NATIONAL AERONAUTICS AND SPACE ADMI

APOLLO 14
CSM 110

CSM SYSTEM CHECKLIST

PREPARED BY

GUIDANCE & CONTROL SECTIO

SPACECRAFT SYSTEMS BRANCI

FLIGHT CREW SUPPORT DIVISIO

MANNED SPACECRAF

HOUSTON, TEXAS

CHANGE'D 1/14/71

~~JUNE 24, 19~~

CHANGE C
12/17/70

~~SEPT 24~~
1970

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CSM Systems Checklist
Change D - 1/14/71

The enclosed is a change to the CSM Systems Checklist. Please use the LOEP (pg i) as a guide in updating this document.

This page may be destroyed.

NOTE: Changes will be identified by date.

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ACKNOWLEDGMENT

AREA	NAME/BRANCH	LOCATION
LM Interface (S/2-1 thru S/2-12)	Jasper C. Smith, Jr. EVA CF5	ext 6226 Bldg 4, rm 236
Stowage (S/4-1 thru S/4-4)	Renato D. Dell'Osso Crew Station CF3	ext 3026 Bldg 4, rm 243

It is requested that any organization having specific comments in his (their) area of responsibility contact the individual(s) listed above.

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APOLLO 14

CSM SYSTEMS CHECKLIST

CHANGE D

JANUARY 14, 1971

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It is requested that any organization having comments, questions, or suggestions concerning this document contact J. W. Samouce, CF22, Building 4, room 253, telephone 483-4371.

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes should be submitted to the Apollo Flight Data File Manager, T. W. Holloway, CF62, Building 4, room 230, telephone 483-4271.

Distribution of this document is controlled by J. W. O'Neill, Chief, Flight Planning Branch, Flight Crew Support Division.

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APOLLO FLIGHT DATA FILE

CSM SYSTEMS CHECKLIST

LIST OF EFFECTIVE PAGES

BASIC DATE 6/24/70
CHANGE A 8/3/70
REVISION 9/24/70
CHANGE B 11/13/70
CHANGE C 12/17/70
PEN & INK 1/11/71 (P&I)
CHANGE D 1/14/71

* INDICATES CURRENT CHANGE
PEN & INK 1/21/71 PEN & INK 1/27/71

PAGE NUMBER	CHANGE DATE
i and ii	12/17/70
iii	BASIC
iv and v	9/24/70
S/1-1	BASIC
S/1-2	1/11/71 (P&I)
S/1-3	11/13/70
S/1-4	9/24/70
S/1-5 and S/1-6	BASIC
S/1-7 and S/1-8	11/13/70
S/1-9 and S/1-10	9/24/70
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S/1-12	12/17/70
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*S/1-14	1/14/71
S/1-15 thru S/1-18	BASIC
S/1-19	11/13/70
S/1-20 thru S/1-25	BASIC
S/1-26	9/24/70
S/1-27	BASIC
S/1-28	11/13/70
S/1-29 and S/1-30	BASIC

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S/2-1	11/13/70
S/2-2	12/17/70
S/2-3 and S/2-4	1/11/71 (P&I)
S/2-5 thru S/2-7	BASIC
S/2-8	1/11/71 (P&I)
S/2-9	BASIC
S/2-10	1/11/71 (P&I)
S/2-11 and S/2-12	BASIC
S/3-1 and S/3-2	BASIC
S/4-1 and S/4-2	~~12/17/70~~ 1/27/71
S/4-3 ~~and S/4-4~~	1/11/71 (P&I) S/4-4 ---- 1/27/71
EMER/1-1 and EMER/1-2	BASIC
EMER/1-3	1/11/71 (P&I)
EMER/1-4	BASIC
EMER 1-5	1/11/71 (P&I)
EMER/1-6	12/17/70
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EMER/1-9 thru EMER/1-13	BASIC
EMER/1-14 and EMER/1-15	12/17/70
EMER/1-16	11/13/70
EMER/1-17 and EMER/1-18	12/17/70

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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 - 115°-175°F (C/W 75°-205°)
He PRESS - record
MANF PRESS - 178-192 psia (C/W 145-215 psia)
He TK TEMP - record
PRPLNT QTY - record
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
MANF PRESS - 80-105 psia

EPS SYSTEM

1 Cryogenic Pressure - Quantity Check
H2 PRESS (2) - 225-260 psia
O2 PRESS (3) - 865-935 psia
SURGE TK PRESS - 865-935 psia
H2 QTY (2) - record
O2 QTY (3) - record
CRYO FANS - OFF; ON as req'd

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-~~450°F~~ - 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 & 2 gray, 3 bp
FC MNB tb - 1 bp, 2 bp, & 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
If LM PWR - CSM
SYS TEST (2) - 4D (LM PWR - 0.5-3.2 vdc)

4 A-C VOLTS - 113 to 117 all phases

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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 - 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

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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

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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8 FUEL CELL SHUTDOWN (APPLICABLE FC)
- FC REAC - OFF
- FC HTRS - OFF
- FC PUMPS - OFF
- cb FC PUMPS AC - open
- AT Tskin <200° F
  - H2 PURGE LINE HTR - ON (for 20 min)
  - FC PURGE - O2 (TIL O2 PRESS = N2 PRESS)
  - FC PURGE - H2 (TIL PRESS STABILIZES)
  - FC PURGE - OFF
  - H2 PURGE LINE HTR - OFF
  - cb FC RAD/REACS - open

9 FUEL CELL SWITCHING
- PRIOR TO DISCONNECTING, INSURE THAT AT LEAST ONE FUEL CELL IS POWERING EACH MAIN BUS
- Possible MA & FC DISCONNECT lt

Changed 9/24/70

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 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 lt on, do not turn off fan until lt extinguishes

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1-5

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 - 38-50.5°F
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 CO2 < 7.6 mm Hg
SUIT COMP ΔP - 0.3-0.4 psid
PRIM GLY ACCUM QTY 30-65%
*If <30% - PRIM ACCUM FILL vlv - *
* ON (Until 40-55%) *
POT H2O QTY - 10-100%
WASTE H2O QTY - 25-85%
If >85% - Dump

2 ECS PERIODIC REDUNDANT COMPONENT CK

Suit Compressor
Sw to other compr
SUIT COMPR ΔP ind - 0.3-0.4 psid
Main O2 Regulators
MAIN REG B vlv - close
EMER CABIN PRESS sel - 1
PUSH TO TEST PB - PUSH (O2 FLOW INC)
MAIN REG B vlv - open
MAIN REG A vlv - close
EMER CABIN PRESS sel - 2
PUSH TO TEST PB - PUSH (O2 FLOW INC)
MAIN REG A vlv - open
EMER CABIN PRESS sel - BOTH (OFF if all suited)

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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 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

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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
SURGE TANK PRESS ≥500 psia
CAB REPRESS vlv - OFF
REPRESS O2 vlv - CLOSE
REPRESS PKG vlv - FILL
SURGE TANK PRESS - 865-935 psia
O2 PRESS IND - 1/2
REPRESS PKG vlv - OFF

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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)

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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 - CLOSED (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

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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 DRAIN vlv - DUMP
- Disconnect urine transfer hose from PGA
- Replace cap on PGA thigh QD
- Remove T-Adapter QD from Urine Hose
- Purge dump line 1 minute (min)
- Replace T-Adapter QD
- 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 UTS vlv - CLOSED
- Connect UT hose/filter to urine/feces QD
- Attach UTS to hose
- WASTE MGT OVBD DRAIN vlv - DUMP
- When UTS Bag Empty
  - UTS vlv - OPEN
- Purge lines 1 minute (min)
- 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 MGMT DRAIN vlv - DUMP

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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
Replace receptacle cover after liquid has cleared from URA
URA vlv - CLOSE
Stow Urine Receptacle/Plenum Assy for next use with urine transfer hose connected and WASTE MGMT DRAIN vlv - DUMP

For stowage prior to entry:
WASTE MGMT DRAIN vlv - OFF
Remove and stow URA, urine transfer hose, and urine filter

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10 CABIN PRESSURIZATION

A NORMAL 30 min
CAB PRESS REL vlv (2) - NORMAL (latch on)
REPRESS PKG vlv - FILL
O2 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

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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

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WHEN CAB PRESS ≥4.7
O2 PRESS ind - 1/2
CAB REPRESS vlv - OFF

11 SUIT CKT 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 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
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
O2 FLOW HI lt - out
Allow O2 flow to stabilize 15 sec
O2 flow will remain below 0.8 lb/hr 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)

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12 PGA INTEGRITY CHECK
DIRECT O2 vlv - CLOSE
SUIT PRESS - 4.7-5.3 psia
O2 FLOW - 0.2-0.4 lb/hr

CAUTION

see pg S/1-10

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

13 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
CAB PRESS REL vlv (RH) - DUMP (latch off)

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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)

14 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

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15 CABIN COLD SOAK
ACTIVATE
SUIT HT EXCH SEC GLY vlv - FLOW
EVAP H2O 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 H2O CONT SEC vlv - OFF (AUTO for ENTRY)

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16 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 1 minute

PRIM EVAP RESERVICE
GLY EVAP STM AUTO - MAN
GLY EVAP STM INCR - INCR
for 1 min
Wait 15 min
GLY EVAP H2O FLOW - ON
for 2 min, then AUTO
GLY EVAP STM AUTO - AUTO

17 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

18 POTABLE WATER CHLORINATION
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
POT TK IN vlv - OPEN (verify)
Wait 10 min & remove ampoule of H2O
Replace chlor port cap
Stow chlorination unit
Do not drink for 30 min

19 WASTE WATER TANK DRAIN
H2O QTY IND sw - WASTE
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

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20 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
If Waste Water Dump:
WASTE TANK SERV vlv - OPEN
until WASTE H2O QTY ind 25%, 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 (verify)
Install plug & dump nozzle connector

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21 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 minute (min)
    WASTE MANAGEMENT DRAIN vlv - CLOSE

22 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

23 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

Changed

Basic Date 6/24/70

24 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
- 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 & dissemble components
Stow vac cleaner & components

Changed _____

Basic Date 6/24/70

C/W SYSTEM

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 lt (2) - on)
C/W CSM - CSM (CM RCS lt (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)

Changed

Basic Date 6/24/70

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 HI GAIN ANTENNA POINTING procedures
Verify required coordinates within full
  coverage region

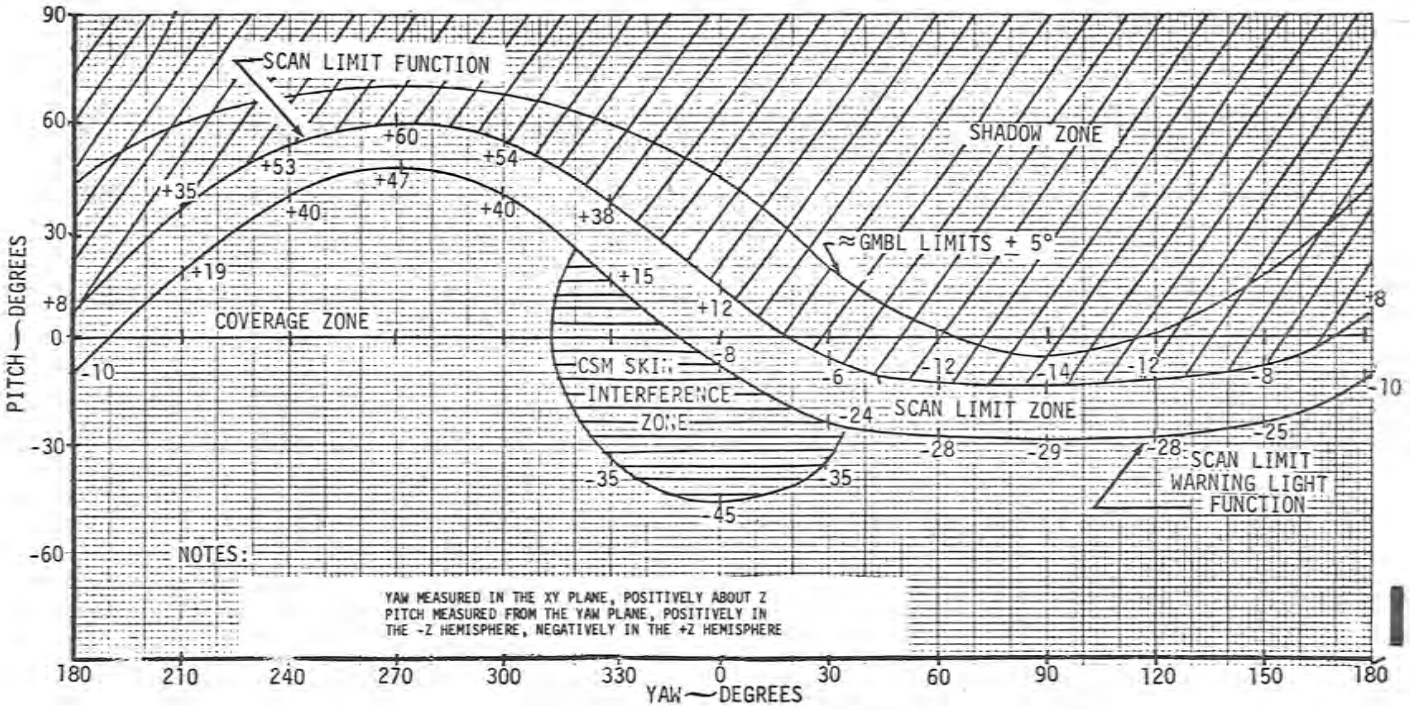
```
*If required coordinates are in scan limit    *
*  zone or skin reflection zone, one or more  *
*  of the following may be done:              *
*a.Change CSM attitude to provide antenna      *
*  coordinates in the full coverage region    *
*b.Allow up to 60 seconds for the expected     *
*  CSM 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
When omni antenna operation is desired:
  HI-GAIN ANT TRACK - MAN
  HI-GAIN ANT PITCH POS - -52°
  HI-GAIN ANT YAW POS - 270°

Changed _____

Basic Date 6/24/70

Basic Date 6/24/70 Changed 11/13/70



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

MSC FORM 2206 (REV MAR 70)

Color

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1-19

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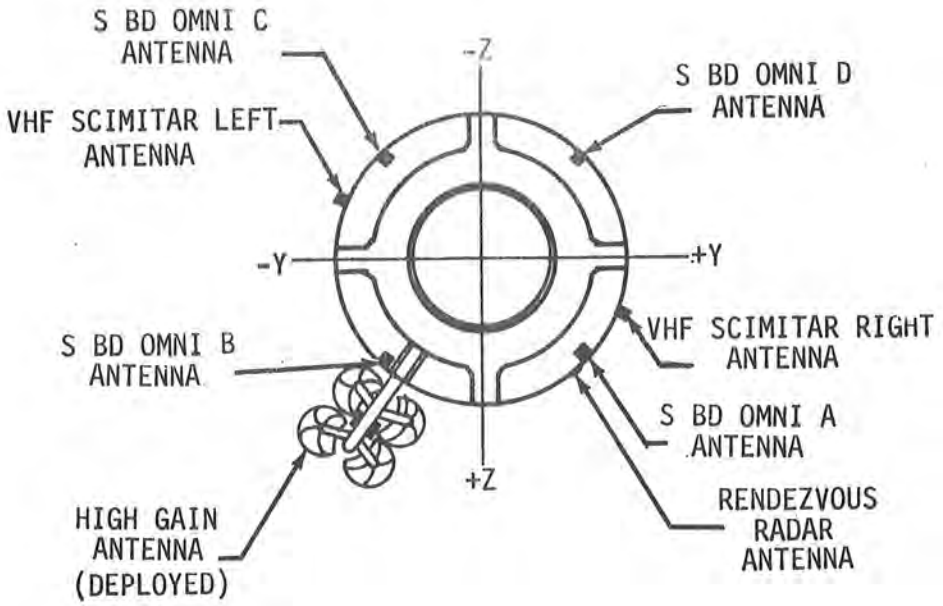
1-20



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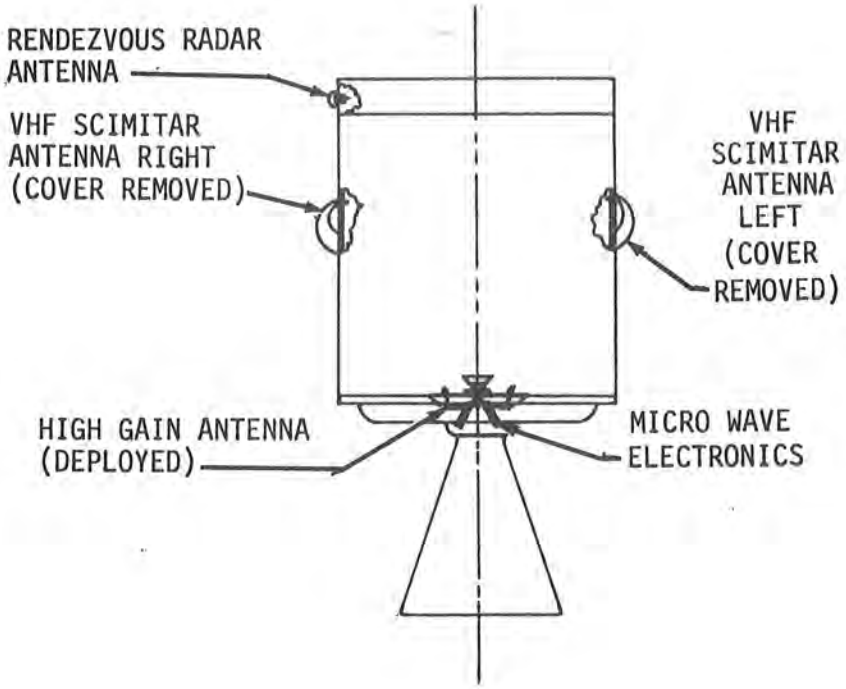

Basic Date 6/24/70

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

Changed _____

Basic Date 6/24/70

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 - ΔV 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 - BBBBOO
P20 operating, TRACKER lt - out
EMS RANGE ind - BXXX XX
V83E (if desired)
R1 = RANGE
R2 = RANGE RATE
R3 = θ
V85E (if desired)
R1 = RANGE
R2 = RANGE RATE
R3 = Ø

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

Changed _____

Basic Date 6/24/70

Color _____

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1-23

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

Changed _____

Basic Date 6/24/70

Color _____

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1-24

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)
S BD NORM MODE VOICE - off (ctr)
1 HI GAIN OPERATION:
P, Y = +40, 270 (ROLL RIGHT)
P, Y = -40, 90 (ROLL LEFT)
HI GAIN ANT BEAM - NARROW
HI GAIN ANT TRACK - REACQ
S BD ANT - HI GAIN
2 OMNI OPERATIONS:
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 P, Y, = _____, _____

E VHF RANGING, VOICE
VHF AM B - DUPLEX
VHF RNG - on (up)
VHF RCV ONLY - B DATA (MINIMIZES CREW SWITCHING)

F VHF LM-CSM VOICE DATA
VHF AM A - SIMPLEX
VHF RCV ONLY - B DATA

Changed _____

Basic Date 6/24/70

Color _____

S
1-25

G CONTINGENCY
VHF AM A - SIMPLEX
VHF AM B - SIMPLEX

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
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 A - SIMPLEX
VHF RCV ONLY - B DATA

I LUNAR STAY
VHF AM B - DUPLEX
VHF AM - RCV (Pnl 9)
HI GAIN ANT BEAM - NARROW
HI GAIN ANT TRACK - REACQ
HI GAIN ANT P____, Y____
S BD SQUELCH - ENABLE

Changed _____

Basic Date 6/24/70

PRESLEEP CHECKLIST

CREW STATUS REPORT (MEDICATION)
ONBOARD READOUTS
CYCLE CRYO FANS
CHLORINATE POTABLE WATER
VERIFY:
  WASTE MNGMT OVBD DRAIN - OFF
  WASTE STOW VENT vlv - CLOSED
  EMERGENCY CABIN PRESS - BOTH
  SURGE TANK 02 vlv - ON
  REPRESS PKG 02 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)
  DIRECT 02 vlv - OPEN (Until 5.7 psia - CLOSE)
  "E" MEMORY DUMP
CONFIGURE COMMUNICATIONS (S/1-24)

Changed 9/24/70

POSTSLEEP CHECKLIST

CREW STATUS REPORT (SLEEP & RADIATION)
CONSUMABLES UPDATE
CYCLE CRYO FANS
CONFIGURE COMMUNICATIONS (S/1-24)

Basic Date 6/24/70

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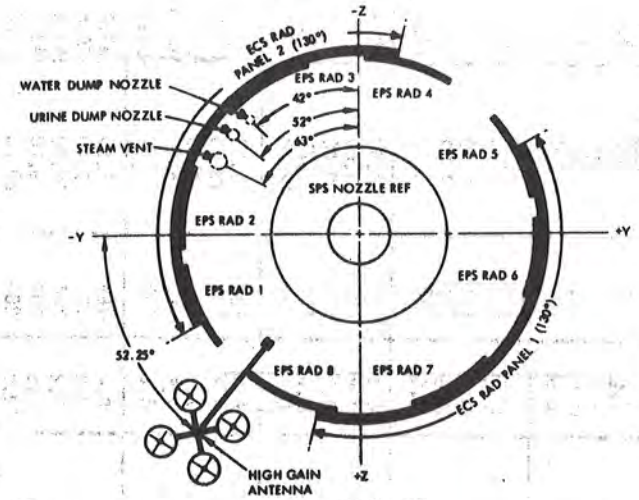
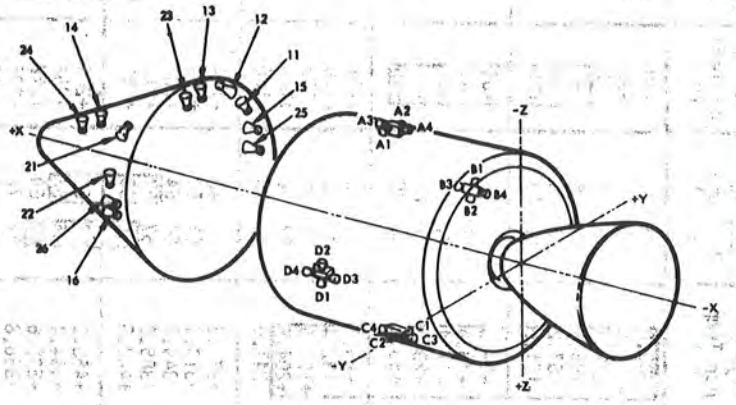
S
1-27

Changed

Basic Date 6/24/70



VIEW LOOKING FWD



CM RCS CODE

FIRST DIGIT: SYSTEM (1 OR 2)
SECOND DIGIT: 1, 2 (+, -ROLL) 3, 4 (+, -PITCH) 5, 6 (+, -YAW)

SM RCS CODE

1 AND 2 ARE ROLL ENGINES
3 AND 4 ARE A/C PITCH OR B/D YAW ENGINES
1 AND 3 = + ROTATION, 2 AND 4 = - ROTATION

RCS Engine, Vent, and Radiator Locations

Trim front page on solid crop marks; back page on dash crop marks.)

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S
1-28

FORM 2206 (REV MAR 70)

Systems Test Indicator Conversion Chart

SYSTEMS TEST Indicator Display	Cryo O2 Htr Temp (°F)	O2, H2 Pressure (psia)	EPS Rad Out Temp (°F)	CM-RCS Oxid Vlv Temp (°F)	LM Power (amps)	SPS Temp (°F)	Battery Compartment Manifold Pressure Ipsia)	Battery Relay Bus (vdc)
0.0	-302.0	0 0	-50	-50	0	0	0.00	0
0.2	-265.8	3 3	-36	-46	0.4	8	0.80	1.8
0.4	-229.6	6 6	-22	-42	0.8	16	1.60	3.6
0.6	-193.4	9 9	-8	-38	1.2	24	2.40	5.4
0.8	-157.2	12 12	+6	-34	1.6	32	3.20	7.2
1.0	-121.0	15 15	+20	-30	2.0	40	4.00	9.0
1.2	-84.8	18 18	+34	-26	2.4	48	4.80	10.8
1.4	-48.6	21 21	+48	-22	2.8	56	5.60	12.6
1.6	-12.4	24 24	+62	-18	3.2	64	6.40	14.4
1.8	+23.8	27 27	+76	-14	3.6	72	7.20	16.2
2.0	+60.0	30 30	+90	-10	4.0	80	8.00	18.0
2.2	+96.2	33 33	+104	-6	4.4	88	8.80	19.8
2.4	+132.4	36 36	+118	-2	4.8	96	9.60	21.6
2.6	+168.6	39 39	+132	+2	5.2	104	10.40	23.4
2.8	+204.8	42 42	+146	+6	5.6	112	11.20	25.2
3.0	+241.0	45 45	+160	+10	6.0	120	12.00	27.0
3.2	+277.2	48 48	+174	+14	6.4	128	12.80	28.8
3.4	+313.4	51 51	+188	+18	6.8	136	13.60	30.6
3.6	+349.6	54 54	+202	+22	7.2	144	14.40	32.4
3.8	+385.8	57 57	+216	+26	7.6	152	15.20	34.2
4.0	+422.0	60 60	+230	+30	8.0	160	16.00	36.0
4.2	+458.2	63 63	+244	+34	8.4	168	16.80	37.8
4.4	+494.4	66 66	+258	+38	8.8	176	17.60	39.6
4.6	+530.6	69 69	+272	+42	9.2	184	18.40	41.4
4.8	+566.8	72 72	+286	+46	9.6	192	19.20	43.2
5.0	+603.0	75 75	+300	+50	10.0	200	20.00	45.0
SYS TEST sel	1A,1B,1C	(02)1D,2A,2B (H2)2C,2D,3A	3B,3C,3D	5C,5D,6A 6B,6C,6D	4D	5A	4A	4B

Basic Date 6/24/70

Changed 11/13/70

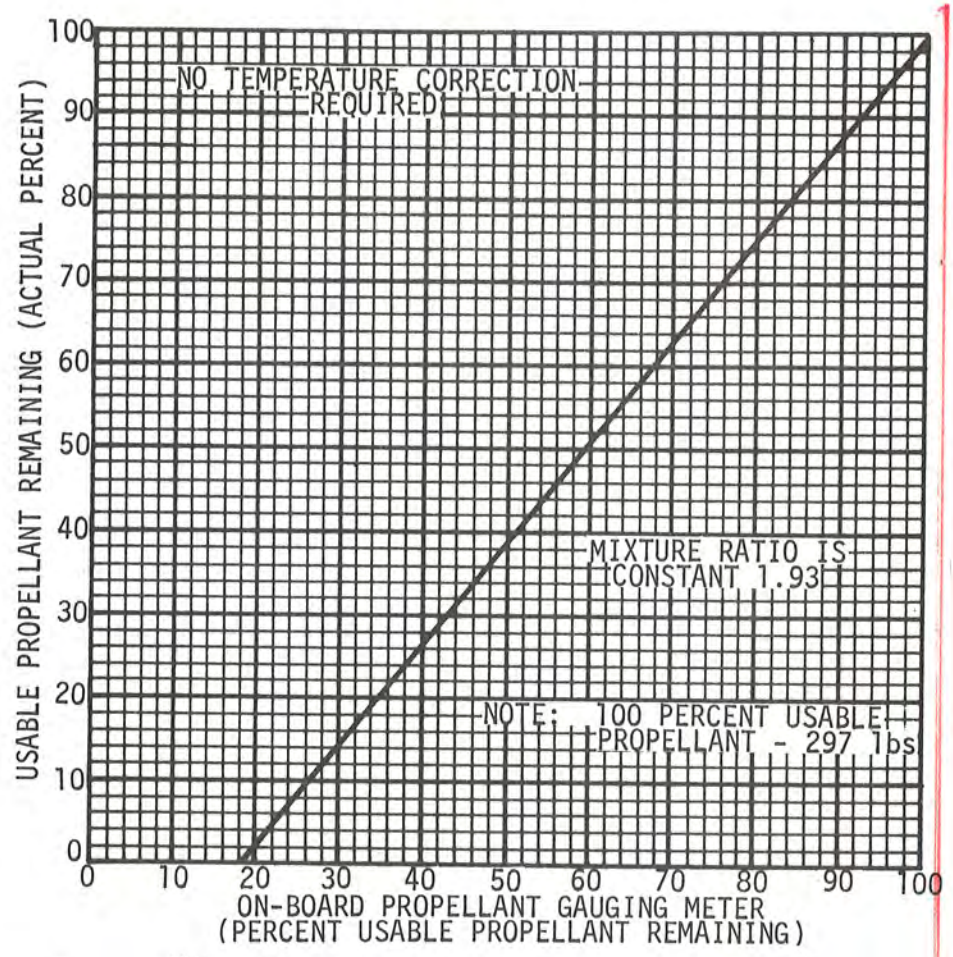
NASA-MSC

Color _____

S
1-29

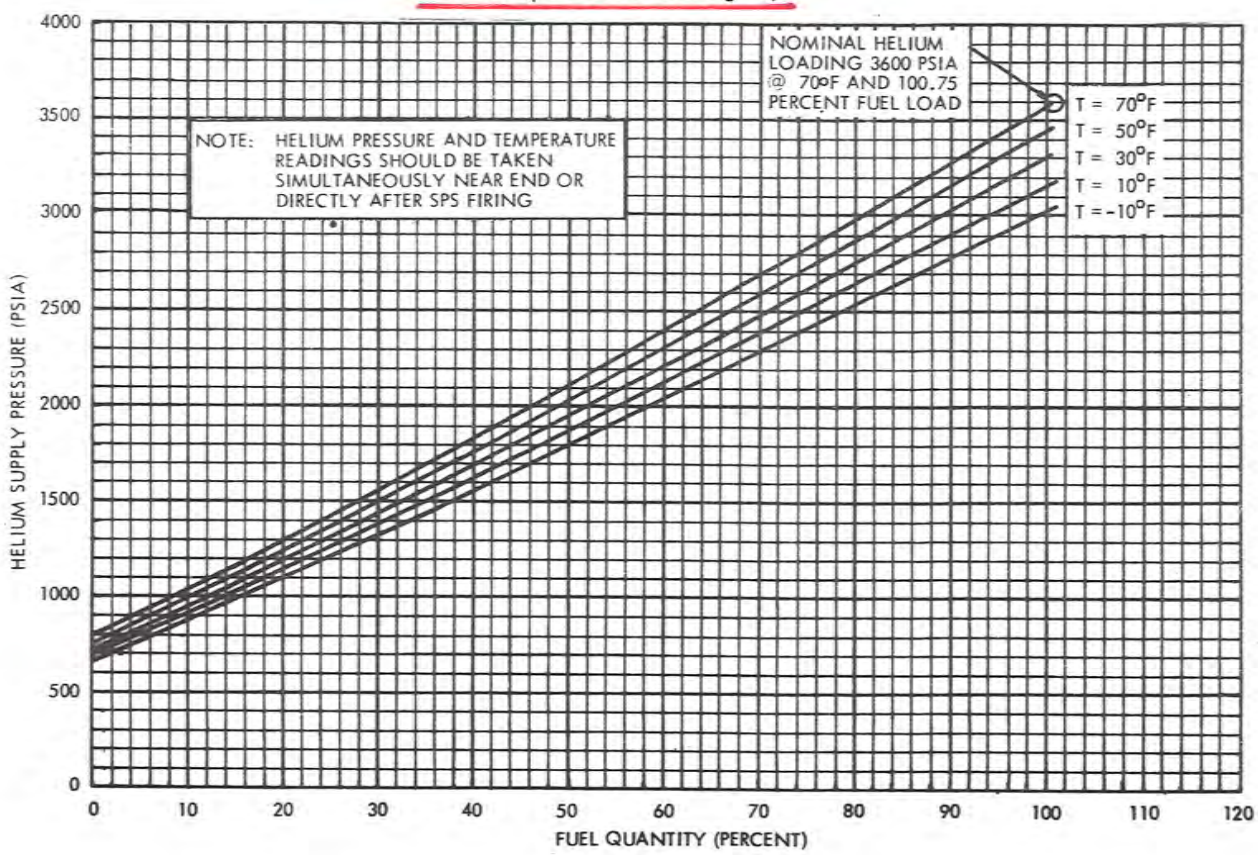
Changed _____

Basic Date 6/24/70



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

SPS Propellant Nomograph



Basic Date 6/24/70

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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 ≥2.7 psid

*LM/CM ΔP <2.7 psid *
*TUNL VENT vlv - VENT *
* till LM/CM ΔP ≥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 & stow (Decal) (3)
Remove drogue & 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 - 4D
- SYS TEST ind - 0 volts
- Perform comm checks with LM

At LM request
- LM PWR - CSM
- SYS TEST - 4D
- 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

Changed 11/13/70

Basic Date 6/24/70

LM INTERFACE

Back

Color _____

S
2-2

IVT TO LM (UNDOCKING, PDI)

Couches: CDR - 0°, CMP - 0°, LMP - 180°
TUNL LTS - ON
TUNL VENT vlv - LM/CM ΔP
Verify LM/CM ΔP <0.2

*LM/CM ΔP >0.2 *
* Equalize CM/LM Pressure*
* (Decal) (1) *

Remove tunnel hatch (Decal) (2)
Remove probe & stow (Decal) (3)
Remove drogue & 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 - 4D
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 ΔP ≥3.5 psid (>3.5,2 jet; >4,4 jet)
Release docking latches (Decal) (13)
Install tunnel hatch (Decal) (11)
Perform hatch integrity check (Decal) (12)
Perform Contingency EVA Prep (C/3-1) (Optional)

Changed 12/17/70

Basic Date 6/24/70

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 ΔP <2.4 PSID

O2 PRESS ind sw - SURGE TANK
Verify CRYO O2 PRESS 1 ind - 865-935 psia
EMER CAB PRESS sel - OFF
REPRESS PKG vlv - OFF
DIRECT O2 vlv - CLOSE (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 ΔP ∿0.0 psia
CAB PRESS ind ∿5.0 psia
EMER CAB PRESS sel - BOTH

Changed

Basic Date 6/24/70

B. LM/CM ΔP ≥2.4 PSID

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

O2 PRESS ind sw - SURGE TANK
  Verify CRYO O2 PRESS 1 ind - 865-935 psia
EMER CAB PRESS sel - OFF
REPRESS PKG vlv - OFF
DIRECT O2 vlv - CLOSE (verify)
TUNL VENT vlv - LM/CM ΔP
  LM/CM ΔP ind - ≥3.1 psid
PRESS EQUAL vlv - OPEN
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 (c)
  CAB PRESS ind - 4.0 psia
    REPRESS O2 vlv - OPEN
CAB PRESS ind 5.7 psia
  Cycle REPRESS O2 as required
    between 4.0 and 5.7 psia limits
    until REPRESS O2 PRESS ind
    ∿0.0 psia
  REPRESS O2 - CLOSE
CAB PRESS ind ≥4.0 psia

If CAB PRESS ind <4.0 psia
* PRESS EQUAL vlv - CLOSE *

LM/CP ΔP ind - ∿0.0 psid
CAB PRESS ind - ∿5.0 psia
  EMER CAB PRESS sel - BOTH
CRYO O2 PRESS 1 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)

Changed _____

Basic Date 6/24/70

HATCH
1
(C)

2 TUNNEL HATCH REMOVAL (Decal)

PRESS EQUAL vlv - 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 beams

B. 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)

Changed

Basic Date 6/24/70

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

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

DOCK 1

Changed _____

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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 position (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.

Changed

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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
Align Hatch in tunnel FULL TO STOP 2
ACTR HNDL SEL - unstow, 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 ΔP, check ΔP
- Recycle to TUNL VENT until ΔP>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 ΔP & flow to check *
* integrity *

Verify LM/CM ΔP ind constant (±.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 ΔP
Verify LM/CM ΔP >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

Changed _____
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Color _____

S
2-10

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

O2 PRESS IND sw - SURGE TANK
Verify CRYO O2 PRESS ind - 865-935 psia
REPRESS PKG vlv - OFF
Direct O2 vlv - OPEN until CAB PRESS 5.5 psia then CLOSE until O2 FLOW <.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 ind ∿3 psid then CLOSE
Monitor LM/CM ΔP ind for 3 min and verify ΔP stable
PRESS EQUAL vlv - OPEN UNTIL LM/CM ΔP (C)

15 DOCKING LATCH VERIFICATION (Decal)

LATCH HNDL - Pull to verify hook engaged (12 latches)

* 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 dis-engage: *
* * 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 - 4D
LM PWR - CSM
SYS Test ind - 0.5-3.2 volts

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

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

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

Changed _____

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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 (Pnl 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,

Changed

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SAFE OF APEX COVER JETT

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

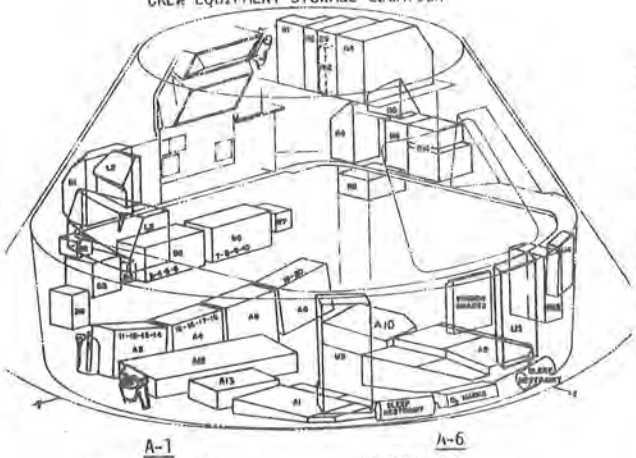
Changed

Basic Date 6/24/70

Front Color

S
4-1

APOLLO 14
CREW EQUIPMENT STOWAGE LOCATION



Changed 12/17/70 11/23/70

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A-1

70MM CAMERA BRACKET
GAS SEPARATOR IN BAG
TISSUE DISPENSER-5
CM TOWEL (RED, WHITE, BLUE)
PENLIGHT-2 IN BAG
TOOL SET
PVL DUCT-3 IN BAG
02 UMB INTERCONNECT-2 IN BAG
SNAG LINE IN BAG
CHLOR & BUFFER AMP-7 IN BAG
PROBE STRAP-2
TEMPORARY STOWAGE BAG-3
CWG

A-3

CO2 ABSORBER-4
FIRE EXT. (ON A-3)

UNDER A-3

TONE BEEPER
REMOTE CONTROL CABLE

A-4

CO2 ABSORBER-4

A-5

SPOTMETER
KITCHEN TIMER
SLEEP RESTRAINT ROPE-5
16MM CAMERA SEXTANT ADAPT.
HEAD REST PAD-3
HEEL CLIP-3 PR
TAPE CASSETTE KIT
TAPE REC BATT-11 IN BAG

A-6

TV MONITOR
TV MONITOR CABLE
TV POWER CABLE
TV BRACKET
CO2 ABSORBER-2

UNDER A-6

URINE HOSE
UCTA TRANSFER ADAPT.
T-ADAPTER

A-8

PPK-3
EXERCISER
TISSUE DISPENSER-2
CWG-3
LIGHT WEIGHT HEADSET-3
CWG ELECT. ADAPTER-4 IN BAG
URINE RECEIVER
METAL COMPOSITE EXPER.
METAL COMPOSITE SPECIMEN-18 IN BAG
ELECTROPHORESIS EXPER.
HEAT FLOW AND CONVECTION EXPER W/CABLE
LIQUID TRANSFER PUMP-IN BAG

DECONTAMINATION BAGS

LS HASS MAG (3-MAGS)
SRC No. 1 AND No. 2
ISA
CSC CASSETTE
CONTINGENCY LUNAR SAMPLE RETURN EQUIPMENT
16MM MAG (6-MAGS)
LS HASS MAG (2-MAGS)

SIDE OF A-8

02 UMBILICAL INTERCONNECT
VACUUM HOSE & 1 BRUSH
VACUUM HOSE BRUSH
VACUUM CLEANER CABLE
VACUUM CLEANER BAG-2

A-10

RES. HASS W/MAG
STD HAS MAG-2 IN BAG
RES HASS MAG-2 IN BAG
HYCON MAG
500MM LENS BRACKET
500MM LENS
LIQUID TRANSFER TANK
LIQUID TRANSFER HOSE-2 IN BAG

A-12

HYCON CAMERA W/MAG
HYCON CONTROL BOX CABLE
HYCON POWER CABLE

SIDE OF A-12

VACUUM CLEANER

A-13

HYCON CONTROL BOX
NYCON MAGAZINE
70MM STD HASS MAG-3 IN BAG
TV CAMERA
RINGSIGHT

B-1

FOOD AND HYGIENE ITEMS

B-2

16MM MAG-5 IN BAG
16MM MAG-1 IN BAG

B-3

70MM CAMERA W/MAG
16MM CAMERA W/MAG
75MM LENS
18MM LENS
10MM LENS
POWER CABLE, DAC
RIGHT ANGLE MIRROR

B-4

CHLOR & BUFFER AMPULE-6
CHLOR SYRINGE KNOB
CHLOR SYRINGE CASING
CHLOR NEEDLE

STOWAGE

Back

Color _____

S
4-2

B-5

CO2 ABSORBER-4

B-6

CO2 ABSORBER-4

CLOSEOUT COVER (B5-B6)

TEMP STOWAGE POUCH-2
SPRING SHORT-6
SPRING LONG-6
SPRING W/HOOK SHORT-2
SPRING W/HOOK LONG-2
CLAMP-8
CLIP-8

B-7

CHLOR & BUFFER AMPULE-7

B-8

16MM FILM MAG-5
VOICE RECORDER W/BATTERY AND CASSETTE

L-2

CCU CONTROL HEAD IN BAG
GROUNDING CABLE
CCU CABLE
TOOL E
70MM PCM CABLE
16MM PCM CABLE

L-3

FOOD PACKAGE
CONTINGENCY FEEDING SYS

R-1

G&N HANDHOLD-2
SUNFILTER-2
FLIGHT DATA FILE BOOKS

R-2

FLIGHT DATA FILE BOOKS

R-3

R12 W/FLT DATA FILE BOOKS
FLIGHT DATA FILE BOOKS
LM XFR DATA CARD KIT W/BOOKS

R-3

DATA CARD KIT

EYEPATCH
METER COVER-2
FUSE (16MM CAMERA)
FLT DATA FILE CLIP-6
CUE CARDS
COLOR WHEEL
CSM STAR CHART
FLIGHT DATA FILE BOOKS

R-4

SURVIVAL KIT No. 1
SURVIVAL KIT No. 2

R-5

UTILITY STRAP-6
URINE FILTER-3
INFLT RETAINER STRAP-3

R-6

TAPE
HELMET STOWAGE BAG W/ ACCESSORY BAG-3
HATCH VENT FILTER IN BAG WITH ADAPTER

R-8

MEDICAL KIT

R-10

FECAL BAG-30
WASTE WATER QD
SIDE HATCH QD
HATCH HEATER CABLE
SIDE HATCH QD PRESSURE CAP

R-11

URINE TRANSFER SYS-3
URINE RECEIVER (SPARE)
ROLL ON CUFF (RED,WHITE,BLUE)

R-13

16MM MAG-6 IN BAG
70MM MAG-3 IN BAG
16MM MAG-2 IN BAG
70MM MAG-2 IN BAG
JETTISON STOWAGE BAG

U-1

LIQUID COOLED GARMET-2
FCS-3
SAMPLE RETURN DECOM BAG-2
EMU MAINTENANCE KIT

U-3

COAS FILTER
COAS LIGHT BULB-
16MM CAMERA BRKT
LM DOCKING TARGET W/ADAPT ARM

11/27/70

U-4

TAPE RECORDER CASSETTE-4
TAPE RECORDER BATTERY-4
MONOCULAR
INTERVALOMETER (Hasselblad)
250MM LENS

PGA BAG

UCTA CLAMP-3
HELMET PROTECTIVE SHIELD
PGA ELECTRICAL COVER-3
ICG W/EARTUBE-3
O2 HOSE SCREEN CAP-3
COUCH RESTRAINING STRAP-3
CABIN FAN FILTER IN BAG
WATER CONTINGENCY BAG-5
HATCH CAMERA BRACKET IN BAG

ECU

CO2 ABSORBER-2

LHFEB

CCU CABLE (L,CNTR,R)
O2 UMBILICAL (L,CNTR,R)
WATER GUN

UEB

WINDOW SHADES -5 AND DIM LIGHT SHADE IN BAG

AFT UEB

SLEEP RESTRAINT (L,CNTR,R)
O2 MASK AND HOSE-3 IN BAG

LEB

RADIATION SURVEY METER
VERB/NOUN LIST

ABOVE L/H WINDOW

COAS

Changed ~~12/17/70~~

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Color _____

S
4-3

ENTRY STOWAGE CHANGES FROM EARTH LAUNCH

A. (LM to CM XFER) ADDITIONS

QTY	NOMENCLATURE	CM STOWAGE LOCATION/VOLUME
3	LM PPK	A8 (In Decontam-Comp.)
1	Flag Kit	PGA Bag
1	DSEA	R13
1	SRC #1	B6 (In Decontam. Bag from A8)
1	SRC #2	B5 (In Decontam. Bag from A8)
1	ISA	On A1
2	Sample Ret. Bag	(1) -On A10, (1)-On A13

Changed 1/11/71

B. (CM to LM XFER) - Final Docking - Off Load

QTY	NOMENCLATURE	CM STOWATE LOCATION/VOLUME
1	B5 Container W/4 CO2 Absorbers	From B5
1	B6 Container W/4 CO2 Absorbers	From B6
1	Jettison Bag (full)	From R13

C. Relocations - For Re-Entry

QTY	NOMENCLATURE	LAUNCH STOW	RE-ENTRY STOW
3	Helmet Stowage Bags	3 Ea. - R6	3 Ea. On Helmet
3	ICG	PGA Bag	3 Ea. On Crew
3	Head Rest Pad	3 Ea. A5	3 Ea. On Couch
3	Heel Restraint	3 Ea. A5	3 Ea. On Crew
3	CWG Elect. Adapter	3 Ea. A8	3 Ea. On Crew
2	PGA-EV	2 Ea. On Crew	2 Ea. PGA Container
2	Helmet	2 Ea. On Crew	2 Ea. in Upper PGA Bag

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Color _____

S
4-4

	1	PGA-IV	1 Ea. On Crew	1 Ea. RH Sleep Restraint
	1	Helmet	1 Ea. On Crew	1 Ea. RH Sleep Restraint On PGA
	3	Gloves,	3 Ea. On Crew	3 Ea. In Helmet W/Accessory Bag ICG
Changed	3	PLV Ducts	3 Ea. A1	3 Ea. LMP ~~PGA~~ Pkt
	5	Ropes	5 Ea. A5	Over PGA Bag & Over RH Sleep Restraint
	2	Rock Boxes	2 Ea. LM	1 Ea. B5 1 Ea. B6
	3	PGA Elect. Covers	3 Ea. PGA Bag	3 Ea. On PGA
	1	RH Sleep Rest	1 Ea. UEB (RH)	1 Ea. A8
	1	C Sleep Rest	1 Ea. UEB (RH)	1 Ea. UEB (LH)
	3	Barf Bags	3 Ea. R10	3 Ea. ICG Pocket
	2	16mm Mag	2 Ea. R13	2 Ea. ISA
	11	Decontamination Bags	9 Ea. A8 2 Ea. U1	1 Ea. W/Hassel Mag, R13 1 Ea. SRC #1-B6 1 Ea. SRC #2-B5 1 Ea. ISA On A1 1 Ea. 16mm R13 1 Ea. Sample Ret Bag, A10 1 Ea. Sample Ret Bag, A13 4 Ea. (LM Jettison)
Basic Date	3	LM PPK	3 Ea. LM	3 Ea. A8 (In decontam. Comp)
	1	Flag Kit	1 Ea. LM	1 Ea. PGA Bag
	1	DSEA	1 Ea. LM	1 Ea. R13