\*TUNL VENT vlv - VENT \*

\* till LM/CM ΔP  $\geq$  2.7 psid\*

At least 30 min. prior to IVT to LM:

DIRECT O2 vlv - OPEN until

CAB PRESS = 5.7 psia, then close.

Couches: CDR - 0°, CMP - 0°, LMP - 180°

TUNL LTS - ON

Equalize CM/LM pressure (Decal B) (1B)

Remove tunnel hatch (Decal) (2)

Remove probe &amp; stow (Decal) (3)

Remove drogue &amp; stow (Decal) (4)

Read docking tunnel index angle \_\_\_\_\_

Open LM hatch

LMP Transfer to LM (5)

Transfer items per LM Activation Checklist

At LM request

LM PWR - RESET, then OFF

Report GET to MSFN - GET \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_

SYS TEST - 7D

SYS TEST ind - 0 volts

Perform comm checks with LM

At LM request

LM PWR - CSM

SYS TEST - 7D

SYS TEST ind - 0.5 - 3.2 volts

LMP Transfer to CSM (6)

Close LM hatch

Install drogue (Decal) (8)

Install probe (Decal) (9)

Install tunnel hatch (Decal) (11)

TUNL VENT vlv - LM/CM ΔP

TUNL LTS - OFF

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STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETU

IVT TO LM (UNDOCKING, PDI)Couches: CDR -  $0^\circ$ , CMP -  $0^\circ$ , LMP -  $180^\circ$ 

TUNL LTS - on (up)

TUNL VENT vlv - LM/CM  $\Delta P$ Verify LM/CM  $\Delta P < 0.2$ \*LM/CM  $\Delta P > 0.2$  \*

\* Equalize CM/LM Pressure\*

\* (Decal) (1) \*

Remove tunnel hatch (Decal) (2)

Remove probe &amp; stow (Decal) (3)

Remove drogue &amp; stow (Decal) (4)

Verify docking tunnel index angle

Open LM hatch

LMP transfer to LM (5)

At LM request,

LM PWR - RESET, then OFF

SYS TEST - 7D

SYS TEST ind - 0 volts

Transfer items per LM Activation Checklist

CDR transfer to LM (5)

Remove LM umbilicals (7)

Install drogue (Decal) (8)

Install probe (Decal) (9)

Preload probe (Decal) (10)

LM hatch closed

Verify CSM roll cmds inhibited

until LM/CM  $\Delta P > 3.5$  psid ( $> 3.5, 2$  jet;  $> 4, 4$  jet)

Verify LM &amp; CM Suit Check complete

Release docking latches (Decal) (13)

Install tunnel hatch (Decal) (11)

Perform hatch integrity check (Decal) (12)

Perform Contingency EVA Prep (C/7-1) (optional)

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FINAL IVT TO CSM

- CDR FWD DUMP vlv - AUTO (verify)
- CMP Equalize CSM/LM Pressure (LOD) (Decal) (14)  
Remove tunnel hatch (Decal) (2)  
Verify docking latches engaged (at least 3)  
Remove & temp stow probe (Decal) (3)  
Remove & temp stow drogue (Decal) (4)  
Transfer items to CDR at his request  
Receive items from LM & stow
- CDR Transfer to CSM (6)  
Transfer CSM jettison items to LM
- LMP Close LM hatch  
Transfer to CSM (6)
- CMP DIRECT O2 vlv - close (CW)  
Install tunnel hatch (Decal) (11)  
Perform hatch integrity check (Decal) (12)

SUB-CHECKLIST

1 CM/LM PRESSURE EQUALIZATION (Decal)

A. LM/CM  $\Delta P < 2.4$  PSID

CRYO PRESS IND - SRG/3

Verify CRYO O2 PRESS 1/SRG ind - 865-935 psia

EMER CAB PRESS sel - OFF

REPRESS PKG vlv - OFF

DIRECT O2 vlv - close (CW) (verify)

PRESS EQUAL vlv - OPEN

(C)

O2 FLOW ind - 1.0 lb/hr (Pegged)

O2 FLOW HI lt - on

MASTER ALARM pb/lt (3) - ON, push

LM/CM  $\Delta P \sim 0.0$  psi

CAB PRESS ind  $\sim 5.0$  psia

EMER CAB PRESS sel - BOTH

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STOWAGE

LV

CM EVA

SAFE OF APEX  
COVER JETT

B. LM/CM ΔP > 2.4 PSID

(Overpressurization of CM to 5.7 psia required at least 30 min. in advance)

CRYO PRESS IND - SRG/3

Verify CRYO 02 PRESS 1/SRG ind - 865-935 psia

EMER CAB PRESS sel - OFF

REPRESS PKG vlv - OFF

DIRECT 02 vlv - close (CW) (verify)

TUNL VENT vlv - LM/CM ΔP

LM/CM ΔP ind -  $> 3.1$  psid

PRESS EQUAL vlv - OPEN

(C)

LM/CM ΔP - 2.0 psid

PRESS EQUAL vlv - CLOSE

MONITOR LM/CM ΔP ind for 3 min

and verify ΔP stable

PRESS EQUAL vlv - OPEN

CAB PRESS ind - 4.0 psia

REPRESS 02 vlv - OPEN

CAB PRESS ind 5.7 psia

Cycle REPRESS 02 as required

between 4.0 and 5.7 psia limits

until REPRESS 02 PRESS ind

$\sim 0.0$  psia

REPRESS 02 - CLOSE

CAB PRESS ind  $> 4.0$  psi

\*If CAB PRESS ind  $< 4.0$  psia\*

\* PRESS EQUAL vlv - CLOSE \*

LM/CM ΔP ind -  $\sim 0.0$  psid

CAB PRESS ind -  $\sim 5.0$  psia

EMER CAB PRESS sel - BOTH

CRYO 02 PRESS 1/SRG ind (SURGE TK) -  $> 400$  psia

REPRESS PKG vlv - FILL to 865-935

TUNL VENT vlv - OFF

WASTE STOW vlv - VENT (until cabin purge

complete at 8 hrs)

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HATCH  
1  
(C)

STOWAGE

2 TUNNEL HATCH REMOVAL (Decal)

PRESS EQUAL v1v - open (CCW)

ACTR HNDL - unstow, pull to stop, set to U  
- push to stop

Verify gearbox disconnect socket - U

ACTR HNDL SEL - stow, push handle to stow

Remove hatch, stow

3 PROBE REMOVAL (CM Side) (Decal)A. Translunar Docking:Verify EXTEND LATCH engaged indicator  
(red) not visible

\*EXTEND LATCH not engaged: \*

\* PRELOAD SEL LEVER-rotate CW(away from\*)

\* orange stripe) \*

\* PRELOAD HNDL - Torque CCW to engage \*

\* extend latch (red ind. not visible)\*

GN2 BLEED button (red) - press (10 sec)

PRELOAD SEL LEVER - rotate CCW (parallel  
to orange stripe)PRELOAD HNDL - Torque (CW) to unload support  
beamsB. Lunar Orbit Docking:NOTE: Probe may be hot from stay in Lunar orbit  
PRELOAD SEL LEVER - rotate CW(away from orange  
stripe)PRELOAD HNDL - torque CCW to engage EXTEND LATCH  
(red indicator not visible)

GN2 BLEED button (red) - press (10 sec)

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LV

CM EVA

SAFE OF APEX  
COVER JET

C. Both TLD & LOD:

PROBE UMBILICALS(2)(yellow) - disconnect and stow  
Elec connector covers (2)(yellow) - close  
PRELOAD HNDL - position against umbilical  
connector

PRELOAD SEL LEVER - mid position

INSTALLATION STRUT - unstow, position on tunnel  
wall (yellow marks)

CAPTURE LATCH RLSE HNDL LOCK - Rotate CCW to un-  
lock (orange stripe visible)

RATCHET HNDL - unstow to full extension  
- push to first detent (red band)  
- push outbd and hold to fold  
probe

DOCK

1

RATCHET HNDL - pull to full extension  
- ratchet one stroke only

Restow RATCHET HANDL and INSTALLATION STRUT

CAPTURE LATCH RLSE HNDL - Pull, rotate to unlock  
(180° CW)

- push to recess

\*Capture latches will not release:

\* Ratchet probe forward

\* Preload probe until latches release\*

Remove PROBE - pull aft to release (25 lbs)

4 DROGUE REMOVAL (Decal)

LOCK LEVER - Pull, rotate 90° CCW

DROGUE - rotate CW, push clear of support,  
remove from tunnel

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5 CREW TRANSFER TO LM (Suited)

CDR and LMP Audio Panels:

PWR - OFF

SUIT PWR - OFF

AUDIO CONT - NORM

CDR and LMP SUIT FLOW vlv - OFF

Connect to TRANSFER UMB if desired

6 CREW TRANSFER TO CSM (Suited)

CDR and LMP Audio Panels:

Verify/set PWR - OFF

Verify/set SUIT PWR - OFF

Verify/set AUDIO CONT - NORM

Verify/set CDR and LMP SUIT FLOW vlv - OFF

Connect to TRANSFER UMB if desired

LMP transfer to CSM

7 REMOVE LM UMBILICALS (FINAL)

LM Connector Fairings (2) (orange) - open

Connectors (2) - release and remove

Fairings (2) - close

Pull lanyard on LM end of umbilical

Remove umbilicals from tunnel, stow in F1 or F2

8 INSTALL DROGUE (Decal)

DROGUE - Align Lugs with fittings,  
rotate CCW to stops

LOCK LEVER - Rotate 90° CW to detent

9 INSTALL PROBE (Decal)

CAPTURE LATCH RLSE HNDL - Pull, rotate CCW to  
cock pos (150°)

Push PROBE into DROGUE

CAPTURE LATCH RLSE HNDL -rotate CCW to LOCK posi-  
tion (do not force)  
-push to recess

Verify capture latches engaged (CDR)

INSTALLATION STRUT - unstow, position on tunnel  
wall (yellow marks)

RATCHET HNDL -unstow to full extension(green band  
-ratchet probe fwd to orange hash  
mark (F)

Restow RATCHET HNDL and INSTALLATION STRUT

CAUTION: For stowage, adjust PRELOAD HANDLE until  
probe loose in tunnel and position at  
45° to support beam.

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STOWAGE

LV

CM EVA

SAFE OF APEX  
COVER JETT

Verify RATCHET PAWL indicator(red) flush with housing

- \*Ratchet pawl indicator not flush: \*
- \* Hold RATCHET HANDLE full outboard \*
- \* Press Pawl indicator to seat (flush)\* \*
- \* Release RATCHET HANDLE \*

Preload Shaft - push up into detent  
CAPTURE LATCH RLSE HNDL - Set in detent  
CAPTURE LATCH RLSE HNDL LOCK - Rotate CW to lock  
(orange stripe not visible)  
PROBE UMBILICALS(2)(yellow) -connect to dock ring

NOTE: For stowage, umbilical connection not req.

10 PRELOAD PROBE (Decal)

PRELOAD SEL LEVER - rotate CCW(parallel to orange stripe)

PRELOAD HNDL - torque (CW) to release

Verify capture latches engaged (CDR)

PRELOAD HNDL - Push inboard to detent,  
pos 45° to support beam

PRELOAD SEL LEVER - mid position

Verify CAPTURE LATCH RLSE HNDL LOCK is locked  
(orange stripe not visible)

11 HATCH INSTALLATION (Decal)

HATCH

2

Align Hatch in tunnel

ACTR HNDL SEL - unstow, pull to stop, set to L  
push to stop

Verify gearbox disconnect socket - L

\*If latches cannot be closed: \*

\*GEARBOX DISCONNECT - 180° CCW (tool B)\*

\*AUX LATCH DRIVE - LATCH (113° CW) \*

\*Verify hatch latched, remove tool B \*

\*(Cannot remove hatch from LM side) \*

ACTR HNDL SEL - stow, push handle to stow  
PRESS EQUAL vlv - CLOSED (CW) (B)

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## 12 HATCH INTEGRITY CHECK (Decal)

Verify LM Hatch Closed, DUMP vlv - AUTO (CDR)

Verify CABIN PRESS ind - 4.7-5.3 psi

TUNL VENT vlv - TUNL VENT for 30 sec

- LM/CM  $\Delta P$ , check  $\Delta P$

- Recycle to TUNL VENT until  $\Delta P > 3.5$   
(~8 1/2 min)

\*Cannot vent tunnel:

- \* If O2 FLOW ind increases, open hatch, \*
- \* wipe seal surfaces, close hatch \*
- \* If O2 FLOW ind does not increase, dump\*
- \* tunnel through LM during reg check \*
- \* Monitor LM/CM  $\Delta P$  & flow to check \*
- \* integrity \*

Verify LM/CM  $\Delta P$  ind constant ( $\pm .2$ ) at last value  
for 2 min

Verify O2 FLOW ind - no increase

Before Undocking only:

TUNL VENT vlv - LM TUNL VENT  
for 10 min, then LM/CM  $\Delta P$

Verify LM/CM  $\Delta P > 4.0$  (pegged)

TUNL VENT vlv - OFF

TUNNEL LIGHTS - OFF

Before Jettison only:

TUNL VENT vlv - TUNL VENT (at least 10 min)

TUNNEL LIGHTS - OFF

## 13 DOCKING LATCH RELEASE (Decal)

(G) (H)

RELEASE BUTTON - depress

LATCH HNDL - pull one or two strokes until bungee  
recocks

Verify LATCH HOOK rotated inboard  
to clear LM RING

- \* Hook does not dis-engage\*
- \* AUX REL(yellow)- push \*
- \* Release latch \*

Verify/push LATCH HNDL outboard  
against LATCH HOOK

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STOWAGE

LV

CM EVA

SAFE OF APEX  
COVER JETT

## 14 CSM/LM PRESSURE EQUALIZATION (LOD) (Decal)

CRYO PRESS IND - SRG/3

Verify CRYO O2 PRESS 1/SRG ind - 865-935 psia

REPRESS PKG vlv - OFF

Direct O2 vlv - OPEN until CAB PRESS

5.5 psia then CLOSE until O2 FLOW

&lt;.5 lb/hr.

- OPEN adjust O2 FLOW  
0.6 lb/hr.

TUNL VENT vlv - LM/CM ΔP

LM/CM ΔP ind - +4 psid (pegged)

PRESS EQUAL vlv - OPEN until LM/CM ΔP (C)

ind ~3 psid then CLOSE

Monitor LM/CM ΔP ind for 3 min and

verify ΔP stable

PRESS EQUAL vlv - OPEN

## 15 DOCKING LATCH VERIFICATION (Decal)

LATCH HNDL - Pull to verify hook en-

gaged (12 latches)

~~NOT LATCHED~~

(3).

2 STROKES  
TO SINK\* Not Engaged - Attempt to engage \*  
\* before releasing\*

LATCH IND BUTTON (Red) - Flush (12 latches)

Power BUNGEE FAIRING - Parallel to +X

\* Not parallel - Push +X end of \*  
\* bungee before releasing\*

\*UNLOCKED LATCHES:

\* Release Latches

\* \* Hook does not disengage:

\* \* AUX REL (yellow)-push

\* \* Release latch

\*Engage Latch - push man-release\*

Verify EXTEND LATCH engaged indicator (red)  
not visible

GN2 BLEED button (red) - press (10 sec)

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16 LM UMBILICAL CONNECTION (Decal)

- ✓ LM connector fairings (2) (orange) - open
- ✓ LM umbilical connectors (2) - install & lock
- ✓ LM connector fairings (2)(orange) - close
- ✓ SYS Test - AD 7D
- LM PWR - CSM
- SYS Test ind - 0.5-3.2 volts 1.8

17 MALFUNCTION LIST

DOCKING

A Positive Indication Of No Capture

- THC -X, withdraw to formation flight distance
- PROBE EXTD/REL - EXTD/REL for 5 sec - RETR
- PROBE EXTD/REL tb (2) - gray (verify)
- Attempt redocking as before
- At contact THC + X until capture or 10 sec max

A<sup>2</sup> Still Positive Indication Of No Capture

- THC -X withdraw to formation flight distance
- Attempt redocking as before and
- PROBE EXTD/REL - EXTD/REL (hold) during final phase prior to contact
- At contact THC +X until capture or 10 sec max AFTER 6 sec, PROBE EXTD/REL - RETR

A<sup>3</sup> Final Docking Attempt  
CAUTION

Docking probe may be damaged if retracted without repositioning capture Latch Release Handle. Damage is acceptable if subsequent use is not required.

- SECS PYRO ARM (2) - SAFE
- SECS LOGIC (2) - OFF
- cb SECS ARM (2) - open
- THC, RHC - locked

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STOWAGE

LV

CM EVA

SAFE OF APEX  
COVER JETK

- Remove access pn1 below pn1 276 (Tool E)
- Unstow Aux Dump Nozzle Htr Cable (A8)
- Unstow Docking Probe Aux Harness Cable (L2)
- UTIL PWR - OFF (verify)(pn1 15)
- Connect Aux Dump Nozzle Htr Cable to UTIL PWR connector
- Route cable to RHEB & connect to Docking Probe Aux Harness Cable
- Remove cover from conn J5 on top LDEC System A box and connect Docking Probe Aux Harness Cable
- THC, RHC - unlock
- Attempt docking as before and
- At contact
  - THC +X until hard dock or 10 sec max
  - UTIL PWR - on (up) while thrusting
  - UTIL PWR - OFF, after probe retract
- After hard dock CMC MODE - FREE

TUNNEL HATCH

- B Pressure Equalization Valve Will Not Close
  - Remove Hatch
  - Use Tool B In External Tool Interface For Additional Leverage
- C Pressure Equalization Valve Will Not Open For TLD:
  - Vent CM
  - Perform Tunnel Operations
  - Repress CM

For Subsequent IVT  
TUNL VENT vlv - LM PRESS  
(May require up to 12 hrs  
to equalize pressure)

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PROBE

- D Do Not Get Retraction Using PRIM 1 (< 30 sec)
- Initiate retraction using bottles in the following order:
    - PROBE RETRACT - PRIM 2
    - If no retraction, initiate PROBE RETRACT - SEC 1
- E Both tb's Not Gray After Undocking
- PROBE EXTD/REL - EXTD/REL for 5 sec
  - PROBE EXTD/REL - RETR
  - PROBE EXTD/REL tb (2) - gray (verify)
- F Pushing Ratchet Handle Outboard Does Not Ratchet Probe Forward
- Push ratchet handle to first detent (red band)
  - Slowly push ratchet handle outboard ~25° until audible click. (If pushed outboard past point of click, probe will release).
  - Repeat until orange hash mark is visible.

DOCKING LATCHES

- G Cannot Release Docking Latch By Pulling Handle
- Depress aft end of RH no-back pawl while pulling on latch handle.
  - If unsuccessful, use tools E&R to depress LH no-back pawl while pulling on Latch Handle

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TUNNEL

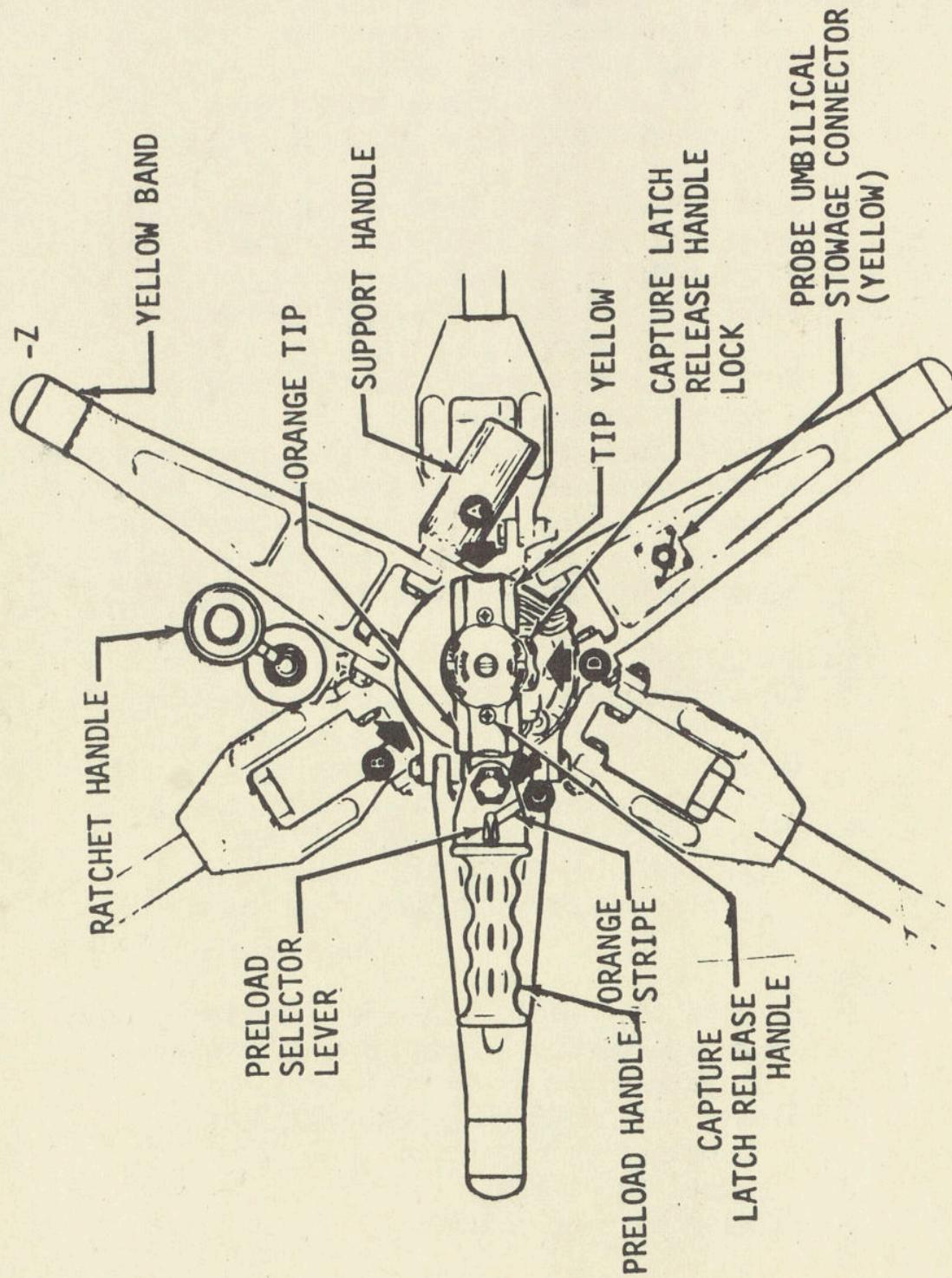
- H High O2 Flow While Releasing Docking Latches
- Re-engage/verify 3 latches ~120° apart are engaged
  - Slowly torque PRELOAD HNDL (CW) until breakout releases;  
repeat (3) times
  - Release docking latches

STOWAGE

LV

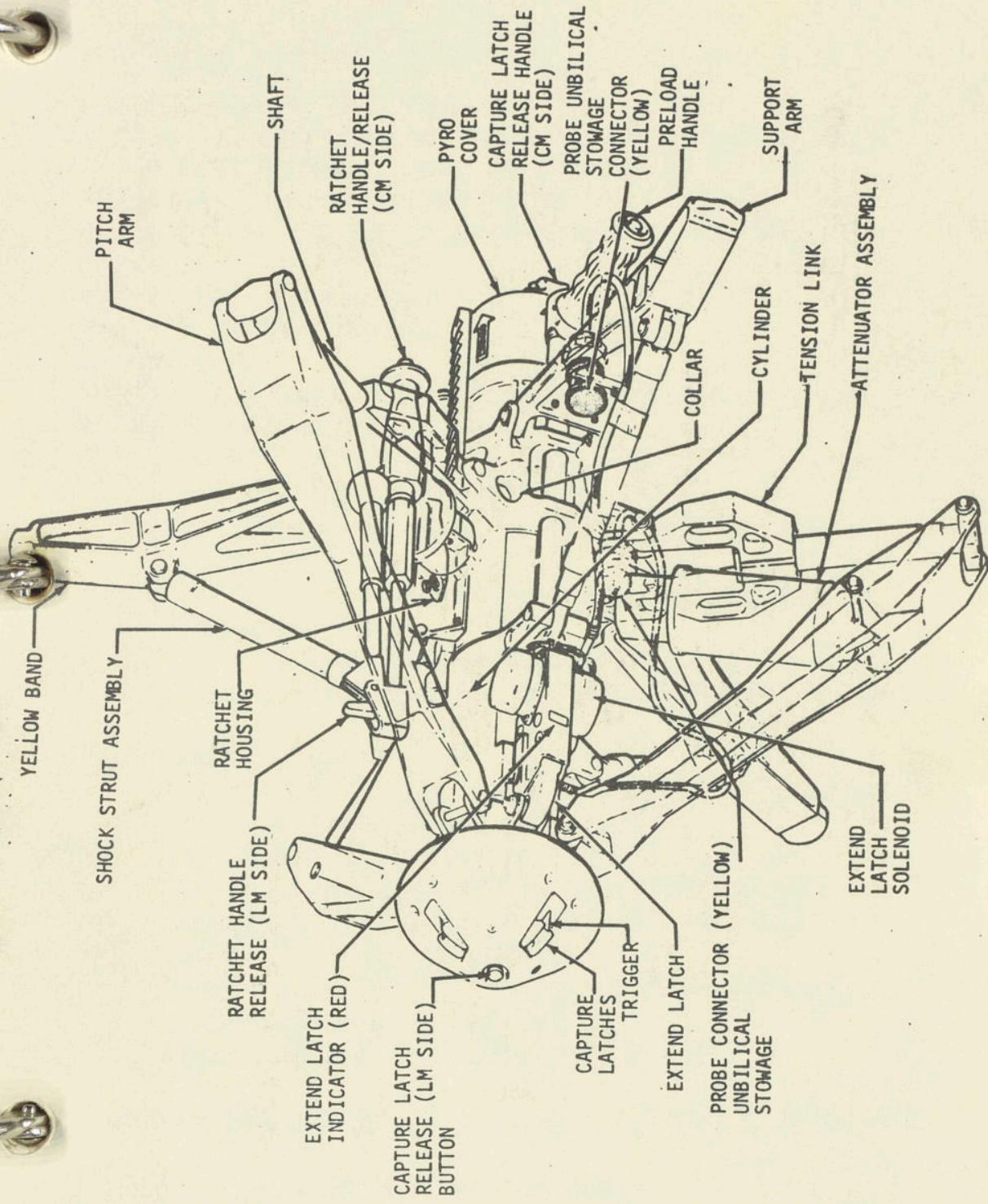
CM EVA  
BURNS (COVER)

SAFE OF APEX  
COVER JETT  
EVA COVER

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S  
2-15



SAFE OF APEX  
COVER JETT  
ERS (COVER)

CM EVA  
BUINS (COVER)

LV

STOWAGE

SYSTEMS MANAGEMENT

LM INTERFACE

S  
3-1

CM EVA

1 CM EVA PREP

✓ CABIN PREP FOR EVA

✓ Stow Optics

✓ Temp stow A9 rock bag

✓ Stow A-9 between Z-Z couch struts, secure with 2 short bungees, snap to side of A9

✓ Install EVA stabilizer strut

✓ Unstow CM EVA cue cards (R-2) attach to MDC and EMER

✓ Stow MDC ingress bar

✓ Verify ORDEAL stowed

✓ Stow COAS

✓ Stow LEVA bags (2) in tunnel using short bungees

✓ Stow Deep Core Tube

✓ Unstow EVA umbilical bag from side of A-7, attach 4 snaps to top of A4, A5 & A6

✓ Discon inboard hooks on A2 Decon bag, attach to handhold on L3

✓ Discon inboard hooks on A7 Decon bag, attach to R9 handle

➡ Retrieve garbage bag, secure draw string

➡ Position garbage bag for jettison between LMP hoses

✓ Unstow from A-8

✓ Tool kit with jack screws fully opened inside, snap 2 snaps to LH girth ring

✓ DAC Mags F & G, stow in CDR TSB, top pkt

✓ 1-interconnect - stow in CDR TSB (Top Pkt)

✓ EMU maint kit, stow in CDR TSB (Top Pkt)

✓ CWG's (3), stow in LMP TSB

✓ Biomed harness (3), verify unstowed and/or donned, stow in LMP TSB

✓ Comm carriers (3), stow in LMP TSB

✓ Close A8

✓ Unstow MDC guards (3) and TV pole from side of A-8

✓ Stow TV pole on RH LEB with bungees

✓ Install MDC guards

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STOWAGE

LV

CM EVA

BURNS COVERED

SAFE OF APEX  
COVER JETT  
COVER

## Unstow From A-2

- ✓ EVA bag, snap top, bot & side to center LEB
  - ✓ Pressure Gauge - Place in EVA bag (Wrist Tether pouch)
  - ✓ CMP EV gloves - stow CDR TSB
  - ✓ Entry tiedown ropes, heel clips, headrest pads, vac cleaner bag - stow in A7
  - ✓ FCS - stow in LMP TSB
  - ✓ Tissue dispenser - stow 4 tissues in CDR TSB, top pocket
  - ✓ Close A2
- ✓ Unstow OPS (A-7) and Perform Checkout per decal  
OPS press 5380-6380  
Hose locked  
02 vlv - Open, press 3.4-4.0  
02 vlv - Close (Reg press decrease)
- ✓ Snap OPS thermal cover on LEB above B3
  - ✓ Stow A9 rock bag in A7
  - ✓ Close A7

## Pnl 1 ← TRANS CONT PWR - OFF

- ✓ ROT CONTR PWR NORMAL (2) - OFF
- ✓ ROT CONTR PWR DIRECT (2) - OFF
- ✓ Verify THC and both RHC's locked
- ✓ Stow RHC No. 1 in F1

- ✓ Remove THC, secure behind Decon bag straps on L3
  - ✓ Install RHC No. 2 on THC mount, route under couch
- ✓ Pnl 1 - ROT CONTR PWR NORMAL #2 - AC/DC
- ✓ Remove stops and covers on RHC 1 & 2 struts using Tool W and Tool 4, stow in LMP TSB (Top Pkt)
  - ✓ Lower handcontroller struts and lock the handcontroller mount push locks

TV AND DAC PREP

- ✓ Unstow from B-3
- ✓ DAC, install mag F or G (CDR TSB, top pkt)
- ✓ Power cable
- ✓ 10mm lens, attach to DAC
- ✓ Close B-3

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Remove A-1 DECON bag, temp stow RH LEB  
Unstow from A-1

- ✓ TV camera
- ✓ Power cable, under camera
- ✓ Monitor cable, under camera
- ✓ TV monitor
- ✓ 1 Pkg towels, stow in CDR TSB
- ✓ Close A1
- ✗ Stow A1 Decon bag on A1

Attach cameras to pole (TV - LH dovetail)

Connect cables to cameras:

- ✓ TV power cable P20 to J20 on camera
- ✓ TV monitor cable P10 to J10 on camera
- ✓ 16mm power cable
- ✓ Route wiring along pole
- ✓ Tape cables together (R-6)

- ✓ DAC settings (T8,1/250,3) 6 FPS, tape settings

- ✓ TV settings:

- ✓ Focus - 4
- ✓ Zoom - 25
- ✓ Aperture - 22

- ✓ Tape settings with removable strip

- ✓ TV camera transmit/standby sw - XMIT (up)

- ✓ TV camera auto light control sw - PEAK (DN)

- ✓ Stow TV pole assembly top of EVA stabilizer strut

- ✓ Pnl 15 - UTILITY PWR - OFF

- ✓ Connect DAC power to receptacle on Pnl 15

- ✓ Pnl 15 - UTILITY PWR - ON, Verify DAC operation

- ✓ Pnl 15 - UTILITY PWR - OFF

- ✓ Pnl 3 - S-BD AUX TV - off (ctr) Verify

- ✓ Connect TV power/COAX to receptacles in tunnel,  
route cable along girth ring, secure wires with  
bungee

Connect cable to TV monitor (P30 to J30 on monitor)

EVA EQUIPMENT PREP

- ✓ Uns tow IV crewman tether from EVA bag -
  - ✓ Conn to fitting on Pn1 301,
  - ✓ Route along LMP umb,
  - ✓ Snap strap at suit end
- ✓ Pn1 10 - POWER - OFF
  - SUIT POWER - OFF
  - AUDIO CONTROL - NORM
- ✓ Pn1 604 - SUIT PRESS ALARM - OFF (verify)
- ✓ Remove all caps from Pn1 603
- ✓ Unsnap CMP comm cable from 02 umbilical
  - ✓ Route outboard of strut and under wires and connect CCU head to pn1 603.
  - ✓ Secure cable to TV bkt and top of strut using 2 straps - (R5)
  - ✓ Position TV monitor, tape as required
  - ✓ Stow tape in EVA bag
- ✓ Disconnect PGA bag from couch (4 places)
  - ✓ Remove center couch
  - ✓ Close and lock marmon clamps
  - ✓ Stow under RH couch using 2 straps (R5)
- ✓ Open EVA umbilical bag
- ✓ Unsnap top strap and remove spacecraft end of EVA umb all the way to the 2nd tiedown strap (Unsnap 2nd tiedown strap)
- ✓ Pn1 603 - EVA sta 02 - Off (Verify)
- ✓ Attach EV umbilical to Pn1 603 - (Route under wires)
  - ✓ 02/lock
  - ✓ ELEC/lock
  - ✓ Umb tether to couch ring/lock, install pin
  - ✓ SCU - open, bleed system, SCU - close
  - ✓ Unstow press gage from EVA bag, (Wrist tether pouch)
  - ✓ Remove Pn1 603 QD and connect gage

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S  
3-5

- ✓ Unstow Waist Tethers (2 EVA Bag - LM Tether pouch)
- ✓ Extend to Max length
- ✓ Attach hooks to LH MDC bar
- ✓ Lock small hooks only
- ✓ Unstow accessory bag (LEB TSB) stow in CDR TSB, top pkt
  
- ✓ Unstow CDR helmet, and LEVA, leave EV gloves in LEVA bag - close bag
- ✓ Unstow LMP helmet, LEVA, and EV gloves
- ✓ Close LEVA bag
- ✓ Restow LEVA bags in tunnel
- ✓ Unstow CMP helmet (HSB RH LEB), restow CMP HSB with IV gloves on RH LEB
  
- ✓ Install CDR LEVA on CMP helmet (or don separately)
- ✓ Unstow antifog wet wipes (3) - EMU maintenance kit (CDR TSB top pocket)
- ✓ Wet wipe 3 helmets, inside, straight line motion
- ✓ Wipe dry with tissue (CDR TSB top pocket)
  
- ✓ Stow LMP EV gloves inside LMP helmet
- ✓ Unstow CMP EV gloves (CDR TSB) place inside CMP Helmet
- ✓ Stow helmets and LEVA's under CDR couch
  
- ✓ Pnl 181 - Logic Pwr (2) - OFF  
SM/AC Pwr - OFF  
cb SM SECTOR 1 AC 2 (3) - Open  
*24044*
  
- ✓ Pnl 230 - α RAY/X DR - OFF (Verify)  
X-RAY - OFF (Verify)
  
- ✓ Pnl 5 - cb INST SCI EQUIP SEB (2) - Open
- ✓ Pull hatch counterbalance pip pin, stow in R-5

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
COVER (OVER)

PGA DONNING

- ✓ Remove PGA's from bag
- ✓ Partially unzip Fecal Containment Bag (PGA Bag)
- ✓ Disconnect bag and stow bag under RH couch using a long hook bungee

CMP PGA donning: - PRD-250 Z8

- | FCS - LMP TSB
- | CWG - LMP TSB
- | Biomed harness - on crewman/LMP TSB
- | UCTA - inside PGA
- | Comm carrier - LMP TSB (don later)
- | Conn O2 hoses to LH side R/R, B/B
- | PGA Diverter vlv - Horizontal
- | Suit Flow - full flow
- | Move scissors to PGA EVA pocket

✓ LMP PGA donning: - 080XX

- | Remove IV gloves stow in LEB TSB
- | FCS - inside PGA
- | CWG - LMP TSB
- | Biomed harness - on crewman/LMP TSB
- | UCTA - inside PGA
- | LCG plug - installed (spare in EVA bag)
- | Gas connector plugs installed
- | Comm carrier - LMP TSB (don later)

Pn1 6 - POWER - OFF  
SUIT POWER - OFF  
AUDIO CONTROL - NORM

Conn O2 hoses to RH PGA connectors (R/R-B/B)

Conn comm

Suit Flow - full flow

✓ Conn IV tether to RH side/Lock, install pin

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3-7

✓ CDR PGA donning:

- Remove IV gloves, stow in CDR TSB, Top Pkt
- FCS - inside PGA
- CWG - LMP TSB
- Biomed harness - on crewman/LMP TSB
- UCTA - inside PGA
- LCG plug - installed (spare in EVA bag)
- Gas connector plugs installed
- Comm carrier - LMP TSB (don later)

Pn1 9 - POWER - OFF

SUIT POWER - OFF

AUDIO CONTROL - NORM

Unstow CDR & LMP ECS hoses

Conn O2 hoses (R/R, B/B)

Conn comm

Suit Flow - full flow

✓ All verify PGA zippers locked

✓ All verify cap off PGA relief vlv

✓ CMP place watch on right arm

Unstow spare 16mm mag (CDR TSB top pkt),  
stow in CDR PGA pocket

V 49 MNVR to EVA Att (352, 063, 050)

HGA = P4, Y225

PRESS GAGE STATIC CHECK

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✓ Verify SCU - CLOSED

✓ Pn1 2 - CRYO PRESS IND - SRG/3

✓ Pn1 603 - EVA Sta 02 - On

✓ Verify EVA Sta 02 gage reads approx same as  
1/SRG press gage (approx 900 psig)

✓ SCU - OPEN

✓ Verify flow and purge umbilical

✓ Pn1 603 - EVA Sta 02 - OFF

✓ Connect EVA umbilical elec and O2 to CMP PGA  
RH blue and lock

✓ Connect waist belt and lock

✓ Don comm carriers (3)

SAFE OF APEX  
COVER JETT  
EX 3 (OVER)

ECS, CRITICAL  
BURNS (OVER)

LV

STOWAGE

COMM CHECK

Pn1 6 - POWER - AUDIO  
SUIT POWER - on (up)

Pn1 9 - POWER - AUDIO  
SUIT POWER - on (up)

Pn1 10 - POWER - AUDIO  
SUIT POWER - on (up)  
MODE - VOX  
VOX SENS TW (as reqd, ~7)  
PAD COMM - OFF  
S-BD - T/R  
AUDIO CONT - NORM  
INTERCOM - T/R  
VHF AM - OFF

✓ Pn1 3 - S-BD AUX TAPE - off (ctr) (verify)

✓ Pn1 3 - S-BD AUX TV - TV

✓ TV MONITOR PWR - ON

✓ Perform comm check with crew & Hou

Pn1 604 - Suit Press Alarm SW - on/off, verify-tone

Pn1 3 - S-BD AUX TV - off (ctr)

SYSTEMS PREP FOR DEPRESS

- ✓ Pn1 325 - CABIN PRESS RELIEF v1v (2) - NORMAL
- ✓ Pn1 2 - CABIN FANS - OFF
- ✓ Pn1 602 - Verify REPRESS O2 PRESS - 865-935 psi
- ✓ Pn1 326 - REPRESS PKG v1v - ON
- ✓ Pn1 326 - verify SURGE TK v1v - ON
- Pn1 351 - CABIN REPRESS v1v - OFF (verify)
- Pn1 600 - EMER O2 v1v - CLOSED
- ✓ Pn1 601 - verify REPRESS O2 v1v - CLOSED
- Pn1 2 - O2 PRESS 1/SRG - 865-935 psi

■ V49 MNVR to EVA Att (352,063,050)

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S  
3-9

✓ Pn1 8 - Deactivate SM RCS - AUTO RCS SEL  
(at conclusion of mnvr)  
A/C ROLL A1 & A2 - OFF  
B/D ROLL B1, B2 - OFF  
PITCH A3 & A4 - OFF  
YAW B3 & B4 - OFF

- ✓ MAN ATT (3) - RATE CMD
- ✓ LIMIT CYCLE - on (up)
- ✓ ATT DB - MIN
- ✓ RATE - LOW
- ✓ SC CONT - SCS
- ✓ BMAG MODE (3) - ATT 1/RATE 2
- ✓ Load DAP, 11101,10011

- \* IF SM RCS THRUSTER FAILED ON: \*
- \* AUTO RCS (affected jet) - OFF \*
- \* (odd jet gives + rotation) \*
- \* BMAG MODE (affected axis) - RATE 1\*
- \* Damp rates with RHC \*
- \*
- \* IF CONDITION PERSISTS: \*
- \* SM RCS PRPLNT (QUADS A&B) - CLOSE \*
- \* ROT CONTR PWR DIRECT #2 - MNA/MNB \*
- \* Damp rates with RHC \*
- \*
- \* IF BMAG FAILED HARDOVER: \*
- \* SC CONT - CMC \*
- \* BMAG MODE(affected axis)-good BMAG\*

CMP EVA EQUIP DONNING

- ✓ Unstow PCV - EVA bag, (Press vlv pouch)
- ✓ Connect PCV to PGA RH red connector, lock
- ✓ PCV - on, turn left (CCW)
- ✓ Don wrist tether (Wrist Tether pouch) - ring fwd
- ✓ Discon red ECS O2 hose
- ✓ Unstow purge vlv (EVA bag, purge vlv pouch) -  
SET LO, lock and install on PGA
- ✓ LMP move to LEB

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
ECS (OVER)

OPS DONNING

- Verify press <2.5 psid
- Unstow OPS 02 nozzle
- Unstow from EVA bag
  - OPS straps (4), attach with letters to OPS (letters face out)
  - OPS adapter brkt, attach adapter to PGA
  - Don OPS, connect straps to adapter brkt
  - Unstow OPS 02 actuator and connect to brkt
  - Snap all flaps
- Pnl 302 - Suit Flow - OFF
  - Disconnect CMP ECS hoses, install interconnect (CDR TSB, top pkt), LMP stow hoses high in tunnel
- Pnl 603 - EVA STA 02 - ON, verify flow

NOTE: Cabin press increases from CMP flow - adjust side dump vlv to stabilize cabin press if required

Conn OPS 02 hose to PGA, route under OPS and under left arm (LMP assist)  
CDR/LMP - Verify ECS hoses - R/R, B/B  
Diverter vlv - Horizontal  
Place CMP helmet/LEVA/EV gloves on RH Couch

LMP don helmet and LEVA, verify alignment  
LMP don EV gloves, verify locked (comfort gloves)  
CDR don helmet , verify alignment  
CDR don IV gloves (CDR TSB) verify locked (comfort gloves)

Check all connections and locks

| CMP                   | CDR/LMP           |
|-----------------------|-------------------|
| 1. UMB (02)           | 1. COMM           |
| 2. Elec               | 2. 02             |
| 3. PCV                | 3. Gas conn plugs |
| 4. Purge vlv          |                   |
| 5. OPS                |                   |
| 6. SCU - OPEN, locked |                   |

S  
3-11

CDR/LMP INTEGRITY CHECK

Pn1 380 - SUIT CKT RETURN vlv - close (push)

Pn1 7 - DIRECT O2 - CLOSE (CW)

SUIT PRESS ind - 4.7-5.3 psia

O2 FLOW ind - 0.2-0.4 LB/HR

CAUTION

SUIT TEST vlv should remain in the PRESS position until suit circuit pressure is stabilized to preclude seal scarring. If repositioning of SUIT TEST vlv from PRESS is required prior to suit pressure and O2 flow stabilization, perform the following:

- a. O2 DEMAND REG vlv - OFF
- b. Allow 15 sec (min) stabilization time
- c. Reposition SUIT TEST vlv - DEPRESS or OFF as applicable
- d. When suit pressure stabilized, O2 DEMAND REG vlv - BOTH

SUIT TEST vlv - PRESS (DIR O2 - OPEN,  
At 4.0 psig, DIR O2 - OFF)

O2 FLOW ind - 1.0 LB/HR (pegged)

O2 FLOW HI lt - on

M/A pb lt - ON (push)

When SUIT PRESS ind 1.5-2.0 psi > CAB PRESS.

SUIT CKT RETURN vlv - open then close

Pn1 603 - EVA Sta O2 - OFF

SUIT PRESS ind - 8.8-9.8 psia

Cuff Gage -4.1-4.5 psig

O2 FLOW HI lt - out

Allow O2 FLOW To Stabilize 15 sec

O2 FLOW Shall Remain Below .97 LB/HR (gage must not be pegged) For 30 sec After Stabilization

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
ERS (OVER)

S  
3-12SUIT TEST vlv - DEPRESS

Pn1 603 - EVA STA 02 - ON

02 FLOW ind - 0.2-0.4 LB/HR

SUIT PRESS ind - Slight &gt; CABIN PRESS ind

SUIT TEST vlv - OFF

Pn1 380 - 02 DEMAND REG vlv - BOTH (verify)

CMP HELMET/GLOVE DONNINGPurge vlv - Pull pin, activate purge vlv LO  
(Hand to CDR)

CMP - PGA diverter vlv - (2) vertical

— GO TO CM EVA CUE CARD —

Don helmet, lock

Don LEVA, verify alignment

Don comfort gloves

Don one glove, lock

Pn1 603 - EVA Sta 02 - OFF

Don other glove, lock

Pn1 603 - EVA Sta 02 - ON, Modulate off/on as  
required to pressurize CMP

Cuff Gage - 3.7 - 4.0 psig

Pn1 604 - SUIT PRESS ALARM - ON

Verify EVA Warning Tone - off

Pn1 10 - Adjust CMP Master Vol if required

Pn1 351 - EMER CAB PRESS sel - OFF

EVA WARNING TONE CHECKCMP Monitor cuff gage, set PURGE  
v lv - Hi, verify EVA warning  
tone on at 3.1 - 3.4 psig,  
then PURGE v lv - closeVerify EVA warning tone - off  
PURGE v lv - lock, Hi, CDR install pin

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3-13

Verify flow & Cuff Gage reads 3.7 - 4.0 psig

#### CMP INTEGRITY CHECK

Pn1 603 - EVA Sta 02 - OFF, Monitor cuff gage to verify PCV closes - monitor press decay for 1 min, verify decay less than 0.8 psi (If suit press decays 0.3 to 0.8, reverify helmet, wriststrings, outer zipper and all connectors locked.)

EVA Warning tone - On (low flow)

Pn1 603 - EVA Sta 02 - ON, install guard Verify PGA press - 3.7-4.0 psig and stable

EVA Warning Tone - off

Verify EVA sta press gage - 100-500 psi

Verify surge tank press greater than 750 psia

#### CABIN DEPRESS

Confirm GO for depress from Hou

NOTE: EVA warning tone may come on momentarily during depress

Side hatch dump vlv - open, 02 Hi Flow warning lt may come on prior to cabin press reg lock up

Close side hatch dump vlv at 3.25 psia

02 FLOW ind - Less than 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 02 flow warning lt - off

CMP verify - CMP cuff gage press 3.7-4.0 psid

EVA sta press gage 100-500 psi

No tone

Pn1 3 - S-BD AUX TV - TV

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
EO (OVER)

**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 actr handle
  - Gear box SEL - latch
- Lower Visors
  - Open hatch

**2 EVA OPERATIONS**

- Jettison jett bag
- Egress
- Install TV/DAC pole (align)
- Adjust TV settings if required
- Pn1 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

S  
3-15

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 and temp stow cassette

Rest at hatch

LMP move to LEB

S-BD AUX TV - OFF (CTR)

Pn1 15 - UTILITY PWR - OFF

CMP remove TV/DAC

Ingress

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
ECS (OVER)

3 CM POST EVAHATCH CLOSING

Close hatch

Verify position of pip pin bracket

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 02 vlv - OPEN then close at cabin press 1 psia

Cabin press ind-read and monitor for gross leakage (30 sec)

Pnl 601 - REPRESS 02 - OPEN, monitor repress 02 ind to zero

Cabin press approx 2 psia

Pnl 601 - REPRESS 02 vlv - CLOSE

Allow CMP umb flow to bring cabin pressure up to 3.0 psia

CMP disconnect OPS 02 hose and hold (direct into open volume)

OPS 02 - on

Monitor cabin press to 5.0 Psia, then OPS 02 - OFF

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3-17

POST EVA PROCEDURES

- Pn1 351 - EMER CAB PRESS sel-BOTH  
CMP purge vlv - HI, pull pin, activate purge vlv  
(Place in CDR TSB, top pkt)  
Pn1 603 - EVA Sta 02 - OFF  
Pn1 604 - SUIT PRESS ALARM - OFF

When PGA press zero (psid) CMP pop glove, do  
not remove gloves

Pn1 603 EVA sta 02 - ON

Doff helmet with LEVA

Pn1 603 EVA sta 02 - OFF

CDR/LMP doff gloves, then helmets

Pn1 380 - SUIT CKT RTN vlv - open (pull)

Verify surge tank press > 400 psia

Pn1 326 - REPRESS PKG vlv - FILL

CLEANUP PROCEDURES

Unstow 3 towels and accessory bag from CDR TSB,  
top pkt

CMP place both gloves in accessory bag

Remove gloves handling wrist rings only

Remove OPS

Wet 1 towel with water gun

Wipe cassette handles with wet towel

Wipe other contaminated areas as required,  
stow towel in accessory bag

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Tape (EVA Bag) film openings on cassettes, do  
not cover breather hole, mapping camera only

Stow Tape (R-6)

Stow Mapping camera cassette (Handle Up) in B1

Snap curtain, lock B1

Stow comfort gloves in accessory bag

Wipe hands with second wet towel, then dry,  
stow in accessory bag

STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
ECS (OVER)

S  
3-18

Pnl 10 - POWER - OFF  
SUIT POWER - OFF

Pnl 604 - SUIT PRESS ALARM - OFF (verify)

Snap OPS to B1

Discon EV umb and waist belt from PGA

CMP doff PGA, stow UCTA, inside  
PGA

Stow PGA's in RH couch

LMP Pnl 6 - POWER - OFF  
SUIT POWER - OFF

Pnl 300 - SUIT FLOW - OFF

Disconnect O2 and comm

Pnl 300 - SUIT FLOW VLV - CABIN FLOW

Doff PGA, stow FCS, UCTA inside  
PGA

CDR Pnl 9 - POWER - OFF  
SUIT POWER - OFF

Pnl 301 - SUIT FLOW - OFF

Disconnect Comm and O2

Pnl 301 SUIT FLOW VLV - CABIN FLOW

Doff PGA, stow FCS, UCTA, inside  
PGA

Connect 1t wgt headset as req'd

Pnl 9 - POWER - AUDIO

SUIT POWER - on (up)

| Enable all jets

| Load DAP, 11101, X1111

| V49 MNVR to Thermal Att (195,002,000)

| Temp stow hoses as req'd

| Restow LMP LEVA bag - LMP EV gloves, LEVA

| Restow CDR LEVA bag - LEVA, CDR EV gloves

| Stow LEVA bags in tunnel

| Stow CMP helmet in HSB RH LEB with  
| CMP IV gloves

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S  
3-19

Unstow HSB (2) and accessory bag (1) from LEB TSB  
Stow in LMP HSB

IV gloves (LEB TSB)

LMP helmet

Stow HSB on LMP SIDE

Stow CDR helmet in CDR HSB

Stow HSB on CDR Side

Stow CDR IV gloves in CDR TSB

Move DECON bag on LHS if req'd to open A2

Open A2 remove contents

Stow pan camera cassette (handle to LEB)

Install around cassette - PPK (3), Tissues (6), CMP FCS

Close A2

Discon from Pnl 603 - EVA Umb 02, elec, comm cable,  
and couch hook

Remove EVA sta 02 gage, place in EVA bag,  
(Wrist Tether pouch)

Install dust caps: Elec (2), 02 (1) on Pnl 603

Install QD on Pnl 603

Connect Umb dust cap and lock

Stow Umb in umb bag

Stow the following in EV bag

PCV - Press valve pouch

Purge vlv - Purge valve pouch

Purge vlv pip pin - CDR TSB (Top Pkt)

Wrist tether - Wrist Tether pouch

Waist tethers (2) - LM tether pouch

OPS adapter bkt - PGA adapter plate pouch

OPS straps (4) - OPS strap pouch

IV tether - IV tether pouch (resnap comm  
cable to LMP hoses)

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Install hatch counter-balance pip pin, R-5

Reconnect CMP comm cable to 02 hoses

Pnl 3 - S-BD AUX TV - off (ctr) (Verify)

Pnl 5 - cb INST SCI equip SEB (2) - close

Pnl 15 - UTILITY PWR - OFF (Verify)

STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
(OVER)

S  
3-20

Remove DECON bag from A-1 (Temp Stow R.H. LEB)  
Stow in A-1

Monitor  
Monitor cable, secure with strap  
TV power cable, secure with strap  
TV camera  
Towels - CDR TSB

Unstow B3 camera container  
Stow in container:

DAC 10mm lens  
DAC power cable in DAC compartment  
DAC (Remove EVA mag)  
Close B3

Snap straps on pole  
Temp stow pole on RH LEB

Remove C couch and temp stow under LH couch  
Stow couch straps in R5

Stow OPS hose, actuator, and flaps, Verify 02 - off  
Report OPS press to Hou

Remove A9 rock bag from A7  
Stow in A-7: OPS (Flag up, feet inboard)  
EVA equipment container (Fold up,  
place next to OPS)  
Penetrometer drum  
Secure strap  
Stow entry boots & ropes with  
other strap  
Restow headrest pads, loose  
Vac cleaner bag  
Accessory bag with CMP gloves

Stow TV pole and MDC guards on side of A8

Stow in A-8: Tool Kit  
Interconnect from CMP 02 hoses  
EMU maint kit (CDR TSB, top pkt)  
DAC Mags F & G  
Comm carriers (3)  
Close A8

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S  
3-21

Pn1 302 - SUIT FLOW VLV - CABIN FLOW

Install Decon bag top A-7

Stow umb bag on side of A-7 (4 snaps, 2 hooks)

Unstow handcontrollers and install

Close F1

Install PGA bag - connect hooks (6 bottom, 2 top)

Zip up Fecal Containment Bag

Stow PGA's (3) in bag

Install couch

Stow EVA stabilizer strut

Connect PGA bag upper straps (2)

Install DECON Bag on top of A-1

Install DECON bag Top A-2

Stow LMP hoses, route to RHS

Stow CMP hoses in tunnel

Stow CDR hoses, route to LHS

Reinstall A-9 as required

Stow A-9 rock bag

STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
LETS (OVER)

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CM\_EVA

LM INTERFACE SYSTEMS MANAGEMENT

SAFE OF APEX COVER JETT

If MSFN NO GO For Pyro Arm Indicates Apex Cover Jettison,  
SECS LOGIC (2) - OFF  
cb ELS/CM-SM SEP (2) - open  
SECS LOGIC (2) - ON  
If MSFN GO, Go To Step A

If Still Apex Cover Jettison,  
cb SECS LOGIC A - open  
If MSFN GO, Go To Step C

If Still Apex Cover Jettison,  
cb SECS LOGIC A - close  
cb SECS LOGIC B - open  
If MSFN GO, Go To Step D

If Still Apex Cover Jettison,  
ELS - MAN  
ELS LOGIC - OFF  
SECS LOGIC (2) - OFF  
cb SECS LOGIC (2) - open  
cb SECS ARM (2) - open  
CMP To LEB  
cb SEQ A&B PYRO A&B (2) - open (Pn1 250)  
Verify PYRO BUS A&B voltage = 0  
Use Tool E, (5/32 allen head) to remove  
closeout panel located beneath panel  
276 (approx 10 fasteners on panel).  
Remove, or cut all wires to, connector  
marked "cut" with white tag (P545). Tape  
ends of any wires cut. Replace closeout  
panel.  
cb SEQ A&B PYRO A&B - close  
Verify PYRO BUS A&B voltage >35 vdc  
cb ELS/CM-SM SEP (2) - close  
cb SECS LOGIC (2) - close  
cb SECS ARM (2) - open (verify)  
DO NOT ARM PYRO BUSES

Continue Normal Entry Except,

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STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APEX  
COVER JETT  
ELS (OVER)

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

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

STEP A

cb ELS/CM-SM SEP BAT A - close  
cb ELS/CM-SM SEP BAT B - open (verify)  
If MSFN GO, Go to STEP B

If Still Apex Cover Jettison,  
cb ELS/CM-SM SEP BAT B - close  
cb ELS/CM-SM SEP BAT A - open  
SECS LOGIC (2) - OFF, then ON

MSFN confirm GO,

cb ELS/CM-SM SEP BAT A - open (verify), close  
at or after apex cover jettison at 24K'  
Continue normal entry

STEP B

cb ELS/CM-SM SEP BAT B - open (verify), close  
at or after apex cover jettison at 24K'  
Continue normal entry

STEP C

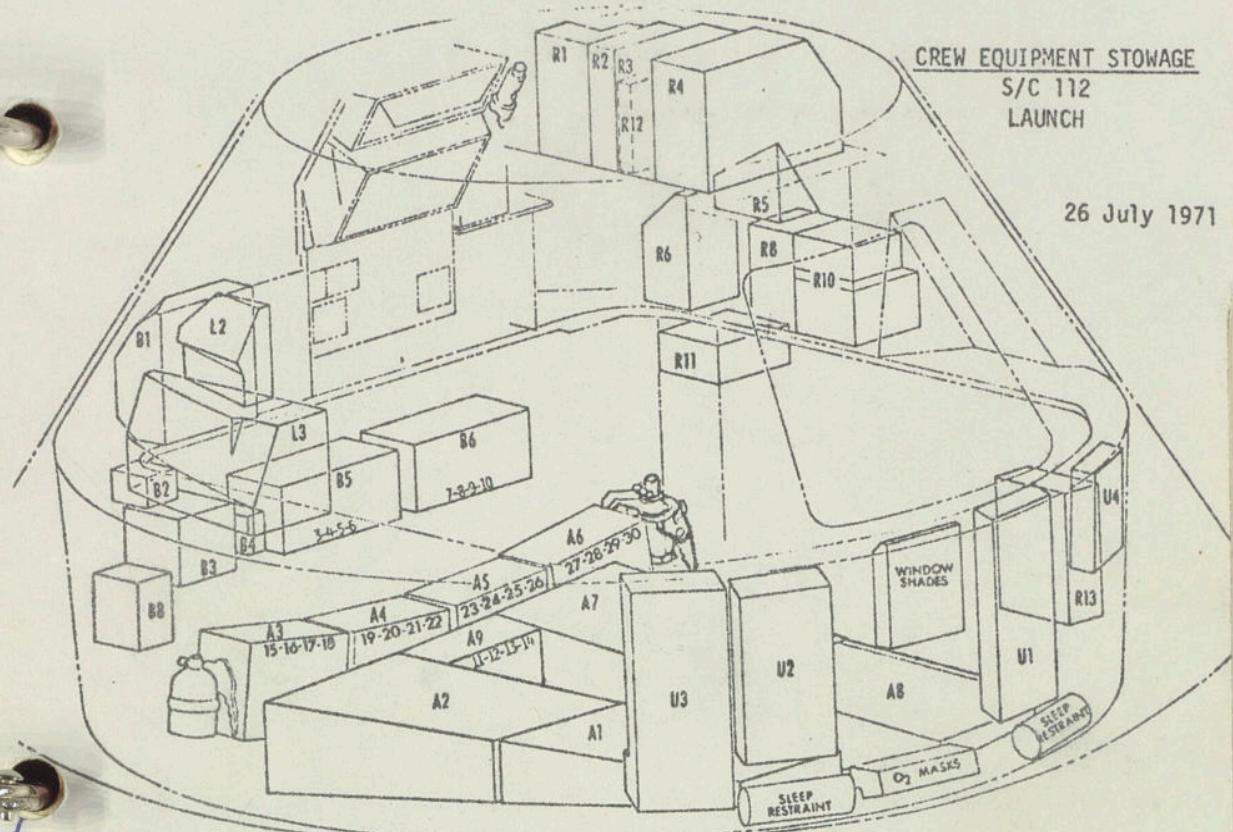
cb SECS LOGIC A - open (verify), close  
at or after apex cover jettison at 24K'  
Continue normal entry

STEP D

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

## STOWAGE

LV

ECS, CRITICAL  
BURNS (OVER)G&C, SPS  
EPS (OVER)A-1  
16MM Mags-7 in 2 Bags  
70MM Mags-2 in Bag R/5  
Interval Timer  
Voice Recorder  
Remote Control Cable W/Strap  
TV Camera & Zoom Lens  
TV Monitor  
TV Monitor Cable W/Strap  
TV 16' Cable W/Strap  
TV Ringsight  
TV Mounting Brkt  
16MM Camera Sext Adapt  
70MM Camera Adapt  
UV Camera Mounting Brkt  
UV Filter Assy  
70MM UV Mag N  
CM Towel (RWB)-3 Ea.

A-2  
PPK-3  
Tissue Dispenser-8  
FCS-3 (2\*)  
Headrest Pads-3  
Heel Rest 3 Pr. in Bag  
Jet Stg Bag(3)(1\*)(1\*\*)(1\*\*\*)  
EV Gloves (CMP)  
Tiedown Ropes-5 in Bag  
Panel 603 Gauge

A-2 Cont  
Vacuum Cleaner Decom Bag  
Vacuum Bags -2 (1\*\*) CO<sub>2</sub>  
Vacuum Cleaner Power Cable Absorbers-4  
EVA Equipment Container CO<sub>2</sub>  
Pressure Cont Vlv Absorbers-4  
PGA Adapter A-5  
Tether, IV Crewman CO<sub>2</sub>  
Wrist Tether Absorbers-4  
OPS PGA Attach Straps-4 A-6  
Water Connector Plugs (2) CO<sub>2</sub>  
Top of A-2 Vacuum Cleaner (Side of A-6)  
ISA Decontamination Bag A-7  
Lunar Sample Ret Decom Food Package \*\*  
Bag-3 Fecal Col Assy in Bag-18  
Reinforcement Plate Fecal Col Assy in Bag-12\*\*  
Penetrometer Drum Decom PPK Side of A-7  
Bag EVA Umbilical in Bag W/Strap  
Tie Down Ropes-5 in Bag A-8

A-3  
Fire Est (Side of A-3)  
CO<sub>2</sub> Absorbers -4

A-4  
Absorbers-4  
A-5  
Absorbers-4  
A-6  
Absorbers-4  
Vacuum Cleaner (Side of A-6)  
A-7  
Food Package \*\*  
Fecal Col Assy in Bag-18  
Fecal Col Assy in Bag-12\*\*  
PPK Side of A-7  
70MM Mags LM XFR-3 in Bag\*  
70MM Mags-3 in Bag O/P/Q  
Inflight Exerciser  
CWG-9  
EMU Maint Kit  
Tape Recorder Battery-11  
in Bag  
Tape Cassette Kit  
CWG Elect Adapt-4 in Bag (2\*)  
Relief Recep in Bag W/Strap  
H<sub>2</sub> Gas Separator in Bag  
Lightweight Headset-3(2\*)

\* LM TRANSFER ITEM  
\*\* LM TRANSFER AFTER FINAL DOCK  
\*\*\* OFFLOAD AFTER SLM EVA

STOWAGE

LM INTERFACE

CM EVA

SAFE OF APEX  
COVER JETT

A-8 Cont  
Ancillary Stg Bag  
35MM Brkt in Bag  
16MM Camera Brkt (MSB) in Bag  
Tool Kit  
PLV Ducts-3 in Bag  
Urine Filter Assy-3 in Bag  
PGA 02 Interconn-3 in Bag  
Snag Line in Bag W/Strap  
Tone Booster in Bag  
16MM Mag-4 in Bag *P1615IK*  
Blindfolds (3)  
WMS Backup Bag

WMS Water Panel OD  
Water Panel Coupling Assy  
WMS Power Cable  
WMS QD Pressure Cap

Side of A-8 in Bag

Vacuum Hose Brush  
Urine Hose W/Adpt & 2 Straps  
EVA Guards, L, Ctr, R W/Strap  
Unipod Pole Assy

A-9  
CO<sub>2</sub> Absorbers-4\*\*  
Partitions\*\*

B-1  
Food & Hygiene Items \*\*\*

B-2  
35MM Camera W/55MM Lens  
& Film Cassette Plus  
(3) 35MM Film Cassettes  
in Bag

B-3  
16MM Camera & Mag  
10MM Lens  
75MM Lens  
10MM Lens  
16MM Power Cable W/Strap  
Right Angle Mirror  
70MM Cam & Mag  
Spotmeter

B-5 \*\*  
CO<sub>2</sub> Absorber-4

B-6 \*\*

CO<sub>2</sub> Absorber-4

B-5/B-6 Closeout Curtain

Stowage Pouch-2  
Data Ret Snap  
6-Short 6-Long  
Data Ret Hook  
2-Short 2-Long  
Clamps-8  
Clips-8

B-8  
Chlor & Buffer Ampules-32  
In (2) Bags

L-2  
CCU Cont Head in Bag  
CCU Cable-Spare W/Strap  
Tool "E" W/Strap  
Ground Cable  
70MM PCM Cable W/Strap  
16MM PCM Cable W/Strap  
Docking Probe Cable

L-3  
Food Package  
Cont feeding system  
Water Sample Bags (2)  
R-1

Flight Data File

R-2  
Flight Data File  
Data Card Kit  
PPK  
R-3

Flight Data File  
LM XFR Data Card Kit\*  
LM Data File\*  
Ctr R-12 W/Books

R-4  
Survival Kits #1/#2

R-5  
Gen use Ret Straps-9 (4\*)  
Couch Straps-2  
Probe Stg Straps-2  
Utility Straps-6 (3\*)

R-6  
Tape  
OUA Sunfilters-2  
Penlights-5 in Bag  
Chlor Syringe Bag with:  
Knob, Casing, Needle

R-8  
Med Kit  
R-11  
Urine Transfer Sys-3  
Urine Rec Spare  
Roll-on-cuff (RWB)  
H.C. Urine Filter in Bag

R-13  
16MM Mag W/Dos-6 in Bag\*  
16MM Mag-2 in Bag\*  
70MM Mag-4 in Bag\*  
70MM Mag-3 in Bag\*  
16MM Mag-2 in Bag\*  
70MM Mag-3 in Bag\*

U-1  
LCG-2\*  
Temp Stg Bag-3  
Rad Dos-Hze (Sewn in Ctr)

U-2  
Helmet Stg Bag-3  
ACC Bag-3  
ICG W/Eartube-3  
Cabin Fan Filter in Bag

U-3  
Coas Filter  
Coas Bulb  
16MM Cam Brkt  
LM Docking Target  
Docking Target Adapter

U-4  
Tape Recorder Cass-4  
Tape Rec Batteries-4  
Monocular  
Intervalometer (70MM)  
250MM Lens

PGA BAG  
UCTA Clamps-3  
Helmet Prot Shield  
Elect Conn Covers-3 (2\*)  
O2 Hose Screen Caps-3  
Urine Bag-3  
Water Bag Assy  
Fecal Bag XFR Bag

LH FEB

Water Gun  
CCU Cables-3

UEB  
Window Shade Bag

Window Shades-5  
S-178 Shade  
UV Shade

Panel 603 EVA Guard  
AFT UEB

O2 Mask & Hose W/Strap  
(3) in Bag  
Sleep Rest-3

LEB  
Radiation Survey Meter

Above L/H Window  
COAS

\* LM TRANSFER ITEM  
\*\* LM TRANSFER AFTER FINAL DOCK  
\*\*\* OFFLOAD AFTER SIM EVA

## ENTRY STOWAGE CHANGES FROM EARTH LAUNCH

## A. LM to CM XFER (ADDITIONS)

| <u>QTY</u> | <u>NOMENCLATURE</u> | <u>CM STOWAGE LOCATION</u> |
|------------|---------------------|----------------------------|
| 1          | Ancillary Bag       | A8                         |
| 2          | LM Helmet Bag       | Under Couch                |
| 1          | LM PPK              | A8                         |
| 1          | Flag Kit            | A8                         |
| 1          | SRC #1              | B6                         |
| 1          | SRC #2              | B5                         |
| 1          | Core Tube Cntr.     | A9                         |
| 1          | ISA                 | Top A2                     |
| 3          | Lunar Sample Ctr    | Top A7, A1, PGA Bag        |
| 1          | OPS                 | A7                         |
| 1          | PGA Purge Vlv       | A2                         |
| 2          | EVA Waist Tether    | A2                         |
| 1          | Penetrometer        | A7                         |
| 1          | DSEA                | A8                         |
| 2          | Neck Ring Dust Cvr  | PGA Pocket                 |
| 1          | Purse               | A8                         |

## B. CM TO LM XFER (Final Docking Off Load)

| <u>QTY</u> | <u>NOMENCLATURE</u>              | <u>CM STOWAGE LOCATION</u> |
|------------|----------------------------------|----------------------------|
| 2          | Container W/4                    | From B5, B6                |
|            | CO2 Absorber ea                  |                            |
| 1          | CO2 Absorber (4)<br>& Partitions | From A9                    |
| 1          | Jettison Bag (full)              | From A2                    |
| 1          | Vacuum Clnr Bag                  | From A2                    |
| 1          | Helmet Shield                    | From Helmet Bag            |

DATE 7/9/71*Step 1  
pg 1*

SM RCS

LV

ECS, CRITICAL  
BURNS (OVER)G&C, SPS  
EPS (OVER)

C. Relocations  
NOMENCLATURE

|  | <u>CM LAUNCH</u>         | <u>POST CM EVA</u> | <u>ENTRY</u>    |
|--|--------------------------|--------------------|-----------------|
| FCS  | A2                       | In PGA             | In PGA          |
| Headrest Pads                              | A2                       | A7                 | On couch        |
| Heel Rest                                  | A2                       | A7                 | On Crew         |
| EV Gloves (CMP)                            | A2                       | A7 (In acc bag)    | A7 (in acc bag) |
| 603 Gage                                   | A2                       | A7 (EVA Cont)      | A7              |
| Vac C1 Bag                                 | A2                       | 1-LM & 1-A7        | 1-LM & 1-A7     |
| Vac C1 Pwr Cable                           | A2                       | A7                 | A7              |
| Vac C1 Decom Bag                           | A2                       | A7                 | A7              |
| EVA Equip Cont (w/contents)                | A2                       | A7                 | A7              |
| Penet Drum Decom Bag                       | On A2                    | On A2              | On A2           |
| ISA Decom Bag                              | On A2                    | B5, B6             | B5, B6          |
| SRC  | On A2                    | On A7, On A7       | On A1, On A7    |
| Lunar Sample Bags                          | On A2                    | Front A9           | Bottom PGA Bag  |
| Lunar Sample Decom (w/reinforcement plate) | On A2                    |                    |                 |
| 70MM film mag                              | On A2                    |                    |                 |
| 16MM film mag                              | On A2                    |                    |                 |
| CWG Elect Adapter                          | A8                       |                    |                 |
| 3" Mapping Mag                             | SM                       |                    |                 |
| 24" Pan Mag                                | SM                       |                    |                 |
| Accessory Bag                              | U2                       |                    |                 |
| UV Lexan Filter                            | In side window Shade Bag |                    |                 |

5-5

5-4

|                      |                      |                      |
|----------------------|----------------------|----------------------|
| 3-R13, 1-A8 (3 pack) | R13                  | 3-R13, 1-A8 (3 pack) |
| 3-0n Crew, 1-A8      | 3-0n Crew, 1-A8      | 3-0n Crew, 1-A8      |
| B1                   | B1                   | B1                   |
| A2                   | A2                   | A2                   |
| 1-A7 w/CMP EV Gloves | 1-A7 w/CMP EV Gloves | 1-A7 w/CMP EV Gloves |
| 2-U2                 | 2-U2                 | 2-U2                 |
| On RH Side Window    | On RH Side Window    | On RH Side Window    |

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SA — MSC

C. Relocations (Contd)  
NOMENCLATURE

| <u>CM LAUNCH</u>  | <u>POST CM EVA</u>                                    | <u>ENTRY</u>   |
|---|---|--|
| LM<br>On Crew   | LEVA Bag<br>LEVA Bag                                  | LEVA Bag   |
| LM<br>PGA Bag<br>On Crew  | LEVA Bag<br>Temp Stow<br>On PGA                       | LEVA Bag   |
| LM<br>PGA Bag<br>On Crew  | PGA Bag<br>Bottom PGA Bag                             | PGA Bag  |
| LM<br>On Crew<br>On Crew<br>On Crew                                   | PGA Bag<br>Bottom PGA Bag<br>Temp Stow<br>Top PGA Bag | In CMP PGA<br>On PGA<br>On Suit (CDR, LMP)<br>Bottom PGA Bag                     |
| UEB<br>LM<br>LM<br>Under ctr couch                                    | UEB Purse<br>A8<br>Under Center Couch                 | On CMP PGA<br>Under RH couch in<br>Sleep Restraint<br>C-In RH, RH-On A8<br>Purse |
| A2<br>On A2   | A7  | 5-5<br>Reversed 180° front<br>A9   |
| A2<br>LM<br>LM<br>On Crew   | On Crew<br>A8<br>A8<br>On Crew                        | Over PGA Bag<br>Over Sleep Rest<br>w/PGA-RH couch<br>On Crew                     |
| ICG<br>LM PPK<br>Flag Kit<br>OPS<br>DSEA<br>Ancillary Bag<br>Bio Inst | A8<br>A8<br>A7<br>A8<br>A8<br>A8<br>On Crew           | A8<br>A8<br>A7<br>A8<br>A8 (purse)<br>A8<br>On Crew                              |

G&C, SPS  
EPS (OVER)

SM RCS

LV

ECS, CRITICAL  
BURNS (OVER)

SAFE OF APPLX  
COVER JETT

CM EVA

TOWAGE  
LM INTERFACE

EMER  
1-1

EMERGENCY CSM/LV SEPARATION

**IF POWERED FLT**

TRANS CONTR - CCW (4 SEC)

MN BUS TIES - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

BMAG MODE (3) - ATT 1/RATE 2

GMBL MTRS (4) - ON

ΔV THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5 SEC) - THEN ΔV THRUST (2) - OFF

DATE 3/15/71

SM RCS

LV

ECS, CRITICAL  
BURNS (OVER)

G&C, SPS  
EPS (OVER)

EMER  
1-2

**IF COASTING FLT**

cb SECS ARM (2) (Pn1 8) - CLOSE

SECS LOGIC (2) - ON

SECS PYRO ARM (2) - ARM

ROT CONTR PWR DIR (2) - MNA/MNB

SC CONT - SCS

SEPARATE FROM LV AS APPLICABLE -

IF BEFORE DOCKING, THC CCW (4 SEC)

IF DOCKED, UMBIL NOT CONNECTED,  
CSM/LM FINAL SEP (2) - ON

IF DOCKED, UMBIL CONNECTED, SIVB/LM SEP - ON

TRANSLATE AWAY FROM LV & MANEUVER TO BURN ATTITUDE

$\Delta$ VCG - CSM OR LM/CSM AS APPLICABLE

MN BUS TIE (2) - ON

TVC SERVO PWR 1 - AC1/MNA

TVC SERVO PWR 2 - AC2/MNB

BMAG MODE (3) - ATT1/RATE 2

GMBL MTRS (4) - ON

$\Delta$ V THRUST A - NORMAL

DIR ULLAGE & THRUST ON PB - PUSH

SPS BURN (5) SEC - THEN  $\Delta$ V THRUST (2) - OFF

STOWAGE

LV

CM EVA

SAFE OF APPL  
COVER JETT

DATE 3/15/71

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EMER  
1-3

### SUIT COMPRESSOR LITE - CLOSED SUIT LOOP

SWITCH TO OTHER COMPRESSOR ON OTHER BUS  
SEE ECS 9

### 02 FLOW HI + RAPID LOSS OF SURGE TK PRESS + CABIN PRESS <4.6 PSI

CABIN PRESS RELF v1vs (2) - CLOSE  
✓ TUNNEL EQUALIZATION v1v - CLOSED  
REPRESS PKG v1v - ON (WHEN SURGE TK PRESS <150 PSI)  
✓ EMERG CABIN PRESS REGS - BOTH  
DON SUITS

### CONTAMINATION IN CM

DON 02 MASKS

### CONTAMINATION IN CLOSED SUIT LOOP

CHANGE TO OTHER SUIT COMPR  
DIRECT 02 v1v - FULL OPEN THEN ADJUST FOR SUIT  
TO CABIN ΔP OF 2 IN OF H2O

### IF CONDITION PERSISTS

SUIT COMPR (2) - OFF  
DOFF HELMETS  
DIRECT 02 v1v - CLOSE  
DON 02 MASKS

### FIRE/SMOKE IN CM

MONITOR DC FOR HI CURRENT - REMOVE POWER  
FROM ASSOCIATED INVERTER  
IF CURRENT REMAINS HI - REMOVE POWER FROM  
ASSOCIATED DC BUS  
IF CLOSED SUIT LOOP, SWITCH SUIT COMPR TO GOOD AC BUS  
IF HELMET OFF, SUIT COMPR (2) - OFF  
RECONFIGURE INVERTER 3 ON LOST AC BUS  
VERIFY RCS CONTROL POWER CONFIGURATION  
IF HELMETS [DON 02 MASKS  
OFF] USE FIRE EXTINGUISHER OR H2O GUN (OPTIONAL)  
IF CLOSED [USE FIRE EXTINGUISHER OR H2O GUN (OPTIONAL)]  
SUIT LOOP [✓ EMERG CABIN PRESS REGS - OFF  
IF FIRE PERSISTS - DUMP CABIN]

SM RCS

ALARM CODES

ECS, CRITICAL  
BURNS (OVER)

G&C, SPS  
EPS (OVER)

EMER  
1-4

G&N CRITICAL BURNS

IF NO START OR ISS LITE + PROG LITE  
IF CMC LITE, PROG ALARM 1407 OR EARLY CUTOFF

SCS TVC (2) - AUTO

SC CONT - SCS

✓ ATTITUDE

SPS THRUST - DIRECT (MOMENTARY), IF REQ'd

IF ABNORMAL DYNAMICS

THC CW, control rates by MTVC  
After SHUTDOWN, AUTO RCS (16) - OFF

SCS CRITICAL BURN

IF NO START OR EARLY CUTOFF

SPS THRUST - DIRECT (MOMENTARY)

IF RATE NEEDLE HARDOVER & FDAIS DIVERGE OPPOSITE

BMAG MODE (3) - RATE 1

THC - CW, use MTVC

IF ABNORMAL DYNAMICS IN AUTO MODE

THC - CW, use MTVC

BMAG MODE (3) - RATE 2

IF ABNORMAL DYNAMICS IN MTVC MODE

THC - CW

IF PROBLEM PERSISTS, SHUTDOWN

AUTO RCS (16) - OFF

CRITICAL BURNS

SAFE OF APEX  
COVER JETT

LV

STOWAGE

DATE 6/19/71

EMER  
1-5

SPS

**IF NO CUTOFF AFTER  $\Delta V$  THRUST (BOTH - OFF)**

cb SPS PILOT VLVS - open

**IF EMS & N40 (R3) STILL COUNTING AFTER SHUTDOWN**

SC CONT - SCS

TRANS CONT PWR - OFF

cb DIR ULLAGE (2) - open

IF CONDITION PERSISTS, AUTO RCS SEL (16) - OFF

SM RCS PRPLNT (AFFECTED QUAD) - OFF

**SPS PRESS LITE**

CONTINUE CRITICAL BURN

**IF FUEL & OX PRESS (BOTH) > 200 PSI**

SPS HE v1vs (2) - OFF, THEN CONTROL MANUALLY  
BETWEEN 170-200 PSI

**IF FUEL/OX  $\Delta P$  > 20 PSI**

SPS HE v1vs (2) - ON

IF CONDITION PERSISTS, SPS HE v1vs(2)-OFF(Until  $P_c < 70$ )

G&C (COASTING, ENTRY)

**CMC LITE**

SC CONT - SCS

SEE G&N 5

**ISS LITE + PROG ALARM LITE**

SC CONT - SCS

SEE G&N 6

SM RCS

ALARM CODES

G&C, SPS  
EPS (OVER)

DATE 6/19/71

## EMERGENCY POWER DOWN

CAUTION: USE BATT'S ONLY WHEN MAIN BUS VOLTS &lt; 24.5

STOWAGE  
CONFIGURE FOR USE OF AUX BATTERY

FUEL CELL 2 MNA & MNB (2) - OFF  
 cb CRYO O2 ISOL/AUX BAT - CLOSE (Pn1 226)  
 SM PWR SOURCE - AUX BAT (mom) (Pn1 278)  
 O2 TANK 3 ISOL - CLOSE ( $\sqrt{TB-bp}$ ) (Pn1 278)  
 FUEL CELL 2 MN A(B) - as desired

## INSURE DSE IS RECORDING

|  | DC AMPS   |
|--|-----------|
| IF UNSUITED, SUIT COMP (2) - OFF                             | 4.0       |
| FC PUMPS (3) - OFF (Until $T_{skin} > 475^{\circ}\text{F}$ ) | 8.7 TOTAL |
| cb G&N OPTICS MNA & MNB (2)- OPEN (Pn1 5)                    | 3.1       |
| G&N PWR (AC) - OFF (Pn1 5)                                   | 0.9       |
| O2 HTRS (3) - OFF (CTR)                                      | 17.0      |
| H2 HTRS (2) - OFF (CTR)                                      | 1.4 EA    |
| H2 FANS (3) - OFF (CTR)                                      | 1.0       |

## C/W NORMAL - ACK

|                        |            |
|------------------------|------------|
| LM PWR - RESET - OFF   | 15.0 MAX   |
| ECS RAD HTRS (2) - OFF | 17.2 EA    |
| POT H2O HTR - OFF      | 1.6 MAX    |
| SM RCS HTRS (4) - OFF  | 3.3 MAX EA |
| HGA PWR - OFF          | 2.9        |
| LIGHTS - Min Rreqd     | 5.3 MAX    |
| EXT LTS - OFF          | 4.6        |

NON ESS BUS - OFF (SPS Burn-Damage SIM CAM)      4 - 6

VHF RANGING - OFF      1.4

S BD AUX TV - OFF (CTR)      5.3

SPS LINE HTR - OFF (CTR)      6.2 (A/B)

RNDZ XPNDR PWR - OFF or HEATER (Pn1 100)      3.0

SIG CONDR/DRIVER BIAS PWR (2) - OFF

SECURE ONE BMAG      2.6

SELECT SINGLE JET CONTROL

EMS FUNC - OFF

RHC PWR DIRECT (2) - OFF

THC PWR - OFF

CONFIGURE FOR SINGLE INVERTER OPERATION

TURN OTHER INVERTER OFF      4.0 MAX

BAT CHGR - OFF

NOTE MISSION TIME

cb TIMERS (2) - OPEN (Pn1 229)

AC INVERTER (9) - OFF

CM RCS HTRS - OFF

ISOLATE FAILED FC's from MAIN BUSES

LV

CRITICAL BURNS

DATE 6/19/71

EMER

1-7

|  |           |
|--|-----------|
| ECS POWER DOWN                             | 3.7 TOTAL |
| ECS GLY PUMP sel - OFF (ISS LIMIT 2.5 HRS) | 2.6       |
| ECS RAD FLOW CONT PWR - off (CTR)          | 0.7       |
| GLY EVAP TEMP IN - MAN                     |           |
| ECS RAD HTRS (2) - OFF                     |           |
| GLYCOL EVAP H2O FLOW - OFF                 | ~0.1      |
| GLYCOL EVAP STEAM PRESS - MAN              | ~0.2      |

|   |            |
|---|------------|
| COMM POWER DOWN                           | 13.0 TOTAL |
| IF VOICE DESIRED                          |            |
| UP TLM CMD RESET - RESET then OFF         |            |
| S-BD AUX TAPE - DN VOICE BU               |            |
| S-BD MODE PCM - OFF                       |            |
| PCM BIT RATE - HIGH                       |            |
| S-BD PWR AMP - OFF (CTR)                  | 4.0        |
| TAPE RCDR - OFF (CTR)                     | 1.6        |
| SCE PWR - OFF (CTR)                       | 0.7        |
| cb INSTR ESS MNA & MNB (2) - OPEN (Pn1 5) | 4.9        |
| TELCOM GRP 1 & 2 (2) - OFF                | 1.6        |

|   |                      |
|---|----------------------|
| CMC/IMU POWER DOWN                      | 6.0 IMU              |
| COMPLETE ALIGNMENT TRANSFER             |                      |
| CMC MODE - FREE                         | PROVIDES CMC MIN IMP |
| cb G&N IMU MNA & MNB (2) - OPEN (Pn1 5) |                      |
| V37E06E                                 | 3.0 CMC              |
| F V50 N25, 00062, CMC PWR DN            |                      |
| PRO, HOLD (~5 SEC) UNTIL STBY LT - ON   |                      |

|                                     |                      |
|-------------------------------------|----------------------|
| SCS POWER DOWN                      | 6.0                  |
| ACCEPTABLE S/C ATTITUDE             |                      |
| BMAG PWR (2) - OFF                  |                      |
| FDAI/GPI PWR - OFF                  | PROVIDES MIN IMP     |
| SCS ELECTRONICS PWR - ECA           | (REQUIRES AC1 & MNB) |
| ORDEAL PWR & LIGHTING - OFF         |                      |
| cb SCS LOGIC BUS (4) - OPEN (Pn1 8) | 2.0                  |
| SCS ELECTRONICS PWR - OFF           |                      |
| RHC PWR NORM (2) - OFF              |                      |

DATE 3/15/71

SM RCS  
ALARM CODES

LAUNCH BUS LOSS**MN BUS A LOST - LAUNCH**

- EDS AUTO/OFF - OFF
- TVC GMBL DR (P,Y) - 2
- SCS TVC (P,Y) - RATE CMD
- BMAG MODE (3) - RATE 2
- FDAI SEL - 2
- cb SPS PITCH 2 & YAW 2 (Pn1 8) - OPEN  
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNB

AC INV 3 AC 1 - ON

AC INV 1 AC 1 - OFF

A11 F/C MNA - OFF

ALL F/C MNB - MNB (BEFORE CM/SM SEP)

cb MNA BAT BUS A (Pn1 275) - OPEN

cb MNB BAT C (Pn1 275) - CLOSED

**MN BUS B LOST - LAUNCH**

- EDS AUTO/OFF - OFF
- TVC GMBL DR (P,Y) - 1
- SPS TVC (P,Y) - RATE CMD
- ✓BMAG MODE (3) - RATE 1
- FDAI SEL - 1
- cb SPS PITCH 1 & YAW 1 (Pn1 8) - OPEN  
(AFTER GIMBAL MOTORS ON)

AC INV 3 - MNA

AC INV 3 AC 2 - ON

AC INV 2 AC 2 - OFF

A11 F/C MNB - OFF

A11 F/C MNA - MNA (BEFORE CM/SM SEP)

cb MNB BAT BUS B (Pn1 275) - OPEN

cb MNA BAT C (Pn1 275) - CLOSED

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STOWAGE

LV

CRITICAL BURNS

EMER  
1-9

**AC BUS 1 LOST - LAUNCH**

B MAG MODE (3) - RATE 2  
FDAI SEL - 2  
TVC SERVO PWR 1 - AC2/MNB  
SCS TVC PITCH, YAW - RATE CMD

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC

**AC BUS 2 LOST - LAUNCH**

✓B MAG MODE (3) - RATE 1  
FDAI SEL - 1  
TVC SERVO PWR 2 - AC1/MNA  
MTVC WITH THUMBWHEELS (MODE III OR IV)

AC INV 2 MNB - OFF  
✓SUIT COMPR - AC 1  
✓ECS GLY PUMP - AC 1

**BAT BUS A LOST - LAUNCH**

EDS AUTO/OFF - OFF  
AUTO RCS SEL (RING 1) - OFF  
IF BUS LOST BEFORE GMBL MTRS ON  
TVC GMBL DR (P,Y) - 2  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(AFTER SEC GIMBAL MOTORS ON)

cb MNA BAT C (Pn1 275) - CLOSED

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**BAT BUS B LOST - LAUNCH**

EDS AUTO/OFF - OFF  
AUTO RCS SEL (RING 2) - OFF  
IF BUS LOST BEFORE GMBL MTRS ON  
TVC GMBL DR (P,Y) - 1  
cb SPS P1 & Y1 (Pn1 8) - OPEN  
(AFTER PRI GIMBAL MOTORS ON)

cb MNB BAT C (Pn1 275) - CLOSED

SM RCS  
ALARM CODES

EMER  
1-10

STOWAGE

SPS BURN BUS LOSS

**MN BUS A LOST - SPS BURN**

TVC GMBL DR (P,Y) - 2  
✓SCS TVC (P,Y) - RATE CMD  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)

FDAI SEL - 2  
✓FDAI SOURCE - CMC  
■ RHC PWR DIRECT 2 - MNB  
BMAG MODE (3) - RATE 2  
■ ✓ΔV THRUST B - NORM  
AUTO RCS SEL - MNB

AC INV 3 - MNB  
AC INV 3 AC 1 - ON  
AC INV 1 AC 1 - OFF  
A11 F/C MNA - OFF  
ALL F/C MNB - MNB  
cb MNA BAT BUS A (Pn1 275) - OPEN

**MN BUS B LOST - SPS BURNS**

■ SCS TVC (P,Y) - RATE CMD  
■ TVC GMBL DR (P,Y) - 1  
■ cb SPS P1 & Y1 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)  
FDAI SEL - 1  
✓FDAI SOURCE - CMC  
■ RHC PWR DIRECT 1 - MNA  
BMAG MODE (3) - RATE 1  
ΔV THRUST A - NORM  
■ AUTO RCS SEL - MNA

AC INV 3 - MNA  
AC INV 3 AC 2 - ON  
AC INV 2 AC 2 - OFF  
A11 F/C MNB - OFF  
A11 F/C MNA - MNA  
cb MNB BAT BUS B (Pn1 275) - OPEN

CRITICAL BURNS

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EMER  
1-11

AC BUS 1 LOST - SPS BURNS

TVC SERVO PWR 1 - AC2/MNB  
SCS TVC (P&Y) - RATE CMD  
BMAG MODE (3) - RATE 2  
FDAI SEL - 2  
✓FDAI SOURCE - CMC

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC  
SPS GAUGING - AC 2

AC BUS 2 LOST - SPS BURNS

TVC SERVO PWR 2 - AC1/MNA  
BMAG MODE (3) - RATE 1  
SCS TVC (P&Y) - AUTO  
ΔVCG - LM/CSM  
MTVC WITH TRIM THUMBWHEELS (SCS BURN ONLY)  
FDAI SEL - 1  
✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF  
✓SUIT COMPR - AC 1  
✓ECS GLY PUMP - AC 1

BAT BUS A LOST - SPS BURNS

TVC GMBL DR (P,Y) - 2  
(IF BUS LOST BEFORE GMBL MTRS ON)  
cb SPS P2 & Y2 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)  
cb MNA BAT C (Pn1 275) - CLOSED

BAT BUS B LOST - SPS BURNS

TVC GMBL DR (P,Y) - 1  
(IF BUS LOST BEFORE GMBL MTRS ON)  
cb SPS P1 & Y1 (Pn1 8) - OPEN  
(CRIT BURNS - AFTER GMBL MTRS ON)  
cb MNB BAT C (Pn1 275) - CLOSED

SM RCS

ALARM CODES

DATE 6/19/71

EMER  
1-12

STORAGE

LV

CRITICAL BURNS

### ENTRY BUS LOSS

#### **MN BUS A LOST - ENTRY**

- BMAG MODE (3) - RATE 2
- FDAI SEL - 2
- ✓FDAI SOURCE - CMC
- AUTO RCS SEL (12) - MNB (ONLY IF BUS LOST AFTER SM SEP)

AC INV 3 - MNB  
AC INV 3 AC 1 - ON  
AC INV 1 AC 1 - OFF  
A11 F/C MNA - OFF  
ALL F/C MNB - MNB (BEFORE CM/SM SEP)  
cb MNA BAT BUS A (Pn1 275) - OPEN  
cb MNB BAT C (Pn1 275) - CLOSED

#### **MN BUS B LOST - ENTRY**

- BMAG MODE (3) - RATE 1
- FDAI SEL - 1
- ✓FDAI SOURCE - CMC
- AUTO RCS SEL (12) - MNA (ONLY IF BUS LOST AFTER SM SEP)

AC INV 3 - MNA  
AC INV 3 AC 2 - ON  
AC INV 2 AC 2 - OFF  
A11 F/C MNB - OFF  
A11 F/C MNA - MNA (BEFORE CM/SM SEP)  
cb MNB BAT BUS B (Pn1 275) - OPEN  
cb MNA BAT C (Pn1 275) - CLOSED

#### **AC BUS 1 LOST - ENTRY**

- BMAG MODE (3) - RATE 2
- FDAI SEL - 2
- ✓FDAI SOURCE - CMC

AC INV 1 MNA - OFF  
SUIT COMPR - AC 2  
ECS GLY PUMP - AC 2  
S BD NORM XPNDR - SEC  
S BD NORM PWR AMP - SEC

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DATE

EMER  
1-13

AC BUS 2 LOST - ENTRY

BMAG MODE (3) - RATE 1

FDAI SEL - 1

✓FDAI SOURCE - CMC

AC INV 2 MNB - OFF

✓SUIT COMPR - AC 1

✓ECS GLY PUMP - AC 1

BAT BUS A LOST - ENTRY

cb SCS B/D ROLL, P&Y (MNA) (3) (Pn1 8)

Before CM/SM SEP - OPEN

After RCS transfer to CM - CLOSE

cb SCS CONTR/AUTO (2) (Pn1 8) - OPEN

(AFTER APEX COVER JET)

cb MNA BAT C (Pn1 275) - CLOSED

BAT BUS B LOST - ENTRY

cb SCS B/D ROLL, P&Y (MNB) (3) (Pn1 8)

Before CM/SM SEP - OPEN

After RCS transfer to CM - CLOSE

cb SCS CONTR/AUTO (2) (Pn1 8) - OPEN

(AFTER APEX COVER JET)

cb MNB BAT C (Pn1 275) - CLOSED

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SM RCS

ALARM CODES

EMER

1-14

ALL FC'S DISCONNECTED - POWERED FLT  
ATTEMPT FC RECONNECT (ONE BUS AT A TIME)

**IF RECONNECT NOT SUCCESSFUL**

FC 1 - MN B

FC 2 - MN B

FC 3 - MN A

**IF STILL NO SUCCESS**

SCE PWR - AUX

EDS AUTO/OFF - OFF

cb MNA BAT C (Pn1 275) - CLOSED

cb MNB BAT C (Pn1 275) - CLOSED

AC BUS OVERLD + AC BUS + MN BUS UNDER V LITES  
AFFECTED AC BUS - OFF (REASON - AC BUS SHORT)

FC 1 (2,3) LITE

VERIFY FC 1 (2,3) REAC tb - gray

**IF tb BP**

FC 1 (2,3) REAC v1v - OPEN (up)

**IF tb STILL BP & REAC FLOW ~0**

OPEN CIRCUIT FC 1 (2,3)

DATE 6/19/71

STOWAGE

LV

CRITICAL BURNS

EMER  
1-15

SM RCS THRUSTER FAILED ON

BMAG MODE (3) - RATE 2  
CHG TO OTHER SC CONT MODE  
ROT CONT PWR DIR (2) - MNA/MNB  
STOP SPACECRAFT RATES WITH DIRECT RCS  
AUTO RCS SEL (16) - OFF

**IF CONDITION PERSISTS**

AUTO RCS SEL (16) - ON (AS REQ'D)  
MAN ATT (3) - ACCEL CMD  
STOP SPACECRAFT RATES  
cb SCS DIR ULL (2)(Pn1 8) - open  
ROT CONT PWR DIR (2) - OFF

**IF CONDITION PERSISTS**

NEUTRALIZE RHC  
SM RCS PRPLNT (AFFECTED QUAD) - OFF

SM RCS LITE

SM RCS HE (2) - CLOSE  
SEE RCS 1

SM RCS QUAD SECURE

SM RCS He 1 & 2 (AFFECTED QUAD) (2) - CLOSE  
SM RCS PRIM PRPLNT (AFFECTED QUAD) - CLOSE  
Fire one jet in affected quad - 2 sec continuously  
AUTO RCS SELECT (AFFECTED QUAD) (4) - OFF (except BOOST)

DATE 4/15/71

SM RCS

ALARM CODES

EMER  
1-16

CM RCS

LV

CRITICAL BURNS

## CM RCS FAILS TO PRESSURIZE OR FEED PRPLNT

### **IF NO PRESSURIZATION**

✓cb EPS BAT BUS (2) (Pn1 229) - CLOSE  
✓cb PYRO A/B SEQ A/B (2) (Pn1 250) - CLOSE  
✓cb SECS ARM (2) (Pn1 8) - CLOSE  
✓SECS PYRO ARM (2) - ARM  
✓SECS LOGIC (2) - ON  
CM RCS - PRESS

### **IF NO RCS PRPLNT FEED**

✓cb EPS GRP 1 & 3 (Pn1 229) - CLOSE  
✓cb SM RCS HTR A&B (Pn1 8) - CLOSE  
✓cb RCS PRPLNT ISOL (2) (Pn1 8) - CLOSE  
CM RCS PRPLNT - ON

### **IF STILL NO FEED**

cb EPS GRP 5 (Pn1 229) - CLOSE  
cb RCS LOGIC (2) (Pn1 8) - CLOSE  
CM RCS LOGIC - ON  
CM PRPLNT - DUMP MOMENTARILY, THEN OFF

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V05 N09 ALARM CODESDATE 5/12/71

- 00110 Mark reject has been entered but ignored  
Continue
- 00113 No inbits (chan 16)  
Continue: if alarm recurs use MDC DSKY.
- 00114 More marks made than desired  
Continue
- 00115 V41 N91 keyed with OPTICS MODE not in CMC  
OPTICS MODE - CMC and OPTICS ZERO - OFF
- 00116 Optics switch altered before 15 sec zero time elapsed  
OPTICS ZERO - ZERO (15 sec).
- 00117 V41 N91 keyed but CMC has reserved OCDU (from start of gimbal test in P40 until termination of TVC functional allocation of the "optics" CDU Driving Output)
- 00120 V41 N91 not yet available  
Optics torque has been requested but optics have not been zeroed since last FRESH START or RESTART  
OPTICS ZERO - OFF then ZERO (15 sec).
- 00121 In 0.05 sec following mark, an ICDU changed by more than 0.033°  
Repeat MK.
- (m)00205 PIPA saturated  
Use SCS control (G&N 12).
- 00206 The IMU zero routine has been entered with both the GMBL LOCK lt and NO ATT lt on  
Coarse align to 0,0,0 Reselect V40E.
- (m)00207 ISS turn-on request not present for 90 sec  
Redo IMU turn on (G&N 12).  
The IMU is not operating  
Redo IMU turn on. If alarm recurs perform fresh start (V36E).  
Consult MSFN. (G&N 12).

- (m)00211 Coarse align error  
 If P51(3)/52(4) in progress record gyro torquing angles and perform fine align check in P52(4)  
 Otherwise, see G/1-24. (G&N 12).
- (m)00212 PIPA fail, but PIPA is not being used  
 PIPA BIAS check (G&N 6/8).
- (m)00213 IMU not operating with turn-on request  
 See 00210
- 00214 Program using IMU when turned OFF  
 See 00210 or exit program.
- (m)00217 IMU coarse align or pulse torque difficulty has occurred  
 If code 211 also, perform 211 cure only  
 Reinitiate current program.  
 If alarm recurs, terminate use of ISS (G&N 12).
- 00220 IMU orientation unknown  
 Align or if aligned set REFSMMAT flag
- 00401 Desired middle gimbal angle is excessive  
 Call N22 - maneuver if MGA < 85° or realign IMU.
- 00402 Second MINKEY pulse torque must be done.
- 00404 Target out of view (90 deg test)  
 (G/3-7,3-11,6-3,7-16)
- 00405 Acceptable star pair is not available  
 (G/6-3,6-6)
- 00406 Rend navigation not operating  
 Select P20 Opt. 0 or 4 or continue.
- 00421 W-matrix overflow  
 Notify MSFN but continue.  
 W-matrix automatically reinitialized at next mark.
- 00600 No solution on first iteration in P31 or P32/72  
 (G/4-6,4-8)
- 00601 Post CSI Perigee/lune alt <85nm/ 5.8nm  
 (G/4-6, 4-8)
- 00602 Post CDH Perigee/lune alt <85nm/ 5.8nm  
 (G/4-6, 4-8)
- 00603 Time from TIG (CSI) to TIG (CDH)  
 <10 min  
 (G/4-6, 4-8)

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- 00604 Time from TIG (CDH) to TIG (TPI)  
<10 min  
(G/4-6,4-8)
- 00605 Number of iterations exceeds loop maximum  
(G/4-6,4-8,4-15,4-16)
- 00606  $\Delta V$  (CSI) has been >1000 fps for last two iterations  
(G/4-6,4-8)
- 00611 No TIG for given ELEV angle  
(G/4-10,4-12)
- 00612 State vector in wrong sphere of influence at TIG  
(G/4-15)
- 00613 Reentry angle out of limits  
(G/4-16)
- (m)00777 ISS warning caused by PIPA fail  
(G&N 6).
- 01102 CMC self test error  
(G/2-3)
- (m)01105 Downlink too fast  
Rset. If alarm recurs DOWNLINK FAILURE.  
(G&N 12).
- (m)01106 Uplink too fast  
Rset. If alarm recurs UPLINK FAILURE.  
(G&N 12).
- (m)01107 Phase table failure-assume erasable memory is destroyed  
If Comm: 1. V74 CMC DOWNLINK  
2. P27 As Necessary.  
3. V48 As Necessary (V46).  
4. Reestablish REFSMMAT via P51 As Necessary.  
If FRESH START recurs,  
CMC FAILURE (SSR-3).  
If no Comm, pg G/9-1
- 01301 Arcsin or arccos input is greater than one  
Notify MSFN, continue.
- (m)01407 VG increasing  
(G&N 12).
- 01426 IMU unsatisfactory  
Realign or use SCS.

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CM RCS

ALARM CODES

CRITICAL BURNS

- 01427 IMU reversed  
Note FDAI operation is inverted.
- 01520 V37 request not permitted at this time  
Wait till COMP ACTY lt.  
not on continuously - reselect V37 or if  
P62-67, select P00 and then desired  
program.
- 01600 Overflow in drift test  
This is gnd test alarm only.
- 01601 Bad IMU torque abort  
See 01600
- 01703 Insufficient time for integration.  
TIG slipped  
(G/5-3,5-18)
- (m)03777 ISS warning caused by ICDU fail  
(G&N 6)
- (m)04777 ISS warning caused by ICDU & PIPA fail  
(G&N 6)
- (m)07777 ISS warning caused by IMU fail  
(G&N 6)
- (m)10777 ISS warning caused by IMU & PIPA  
fail (G&N 6)
- (m)13777 ISS warning caused by IMU & ICDU fail  
(G&N 6)
- (m)14777 ISS warning caused by IMU,ICDU & PIPA  
fail  
(G&N 6)
- \*\*20430 Orbital integration has been  
terminated to avoid possible  
infinite loop.  
Notify MSFN.  
Probable S.V. uplink required
- \*\*20607 No solution to conic subroutine  
Reselect program.
- \*\*20610 Alt at specified TIG in P37 < 400K ft  
Reselect P37 and decrease TIG.
- \*\*21204 Negative or zero time waitlist call.  
If ave-g or ext. vb. on, continue.  
Otherwise reselect program.
- \*\*21206 Second job attempts to go to sleep via  
keyboard and display program  
See 21204.

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- \*\*21210 Second attempt is made to stall  
Reselect program  
Do not attempt use of IMU while CMC is  
using it.
- \*\*21302 SQRT called with negative argument  
See 21204
- \*\*21501 Keyboard and display alarm during  
internal use  
See 21204
- \*\*21502 Illegal flashing display  
See 21204
- \*\*21521 P01 selected and P11 has already been  
performed  
Select correct program
- \*31104 Delay routine busy  
Reselect extended verb or continue with  
program.  
Notify MSFN.
- \*31201 Executive overflow - no vac area  
Reselect Extended Verb and/or Continue  
Program.
- \*31202 Executive overflow - no core sets  
See 31201
- \*31203 Waitlist overflow - too many tasks  
See 31201
- \*31211 Illegal interrupt of extended verb  
Reselect extended verb after optics  
marking is completed.  
(m) - Malf procedure indicated  
\*\*(2xxxx) - Generates restart (no lt), F37 (POODOO)  
\*(3xxxx) - Restart (no lt) and program  
continues (i.e. attempted  
recovery)(BAILOUT)
- NOTE - All \*\*alarms act as \*type if  
they occur when Ave-g is on or  
display type extended verb  
is active.

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CRITICAL BURNS

ALARM CODES

CM RCS

