

SECTION 4

NORMAL/BACKUP PROCEDURES

Normal/backup procedures consist of detail control actions and anticipated displays for accomplishing CM system management, flight control, navigation, and experimental procedures under nominal mission operating conditions. Approved alternate operating methods and backup systems procedures are included, and options indicated where applicable to provide maximum vehicle capability and operational flexibility. As an aid to the user, supporting rationale, system operating limitations, and remarks clarifying unique or obscure operating methods are provided adjacent to or keyed to affected locations in the procedures.

STEP/STEP	PROCEDURE	PANEL	REMARKS
<p>4.1 BACKUP CREW PRELIMINARY CHECKS</p> <p>Prelaunch procedures consist of operational and configuration checks performed by backup flight crew prior to ingress of prime crew. Procedures have been sequenced so they can be more easily compared with other prelaunch documents. In order to keep them closely aligned, redundant switch settings may appear in more than one area and ODC align procedures have been repeated wherever necessary. It is assumed that a complete prelaunch checklist, including loose gear stowage, has been performed by ground support personnel, prior to backup crew ingress into command seats, and that all switches are in an active configuration as required at time of ingress. Spacecraft suit circuit shall have been purged and oxygen content verified to be 99% minimum. Backup crew will utilize facility helmets until service structure is clear of vehicle, as there will be no VHF AM or C BAND transmission until that time. Refer to Appendix B for cabin switch/control position prior to backup crew cabin ingress.</p>			
<p>4.1.1 CMM STATUS CHECK</p>			
CRP	C/W NORM - NORM	2	
	C/W COM - COM		
	C/W PWR - 2 [press at off (ctr)] at least 1 sec]		Excessive switching speed will cause temporary loss of both power supplies, and alarm reset capability.
ALL	MASTER ALARM pb/1a [3] - on, push	1,3,102	
CRP	C/W PWR - 1 [press at off (ctr)] at least 1 sec]	2	Excessive switching speed will cause temporary loss of both power supplies, and alarm reset capability.
ALL	MASTER ALARM pb/1a [3] - on, push	1,3,102	
CRP	C/W LAMP TEST - 1 [hold]	2	1 position is momentary.
CRP	MASTER ALARM pb/1c - on	1	
CRP	as C/W at [25] - on	2	
	C/W NORM - BOOST		
CRP	MASTER ALARM pb/1a - out	1	
CRP	C/W NORM - NORM	2	
CRP	MASTER ALARM pb/1c - on	1	

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CMM STATUS CHECK

ORIG STEP	PROCEDURE	PAGE	REMARKS
000	C/W LAMP TEST - 0 (hold)	0	0 position in secondary.
001	WATER ALARM 04/12 - out	1	
002	20 C/W 18 (115) - out	0	
003	WATER ALARM 04/12 - on	3	
004	20 C/W 18 (115) - on	0	
	C/W LAMP TEST - rel		
005	WATER ALARM 04/12 - out	1	
006	20 C/W 18 (115) - out	0	RUIT COMPY C/W light will remain on until compressor is activated.
	C/W HOLD - 000		
	5.1.2 100 PRESSURE TEST:		
	1 Initial 100 Prep		
008	100 PRESS - OFF	1	
	CRITERIA		
	If 100 THROAT is on, a grd exists on one or both 100 THROAT ans.		
	cb 100 (2) - close	0	
	Open 100 STA cover	1	A 5/16-inch hex driver is required.
	100 on - on (up)		STA switch is used during ground operations only. Setting switch on (up) allows 100 calibration for zero 0 condition. Switch must be set off (down) and door closed before flight.
	100 HOLD - 000		

STEP/STEP	PROCEDURE	PAGE	REMARKS									
100 1 2 3 4 5	100 FREQ - BY 440 alignment: heli/visura (option) Wait 5 sec 1 070 Roll Adj 100: 0000 - 0000 440 Roll ball adj until 07700 beam significant pitch changes +1 per 10 sec 4 000 FREQ - BY 007 Clear BY ind to +1500.0 5 100 FREQ - BY 000 000 THROUGH it - 00 BY ind - decr (20 sec)	1	07700 BY switch used both for slowing G-V scroll and for setting 07700 indicator. Slow speeds selected by 07700 BY switch are as follows: <table border="1" data-bbox="939 486 1324 709"> <thead> <tr> <th></th> <th>0-F Display Ft/Sec 1000 Ft/Sec = 1 in. of scroll</th> <th>BY 000 Indicator Ft/Sec or Nautical Miles</th> </tr> </thead> <tbody> <tr> <td>Slow Coast stop 1000 or 1000</td> <td>30 Ft/Sec/Sec = 0.8100 in./sec</td> <td>0.15/Sec</td> </tr> <tr> <td>Fast Coast stop 1000 or 1000</td> <td>400 Ft/Sec/Sec = 0.200 in./sec</td> <td>107.5/Sec</td> </tr> </tbody> </table> For negative numbers 07700 indicator will display a minus sign. No sign will appear for positive numbers.		0-F Display Ft/Sec 1000 Ft/Sec = 1 in. of scroll	BY 000 Indicator Ft/Sec or Nautical Miles	Slow Coast stop 1000 or 1000	30 Ft/Sec/Sec = 0.8100 in./sec	0.15/Sec	Fast Coast stop 1000 or 1000	400 Ft/Sec/Sec = 0.200 in./sec	107.5/Sec
	0-F Display Ft/Sec 1000 Ft/Sec = 1 in. of scroll	BY 000 Indicator Ft/Sec or Nautical Miles										
Slow Coast stop 1000 or 1000	30 Ft/Sec/Sec = 0.8100 in./sec	0.15/Sec										
Fast Coast stop 1000 or 1000	400 Ft/Sec/Sec = 0.200 in./sec	107.5/Sec										

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TEST STEP	PROCEDURE	LABEL	REMARKS
CON	0% THRUST It - out (set BY -0.1 fpm) 0% Ind - stops at -20,0 ₂₀ ,1 fpm 0% Mode - 000	1	
6	0% FUNC - 0% TEST 1 (000) (wait 5 sec) 0% Mode - 000 (wait 10 sec) .05 G It - on 0% THRUST It - out lift vote ds It - out lift vote up It - out 0% Ind - 0.0 IM 0% scroll until diag Index superimposed upon mode at start of 000 self-test pattern		Test 1 checks lower trip point of .05 G comparator. Ten seconds should be allowed to verify no malfunctions. No other light should come on before or after 10 seconds. 0% scroll reverse slow capability is limited to one inch.
7	0% FUNC - 0% TEST 2 Wait 10 sec .05 G It - on (all others out)		Test 2 checks upper trip point of .05 G comparator. No other light should come on before or after 10 seconds.
8	0% FUNC - 0% TEST 3 .05 G It - on lift vote ds It - on (10 sec after .05 G It) Set 0% Ind to 50,000.0 IM		Test 3 checks corridor verification circuitry associated with lift vector down mode (0 +.2). For negative numbers 0% indicator will display minus sign in most significant digit. No sign will appear for positive numbers.

TEST STEP	PROCEDURE	PANEL	REMARKS
008	<p>008 FUNC - 008 TEST 4</p> <p>.05 G 14 - on (all others off) 0.7 trace (during 10-sec period) within test pattern After 10 sec, 0.7 trace stops at lower right corner of test pattern 008 ind (during 20-sec period) rotates toward 008 After 10 sec, stops at 0.7G.7</p>	1	<p>Test 4 checks range-to-go integrator circuits, range-to-go indicator, counter circuits, and G-Y plotter.</p>
009	<p>009 FUNC - 009 TEST 5</p> <p>.05 G 14 - on Lift vscr up is - on (10 sec after .05 G 14) 009 ind - rotates to 0.0 00 Scribe traces work line = 9 G to 8.00G.1 G 8 stops (trace within test pattern)</p>		<p>Test 5 checks corridor verification circuitry associated with left vector up light (V-10). Enables scribe scroll to start of entry pattern. After scroll is set to 000 00, it is not per- mitted to return 000 FUNC switch to 009 TEST 5 position (range integrator and scroll gear would be locked).</p>
010	<p>010 Slow scroll until stopline is at 0.08 G 0.1 stop of 009 test pattern 1 & verify IV instructions are visible</p>		

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STA/T STOP	PROCEDURE	LABEL	REMARKS
10B 10 1200 PWRD - 100 OFF 100 MODE - 2TRF Scribe traces vert line from 0.00 0 to 0.000.1 0 & steps 001 10 - 000		1	
11 1200 PWRD - OFF WARRING STA pw is for 2nd beam only & must be set off (down) & door closed for proper TX oper of 1001. 070 pw = off (down) Close 070 cover 4.2.3 GLOBAL LOOP CHECKS			A 5/8-inch hex driver is required.
10B Get Gly Loop Data 01Y TO RAD 120 vlt - 10000 020 120 vlt - 000 030 COOL PUMP - 001 040 020 120 vlt - 000-0100 050 030 020 120 vlt - 000-0000 (pregen4) 060 040 020 020 120 vlt - 000-0000 (pregen4) 070 050 020 020 120 vlt - 0.25 psia (pregen4) 080 060 020 020 120 vlt - 00-01 psia 090 070 020 120 vlt - 00-000		ITT 2	

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PLANT STEP	PROCEDURE	PANEL	REMARKS
040	<p> 040 COAL FEED - ON 040 RAY HIDE FEED Ina - 0-51 pair 040 COAL FEED - off (rate) 040 TRG on - HSB 040 TO HAD 040 via - TRF </p>	2 377	
	Prim-ly loop Activation		
040	040 FEED - 0 ACC	4	
040	HSB 040 0400 HSB Ina - 0-50 pair	2	040 flow can be temporarily interrupted (3 minutes max/min) for this check.
	HSB ACCUM off Ina - 0-50C		
040	040 FEED - 1 ACC	4	
040	HSB 040 0400 HSB Ina - 0-50 pair	2	
	HSB FLOW ONLY Ina - Ina		
	HSB FLOW COSM AUTO - 0		
	040 HAD In - 0		0 Indicates No. 2 flow proportional valve controlling flow.
	HSB FLOW COSM AUTO - AUTO		
	040 HAD In - 040		040 Indicates No. 1 flow proportional valve controlling flow.
	HAD FLOW COSM Ina - off (040)		
040	040 HAD 040 via - 0400 (040), 040 Ina	7	
040	040 FLOW Ina - 0.4kg/L 30/Ina	2	
	4.1.4 STANDBY INVERTER (NO. 3) CHECK		
040	<p> ACC FEED - OFF TRG 0 - HSB TRG 0 ACC - OFF TRG 0 ACC - on (up) </p>	3	Rapid performance of inverter switching sequence may initiate MOTOR SLAM pb/In when alternate inverter is connected to bus.

STA/PC STEP	PROCEDURE	PANEL	REMARKS
200	ACT RESET - RESET	3	RESET position is unnecessary. Positioning R/1 or 2 RESET switches to RESET and releasing causes a MASTER ALARM light and tone. Positioning A/1 or 2 RESET switches to center will cause random activation of MASTER ALARM lights and tone.
200, 200	INVERTER ALARM pb/14 (2) - on (push)	3, 100	
200	O/P I/O (14) - out	2	
200	AC 110 sec - BUS 3, 4A, B, C AC BOLDS Ind - 113-117 sec ACT RESET - OFF INV 3 ACC - OFF INV 2 ACC - on (up)	3	Rapid performance of inverter switching sequence may initiate MASTER ALARM pb/14 when alternate inverter connected to bus.
	ACT RESET - RESET		RESET position is unnecessary. Positioning A/1 or 2 RESET switches to RESET and releasing causes a MASTER ALARM light and tone. Positioning A/1 or 2 RESET switches to center will cause random activation of MASTER ALARM lights and tone.
200, 200	INVERTER ALARM pb/14 (2) - on (push)	3, 100	
200	O/P I/O (14) - out	2	
200	INV 3 - OFF	3	Inverter 1 powering a-c bus No. 1 and inverter 2 powering a-c bus No. 2.
	AC 110 sec - BUS 1 & 2, 4A, B, C AC BOLDS Ind - 113-117 sec		
	4.1.5 FC RADIATOR & FLOW MFC CHECKS		
	FC Rad Check.		
200	cb FC RAD (all) - close	200	
200	FC RAD th (all) - grip	3	Grip indicates fuel cell radiator panels not bypassing flow.
200	cb FC RAD (all) - open	200	

FC RADIATOR & FLOW MFC CHECKS

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INIT/STEP	PROCEDURE	PANEL	REMARKS
CDB	Float Inq Check FLOAT BAG (a11) - OFF ok FLOAT INQ (a11) - close FLOAT BAG (a11) - VOFF ok FLOAT INQ (a11) - open	0	Lower lock. Lower lock.
4.1.6 LEED RCS VALVE STATED			
CDB	SLY TO RAD SEC siv - DEF (verify) FRIN ACCUM FILL via - OFF FRIN GLE ACCUM siv - open (CCW) T-7 strut - retract	373 373 373	T-7 strut to be retracted to position after mainline panel access.
	Open cool coast status panel SLYT AT (RCS) FLOW GLE - FLOW (CCW)	383	Covered panel RC.
<u>MISSION</u>			
SLYT FLOW HELP via must remain OFF throughout use or resealing of CO2-odor absorber filters may result.			
SLYT FLOW HELP siv - OFF SLYT FLOW IN TEMP via - RES (CCW) SLYT AT (RCS) FLOW GLE - FLOW FLOW RCS COAST (2) - AUTO RCS ACCUM (status) - zero Close cool coast status panel T-7 strut - hold & lock in place			

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LEED RCS VALVE STATED



STA/T STOP	PROCEDURE	PANEL	REMARKS
ORP	Open OOC exit alarm panel OOC WITH DIVERT s/w - OFF	350	Covers OOC indicators.
	Close OOC exit alarm panel on RCO (2) - open	351	
	ACTIVATE TR set (2) - OFF		
	TRIP CAB PRESS s/w - OFF		
	CRS NORMALS s/w - OFF (OCS)		
	WASH TR CRFF s/w - CLOSE	307	Service filling is plugged.
	FRONT HELP s/w - 0		
	POP TR 1A s/w - CLOSE		Notice water chlorination post opened.
	WASH TR 1B s/w - OFF		
	FRONT NORMAL s/w - CLOSE	Panel Below	
	AC UTIL PWR - OFF	381	
	TRIP VENT s/w - ON/OFF SP	32	
	LATCH SP lock - 0.0 push		
	UNIT STAN s/w (1) - FILL FLOW	380, 380, 380	
	FRON CAB TEMP s/w - 0000 (04)	383	
	CRS CAB TEMP s/w - 999 (000) (05)		
	DRINK H2O CRFF s/w - OFF	354	Drinking water unavailable during launch hold periods.
	4.1.7 1A & 1B TRIP PANEL 306		
	UTIL PWR - OFF	380	Generator covered.
	FLOOD DIM - 1		
	FLOOD FIXED - OFF		
	CRV CRV PWR - OFF		
	CRV 1A PWR - on (up)		Guarded.
	WASH AFTER PWR - ON		
	SUBSIDE OCS - as desired		
	DRINK LTD - as desired		
	FLOOD LTD - OFF (OCS)		

TEST STEP	PROCEDURE	PANEL	REMARKS
087	CEL/ATIS PWR - OFF CEL PWR - OFF	263 162	Switches are located behind console panel and will be set at panel console.
	CG - OFF CROO AC PWR - on (up) DC PWR - AUTO CG PWR - AUTO CRO/AC PWR - on (up)	164 161	Connector covered.
	DOOR JETP - off (down) LOGIC PWR - OFF ch panel 180 - all closed		Supplies ac/dc power to cameras and EM sounder and heater power to pan camera. Guarded.
	4.1.0 PWR & PANEL 001		
	ch panel 205 - all closed except cb BI CRIB SUP (2) - open ch panel 206 - all closed except cb FC RAD (all) - open	205 206	Prevents inadvertent fuel cell radiator effective area reduction.
	cb FC REMCD (all) - open		Fuel cell ventblast valve circuit breakers are opened after fuel cell start-up to provide inadvertent valve closure.
	cb ROAS/TANK DTC PWR - open ch panel 209 - all closed except cb HI REL (2) - open cb HI WPC 300 FUND (2) - open	209	
	MFP CRIB ON ts - gray MFP CRIB TRACE ts - gray	230	Gray indicates TSD. Gray indicates TSD.

PLANT STEP	PROCEDURE	PANEL	REMARKS
000	<p>MAP CABIN ON - ONTR</p> <p>MAP CABIN TRACK - off (str)</p> <p>MAP CABIN DANGLE MFL - OFF</p> <p>MAPS MAP ROOM DPLY 1L - gray</p> <p>MAPS MAP ROOM JETT 1b - gray</p> <p>MAPS MAP ROOM DPLY - off (str)</p> <p>MAPS MAP ROOM JETT - off (down)</p> <p>MAPS MAP KEP - OFF</p> <p>MAPS MAP CRD - COLD OFF</p> <p>MAPS EFFECT ROOM BRL 1b - gray</p> <p>MAPS EFFECT ROOM JETT 1b - gray</p> <p>MAPS EFFECT ROOM BRL - off (str)</p> <p>MAPS EFFECT ROOM JETT - off (down)</p> <p>MAPS EFFECT KEP - off (str)</p> <p>MAPS EFFECT DSI SOURCE - OFF</p> <p>MAPS EFFECT BULT - LO</p> <p>MAPS EFFECT SOURCE - LO</p> <p>DATA SYS CAL - off (down)</p> <p>DATA SYS ON - OFF</p> <p>SLD SAT 1b - gray</p> <p>SLD SAT - off (str)</p> <p>PAN CABIN OFF 1b - gray</p> <p>PAN CABIN BULT TEST - off (str)</p> <p>PAN CABIN HIRE - ONTR</p> <p>PAN CABIN PWR - BOOST</p> <p>X PAN DR DPLY - off (str)</p> <p>X PAN KEP - off (str)</p> <p>ALPHA PAN - OFF</p> <p>LASER SLTN - OFF</p>	030	<p>Map covers must be in standy during boost, TLI, and OTE servicing periods.</p> <p>Gray indicates boom retracted.</p> <p>Gray indicates boom retracted and tile-down engaged.</p> <p>Gray indicates boom retracted.</p> <p>Gray indicates boom retracted and tile-down engaged.</p> <p>Gray indicates TDB.</p> <p>Gray indicates TDB.</p> <p>Pan covers must be in standy during boost, TLI, and OTE servicing periods.</p>

STA/T STEP	PROCEDURE	PRERL	REMARKS
CRP	<p>cb psl 250 - all closed except</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>cb MAT MEC ASB TO PFRS SEC (2) should never be closed when cb PFRS ASB/REQ ASB (2) are closed. Loss of pprc hot gas could result.</p> <p>cb MAT MEC ASB TO PFRS SEC (2) - open cb MAT C TO MAT MEC ASB (2) - open</p> <p>OVEN DRAIN vls - OFF HOT VENT vls - CLOSED WASTE STOP vls - VENT HAPROD2 OR - closed</p> <p>4.1.9 ORBIAL SWITCH POSITION CHECK</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>Before ORBIAL is stowed, or when not being used (whether GATHE/ LUNGE or in its PWR OFF or not), FOM 1 & 2 or must be at INEYL. Otherwise, pilot inertial air cannot be displayed by FOM ball.</p>	<p>250</p> <p>251</p> <p>250</p> <p>601</p>	<p>Assumes that ORBIAL bus has been interconnected between PFRS and IBA during installation, and that prime or backup crews will not be required to connect or disconnect ORBIAL cables to give or unflow ORBIAL.</p>
CRP	<p>FOM1 or (both) - INEYL HARTS/LUNGE - PWR OFF HOT CRT coat - as desired</p>	11	<p>This value to be determined from planned nominal Inertial altitudes for each particular mission.</p>

STA/T DEFP	PROCEDURE	PAGE	REMARKS
CLR	<p data-bbox="278 166 419 187">ONE ATT - 380</p> <p data-bbox="278 291 492 311">ACCEL - check (+) G</p> <p data-bbox="278 311 448 332">PRAI SCALE - 5/3</p> <p data-bbox="278 332 433 353">PRAI SCL - 1/2</p> <p data-bbox="278 353 463 373">PRAI SOURCE - ONE</p> <p data-bbox="278 373 419 394">ATT SET - ONE</p> <p data-bbox="278 394 521 415">MAN ATT HOLD - RATE ONE</p> <p data-bbox="278 415 550 436">MAN ATT PITCH - ACCEL ONE</p> <p data-bbox="278 436 521 456">MAN ATT TRN - RATE ONE</p> <p data-bbox="278 456 448 477">LEN CYCLE - OFF</p> <p data-bbox="278 477 419 498">ATT DND - M13</p> <p data-bbox="278 498 375 519">RATE - HI</p> <p data-bbox="278 519 463 539">TRC PWR - on (up)</p> <p data-bbox="278 539 564 560">RSC PWR NORM (both) - AS/NO</p> <p data-bbox="278 560 535 581">RSC PWR DIR (both) - OFF</p> <p data-bbox="278 612 419 632">SC CONT - ONE</p> <p data-bbox="278 632 448 653">CSC MODE - FREE</p> <p data-bbox="278 653 521 674">SMAS MODE (1) - RATE 0</p> <p data-bbox="278 674 463 695">SCS THRUST - NORM</p> <p data-bbox="278 695 477 715">BY THRUST (2) - OFF</p> <p data-bbox="278 715 492 736">SCS ORNL to (3) - 0</p> <p data-bbox="278 736 666 757">ATT SET to (3) - R 100°, P 90°, Y 0°</p> <p data-bbox="278 757 521 778">SCS TRC (2) - RATE ONE</p> <p data-bbox="278 778 477 798">ORNL MPT (4) - OFF</p> <p data-bbox="278 798 433 819">AY CO - SA/DIR</p>	1	<p data-bbox="758 166 1292 291">Normally left at IMH position throughout mission. Selection of CDC position causes total attitude display to be lost on both balls. CDC damage will result if CDC position selected and pitch or yaw rate is $>5^\circ/\text{sec}$, or if CDC yaw Euler angle is $>60^\circ$ and $<-60^\circ$.</p> <p data-bbox="758 529 1307 612">For ground checks, TRAC CORTR PWR, RPT CORTR PWR NORM, and RSC CORTR PWR DIR are the equivalent of flight terms TRC PWR, MAN PWR NORM, and RSC PWR DIR respectively.</p> <p data-bbox="758 674 885 715">Lower Lock. Guarded.</p> <p data-bbox="758 798 1307 840">Provides reduced gain for SCS timeshared control of CDC auto mode if short.</p>

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LR ORNL CHECKS

STA/T STEP	PROCEDURE	PANEL	REMARKS
000	110 LOGIC - OFF 110 AUTO - AUTO 04 HOLD LOGIC - OFF 04 PREPARE DUMP - OFF 04 PREPARE FUEL - OFF (down) 100 GAGE - off (down) 100 HOLD - OFF .85 C W - OFF a/fc 100 W - a a/fc 100 - 8000 10 PREP/OP W - OFF TWO SHUT IN C2 - AUTO 1000 TMR START - etc	1	Guarded. Guarded. Guarded. Guarded. Required at OFF position until .85 C during entry. OFF position governed by LIMIT 2/3 FMR switch.
001	1000 TMR END - up (etc) 001 GAB AP Ind - +0.0 in. SC 00 FLOW Ind - 0.426.1 In/hr Inst (popped) PROBE EXT/REL to (2) - grip PROBE (3) - OFF EXT SURVIVAL LTS - OFF EXT HOLD LTS - OFF (etc) TUREL LTS - OFF 10 FMR - OFF UP TLM 04 - ACFT UP TLM 01 - BLOCK	2	TMR timer not working. Timer resets and starts counting; automatically shows 110-off occurs. Resets and starts counting up in event of abort initiation. DIRECT 00 valve partially open. Grip indicates probe fully extended or fully retracted. PROBE EXT/REL switch guarded. UP TLM 04 and UP TLM 01 switches should be placed to ACFT only as required during updates.

START STEP	PRECEDENCE	FUEL	COMMENT
000	ON RCS PRESS - off (down) ON RCS DRD SW - DISPLAY OFF RCS Status Check ON RCS IN 1 to (4) - hp ON RCS IN 2 to (4) - hp ON RCS PRIM DISPLAY to (4) - hp ON RCS SEC DISPLAY to (4) - hp ON RCS SEC FUEL PRESS (4) - OPEN RCS DRD SW - ON A, B, C, D ON RCS FHS TEST Ind - sub ON RCS IN PRESS Ind - 4000-4150 psia ON RCS SEC FUEL PRESS Ind - 100-200 psia	2	Recorded. Barber pole indicates helium isolation valves for system 1 are closed. Barber pole indicates helium isolation valves for system 2 are closed. Barber pole indicates at least one primary propellant isolation valve (fuel or oxidizer) in each quad is closed. Barber pole indicates at least one secondary propellant isolation valve (fuel or oxidizer) in each quad is closed. OPEN position is momentary. There is no position indicator lockback. Valve opening can be confirmed by ACE. ON RCS hysters are not operated on pad and during ascent to reduce effects of burst heating on package temperature. Ambient temperature +75° or +100°F will illuminate ON RCS status lights. Minimal in load is 8150 psia at 10°F. Pressure and temperature excursions are due to ambient conditions.

STAFF STEP	PROCEDURE	PANEL	REMARKS
CM:	<p>CM RCS 180 sw - On (X TEMP) CM RCS On TE TEMP Ind - 60°-80°F CM RCS 180 sw - PROPULST QTY CM RCS PROPULST QTY Ind - 1000 CM RCS 180C (A) - OFF CM RCS PROPULST (both) - on (up) CM RCS PROPULST (both) - down RCS 180 Ind - CM 1, CM 2 CM RCS On TEMP Ind - 60°-80°F CM RCS On PRESS Ind - 4800-4950 psia CM RCS RAMP PRESS Ind - 80-100 psia</p> <p>RCS 280 - off</p> <p>RCS 180C (A) - ON RCS 180C (B) - OFF CM/SM PRE SEP (both) - off (down) CM/SM SEP (?) - off (down) SM/SM SEP - off (down) PROPULST RAMP - AUTO 2 ENG OUT sw - AUTO LV BATES sw - AUTO TMR 180C (both) - AUTO</p>	2	<p>On position in momentary. Grip indicated propellant isolation valves are open.</p> <p>(X) servicing pressure monitored until system self-vented. Pressure varies with temperature and ullage. If manifold pressure drops suddenly (indicates ruptured burst diaphragm), close CM RCS propellant isolation valves and then prevent jets 4, 15, 6, for 15 minutes after orbit insertion. Preventing open vents in vent may propellant trapped between propellant isolation valves and jets by energizing Jet valve direct coils.</p> <p>Switch last set to OFF (momentary position) prior to backing crew ingress.</p> <p>SM position in momentary.</p> <p>Guarded. Guarded. Guarded.</p> <p>Guarded.</p>

PLA/T STEP	PROCEDURE	PANEL	REMARKS
00P	LF 0000 ON - 10 LF 0000 - OFF ALARM INJECT - INJECT NR REL - OFF (down) SMOKE 02 - CLOSE REPRESS 00 PALE - open (CW) REPRESS 00 PRESS 1rd - 000 pale DRA DRA 00 DRP - OFF MUT PRESS ALARM - OFF	2 600 600 600 604	Guarded. Guarded. Guarded.
4.1.11 NR COUCH CHECKS			
L0P	NR00 & Pnl 00 SCI PNR - OFF SMOKE TRIGG - OFF NCEL PNR - OFF DOME PNR - OFF cb pnl 075 - all closed except cb NR00 & B NR01 (2) - open cb FLY/PL BAT NR0 0, 1, & BAT C (2) - open cb pnl 076 - all closed cb pnl 078 - all closed except cb UPB 075 COMPP (North) - open	000 16 075 076 078	Connector covered. Connector covered. Connector covered.
	NR Side Pnl PC 1 PUMPS - ACC PC 2 & 3 PUMPS - ACC 1/2 PNR - ACC NR DRG TEL (2) - OFF BAT CHRG - ACC	5	

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NR COUCH CHECKS

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 APOLLO OPERATIONS HANDBOOK

STA/STEP	PROCEDURE	PANEL	REMARKS
LMF	<p>UNLOCK BUS - OFF</p> <p>INITIAL LTS - OFF</p> <p>FLOOD LTS - OFF</p> <p>FLOOD BTM - 1</p> <p>FLOOD THERM - OFF</p> <p>ch panel 5 - all closed except</p>	3	<p>If circuit breaker 58B (58C) OFF in RAT 2 and/or RAT 3 trip, or are opened in flight, they should not be closed unless batteries are tied to main bus (see MAT TIE (C) - on Cap)). This prevents possible disconnect of ECF radiator heaters by false overheat signal.</p>
	<p>ch BATTERY HEAT - open</p> <p>ch WASTE HEAT FTRG (L) - open</p> <p>RFG CHARGING - ACT</p> <p>TELECOM OFF 1 - ACT</p> <p>TELECOM OFF 2 - ACT</p> <p>OLE FWDPS - 1 ACT (verify)</p> <p>HEAT COMPS (initial) - OFF</p> <p>ch panel 4 - all closed</p>	4	
MS HNO Fuel	<p>FC HND (all) - OFF (str)</p> <p>FC HND 4b (all) - CRAY</p>	3	<p>CRAY does not indicate status of fuel cell radiator bypass valves as talkback circuits are not powered at this time.</p>
	<p>FC HTRG (all) - on (cap)</p> <p>FC FTRG (all) - OFF</p> <p>FC HTRCC (all) - str</p> <p>FC HTRCC 4a (all) - CRAY</p>		<p>CRAY indicates fuel cell radiators valves open.</p>
	<p>FC HND 1 & 3 - OFF, 2 - str</p>		<p>Fuel cell management will be monitored by ground crew until the global drive and trim check at which time they will be verified on the main buses by the crew.</p>

INIT/STEP	PROCEDURE	PANEL	REMARKS
IMP	<p>PC NSA 1 & 2 th - tp, 7 th - gray</p> <p>NSA RESET - clr PC NSA (all) - OFF PC NSA th (all) - tp</p> <p>ISB RESET - clr PC ISB sel - 1, 2, 3 PC IS PLM Sel - 0.01-0.05 lb/hr PC IS PLM Sel - 0.1-0.6 lb/hr</p> <p>PC SKIN TEMP Ind - 100°-150°F PC CORE SKI TEMP Ind - 100°-115°F PC Ws (2) - gray</p> <p>PC ISB sel - 2 BAT CRG - OFF DC ISB sel - PC 1, 2, 3 DC AMPB Ind - 1-28 amps DC ISB sel - 100, 0 DC WOODS Ind - 25.5-30 mdc DC ISB sel - BAT IND A, B, BAT C DC WOODS Ind - 35-37.5 mdc DC AMPB Ind - 43.0 amps</p>	3	<p>Barber pole indicates fuel cells 1 and 2 disconnected from main bus A, gray indicates fuel cell 2 connected to main bus A.</p> <p>Barber pole indicates all fuel cells disconnected from main bus B.</p> <p>Flow limits are proportional to individual fuel cell currents and can be approximated by fuel cell DC flow $w(\text{amps} \times 0.5)/1000$, and fuel cell AC flow $w(\text{amps} \times 2.0)/1000$. CRT is supplying most of the DC power.</p> <p>Gray indicates normal pH factor and normal fuel cell radiator temperature.</p>

4.1.11

RE CORE CIRCS

CDA/T STEP	PROCEDURE	PANEL	REMARKS
	<p style="text-align: center;">CAUTION</p> <p>Do not leave NO TRG sel at PTRD BAT A (0) position any longer than req to read DC VOLTS, or PTRD bat chg will be detected.</p> <p>1-21 NO TRG sel - PTRD BAT A, 0 1-22 DC VOLTS sel - 24.0-25.0 vdc 1-23 NO TRG sel - PRA</p> <p>Read the fuel flows</p> <p>1-24 INV 1 - PRA 1-25 INV 2 - PRA 1-26 INV 3 - PRA 1-27 INV 1 AC1 - on (up) 1-28 INV 2 AC1 - OFF 1-29 INV 3 AC1 - OFF 1-30 INV 1 AC2 - OFF 1-31 INV 2 AC2 - on (up) 1-32 INV 3 AC2 - OFF 1-33 NO TRG sel - BAT 1 & 2, PA, P₁, P₂, C 1-34 NO VOLTS sel - 113-117 vdc</p> <p>1-35 OTC Stat Checks 1-36 OTC FUEL FLOW sel - 100% max</p> <p>1-37 OTC PRESS FLOW sel - 170-190 psia 1-38 OTC OIL FLOW sel - 170-190 psia</p>	<p>3</p>	<p>Switch position verification req. If switch positions must be changed, refer to 3.3.3.0, step 4.</p> <p>Normal operating temperature is +40° to +70°F, Redline is +27 and +180°F.</p> <p>Normal operating pressure after fuel and oxidizer leak is pressurized will be (after the valve is actuated) is 130-185 psia. OTC servicing pressure is 120 psia.</p>

STATE STEP	PROCEDURE	PANEL	REMARKS
14F	<p>SPS PRESS 180 sw - He, HGA, 500 SPS He PRESS Ind - 3000-3000 psia SPS He PRESS Ind - 3000-3000 psia SPS 180 VLV test (A) - check SPS 0810 VLV upper th - MAX (verify) SPS 0810 VLV lower th - crop (verify)</p> <p>OXID FLOW VLV 180B - DIB (verify)</p> <p>OXID FLOW VLV 190A - 190A PWR 8000 - 8000 SPS He VLV th (both) - tp</p> <p>SPS He VLV (both) - 8000 SPS LINE 8000 - off (air) SPS PRESS 180 sw - He</p> <p>VLF ANT - ON LIGHT S NO XPDR - OFF S NO PWR APPL WPT - PWRM S NO PWR APPL SI - off (ctrl) S NO 8000 BUICK - VOICE S NO 8000 PCM - PCM S NO 8000 SW - SW S NO 8000 SAFE - STR S NO 8000 TP - STR</p> <p>UP TLR CRDA - DATA UP TLR CRB - 8000, when OFF PWR APPL th - tp</p> <p>TAPE ROTATE th - tp</p>	0	<p>SPS working pressure is 3000±50 psia.</p> <p>Upper tailback MAX and lower tailback gray indicates propellant utilization valve positioned for maximum oxidizer flow.</p> <p>Valve positioned to DIB by SPS during hypergolic landing.</p> <p>Barber pole indicates both helium isolation valves closed.</p> <p>Barber pole indicates power is not applied to E-band power amplifier.</p> <p>Barber pole indicates no tape motion.</p>

STAGE DEEP	PROCEDURE	PANEL	REMARKS
LND	<p> HND DRIM STN - off (ctr) HND 170 100 - OFF 130T 0800 SP Int - 0.0 paid FROM ACCUM QTS Int - 20-500 min HND QTS Int as - 8000. 1300E Int QTS Int - 1700 HND QTS Int as - 10T 130T 120 QTY Int - 100 HND 100 QTS - OFF 130T 120 ACCUM AMRO - ctr 130T 120 ACCUM OS - ctr 130T 10 0200 - ON for 30 sec then off (ctr) 1300 COOL KMAP - 130T for 50 sec min, then off (ctr) 1300 COOL PMAP - off (ctr) 01Y 000 10 1300 - MAN Position prin loop atm press vlv 01Y 000 07H 1300 - MAN 01Y 000 07H 1300 - 1300 for 50 sec min, then 0200 for 8.5±0.5 sec 01Y 000 100 FLOW - off (ctr) 01Y 000 100 - MAN 01Y 000 100 - max deep 01Y 000 100 FNR - OFF 01Y 000 100 TRACK - AMRO 01Y 000 100 1000 - VIDE </p>	2	<p> 130T 0800 C/O (light) remains on as long as compressors are not operating. Unless 01Y 07 0000 masterd switch is positioned to off (center), continuous power will be applied to master valve. Ensures secondary loop steam primary valve closed. 1300 and 0200 positions are secondary. Steam pres- sure valve requires 50 seconds from full close to full open. </p>

11 0000 0000

CR/T STEP	PROCEDURE	PANEL	REMARKS
CRP	HI GAIN ANT FITCH Ind - 400° HI GAIN ANT YW Ind - 0° HI GAIN ANT FITCH coord - 0° HI GAIN ANT YW coord - 150° HI GAIN ANT CRVDO - PRIM CRB PRESS: HRP via - slide (C) Slide hatch	3	Power off indicator reading. Power off indicator reading. Zero position. Zero position.
	4.1.10 COMMUNICATIONS CHECK		
	1. Comm Activation		
LAP	E 30 SPDR - PRIM O 30 PAR AMPL S1 - 10 VRF AMPL W - zero (after 70 sec)	5	Lamp indicated power applied to channel power amplifier.
CRP	VRF AM W - 0VDC	2	
ALL	O 30 INT Ind - 12/3 scale MODE (3) - INTERCOM/INT PAR COMM (3) - T/R PAR COMM VOL tw (3) - 5 PAR (3) - AM-COUSTIC METER VOL tw (3) - 5 CRIT PAR (3) - on top INTERCOM (3) - T/R INTERCOM VOL tw (3) - 5 VRF AM (3) - T/R VRF AM VOL tw (3) - 5 W 30 (3) - T/R O 30 VOL tw (3) - 5 RADIO CRIT (3) - COMM	9, 10, 6	
CRP	VRF 300 - 300M	9	

4.1.10

COMMUNICATIONS CHECK

STEP/STEP	PROCEDURE	PAGE	REMARKS
2 CS-10P	Comm Checks Replicate facility handsets with CR handsets		CR handsets and CRF adapters have been connected to communication control head prior to backup crew ingress at which time PWR and CRIT PWR switches were OFF (panels 6, 10, and 9).
CRB 10P	Perform comm checks (incl comm. D-band, & VHF 2P) Return to facility handset Test CRP handset & perform D-band & VHF AM comm checks IF TLE DATA - 10: twice CR Establish 3-way comm on D-band IF TLE DATA - 10:10 (NO MIC TAMP - NO SWITCH NO) Establish 3-way comm on D-band (NO MIC TAMP - CR) Return to facility handset	1	Ground will switch communication channel code that D-band codes and VHF 2P may be verified.
10L	At completion of Comm Checks CRIT PWR (3) - ON	10,10,6	
CRP	PWR (1) - OFF CRITVCR VOL sw - 6 INTERRUPT VOL sw - 6 (NO VOL sw - 6) CRP 2P VOL sw - 7	10	
10L	Disconnect CR handset & CRF adapter from comm control head		
CRP	CRIT PWR - OFF (CR)	10	
CRP	CR CRP (1) - open CRB & CRP return CR	5	

COMMUNICATIONS CHECK

ASAP-13-8000E II-2-10
 Change Data
 Page
 4-10

CMT/STEP	PROCEDURE	PAGE	REMARKS
4.1.13 TRIP/TIME CONFIGURATION			
NOTE:	TEC assist bar - stowed & locked Handbrake - soft pull position TEC arrest in launch position & locked LH-3 arm restraints - stowed & center locked Coustons - launch/entry position (Y-0 - stowed & locked) Seat pans - 85° position & locked O/doors up - stowed Harnesses & restraints - stowed & held aside Coach plate brace - stowed Egress ON		Backup CM' (BCTM) accomplishes all tasks in 4.1.13 and 4.1.14. To eliminate confusion, station callouts for CM and M' (seatings have) not been included.
4.1.14 TRIP/CHRY PRE-INSERT PROCEDURE			
	Increase CM		Backup CM' re-enters CM.
	C NO PAR BRK. ST - OFF	1	The S-hand is powered down to allow (CM) rotation
	C NO BRKE - OFF		Default unknown alignment.
	CH C/W (2) - close	5	
	C/W PAR - 1	2	
	TRIP/TIME ALARM pl/Lt - on, push	1,1,102	
	Perform Post Motor Check		Performed following launch vehicle propellant loading.
	FOT TO IS via - OFF	102	
	Attach needle away to inj port		Use emergency sterilization kit for sterilization.
	Insert chlor ampoule into casing		
	Conn. knob away & rot (CM) until		
	- piston contacts ampoule		
	Install ampoule away on needle away (push		
	& turn CM)		

4.1.14

TRIP/CHRY PRE-INSERT PROCEDURE

CALL/STEP	PROCEDURE	PAGE	REMARKS
ACM*	<p>Rot knob (CW) until ampoule is empty (piston bottom out) Disconnect ampoule away from needle away (push & turn CCM) Rot knob (CCW), remove used ampoule Repeat chisel inj steps using buffer ampoule (do not remove empty ampoule after inj) Wait 10 min. Then rot lag barrel (CCW) four turns while holding bagonet section in locked position (CW) Rot knob (CCW), remove filled ampoule because needle away from inj port Wait 30-45 min. Then withdraw water as follows</p> <p>Attach H2O sampling container to Food prep unit 40% push FOOD PREP HOT H2O vlv - push, rel 363 until 40 cc water withdrawn FOOD PREP COLD H2O vlv - push, rel until 30 cc water withdrawn Remove H2O sampling container from Food prep unit & attach to drink gun nozzle DRINK H2O SUP vlv - ON 364 activate drink gun control 0-4 cc water withdrawn DRINK H2O SUP vlv - OFF Remove H2O sampling container from drink gun nozzle Remove sterilization kit from CM</p>	363	<p>Requires 0.5-1.0 turns.</p> <p>Needle assembly to remain on injert port.</p> <p>Withdraw one ampoule of water.</p>

STEP/STEP	PROCEDURE	PANEL	REMARKS
1000*	DIRECT ON air - OPEN (COM) w/d bar	0	
	02 FLOW Ind - 0.4-0.8 lb/hr	2	
	0307 COMPB 1 - Acc	4	
	0317 COMPB 1t - out	2	
	0317 COMPB 4P Ind - 0.7-0.9 psid		
	0317 CAB 4P Ind - +0.0 In. H ₂ O		
	Verify 100		
	0320 PRND MM (2) - SAFE (unlocked)	8	Red safety officer provides key to remove guard from before lock 0320 PRND MM switches.
	0320 XPRND PWS - 050	100	
	0 50 XPRND - PRIM	2	
	0 50 PWS WDEL RT - 10		
	Increase GSR for prime crew ingress support.		