

APOLLO 10	
LMP CHECKLIST	
PART NO.	S/N
SKB32100079-302	1002

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Changed

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SYSTEMS MANAGEMENT

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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

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 - record

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

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

PKG TEMP - 105°-195°F (C/W 75°-205°)

He PRESS - record

MANF PRESS - 178-192 psia (C/W 145°-205°)

He TK TEMP - record

PRPLNT QTY - record

When MANIF PRESS <150 psia

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

3 CM RCS MONITORING CHECK

CM RCS PRPLNT tb (2) - bp

RCS IND sw - CM 1,2

He TEMP - 60-90°F

He PRESS - 4100-4200 psia

MANIF PRESS - 25-105 psia

(287-302 after activation)

CM RCS HTRS - OFF (ON 20 min prior to
pressurization if req'd)

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EPS SYSTEM

1 Cryogenic Pressure - Quantity Check

H2 PRESS (2) - 225-260 psia
O2 PRESS (2) - 865-935 psia
SURGE TK PRESS - 865-935 psia
H2 QTY (2) - record
O2 QTY (2) - record
CRYO FANS - OFF; ON as req'd

2 FC Power Plant Check

FC HTRS (3) - on (up)
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 - 390-450° F
MOD COND EXH TEMP - 150-175° F
FC pH HI tb - gray
FC RAD TEMP LO tb - gray
FC REACS & RAD cb (6) - out, all others in(verify)

3 D-C Voltage-Amperage Check

MN BUS TIE (2) - OFF (verify)
FC MNA tb - 1 & 2 gray, 3 bp
FC MNB tb - 1 bp, 2 & 3 gray
FC 1, 2, & 3 (RECORD AMPS)
MAIN BUS A, B, (26.5-31 vdc - Record)
BAT BUS A, B, & BAT C (31.5-38 vdc < 3 amp)
PYRO BAT A, B (36.5 - 37.5 vdc)
DC IND sel - MNB
SYS TEST 4B (BAT RLY BUS - 3.4-4.1 vdc)
SYS TEST 4A (BAT COMPT PRESS) - <1.5 vdc
(NA until 1st Vent)
If >1.5: BAT VENT vlv -
VENT (to ~ 0) then CLOSED

4 A-C VOLTS - 113 to 117 all phases

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- 5 Battery Charging BAT A(B)
 ECS RAD HTRS OVLD - close (verify)
 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-~~40~~^{37.5} vdc
~~DC AMPS - 2.0-3.0 amps~~
 BAT CHARGE - OFF at 39.5 vdc or 100% recharge
 cb BAT RLY BUS BAT A(B) - closed
 SYS TEST - 4A (BAT VENT <1.5)
 If >1.5: BAT VENT vlv -
 VENT (to ~0) then CLOSED
 SYS TEST - 4B

6 Fuel Cell Power Plant Purging

A. O2 PURGING

FC IND sw - 1(2,3)
 FC PURGE 1(2,3) - O2 (2 min.)
 FC FLOW - O2 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
 H2 PURGE LINE HTR - OFF

- 7 H2 or O2 Quantity Balance Correction
 ON LOW Tank, H2 or O2 HTRS 1(2) - OFF,
 THEN AUTO, WHEN BALANCED

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 Changed July 3, 1969

8 FUEL CELL SHUTDOWN (APPLICABLE FC)

cb FC REACS - close
cb FC PURGE - open
FC REAC - OFF
FC HTRS - OFF
FC PUMPS - OFF
cb FC PUMPS AC - open
AT Tskin <200° F
H2 PURGE LINE HTR - ON (for 30 min)
cb FC PURGE - close
FC PURGE - O2 (TIL O2 PRESS = N2 PRESS)
FC PURGE - H2 (TIL PRESS STABILIZES)
FC PURGE - OFF
H2 PURGE LINE HTR - OFF
cb FC PURGE - open

9 FUEL CELL SWITCHING

PRIOR TO DISCONNECTING, INSURE THAT AT LEAST
ONE FUEL CELL IS POWERING EACH MAIN BUS

10 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

11 CRYO O2 & H2 MANUAL FAN OPERATION

- H2 & O2 FANS - ON (seq for 1 min each)
- a. Prior to every SPS or SIVB ΔV
 - b. Presleep
 - c. Postsleep

CAUTION

If CRYO PRESS lt on, do not
turn off fan until lt ex-
tinguishes

Basic Date May 18, 1969
Changed May 3, 1969

ECS PERIODIC VERIFICATION

1 ECS MONITORING CHECK

+CABIN ΔP - -1 to -3.5 in H₂O

+O₂ FLOW - 0.2-0.45 lb/hr (after changeover)

O₂ SURGE TANK PRESS - 865-935 psia

REPRESS O₂ >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 - 40-50.5° F

+PRIM GLY EVAP STEAM PRESS

.1-.15 boiling, > .16 not boiling

+PRIM GLY DISCH PRESS - 40-52 psig

+SUIT TEMP - 45-55° F

+CABIN TEMP - 70-80° F

SUIT PRESS/CABIN PRESS - 4.7-5.3 psia(14.7 for launch)

+PART PRESS CO₂ < 7.6 mm Hg

+SUIT COMP ΔP - 0.3-0.4 psid

+PRIM GLY ACCUM QTY 30-65% (expect 20-50% at insert)

*If <30% - PRIM ACCUM FILL vlv - *

* ON (Until 40-55%) *

+POT H₂O QTY - 10-100%

POT TK IN vlv - OPEN at \leq 25%

+WASTE H₂O QTY - 25-85%

If >85% - Dump, pg S/1-15

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MAIN REG B vlv - close
EMER CABIN PRESS sel - 1
PUSH TO TEST PB - PUSH (O2 FLOW INC)
O2 press - 90-110 psig (from MSFN if avail)
MAIN REG B vlv - open
MAIN REG A vlv - close
EMER CABIN PRESS sel - 2
PUSH TO TEST PB - PUSH (O2 FLOW INC)
O2 press - 90-110 psig (from MSFN if avail)
MAIN REG A vlv - open
EMER CABIN PRESS sel - BOTH (OFF if all suited)

```

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
 SEC EVAP STEAM PRESS .1-.15 boiling,
 >.16 not boiling

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SEC EVAP TEMP OUT - 40-50.5°F
SEC COOL LOOP EVAP - RESET for 58 sec minimum,
                    then off (ctr)

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ECS IND sw - PRIM
SEC COOL LOOP PUMP - off (ctr)

Suit compressor
Sw to other compr
SUIT COMPR ΔP ind - 0.3 - 0.4 psid

- 3 CO2 ABSORBER FILTER REPLACEMENT
Open CO2 Canister attenuation pnl

CAUTION

Connect ground wire when removing or replacing filter from canister or stowage

CO2 CSTR DIVERT vlv - up (or dn)

CAUTION

Apply 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 pnl
SHIM Stowage - B5 & B6

- 4 GLYCOL ACCUMULATOR REFILL (IF <30%)
PRIM ACCUM FILL vlv - ON
GLY ACCUM PRIM QTY - 40-55%
PRIM ACCUM FILL vlv - OFF
IF OVER FILL
GLYCOL RESVR INLET - OPEN (MOM)

- 5 DEBRIS SCREEN CHECK
Check cabin ht exch inlet screen
Check SUIT RET AIR vlv screen
SUIT RET AIR vlv - CLOSE (push)
Clean screens
SUIT RET AIR vlv - OPEN (pull)

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Changed

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10A 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 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 1 min (min)
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 (Dump)

Verify vent line clear
Connect UT hose/filter to urine/feces QD
Attach UTS to hose
WASTE MGT OVBD DRAIN vlv - DUMP
UTS vlv - OPEN
Purge lines 1 min (min)
WASTE MGT OVBD DRAIN vlv - OFF
Stow UTS & Hose

10B URINE DUMP MODE USING URA

Connect urine line filter to urine
transfer hose
Connect urine transfer hose/filter to
urine feces QD
Connect diaphragm assy to Urine
Receptacle/Plenum Assy
Remove diaphragm cover & stow

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WASTE MGMT DRAIN vlv - DUMP
URA vlv - OPEN (CCW)
Perform task
Purge line for 1 min (min)
URA vlv - CLOSE (CW)
WASTE MGMT DRAIN vlv - CLOSE
Attach diaphragm cover
Stow Urine Receptacle/Plenum Assy

11 CABIN PRESSURIZATION

A NORMAL 30 min

CAB PRESS REL vlv (2) - NORMAL (latch on)
MONITOR SURGE TANK PRESS
PLSS 02 vlv - FILL
REPRESS 02 vlv - OPEN
AT 150 psia on SURGE TANK:
PLSS 02 vlv - OFF
CABIN REPRESS vlv - Adjust to 150 psia on
SURGE TANK
AT ZERO psia on EMERG 02 GAUGE:
REPRESS 02 vlv - CLOSE
CAB REPRESS vlv - OPEN
WHEN CABIN PRESS = 4.7-5.3
02 PRESS ind - TANK 1
CAB REPRESS vlv - CLOSE

B ALTERNATE, 52 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
02 PRESS IND - TANK 1
CAB REPRESS vlv - CLOSE

11A 02 TOP OFF FOR ENTRY

SURGE TANK vlv - ON (verify)

PLSS ~~REPRESS~~ 02 vlv - ~~OFF~~ until:

TANK PRESS = CRYO PRESS - 50 psi

PLSS ~~REPRESS~~ 02 vlv - OFF

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- 12 SUIT CKT INTEGRITY CHECK
DIRECT O2 vlv - CLOSE
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 sta-
bilized 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
O2 FLOW ind - 1.0 lb/hr (pegged)
O2 FLOW HI lt - on
M/A - ON, Reset
Cycle SUIT CKT RTN
AIR vlv open and close
at suit press of 1.5 to 2.0 psig
SUIT PRESS ind - 8.8-9.8 psia
PGA PRESS ind - 4.1-4.5 psig
O2 FLOW HI lt - out
Allow O2 flow to stabilize 15 sec
O2 flow shall remain below
0.8 lb/hr for 30 secs after
stabilization

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

- 13 PGA INTEGRITY CHECK
DIRECT O2 vlv - CLOSE
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

SUIT TEST vlv - PRESS
O2 FLOW - 1.0 lb/hr (pegged)
O2 FLOW HI lt - ON
M/A - ON, Reset
SUIT PRESS - 8.8-9.8 psia
PGA PRESS - 4.1-4.5 psig

WARNING

SUIT FLOW vlv(s) may remain in
OFF position for no longer than
one minute or asphyxiation may
result. If all SUIT FLOW vlvs
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

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- 14 CM PRESSURE DUMP
 EMER CABIN PRESS vlv - OFF (verify)
 CAB REPRESS vlv - OFF (verify)
 SUIT RTN AIR vlv - CLOSED (verify)
 DIR O2 vlv - CLOSE
 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)
- 15 SUIT CKT H2 PURGE
 DIRECT O2 vlv - OPEN for 1 min
 O2 FLOW - 1.0 lb/hr (pegged)
 O2 FLOW HI lt - on
 MASTER ALARM pb/lt (3) - on, push
 DIRECT O2 vlv - CLOSE
 O2 FLOW HI lt - out
 O2 FLOW - 0.2 lb/hr
- 16 CABIN COLD SOAK
ACTIVATE
 SUIT HT EXCH SEC GLY vlv - FLOW
 EVAP H2O CONT SEC vlv - AUTO
 GLY TO RAD SEC vlv - BYPASS (verify)
 CAB TEMP - MAN
 PRIM CAB TEMP vlv - C (CW)
 SEC CAB TEMP vlv - OFF
 SUIT CKT HT EXCH - BYPASS (20sec), then OFF
 (EI - 50 min)
 ECS IND sel - SEC
 SEC COOL LOOP PUMP - AC2 (EI - 50 min)
 GLY DISCH SEC PRESS - 39-51 psig
 SEC ACCUM QTY - 30-55%
 SEC COOL LOOP EVAP - EVAP (EI - 50 min)
 SEC GLY EVAP OUT TEMP - 40-50.5°F
 SEC GLY EVAP STM PRESS - 0.1-0.15 psia, >.16
 not boiling
 ECS IND - PRIM
 PRIM ECS RAD OUT TEMP - >-20°F
 IF <-20°F, DEACTIVATE

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 Changed

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DEACTIVATE

SEC CAB TEMP vlv - MAX COOL

CAB TEMP - AUTO

SUIT CKT HT EXCH - ON (20 sec), then OFF

SEC COOL LOOP EVAP - RESET 58 sec min,

then OFF

SEC COOL LOOP PUMP - OFF

EVAP H2O CONT SEC vlv - AUTO

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ACTIVATE PRIMARY EVAP

GLY EVAP H2O FLOW - AUTO

GLY EVAP STM PRESS - AUTO

DEACTIVATE PRIMARY EVAP

GLY EVAP H2O FLOW - off (ctr)

GLY EVAP STM PRESS AUTO - MAN

GLY EVAP STM PRESS INCR - INCR
for 58 sec

PRIM EVAP RESERVICE

GLY EVAP STM AUTO - MAN

GLY EVAP STM INCR - INCR for
for 58 sec

Wait 15 min

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

GLY EVAP STM AUTO - AUTO

18

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 58 sec

SEC COOL LOOP PUMP - off (ctr)

SEC EVAP H2O CONT - OFF

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19 POTABLE WATER CHLORINATION

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
POT TK IN vlv - OPEN
Wait 10 min & remove ampoule of H2O
Replace chlor port cap
Stow chlorination unit
Do not drink for 30 min

20 WASTE WATER TANK DRAIN

H2O QTY Ind sw - WASTE
POTABLE TANK INLET - CLOSE
WATER CONT PRESS REL vlv - DUMP A
Monitor H2O QTY (WASTE) ind - decreasing
When H2O QTY (WASTE) ind reads 25%:
WATER CONT PRESS REL vlv - 2
POTABLE TANK INLET - OPEN

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21 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
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 UTS/
Waste Servicing Tank (as req)
Dump Waste Water/Urine
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 (verify)
Install plug & dump nozzle connector

22 WATER COLLECTION

Connect urine transfer hose-filter to urine/feces QD
Connect cabin purge QD to urine transfer hose
WASTE MANAGEMENT DRAIN vlv - DUMP
Collect water
After collection complete:
Purge for 1 min (min)
WASTE MANAGEMENT DRAIN vlv - CLOSE

Basic Date April 18, 1969
Changed May 3, 1969

C/W SYSTEM OPERATIONAL CHECK

CAUTION

Status lts should not
be on for more than
10 min or matrix will
overheat

C/W LAMP TEST - 1 (hold)

M/A Pnl 1 - on

LH C/W lts (16) - on

C/W LAMP TEST - 2 (hold)

M/A Pnl 1 - off

LH C/W lts (16) - out

M/A Pnl 3 - on

RH C/W lts (23) - on

C/W LAMP TEST - OFF (lts out)

C/W CSM - CM

CM RCS 1t (2) - on

M/A Tone & Lts (3) - on, RESET

M/A tone & lts (3) - off

C/W CSM - CSM

CM RCS lts (2)- OFF

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TELECOMM PROCEDURES

1 HI-GAIN ANTENNA OPERATION

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 PWR - POWER
Go to V64 START S-BAND ANTENNA procedures
Verify required coordinates within full coverage region

- *If required coordinates are in scan limit *
- *zone or skin reflection zone, one or more *
- *of the following may be done: *
- *a.Change CSM attitude to provide antenna *
- * coordinates in the full coverage region *
- *b.Allow up to 60 seconds for the expected *
- * CSM attitude variation to alleviate the *
- * condition *
- *c.In attitude hold condition, operate in *
- * wide beam mode *
- *d.Switch to narrow beam and acquire manually *

HI-GAIN ANT PITCH & YAW POS (2) - Set in required coordinates

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 required depending on range

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

CAUTION

~~HI-GAIN ANT TRACK - MAN or HI-GAIN ANT PWR - OFF~~
~~when omni antenna operation is selected to pre-~~
~~vent damage to the horn due to jitter.~~

When omni antenna operation is desired:

HI-GAIN ANT TRACK - MAN

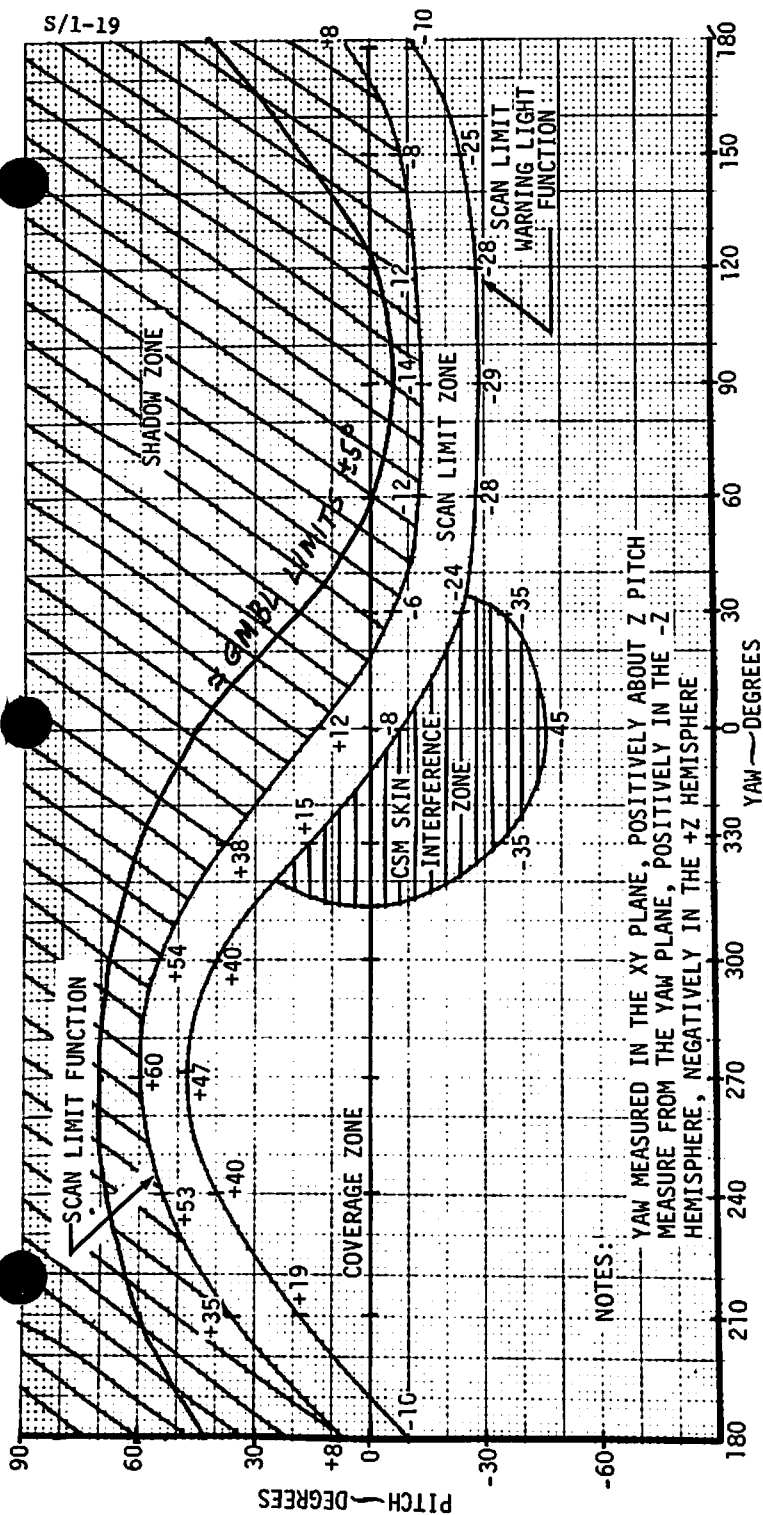
HI-GAIN ANT PITCH = -52°

HI-GAIN ANT YAW = 270°

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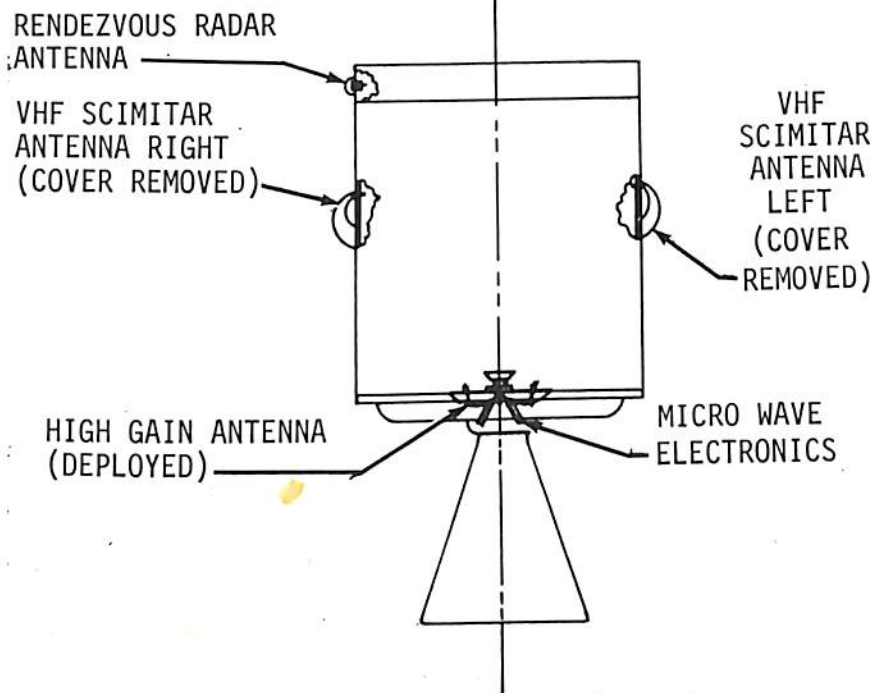
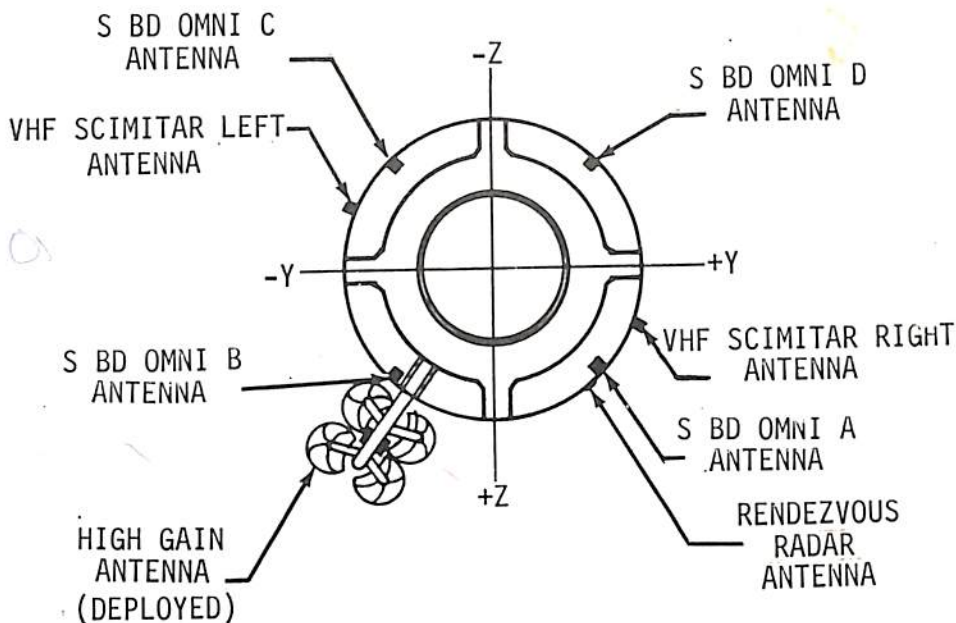
CSM 6



NOTES:

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

HIGH-GAIN ANTENNA SCAN AND WARNING LIMIT,
YAW-PITCH COORDINATES (CSM)



Basic Date April 18, 1969
Changed

2 TV CAMERA OPERATION (Black & White)

Unstow camera, optical sight, lens, lens attenuator,
and cables

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

S BD AUX TV - off (ctr)

Connect power and RF cables

Install proper lens

(telephoto out of focus at < 143 ft)

(wide angle out of focus at < 18 in)

Attach light attenuator to camera lens

Install optical ring sight in top or

side mount as desired

S BD AUX TV - TV

ALC (camera) - IN (normally)

OUT(when detail on dim objects

in presence of bright objects

is desired)

Power (camera) - ON

Adjust light attenuator as req'd

(lower numbers have less attenuation)

When TV operation is completed -

Power (camera) - OFF

S BD AUX TV - off (ctr)

Disassemble and stow equipment as desired

2A TV CAMERA OPERATION (COLOR)

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

TAPE RCDR FWD - off (ctr)

Verify tb - bp; if gray, notify MSFN to reset all
tape recorder RTC's

cb FM XMTR/GRP 1- open

Verify monitor power sw is in off position

Verify TV camera ALC sw - INSIDE

Set focus to 4ft, zoom control to 12.5, aperture
control to f/22

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

Basic Date April 18, 1969
Changed March 3, 1969

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:

cb FM XMTR/GRP 1 - closed

(xmsn will begin immediately)

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

Disassemble and stow TV camera, monitor, and
cables

3 VHF RANGING OPERATION

VHF AM A - off (ctr)

VHF AM B - DUPLEX

VHF RNG - on (up)

P20 operating

V87E, TRACKER lt - on

EMS FUNC - AV SET/VHF RNG

EMS MODE - BACKUP/VHF RNG

CAUTION

No VHF voice transmission for

~ 12 sec after VHF RNG - RESET

VHF RNG - RESET

EMS RANGE ind - 000 00

P20 operating, TRACKER lt - out

EMS RANGE ind - XXX XX

V83E (if desired)

R1 = RANGE

R2 = RANGE RATE

R3 = 0

V85E (if desired)

R1 = RANGE

R2 = RANGE RATE

R3 = ϕ

Basic Date April 18, 1963
Changed May 13, 1969

- 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 (rh) - B

- 5 COMM MODES
NORMAL LUNAR 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 - DN VOICE BU
S BD AUX TV - 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 - 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

Basic Date April 18, 1969
Changed

CSM 106

For the following mission phases select the Normal Lunar Configuration plus the specified deltas:

A. COAST AWAKE

S BD AUX TAPE - off (ctr)
TAPE RCDR FWD - off (ctr)

B. COAST ASLEEP

S BD SQUELCH - ENABLE
S BD AUX TAPE - off (ctr)

1. HI GAIN OPERATION: (NOMINAL > 120 KNM)

Y,P, = 270, +40 (ROLL RIGHT)

Y,P, = 90, -40 (ROLL LEFT)

HI GAIN ANT BEAM - NARROW

HI GAIN ANT TRACK - REACQ

S BD ANT - HI GAIN

2. OMNI OPERATIONS: (NOMINAL < 120 KNM)

S BD ANT - OMNI

S BD ANT OMNI - B

TAPE RCDR FWD - off (ctr)

C. LUNAR ORBIT AWAKE

USE NORMAL LUNAR CONFIGURATION

D. LUNAR ORBIT ASLEEP

S BD SQUELCH - ENABLE

HI GAIN ANT TRACK - REACQ

HI GAIN ANT BEAM - NARROW

HI GAIN ANT Y,P, = _____, _____

E. VHF RANGING, VOICE

VHF AM A - off (ctr) *verify*

VHF AM B - DUPLEX

VHF RNG - RNG

VHF RCV ONLY - B DATA (MINIMIZES CREW SWITCHING)

F. VHF LM-CSM VOICE DATA

VHF AM A - SIMPLEX *VHF ranging off*

VHF AM B - off (ctr)

VHF RCV ONLY - B DATA

G. CONTINGENCY EVA

VHF AM A - DUPLEX

Basic Date - April 18, 1969
Changed - _____

CSM

S
1-24 A

H. Relay Mode (LM Voice to MSFN)

Voice Relay (With VHF Ranging)

MODE - VOX (Pnl 10)
VOX SENS tw - 5
S BD - OFF
INTERCOM - OFF *VHF AM-T/R*
AUDIO CONT - BU
MODE - VOX (Pnl 9)
VOX SENS tw - as req
S BD MODE VOICE - RELAY
VHF AM B - DUPLEX
VHF RNG - on (up)

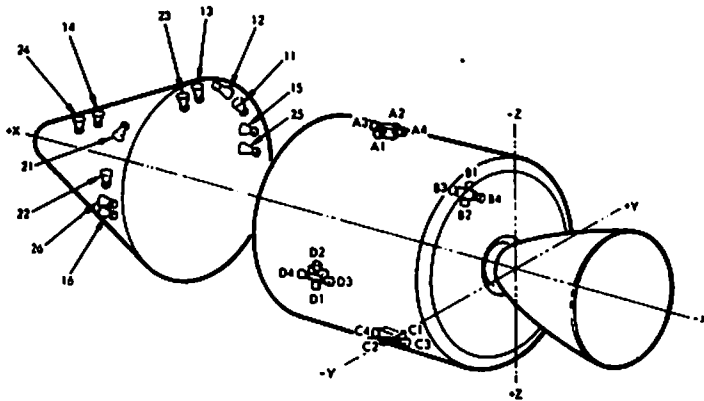
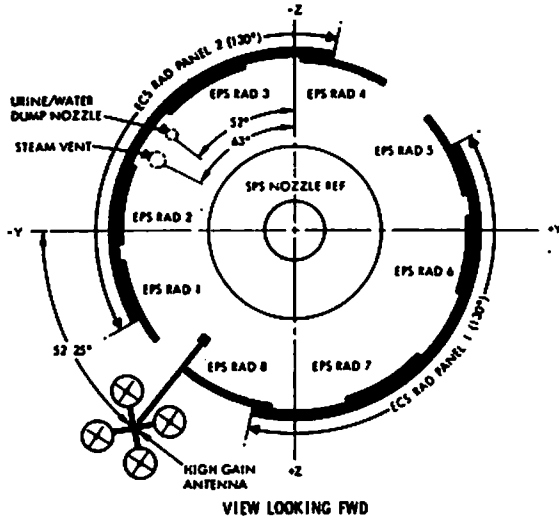
Voice Relay (With LM LBR PCM record)

MODE - VOX (Pnl 10)
VOX SENS tw - 5
S BD - OFF (Pnl 10)
INTERCOM - OFF *VHF AM-T/R*
AUDIO CONT - BU
MODE - VOX (Pnl 9)
VOX SENS tw - as req
S BD MODE VOICE - RELAY
VHF RCV ONLY - B DATA

Basic Date April 18, 1969
Changed May 3, 1969

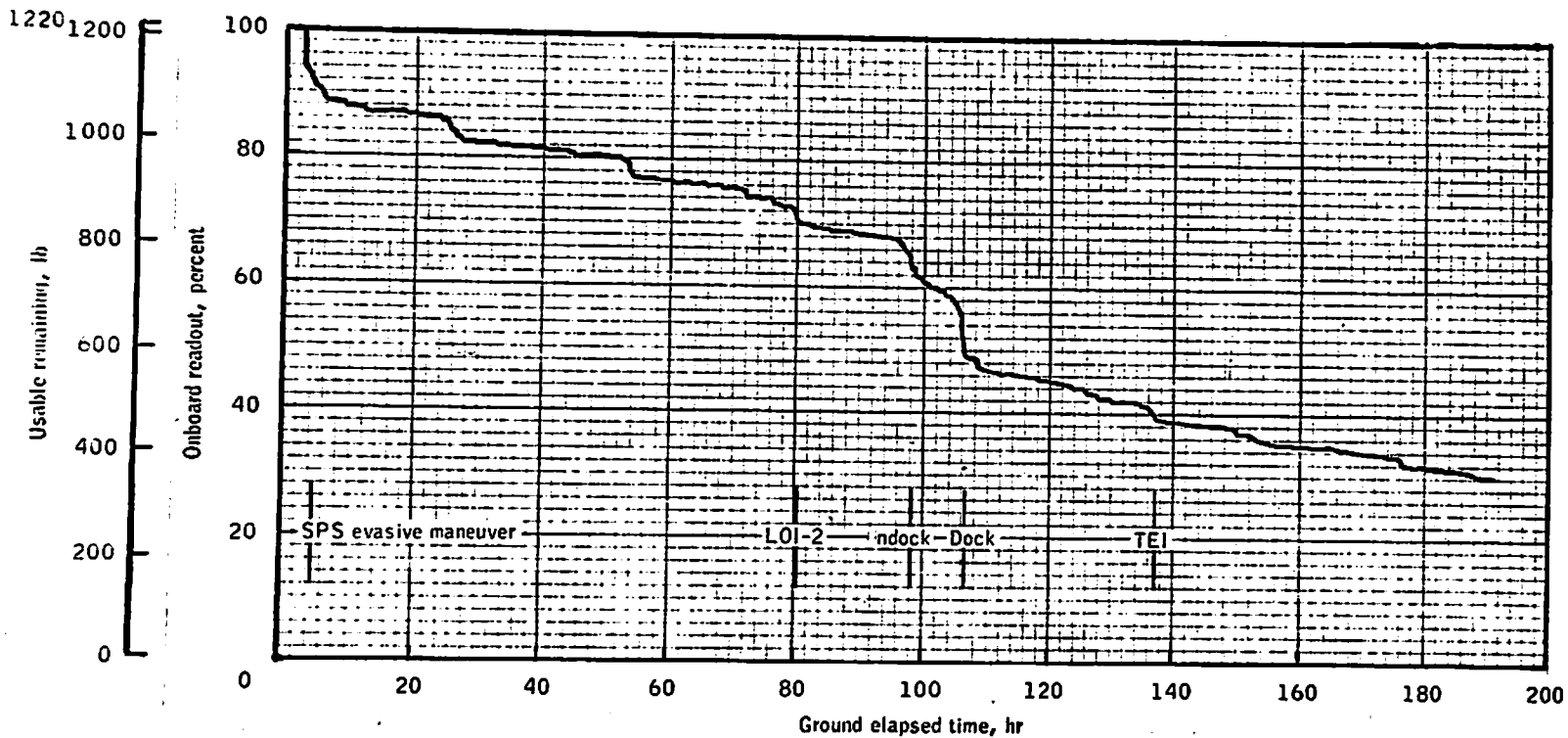
CSM 10

Basic Date April 18, 1969
Changed _____



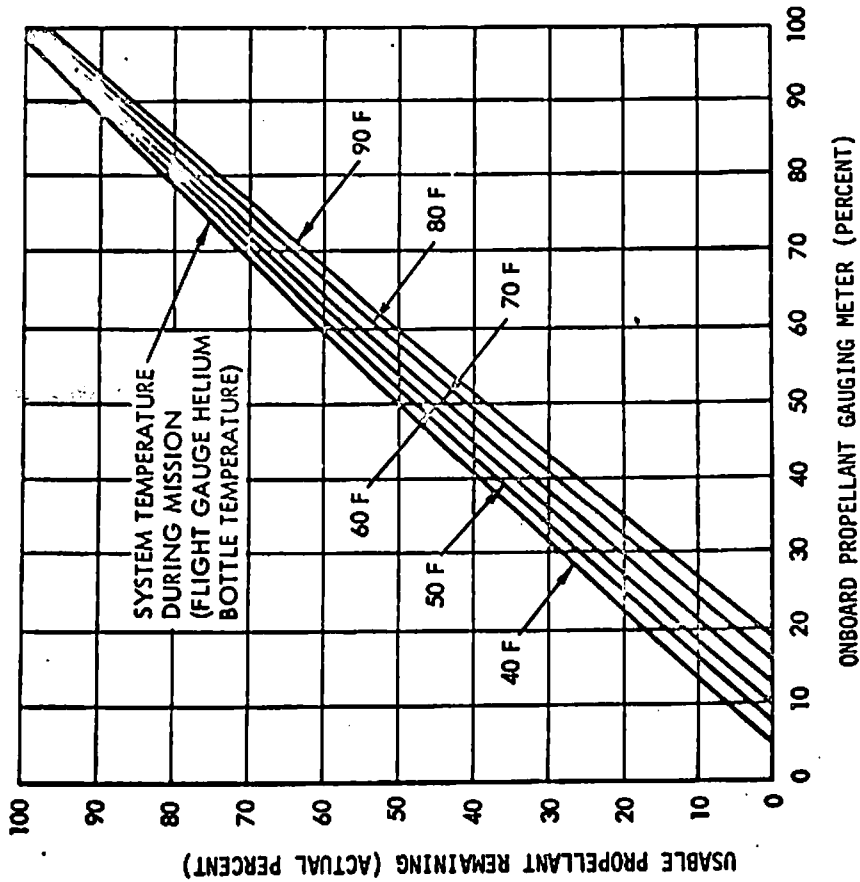
RCS Engine, Vent, and Radiator Location

Systems Test Meter Display	NOM VALUES 53 62 61 N ₂ , O ₂ , H ₂ Pressure (PSIA)	EPS Radiator Outlet Temperature (°F)	CM-RCS Oxidizer Valve Temperature (°F)	LM Power (Amps)	SPS Temperature (°F)	Battery Manifold Pressure (PSIA)	Battery Relay Bus (VDC)
0.0	0	-50	-50	0	0	0.00	0
0.2	3	-36	-46	0.4	8	0.72	1.8
0.4	6	-22	-42	0.8	16	1.44	3.6
0.6	9	-8	-38	1.2	24	2.16	5.4
0.8	12	+6	-34	1.6	32	2.88	7.2
1.0	15	+20	-30	2.0	40	3.60	9.0
1.2	18	+34	-26	2.4	48	4.32	10.8
1.4	21	+48	-22	2.8	56	5.04	12.6
1.6	24	+62	-18	3.2	64	5.76	14.4
1.8	27	+76	-14	3.6	72	6.48	16.2
2.0	30	+90	-10	4.0	80	7.20	18.0
2.2	33	+104	-6	4.4	88	7.92	19.8
2.4	36	+118	-4	4.8	96	8.64	21.6
2.6	39	+132	0	5.2	104	9.36	23.4
2.8	42	+146	+4	5.6	112	10.08	25.2
3.0	45	+160	+10	6.0	120	10.80	27.0
3.2	48	+174	+14	6.4	128	11.52	28.8
3.4	51	+188	+18	6.8	136	12.24	30.6
3.6	54	+202	+22	7.2	144	12.96	32.4
3.8	57	+216	+26	7.6	152	13.68	34.2
4.0	60	+230	+30	8.0	160	14.40	36.0
4.2	63	+244	+34	8.4	168	15.12	37.8
4.4	66	+258	+38	8.8	176	15.84	39.6
4.6	69	+272	+42	9.2	184	16.56	41.4
4.8	72	+286	+46	9.6	192	17.28	43.2
5.0	75	+300	+50	10.0	200	18.00	45.0



SM RCS propellant profile (Total).

SERVICE MODULE
RCS QUANTITY
CORRECTION NOMOGRAPH



April 14, 1969

28.14

100

80

60

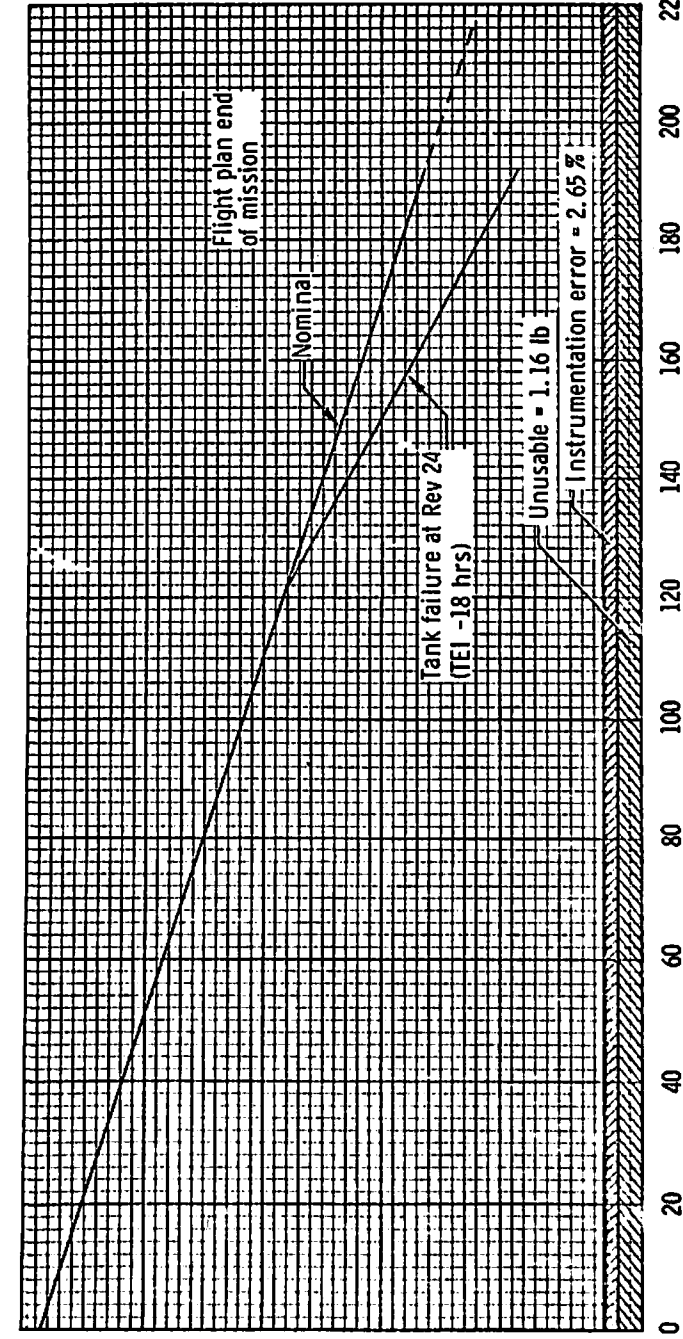
40

20

0

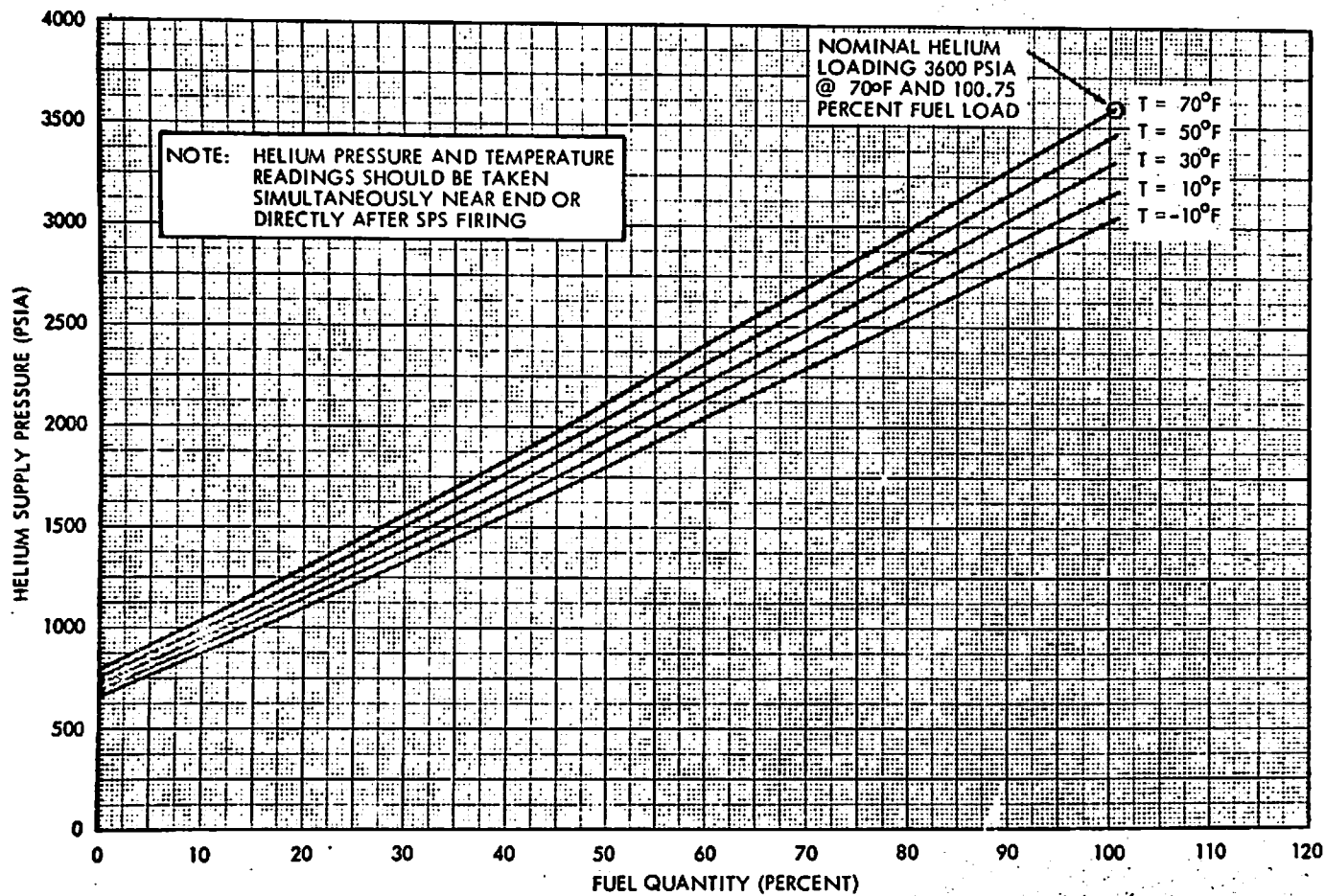
Usable hydrogen remaining, lb

Onboard readout, percent



Crew chart 24.- Hydrogen remaining in one tank.

SPS PRPLNT NOMOGRAPH



FLIGHT EMERGENCY PROCEDURES

FIRE/SMOKE IN CM (CREW SUITED)
WARNING: CM water must not be used to extinguish fire

- 1 CAB FAN (2) - OFF (verify)
- 2 Monitor EPS for excessive current and remove power from affected bus
- 3 Verify suit compressor on good AC bus
- 4 Use fire extinguisher as appropriate

FIRE IS OUT

- 5 Remove smoke from cabin per "Contamination in CM" procedures before removing helmets

FIRE PERSISTS - DUMP CABIN

- 6 Verify:
 SUIT CKT RET vlv - CLOSE (push)
 EMER CAB PRESS vlv - OFF
 PLSS 02 vlv - OFF
- 7 Visually check suit integrity
- 8 CAB PRESS REL (RH) - DUMP to 3.0 psia
 then to BOOST ENTRY
 REMARK: Provides controlled cabin
 dump until suit circuit
 pressure is verified
- 9 Verify Suit pressure >3.5 psia
- 10 CAB PRESS REL (RH) - DUMP
 and/or CAB PRESS DUMP vlv - OPEN
- 11 CAB PRESS ind 0.0 psia for 6 min

Basic Date April 18, 1969
Changed

CSM 106

FLIGHT EMERGENCY

- 12 CAB PRESS REL (RH) - NORMAL
- 13 CAB PRESS DUMP vlv - CLOSE
- 14 Do not repress cabin until fire source is removed

FIRE/SMOKE IN CM (CREW UNSUITED)

WARNING: CM water must not be used to extinguish fire

- 1 CAB FAN (2) - OFF (verify)
- 2 SUIT COMPR (2) - OFF
- 3 Monitor EPS for excessive current and remove power from affected bus
- 4 Don emergency O2 masks
- 5 Use fire extinguishers as appropriate

FIRE IS OUT

- 6 Remove smoke from cabin per "Contamination in CM" procedure before removing O2 masks

FIRE PERSISTS - DON SUITS and DUMP CABIN

- 7 Don PGA's except helmets and verify O2 connectors (Use O2 masks as long as possible)
- 8 DIRECT O2 vlv - OPEN
REMARK: Purges suit circuit of smoke and fumes
- 9 Don helmet
- 10 SUIT FLOW vlv (3) - SUIT FULL FLOW
- 11 SUIT COMPR 1 (2) - AC1 (AC2)
- 12 DIRECT O2 vlv - CLOSE

- 13 EMER CAB PRESS vlv - OFF
- 14 Visually check suit integrity
- 15 CAB PRESS REL (RH) - DUMP to 3.0 psia
then to BOOST/ENTRY
- 16 Verify Suit pressure holding >3.5 psia
- 17 CAB PRESS REL (RH) - DUMP
and/or CAB PRESS DUMP vlv - OPEN
- 18 CAB PRESS ind 0.0 psia for 6 min.
- 19 CAB PRESS REL (RH) - NORMAL
- 20 CAB PRESS DUMP vlv - CLOSE
- 21 Do not repress cabin until fire source
is removed

Contamination in CM

- 1 Don O2 masks and/or PGA's immediately
2. Evaluate contamination level (isolate
& correct source of contamination if
possible) and proceed with one of the
following steps:
 - a. Retain O2 masks or remain in suit
and accept contamination level in
cabin.

CAUTION

If in PGA's, adjust DIRECT O2
to maintain suit to cabin ΔP
>+2 in. H2O

Basic Date April 18, 1969

Changed

CSM 106

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

CAUTION

Change LiOH cartridges after scrub completed.

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

Contamination In Suit

- 1 SUIT COMPR 2 - AC1
2 SUIT COMPR 1 - OFF
3 DIRECT O2 vlv - OPEN for
1 minute then CLOSE

If condition persists:

- 4 SUIT COMPR 2 - OFF
5 DIRECT O2 vlv - CLOSE
6 Doff helmet
7 Don emergency O2 masks

Basic Date April 18, 1969
Changed

C&W/MALFUNCTION INDICATORS

Basic Date April 18, 1969
Changed 3, 1969

CSM 106

CMC	SC CONT - SCS, If out in 5 sec V11 N10E 33E:R1:A: if RIA≠0,1,4,5: C/W fail (if LEB,CMC, no TVC)	G&N 5
ISS	SC CONT - SCS, G&N PWR - AC1 Both Lamps on: G&N PWR - OFF,check V5N9 One lamp: V35 for lamp test	G&N 6
TEMP	RSET, If V11 N10E, 30E, R1A=0,1,2,3: Temp in limits If not, 15 min available.	G&N 7
TRACKER	RSET: OFF, Continue; Both ON: V11 N10E 30E, RIC≠2,6 Output channel failed	G&N 10
SPS PRESS	FUEL/OX ΔP < 20: P>200 He vlv - OFF; <157: ON > 20: ΔV THRUST - OFF	SPS 1
SPS FLANGE TEMP HI	Non Burn: heat soak back Non Burn: heat soak back	SPS 5
SM RCS	He 1 & 2 - CLOSE; PKG TEMP <70°: QUAD AUTO RCS - OFF RCS HTRS - SEC >205°: HTRS - OFF	RCS 1
CM RCS	MANF PRESS <260, He PRESS Low: CM RCS PRPLNT - OFF	RCS 3
CRYO PRESS	Any Lo: FANS and HTRS - ON Both Hi: FANS and HTRS - OFF: Any Hi: Inst fail	EPS CRYO 1

FC 1

Skin Temp >450°: HTRS Off, Check VI Perf EPS
<360°: Check VI Perf FC
Con Ex Temp >200°: Open CKT, Check 1a
RAD OUT TEMPS (3B, 3C, 3D) 1b
<150°: Check cb FC PUMPS AC EPS
Check T skin Hi (450°) 1c
Rad Temp Lo: Check TCE, RAD OUT TEMPS 1d
Ph Hi-bp: If current <5 amps, shutdown: 1e
PUMPS - OFF 1f
POTABLE TANK INLET vlv - CLOSE

FC O2 (H2) O2 < (8)(H2): Cycle Purge EPS
FLOW HI .8(.1) O2 > (8)(H2): Check amps vs. flow FC 1g

FC O2 (H2) O2 < (8)(H2): Check REG PRESS: 10(2C) EPS
FLOW LOW (2 > (8)(H2): Check VI perf FC2

AC BUS 1 RSET: < 98: Replace Inv. EPS-PD
>128: Replace Inv. 1d
NORM: EPS Sensor Unit Out, 1e
RESET-OFF 1b

AC BUS + MAIN BUS
UNDERVOLT DC Volts <26, AMPS Hi: EPS
Replace Inv. 3

BUS B + BUS A
UNDER UNDER + FC 3 + FC 2

Remove FC2 from MNB, Tie (With FC
1) MNA, Check Volts, Go to EPS-PD1

AC BUS + AC BUS + MAIN BUS
OVERLOAD UNDERVOLT

Replace INV
If still OVERLOAD -
Disconnect 2nd INV

MAIN BUS
UNDER Volts <26, AMPS Hi: Replace Inv.

Basic Date April 18, 1969
Changed May 3, 1969

INV TEMP HI	Gly Out Temp >51: SEC EVAP - ON,	ECS-16
	Gly Out Temp <51: AC volts, Replace	EPS-PD
	INV	2

FC BUS	1 or 3: Connect 1 to B, 3 to A
DISCONNECT	2 : Attempt Reconnect

O2 FLOW HI	Indicator, Cabin Press, Surge OK: Waste Mgt Valve Cabin Press Rel; DIRECT O2; Demand Reg; REPRESS O2; Emerg. Reg; H2O/Gly Tank Reg. LM PRESS vlv
------------	---

SUIT COMPRESSOR	$\Delta P < .22$, other comp to other bus	ECS 9
--------------------	--	----------

CO2 PP HI	>7.6mm: Direct O2 10 sec, O2 Mask	ECS 12
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GLYCOL TEMP LOW	Prim Rad Out T <-30: ECS RAD HTR - PRIM 2	ECS 14
	Still <30: RAD FLOW CONT - 2	

GLY EVAP TEMP HI	>60° Actuate Secondary Loop
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Basic Date April 18, 1969
Changed March 3, 1969

EMERGENCY POWERDOWN

(MN BUS Voltage <26.0, no short verified, Powerdown
until MN BUS > 26.5 vdc)

SPS BURN

AMPS

O2 HTRS (2) - off (ctr)	11.05
BAT C on MNA&B	
cb MNA BAT C - close	
cb MNB BAT C - close	
ECS RAD HTRS (2) - OFF	17.2 per HTR
If unsuited	
SUIT COMPR (2) - OFF	8.44
S BD PWR AMP - off (ctr)	4.35
FC PUMPS (3) - OFF	9.43
SM RCS HTRS (4) - OFF	2.90 per quad
POT H2O HTR - OFF	1.62
H2 HTRS (2) - off (ctr)	1.43
H2 FANS (2) - off (ctr)	0.72
O2 FANS (2) - off (ctr)	5.4
SPS LINE HTRS - off (ctr)	1.025 A
	2.05 A/B
LIGHTS (min req'd)	
TAPE RCDR FWD - off (ctr)	1.69
SPS GAUGING - OFF	2.96
ECS GLY PUMPS (2) - OFF	2.76 per pump
cb ECS RAD CONT/HTR (2) - open	2.69
SCE PWR - off (ctr)	0.65
TELECOM GRP 1&2 - OFF	3.71 3.71
cb INSTR ESS (2) - open	4.80

April 18, 1969

Basic Date _____
Changed _____
Me B, 1969

BUS LOSS RECONFIGURATION

- A Loss of MN BUS A
 FC 2 - MNB only
 FC 1 - MNB (if req'd)
 INV 3 - MNB, AC1
 cb MNA BAT BUS A - open
 cb MNB BAT C - closed
 SUIT H2O ACCUM AUTO - 2
 BMAG MODE (3) - RATE 2
 FDAI SEL - 2
 URINE DUMP - HTR B
 WASTE H2O DUMP - HTR B
 RHC PWR DIR 2 - MNB
 AUTO RCS SEL (16) - MNB
 RAD PRIM HTR - 1
 SPS LINE HTR - A/B (as req'd)
 RAD FLOW CONT PWR - MAN SEL
 SCS TVC (P&Y) - RATE CMD
- B Loss of MN BUS B
 FC 2 - MNA only
 FC 3 - MNA (if req'd)
 INV 3 - MNA, AC2
 cb MNB BAT BUS B - open
 cb MNA BAT C - closed
 BMAG MODE (3) - RATE 1
 RHC PWR DIR 1 - MNA
 AUTO RCS SEL (16) - MNA
 SCS ELEC PWR - ECA
 RAD PRIM HTR - 2
 RAD FLOW CONT AUTO - 1
- C Loss of BAT BUS A
 RAD PRIM HTR - 2
 If MN BUS TIE A/C is closed
 cb MNA BAT BUS A - open
 cb MNA BAT C - open
 If MN BUS TIE A/C is open
 cb MNB BAT BUS B - open
 cb MNA BAT C - open
 MN BUS TIE BAT B/C - on (up)

Basic Date April 18, 1969
 Changed May 3, 1969

- D Loss of BAT BUS B
RAD PRIM HTR - 1
If MN BUS TIE B/C is closed
 cb MNB BAT BUS B - open
 cb MNB BAT C - open
If MN BUS TIE B/C is open
 cb MNA BAT BUS A - open
 cb MNB BAT C - open
 MN BUS TIE BAT A/C - on (up)
- E Loss of AC BUS 1
AC INV 1 MNA - OFF
SUIT COMPR 2 - AC2
FDAI SEL - 2
BMAG MODE (3) - RATE 2
TELECOM GRP 1 - AC2
FC PUMP 1 - AC2
ECS GLY PUMP 2 - AC2
BMAG 1 PWR - OFF
G/N PWR - AC2
SIG CONT/BIAS PWR 1 - AC2
Maintain GLY EVAP TEMP INLET temp above 40°F
ECS RAD FLOW CONT - 2
BAT CHGR - AC2
- F Loss of AC BUS 2
AC INV 2 MNB - OFF
SCS ELEC PWR - ECA
TELECOM GRP 2 - AC1
FC PUMP 2&3 - AC1
BMAG 2 PWR - OFF
FDAI SEL - 1
SIG COND/BIAS PWR 2 - AC1
BMAG MODE (3) - RATE 1
Activate SEC COOL LOOP
Shut down PRIM EVAP

Basic Date April 18, 1969
Changed May 3, 1969

PRE/POST SPS BURN

A. Loss of MN BUS A

Pre SPS Burn

Verify reconfiguration per mission phase
Perform G&N SPS maneuver with
following deviations:

- cb MNB BAT C - close
- TVC GMBL DR (P&Y) - 2
- cb SPS Pl&2, Yl&2 (4) - open
(after GMBL MTR turn on)
- SCS TVC (P&Y) - RATE CMD

Post SPS Burn

- cb SPS Pl&2, Yl&2 - close
(prior to GMBL MTR turn off)

B. Loss of MN BUS B

Pre SPS Burn

Verify reconfiguration per mission phase
Perform G&N SPS maneuver with
following deviations:

- cb MNA BAT C - close
- TVC GMBL DR (P&Y) - 1
- cb SPS Pl&2, Yl&2 - open
(after GMBL MTR turn on)

Post SPS Burn

- cb SPS Pl&2, Yl&2 - closed
(prior to GMBL MTR turn off)

C. Loss of BAT BUS A

Pre SPS Burn

- cb MNA BAT BUS A - open (verify)
- cb MNB BAT BUS B - closed (verify)
- cb MNA BAT C - closed

NOTE

If BUS TIE B/C is already closed,
BAT C should be brought on line
when ready to tie bats to mains.

TVC GMBL DR (P&Y) - 2

After GMBL start,

- cb SPS Pl&2, Yl&2 - open

Basic Date April 18, 1969
Changed May 3, 1969

CSM 106

Post SPS burn

cb SPS P1&2, Y1&2 - closed
(prior to GMBL MTR turn off)

D. Loss of BAT BUS B

Pre SPS Burn

cb MNB BAT BUS B - open (verify)
cb MNA BAT BUS A - closed (verify)
cb MNB BAT C - closed

NOTE

If BUS TIE A/C is already closed,
BAT C should be brought on line
when ready to tie bats to mains.

TVC GMBL DR (P&Y) - 1
After GMBL start,
cb SPS P1&2, Y1&2 - open

Post SPS Burn

cb SPS P1&2, Y1&2 - closed
(prior to GMBL MTR turn off)

E. Loss of AC BUS 1

AC INV 1 MNA - OFF
S BD NORM PWR AMP - SEC
S BD NORM XPNDR - SEC
FC PUMP 1 - AC2
G/N PWR - AC2
ECS GLY PUMP 2 - AC2
BMAG 1 PWR - OFF
SIG COND/BIAS PWR 1 - AC2
FDAI SEL - 2
SCS TVC (2) - RATE CMD
BMAG MODE (3) - RATE 2
TVC SERVO PWR 1 - AC2/MNB
SPS GAUGING - AC2

Basic Date April 18, 1969
Changed May 3, 1969

F. Loss of AC BUS 2

AC INV 2 MNB - OFF

S BD NORM XPNDR - PRI

Note: If post TLI, TELECOM GRP 2 - AC1

FC PUMP 2&3 - AC1

BMAG 2 PWR - OFF

FDAI SEL - 1

SCS ELEC PWR - ECA

SCS TVC (P&Y) - RATE CMD

BMAG MODE - RATE 1

TVC SERVO PWR 2 - AC1/MNA

DURING CRITICAL SPS BURNS

Loss of MNA

FC 2 - MNB only

TVC GMBL DR (P&Y) - 2

cb SPS P2,Y2 - open

AC BUS 1 INV 1 - OFF

AC BUS 1 INV 2 - on (up)

SCS TVC (P&Y) - RATE CMD

FDAI SEL - 2

AV THRUST B - NORM

Loss of MNB

FC 2 - MNA only

cb SPS P1,Y1 - open

TVC GMBL DR (P&Y) - 1

AC BUS 2 INV 1 - on (up)

Loss of AC BUS 1

TVC SERVO PWR 1 - AC2/MNB

BMAG MODE (3) - RATE 2

FDAI SEL - 2

SUIT COMPR 2 - AC2

Loss of AC BUS 2

TVC SERVO PWR 2 - AC1/MNA

BMAG MODE (3) - RATE 1

SCS TVC (2) - AUTO

ΔV CG - LM/CSM

Control MTVC with Trim tw's

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Loss of BAT BUS A
cb MNA BAT C - closed

Loss of BAT BUS B
cb MNB BAT C - closed

LOSS OF TWO FUEL CELLS

1. Power down the following:

Panel 2

O2 & H2 FANS & HTRS - OFF
C/W NORM - ACK
POT H2O HTR - OFF
GLY EVAP STM AUTO - MAN
GLY EVAP H2O FLOW - off (ctr)
GLY EVAP IN TEMP - MAN
ECS RAD HTRS (2) - OFF
Power down IMU and CMC to STBY per checklist

Panel 3

SPS LINE HTR - off (ctr)
TAPE RCDR FWD - off (ctr)
S BD NORM PWR AMP - off (ctr)
Select single inverter operation
Configure remaining fuel cell to both main busses

Panel 5

cb ECS RAD HTR OVLD (2) - open
Failed FC PUMPS (2) - OFF

Panel 7

SCS LOGIC PWR 2/3 - OFF
BMAG PWR (2) - OFF (place to WARMUP
40 min prior to an IMU/GDC align)
FDAI/GPI - OFF

Panel 8

AUTO RCS SEL (16) - OFF
cb SCS LOGIC (4) - open

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2. IGN - 2 hrs
- a. Power up CMC, IMU, and OPTICS per checklist and perform IMU align (crew option)
 - b. After IMU align OPT PWR - OFF
 - c. If main bus voltage 26.0 vdc with CMC, IMU, and OPTICS up perform the following:
 - 1) If sufficient battery energy is available, place battery with highest energy on both main busses.
 - 2) If insufficient battery energy available perform:
 - SM RCS HTR - OFF
 - ECS GLY PUMP - OFF (to be turned back on within 1 1/2 hrs)
 - SUIT COMPR - OFF (to be turned back on within 1 hr)
 - cb INSTR ESS (2) - open (to be closed when the batts are on line) (crew option)
 - Lights - as req'd
3. IGN - 1 hr
- BMAG PWR (2) - WARMUP for 40 min before IMU/GDC align.
 - After warmup, power up SCS per checklist
- Arm logic
Arm pyros
Press CM RCS
Safe pyros
Safe logic
4. Batts on at normal time prior to SPS deorbit and proceed with normal entry

Basic Date April 18, 1969
Changed 10-3, 1969

CSM 106

NON-DIODED/NON-SWITCHABLE LOADS

MAIN A

O2 & H2 TK 1 HTRS
PP C02 (TLM & Onboard)
PRIM 2 RAD HTR
RAD SEC HTR
RAD MAN SEL
RAD FLOW CONT No. 1 & AUTO SEL capability
RAD SEC TEMP Inlet & Outlet (SF0262T & SF0263T)
AUTO & semi-auto operation of No. 1 H2O ACCUM
 sw if H2O ACCUM (Pnl 382) is in the RMTE position
INV 1
16mm SEQ Camera
Quads B, D; CM1, HTRS & Isol vlvs
ΔV THRUST A
PRI GMBL MTRS P,Y
L COAS
Flashing RNDZ Lts
FDAI 1
GDC
BMAG 1 (immediately)
RHC PWR DIR 1
DIRECT ULLAGE PB (C3 & A4)

MAIN B

O2 & H2 TK HTRS
PRIM 1 RAD HTR
PRIM RAD INLET TEMP
RAD FLOW CONT No. 2
H2O ACCUM 2
INV 2
Quads A,C; CM2, HTRS & Isol vlvs
ΔV THRUST B
SEC GMBL MTRS P,Y
FDAI 2
GDC (All modes)
BMAG 2
RHC PWR DIR 2
DIRECT ULLAGE PB (D3 & B4)
ORDEAL

Basic Date Apr 18, 1969
Changed May 3, 1969

BAT BUS A

SECS & ELS System A
UPRIGHTING SYS COMPR 1
UPRIGHTING FLOAT BAG 1
EDS Voting Logic 1
GMBL MTR Control (On-Off) P1 & Y1
MN BUS TIE A/C

BAT BUS B

SECS & ELS System B
UPRIGHTING SYS COMPR 2
UPRIGHTING FLOAT BAG 2
EDS Voting Logic 3
GMBL MTR Control (On-Off) P2 & Y2
MN BUS TIE B/C

AC BUS 1

O2 & H2 TK 1 FAN, Qty & Temp
CAB FAN 1
RAD FLOW CONT No. 1
Man control of GLY EVAP STM PRESS (ϕ C) (Pri Sys)
Elect control of SUIT HT EXCH PRI GLY CONT vlv (ϕ B)
Auto control of PRI GLY EVAP TEMP IN vlv (ϕ A)
EMS Δ V
FDAI 1
GPI (primary)
GDC
SCS MIN IMP & RATE CMD
BMAG 1
RHC 1 for MTVC (ϕ A only)

AC BUS 2

O2 & H2 TK 2 FAN, Qty & Temp
PRI EVAP TEMP Cont Unit (ϕ A)
CABIN TEMP AUTO Control unit (ϕ C)
CAB FAN 2
FDAI 2
RSI
BMAG 2
GDC
RATE CMD
MTVC
GPI (secondary)
ORDEAL

Basic Date April 18, 1969
Changed May 3, 1969