

Orbit Operations Checklist

**Mission Operations Directorate
Operations Division**

**Generic, Rev H
January 17, 2002**

NOTE
For STS-109 and subsequent flights

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



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MISSION OPERATIONS DIRECTORATE

ORBIT OPERATIONS CHECKLIST

GENERIC, REVISION H
January 17, 2002

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	ORB OPS-1928
	ORB OPS-1934
	ORB OPS-1935A
	ORB OPS-1936
	ORB OPS-1944
	ORB OPS-1945

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DO3/H. Scott	281-483-0670
Alt. Book Manager	DO3/T. Grosko	281-483-3727

ORBIT OPERATIONS CHECKLIST

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REV H 01/17/02

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2-14		ALL/GEN H	3-22	ALL/GEN H

* - Omit from flight book

3-23	ALL/GEN H	5-25	<input checked="" type="checkbox"/> ALL/GEN H
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3-29	ALL/GEN H	5-31	ALL/GEN H
3-30	ALL/GEN H	5-32	ALL/GEN H
4-1	ALL/GEN H	5-33	ALL/GEN H
4-2	ALL/GEN H	5-34	ALL/GEN H
4-3	ALL/GEN H	5-35	ALL/GEN H
4-4	ALL/GEN H	5-36	ALL/GEN H
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4-6	ALL/GEN H	5-38	ALL/GEN H
4-7	ALL/GEN H	5-39	<input checked="" type="checkbox"/> ALL/GEN H
4-8	ALL/GEN H	5-40	ALL/GEN H
4-9	ALL/GEN H	5-41	ALL/GEN H
4-10	ALL/GEN H	5-42	ALL/GEN H
5-1	ALL/GEN H	6-1	ALL/GEN H
5-2	ALL/GEN H	6-2	ALL/GEN H
5-3	ALL/GEN H	6-3	ALL/GEN H
5-4	ALL/GEN H	6-4	ALL/GEN H
5-5	ALL/GEN H	6-5	ALL/GEN H
5-6	ALL/GEN H	6-6	ALL/GEN H
5-7	ALL/GEN H	6-7	ALL/GEN H
5-8	ALL/GEN H	6-8	ALL/GEN H
A5-9	MEDS/GEN H	6-9	ALL/GEN H
A5-10	MEDS/GEN H	6-10	ALL/GEN H
B5-9	NOM/GEN H	6-11	ALL/GEN H
B5-10	NOM/GEN H	6-12	ALL/GEN H
5-11	ALL/GEN H	6-13	ALL/GEN H
5-12	ALL/GEN H	6-14	ALL/GEN H
5-13	ALL/GEN H	7-1	ALL/GEN H
5-14	ALL/GEN H	7-2	ALL/GEN H
5-15	ALL/GEN H	7-3	ALL/GEN H
5-16	ALL/GEN H	7-4	ALL/GEN H
5-17	ALL/GEN H	7-5	ALL/GEN H
5-18	ALL/GEN H	7-6	ALL/GEN H
5-19	ALL/GEN H	7-7	ALL/GEN H
5-20	ALL/GEN H	7-8	ALL/GEN H
5-21	ALL/GEN H	7-9	ALL/GEN H
5-22	ALL/GEN H	7-10	ALL/GEN H
5-23	ALL/GEN H	7-11	ALL/GEN H
5-24	ALL/GEN H	7-12	ALL/GEN H

– Prelift-off information required

A7-13	MEDS/GEN H	7-36	ALL/GEN H
A7-14	MEDS/GEN H	A7-37	MEDS/GEN H
A7-15	MEDS/GEN H	A7-38	MEDS/GEN H
A7-16	MEDS/GEN H	A7-39	MEDS/GEN H
A7-17	ALL/GEN H	A7-40	MEDS/GEN H
A7-18	ALL/GEN H	B7-37	NOM/GEN H
A7-19	MEDS/GEN H	B7-38	NOM/GEN H
A7-20	MEDS/GEN H	B7-39	NOM/GEN H
A7-21	MEDS/GEN H	B7-40	NOM/GEN H
A7-22	ALL/GEN H	8-1	ALL/GEN H
A7-23	MEDS/GEN H	8-2	ALL/GEN H
A7-24	MEDS/GEN H	9-1	ALL/GEN H
A7-25	ALL/GEN H	9-2	ALL/GEN H
A7-26	ALL/GEN H	9-3	ALL/GEN H
A7-27	ALL/GEN H	9-4	ALL/GEN H
A7-28	MEDS/GEN H	9-5 (3 pgs)	† ALL/GEN H
A7-29	MEDS/GEN H	9-6 (3 pgs)	† ALL/GEN H
A7-30	MEDS/GEN H	10-1	ALL/GEN H
A7-31	ALL/GEN H	10-2	ALL/GEN H
A7-32	MEDS/GEN H	10-3	ALL/GEN H
B7-13	NOM/GEN H	10-4	ALL/GEN H
B7-14	NOM/GEN H	10-5	ALL/GEN H
B7-15	ALL/GEN H	10-6	ALL/GEN H
B7-16	NOM/GEN H	10-7	ALL/GEN H
B7-17	ALL/GEN H	10-8	ALL/GEN H
B7-18	ALL/GEN H	10-9	ALL/GEN H
B7-19	NOM/GEN H	10-10	ALL/GEN H
B7-20	NOM/GEN H	10-11	ALL/GEN H
B7-21	NOM/GEN H	10-12	ALL/GEN H
B7-22	ALL/GEN H	10-13	ALL/GEN H
B7-23	NOM/GEN H	10-14	ALL/GEN H
B7-24	ALL/GEN H	10-15	ALL/GEN H
B7-25	ALL/GEN H	10-16	ALL/GEN H
B7-26	ALL/GEN H	10-17	ALL/GEN H
B7-27	ALL/GEN H	10-18	ALL/GEN H
B7-28	ALL/GEN H	10-19	ALL/GEN H
B7-29	NOM/GEN H	10-20	ALL/GEN H
B7-30	NOM/GEN H	10-21 (4 pgs)	† ALL/GEN H
B7-31	NOM/GEN H	10-22 (4 pgs)	† ALL/GEN H
B7-32	NOM/GEN H	11-1	ALL/GEN H
7-33	ALL/GEN H	11-2	ALL/GEN H
7-34	ALL/GEN H	11-3	ALL/GEN H
7-35	ALL/GEN H	11-4	ALL/GEN H

† – Extra pages in crew copy only

12-1	ALL/GEN H	12-45	ALL/GEN H
12-2	ALL/GEN H	12-46	<input checked="" type="checkbox"/> ALL/GEN H
12-3	ALL/GEN H	12-47	ALL/GEN H
12-4	ALL/GEN H	12-48	ALL/GEN H
12-5	ALL/GEN H	12-49	ALL/GEN H
12-6	ALL/GEN H	12-50	ALL/GEN H
12-7	ALL/GEN H	12-51	ALL/GEN H
12-8	ALL/GEN H	12-52	ALL/GEN H
12-9	ALL/GEN H	12-53	ALL/GEN H
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12-11	ALL/GEN H	12-55	ALL/GEN H
12-12	<input checked="" type="checkbox"/> ALL/GEN H	12-56	ALL/GEN H
12-13	ALL/GEN H	12-57	ALL/GEN H
12-14	ALL/GEN H	12-58	ALL/GEN H
12-15	ALL/GEN H	12-59	ALL/GEN H
12-16	ALL/GEN H	12-60	ALL/GEN H
12-17	ALL/GEN H	12-61	ALL/GEN H
12-18	ALL/GEN H	12-62	ALL/GEN H
12-19	ALL/GEN H	12-63	ALL/GEN H
12-20	ALL/GEN H	12-64	ALL/GEN H
12-21	ALL/GEN H	12-65	ALL/GEN H
12-22	ALL/GEN H	12-66	ALL/GEN H
12-23	ALL/GEN H	12-67	ALL/GEN H
12-24	ALL/GEN H	12-68	ALL/GEN H
12-25	ALL/GEN H	12-69	ALL/GEN H
12-26	ALL/GEN H	12-70	ALL/GEN H
12-27	ALL/GEN H	12-71	ALL/GEN H
12-28	ALL/GEN H	12-72	ALL/GEN H
12-29	ALL/GEN H	12-73	ALL/GEN H
12-30	ALL/GEN H	12-74	ALL/GEN H
12-31	ALL/GEN H	12-75	ALL/GEN H
12-32	ALL/GEN H	12-76	ALL/GEN H
12-33	ALL/GEN H	12-77	ALL/GEN H
12-34	ALL/GEN H	12-78	ALL/GEN H
12-35	ALL/GEN H	13-1	ALL/GEN H
12-36	ALL/GEN H	13-2	<input checked="" type="checkbox"/> ALL/GEN H
12-37	ALL/GEN H	13-3	ALL/GEN H
12-38	ALL/GEN H	13-4	<input checked="" type="checkbox"/> ALL/GEN H
12-39	ALL/GEN H	13-5	<input checked="" type="checkbox"/> ALL/GEN H
12-40	ALL/GEN H	13-6	<input checked="" type="checkbox"/> ALL/GEN H
12-41	ALL/GEN H	13-7	<input checked="" type="checkbox"/> ALL/GEN H
12-42	ALL/GEN H	13-8	<input checked="" type="checkbox"/> ALL/GEN H
12-43	ALL/GEN H	13-9	ALL/GEN H
12-44	ALL/GEN H	13-10	<input checked="" type="checkbox"/> ALL/GEN H

– Prelift-off information required

13-11	.....	ALL/GEN H		CC 15-30	.....	*	ALL/GEN H
13-12	<input checked="" type="checkbox"/> ALL/GEN H		CC 15-31	.....	*	ALL/GEN H
13-13	.....	ALL/GEN H		CC 15-32	.....	*	ALL/GEN H
13-14	.....	ALL/GEN H		CC 15-33	.....	*	ALL/GEN H
13-15	.....	ALL/GEN H		CC 15-34	.....	*	ALL/GEN H
13-16	.....	ALL/GEN H		CC 15-35	.....	*	ALL/GEN H
13-17	.....	ALL/GEN H		CC 15-36	.....	*	ALL/GEN H
13-18	.....	ALL/GEN H		CC 15-37	.....	*	ALL/GEN H
14-1	.....	ALL/GEN H		CC 15-38	.....	*	ALL/GEN H
14-2	.....	ALL/GEN H		CC 15-39	.....	*	ALL/GEN H
14-3	.....	ALL/GEN H		CC 15-40	.....	*	ALL/GEN H
14-4	.....	ALL/GEN H		CC 15-41	.....	*	ALL/GEN H
15-1	.....	*	ALL/GEN H	CC 15-42	.....	*	ALL/GEN H
CC 15-2	.....	*	ALL/GEN H				
CC A15-3	.....	*	ALL/GEN H				
CC A15-4	.....	*	MEDS/GEN H				
CC B15-3	.....	*	ALL/GEN H				
CC B15-4	.....	*	NOM/GEN H				
CC 15-5	.....	*	ALL/GEN H				
CC 15-6	.....	*	ALL/GEN H				
CC 15-7	.....	*	ALL/GEN H				
CC 15-8	.....	*	ALL/GEN H				
CC 15-9	.....	*	ALL/GEN H				
CC 15-10	*	ALL/GEN H				
CC 15-11	*	ALL/GEN H				
CC 15-12	*	ALL/GEN H				
CC 15-13	*	ALL/GEN H				
CC 15-14	*	ALL/GEN H				
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CC 15-21	*	ALL/GEN H				
CC 15-22	*	ALL/GEN H				
CC 15-23	*	ALL/GEN H				
CC 15-24	*	ALL/GEN H				
CC 15-25	*	ALL/GEN H				
CC 15-26	.....	*	ALL/GEN H				
CC 15-27	.....	*	ALL/GEN H				
CC 15-28	.....	*	ALL/GEN H				
CC 15-29	*	ALL/GEN H				

– Prelift-off information required
 * – Omit from flight book

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ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
WCCS COMM Plan		
(Front)	CC 15-2	ORB OPS-1a/O/A
(Back)	CC A15-3	ORB OPS-1b/O/A
Orbit Spec (R11)	CC A15-4	ORB OPS-2a/MEDS/O/F
(Back)	CC B15-3	ORB OPS-1b/O/A
Orbit Spec (R11)	CC B15-4	ORB OPS-35a/NOM/O/A
Primary C/W Parameter		
Matrix (Back of Orbit		
Spec (R11))	CC 15-5	ORB OPS-2b/O/B
KU Antenna Overlay		
(B&W Monitor)	CC 15-6	ORB OPS-3a/O/B
(Color Monitor)	CC 15-7	ORB OPS-4a/O/A
Urine Collection		
(w/o UMS) (Front)	CC 15-8	ORB OPS-5a/O/G
CONT Waste Collection -		
UCD/Apollo Bag (Back of		
Urine Collection		
(w/o UMS))	CC 15-9	ORB OPS-5b/O/F
Urine Collection (w/UMS)		
(Front)	CC 15-10	ORB OPS-6a/O/H
UMS CONT Waste		
Collection - UCD/		
Apollo Bag (Back of		
Urine Collection		
(w/UMS))	CC 15-11	ORB OPS-6b/O/G
EDO WCS Urine/Feces		
Collection		
(Front)	CC 15-12	ORB OPS-7a/O/C
(Back)	CC 15-13	ORB OPS-7b/O/C
EDO WCS Manual		
Compaction		
(Front)	CC 15-14	ORB OPS-8a/O/A
(Back)	CC 15-15	ORB OPS-8b/O/A
Photo Grid Overlay	CC 15-16	ORB OPS-9a/O/A

ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
Dual Shift Orbiter CO2		
Absorber Replacement		
(Front)	CC 15-17	ORB OPS-11a/NON-RCRS/A
(Back)	CC 15-18	ORB OPS-11b/NON-RCRS/A
(Front)	CC 15-19	ORB OPS-12a/NON-RCRS/A
(Back)	CC 15-20	ORB OPS-12b/NON-RCRS/A
(Front)	CC 15-21	ORB OPS-13a/NON-RCRS/A
(Back)	CC 15-22	ORB OPS-13b/NON-RCRS/A
(Front)	CC 15-23	ORB OPS-14a/NON-RCRS/A
(Back)	CC 15-24	ORB OPS-14b/NON-RCRS/A
(Front)	CC 15-25	ORB OPS-15a/NON-RCRS/A
(Back)	CC 15-26	ORB OPS-15b/NON-RCRS/A
(Front)	CC 15-27	ORB OPS-16a/NON-RCRS/A
(Back)	CC 15-28	ORB OPS-16b/NON-RCRS/A
(Front)	CC 15-29	ORB OPS-17a/NON-RCRS/A
(Back)	CC 15-30	ORB OPS-17b/NON-RCRS/A
(Front)	CC 15-31	ORB OPS-18a/NON-RCRS/A
(Back)	CC 15-32	ORB OPS-18b/NON-RCRS/A
Single Shift Orbiter CO2		
Absorber Replacement		
(Front)	CC 15-33	ORB OPS-19a/NON-RCRS/A
(Back)	CC 15-34	ORB OPS-19b/NON-RCRS/A
(Front)	CC 15-35	ORB OPS-20a/NON-RCRS/A
(Back)	CC 15-36	ORB OPS-20b/NON-RCRS/A
(Front)	CC 15-37	ORB OPS-21a/NON-RCRS/A
(Back)	CC 15-38	ORB OPS-21b/NON-RCRS/A
(Front)	CC 15-39	ORB OPS-22a/NON-RCRS/A
(Back)	CC 15-40	ORB OPS-22b/NON-RCRS/A
Urine Pretreat		
Changeout		
(Front)	CC 15-41	ORB OPS-23a/O/C
(Back)	CC 15-42	ORB OPS-23b/O/C

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**APU/
HYD**

APU/
HYD

APU HEATER RECONFIG

A12 APU HTR GAS GEN/FUEL PUMP (three) - B AUTO
 LUBE OIL LINE (three) - B AUTO
 TK/FU LINE/H2O SYS 1B,2B,3B - AUTO
 1A,2A,3A - OFF

HYD ISOL VALVE REPOSITIONING

SM 87 HYD THERMAL

NOTE

LG EXTEND ISOL VLV should
not be opened on orbit

CAUTION

If CIRC PUMP P (HYD PRESS)
< 100 psia 30 sec after pump on,
CIRC PUMP – OFF

- If Spacelab and HYD System 2:
- R1 MN BUS TIE A – ON
B – OFF
 - R2 HYD CIRC PUMP 2 – ON
Wait 10 sec
 - R4 HYD BRAKE ISOL VLV 2 – OP(CL)
Hold 5 sec, √tb – OP(CL)
 - R2 HYD CIRC PUMP 2 – GPC
 - R1 MN BUS TIE B – ON
A – OFF

 - R2 HYD CIRC PUMP X – ON
Wait 10 sec
 - R4 HYD BRAKE ISOL VLV X – OP(CL)
Hold 5 sec, √tb – OP(CL)
or
HYD MPS/TVC ISOL VLV X – OP(CL)
Hold 5 sec, √tb – OP(CL)
 - R2 HYD CIRC PUMP X – GPC

COMM/INST

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**COMM/
INST**

COMM/
INST

KU-BD ANT DEPLOY

A1U ✓KU PWR – OFF
 CNTL – PNL
R13L ✓ANT DIRECT STO – OFF

PL BAY MECH PWR SYS 1,2 (two) – ON
KU ANT – DPY

- * If tb not DPY after 46 sec, *
- * KU ANT – GND *
- * Perform MAL, MECH, 9.3a *

When KU ANT tb – DPY (~23 to 46 sec),
KU ANT – GND

PL BAY MECH PWR SYS 1,2 (two) – OFF

CRT SELF TEST – ITEM 7 EXEC (no *)

A1U KU MODE – COMM
KU – GPC DESIG
KU CNTL – CMD

KU-BD ANT STOW

R13L ✓PL BAY MECH PWR SYS 1,2 (two) – OFF
 ✓KU CNTL – CMD
A1U KU PWR – ON
 MODE – RDR PASSIVE
 CNTL – PNL
 sel – MAN SLEW
A2 ✓DIGI-DIS SEL – EL/AZ
A1U SLEW RATE – as reqd

 SLEW ELEV – as reqd:
A2 R/EL ind: -27.0 (± 1°)

A1U SLEW AZM – as reqd:
A2 R/AZM ind: -123.0 (± 1°)

LOCK GIMBALS

NOTE

KU ANT sw must remain in STOW until
STOW DEPLOYED ASSEMBLY complete

DAP: VERN(FREE)

R13L KU ANT – STOW

A2 ✓R/EL ind: -29.0 (± 1°)
 ✓R/AZM ind: -125.0 (± 1°)

00:00 Start Event Timer
A2 Monitor KU ANT gimbal angles for 50 sec
 (gimbal lock test), then:

 * If KU ANT gimbal movement occurs *
 * within 50 sec, and/or if gimbal *
 * angles incorrect after 50 sec, *
 * perform MAL, MECH, 9.3c *

DAP: as reqd

Cont next page

2-5

ORB OPS/ALL/GEN H

STOW DEPLOYED ASSEMBLY
R13L PL BAY MECH PWR SYS 1,2 (two) – ON
√ KU ANT tb – STO (~23 to 46 sec)

* If tb not STO after 46 sec, *
* perform MAL, MECH, 9.3b *

A1U KU PWR – OFF (Expect ‘BCE BYP KU’)
R15:C cb MNB KU ELEC – op
MNC KU SIG PROC – op

R13L PL BAY MECH PWR SYS 1,2 (two) – OFF
KU ANT – GND

OCA If not in D/O Prep,
go to OCA S-BAND MODEM (MFX)
ACTIVATION (PGSC)

KU-BD MANUAL ACQUISITION (COMM)

1. SETUP
- | | | |
|-----|-------------------|--------------|
| A2 | ✓DIGI-DIS SEL | - EL/AZ |
| A1U | KU sel | - AUTO TRACK |
| | ✓PWR | - ON |
| | MODE | - COMM |
| | ✓SIG PROC HDR | - TV |
| | ✓LDR | - OPS RCDR |
| | CNTL | - PNL |
| | ✓SIG STRENGTH sel | - KU |
| | SLEW RATE | - as reqd |
| | ✓KU SCAN WARN tb | - bp |
| | ✓TRACK tb | - bp |
| | ✓SEARCH tb | - bp |

2. ANTENNA STEERING

NOTE

ANT will not LOCK/TRACK
when slewing in FAST RATE

SM ANTENNA

A1U,CRT,
A2 Use SLEW AZM and SLEW ELEV sw as reqd to
position antenna, until ANT EL,AZ angles on pnl
A2 are within 5° of ANT EL,AZ CMD angles on
CRT

A1U KU SEARCH - SEARCH
✓tb - gray
When SIG STRENGTH > 1.0 and
KU TRACK tb - gray (< 3 min),
✓KU SCAN WARN tb - bp
✓SEARCH tb - bp

- * If no track in 3 min, *
- * repeat step 2 once *
- * If still no track, ✓MCC *

KU CNTL - CMD

KU-BD ANT JETTISON

NOTE

Jettison between sunrise
and noon if possible

AUTO MNVR TO -XLV

GNC UNIV PTG

- ✓ START TIME at least 15 min prior to sunrise
- ✓ TGT ID: +2
- BODY VECT: +2
- OM: +0
- START TRK - ITEM 19 EXEC (CUR - *)
- DAP: A/AUTO/VERN

A6U

CONFIGURE KU FOR JETTISON

- A1U ✓ KU PWR - OFF
- CNTL - PNL
- R15 cb MNB KU ELEC - op
- ANT HTR - op
- CABLE HTR - op
- MNC KU SIG PROC - op
- A14 ✓ ANT ARM - SAFE
- ✓ JETT - SAFE
- MA73C:A MCA LOGIC MNC MID 2 - OFF
- :B MNB MID 4 - OFF
- ML86B:D cb MNA PYRO JETT SYS A KU ANT - cl
- MNC PYRO JETT SYS B KU ANT - cl

CONFIGURE CCTVs TO MONITOR JETTISON

Perform ACTIVATION (Cue Cards, TV, 8mm VTR)

- CCTV MON 1 - A
- 2 - B

Point CCTVs as reqd
Put new tape in VTR

- A7U ✓ Lighting - as reqd

Cont next page

2-8

ORB OPS/ALL/GEN H

A6U FLT CNTLR PWR – ON

✓In jettison att
DAP TRANS: PULSE/PULSE/PULSE

If VERN jets avail:
DAP: A1/INRTL/VERN
If VERN jets not avail:
DAP: B1/INRTL/PRI

Wait until rates damped, then:
DAP: A1/FREE/PRI
✓SENSE – as reqd
VTR – PLAY/RCD/RUN

NOTE

After JETT, initiate opening
rate ASAP. Minimize other
THC/RHC inputs

A14 PYRO KU ANT ARM – ARM

Wait 1 sec, then:
PYRO KU ANT JETT – JETT

INITIAL SEP MNVR (IMMEDIATELY
AFTER JETT)

DAP: A/INRTL/PRI

THC: +Z, 12 pulses (~1 fps)
(-X sense: THC dn)
(-Z sense: THC out)

SECOND SEP BURN (JETT +2:00 MIN)

SENSE – as reqd

THC: +Z, 12 pulses (~1 fps)
(-X sense: THC dn)
(-Z sense: THC out)

Cont next page

Maintain visual contact with KU ANT in OVHD window using RHC
When KU ANT no longer visible, then:

R12L CLEANUP
 VTR pb – STOP

GNC UNIV PTG
 √TGT ID: +2
 BODY VECT: +3
 √OM: +0
 START TRK – ITEM 19 EXEC (CUR – *)

 DAP: A1/AUTO/VERN
 FLT CNTLR PWR – OFF

A7U √Lighting – as reqd

A14 PYRO KU ANT JETT – SAFE
 ARM – SAFE

ML86B:D cb MNA PYRO JETT SYS A KU ANT – op
 MNC PYRO JETT SYS B KU ANT – op

MA73C:A MCA LOGIC MNC MID 2 – ON
 :B MNB MID 4 – ON

PRE-SLEEP AUD CONFIG

✓XX AUD PWR – AUD
A/G 2 – T/R
All other LOOPS – OFF
XX AUD XMIT/ICOM MODE – PTT/PTT

O6 ✓UHF MODE SEL – OFF

FLIGHT DECK/MIDDECK AUD CONFIG

Perform STD HANDHELD MIC/SPEAKER
CONFIG, 2–16, then:

MO42F SPKR BOX CHECKOUT
MIDDECK SPKR AUD PWR – AUD
Set off alert tone and adjust Bypass Tone volume
as reqd
IDP/CRT PWR – OFF,ON

MIDDECK SPKR AUD PWR – OFF
Perform comm check with GND using flt deck
handheld mic
MIDDECK SPKR AUD PWR – AUD/TONE

A13 OS AUD SPKR PWR – OFF
Perform comm check with GND using middeck
handheld mic
OS AUD SPKR PWR – SPKR

NOTE

If during sleep period, SM ALERT
annunciated with no fault msg, MCC has
no cmd capability. ✓MCC. If no joy, go
to COMM LOST (ORB PKT, COMM)

MEDS

A2-11 ORB OPS/MEDS/GEN H

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PRE-SLEEP AUD CONFIG

✓XX AUD PWR – AUD
A/G 2 – T/R
All other LOOPS – OFF
XX AUD XMIT/ICOM MODE – PTT/PTT

O6 ✓UHF MODE SEL – OFF

FLIGHT DECK/MIDDECK AUD CONFIG

Perform STD HANDHELD MIC/SPEAKER
CONFIG, 2–16, then:

MO42F SPKR BOX CHECKOUT
MIDDECK SPKR AUD PWR – AUD
Set off alert tone and adjust Bypass Tone volume
as reqd
CRT PWR – STBY,ON

MIDDECK SPKR AUD PWR – OFF
Perform comm check with GND using flt deck
handheld mic
MIDDECK SPKR AUD PWR – AUD/TONE

A13 OS AUD SPKR PWR – OFF
Perform comm check with GND using middeck
handheld mic
OS AUD SPKR PWR – SPKR

NOTE

If during sleep period, SM ALERT
annunciated with no fault msg, MCC has
no cmd capability. ✓MCC. If no joy, go
to COMM LOST (ORB PKT, COMM)

NOM

B2-11 ORB OPS/NOM/GEN H

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POST-SLEEP AUD CONFIG

If handheld mic/speaker operation:
Perform STD HANDHELD MIC/SPEAKER
CONFIG, 2-16

If VLHS/HIU operation:
Perform STD VLHS/HIU CONFIG
(NO SPEAKER)

If WCCS operation:

NOTE

More than one crewmember per
WCCS channel will cause
intermittent loss of comm. Turn
unused WCCS leg units OFF

Perform STD VLHS/HIU CONFIG
(NO SPEAKER)

STD VLHS/HIU CONFIG (NO SPEAKER)

XX	XX AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - 2
	A/G 2	- RCV, tw - 2
	A/A	- RCV, tw - 2
	ICOM A,B (two)	- T/R, tw - 2
	XMIT/ICOM MODE	- PTT/PTT
XX	CCU PWR	- ON
A13	OS AUD SPKR PWR	- OFF
	MSTR SPKR VOL	- MIN
MO42F	MIDDECK AUD TONES	- ACCU/BYP
	SPKR PWR	- OFF
	MSTR SPKR VOL	- MIN

NOTE

Unused audio loops either RCV or OFF.
Unused VLHS comm systems either
disconnected or CCU PWR - OFF and
HIU VOL - 0

STD S-BD/KU-BD PNL CONFIG

If configuring for TDRS KU-BD:

Prior to configuring A1L/C3:

If KU in radar:

✓KU PWR – ON
 Perform KU OPS, step 4 (Cue Card,
RNDZ), then:
 KU CNTL – PNL,CMD

NOTE

KU-BD may take up to 3 min to
 complete search and acquire TDRS

If KU TRACK tb – bp

Perform KU-BD MANUAL
 ACQUISITION, 2-7, then:

		IF STDN(SGLS) <u>S-BD</u>	IF TDRS <u>S-BD</u>	IF TDRS <u>KU-BD</u>
A1L	NSP DATA RATE XMIT	– HI	HI	HI
	RCV	– HI	HI	HI
	UPLK DATA	– S-BD	S-BD	KU
	CODING XMIT	– OFF	ON	ON
	RCV	– OFF	ON	OFF
	S-BD PM MODE	– STDN LO (SGLS)	TDRS DATA	—
C3	S-BD PM CNTL	– PNL, CMD	PNL, CMD	PNL, CMD

NOTE

If S-BD mode TDRS or STDN HI,
 xmit may be delayed 3 min for PA
 warmup. Receive not affected

STD HANDHELD MIC/SPEAKER CONFIG

NOTE

For PRE-SLEEP AUD CONFIG,
MS(OS*) A/G 2, and MIDDECK
SPKR AUD A/G 2 switches should
remain off. '*' indicates OV102

FLIGHT DECK CONFIG

R10(A13*)	MS(OS*) AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - 2
	2	- RCV, tw - 2
	A/A	- RCV, tw - 2
	ICOM A,B (two)	- RCV, tw - 2
	XMIT/ICOM MODE	- PTT/PTT
A13	OS AUD SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- 8
A11	MS(OS*) COMM CCU PWR	- ON
	All WCCS leg units	- off

MIDDECK CONFIG

MO42F	MIDDECK SPKR AUD	
	A/G 1	- T/R, tw - 2
	2	- RCV, tw - 2
	A/A	- RCV, tw - 2
	ICOM A,B (two)	- RCV, tw - 2
	XMIT/ICOM MODE	- PTT/PTT
	SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- 8
MO39M	MIDDECK COMM CCU PWR	- ON
	All WCCS leg units	- off

STD WCCS CONFIG

ACTIVATION

Unstow and assemble WCCS leg units

XX	XX AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - 5
	A/G 2	- RCV, tw - 2
	A/A	- RCV, tw - 5
	ICOM A	- T/R, tw - 5
	B	- OFF, tw - 5
	XX AUD XMIT/ICOM MODE	- PTT/PTT
A13	OS AUD SPKR PWR	- OFF
	MSTR SPKR VOL sel	- MIN
MO42F	MIDDECK AUD SPKR PWR	- OFF
	MSTR SPKR VOL	- MIN
XX	XX CCU PWR	- OFF
	Connect AIU cables to CCU outlets	
	XX CCU PWR	- ON
AIU	MODE SEL	- as reqd
	Green pwr lt	- ON
CRU	CHNL	- Designated chnl (see Cue Card, <u>WCCS COMM PLAN</u>)
	VOLUME	- as reqd

NOTE

If WCCS used in config with Spkr Units, adjust spkr volume as reqd to prevent squeals

DEACTIVATION

AIU	MODE SEL	- OFF
	Green pwr lt	- OFF
CRU	VOLUME	- OFF
XX	XX CCU PWR	- OFF
	Disconnect AIU cables from CCU outlets	
	Disassemble, stow WCCS leg units	

ICOM RECORDER OPS

1. RECORD (Entry Config)
- A11 CCU PWR – OFF
 ✓MHA Connected to CCU
 Connect to MHA at A11
- ICOM
 RCDR
 CABLE
- Plug P3/RCDR into Rcdr MIC Port
 Plug P2/RCDR Headphone into Rcdr
 Headphones port
 Plug mic into cable MIC connector
 Tape all connections to Rcdr
- A11 CCU PWR – ON
 RCDR Install tape
 MIC ATT sw – 0 dB
 SPEED TUNE – OFF
 HEADPHONE VOLUME – 0 (taped)
 DOLBY NR – OFF
 TAPE – NORM
 PEAK/BATT – BATT
 MIC MIC PWR – 120
 ✓LED flash for good BATT
- ATU Desired Audio Loop(s) – T/R
 RCDR PAUSE and RECORD – depress, ✓no motion
 ✓BATT LED
 PEAK/BATT – PEAK
 REC LEVEL – 4
 PAUSE – release, ✓tape motion
 When complete – STOP, Mic – OFF
 To test setup – PLAYBACK
2. PLAYBACK
- RCDR ✓Tape rewind
 HEADPHONE VOL – 7
- ATU XMIT/ICOM MODE – PTT/VOX
 VOX SENS – MAX
 ICOM A(B) – T/R
- RCDR PLAY – depress
 ✓Tape motion, voice quality
 When complete, STOP – depress

Cont next page

O6 3. NORMAL UHF CONFIG
√UHF SQUELCH - ON
MODE - OFF

ATUxx AUD A/A - RCV

4. VIDEO RECONFIG
F8U R HUD MODE - NORM
F3 PWR - OFF
V10 PWR - OFF
O19 TV PWR - OFF

H/O TIMES (supplied by MCC at crew request)

TDRS -> STDN ____/____:____:____
WEST COAST STDN -> TDRS ____/____:____:____
TDRS -> STDN ____/____:____:____
EAST COAST SITE -> SITE (STDN) ____/____:____:____
STDN -> TDRS ____/____:____:____

COMM STRING 1 C/O (PART A: COMMAND TO STRING 1)

- A1L 1. VERIFY PANEL A1L CONFIG
- ✓S-BD PM ANT SW ELEC - 1
 - ✓PRE AMP - 1
 - ✓PWR AMPL STBY - 1
 - ✓OPER - 1
 - ✓AMP MODE - TDRS DATA
 - ✓XPNDR - 1
 - ✓NSP DATA RATE (two) - HI
 - ✓UPLK DATA - S-BD
 - ✓CODING (two) - ON
 - ✓PWR - 1

2. RECONFIG COMM STRINGS

- ✓MCC ready for reconfig

C3 S-BD PM CONTROL - PNL,CMD

Perform comm check with MCC-H

NOTE

S-Band, NSP now configured to String 1.
Alternate sw callouts used on all malfunction procedures. This config maintained for approx 24 hr

- A1L 3. RECONFIG PANEL A1L
- S-BD PM ANT SW ELEC - 2
 - PRE AMP - 2
 - PWR AMPL STBY - 2
 - OPER - 2
 - XPNDR - 2
 - NSP PWR - 2

COMM STRING 1 C/O (PART B: RETURN TO STRING 2)

1. VERIFY PANEL A1L CONFIG
- A1L ✓S-BD PM ANT SW ELEC - 2
 ✓PRE AMP - 2
 ✓PWR AMPL STBY - 2
 ✓OPER - 2
 ✓AMP MODE - TDRS DATA
 ✓XPNDR - 2
✓NSP DATA RATE (two) - HI
 ✓UPLINK DATA - S-BD
 ✓CODING (two) - ON
 ✓PWR - 2

2. RECONFIG COMM STRINGS

- ✓MCC ready for reconfig

C3 S-BD PM CONTROL – PNL,CMD

Perform comm check with MCC-H

NOTE

S-Band, NSP now configured to String 2.
Nominal sw callouts should be used on
all malfunction procedures

3. RECONFIG PANEL A1L
- A1L S-BD PM ANT SW ELEC - 1
 PRE AMP - 1
 PWR AMPL STBY - 1
 OPER - 1
 XPNDR - 1
NSP PWR - 1

CREW SYSTEMS

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 side view (facing stbd) 3-30

**CREW
SYS**

MEDS

PRE-SLEEP ACTIVITY

FLIGHT DECK ACTIVITY LIST

**CREW
SYS**

- R1(A11) 1. If reqd, SUPPLY WATER DUMP (ECLS) (✓MCC)
CRYO HEATER/MANF VLV config per MCC
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- MO69M 2. If FD1 and PPO2 < 3.20:
✓LEH O2 8 vlv – CL
Insert O2 Bleed Orifice Assembly into
LEH O2 8 QD
LEH O2 8 vlv – OP
- C7 ✓SPLY 1,2 vlv – OP
3. SM CHECKPOINT INITIATE (DPS)
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
4. CRT TIMER FOR WAKE UP
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
5. ALERT TONE DURATION
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- L1 6. CAB TEMP – adj rotary as desired (suggest
5 o'clock posn)
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

MEDS

A3-2 ORB OPS/MEDS/GEN H

MO10W 7. If 14.7 CAB REG INLET SYS 1(2) VLV – OP
(PCS active):

L2 Expect possible 'S66 CAB N2 FLO 1(2)'
O2/N2 CNTLR VLV SYS 1(2) – OP

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

NOTE

Do not perform following step until PRE-SLEEP
AUD CONFIG (COMM/INST) complete; see
MIDDECK ACTIVITY LIST, step 9, 3-6

8. PWRDN:

R11 ✓IDP/CRT4 PWR – ON
IDP/CRT4 MAJ FUNC – SM
✓IDP4 assigned to SM GPC

CRT4 SM ANTENNA
All AFT MDUs PWR – OFF
IDP/CRT4 PWR sw – OFF

C2 ✓IDP/CRT1 PWR sw – ON
✓IDP/CRT2 PWR sw – ON
IDP/CRT2 MAJ FUNC – GNC
✓IDP2 assigned to GNC GPC

CRT2 GNC UNIV PTG
All FWD MDUs except CRT 1,
MDU PWR – OFF
IDP/CRT2 PWR sw – OFF

Perform ERR LOG resets:

GNC 0 GPC MEMORY
ITEM 48 EXEC
 SM 0 GPC MEMORY
ITEM 48 EXEC

C3 BFC CRT SEL – 1 + 2
DISP – ON
MDU CRT1 PWR – OFF

Cont next page

MEDS

A3-3 ORB OPS/MEDS/GEN H

C2

IDP/CRT1 PWR sw – OFF
✓PWR OFF:
TV MON
CAMERAS
PWR CONTR UNIT
PWR
VTR
PLB LIGHTS
DDUs

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

9. WINDOW SHADES/FILTERS

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

10. LIGHTING

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F, 11. Pri RJDF DRIVER, LOGIC (eight) – OFF
O15:F,
O16:F

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F, 12. Pri RJDA DRIVER, LOGIC (eight) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

MIDDECK ACTIVITY LIST

1. FOOD PREP/POST

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

2. CO2 ABSORBER REPLACEMENT (Cue Card)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

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MEDS

A3-4 ORB OPS/MEDS/GEN H

CREW SYSTEMS

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**CREW
SYS**

NOM

B3-1

ORB OPS/ALL/GEN H

PRE-SLEEP ACTIVITY

FLIGHT DECK ACTIVITY LIST

**CREW
SYS**

- R1(A11) 1. If reqd, SUPPLY WATER DUMP (ECLS) (✓MCC)
CRYO HEATER/MANF VLV config per MCC
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- MO69M 2. If FD1 and PPO2 < 3.20:
✓LEH O2 8 vlv – CL
Insert O2 Bleed Orifice Assembly into
LEH O2 8 QD
LEH O2 8 vlv – OP
- C7 ✓SPLY 1,2 vlv – OP
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
3. SM CHECKPOINT INITIATE (DPS)
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- CRT 4. CRT MAJ FUNC – one SM, one GNC
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
5. CRT TIMER FOR WAKE UP
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
6. ALERT TONE DURATION
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- L1 7. CAB TEMP – adj rotary as desired (suggest
5 o'clock posn)
- 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

NOM

B3-2

ORB OPS/NOM/GEN H

MO10W 8. If 14.7 CAB REG INLET SYS 1(2) VLV – OP
(PCS active):

L2 Expect possible 'S66 CAB N2 FLO 1(2)'
O2/N2 CNTLR VLV SYS 1(2) – OP

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

NOTE

Do not perform following step until PRE-SLEEP
AUD CONFIG (COMM/INST) complete; see
MIDDECK ACTIVITY LIST, step 9, 3–6

9. PWRDN:
- CRT4 ✓PWR – ON
MAJ FUNC – SM
✓CRT4 assigned to SM GPC
 SM ANTENNA
PWR – OFF
- CRT2 ✓PWR – ON
MAJ FUNC – GNC
✓CRT2 assigned to GNC GPC
 GNC UNIV PTG
PWR – OFF
Perform ERR LOG reset:
- CRT1 GNC 0 GPC MEMORY
ITEM 48 EXEC
 SM 0 GPC MEMORY
ITEM 48 EXEC
- C3 BFC CRT SEL – 1+2
DISP – ON

Cont next page

NOM

B3–3 ORB OPS/NOM/GEN H

CRT1

PWR – STBY
✓PWR OFF:
TV MON
CAMERAS
PWR CONTR UNIT
PWR
VTR
PLB LIGHTS
DDUs (one ON, if reqd)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

10. WINDOW SHADES/FILTERS

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

11. LIGHTING

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F, 12. Pri RJDF DRIVER, LOGIC (eight) – OFF
O15:F,
O16:F

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F, 13. Pri RJDA DRIVER, LOGIC (eight) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

MIDDECK ACTIVITY LIST

1. FOOD PREP/POST

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

2. CO2 ABSORBER REPLACEMENT (Cue Card)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

NOM

B3-4

ORB OPS/NOM/GEN H

3. HOUSEKEEPING

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

4. WCS CLEANING (Cue Card, URINE
COLLECTION)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

5. SET UP EQUIPMENT FOR NEXT DAY'S
ACTIVITIES

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

6. ✓PWR OFF:
TV PWR

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

7. MISSION NOTES

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

8. TYPE PERSONAL MESSAGES, if desired

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

9. PRE-SLEEP AUD CONFIG (COMM/INST)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

10. LIGHTING

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

POST-SLEEP ACTIVITY

MIDDECK ACTIVITY LIST

1. LIGHTING (minimize if in GROUP B(C) PWRDN)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

2. CO2 ABSORBER REPLACEMENT (Cue Card)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

3. MESSAGE REVIEW

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

4. POST-SLEEP AUD CONFIG (COMM/INST)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

5. If FD2 and Bleed Orifice not installed:

MO69M

✓ LEH O2 8 vlv – CL
Insert O2 Bleed Orifice Assembly into
LEH O2 8 QD

C7

LEH O2 8 vlv – OP
✓ SPLY 1,2 vlv – OP

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

6. FOOD PREP/POST

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

7. HOUSEKEEPING

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

8. WCS OHS REPLACEMENT
- a. If FD2, perform URINE PRETREAT SETUP (Cue Card, URINE PRETREAT CHANGEOUT)
 - b. URINE PRETREAT CHANGEOUT
(Cue Card)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
9. If Entry day, perform URINE PRETREAT ENTRY PREP (Cue Card, URINE PRETREAT CHANGEOUT) (if flown)

Cont next page

FLIGHT DECK ACTIVITY LIST

1. LIGHTING (minimize if in GROUP B(C) PWRDN)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

2. WINDOW SHADES/FILTERS

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

3. IDPs/MDUs – ON as desired (use only one IDP with three MDUs max if in GROUP B(C) PWRDN)

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

C3

4. BFC CRT DISP – OFF

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

5. ALERT TONE DURATION

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

L1

6. CAB TEMP – adj rotary as reqd

If Entry day:

CAB TEMP – full COOL

Wait 20 min

CAB TEMP CNTLR – OFF

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

MO10W

7. If 14.7 CAB REG INLET SYS 1(2) vlv – OP (PCS active):

L2

O2/N2 CNTLR VLV SYS 1(2) – AUTO

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

MEDS

A3-9 ORB OPS/MEDS/GEN H

8. If planned, perform I'CNCT: L(R) OMS to RCS (ORB PKT, RCS), then:

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F,
O15:F,
O16:F

9. If not GROUP B(C) PWRDN:
Pri RJDF DRIVER,LOGIC (eight) – ON

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F,
O15:F,
O16:F

10. If not GROUP B(C) PWRDN:
Pri RJDA DRIVER,LOGIC (eight) – ON

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

R1(A11)

11. If reqd, SUPPLY WATER DUMP (ECLS) (✓MCC)
CRYO HEATER/MANF VLV config per MCC

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

MEDS

A3-10

ORB OPS/ALL/GEN H

FLIGHT DECK ACTIVITY LIST

1. LIGHTING (minimize if in GROUP B(C) PWRDN)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
2. WINDOW SHADES/FILTERS
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
3. CRTs (three) – ON (use only one CRT if in GROUP B(C) PWRDN)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- C3 4. BFC CRT DISP – OFF
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
5. ALERT TONE DURATION
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- L1 6. CAB TEMP – adj rotary as reqd
If Entry day:
CAB TEMP – full COOL
Wait 20 min
CAB TEMP CNTLR – OFF
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16
- MO10W 7. If 14.7 CAB REG INLET SYS 1(2) vlv – OP
(PCS active):
O2/N2 CNTLR VLV SYS 1(2) – AUTO
L2 1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

Cont next page

NOM

B3-9 ORB OPS/NOM/GEN H

8. If planned, perform I'CNCT: L(R) OMS to RCS (ORB PKT, RCS), then:

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F,
O15:F,
O16:F

9. If not GROUP B(C) PWRDN:
Pri RJDF DRIVER,LOGIC (eight) – ON

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

O14:F,
O15:F,
O16:F

10. If not GROUP B(C) PWRDN:
Pri RJDA DRIVER,LOGIC (eight) – ON

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

R1(A11)

11. If reqd, SUPPLY WATER DUMP (ECLS) (✓MCC)
CRYO HEATER/MANF VLV config per MCC

1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16

NOM

B3-10

ORB OPS/ALL/GEN H

OCAC SETUP

- OCAC
1. ✓OCAC PWR – OFF
Attach DC Pwr cable to OCAC
 2. Loosen fabric shroud via Velcro attach points
 3. Loosen knurled collar on port arm until arm can be rotated down and locked
Fully extend arm by rotating collar
 4. Depress handles on stbd arm
Rotate arm down until locked
 5. Center OCAC in stbd interdeck accessway
 6. Place port arm pad in upper groove
 7. While depressing stbd arm handles, pivot OCAC into position, then release handles

NOTE

Port arm may need adjustment
to accommodate OCAC fit

8. ✓OCAC fit secure
9. Secure fabric shroud to surrounding accessway
10. ✓DC UTIL PWR – OFF
Attach DC Pwr cable to predetermined orbiter
DC UTIL PWR outlet
DC UTIL PWR – ON
11. Remove filter cover
OCAC PWR – ON
Adjust CFM to 300 cfm (or desired level)

OCAC STOWAGE

- OCAC
1. ✓Filter for debris. If reqd, clean using Gray Tape or vacuum
Place filter cover over filter
 2. OCAC PWR – OFF
✓RPM – 0
 3. DC UTIL PWR – OFF
Disconnect DC Pwr cable from orbiter/OCAC
 4. Pivot stbd/port arms into stowed position via pivot release buttons
Adjust arms to fit within OCAC
 5. Secure fabric shroud to OCAC
 6. Stow OCAC

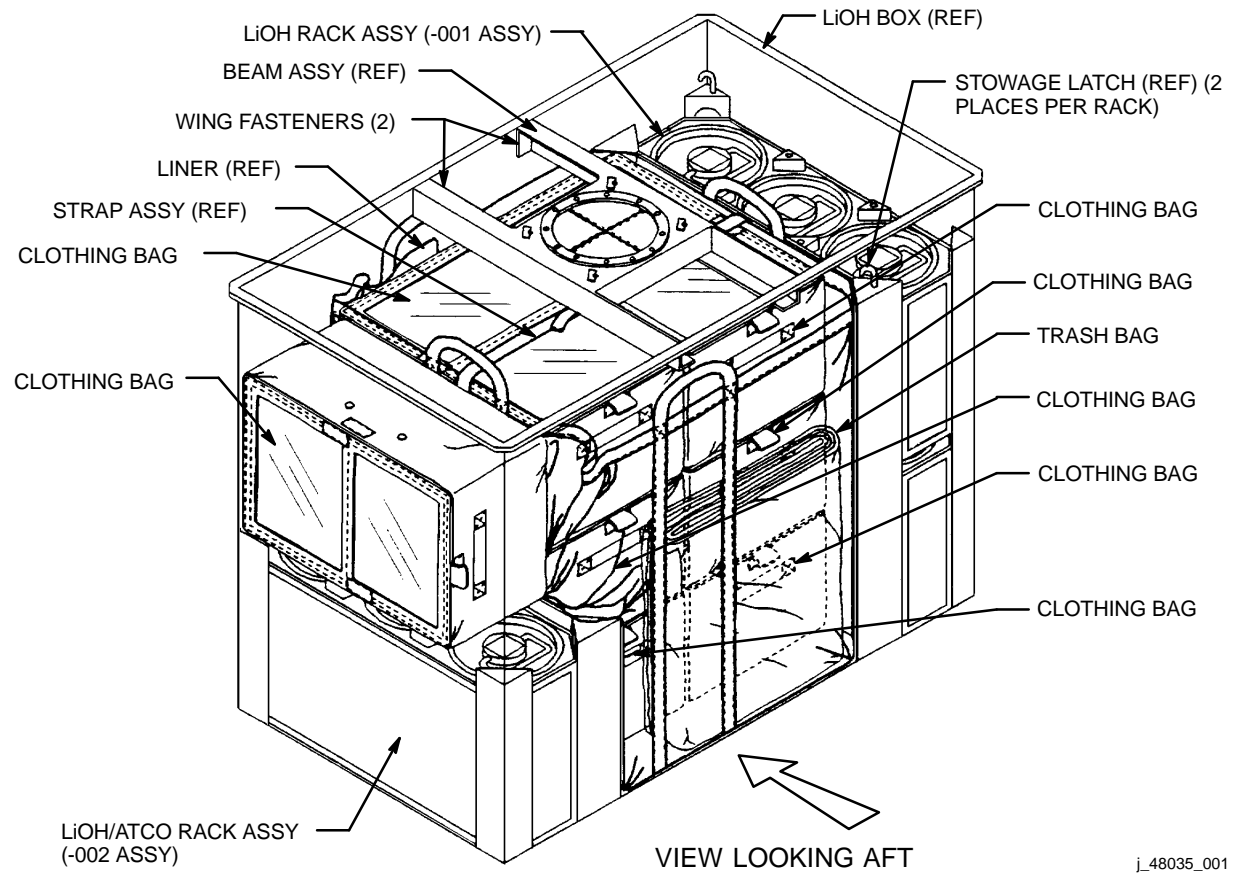
OCAC MAL

ERROR INDICATOR	PROBLEM RESOLUTION
CHECK FILTER (LED illuminated)	Filter not properly attached to OCAC; reattach filter
CHECK BREAKER (LED illuminated)	<ul style="list-style-type: none"> ✓cb sw – off ✓MCC
MOTOR OVERHEAT (LED illuminated)	<ul style="list-style-type: none"> ✓OCAC PWR – OFF ✓Filter clean (If reqd, clean filter, allow motor to cool down before turning) OCAC PWR – ON ✓Motor not restricted (If reqd, remove object, allow motor to cool down before turning OCAC PWR – ON)
LED on top of OCAC (not illuminated)	<ul style="list-style-type: none"> ✓DC UTIL PWR – ON ✓OCAC PWR – ON ✓cb sw – on Ensure proper cable connection

LiOH VOLUME INFLIGHT RECONFIG

1. Open LiOH Door
2. Unfasten wing fasteners (two) on beam assembly
Remove beam
3. Unfasten strap from buckle
4. Remove clothing bags (seven)
5. Unfold trash bag liner and position in container, matching bottom Velcro on liner with Velcro on preinstalled Nomex bag (verify vent opening positioned aft of beam)
6. Place collar on trash bag liner under beam assembly and align with wing fasteners (four) on beam assembly. Hand tighten
7. Mate vent line from orbiter to collar assembly (ensure proper connection by gently pulling on hose)
8. Reinstall beam
9. Place hand inside liner and mate Velcro on outside of liner to Velcro on Nomex bag
Spread bag out while mating Velcro

Cont next page



TISSUE EQUIVALENT PROPORTIONAL COUNTER (TEPC)

A. POWER ON

NOTE

PDB (P1) needs to be connected
after launch

MO52J
TEPC 1. ✓DC UTIL PWR MNA – ON

Avionic
Bay 3A 2. POWER sw 1 – ON

3. Verify green LED – ON
If not, perform Malfunction step C1

4. After 1 min, verify display backlit and startup
displays cycling
If not, perform Malfunction step C3
If no joy, notify MCC

NOTE

During instrument startup routine,
TEPC cycles through 12 startup
displays (initializations). After
8 min, TEPC startup complete

5. Record initialization MET
____/____:____:____

NOTE

When startup complete, TEPC cycles
through four operational displays.
See table 3–I for displays

When time permits:

6. ✓TEPC Window Display
If display not cycling, (e.g., if time not
incrementing), perform Malfunction
step C4

If dose not incrementing,
perform Malfunction step C5

7. Notify MCC of MET

Cont next page

TABLE 3-I.- TEPC NORMAL OPERATIONAL DISPLAY KEY

Verification of normal operation:

Cyclic displays of operating parameters from the Window Display are shown below. Each left-hand box represents the layout of each display. The right-hand boxes are the noun names of the indicated values for the corresponding Window Display. Dose rate should change with each screen. Elapsed time (m) will change with each min

NOTE

Units for Dose Rate may be pGy/h, nGy/h, μ Gy/h, or mGy/h. Units for Total Dose may be pGy, nGy, μ Gy, or mGy. 1 Gy = 100 rad
 pGy – picogray
 nGy – nanogray
 μ Gy – microgray
 mGy – milligray

::00 Display 1	hh:mm:ss _____.__ μ G _____m_____ μ G/h	→	Time Elapsed Time	Total Dose Dose Rate
::15 Display 2	hh:mm:ss _____.__ μ G DD.MM.YY _____ μ G/h	→	Time Date	Total Dose Dose Rate
::30 Display 3	hh:mm:ss _____.__ μ G ___% ___E _____ μ G/h	→	Time Memory Errors	Total Dose Dose Rate
::45 Display 4	hh:mm:ss_____.__ μ G > _____ _____ μ G/h	→	Time Flags	Total Dose Dose Rate

Cont next page

- B. POWERDOWN
TEPC 1. PWR sw 1 – OFF

NOTE

Following step 2 will terminate power to other loads on that utility outlet

- MO52J 2. DC UTIL PWR MNA – OFF
3. Record TEPC deactivation MET
____/____:____:____

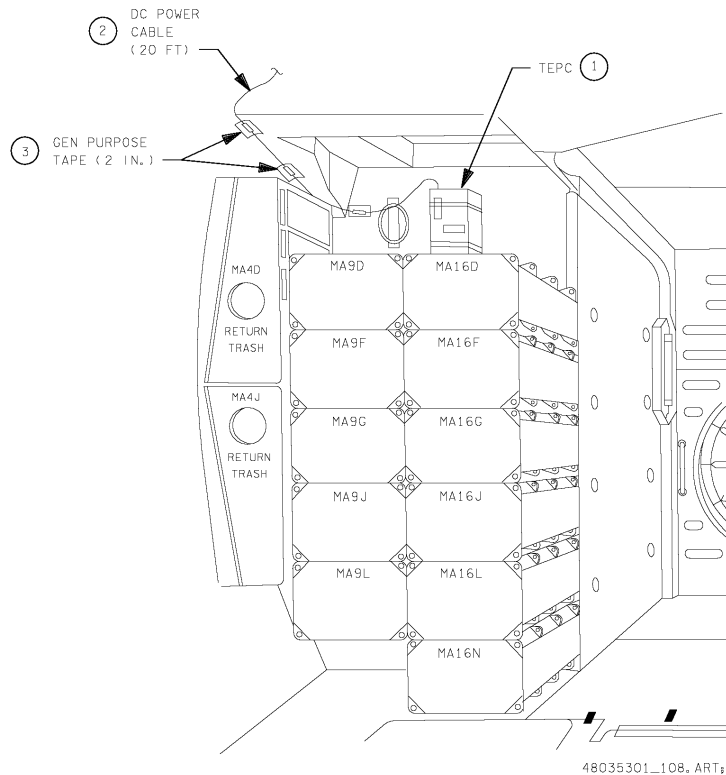


Figure 3-1.- TEPC location (middeck avionics bay 3A).

Cont next page

C. MALFUNCTION

1. Green LED not ON (no display)

TEPC POWER sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

✓External connections properly mated per Plug-In-Plan

MO52J DC UTIL PWR MNA – ON

TEPC POWER sw 1 – ON

✓Green LED – ON
If green LED ON, go to POWER ON step A3
If no green LED:
✓MCC regarding fuse replacement and perform Malfunction step C2

2. Fuse Replacement

TEPC POWER sw 1 – OFF

MO52J DC UTIL PWR MNA – OFF

TEPC sw Box ✓Fuse (F1/F2)

If necessary:
Top of TEPC Replace with spare fuse
Stow blown fuse in spare fuse holder

NOTE

There are two spare fuses available, one on top of TEPC pouch and one in TEPC switchbox. Fuse on top of pouch is easier to access so it should be tried first

MO52J DC UTIL PWR MNA – ON

TEPC POWER sw 1 – ON

✓Green LED – ON
If green LED, perform POWER ON step A4
If no green LED, notify MCC

3. Green LED – ON but no display after 60 sec

TEPC POWER sw 1 – OFF

Cont next page

MO52J	DC UTIL PWR MNA – OFF	|
	✓Internal connections properly mated: Unfasten straps and unzip TEPC case Check three internal connections Zip up TEPC case and fasten straps	|
	DC UTIL PWR MNA – ON	
TEPC	POWER sw 1 – ON	
	Go to POWER ON step A4	
TEPC	4. Display ON but not cycling (or no time updates) POWER sw 1 – OFF	|
	Wait 30 sec	
	POWER sw 1 – ON	

NOTE

During instrument startup routine,
TEPC cycles through 12 startup
displays (initializations). After
8 min, TEPC startup complete

✓For proper display:
If proper display, go to POWER ON step A4
If no joy, notify MCC

	5. Display ON but no dose rate or incrementing dose	
TEPC	POWER sw 1 – OFF	|
MO52J	DC UTIL PWR MNA – OFF	|
	Unfasten straps and unzip TEPC case ✓Detector cable connection to spectrometer Zip up TEPC case and fasten straps	
MO52J	DC UTIL PWR MNA – ON	
TEPC	POWER sw 1 – ON	

Cont next page

NOTE

During instrument startup routine, TEPC cycles through 12 startup displays (initializations). After 8 min, TEPC startup complete

✓For proper display:

If proper display, go to POWER ON step A4
If no joy, notify MCC

D. CALL DOWN DATA

NOTE

This procedure only reqd at direction of MCC

1. Record data per MCC instruction. Note appropriate scientific units on dose and dose rate. Refer to TEPC DISPLAY LOGSHEET, 3-22
2. Call down recorded data to MCC

NOTE

TEPC operational sequence consists of continuous cycling through four operational displays. See table 3-1 for displays

Cont next page

3-21

ORB OPS/ALL/GEN H

TEPC DISPLAY LOGSHEET

NOTE

Report units as well as values

Date	GMT	Dose Rate (__Gy/h)	Total Dose (__Gy)	Elapsed Time (m)

CYCLE ERGOMETER OPS

ERGOMETER SETUP

1. Remove Ergometer Assy from middeck floor, transport Ergometer to desired exercise location
2. Unstow:
Ergo Assy Ergometer Accessories (Ergo Acc) Bag
Ergo Acc Bio Bag
Bag Sound Mounts (4)
Bio Bag Adjustable Quick Disconnects (AQDs)
 Spacers (4)

NOTE

102 only – spacers
not used on flight deck

3. Attach AQDs (four) to seat floor studs. Install sound mounts and spacers on ADQs

Disassemble Ergo Assy:

4. Remove seat stem pip pin, seat stem foot, restraining belt, temp stow
5. Remove seat assy, temp stow
6. Remove Ergometer pip pins (four), ergometer assy straps (four); release Ergometer from frame; temp stow
7. Mount both frame sections loosely to AQDs on seat floor studs (fig 3-2) using Knurled Kbs (four)
8. Install seat assy on seat stem; insert seat stem foot into stem
Move seat assy pip pin (one) from green to yellow position, secure with seat stem pip pin, slide blocks together, secure with Velcro
9. ✓Ergometer ON/OFF – OFF

Cont next page

NOTE

Following steps will interrupt power to other loads on that utility outlet

MO30F 10. ✓DC UTIL PWR – OFF

11. Connect prerouted Ergometer Pwr cable to Ergometer Pwr Jack
Connect Ergometer Display Panel cable to Ergometer Display Jack; temp stow

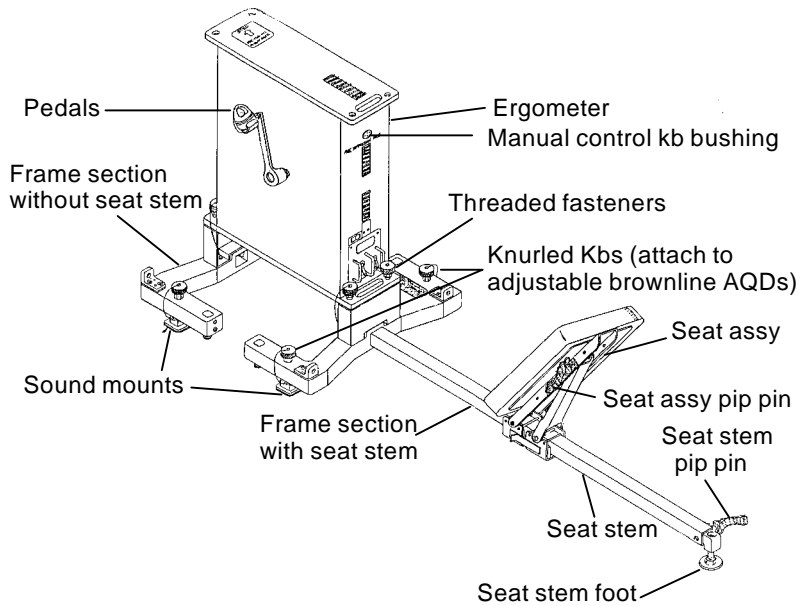


Figure 3-2.- Ergometer.

Bio Bag 12. Unstow: Threaded fasteners (four)

NOTE

Ergometer ON/OFF, MANUAL/REMOTE switches should face subject

Cont next page

13. ✓ Ergometer for proper orientation
Mount Ergometer to frame assy with Threaded Fasteners (four)
Tighten with Wrench
Hand-tighten Knurled Kbs to secure Ergometer frame assy to Middeck floor
Tighten seat stem foot against orbiter floor
14. Unstow:
Ergo Acc Ergometer Pedals
Bag Ergometer Cranks
15. Install pedals on cranks using Wrench from Ergo Acc Bag, attach cranks with pedals to Ergometer, tighten with Wrench (fig 3-2)

NOTE

Install RED on RIGHT,
BLUE on LEFT

- MO30F 16. DC UTIL PWR – ON

As reqd, if exercise session follows immediately, perform muscle stretch:

17. Hold each stretch 1 min
18. While stretching, relax involved muscle
19. Adjust seat assy for subject comfort
20. Mount Ergometer
Secure shoes into pedals
Secure body with restraining belt
21. Ergometer ON/OFF – ON
22. Perform exercise
23. Ergometer ON/OFF – OFF

Cont next page

RECONFIG/STOW

NOTE

Following steps will interrupt power to other loads on that utility outlet

- MO30F 1. DC UTIL PWR – OFF
2. Disconnect prerouted Ergometer Pwr cable, secure
3. If other loads on utility outlet (verify per Plug-In Plan)
DC UTIL PWR – ON
- Ergo Acc 4. Detach Ergometer Display Panel cable, Bag Ergometer pedals, cranks, stow
- Bio Bag 5. Remove Threaded Fasteners, stow
6. Remove Ergometer from frame, temp stow
7. Remove seat stem pip pin, seat stem foot; temp stow
8. Remove seat assy, reconfigure for launch/landing (pip pin moves from yellow to green hole)
9. Unscrew Knurled Kbs (four)
10. Release both frame sections from AQDs on seat studs; remove spacers (four), AQDs with Knurled Kbs/sound mounts (four), stow
11. Slide frame half, without seat stem, onto stem in launch/landing config (fig 3-3)
12. Unstow: Ergo Assy Straps (two pair), slide onto frame
13. Unstow: Pip pins

Cont next page

14. Attach Ergometer horizontally to frame with pip pins (fig 3-3)
 ✓ Arrow on decal, seat stem face same direction
 15. Slide seat assy onto seat stem, reinstall seat stem foot, secure with seat stem pip pin
 16. Tighten Knurled Kbs (two) on seat assy
 17. Secure restraining belt around seat assy, seat stem
 18. Mount frame to launch/landing position in middeck using frame/AQDs (four), with seat stem facing forward (fig 3-3)
- Ergo Acc Bag
19. Unstow: Ergo Assy Straps
 Using Ergo Assy Straps attach Ergo Acc Bag to Ergometer (fig 3-3)
 20. Pull straps tight; secure loose ends

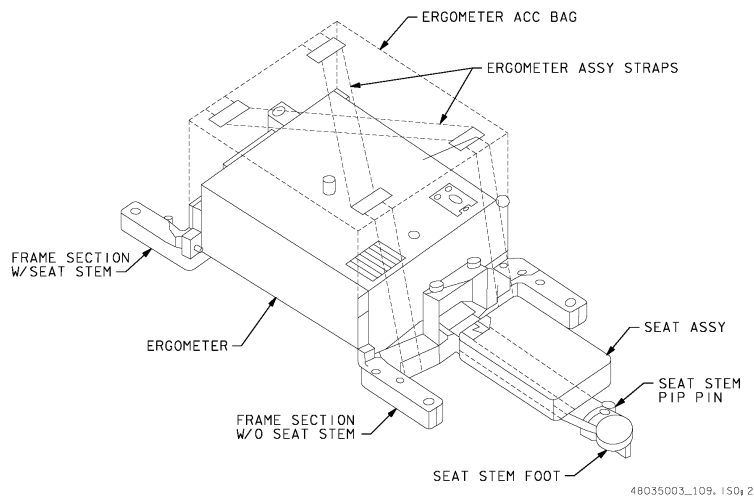


Figure 3-3.- Ergometer middeck launch/landing config (ergo assy).

Cont next page

CYCLE ERGOMETER MANUAL OPS

Ergo Acc
Bag

1. Unstow: Manual Control Kb
2. Screw Manual Control Kb into bushing on Ergometer (fig 3-2)

NOTE

To increase workload, turn Manual Control Kb cw. To decrease workload, turn Manual Control Kb ccw

If workload/pedal speed desired, pwr available:

3. ✓ Ergometer ON/OFF – ON
Set desired pedal speed, workload on display panel
Perform exercise
Adjust Manual Control Kb until ONLY center LED on workload illuminated; repeat for any change in workload

If workload/pedal speed feedback not desired or pwr not available:

4. Perform exercise, adjusting Manual Control Kb cw or ccw as desired

ALTERNATE ERGOMETER EXERCISE

Ergo Acc
Bag

1. Unstow: Bungee Cords (Bio Bag)
2. Connect two sets of four Bungee Cords in series
3. Stand topside of Ergometer with feet approx shoulder width apart
4. Attach Bungees to opposite corners of Ergometer frame crossing Bungees over shoulders (figs 3-4, 3-5)
5. Adjust Bungee length for comfort

Cont next page

NOTE

Use towels, socks for shoulder padding if desired

6. Perform exercise
7. Stow: Bungee Cords (Bio Bag)

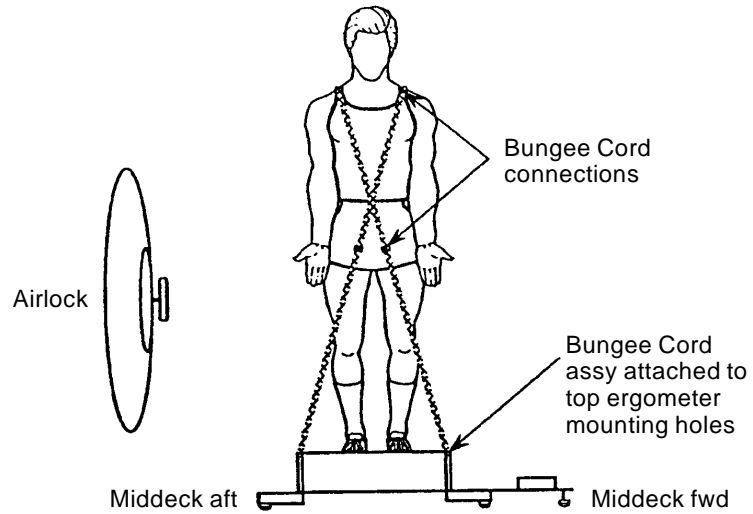


Figure 3-4.- Alternate exercise bungee attachments – front view (facing stbd).

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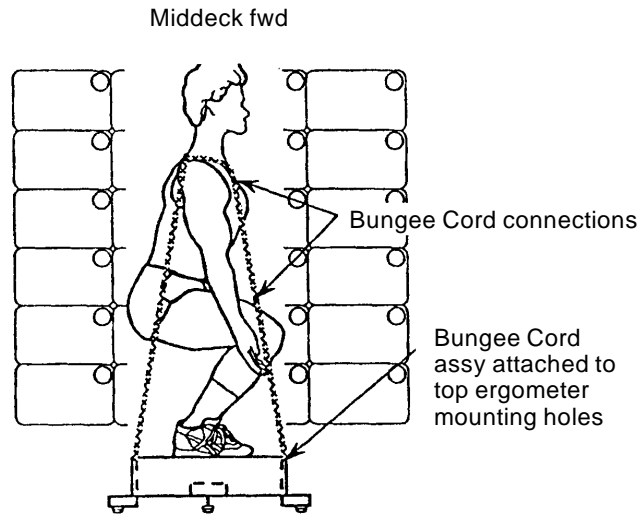


Figure 3-5.- Alternate exercise bungee attachments – side view (facing stbd).

DPS

G2 SET CONTRACTION	4-2
EXPANSION	4-4
TO G8 TRANSITION	4-6
G8 TO G2 TRANSITION	4-7
SM CHECKPOINT INITIATE	4-9

DPS

G2 SET CONTRACTION

NOTE

Do not perform any keyboard item entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests

1. If RNDZ NAV enabled:

NOTE

The following steps do not take PASS redundant set through OPS 0

- a. Remove GPC From Redundant Set
Perform step 2 without modifying GPC target set, then:
 O6 GPC MODE – STBY (tb-bp)
 C3(A6U) – RUN (tb-RUN)
 DAP: as reqd
- b. Create G2FD GPC
Perform step 4 if GPC not currently reqd
- c. Clear Software Fail Votes
Go to step 6 >>

DPS

2. CONTRACT G2 GPC SET
If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY

CONFIG –
 ITEM 1 +2 EXEC
 Assign MC 2 per table →
 ✓ DOWNLIST GPC,
 ITEM 44 +1 EXEC

C3(A6U) DAP: FREE
 VERN (ALT)
 CRT GNC, OPS 201 PRO

If:	Single G2	Dual G2
CONFIG GPC	2 10000	2 12000
STR 1	1	1
2	1	2
3	1	1
4	1	2
PL 1/2	0	0
CRT 1	1	1
2	1	2
3	0	0
4	1	2
L 1	0	0
2	0	0
MM 1	1	1
2	1	2

Cont next page

- C3(A6U) 3. Pause ~30 sec (DAP settling), then
DAP: as reqd
- CRTX 4. FREEZE DRY GPC 2(3) (G2FD)
MAJ FUNC – PL
GPC/CRT2(3)/X EXEC
X: PL GPC MEMORY
CONFIG – ITEM 45 +2 EXEC
GPC – ITEM 46 +2(3) EXEC
STORE – ITEM 47 EXEC
Store complete when MC = 02 (~30 sec)
√All IDPs [CRTs] deassigned from FD GPC
- O6 GPC MODE 2(3) – STBY (tb–bp)
– HALT (tb–bp)
– STBY (tb–RUN)
– HALT (tb–bp)
5. CONFIG CLEANUP
GNC 22 S TRK/COAS CNTL
S TRK –Y,–Z: STAR TRK – ITEM 3,4 EXEC (*)
GNC 21 IMU ALIGN
RESUME
6. CLEAR SOFTWARE FAIL VOTES
On MCC GO:
GNC 0 GPC MEMORY
ITEM 48 EXEC
SM 0 GPC MEMORY
ITEM 48 EXEC

G2 SET EXPANSION

NOTE

Do not perform any keyboard item entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests

1. If RNDZ NAV enabled:
 C3(A6U) DAP: LVLH
 GNC UNIV PTG
 CNCL – ITEM 21 EXEC
2. CONFIG G2FD GPC(s) FOR SET EXPANSION
 ✓AV BAY 2(3) FAN A(B) – ON
 O6 ✓GPC MODE 2(3) – HALT
 ✓OUTPUT 2(3) – NORM
 ✓PWR 2(3) – ON
 MODE 2 – STBY(tb–RUN)
 – RUN (OUTPUT tb–gray)

If triple G2 reqd:
 MODE 3 – STBY (tb–RUN)
 – RUN (OUTPUT tb–gray)

3. CONFIG FOR SET EXPANSION
 CRT If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY

CONFIG –
 ITEM 1 +2 EXEC
 Assign MC 2 per table →

4. OPS MODE RECALL
 C3(A6U) DAP: FREE
 CRT GNC, OPS 201 PRO
 Pause ~30 sec
 (DAP settling), then
 C3(A6U) DAP: as reqd

If:	Dual G2	Triple G2
CONFIG	2	2
GPC	12000	12300
STR 1	1	1
2	2	2
3	1	3
4	2	3
PL 1/2	0	0
CRT 1	1	1
2	2	2
3	0	0
4	2	3
L 1	0	0
2	0	0
MM 1	1	1
2	2	2

Cont next page

5. CONFIG CLEANUP

GNC 22 S TRK/COAS CNTL

S TRK -Y, -Z: STAR TRK - ITEM 3,4 EXEC (*)

GNC 21 IMU ALIGN

RESUME

6. If resuming RNDZ NAV TRACKING:

Go to RNDZ NAV RECOVERY (RNDZ,
CONTINGENCY OPS)

G2 TO G8 TRANSITION

NOTE

Do not perform any keyboard item entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests

1. If RNDZ NAV enabled:
 C3(A6U) DAP: LVLH
GNC UNIV PTG
 CNCL – ITEM 21 EXEC
2. CONFIGURE TFL FOR G8 TRANSITION
 If Elevon Park: TFL change not reqd
 If FCS Checkout:
SM 62 PCMMU/PL COMM
 Perform LOAD PCMMU FORMAT
 (ORB OPS FS, COMM/INST)
 FORMAT ID: 103/161

3. CONFIGURE FOR G8 OPS TRANSITION
 O8 ✓MLS (three) – ON
 O14,O15, ✓cb ADTA (four) – cl
 O16:E
 O14,O15:F ✓MMU (two) – ON
 CRT If MM202: GNC, OPS 201 PRO
GNC 0 GPC MEMORY

CONFIG –
 ITEM 1 +8 EXEC
 Modify MC8 per table →

lf:	Single G2	Dual G2	Triple G2
CONFIG GPC	8 10000	8 12000	8 12300
STR 1	1	1	1
2	1	2	2
3	1	1	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	1	1
2	1	2	2
3	0	0	0
4	1	2	3
L 1	0	0	0
2	0	0	0
MM 1	1	1	1
2	1	2	2

4. OPS TRANSITION
 C3(A6U) DAP: FREE
 CRT GNC, OPS 801 PRO
 Pause ~30 sec
 (DAP settling), then
 C3(A6U) DAP: as reqd
5. If PWRDN config:
 O15:F MMU2 – OFF

4-6

ORB OPS/ALL/GEN H

G8 TO G2 TRANSITION

NOTE

Do not perform any keyboard item entries or sw throws 10 sec before and after moding PASS GPCs to RUN or making OPS transition requests

1. SM 62 PCMMU/PL COMM
If reqd, perform LOAD PCMMU FORMAT (ORB OPS FS, COMM/INST)
2. CONFIGURE FOR G2 OPS TRANSITION
O14, O15:F ✓MMU (two) – ON

GNC 0 GPC MEMORY

CONFIG –
ITEM 1 +2 EXEC
Modify MC2 per
table →

if:	Single G8	Dual G8	Triple G8
CONFIG GPC	2 10000	2 12000	2 12300
STR 1	1	1	1
2	1	2	2
3	1	1	3
4	1	2	3
PL 1/2	0	0	0
CRT 1	1	1	1
2	1	2	2
3	0	0	0
4	1	2	3
L 1	0	0	0
2	0	0	0
MM 1	1	1	1
2	1	2	2

3. OPS TRANSITION
C3(A6U) CRT DAP: FREE
GNC, OPS 201 PRO
Pause ~30 sec
(DAP settling), then
C3(A6U) DAP: as reqd
4. CONFIG CLEANUP
GNC 22 S TRK/COAS CNTL
S TRK –Y, –Z: STAR TRK – ITEM 3,4 EXEC (*)
GNC 21 IMU ALIGN
RESUME
O15:F MMU 2 – OFF (if PWRDN config reqd)
If not currently performing FCS Checkout, then:
O8 ✓MLS (three) – OFF
O14,O15, ✓cb ADTA (four) – op
O16:E

Cont next page

5. If resuming RNDZ NAV TRACKING:
Go to RNDZ NAV RECOVERY (RNDZ,
CONTINGENCY OPS)

SM CHECKPOINT INITIATE

O15:F 1. ✓MMU 2 – ON

NOTE

If MMU powered off (Group B or Group C PWRDN), unit can take up to 34 sec to initialize before ready to support MMU ops

- CRT
2. SELECT MMU 2(1) FOR CKPT
SM 1 DPS UTILITY
MMU 2(1) ASSIGN – ITEM 4(3) EXEC (*)
 - ✓MMU STATUS 2(1):
When 'RDY' (up to ~30 sec), continue
SM 60 TABLE MAINT
 - ✓SM COM BUFF – 'RDY'
CHECKPT INITIATE – ITEM 18 EXEC
 - ✓Time updated
 - ✓STATUS – 'GOOD'
 3. Repeat step 2 for MMU 1
 4. After completion of SM CKPTs:
SM 1 DPS UTILITY
✓CKPT RETRV ENA – ITEM 12 EXEC (*)
 5. If in Group B or C PWRDN:
O15:F MMU 2 – OFF

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ECLS

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ECLS

SUPPLY/WASTE WATER DUMP

For SPLY H2O Dump, perform steps in sections A,B,D,F,H,K.

For WST H2O Dump, perform steps in sections B,E,G,I,K.

For simo SPLY/WST H2O Dump, perform all steps

NOTE

If PASS SM avail, monitor temps and QTY; otherwise, dump only when MCC avail to monitor.

Dump in current SPLY H2O tank config (panels R11L, ML31C), unless directed otherwise by MCC.

If no comm: Dump H2O tanks to provide 100% total ullage in any single or combination of TKs A,B,C,D. 100% ullage reqd for FC-produced water for 12 hr.

QTY of approx 200% among TKs A,B,C,D reqd for deorbit/entry FES usage.

If part of TKA and all of TKB to be dumped:
Set TKB QTY LL to -10 to preclude nuisance alarm
Do not reset LL or dump TKA QTY less than 80

ECLS

WCS
Outboard
Wall

A. SUPPLY/SIMO DUMP PREP

For SPLY H2O or simo SPLY/WST H2O DUMP, unstow and install SPLY H2O Dumpline Purge Device into CONT H2O X-TIE POT QD (Lower QD with blue Velcro and "POTABLE" label)

NOTE

Have towel ready for possible release of water when mating/demating any connections

Cont next page

B. PRE-DUMP FDA

If comm, MCC will TMBU nozzle temp, tank qty limits, and provide dump duration as reqd

If no comm, change limits via table A for SPLY H2O Dump, table B for WST H2O Dump, or both for simo SPLY/WST H2O Dump

TABLE A

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O QTY A	0620410	*	
B	0620420	*	
C	0620548	*	*
D	0620544		
NOZ T A	0620440	90	250
B	0620439	90	250

*Limits TMBU'd on orbit to provide leak and overfill detection

TABLE B

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O QTY 1	0620540	*	99
NOZ T A	0620520	50	250
B	0620519	50	250

*Limits TMBU'd on orbit to provide leak and overfill detection

Cont next page

- MO10W C. SIMO DUMP H2O TK N2 REG CONFIG
 If performing simo SPLY/WST H2O Dump:
 H2O TK N2 REG INLET SYS 1, SYS 2 vlv
 (two) – OP
- CRT D. SUPPLY H2O DUMP NOZZLE HTR ACTIVATION
SM 66 ENVIRONMENT
 1. ✓ SUPPLY H2O DMP LN T ≥ 65
- ML86B:A * If DMP LN T < 65, enable 2nd heater: *
 * cb MNB(MNA) H2O LINE HTR *
 * B(A) – cl *
- R11L 2. ✓ SPLY H2O DUMP ISOL VLV – OP (tb–OP)
 3. SPLY H2O DUMP VLV ENA/NOZ HTR –
 ON
 4. ✓ SPLY H2O DUMP VLV – CL (tb–CL)
- CRT E. WASTE H2O DUMP NOZZLE HTR ACTIVATION
SM 66 ENVIRONMENT
 1. ✓ WASTE H2O DMP LN T > 50
- ML86B:A * If WASTE H2O DMP LN T ≤ 50, *
 * enable 2nd heater: *
 * cb MNB(MNA) H2O LINE HTR *
 * B(A) – cl *
- ML31C 2. ✓ WASTE H2O DUMP ISOL VLV – OP
 (tb–OP)
 3. WASTE H2O DUMP VLV ENA/NOZ HTR –
 ON
 4. ✓ WASTE H2O DUMP VLV – CL (tb–CL)

Cont next page

F. SUPPLY H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION

Tile debonding may occur if nozzle temps exceed 350 degF

- CRT 1. When SUPPLY H2O NOZ T A,B (two) exceed 100 (~5 min warmup time), continue
- R11L 2. SPLY H2O DUMP VLV – OP (tb–OP)
- CRT 3. ✓ SUPPLY H2O QTY A(B,C,D) decr (~1 to 2% per min)

If 'S66 SPLY H2O TEMP', SUPPLY H2O NOZ T A,B (two) < 90, terminate dump immediately per step H (SUPPLY H2O DUMP TERMINATION), 5–6

NOTE

If dump terminated for SUPPLY H2O NOZ T < 90, ✓MCC about dumping supply water thru FES, thru waste water nozzle, or into CWC to make ullage for fuel cell product water

G. WASTE H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION

Tile debonding may occur if nozzle temps exceed 350 degF

- CRT 1. When 'S66 WASTE H2O TEMP' msg, WASTE H2O NOZ T A,B (two) exceed 250 (~10 min warmup time), continue

CAUTION

Dumping WASTE H2O TK1 QTY below 5% can cause bellows damage

Cont next page

- ML31C 2. ✓WASTE H2O TK1 VLV – OP (tb–OP)
 3. DUMP VLV – OP (tb–OP)
 CRT 4. WASTE H2O QTY 1 – decr (~1 to 2%
 per min)
 5. ✓WASTE H2O NOZ T A,B (two) – not incr

If 'S66 WASTE H2O TEMP' msg, WASTE
 H2O NOZ T A(B) '↓' then:

- ML31C 6. WASTE H2O DUMP VLV – CL
 (tb–CL)
 7. When 'S66 WASTE H2O TEMP' msg,
 WASTE H2O NOZ T A,B (two) exceed
 250 (~8 min reheat time), continue
 8. WASTE H2O DUMP VLV – OP
 (tb–OP)

H. SUPPLY H2O DUMP TERMINATION

- R11L 1. SPLY H2O DUMP ISOL VLV – CL (tb–CL)
 CRT 2. ✓SUPPLY H2O QTY A(B,C,D) not decr

- R11L * If SUPPLY H2O QTY A(B,C,D) decr, *
 * cycle SPLY H2O DUMP ISOL VLV *
 * If not successful, *
 * SPLY H2O DUMP VLV – CL (tb–CL) *

- CRT 3. When 'S66 SPLY H2O TEMP' msg,
 SUPPLY H2O NOZ T A,B (two) exceed
 250 (~10–12 min bakeout time), continue

- R11L 4. SPLY H2O DUMP VLV – CL (tb–CL), wait
 60 sec
 5. SPLY H2O DUMP VLV – OP (tb–OP), wait
 60 sec
 6. SPLY H2O DUMP VLV – CL (tb–CL)
 7. SPLY H2O DUMP ISOL VLV – OP
 (tb–OP)
 8. SPLY H2O DUMP VLV ENA/NOZ
 HTR – OFF
 9. ✓SPLY H2O DUMP VLV tb – bp

Cont next page

CRT 10. ✓ SUPPLY H2O NOZ T A,B (two) – not incr

ML86B:A * If SPLY H2O NOZ T A,B (two) incr: *
* cb MNC SPLY H2O DUMP *
* VLV/NOZ HTR – op *

WCS 11. Remove, stow SPLY H2O Dumpline Purge
Outboard Device from CONT H2O X-TIE POT QD
Wall

I. WASTE H2O DUMP TERMINATION
ML31C 1. WASTE H2O DUMP VLV – CL (tb-CL)
CRT 2. ✓ QTY 1 not decr

ML31C * If WASTE H2O QTY 1 decr: *
* Cycle WASTE H2O DUMP VLV *
* If not successful, *
* WASTE H2O DUMP ISOL VLV – *
* CL (tb-CL) *

CRT 3. When ‘S66 WASTE H2O TEMP’ msg,
WASTE H2O NOZ T A,B (two) exceed
250 (~8 min bakeout time), continue

ML31C 4. WASTE H2O DUMP VLV ENA/NOZ HTR –
OFF
5. ✓ WASTE H2O DUMP VLV tb – bp

* If WASTE H2O NOZ T A,B (two) incr: *
* cb MNA WASTE H2O DUMP *
* VLV/NOZ HTR – op *

J. SIMO DUMP H2O TK N2 REG RECONFIG
If simo SPLY/WASTE H2O DUMP performed,
execute following after both dumps complete:

MO10W If Cab P < 14.7 psia or PCS1 active:
1. H2O TK N2 REG INLET SYS 2
vlv – CL
If PCS2 active:
2. H2O TK N2 REG INLET SYS 1
vlv – CL

Cont next page

K. POST-DUMP FDA CLEANUP

If comm, MCC will reset SM limits via TMBU

If no comm, reset SM limits via table C for SPLY H2O DUMP, table D for WST H2O Dump, or both for simo SPLY/WST H2O Dump

TABLE C

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
SUPPLY H2O NOZ T A B	0620440	-82	250
	0620439	-82	250

TABLE D

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A B	0620520	-82	250
	0620519	-82	250

NOTE

If WASTE H2O and SUPPLY QTY limits were reset to annunciate end of dump, leave limits at annunciation value

SUPPLY WATER DUMP USING FES

NOTE

If PASS SM avail, monitor tank QTY;
otherwise, monitor dump time provided
by MCC

Approx 8%/hr net supply water used by this
method

1. DUMP INITIATION
L1 FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
RAD CNTLR OUT TEMP – HI
O1 When FREON EVAP OUT TEMP > 50 degF,
L1 FLASH EVAP CNTLR PRI A(B) – ON
After 1 min, ✓FREON EVAP OUT TEMP
~39 degF

2. DUMP TERMINATION
L1 RAD CNTLR OUT TEMP – NORM
FLASH EVAP CNTLR PRI A(B) – OFF
If FES reqd, wait 1 min, then:
O1 When FREON EVAP OUT TEMP < 40 degF,
L1 FLASH EVAP CNTLR PRI A(B) – ON

MEDS

A5-9

ORB OPS/MEDS/GEN H

CABIN TEMP CONTROL

SM 88 APU/ENVIRON THERM

CREW ACTION	Δ TEMP degF EXPECTED
√MCC	
Implement ECLS SSR-6 CABIN EQUIP PWRDN-----	} 1 to 9 degF
√H2O LOOP 2(1) ICH FLOW 950 -----	
(L1) FLOW PROP VLV LOOP 2 – ICH ----- (√MCC for payload impact)	} 8 degF
FLOW PROP VLV LOOP 1 – ICH ----- (√MCC for payload impact)	} 1 degF
(MD44F) CAB TEMP CNTLR vlv – FULL COOL --	} 6 degF
– 2/3 COOL ----	
– 1/3 COOL ----	
– FULL HEAT --	
(L1) FLOW PROP VLV LOOP 1 – PL -----	} 4 degF
2 – PL -----	} 1 degF
H2O LOOP 2 BYP MAN – DECR until H2O LOOP 2 ICH FLOW MAX-----	} 8 degF
H2O PUMP LOOP 1 – ON, B ----- H2O LOOP 1,2 BYP MAN – DECR until H2O LOOP 1,2 ICH FLOW MAX	} 5 degF
FLASH EVAP CNTLR PRI A,B – OFF SEC – OFF	
√MCC	

MEDS

A5-10 ORB OPS/MEDS/GEN H

SUPPLY WATER DUMP USING FES

NOTE

If PASS SM avail, monitor tank QTY;
otherwise, monitor dump time provided
by MCC

Approx 8%/hr net supply water used by this
method

1. DUMP INITIATION
L1 FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
RAD CNTLR OUT TEMP – HI
O1 When FREON EVAP OUT TEMP > 50 degF,
L1 FLASH EVAP CNTLR PRI A(B) – ON
After 1 min, ✓FREON EVAP OUT TEMP
~39 degF

2. DUMP TERMINATION
L1 RAD CNTLR OUT TEMP – NORM
FLASH EVAP CNTLR PRI A(B) – OFF
If FES reqd, wait 1 min, then:
O1 When FREON EVAP OUT TEMP < 40 degF,
L1 FLASH EVAP CNTLR PRI A(B) – ON

NOM

B5-9

ORB OPS/NOM/GEN H

CABIN TEMP CONTROL

SM 88 APU/ENVIRON THERM

CREW ACTION	Δ TEMP degF EXPECTED
√MCC	
Implement ECLS SSR-6 CABIN EQUIP PWRDN-----	} 1 to 9 degF
√H2O LOOP 2(1) ICH FLOW 950 -----	
(L1) FLOW PROP VLV LOOP 2 – ICH ----- (√MCC for payload impact)	} 8 degF
FLOW PROP VLV LOOP 1 – ICH ----- (√MCC for payload impact)	} 1 degF
(MD44F) CAB TEMP CNTLR vlv – FULL COOL --	} 4 degF
– 2/3 COOL -----	
– 1/3 COOL -----	
– FULL HEAT --	
(L1) FLOW PROP VLV LOOP 1 – PL -----	} 4 degF
2 – PL -----	} 1 degF
H2O LOOP 2 BYP MAN – DECR until H2O LOOP 2 ICH FLOW MAX-----	} 8 degF
(C2) Pwr up one or two CRTs as reqd -----	} 5 degF
H2O PUMP LOOP 1 – ON, B -----	
H2O LOOP 1,2 BYP MAN – DECR until H2O LOOP 1,2 ICH FLOW MAX	
FLASH EVAP CNTLR PRI A,B – OFF SEC – OFF	
√MCC	

NOM

**CO2 RMVL SYS CNTLR CONFIG:
ACT 1/DEACT 2 (ACT 2/DEACT 1)**

ML86B:E ✓cb MNA,C CO2 SYS 1,2 CNTLR (two) – cl

MO51F CNTLR 2(1) MODE – STBY (hold 3 sec)
 Wait 6 sec

✓CNTLR 2(1) OPER It – off

 ✓FAIL It – on

 MNC(MNA) – OFF

✓CNTLR 2(1) FAIL It – off

 AC3(AC1) – OFF (hold 3 sec)

 cb AC3(AC1) (three) – op

 AC1(AC3) (three) – cl

 AC1(AC3) – ON (hold 3 sec)

 MNA(MNC) – ON

 CNTLR 1(2) MODE – OPER (hold 3 sec)

 Wait 6 sec

✓CNTLR 1(2) OPER It – on

✓COM INSTR – ON

CHARCOAL CANISTER REPLACEMENT

Perform if CO2 RMVL SYS CNTLR CONFIG
accomplished as part of midflight reconfig:

MD54G

a. Remove and replace charcoal
canister, if manifested

b. Reseal used charcoal canister with
wrapper and Gray Tape, stow

8. Proceed on MCC call (if no comm, wait minimum 7 min, then proceed when EVAP OUTs stable at 62 and TOP FWD(AFT) DUCT temps > 120 degF)

- * While waiting, if TOP FWD(AFT) *
- * DUCT < 40, proceed to step 9 *
- * Flush not successful *

9. FLASH EVAP CNTLR SEC – OFF
HI LOAD EVAP – ENA

If successful flush:

FLASH EVAP CNTLR PRI B – ON

If not successful flush:

FLASH EVAP CNTLR SEC – ON

10. ✓FLOW PROP VLV LOOP 1,2 tb (two) – ICH

11. RAD CNTLR OUT TEMP – NORM

RAD DEPLOY

NOTE

If RMS uncradled, ✓MCC for priority of RAD deploy/RMS ops. If MCC not avail and RADs must be deployed immediately, continue ops. Expect PORT RAD, LAT 7–12, STBD LAT 1–6 to operate single motor

WARNING

To preclude inadvertent MPM cycling:
 cb MCA PWR AC2 3Φ MID 2
 AC3 3Φ MID 4
 must remain open if RMS uncradled

1. CONFIG CBS

MA73C:
C,D

If deploying single RAD and opposite RAD stowed, config cbs:

DESIRED ACTION	cb CONFIG
Deploy PORT RAD	cb MCA PWR AC1 3Φ MID 3 – op AC2 3Φ MID 2 – op AC3 3Φ MID 2 – op
Deploy STBD RAD	cb MCA PWR AC1 3Φ MID 1 – op AC2 3Φ MID 4 – op AC3 3Φ MID 4 – op

2. UNLATCH PANELS

R13L

- ✓RAD LAT CNTL SYS A,B (two) – OFF
 - ✓CNTL SYS A,B (two) – OFF
- ✓RAD,LAT PORT,STBD tb (four) match current RAD config

PL BAY MECH PWR SYS 1,2 (two) – ON

RAD LAT CNTL SYS A,B (two) – REL
 (✓Deploying RAD LAT tb(s)–bp, ~30 sec REL)
 RAD LAT CNTL SYS A,B (two) – OFF

Cont next page

- * If deploying RAD LAT tb not REL in *
- * 30 sec: *
- * RAD LAT CNTL SYS A,B (two) – OFF *
- * Perform MAL, MECH, 9.2a *

3. DEPLOY PANELS

RAD CNTL SYS A,B (two) – DPY
 (✓Deploying RAD tb(s)–bp, ~50 sec DPY)

RAD CNTL SYS A,B (two) – OFF

- * If deploying RAD tb(s) not bp after 10 sec *
- * and no motion, or *
- * If RAD panel(s) in transit and no motion, or *
- * If deploying RAD tb not DPY within *
- * 50 sec: *
- * RAD CNTL SYS A,B (two) – OFF *
- * Perform MAL, MECH, 9.2b *

PL BAY MECH PWR SYS 1,2 (two) – OFF

4. RECONFIG CBS

If cbs were opened for single RAD deploy,
 config cbs:

MA73C:
 C,D

COMPLETED ACTION	cb CONFIG
PORT RAD Deployed	cb MCA PWR AC1 3Φ MID 3 – cl AC2 3Φ MID 2 – cl (unless RMS uncradled) AC3 3Φ MID 2 – cl
STBD RAD Deployed	cb MCA PWR AC1 3Φ MID 1 – cl AC2 3Φ MID 4 – cl AC3 3Φ MID 4 – cl (unless RMS uncradled)

RAD STOW

NOTE

If RMS uncradled, PORT RAD, LAT 7–12, and STBD LAT 1–6 will operate single motor (cbs are pulled to safe MPMs)

WARNING

To preclude inadvertent MPM cycling:
 cb MCA PWR AC2 3Φ MID 2
 AC3 3Φ MID 4
 must remain open if RMS uncradled

1. CONFIG CBS

MA73C:
 C,D

If stowing single RAD and opposite RAD deployed, config cbs:

DESIRED ACTION	cb CONFIG
Stow PORT RAD	cb MCA PWR AC1 3Φ MID 3 – op AC2 3Φ MID 2 – op AC3 3Φ MID 2 – op
Stow STBD RAD	cb MCA PWR AC1 3Φ MID 1 – op AC2 3Φ MID 4 – op AC3 3Φ MID 4 – op

2. STOW PANELS

R13L

- ✓ RAD LAT CNTL SYS A,B (two) – OFF
 - ✓ CNTL SYS A,B (two) – OFF
- ✓ RAD,LAT PORT,STBD tb (four) match current RAD config

PL BAY MECH PWR SYS 1,2 (two) – ON

RAD CNTL SYS A,B (two) – STO
 (✓ Stowing RAD tb(s)–bp, ~50 sec STO)
 RAD CNTL SYS A,B (two) – OFF

Cont next page

- * If stowing RAD tb(s) not bp after 10 sec *
- * and no motion, or *
- * If RAD panel(s) in transit and no motion, *
- * or *
- * If stowing RAD tb not STO within 100 sec *
- * and no motion: *
- * RAD CNTL SYS A,B (two) – OFF *
- * Perform MAL, MECH, 9.2b *

3. LATCH PANELS

RAD LAT CNTL SYS A,B (two) – LAT
 (✓Stowing RAD LAT tb(s)–bp, ~30 sec, LAT)
 RAD LAT CNTL SYS A,B (two) – OFF

- * If stowing RAD LAT tb not LAT in *
- * 60 sec: *
- * RAD LAT CNTL SYS A,B (two) – *
- * OFF *
- * Perform MAL, MECH, 9.2a *

PL BAY MECH PWR SYS 1,2 (two) – OFF

4. RECONFIG cbs

If cbs were pulled for single RAD stow, config
 cbs:

MA73C:
 C,D

COMPLETED ACTION	cb CONFIG
PORT RAD stowed	cb MCA PWR AC1 3Φ MID 3 – cl AC2 3Φ MID 2 – cl (unless RMS uncradled) AC3 3Φ MID 2 – cl
STBD RAD stowed	cb MCA PWR AC1 3Φ MID 1 – cl AC2 3Φ MID 4 – cl AC3 3Φ MID 4 – cl (unless RMS uncradled)

PCS 1(2) CONFIG

If FD1:
S66 ENVIRONMENT
CRT,O1 Report cabin pressure (two) to MCC
Expect possible 'S66 CAB O2(N2) FLO 1(2)' msg

MO10W 14.7 CAB REG INLET SYS 1(2) vlv – OP
2(1) vlv – CL

O2 REG INLET SYS 1(2) vlv – OP
2(1) vlv – CL
H2O TK N2 REG INLET SYS 1(2) vlv – OP
2(1) vlv – CL
√ISOL SYS 1,2 vlv (two) – OP
√PPO2 CNTLR SYS 1,2 (two) – NORM
√N2 XOVER vlv – CL
√PL O2 SYS 1,2 vlv – CL
√N2 SYS 1,2 vlv – CL

If no internal Airlock:
Middeck Floor √EMU O2 ISOL VLV – CL

L2 √O2 SYS 1,2 SPLY (two) – ctr (tb-OP)
√XOVR SYS 1,2 (two) – OP
√N2 SYS 1,2 SPLY (two) – ctr (tb-OP)
√REG INLET (two) – ctr (tb-OP)
O2/N2 CNTLR VLV SYS 1(2) – AUTO
√2(1) – CL

O1 √O2/N2 FLOW sel – SYS 1(2) O2
√PPO2 sel – SNSR A(B)

VENT SAFING
O14:D √cb MNA CAB VENT – op
√VENT ISOL – op

TOPPING FES DEACTIVATION

L1 FLASH EVAP CNTLR PRI A,B – OFF
 SEC – OFF
 Wait 30 min

PARAMETER NAME	PARA ID	SM ALERT		
		LOW	HIGH	
EVAP TEMP TOPPING	AFT	0631802	-10	
	FWD	0631801	-10	
	L DUCT	0631800	-10	
	NOZ	0631878	-10	
	R DUCT	0631810	-10	
	NOZ	0631879	-10	

TOP EVAP HTR DUCT – OFF
 NOZ L,R – OFF

TOPPING FES STARTUP

1. HEATER ACTIVATION
 L1 ✓TOP EVAP HTR DUCT – A(B,C)
 ✓NOZ L,R – A(B) AUTO

* If htrs were off, wait 90 min *

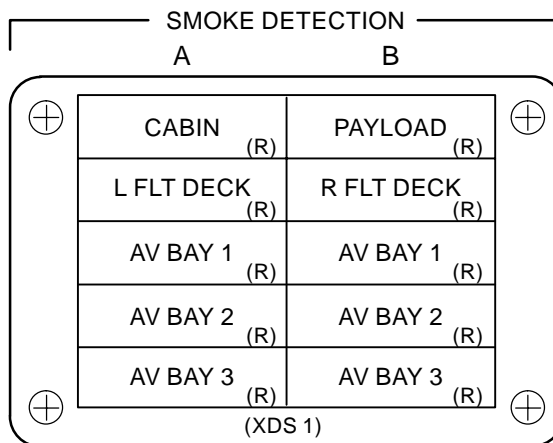
PARAMETER NAME	PARA ID	SM ALERT		
		LOW	HIGH	
EVAP TEMP TOPPING	AFT	0631802	100	
	FWD	0631801	100	
	L DUCT	0631800	50	
	NOZ	0631878	40	
	R DUCT	0631810	50	
	NOZ	0631879	40	

2. FES STARTUP

SM 79 SM SYS SUMM 2

- CRT If FREON EVAP OUT TEMP > 41 and ≤ 47 degF:
 L1 RAD CNTLR OUT TEMP – HI
 CRT When FREON EVAP OUT TEMP > 50 degF,
 L1 RAD CNTLR OUT TEMP – NORM, then
 immediately:
 FLASH EVAP CNTLR PRI A(B) – ON
 CRT If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:
 L1 FLASH EVAP CNTLR PRI A(B) – ON

SMOKE DETN CKT TEST



NOTE

If any SMOKE DETN It fails to illum (except PAYLOAD), open and close associated cb (pnl O14/O15/O16) and repeat test. For PART 2 TESTS only, allow 60 sec to take SMOKE DETN CKT TEST – OFF

CKT TEST A PART 1

- L1 SMOKE DETN CKT TEST – A
- ✓ FIRE SUPPR AV BAY pb (three) – Its on
 - Wait at least 5 sec (no more than 10 sec)
 - SMOKE DETN CKT TEST – OFF
 - ✓ FIRE SUPPR AV BAY pb (three) – Its off
 - ✓ SMOKE DETN A Its (five) – on
 - ✓ Siren – on
- F2 ✓ MSTR ALARM It – on
pb – off
- L1 SMOKE DETN SNSR – RESET
- ✓ Above lights and siren – off

Cont next page

CKT TEST A PART 2

SMOKE DETN CKT TEST – A

✓FIRE SUPPR AV BAY pb (three) – lts on

In 15–25 sec:

✓SMOKE DETN A lts (five) – on

✓Siren – on

F2 ✓MSTR ALARM lts – on

MSTR ALARM pb – off

L1 SMOKE DETN CKT TEST – OFF

SNSR – RESET

✓Above lights and siren – off

CKT TEST B PART 1

SMOKE DETN CKT TEST – B

✓FIRE SUPPR AV BAY pb (three) – lts on

Wait at least 5 sec (no more than 10 sec)

SMOKE DETN CKT TEST – OFF

✓FIRE SUPPR AV BAY pb (three) – lts off

✓SMOKE DETN B lts (four) – on (PL lts off)

✓Siren – on

F2 ✓MSTR ALARM lts – on

pb – off

L1 SMOKE DETN SNSR – RESET

✓Above lights and siren – off

CKT TEST B PART 2

SMOKE DETN CKT TEST – B

✓FIRE SUPPR AV BAY pb (three) – lts on

In 15–25 sec:

✓SMOKE DETN B lts (four) – on (PL lts off)

✓Siren – on

F2 ✓MSTR ALARM lts – on

MSTR ALARM pb – off

L1 SMOKE DETN CKT TEST – OFF

SNSR – RESET

✓Above lights and siren – off

Cont next page

SM SYS SUMM 1

CRT

Verify:

SMOKE	1/A	2/B
CABIN	-0.5 to +0.5	
L/R FD	-0.5 to +0.5	-0.5 to +0.5
AV BAY 1	-0.5 to +0.5	-0.5 to +0.5
2	-0.5 to +0.5	-0.5 to +0.5
3	-0.5 to +0.5	-0.5 to +0.5

If limits exceeded, ✓MCC

SHUTTLE/ISS H2O CONTAINER FILL

NOTE

For CWC or RSA EDV Tank fill. Assumes galley iodine removal hardware (LIRS or GIRA) already installed. Refer to flight-specific iodine removal procedures for galley iodine removal config. To minimize contamination possibility, avoid touching any internal parts of QDs or connections

EQUIPMENT PREPARATION

Unstow from designated stowage when needed:

Towel(s), CWCs, Sample/Purge Kit (contains Sample Bags (mylar), Purge Bags (clear), Needle Adapter, Sampling Adapter), mineral and silver biocide syringe kits. Retrieve “-2” adapter (EDV QD Adapter) if filling EDVs

TEE/HOSE ASSEMBLY PURGE (Perform ONLY if GIRA installed. See fig 5-1)

NOTE

TEE/HOSE ASSEMBLY PURGE reqd only if prior to first fill or three or more days since last fill

- ML90N
1. Retrieve Needle Adapter from Sample/Purge kit. Attach to injection port on tee at end of CWC Hose coming from tee of previously installed ACTEX
 2. Remove cap on Needle Adapter and attach Purge Bag. Open valve on injection port and fill bag to capacity (about 12 ounces). Close valve when capacity reached
 3. Disconnect bag from Needle Adapter. Stow Bag in Ziploc and place in crew-designated location (empty fresh food locker suggested). Replace cap on Needle Adapter and temp stow adapter until further use

Cont next page

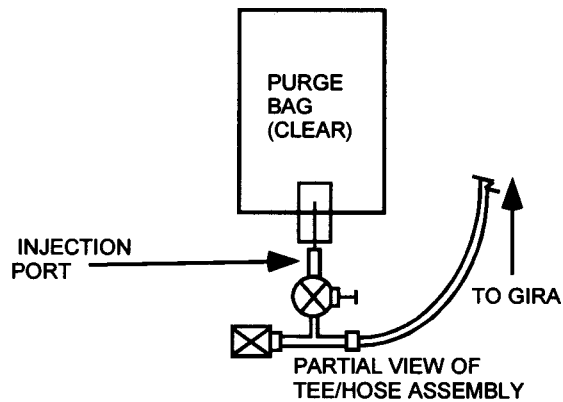


Figure 5-1.- Initial purge setup; tee/hose coming from GIRA.

CWC FILL (see fig 5-2)

NOTE

Potable water is water to which both silver biocide and minerals are added. Technical water is water to which only silver biocide is added

Do not squeeze CWC while filling. This may result in water backflow into connecting equipment and galley. Do not detach or move quantity measurement strap (if flown)

4. Retrieve desired number of CWCs. Report condition to MCC-H

NOTE

For Potable CWCs, ALWAYS add minerals first

CWC will begin filling as soon as it is connected to free end of ACTEX or tee/hose assembly

- ML90N
5. Attach CWC to free end of ACTEX (if LIRS installed) or tee/hose assembly (if GIRA installed)

Cont next page

6. Remove cap from syringe. At injection port nearest to CWC, remove cap and install syringe. Open valve on injection port and inject solution. Slowly withdraw syringe plunger fully, filling syringe with water, then reinject. Close valve on injection port when final injection complete
7. Remove syringe and stow in empty syringe location

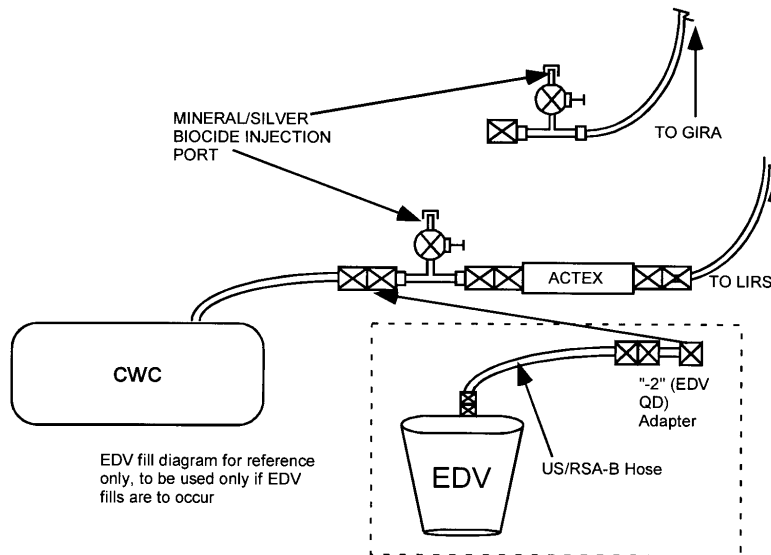


Figure 5-2.- CWC or EDV fill setup.

FILL TERMINATION

8. If quantity indicator flown:
 - If NO COMM, terminate fill if quantity indicator shows yellow/white transition (see fig 5-3)
 - If COMM, terminate fill on MCC call or when quantity indicator shows yellow/white transition, whichever occurs first
9. To terminate fill, disconnect CWC from ACTEX (if LIRS) or tee/hose assembly (if GIRA). Flow to CWC will stop when this action performed

Cont next page

10. If no samples reqd, fill out CWC label and temp stow CWC until transferred to ISS. If samples reqd, fill out CWC label, then go to CWC SAMPLING PROCEDURE and/or CARTRIDGE ASSEMBLY SAMPLING PROCEDURE
11. Report barcode and serial number (located on CWC label) to MCC-H

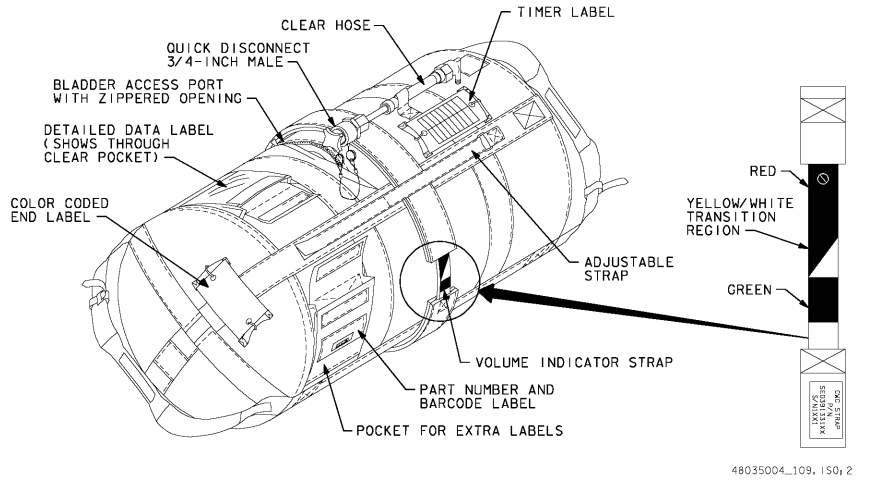


Figure 5-3.- Quantity measuring strap and CWC details.

Cont next page

CWC SAMPLING PROCEDURE (if reqd. See fig 5-4)

NOTE

If filling Technical CWCs, use ONLY sampling hardware with green valve handle. Sampling hardware with blue handle is for Potable CWCs only

12. Retrieve Sample/Purge kit and obtain Sampling Adapter. Connect Luer-lock end to Sample Bag. Connect QD end of Sampling Adapter to CWC. Ensure manual valve set to open posn. Fill bag (estimate visually) by squeezing CWC. When complete, close manual valve and remove Sample Bag. Fill out Sample Bag label, stow in Ziploc Bag, and place in crew-designated sample stowage location
13. Disconnect Sampling Adapter from CWC and stow in Sample/Purge kit. Temp stow CWC until transferred to ISS

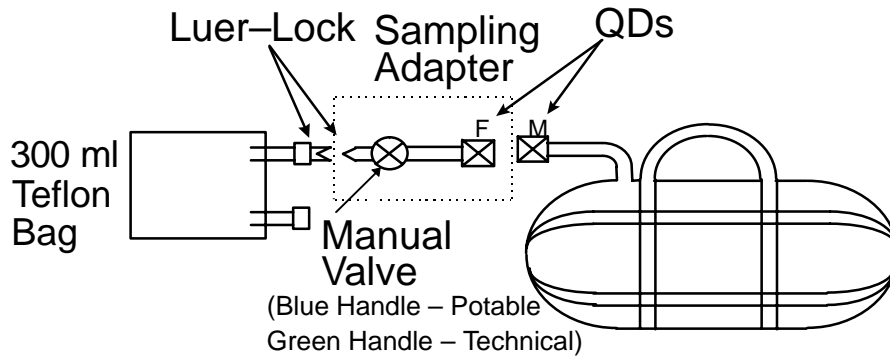


Figure 5-4.- CWC sample setup.

Cont next page

ACTEX CARTRIDGE SAMPLING PROCEDURE
(if reqd)

- ML90N 14. At injection port on ACTEX cartridge, remove cap, connect Needle Adapter
15. Connect clear Purge Bag to Needle Adapter. Open valve on injection port and fill bag to ~4 oz (estimate visually)
16. When complete, close valve on injection port and remove bag. Fill out label. Stow Sample Bag in Ziploc Bag and place in crew-designated sample stowage location
17. Remove and temp stow Needle Adapter. Replace cap on injection port

EDV TANK FILL PROCEDURE (see fig 5-2)

NOTE

Procedure assumes TEE/HOSE ASSEMBLY PURGE has already been completed

- _____ 1. Retrieve desired number of EDV tanks (usually preassembled with lids), fill indicator, “-2” adapter, EDV tank hose (US-PB or US/RSA-B)
- ML90N 2. Install “-2” adapter to free end of ACTEX (if LIRS) or Tee/Hose assembly (if GIRA)
3. Attach free end of “-2” adapter to EDV tank hose, and free end of hose to EDV tank hose fitting (remove cap if present)

Cont next page

NOTE

EDV will begin filling as soon as it is connected to “-2” adapter

4. On EDV tank lid, remove plug from fitting designated “Supply Pressure” (ПОДАЧА ДАБЛЕНИЯ). Remove plug from opposite fitting and install fill indicator in that fitting (Note: This fitting will not have filter screen)

NOTE

For Potable EDVs, ALWAYS add minerals first

5. Remove cap from syringe. At injection port nearest to EDV, remove cap and install syringe. Open valve on injection port and INJECT ONLY 1/2 OF SYRINGE. When complete, remove syringe and replace syringe cap. Stow syringe in location from which it came
6. Retrieve empty syringe from syringe kit and remove cap. Verify syringe plunger fully depressed. At injection port nearest to EDV, install empty syringe. Slowly withdraw syringe plunger fully, filling syringe with water, then reinject. Repeat once. After last reinjection, remove empty syringe and replace cap on syringe and injection port
7. On MCC-H call, check that EDV fill indicator shows red band. If red band shows, disconnect EDV from tank hose
8. Remove fill indicator from fitting and replace plug. Install other plug on “Supply Pressure” (ПОДАЧА ДАБЛЕНИЯ) fitting. Reinstall cap on tank hose fitting on lid (if cap present). Label EDV as reqd using spare labels from kit, then temp stow EDV until transferred to ISS

CWC OVERBOARD DUMP

NOTE

Use for dump of CWC(s) containing waste or supply water, or shuttle/ISS condensate. If CWC hose contains waste or shuttle/ISS condensate, use "CWC hose" instead of Y-Y hose.

If PASS SM avail, monitor waste dumpline and nozzle temps; otherwise, dump only when MCC available to monitor. Have towels ready to absorb any liquid released when mating or demating QDs

1. DUMP PREP

- BOB Obtain CWCs to be dumped
- CHCK Unstow Waste Water Dump (WWD) filter
- CHCK Unstow Y-Y (CWC) hose
- ML31C WASTE H2O DUMP ISOL VLV – CL (tb-CL)
- WCS OUTBD Connect female end of WWD filter to Cont H2O
- WALL X-tie Waste QD (upper QD with yellow Velcro and "WASTE" label)
- Connect Y-Y (CWC) hose to male end of WWD filter
- Connect free end of Y-Y (CWC) hose to CWC
- Change limits via table or request MCC TMBU:

SM 60 SM TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	50	250
B	0620519	50	250

On MCC GO, proceed to step 2

Cont next page

2. HEATER ACTIVATION

SM 66 ENVIRONMENT

√WASTE H2O DMP LN T > 50

ML86B:A * If WASTE H2O DMP LN T ≤ 50, *
* enable 2nd htr: *
* cb MNB(MNA) H2O LINE *
* HTR B(A) – cl *

ML31C WASTE H2O DUMP VLV ENA/NOZ HTR – ON
√VLV – CL (tb–CL)
√ISOL VLV – CL (tb–CL)

3. DUMP INITIATION

CRT When WASTE H2O NOZ T A,B (two) > 250
(8–10 min),

ML31C WASTE H2O DUMP VLV – OP (tb–OP)
CRT √WASTE H2O NOZ T A,B (two) – not incr
If 'S66 WASTE H2O TEMP', WASTE H2O
NOZ T A(B) '↓':

ML31C * WASTE H2O DUMP VLV – CL (tb–CL) *
CRT * When WASTE H2O NOZ T A,B (two) *
ML31C * > 250 (~8 min), *
* WASTE H2O DUMP VLV – OP *
* (tb–OP) *

NOTE

Periodically monitor CWC and hose. Ensure
no hose kinks or signs of CWC collapse

4. DUMP TERMINATION

Terminate on MCC call, or if no comm, upon any
signs of CWC collapse

ML31C WASTE H2O DUMP VLV – CL (tb–CL)
Disconnect CWC from Y–Y (CWC) hose, and
temp stow empty CWC

If dumping multiple CWCs sequentially:
Connect next CWC to Y–Y (CWC) hose
Repeat step 3

Cont next page

CRT When WASTE H2O NOZ T A,B (two) > 250 (~8 min),

ML31C WASTE H2O DUMP VLV ENA/NOZ HTR – OFF

✓WASTE H2O DUMP VLV tb – bp

ML86B:A * If WASTE H2O NOZ T A,B (two) incr: *
* cb MNA WASTE H2O DUMP *
* VLV/NOZ HTR – op *

5. POST-DUMP RECONFIG

WCS Disconnect WWD filter from Cont H2O X-tie
OUTBD Waste QD and Y-Y (CWC) hose from filter
WALL

ML31C WASTE H2O DUMP ISOL VLV – OP (tb-OP)

Stow empty CWC(s)

If additional CWC dump(s) to be performed:

Temp stow WWD filter (place filter in Ziploc Bag) and Y-Y (CWC) hose

If final CWC dump:

CHCK Stow Y-Y (CWC) hose

BOB Stow WWD filter (place filter in Ziploc Bag)

6. POST-DUMP FDA CLEANUP

Change limits via table or request MCC TMBU:

SM 60 SM TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	-82	250
B	0620519	-82	250

CABIN TEMP CONTROLLER RECONFIG – 2(1)

L1 CAB TEMP sel – WARM
Wait 10 sec, then:
CAB TEMP CNTLR – OFF
MD44F Pin CAB TEMP CNTL act link – SEC(PRI) ACT
L1 CAB TEMP CNTLR – 2(1)
sel – as reqd

SHUTTLE CONDENSATE COLLECTION

SETUP

1. Unstow:
 - Y/Y Hose
 - Contingency Water Container (CWC),
report barcode and serial number to MCC
 - Towel
 - Gray Tape
2. Attach CWC to Y/Y Hose
3. Label CWC with Gray Tape marked
"CONDENSATE, DO NOT TRANSFER TO ISS"
- ML86B:B 4. cb MNB WASTE H2O TK1 DRAIN – cl

NOTE

Catch any water droplets with towel. Waste Tank Drain config (step 6) should be performed ASAP after attaching Y/Y Hose to Condensate QD to prevent possible backflow of waste tank contents into condensate CWC

MIDDECK

- FLR 5. Attach Y/Y Hose to Condensate QD
- ML31C 6. WASTE H2O TK1 DRAIN VLV – CL (tb–CL)
- ML86B:B 7. cb MNB WASTE H2O TK1 DRAIN – op
8. Position, secure all hardware
9. Mark start MET on CWC label
10. Notify MCC, CONDENSATE FILL initiated
11. ✓CWC fill progress every 24 hr

TEARDOWN

- ML86B:B 1. cb MNB WASTE H2O TK1 DRAIN – cl
- ML31C 2. WASTE H2O TK1 DRAIN VLV – OP (tb–OP)
- ML86B:B 3. cb MNB WASTE H2O TK1 DRAIN – op

NOTE

Catch any water droplets with towel

4. Remove, stow all hardware

PWR OVERBOARD DUMP

NOTE

If PASS SM avail, monitor waste dump line and nozzle temps, otherwise dump only when MCC available to monitor.
Have towels ready to absorb any liquid released when mating or demating QDs

- DUMP PREP
Obtain PWRs to be dumped

BOB _____
_____ Unstow Waste Water Dump (WWD) filter
Unstow B-B hose
Unstow R-Y QD adapter

ML31C WASTE H2O DUMP ISOL VLV – CL (tb-CL)

WCS
OUTBD
WALL Connect female end of WWD filter to Cont H2O X-tie Waste QD (upper QD with yellow Velcro and "WASTE" label)
Connect yellow end of R-Y QD adapter to free end of WWD filter
Connect B-B hose to free end of R-Y QD adapter
Connect free end of B-B hose to PWR

- Change limits via table, or request MCC TMBU:

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	50	250
B	0620519	50	250

Proceed to step 3

- HEATER ACTIVATION
SM 66 ENVIRONMENT
√ WASTE H2O DMP LN T > 50

Cont next page

ML86B:A * If WASTE H2O DMP LN T \leq 50, *
* enable second heater: *
* cb MNB(MNA) H2O LINE HTR B(A) – cl *

ML31C WASTE H2O DUMP VLV ENA/NOZ HTR – ON
✓VLV – CL (tb–CL)
✓ISOL VLV – CL (tb–CL)

4. DUMP INITIATION
CRT When WASTE H2O NOZ T A,B (two) > 250
(8–10 min),
ML31C WASTE H2O DUMP VLV – OP (tb–OP)
CRT ✓NOZ T A,B (two) – not incr

If dumping multiple PWRs sequentially:
When PWR empty,
ML31C WASTE H2O DUMP VLV – CL (tb–CL)
Disconnect empty PWR and temp stow
Connect next PWR
CRT When WASTE H2O NOZ T A,B (two) > 150,
ML31C WASTE H2O DUMP VLV – OP (tb–OP)

If 'S66 WASTE H2O TEMP', WASTE H2O NOZ
T A,(B) '↓':
ML31C * WASTE H2O DUMP VLV – CL (tb–CL) *
CRT * When WASTE H2O NOZ T A,B (two) > 250 *
* (~8 min), *
ML31C * WASTE H2O DUMP VLV – OP (tb–OP) *

NOTE

Periodically monitor PWR and B–B
hose. Ensure no hose kinks or signs
of PWR collapse

5. DUMP TERMINATION
CRT Upon any sign of PWR collapse, or when
WASTE H2O NOZ T A,B (two) > 250:
ML31C WASTE H2O DUMP VLV – CL (tb–CL)
Disconnect PWR from B–B hose and temp stow

Cont next page

CRT When WASTE H2O NOZ T A,B (two) > 250
 (~8 min),
 ML31C WASTE H2O DUMP VLV ENA/NOZ
 HTR – OFF
 ✓WASTE H2O DUMP VLV tb – bp

CRT * If WASTE H2O NOZ T A,B (two) still incr: *
 ML86B:A * cb MNA WASTE H2O DUMP *
 * VLV/NOZ HTR – op *

6. POST-DUMP RECONFIG

WCS Disconnect WWD filter from Cont H2O X-tie
 OUTBD Waste QD, R-Y QD adapter from filter, and
 WALL B-B hose from adapter
 ML31C WASTE H2O DUMP ISOL VLV – OP (tb-OP)

Stow empty PWR(s)
 If additional PWR dump(s) to be performed
 later:
 Temp stow WWD filter, B-B hose, and
 R-Y QD adapter (place equipment in
 Ziploc Bags)

If final PWR dump of flight:
 Stow B-B hose (place in Ziploc Bag)
 Stow R-Y QD adapter (place in Ziploc Bag)
 Stow WWD filter (place in Ziploc Bag)

BOB

7. POST-DUMP FDA CLEANUP

Change limits via table, or request MCC TMBU:

SM 60 TABLE MAINT

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O NOZ T A	0620520	-82	250
B	0620519	-82	250

EMU WATER RECHARGE BAG FILL

- E-Lk 1. Unstow EMU Water Recharge Bag(s) (Payload Water Reservoir) from E-Lk floor bin, as reqd

CAUTION
Do not use water bags containing orange cards. These bags not certified for EMU use

2. Transfer bag(s) to orbiter galley

WATER FILL (ON MCC-H CALL)

NOTE
Do not perform Galley Ops or CWC fills while filling EMU Water Recharge Bags

If SPLY H2O XOVR VLV – CL (tb-CL) (water transfer config):

- R11L 3. SPLY H2O TKA OUTLET → CL (tb-CL)

SM 60 TABLE MAINT

4. Use TKA quantity:
PARAM ID – ITEM 1 +0 6 2 0 4 1 0 EXEC
5. Log bag serial number/barcode and TKA % value before recharge. Report bag serial number/barcode to MCC-H

Bag Serial Number/Barcode	H2O TKA %

CAUTION
Do not overfill EMU Water Recharge Bag as damage to bag may occur

Cont next page

NOTE

Full charge = 12% change in TKA quantity and requires ~ 30 min

- Galley
6. MV2 vlv → Max AMB
 7. EMU Water Recharge Bag QD →|← Orbiter Galley Aux Port
 8. Set timer for 30 min
Attach timer to Velcro square on EMU Water Recharge Bag
 9. ✓H2O TKA quantity decreasing

VERIFYING WATER FILL

After approx 30 min:

SM 60 TABLE MAINT

10. Use TKA quantity:
PARAM ID – ITEM 1 +0 6 2 0 4 1 0 EXEC
11. Log bag serial number/barcode and TKA % value after recharge

Bag Serial Number/Barcode	H2O TKA %

NOTE

Full charge = 12% change in TKA quantity

To terminate fill:

12. EMU Water Recharge Bag →|← Orbiter Galley Aux Port
13. Temp stow EMU Water Recharge Bag for transfer to ISS

Cont next page

14. Repeat steps 4–13 for remaining bag(s)

After last bag filled:

Galley 15. MV2 vlv → as reqd

If SPLY H2O XOVR VLV – CL (tb–CL) (water transfer config):

16. SPLY H2O TKA OUTLET → OP (tb–OP)

17. Record fill date and quantity for bag(s) on white card. Report bag(s) serial number, fill date, and quantity of bags to MCC–H as comm permits

18. Transfer bag(s) to ISS

E–Lk 19. Stow bag(s) in floor bins

EPS

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EDO PALLET CRYO O2 TK HTR SNSR CK	6-11
ACTIVATION	6-12
DEACT	6-13

EPS

FORWARD STATION
 O6/O8 ANNUN LAMP TEST – L, hold
 ✓78 lights – illuminated:
 O1 CAM Its (25)
 F2 MSTR ALARM (1)
 Aerodynamic controls (7)
 DRAG CHUTE (2)
 F3 NWS FAIL (1)
 DRAG CHUTE (1)
 L1 FIRE SUPPR AV BAY (3)
 SMOKE DETN (10)
 F6 LDG GEAR (2)
 ABORT (1)
 RCS CMD (3)
 RANGE SAFE ARM (1)
 F7 SM ALERT (1)
 C/W panel – partial (20)

O6/O8 ANNUN LAMP TEST – R, hold
 ✓61 lights – illuminated:
 F4 MSTR ALARM (1)
 Aerodynamic controls (7)
 DRAG CHUTE (1)
 F3 ANTISKID FAIL (1)
 DRAG CHUTE (2)
 F8 LDG GEAR (2)
 F7 MN ENG STAT (3)
 C/W panel – partial (20)
 C3 DAP PANEL (24)

MIDDECK (Verified by second crewmember)
 O6/O8 ANNUN LAMP TEST – L, hold
 MO29J ✓MIC KEY light – illuminated
 O6/O8 ANNUN LAMP TEST – R, hold
 ✓5 lights – illuminated:
 MO52J MSTR ALARM light (1)
 MO51F RCRS CNTLR 1 (2)
 RCRS CNTLR 2 (2)

Cont next page

AFT STATION
A6U ANNUN LAMP TEST – L, hold
√25 lights – illuminated:
DAP PANEL (24)
A2 MIC KEY (1)

A6U ANNUN LAMP TEST – R, hold
√28 lights – illuminated:
A7U MSTR ALARM (1)
VID IN (13)
OUT (8)
CAMR CMD ALC (3)
GAMMA (3)

C/W STATUS
R13U C/W LAMP TEST – L, hold
√STATUS lights – illuminated (60)
C/W LAMP TEST – R, hold
√STATUS lights – illuminated (60)

HEATER RECONFIG – CONFIG B(CONFIG A)

L1 TOP EVAP HTR NOZ (two) – B AUTO(A AUTO)
DUCT – B(A)

L2 FLASH EVAP FDLN HTR A,B SPLY (two) – 2(1)

A12 HYD HTR RUD SPD BK A – OFF(AUTO)
B – AUTO(OFF)
BDY FLP A – OFF(AUTO)
B – AUTO(OFF)
ELEV A – OFF(AUTO)
B – AUTO(OFF)
AFT FUS A – OFF(AUTO)
B – AUTO(OFF)

Perform APU HEATER RECONFIG (APU/HYD),
then:

A14 RCS/OMS HTR FWD RCS – B AUTO(A AUTO)
L POD – A OFF(A AUTO)
– B AUTO(B OFF)
R POD – A OFF(A AUTO)
– B AUTO(B OFF)

RCS/OMS HTR
OMS CRSFD LINES – OFF(A AUTO)
– B AUTO(OFF)

R11U FC H2O LINE HTR – B AUTO(A AUTO)
RELIEF HTR – B AUTO(A AUTO)

ML86B:A cb MNA H2O LINE HTR A – op(cl)
MNB H2O LINE HTR B – cl(op)

If no internal A/L:
ML86B:C cb MNA EXT ARLK HTR
LINE ZN 1,2 (two) – op(cl)
STRUC Z1/2/3 – op(cl)
cb MNB EXT ARLK HTR
LINE ZN 1,2 (two) – cl(op)
STRUC Z1/2/3 – cl(op)

If docked:
cb MNA EXT ARLK HTR
VEST Z1/2/3 – op(cl)
cb MNB EXT ARLK HTR
VEST Z1/2/3 – cl(op)

Cont next page

FUEL CELL PURGE – MANUAL

R11U 1. TURN ON PURGE HEATERS
FC PURGE HTR – ON

CRT SM 69 FUEL CELLS
✓PURGE LN O2 T > 69
 ✓H2 T1 > 79
 ✓T2 > 40

2. MANUAL PURGE SEQUENCE

NOTE

Fuel cells must be purged separately

CAUTION

Do not purge FC if:
FC AMPS > 350
FC is shut down
Within 3 hr of deorbit burn

CRT FC 1(2,3) FLOW O2 – note
H2 – note

R11U FC PURGE VLV 1(2,3) – OP

CRT ✓FC 1(2,3) FLOW O2 – incr ~3.3 (max)
 ✓H2 – incr ~0.6 (max)

R11U * If any flow '↑' alarm, *
* (aff) FC PURGE VLV – CL *

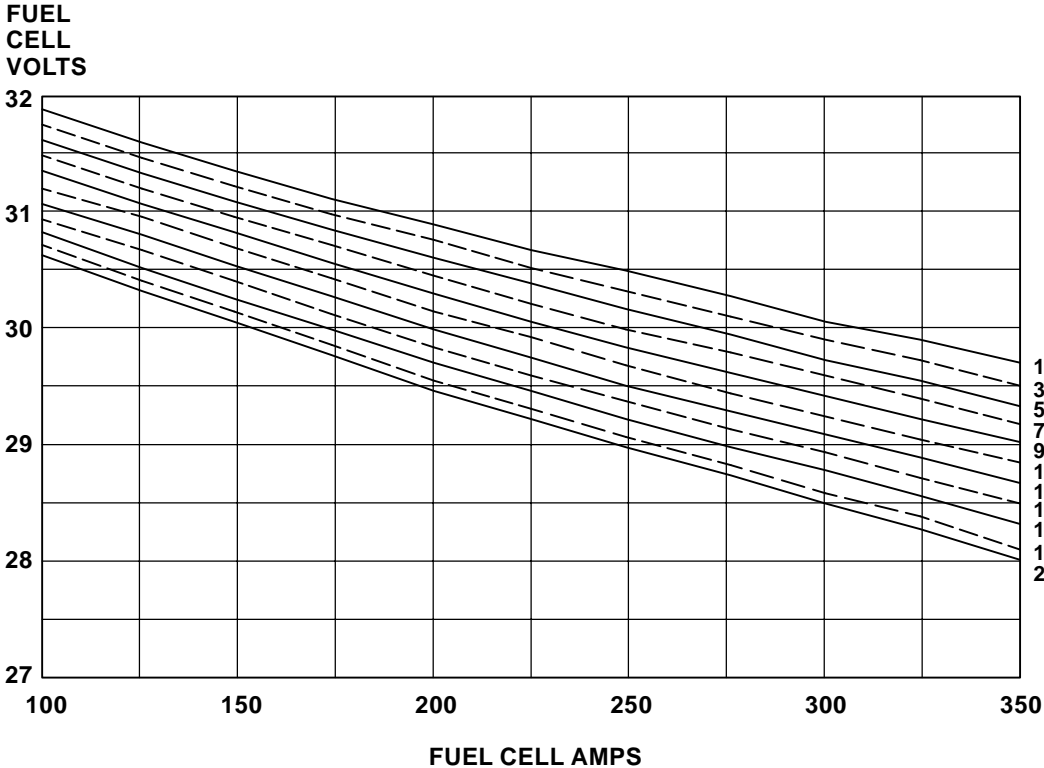
Wait 2 min
FC PURGE VLV 1(2,3) – GPC

CRT ✓FC 1(2,3) FLOW O2 – decr ~3.3 (max)
 ✓H2 – decr ~0.6 (max)

Repeat step 2 for FCs 2 and 3
Wait at least 30 min, then continue

R11U 3. TURN OFF PURGE HEATERS
FC PURGE HTR – GPC

FUEL CELL VI PERFORMANCE PLOT



NOTE
 Record FC performance.
 Select a curve for each FC. A drop of 0.5 volts below a selected curve during subsequent check indicates a degraded FC

- 0 = FC1
- X = FC2
- Δ = FC3

6-8 ORB OPS/ALL/GEN H

CRYO O2 TK HTR SNSR CK

NOTE

Expect 'S68 O2 HTR TRP' msg
when htr sensor taken to test

SM 68 CRYO SYSTEM

- R1 1. Note O2 TK1 HTR sw posns
O2 TK1 HTRS A,B (two) – ON, pause 5 sec, then:
– TEST (1 sec)
- CRT 2. ✓HTR CUR SNSR 1A,1B,2A,2B (four) – '↓'
- * If HTR CUR SNSR 1A(1B)/2A(2B) not '↓': *
 - * O2 TK1 HTRS A(B) – OFF, then: *
 - * If HTRS A(B) was in AUTO: *
 - * O2 TK1 HTRS B(A) – AUTO *
 - * Go to step 4 *
- R1 3. O2 TK1 HTRS A,B (two) – previous posn
4. O2 TK1 – RESET
5. Repeat steps 1–4 for following:
O2 TK2 HTRS
TK3 HTRS
- A11 O2 TK4 HTRS (if OV103/104/105 and
4th tk flown)
- A15 O2 TK5 HTRS (if OV103/104/105 and
5th tk flown)
- If OV102 TK4/TK5 flown:
- A11 6. Note O2 TK4/5 HTR sw posns
CRYO TK4/5 HTR O2 TK4,TK5 (two) – ON,
pause 5 sec, then:
CRYO TK4/5 HTR O2 TK4/5 – TEST (1 sec)

Cont next page

CRT

7. ✓HTR CUR SNSR TK4 1A,1B,2A,2B
(four) – ‘↓’

A11

* If HTR CUR SNSR 1A(1B)/2A(2B) *
* not ‘↓’: *
* CRYO TK4/5 HTR O2 TK4(TK5) – *
* OFF, then: *
* If TK4(TK5) was in AUTO: *
* O2 TK5(TK4) HTR – AUTO *
* Go to step 9 *

8. CRYO TK4/5 HTR O2 TK4,TK5 (two) –
previous posn

9. CRYO TK4/5 HTR O2 TK4/5 – RESET

EDO PALLET CRYO O2 TK HTR SNSR CK

NOTE

Expect 'S168 O2 HTR TRP' msg
when htr sensor taken to TEST

SM 168 CRYO PALLET

- A15 1. Note O2 TK6 HTR sw posns
O2 TK6 HTRS A,B (two) – ON, pause 5 sec, then:
– TEST (1 sec)
- CRT 2. ✓HTR CUR SNSR 1A,1B,2A,2B (four) – '↓'
- * If HTR CUR SNSR 1A(1B)/2A(2B) not '↓': *
 - * O2 TK6 HTRS A(B) – OFF, then: *
 - * If HTRS A(B) was in AUTO: *
 - * O2 TK6 HTRS B(A) – AUTO *
 - * Go to step 4 *
- A15 3. O2 TK6 HTRS A,B (two) – previous posn
4. O2 TK6 – RESET
5. Repeat steps 1–4 for following:
O2 TK7 HTRS
TK8 HTRS
TK9 HTRS

EDO PALLET DEACT

A15:C PALLET HTRS A,B (two) – OFF
:D-G ✓ PALLET O2,H2 TK6,TK7,TK8,TK9 HTRS A,B
(sixteen) – OFF

A15:C PALLET PWR PPCA-1 (PPCA-1/3 if OV105)
MNA – OFF (tb-OFF)
PALLET PWR PPCA-2 (PPCA-2/4 if OV105)
MNB – OFF (tb-OFF)

A15:B cb PPCA CONT PWR 1 (1/3 if OV105)
ESS 1BC – op
cb PPCA CONT PWR 2 (2/4 if OV105)
ESS 2CA – op

A15:H cb PALLET MNA,MNB TK6 O2 SNSR 1,2 (two) – op
:I TK7 O2 SNSR 1,2 (two) – op
:J TK8 O2 SNSR 1,2 (two) – op
:K TK9 O2 SNSR 1,2 (two) – op

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GNC

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GNC

IMU ALIGN – S TRK, GNC 201,202,301

1. COLLECT STAR DATA

✓ In attitude

GNC 22 S TRK/COAS CNTL

S TABLE CLR – ITEM 20 EXEC

✓ STAR TRK – ITEM 3,4 (*)

✓ S TRK –Y,–Z: STATUS – (no BITE)
SHUTTER – OP

- * If SHUTTER – CL: *
- * ✓ Attitude, MET correct *
- * Visually verify no bright object in FOV *
- * After data collected and before changing *
- * attitude, return shutter to AUTO *
- * To open shutter: *
- * MAN OP – ITEM 15(16) EXEC (*) *
- * To return shutter to AUTO: *
- * MAN OP – ITEM 15(16) EXEC (no *) *

2. VERIFY STAR DATA

✓ S TABLE: TRK ID 1,2 correct #s

ANG ERR 1 ≤ .08

SEL, ITEM 17,18 – (*)

Wait ~1 min for new IMU ΔANGs

- * If no data after 3 min or bad data: *
- * Repeat step 1 *
- * ✓ Attitude, stars, MET correct *
- * ✓ S TRK –Y,–Z: TRK ID: correct #s *
- * ΔANG: < 1.0 *
- * If still no data or bad data: *
- * Perform S TRK SELF-TEST, then: *
- * If both STATUS – ST FAIL: *
- * | Inform MCC before proceeding *
- * If both STATUS – ST PASS: *
- * | Repeat step 1 at new att, stars *
- * If one STATUS – ST PASS: *
- * Perform single tracker steps *

GNC

Cont next page

- * Single tracker procedure *
- * ✓TERM/IDLE, ITEM 9(10) – (*) *
- * Good S TRK, STAR TRK – *
- * ITEM 3(4) EXEC (*) *
- * S TABLE CLR – ITEM 20 EXEC *
- * ✓S TABLE: TRK ID 1 correct # *
- * Good S TRK, TERM/IDLE – ITEM *
- * 9(10) EXEC (*) *
- * MnvR to 2nd attitude, star *
- * Good S TRK, STAR TRK – ITEM *
- * 3(4) EXEC (*) *
- * Repeat step 2 with good S TRK only *

3. CHECK IMU ΔANGs

CRT

GNC 21 IMU ALIGN

- IMU 1,2,3: STAT – blank
- ✓STAR ALIGN, ITEM 13 – (*)
- ✓ANG 1,2,3: $\Delta X, \Delta Y, \Delta Z \leq 0.50$
- If no comm, record ΔANGs

- * If ANG $\Delta X, \Delta Y, \Delta Z > 0.50$ for two or *
- * more IMUs, repeat steps 1,2,3 *

CAUTION

If ANG $\Delta X, \Delta Y, \Delta Z$ still > 0.50 for two or more IMUs, DO NOT TORQUE PLATFORMS EXCEPT UNDER MCC INSTRUCTIONS

4. ALIGN IMUs

- ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
- EXEC – ITEM 16 EXEC (*)
- ✓EXEC, ITEM 16 – (no *)
- If not deorbit align >>

5. D/O ALIGN VERIFICATION

- When D/O align complete, mnvr to VERIF ATT (FLIGHT PLAN, Detailed Timeline), perform steps 1,2 using verif stars
- ✓IMU 1,2,3 ANG $\Delta X, \Delta Y, \Delta Z < 0.1$

- * If ANG $\Delta X, \Delta Y, \Delta Z \geq 0.1$, ✓MCC *
- * If no comm, repeat steps 1–5 *

IMU ALIGNMENT – IMU/IMU

NOTE

Procedure must be accomplished
in GNC OPS 2 or 3

GNC 21 IMU ALIGN

IMU/IMU – ITEM 14 +__ EXEC

ΔX () ¹____ () ²____ () ³____

ΔY () ____ () ____ () ____

ΔZ () ____ () ____ () ____

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)

EXEC – ITEM 16 EXEC (*),

Rcd MET ____/____:____
____/____:____
____/____:____

NOTE

Align will require 3–6 min

Report IMU align results

VERIFY GOOD IMU/IMU ALIGNMENT

✓ EXEC, ITEM 16 – (no *)

IMU/IMU – ITEM 14 +(SAME REF IMU) EXEC

✓ IMU 1,2,3 ANG $\Delta X, \Delta Y, \Delta Z < 0.13$

* If ANG $\Delta X, \Delta Y, \Delta Z \geq 0.13$, report to MCC *

If in GNC OPS 2 or MM 301,

STAR ALIGN – ITEM 13 EXEC (*)

S TRK SELF-TEST, GNC 201,202,301

Mnvr to avoid bright objects in both BOSS

CRT GNC 22 S TRK/COAS CNTL
√ S TRK -Y,-Z: STATUS - (no BITE)
SHUTTER - OP

- * If SHUTTER - CL: *
- * ITEM 15(16) - EXEC (*) *
- * ITEM 15(16) - EXEC (no *) *

SELF-TEST - ITEM 1,2 EXEC (*)
√ S TRK -Y,-Z: SHUTTER - CL
S PRES - (*)
STATUS - BITE (mom)
SHUTTER - OP
STATUS - ST PASS

- * If STATUS - ST FAIL, repeat *
- * SELF-TEST *
- * If still FAIL, use only if directed *
- * by MCC *

STAR TRK - ITEM 3,4 EXEC (*)

IMU STAR OF OPPORTUNITY ALIGN

1. VERIFY STAR DATA
 - ✓ S TABLE: TRK ID 1,2,3 for correct #s
ANG ERR 1,2,3: ≤ 0.08 for correct #s
SEL, ITEM 17,18,19 – (*) for correct #s
2. CHECK IMU Δ ANGs
 - GNC 21 IMU ALIGN
 - IMU 1,2,3: STAT – blank
 - ✓ STAR ALIGN, ITEM 13 – (*)
 - ✓ ANG 1,2,3: $\Delta X, \Delta Y, \Delta Z \leq 0.50$

CAUTION

If ANG $\Delta X, \Delta Y, \Delta Z > 0.50$ for any IMU,
DO NOT TORQUE PLATFORMS
EXCEPT UNDER MCC INSTRUCTIONS

3. ALIGN IMUs
 - ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
 - EXEC – ITEM 16 EXEC (*)
 - ✓ EXEC, ITEM 16 – (no*)

COAS CALIBRATION, GNC 201

- O1(O19)
COAS
1. COAS CALIBRATION PREP
COAS – ON
✓Barrel Index – FW(OW)
✓DAP: A/AUTO/VERN
- If –Z COAS CAL,SENSE: –Z
- Change DAP A,B to A1,B5
- GNC 22 S TRK/COAS CNTL
COAS: REQD ID – ITEM 21 +__ __ EXEC
POS +X(–Z) – ITEM 26(27) EXEC (*)
CAL MODE – ITEM 24 EXEC (*)
- O14:E,
O15:E,
O16:E
- ✓cb DDU L(AFT) (two) – cl
- GNC 25 RM ORBIT
SW RM INH – ITEM 16 EXEC (*)
FLT CNTLR PWR – ON
- F7/F8
(A6U)
- SW RM INH – ITEM 16 EXEC (no *)
- GNC 22 S TRK/COAS CNTL
2. MARK ON STAR
DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)
- Mnvr to locate star
- DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)
B5/FREE/PRI (loss of VERNs)
- Mnvr to center star in COAS:
ATT REF pb – push
- F6
(A6U)

NOTE

Take minimum three verif marks
to ensure Δ BIAS consistency

DAP: A1/AUTO/VERN

Cont next page

- CRT
3. CALIBRATE COAS
 Rcd CAL +X(-Z) ΔBIAS: _____._____
 UPDATE – ITEM 28(29) EXEC, Rcd
 MET ___ / ___ : ___
 ✓ΔBIAS goes to zero
4. VERIFICATION
 DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)
- Mnvr to locate star
- DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)
 B5/FREE/PRI (loss of VERNs)
- Mnvr to center star in COAS:
 ATT REF pb – push
- F6
 (A6U)

NOTE

Take minimum three verif marks
 to ensure ΔBIAS consistency

✓ΔBIAS < 0.12

- * If majority of ΔBIASs > 0.12, repeat *
- * steps 3 and 4. If ΔBIAS still > 0.12, *
- * ✓MCC *

5. CLEAN UP
 COAS: DES – ITEM 25 EXEC (*)
 COAS – OFF
 FLT CNTLR PWR – OFF
- O1(O19)
 F7/F8
 (A6U)
- O14,O15,
 O16:E cb DDU L(AFT) (two) – as reqd

✓Data transcribed into FLIGHT PLAN

- CRT
- If S TRK(S) to be left in auto star-select mode:
 S TRK(S) –Y(-Z) – ITEM 3(4) EXEC (*)
- Reconfig to FLIGHT PLAN DAP

F6/F8 Mnv to center star in HUD boresight:
(‘P’ in ‘COMPLETE’, see HUD BORESIGHT
DESIGNATION, 7–12)
ATT REF pb – push

Note Δ BIAS value

NOTE

Take minimum three marks to
ensure Δ BIAS consistency

If Δ BIAS < 0.12° for at least three marks, go to
step 5

DAP: A1/AUTO/VERN

CRT 3. CALIBRATE HUD
Rcd CAL +X Δ BIAS: ____ . ____ ____
UPDATE – ITEM 28 EXEC,
Rcd MET ____ / ____ ____ : ____
✓ Δ BIAS goes to zero

4. VERIFICATION
DAP: A1/INRTL(FREE)/VERN (for COARSE CNTL)

Mnv to locate star

DAP: B5/INRTL(FREE)/VERN (for FINE CNTL)
B5/FREE/PRI (loss of VERNs)

F6/F8 Mnv to center star in HUD boresight:
ATT REF pb – push

NOTE

Take minimum three marks to
ensure Δ BIAS consistency

✓ Δ BIAS < 0.12°

- * If majority of Δ BIAS > 0.12, repeat *
- * steps 3 and 4. If Δ BIAS still > 0.12, *
- * ✓MCC *

Cont next page

5. CLEAN UP

	COAS: DES	- ITEM 25 EXEC (*)
F6U/F8U	HUD MODE	- NORM
F3	HUD PWR	- OFF
F7/F8	FLT CNTLR PWR	- OFF

O14,O15,
O16:E cb DDU L(R) (two) - as reqd

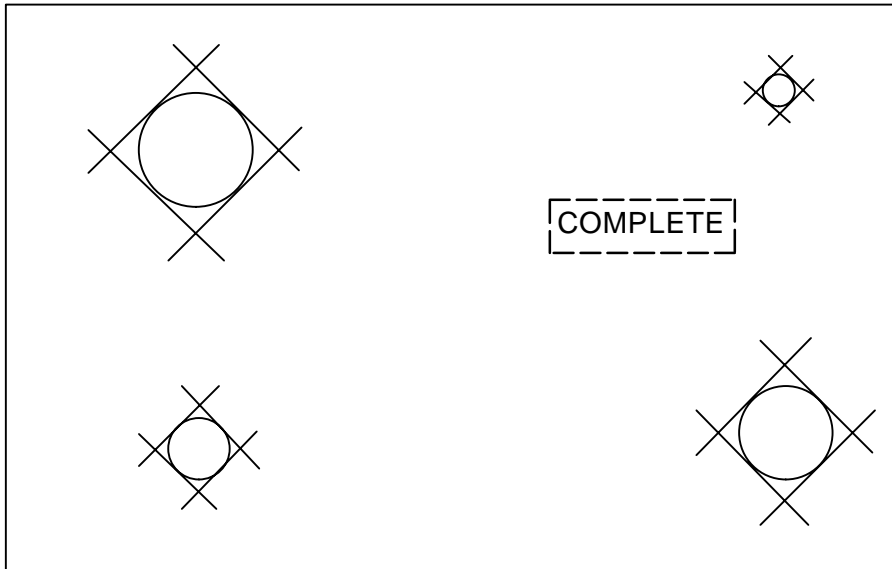
✓Data transcribed into FLIGHT PLAN

CRT If S TRK(s) to be left in auto star-select mode:
 S TRK(s) -Y(-Z) - ITEM 3(4) EXEC (*)

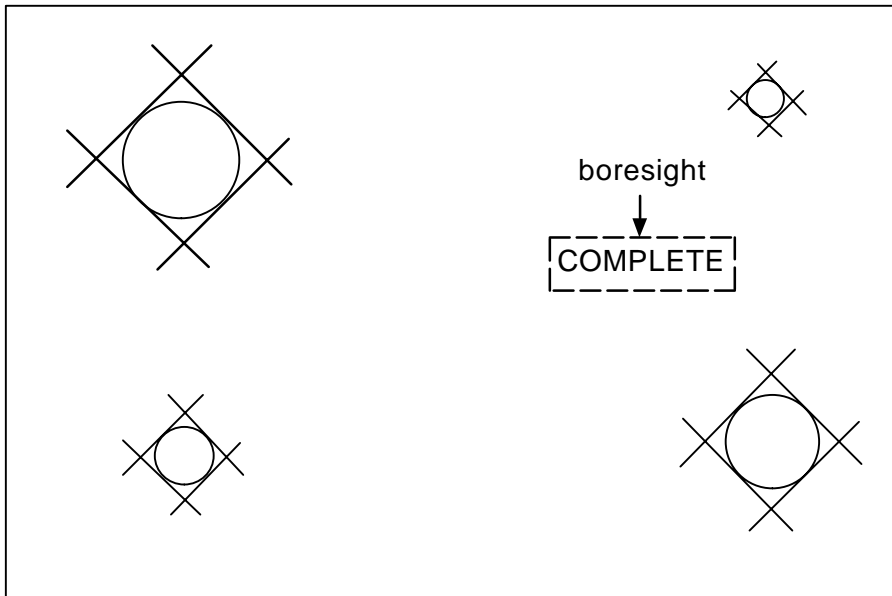
Install L(R) HUD Cover

Reconfig to FLIGHT PLAN DAP

HUD BORESIGHT DESIGNATION



Final symbology of HUD test mode display



HUD boresight designation

FCS CHECKOUT

- DISPLAY/DPS CONFIG
- O14, RGA (four) – ON
- O15, cb MNA,B,C ADTA (four) – cl
- O16 MNA,B ACCEL 1,2 (two) – cl
DDU L (two) – cl
MNB,C DDU R (two) – cl
- If APU will be used:
ASA (four) – ON
- If circ pump will be used:
✓ASA (four) – OFF
ACCEL 3,4 (two) – ON
BRAKES (three) – ON
- O15 ✓cb GPS 2 PRE AMPL UPPER – cl
LOWER – cl
- A13 ✓GPS PRE AMPL UC – ON
✓LC – ON
- ✓GPS PWR – ON
- L2 ANTISKID – ON
- O17 ATVC (four) – ON
- O7 TACAN MODE (three) – GPC
- O8 RADAR ALTM (two) – ON
MLS (three) – ON
- F3 TRIM PNL (two) – ON
HUD PWR (two) – ON
- C3 ✓FCS CH (four) – AUTO
- ✓DAP: A1/AUTO/VERN
- Perform G2 TO G8 TRANSITION (DPS), then:
- If using circ pump for part 1:
FCS CH 2,3 – OFF
ASA (four) – ON
Go to step 7b, 7–18

Cont next page

MEDS

A7–13 ORB OPS/MEDS/GEN H

ON-ORBIT FCS CHECKOUT, PART 1

NOTE

Only one APU will be used for FCS C/O. If APU does not start or MCC advises abbreviated actuator check, circ pump will be used. Selection of APU or circ pump will be made real time by MCC

If APU shuts down, 'S86 APU GBX T', 'S86 APU TEMP', 'S86 APU GBX P', APU shifts to HI speed (✓CRT), APU OVERSPEED or APU UNDERSPEED, then go to step 6, APU SHUTDOWN

NOTE

Any previously failed actuator channel should be bypassed via ITEM 21 on FCS/DED DIS C/O display prior to APU start

Cont next page

MEDS

A7-14 ORB OPS/MEDS/GEN H

C2 1. FCS C/O PREP
Set EVENT TIMER to 00:00, count UP

2. APU PRESTART

1: GNC, FCS/DED DIS C/O | 2: SM 86 APU/HYD

CRT2 ✓APU, HYD, WB status no '↑' or '↓'
(except HYD B/U)

If SYS 1:

R4 ✓LG EXTEND ISOL VLV tb – CL

R2 ✓HYD BRAKE ISOL VLV X tb – CL
HYD CIRC PUMP (three) – OFF

BLR N2 SPLY X – ON
✓PWR (three) – ON
✓CNTLR/HTR (three) – B
✓APU AUTO SHUTDN (three) – ENA
CNTLR PWR X – ON
HYD MN PUMP PRESS X – LO
✓APU SPEED SEL (three) – NORM
✓OPER (three) – OFF
✓FUEL TK VLV (three) – CL
✓cb APU FU TK VLV ENA (six) – cl

Inform MCC: READY FOR APU START

Wait for MCC GO

Cont next page

MEDS

A7-15 ORB OPS/MEDS/GEN H

3. APU START
 R2 APU FUEL TK VLV X – OP
 ✓APU/HYD RDY X tb – gray

* If tb – bp, ✓MCC *

- 00:00 Start EVENT TIMER
 R2 APU OPER X – START/RUN
 HYD/APU ✓HYD PRESS ind X – LOW green
 R2 ✓APU/HYD RDY X tb – bp

* If APU did not start, go to step 6 *

- HYD/APU HYD MN PUMP PRESS X – NORM
 ✓HYD PRESS ind X – HI green

SM 87 HYD THERMAL

- ✓SW VLV ELEV (four) per table
 ✓RUD/SPDBK per table

If HYD SYS 1	If HYD SYS 2	If HYD SYS 3
1(*)	2(*)	3(*)
1(*)	2(*)	3(*)

4. AEROSURFACE DRIVE
 CRT1 SURF DR START – ITEM 10 EXEC (*)
 Verify all surfaces cycling for 30 sec

NOTE

POS '↓' may be indicated
 until HYD SYS is warm

- * If FCS CH failure ('↓' port status), *
 * reset affected FCS CH: *
 * FCS CH – ORIDE, then *
 * – AUTO *

- After 30 sec of aerosurface drive,
 SURF DR STOP – ITEM 11 EXEC (*)
 ✓Surfaces not moving

Cont next page

MEDS

A7-16 ORB OPS/MEDS/GEN H

5. SECONDARY ACTUATOR CHECK (APU)

NOTE

If a port does not bypass during check, bypass affected port after APU shutdn:

SEC ACT BYPASS – ITEM 21 +X X EXEC

If affected port still does not bypass:

SEC ACT RESET – ITEM 22 +X X EXEC

- CRT1 a. ✓POS STIM ENA, ITEM 20 – (*)
- C3 b. ✓FCS CH 1,2,3,4 – AUTO
- CRT1 c. SEC ACT CK, CH 1 – ITEM 15 EXEC (*)
- d. ✓All CH 1 ports bypass ('↓')
STOP – ITEM 19 EXEC (*)
- C3 e. FCS CH 1 – ORIDE
CRT1 ✓All CH 1 ports reset (no '↓')
C3 FCS CH 1 – AUTO
- f. Repeat steps c thru e for CH 2,3,4
- CRT1 g. NEG STIM – ITEM 20 EXEC (no *)
- h. Repeat steps b thru f

6. APU SHUTDOWN

On MCC GO for APU SHUTDN:

- R2 BLR PWR (three) – OFF
APU OPER X – OFF
FUEL TK VLV X – CL
✓Shutdn (hyd press)
CNTLR PWR X – OFF
BLR N2 SPLY X – OFF
HYD CIRC PUMP (three) – GPC

Proceed to part 2

Cont next page

MEDS

A7-17

ORB OPS/ALL/GEN H

7. CIRC PUMP ACTIVATION

1: GNC, FCS/DED DIS C/O 2: SM 86 APU/HYD

NOTE

OPS 2/8 trans must be performed with ASAs off to avoid AERO DRIVE fault msgs during actuator checks

- O14,O15,
O16:F
- C3
- R4
- R2
- a. Perform G8 to G2 TRANSITION (DPS),
then:
ASA (four) – OFF
- Perform G2 to G8 TRANSITION (DPS), then:
✓FCS CH 1,4 – AUTO
2,3 – OFF
ASA (four) – ON
- ✓HYD BRAKE ISOL VLV X tb – CL
- ✓HYD CIRC PUMP (three) – OFF
- b. HYD CIRC PUMP X – ON

8. ABBREVIATED SECONDARY ACTUATOR CHECK (circ pump)

NOTE

If an elevon does not move to commanded posn, bypass affected port after check of all channels:
SEC ACT BYPASS – ITEM
21 +X X EXEC

- CRT1
- C3
- CRT2
- CRT1
- a. ✓POS STIM ENA, ITEM 20 – (*)
- b. ✓FCS CH 1,4 – AUTO
✓2,3 – OFF
- c. GNC 42 SWITCH/SURF
✓All elevons move to $U7.5^\circ \pm 0.8^\circ$
- d. SEC ACT CK, CH1 – ITEM 15 EXEC (*)
Wait 5 sec

Cont next page

A7-18

MEDS

ORB OPS/ALL/GEN H

- C3
CRT2
- e. Turn off FCS CH not being checked:
FCS CH (three) – OFF
✓All elevons move to $U1.5^\circ \pm 0.8^\circ$
- * If any elevon drives past 0° , turn on *
 - * all FCS CHs to stop movement *
 - * FCS CH (four) – AUTO *
 - * Expect AERO DRIVE msg. Continue *
 - * procedure and report to MCC *

- CRT1
- f. STOP – ITEM 19 EXEC (*)
✓All elevons move to $U7.5^\circ \pm 0.8^\circ$

- C3
- g. Config FCS CHs for check of next CH:
(Config switches in sequence shown)

NEXT CH	FCS CH SWITCHES			
	4	1	2	3
2	AUTO	OFF	AUTO	OFF
3	AUTO	OFF	OFF	AUTO
4	AUTO	OFF	OFF	AUTO

- h. Repeat steps d thru g for CHs 2,3,4

- R2
9. HYDRAULIC SYSTEM RECONFIG
HYD CIRC PUMP (three) – GPC

10. FCS CH RECONFIG

- a. Perform G8 to G2 TRANSITION (DPS),
then:
FCS CH 1,2,3 – AUTO
✓4 – AUTO
- C3
- b. Perform G2 to G8 TRANSITION (DPS),
then:
Continue with part 2

Cont next page

MEDS

A7-19 ORB OPS/MEDS/GEN H

LIMIT VALUES TABLE

	RNG	AZ	EL
MLS	15.0 to 15.4	+,-2.9 to +,-3.1 (+ for 3 sec, then -)	5.9 to 6.1
TAC	0 to 0.5	177.5 to 182.5 NOTE Values from 182.1 to 182.5 will be displayed as 2.1 to 2.5	
RA	ALT		
	900 to 1100		
AA		Y	Z
		+14.40 to 17.80	+57.70 to 71.10

07 STOP – ITEM 14 EXEC (*)
TACAN MODE (three) – OFF

2. Sensor Test – RGA, ADTA

NOTE

During RGA, ADTA test, deselect LRU for failure indicated:

RGA – bias null limits exceeded,
'↑' or '↓', or SMRD

ADTA – any '↑' or '↓', except temp ('T')

If RGA does not respond to HIGH or LOW TEST or displays 'SMRD' indication in STAT column:

✓MCC, confirm that payload config can support PRCS firings

Null vehicle rates

Maneuver at 0.5°/sec about appropriate axis; monitor RGA data

If RGA responds, self-test circuitry

| or SMRD circuitry failed

If no RGA response, deselect sensor

Cont next page

MEDS

A7-21 ORB OPS/MEDS/GEN H

CRT2

2: GNC 41 RGA/ADTA/RCS

- ✓DES: (no *)
- ✓STAT: blank
- ✓PS,PαC,PαU,PαL,T – no M

Config For Free Drift

- ✓DAP: A1/INRTL/VERN
- ✓R,P,Y rates $0 \pm 0.1^\circ/\text{sec}$, then:
DAP: FREE

RGA Bias/Null Shift Test

- ✓R,P,Y within limits: R –.4 to +.4
P/Y –.2 to +.2
Refer to Limit Values Table, 7–23

High Test

TEST HI – ITEM 9 EXEC (*)
(after 10 sec, no *)

- ✓No '↑' or '↓'
If ADTA BITE, ✓MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

Low Test

TEST LOW – ITEM 10 EXEC (*) (after 10 sec,
no *)

- ✓No '↑' or '↓'
If ADTA BITE, ✓MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

DAP: A1/AUTO/VERN

Cont next page

A7–22

MEDS

ORB OPS/ALL/GEN H

LIMIT VALUES TABLE

<u>HIGH TEST LIMITS</u>				
<u>RGA</u>				
R +18.8 to +21.2	P +9.4 to +10.6	Y +9.4 to +10.6		
<u>ADTA</u>				
PS .813 to .815	PαC 5.473 to 5.477	PαU 2.740 to 2.744	PαL 1.708 to 1.712	T 173.56 to 173.60
<u>LOW TEST LIMITS</u>				
<u>RGA</u>				
R -18.8 to -21.2	P -9.4 to -10.6	Y -9.4 to -10.6		
<u>ADTA</u>				
PS 24.887 to 24.889	PαC 29.527 to 29.531	PαU 21.708 to 21.712	PαL 14.713 to 14.717	T 18.50 to 18.54

3. Sensor Test – GPS

NOTE

After GPS S/TEST, deselect LRU for failure indicated by '↓'. GPS self-test takes about 2 min to complete. 'BIT' in STAT field on SPEC 55 indicates hardware feedback and clears when test complete

2: GNC 55 GPS STATUS

- √NAV – ITEM 18 (*)
- If 'RPF' in STAT field, √MCC (if LOS, proceed with test)
- S/TEST – ITEM (12) EXEC (*)
- √'BIT' in STAT field after ~6 sec,
Wait for 'BIT' to clear after ~2 min
- √S/TEST '↑'; if '↓' deselect GPS
- NAV – ITEM 18 EXEC (*)
- √MODE – INS

Cont next page

MEDS

A7-23 ORB OPS/MEDS/GEN H

4. FCS MODE/CH SWITCH TEST

NOTE

During tests, FCS CH:

Fail op or fail cl – deselect failed contacts
FCS CH OVERRIDE function of a CH with
failed contacts may be made operable if at
least one good contact available.

Proceed: ✓MCC when possible

FCS MODE:

Fail op – 2 op or 1 op/1 cl contacts preclude
use of sw

Fail cl – 1st failure, deselect failed contact
2nd failure L(R), deselect all L(R)
contacts

ENTRY MODE:

Fail op or cl – 1st, 2nd failure, deselect
contact
3rd failure, when in OPS 3,

GNC 51 OVERRIDE
AUTO SEL – ITEM 42
EXEC (*)

2: GNC 43 CONTROLLERS

Deselect L THC:

CRT2

THC L DES – ITEMS 1,2,3 EXEC (*)

Cont next page

MEDS

A7-24 ORB OPS/MEDS/GEN H

2: GNC 42 SWITCH/SURF

CRT2

NOTE

During following tests, verify '*' appears except as noted. If '*' remains after releasing pb, contact failed closed

F6/F8
C3

FLT CNTLR PWR (two) – ON
FCS CH (four) – ORIDE (wait 5 sec)
– AUTO (no *)

F2/F4

PITCH pb – AUTO
– CSS
ROLL/YAW pb – AUTO
– CSS

L2/C3

SPDBK/THROT pb – AUTO
BODY FLAP pb – AUTO
SBTC TAKEOVER pb – push

5. **SURF TEST**

Notify MCC if any single surf feedback exceeds average of other three feedbacks by greater than:

Elevons ($\Delta 1.3^\circ$)
Rudder ($\Delta 1.2^\circ$)
SPD BK ($\Delta 2.2\%$)
BDY FLP ($\Delta 3\%$)

2: GNC 44 SWITCHES

During following sw test, verify '*' appears

L2

ENTRY MODE – LO GAIN
– NO Y JET
– AUTO (no *)

Cont next page

A7-25

MEDS

ORB OPS/ALL/GEN H

6. NWS CHECK

2: GNC 45 NWS CHECK

CRT2

NOTE

During following tests, verify position transducer values A,B,C remain ~0.00°

✓Position A,B,C: 0.00° ± 0.75°

a. NWS1

L2

NWS – 1

CRT2

✓NWS1 SYS SEL (*)
✓HYD PRESS HIGH (no *)
✓CURRENT: 1.00 ma to 3.15 ma

F3

ENABLE – ITEM 1 EXEC (*)
✓NWS1 ENABLE A,B (*)
✓NWS FAIL It – on (illuminated)

CRT2

RIGHT TURN – ITEM 2 EXEC (*)
✓NWS1 CURRENT: 3.75 ma to 6.25 ma

LEFT TURN – ITEM 3 EXEC (*)
✓NWS1 CURRENT: -4.25 ma to -1.75 ma
STOP – ITEM 4 EXEC (*)
✓NWS1 CURRENT: 1.00 ma to 3.15 ma

b. NWS2

L2

NWS – 2

CRT2

✓NWS2 SYS SEL (*)
✓HYD PRESS HIGH (no *)
✓CURRENT: 1.00 ma to 3.15 ma

F3

ENABLE – ITEM 1 EXEC (*)
✓NWS2 ENABLE A,B (*)
✓NWS FAIL It – on (illuminated)

CRT2

RIGHT TURN – ITEM 2 EXEC (*)
✓NWS2 CURRENT: 3.75 ma to 6.25 ma

Cont next page

MEDS

A7-26

ORB OPS/ALL/GEN H

LEFT TURN – ITEM 3 EXEC (*)
✓NWS2 CURRENT: –4.25 ma to –1.75 ma
STOP – ITEM 4 EXEC (*)
✓NWS2 CURRENT: 1.00 ma to 3.15 ma

L2

NWS – OFF

7. CONTROLLER AND SWITCH TEST

NOTE

During cntlr/sw test,

THC: One TX(TY,TZ) failed CLOSED –
reselect all contacts (failed
contact last)

One TX(TY,TZ) failed OPEN –
reselect good contacts only

Multi +TX,–TX,+TY,–TY,+TZ,–TZ
failures – reselect good
contacts only

SPDBK L(R): Deselect failed xdcrs
After 2nd L(R) failure,
use other side

RUD PED L(R): One failure – deselect
failed xdcr
Multi L(R) failures –
deselect all L(R) xdcrs

RHC L(R): One xdcr failure – reselect
good xdcrs only
Multi L(R) failures – reselect
good xdcrs L(R) and F7(F8)
FLT CNTLR PWR – OFF

BDY FLP L(R): Fail close, deselect all
L(R) contacts

RHC or PNL TRIM L(R): If contact failed, deselect
failed contact row

Cont next page

A7–27

MEDS

ORB OPS/ALL/GEN H

2: GNC 43 CONTROLLERS

F5
CRT2

- a. THC
L THC – deflect in each axis
√THC: ‘+’ and ‘-’
Reselect THC contacts:
THC L – ITEM 1,2,3 EXEC (no *)
- b. LSBTC
L SBTC – full aft; √ > 95%
– full fwd; √ < 15%
- c. Rudder/Brake
RUD PED – full L; √ > 87% and ch Δ < 9%
– full R; √ > 80% and ch Δ < 9%
– null; between L 14% and R 4%
BK PED – depress to verify unrestricted
movement (~20 to 25°)
- d. L Body Flap Switch
BDY FLP – UP, DN
√BDY FLP UP, DN – ‘*’
- e. L RHC
Deselect L RHC:
RHC L DES – ITEM 23,24,25 EXEC (*)
L RHC – deflect to hardstop in each axis
√RHC L: R,P – > 92%
Y – > 88%

Reselect RHC CHs:
RHC L DES – ITEM 23,24,25
EXEC (no *)
- f. L RHC Trim Switch
L RHC Trim – deflect sw in each axis
√RHC TRIM L: R – R/L
P – U/D

L2
CRT2

Cont next page

MEDS

A7-28 ORB OPS/MEDS/GEN H

- L2 g. L Panel Trim Switches
 ROLL TRIM – R, then L
 PITCH TRIM – UP, then DN
 YAW TRIM – R, then L
 - CRT2 ✓PNL TRIM L: R,Y – R/L
 P – U/D
 - F3 TRIM RHC/PNL – ENA
 (wait 5 sec; no crew insight)
 TRIM RHC/PNL – INH
 - h. Repeat steps b and d thru g for R cntlrs/sw:
 RHC R DES – ITEM 26,27,28
- 8. MEDS CHECKOUT
MDU Checkout
 F6/F7 Power ON all forward MDUs (9) and IDPs (3)
 F8/C2 Verify appropriate display appears (expect big ‘X’
 for any DPS Display whose IDP is deassigned)
- Flight Critical/IDP Interface Checkout
 F6/F8 On CDR 1, CDR 2, and PLT 1 MDUs:
 Ensure on primary ports
 Sel FLT INST: ORBIT: ADI displays
 Verify no OFF FLAGS in the following
 configurations:
 On CDR 1 and CDR 2, ✓FC BUS 4,1,2,3
 On PLT 1, ✓FC BUS 1,2,3,4
- F6/F7 Reconfig MDUs as desired (use only one IDP
 F8/C2 with three MDUs max if in GROUP B(C) PWRDN)
- 9. HUD CHECK
 ✓HUD BRT (two) – as reqd
 MODE (two) – TEST
 ✓Brightness
 ✓Format ‘COMPLETE’ msg
 HUD MODE (two) – NORM
- CRT1 DED DIS FWD – ITEM 1 EXEC (*)
 LOW – ITEM 4 EXEC (*)
- ✓HUD using HUD low value test diagram
- F6/F8 ✓Readouts for L(R) DATA BUS 1,2(3,4)
- CRT1 DED DIS OFF – ITEM 6 EXEC (*)

Cont next page

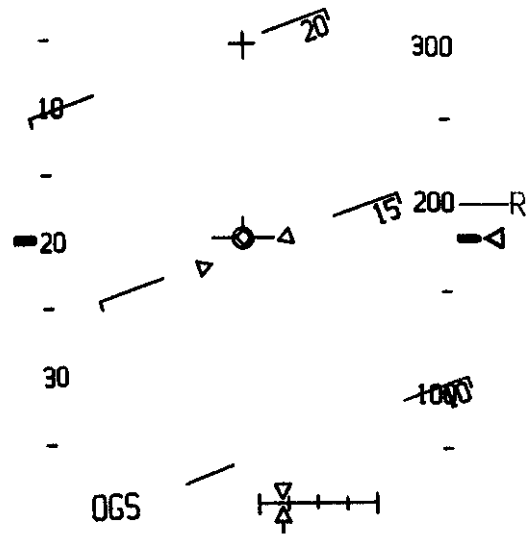
MEDS

A7–29 ORB OPS/MEDS/GEN H

HUD LOW VALUE TEST

NOTE

No HUD high value test exists



Cont next page

MEDS

A7-30 ORB OPS/MEDS/GEN H

10. MODE LAMP TEST

Test Start

CRT1 MODE LT ON – ITEM 7 EXEC (*)

F2/F4 ✓PITCH AUTO,CSS lt (two) – on
✓ROLL/YAW AUTO,CSS lt (two) – on
✓SPDBK/THROT AUTO,MAN lt (two) – on
✓BDY FLP AUTO,MAN lt (two) – on

Test Terminate

CRT1 MODE LT OFF – ITEM 8 EXEC (*)

F6/F8 FLT CNTLR PWR (two) – OFF

Display/DPS Reconfig

Perform G8 TO G2 TRANSITION (DPS), then:

F3 TRIM PNL (two) – OFF

HUD PWR (two) – OFF

C3 FCS CH (four) – AUTO

O8 MLS (three) – OFF

RADAR ALTM (two) – OFF

O14, RGA (four) – OFF

O15, cb MNA,B,C ADTA (four) – op

O16 MNA,B ACCEL 1,2 (two) – op

DDU L (two) – as reqd

MNB,C DDU R (two) – op

ASA (four) – OFF

ACCEL 3,4 (two) – OFF

BRAKES (three) – OFF

L2 ANTISKID – OFF

O17 ATVC (four) – OFF

MEDS

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MEDS

A7-32 ORB OPS/MEDS/GEN H

FCS CHECKOUT

DISPLAY/DPS CONFIG

O14, RGA (four) – ON
O15, cb MNA,B,C ADTA (four) – cl
O16 MNA,B ACCEL 1,2 (two) – cl
 ✓DDU L (two) – cl
 MNB,C DDU R (two) – cl

If APU will be used:
| ASA (four) – ON

If circ pump will be used:
 ✓ASA (four) – OFF
ACCEL 3,4 (two) – ON
BRAKES (three) – ON

✓cb MNA GPS PRE AMPL UC – op
 ✓LC – cl
 ✓MNC GPS PRE AMPL UC – cl
 ✓LC – op

L2 ANTISKID – ON
O17 ATVC (four) – ON

O7 TACAN MODE (three) – GPC

O8 RADAR ALTM (two) – ON
MLS (three) – ON

F6 INST PWR – FLT
F8 INST PWR – ON
F3 TRIM PNL (two) – ON
HUD PWR (two) – ON
F6/F8 HSIs: ✓Off flag – not visible

F8 ADI: ✓Error needles and Rate pointers – visible
C3 ✓FCS CH (four) – AUTO

✓DAP: A1/AUTO/VERN

Cont next page

B7-13

NOM
ORB OPS/NOM/GEN H

A13

✓GPS PWR – ON
✓ENCRYPT – NORMAL
✓PRE AMPL UC – MNC
✓LC – MNA

Perform G2 TO G8 TRANSITION (DPS), then:

If using circ pump for part 1:

FCS CH 2,3 – OFF
ASA (four) – ON
Go to step 7b, 7–18

ON-ORBIT FCS CHECKOUT, PART 1

NOTE

Only one APU will be used for FCS C/O.
If APU does not start or MCC advises abbreviated actuator check, circ pump will be used. Selection of APU or circ pump will be made real time by MCC

If APU shuts down, 'S86 APU GBX T', 'S86 APU TEMP', 'S86 APU GBX P', APU shifts to HI speed (✓CRT), APU OVERSPEED or APU UNDERSPEED, then go to step 6, APU SHUTDOWN, 7–17

NOTE

Any previously failed actuator channel should be bypassed via ITEM 21 on FCS/DED DIS C/O display prior to APU start

Cont next page

NOM

B7–14 ORB OPS/NOM/GEN H

C2 1. FCS C/O PREP
Set EVENT TIMER to 00:00, count UP

2. APU PRESTART

1: GNC, FCS/DED DIS C/O 2: SM 86 APU/HYD

CRT2 ✓APU, HYD, WB status no '↑' or '↓'
(except HYD B/U)

If SYS 1:

R4 ✓LG EXTEND ISOL VLV tb – CL

R2 ✓HYD BRAKE ISOL VLV X tb – CL
HYD CIRC PUMP (three) – OFF

BLR N2 SPLY X – ON
✓PWR (three) – ON
✓CNTLR/HTR (three) – B
✓APU AUTO SHUTDN (three) – ENA
CNTLR PWR X – ON
HYD MN PUMP PRESS X – LO
✓APU SPEED SEL (three) – NORM
✓OPER (three) – OFF
✓FUEL TK VLV (three) – CL
✓cb APU FU TK VLV ENA (six) – cl

Inform MCC: READY FOR APU START

Wait for MCC GO

Cont next page

B7-15

NOM

ORB OPS/ALL/GEN H

3. APU START
 R2 APU FUEL TK VLV X – OP
 ✓APU/HYD RDY X tb – gray

* If tb – bp, ✓MCC *

- 00:00 Start EVENT TIMER
 R2 APU OPER X – START/RUN
 F8 ✓HYD PRESS ind X – LOW green
 R2 ✓APU/HYD RDY X tb – bp

* If APU did not start, go to step 6 *

- F8 HYD MN PUMP PRESS X – NORM
 ✓HYD PRESS ind X – HI green

SM 87 HYD THERMAL

- ✓SW VLV ELEV (four) per table
 ✓RUD/SPDBK per table

If HYD SYS 1	If HYD SYS 2	If HYD SYS 3
1(*)	2(*)	3(*)
1(*)	2(*)	3(*)

4. AEROSURFACE DRIVE
 CRT1 SURF DR START – ITEM 10 EXEC (*)
 Verify all surfaces cycling for 30 sec

NOTE

POS '↓' may be indicated
 until HYD SYS is warm

- * If FCS CH failure ('↓' port status), *
 * reset affected FCS CH: *
 * FCS CH – ORIDE, then *
 * – AUTO *

- After 30 sec of aerosurface drive,
 SURF DR STOP – ITEM 11 EXEC (*)
 ✓Surfaces not moving

Cont next page

NOM

5. SECONDARY ACTUATOR CHECK (APU)

NOTE

If a port does not bypass during check, bypass affected port after APU shutdn:

SEC ACT BYPASS – ITEM 21 +X X EXEC

If affected port still does not bypass:

SEC ACT RESET – ITEM 22 +X X EXEC

- CRT1 a. ✓POS STIM ENA, ITEM 20 – (*)
- C3 b. ✓FCS CH 1,2,3,4 – AUTO
- CRT1 c. SEC ACT CK, CH 1 – ITEM 15 EXEC (*)
- d. ✓All CH 1 ports bypass ('↓')
STOP – ITEM 19 EXEC (*)
- C3 e. FCS CH 1 – ORIDE
CRT1 ✓All CH 1 ports reset (no '↓')
C3 FCS CH 1 – AUTO
- f. Repeat steps c thru e for CH 2,3,4
- CRT1 g. NEG STIM – ITEM 20 EXEC (no *)
- h. Repeat steps b thru f

6. APU SHUTDOWN

On MCC GO for APU SHUTDN:

- R2 BLR PWR (three) – OFF
APU OPER X – OFF
FUEL TK VLV X – CL
✓Shutdn (hyd press)
CNTLR PWR X – OFF
BLR N2 SPLY X – OFF
HYD CIRC PUMP (three) – GPC

Proceed to part 2

Cont next page

NOM

B7-17

ORB OPS/ALL/GEN H

7. CIRC PUMP ACTIVATION

1: GNC, FCS/DED DIS C/O 2: SM 86 APU/HYD

NOTE

OPS 2/8 trans must be performed with ASAs off to avoid AERO DRIVE fault msgs during actuator checks

- O14,O15,
O16:F
- C3
- R4
- R2
- a. Perform G8 to G2 TRANSITION (DPS), then:
ASA (four) – OFF
 - Perform G2 to G8 TRANSITION (DPS), then:
✓FCS CH 1,4 – AUTO
2,3 – OFF
ASA (four) – ON
 - ✓HYD BRAKE ISOL VLV X tb – CL
 - ✓HYD CIRC PUMP (three) – OFF
 - b. HYD CIRC PUMP X – ON

8. ABBREVIATED SECONDARY ACTUATOR CHECK (circ pump)

NOTE

If an elevon does not move to commanded posn, bypass affected port after check of all channels:
SEC ACT BYPASS – ITEM
21 +X X EXEC

- CRT1
- C3
- CRT2
- CRT1
- a. ✓POS STIM ENA, ITEM 20 – (*)
 - b. ✓FCS CH 1,4 – AUTO
✓2,3 – OFF
 - c. GNC 42 SWITCH/SURF
✓All elevons move to $U7.5^\circ \pm 0.8^\circ$
 - d. SEC ACT CK, CH1 – ITEM 15 EXEC (*)
Wait 5 sec

Cont next page

B7-18

ORB OPS/ALL/GEN H

NOM

- C3
CRT2
- e. Turn off FCS CH not being checked:
 FCS CH (three) – OFF
 ✓All elevons move to $U1.5^\circ \pm 0.8^\circ$
- * If any elevon drives past 0° , turn on *
 - * all FCS CHs to stop movement *
 - * FCS CH (four) – AUTO *
 - * Expect AERO DRIVE msg. Continue *
 - * procedure and report to MCC *

- CRT1
- f. STOP – ITEM 19 EXEC (*)
 ✓All elevons move to $U7.5^\circ \pm 0.8^\circ$

- C3
- g. Config FCS CHs for check of next CH:
 (Config switches in sequence shown)

NEXT CH	FCS CH SWITCHES			
	4	1	2	3
2	AUTO	OFF	AUTO	OFF
3	AUTO	OFF	OFF	AUTO
4	AUTO	OFF	OFF	AUTO

- h. Repeat steps d thru g for CHs 2,3,4

- R2
9. HYDRAULIC SYSTEM RECONFIG
 HYD CIRC PUMP (three) – GPC

10. FCS CH RECONFIG

- a. Perform G8 to G2 TRANSITION (DPS),
 then:
 FCS CH 1,2,3 – AUTO
 ✓4 – AUTO
- C3
- b. Perform G2 to G8 TRANSITION (DPS),
 then:
 Continue with part 2

Cont next page

NOM

B7-19 ORB OPS/NOM/GEN H

LIMIT VALUES TABLE

	RNG	AZ	EL
MLS	15.0 to 15.4	+,-2.9 to +,-3.1 (+ for 3 sec, then -)	5.9 to 6.1
TAC	0 to 0.5	177.5 to 182.5 NOTE Values from 182.1 to 182.5 will be displayed as 2.1 to 2.5	
RA	ALT		
	900 to 1100		
AA		Y	Z
		+14.40 to 17.80	+57.70 to 71.10

07 STOP – ITEM 14 EXEC (*)
TACAN MODE (three) – OFF

2. Sensor Test – RGA, ADTA

NOTE

During RGA, ADTA test, deselect LRU for failure indicated:

RGA – bias null limits exceeded,
‘↑’ or ‘↓’, or SMRD

ADTA – any ‘↑’ or ‘↓’, except temp (‘T’)

If RGA does not respond to HIGH or LOW TEST or displays ‘SMRD’ indication in STAT column:

✓MCC, confirm that payload config can support PRCS firings

Null vehicle rates

Maneuver at 0.5°/sec about appropriate axis; monitor RGA data

If RGA responds, self-test circuitry
| or SMRD circuitry failed

If no RGA response, deselect sensor

Cont next page

NOM

B7-21 ORB OPS/NOM/GEN H

CRT2

2: GNC 41 RGA/ADTA/RCS

- ✓DES: (no *)
- ✓STAT: blank
- ✓PS,PαC,PαU,PαL,T – no M

Config For Free Drift

- ✓DAP: A1/INRTL/VERN
- ✓R,P,Y rates $0 \pm 0.1^\circ/\text{sec}$, then:
DAP: FREE

RGA Bias/Null Shift Test

- ✓R,P,Y within limits: R -0.4 to + -0.4
P/Y -0.2 to + -0.2
Refer to Limit Values Table, 7-23

High Test

TEST HI – ITEM 9 EXEC (*)
(after 10 sec, no *)

- ✓No '↑' or '↓'
If ADTA BITE, ✓MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

Low Test

TEST LOW – ITEM 10 EXEC (*) (after 10 sec,
no *)

- ✓No '↑' or '↓'
If ADTA BITE, ✓MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

DAP: A1/AUTO/VERN

Cont next page

B7-22

NOM

ORB OPS/ALL/GEN H

LIMIT VALUES TABLE

<u>HIGH TEST LIMITS</u>				
<u>RGA</u>				
R +18.8 to +21.2	P +9.4 to +10.6	Y +9.4 to +10.6		
<u>ADTA</u>				
PS .813 to .815	P α C 5.473 to 5.477	P α U 2.740 to 2.744	P α L 1.708 to 1.712	T 173.56 to 173.60
<u>LOW TEST LIMITS</u>				
<u>RGA</u>				
R -18.8 to -21.2	P -9.4 to -10.6	Y -9.4 to -10.6		
<u>ADTA</u>				
PS 24.887 to 24.889	P α C 29.527 to 29.531	P α U 21.708 to 21.712	P α L 14.713 to 14.717	T 18.50 to 18.54

Cont next page

NOM

B7-23

ORB OPS/NOM/GEN H

3. SENSOR TEST – GPS

NOTE

After GPS S/TEST, deselect LRU for failure indicated by '↓'. GPS self-test takes about 2 min to complete. 'BIT' in STAT field on SPEC 55 indicates hardware feedback and clears when test complete

2: GNC 55 GPS STATUS

- √NAV – ITEM 18 (*)
If 'RPF' in STAT field, √MCC (if LOS, proceed with test)
- S/TEST – ITEM 12 EXEC (*)
- √'BIT' in STAT field after ~6 sec
Wait for 'BIT' to clear after ~2 min
- √S/TEST '↑'; if '↓' deselect GPS
- NAV – ITEM 18 EXEC (*)
- √MODE – INS

4. FCS MODE/CH SWITCH TEST

NOTE

During tests, FCS CH:

Fail op or fail cl – deselect failed contacts
FCS CH OVERRIDE function of a CH with failed contacts may be made operable if at least one good contact available.

Proceed: √MCC when possible

FCS MODE:

Fail op – 2 op or 1 op/1 cl contacts preclude use of sw

Fail cl – 1st failure, deselect failed contact
2nd failure L(R), deselect all L(R) contacts

Cont next page

B7-24

NOM

ORB OPS/ALL/GEN H

ENTRY MODE:

Fail op or cl – 1st, 2nd failure, deselect
contact
3rd failure, when in OPS 3,
GNC 51 OVERRIDE
AUTO SEL – ITEM 42
EXEC (*)

2: GNC 43 CONTROLLERS

CRT2 Deselect L THC:
THC L DES – ITEMS 1,2,3 EXEC (*)

2: GNC 42 SWITCH/SURF

CRT2 NOTE
During following tests, verify '*' appears
except as noted. If '*' remains after releasing
pb, contact failed closed

F7/F8 FLT CNTLR PWR (two) – ON
C3 FCS CH (four) – ORIDE (wait 5 sec)
– AUTO (no *)

F2/F4 PITCH pb – AUTO
– CSS
ROLL/YAW pb – AUTO
– CSS

L2/C3 SPDBK/THROT pb – AUTO
BODY FLAP pb – AUTO
SBTC TAKEOVER pb – push

5. SURF TEST

Notify MCC if any single surf feedback exceeds
average of other three feedbacks by greater
than:

Elevons ($\Delta 1.3^\circ$)
Rudder ($\Delta 1.2^\circ$)
SPD BK ($\Delta 2.2\%$)
BDY FLP ($\Delta 3\%$)

Cont next page

B7-25

NOM

ORB OPS/ALL/GEN H

2: GNC 44 SWITCHES

During following sw test, verify '*' appears

- L2 ENTRY MODE – LO GAIN
– NO Y JET
– AUTO (no *)

6. NWS CHECK

2: GNC 45 NWS CHECK

CRT2

NOTE

During following tests, verify position transducer values A,B,C remain ~0.00°

✓Position A,B,C: 0.00° ± 0.75°

- L2 a. NWS1
NWS – 1
- CRT2 ✓NWS1 SYS SEL (*)
✓HYD PRESS HIGH (no *)
✓CURRENT: 1.00 ma to 3.15 ma
- ENABLE – ITEM 1 EXEC (*)
F3 ✓NWS1 ENABLE A,B (*)
✓NWS FAIL It – on (illuminated)
- CRT2 RIGHT TURN – ITEM 2 EXEC (*)
✓NWS1 CURRENT: 3.75 ma to 6.25 ma
- LEFT TURN – ITEM 3 EXEC (*)
✓NWS1 CURRENT: –4.25 ma to –1.75 ma
STOP – ITEM 4 EXEC (*)
✓NWS1 CURRENT: 1.00 ma to 3.15 ma
- L2 b. NWS2
NWS – 2
- CRT2 ✓NWS2 SYS SEL (*)
✓HYD PRESS HIGH (no *)
✓CURRENT: 1.00 ma to 3.15 ma

Cont next page

NOM

B7–26

ORB OPS/ALL/GEN H

F3 ENABLE – ITEM 1 EXEC (*)
 ✓NWS2 ENABLE A,B (*)
 ✓NWS FAIL It – on (illuminated)

CRT2 RIGHT TURN – ITEM 2 EXEC (*)
 ✓NWS2 CURRENT: 3.75 ma to 6.25 ma

 LEFT TURN – ITEM 3 EXEC (*)
 ✓NWS2 CURRENT: -4.25 ma to -1.75 ma
 STOP – ITEM 4 EXEC (*)
 ✓NWS2 CURRENT: 1.00 ma to 3.15 ma

L2 NWS – OFF

7. CONTROLLER AND SWITCH TEST

NOTE

During cntlr/sw test,

THC: One TX(TY,TZ) failed CLOSED –
 reselect all contacts (failed
 contact last)

One TX(TY,TZ) failed OPEN –
 reselect good contacts only

Multi +TX,-TX,+TY,-TY,+TZ,-TZ
failures – reselect good
contacts only

SPDBK L(R): Deselect failed xdcrs
 After 2nd L(R) failure,
 use other side

RUD PED L(R): One failure – deselect
 failed xdcr
 Multi L(R) failures –
 deselect all L(R) xdcrs

RHC L(R): One xdcr failure – reselect
 good xdcrs only
 Multi L(R) failures – reselect
 good xdcrs L(R) and F7(F8)
 FLT CNTLR PWR – OFF

Cont next page

B7-27

NOM

ORB OPS/ALL/GEN H

BDY FLP L(R): Fail close, deselect all
L(R) contacts

RHC or PNL TRIM L(R): If contact failed, deselect
failed contact row

2: GNC 43 CONTROLLERS

F5
CRT2

- a. THC
L THC – deflect in each axis
✓THC: ‘+’ and ‘-’
Reselect THC contacts:
THC L – ITEM 1,2,3 EXEC (no *)
- b. L SBTC
L SBTC – full aft; ✓ > 95%
– full fwd; ✓ < 15%
- c. Rudder/Brake
RUD PED – full L; ✓ > 87% and ch Δ < 9%
– full R; ✓ > 80% and ch Δ < 9%
– null; between L 14% and R 4%
BK PED – depress to verify unrestricted
movement (~20 to 25°)

L2
CRT2

- d. L Body Flap Switch
BDY FLP – UP, DN
✓BDY FLP UP, DN – ‘*’
 - e. L RHC
Deselect L RHC:
RHC L DES – ITEM 23,24,25 EXEC (*)
L RHC – deflect to hardstop in each axis
✓RHC L: R,P – > 92%
Y – > 88%
- Reselect RHC CHs:
RHC L DES – ITEM 23,24,25
EXEC (no *)

Cont next page

B7-28

NOM

ORB OPS/ALL/GEN H

- f. L RHC Trim Switch
 L RHC Trim – deflect sw in each axis
 ✓RHC TRIM L: R – R/L
 P – U/D

- L2 g. L Panel Trim Switches
 ROLL TRIM – R, then L
 PITCH TRIM – UP, then DN
 YAW TRIM – R, then L
- CRT2 ✓PNL TRIM L: R,Y – R/L
 P – U/D

- F3 TRIM RHC/PNL – ENA
 (wait 5 sec; no crew insight)
 TRIM RHC/PNL – INH

- h. Repeat steps b and d thru g for R cntlrs/sw:
 RHC R DES – ITEM 26,27,28

- 8. DEDICATED DISPLAY/HUD CHECK
 ✓HUD BRT (two) – as reqd
 MODE (two) – TEST
 ✓Brightness
 ✓Format ‘COMPLETE’ msg
 HUD MODE (two) – NORM

- CRT1 DED DIS FWD – ITEM 1 EXEC (*)
 LOW – ITEM 4 EXEC (*)

- ✓HUD using HUD low value test diagram

- F6/F8 ✓Readouts for DATA BUS 1,2,3,4

- CRT1 DED DIS HIGH – ITEM 3 EXEC (*)

- F6/F8 ✓Readouts for DATA BUS 1,2,3,4 and record
 deltas
 * For ADI failure, consult MCC *
 * for possible replacement *

Cont next page

NOM

B7-29 ORB OPS/NOM/GEN H

Dedicated Display Input Checkout Values						
	<u>Parameter</u>	<u>Low Value</u>		<u>High Value</u>		
F6/F8	ADI:	R,P,Y ATT	20°	___	300°	___
		R,Y RATE	2 ticks L	___	3 ticks R	___
		P RATE	2 ticks D	___	3 ticks U	___
		R,Y ATT ERR	2 ticks L	___	3 ticks R	___
		P ATT ERR	2 ticks D	___	3 ticks U	___
	AMI:	ALPHA	+2°	___	+30°	___
		ACCEL	+20 fps ²	___	+30 fps ²	___
		M/VEL	20,000 fps	___	Mach 3	___
		EAS	20 kts	___	300 kts	___
	AVVI:	ALT ACCEL	-2 fps ²	___	+3 fps ²	___
		ALT RATE	-200 fps	___	+300 fps	___
		ALT	200 ft	___	+300K ft	___
		RDR ALT	200 ft	___	+3000 ft	___
	HSI:	SEL COURSE	200°	___	30°	___
		HEADING	20°	___	300°	___
		PRI BEAR	20°	___	30°	___
		SEC BEAR	200°	___	300°	___
		PRI,SEC MILES	200 nmi	___	3000 nmi	___
		CDI	1 tick L	___	1 tick R	___
		GSI	1 tick D	___	1 tick U	___
		F7	SPI:	ELEV	U20°	___	U30°	___
BDY FLP	20%			___	30%	___
RUD	20° L			___	3° R	___
AILERON	2° L			___	3° R	___
SPD BK	20%			___	30%	___
SPD BK CMD	20%			___	30%	___

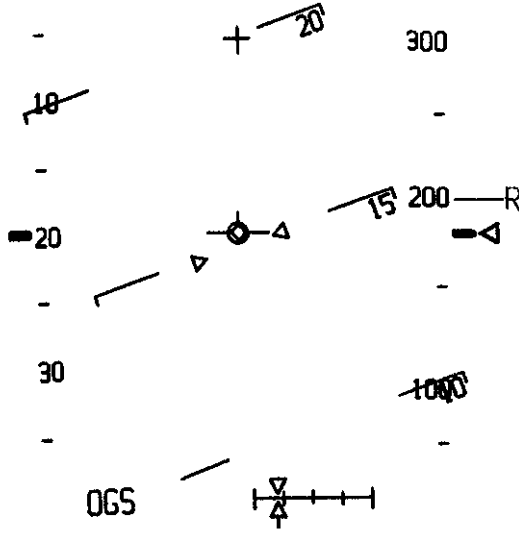
Cont next page

B7-30

ORB OPS/NOM/GEN H

NOM

HUD LOW VALUE TEST
 NOTE
 No HUD high value test exists



- CRT1 9. FLAG TEST
 DED DIS FLAG – ITEM 5 EXEC (*)

FLAG TEST	
Verify flags visible:	
AMI	4
AVVI	4
HSI	MILES 2
	CDI 1
	BRG 1
	GSI 1 (pointer stowed)
ADI	6 (rate/err needle stowed)
SPI	1

Test Terminate
 DED DIS OFF – ITEM 6 EXEC (*)

10. MODE LAMP TEST

Test Start

CRT1 MODE LT ON – ITEM 7 EXEC (*)

F2/F4 ✓PITCH AUTO,CSS lt (two) – on
✓ROLL/YAW AUTO,CSS lt (two) – on
✓SPDBK/THROT AUTO,MAN lt (two) – on
✓BDY FLP AUTO,MAN lt (two) – on

Test Terminate

CRT1 MODE LT OFF – ITEM 8 EXEC (*)

F7/F8 FLT CNTLR PWR (two) – OFF

Display/DPS Reconfig

Perform G8 TO G2 TRANSITION (DPS), then:

F3 TRIM PNL (two) – OFF

HUD PWR (two) – OFF

F6,F8 INST PWR (two) – OFF

C3 FCS CH (four) – AUTO

O8 MLS (three) – OFF

RADAR ALTM (two) – OFF

O14, RGA (four) – OFF

O15, cb MNA,B,C ADTA (four) – op

O16 MNA,B ACCEL 1,2 (two) – op

DDU L (two) – as reqd

MNB,C DDU R (two) – op

ASA (four) – OFF

ACCEL 3,4 (two) – OFF

L2 BRAKES (three) – OFF

ANTISKID – OFF

O17 ATVC (four) – OFF

NOM

B7-32 ORB OPS/NOM/GEN H

AFT CONTROLLER C/O

1. POWER UP

GNC 25 RM ORBIT

Deselect A THC:

THC A DES – ITEM 4,5,6 EXEC (*)

O14:E ✓cb MNA DDU AFT – cl
O16:E ✓MNC DDU AFT – cl
A6U FLT CNTLR PWR – ON

2. AFT THC

A THC – deflect in each axis

✓THC: ‘+’ and ‘-’

AFT CONTROLLER C/O						
THC	PUSH	PULL	LEFT	RIGHT	UP	DOWN
DISP	+X	-X	+Z	-Z	-Y	+Y

- * During THC test, *
- * One TX(TY,TZ) failed CLOSED – *
- * reselect all contacts (failed contact last) *
- * One TX(TY,TZ) failed OPEN – reselect *
- * good contacts only *
- * Multi +TX,-TX,+TY,-TY,+TZ,-TZ *
- * failures – reselect good contacts only *

Reselect A THC contacts:

THC A DES – ITEM 4,5,6 EXEC (no *)

Cont next page

- CRT
3. AFT RHC
 Deselect A RHC:
 RHC A DES – ITEM 13,14,15 EXEC (*)
 A RHC – deflect to hardstop in each axis
 ✓RHC A: R,P > 92%
 Y > 88%
- * During RHC test, *
 - * One xdcr failure – reselect good xdcrs *
 - * only *
 - * Multi RHC failures – reselect good *
 - * xdcr, A6U FLT CNTLR PWR – OFF *
- Reselect RHC CHs:
 RHC A DES – ITEM 13,14,15 EXEC (no *)
- A6U
 O14:E,
 O16:E
4. RECONFIG TO NOMINAL
 FLT CNTLR PWR – OFF
 AFT DDU PWR – as reqd

OMICRON SPECIFICATION

1. DETERMINE REFERENCE ATTITUDE
Designated body axis pointed toward target (P).
Y body axis in same plane as negative angular momentum vector (-h) and P
2. DETERMINE DESIRED ATTITUDE
Rotate cw around P (right-hand rule) to desired attitude

Omicron = angle of rotation around P from reference attitude to desired attitude

NOTE

If P = $\pm Y$ body axis, use $-Z$ body axis for reference attitude

ELEVON PARK, GNC 201

1. Perform G2 to G8 TRANSITION (DPS)
- O16:F 2. ASA 4 – ON
3. Perform G8 TO G2 TRANSITION (DPS)
- R2 4. HYD CIRC PUMP 1 – ON

NOTE

Elevons will be positioned
within 3 min

On MCC GO,
HYD CIRC PUMP 1 – GPC

GPS PWRUP

1. CHECK GPS ANTENNA PRE-AMP CONFIG

O15:C GPS 2 PRE AMPL UPPER - cl
O15:D LOWER - cl
A13 (A12 PRE AMPL UC - ON
if OV102) LC - ON

2. PWR UP GPS RECEIVER

* If GPS just PWRD off, wait *
* at least 30 sec *

A13 (A12 GPS PWR - ON
if OV102) ✓ENCRYPT - NORMAL
Wait at least 30 sec
GNC I/O RESET

3. INITIALIZE GPS RECEIVER

GNC 55 GPS STATUS

✓NAV - ITEM 18 (*)
INIT - ITEM 15 EXEC (*)
✓MODE - INIT
NAV - ITEM 18 EXEC (*)
✓MODE - INS

MEDS

A7-37 ORB OPS/MEDS/GEN H

GPS SELF-TEST, GNC 201,202,301,801

1. CHECK GPS ANTENNA PRE-AMP CONFIG (if reqd)

O15:C ✓GPS 2 PRE AMPL UPPER – cl
O15:D LOWER – cl

A13 ✓PRE AMPL UC – ON
LC – ON
✓ENCRYPT – NORMAL

2. PWR UP GPS RECEIVER (if reqd)

* If GPS just PWRD off, wait *
* at least 30 sec *

GPS PWR – ON
Wait at least 30 sec
GNC I/O RESET

3. INITIALIZE GPS RECEIVER (if reqd)

GNC 55 GPS STATUS

✓NAV – ITEM 18 (*)
INIT – ITEM 15 EXEC (*)
✓MODE – INIT
Wait 5 sec
NAV – ITEM 18 EXEC (*)
✓MODE – INS

4. GPS SELF-TEST

2: GNC 55 GPS STATUS

✓NAV – ITEM 18 (*)
If “RPF” in STAT field, ✓MCC (If LOS,
proceed with test)
S/TEST – ITEM 12 EXEC
✓“BIT” in STAT field after ~6 sec
Wait for “BIT” to clear after ~2 min
✓S/TEST ‘↑’; if ‘↓’ deselect GPS
NAV – ITEM 18 EXEC (*)

✓MODE – INS

Cont next page

MEDS

A7-39 ORB OPS/MEDS/GEN H

- A13
5. PWR OFF GPS RECEIVER (if reqd)
GPS PWR – OFF
 6. PWR OFF GPS ANTENNA PRE-AMPS (if reqd)
GPS PRE AMPL UC – OFF
LC – OFF
- O15:C 2 PRE AMPL UPPER – op
O15:D LOWER – op

MEDS

A7-40 ORB OPS/MEDS/GEN H

GPS PWRDN

1. CHECK GPS RECEIVER MODE

SPEC 55 GPS STATUS

√ NAV – ITEM 18 (*)

2. PWR OFF GPS RECEIVER
A13 GPS PWR – OFF

3. PWR OFF GPS ANTENNA PRE-AMPS
GPS PRE AMPL UC – OFF
LC – OFF
O14:D √cb MNA GPS PRE AMPL UC – op
LC – op
O16:D √MNC GPS PRE AMPL UC – op
LC – op

NOM

MPS

MPS VACUUM INERT 8-2

MPS

8-1

ORB OPS/ALL/GEN H

MPS

MPS VACUUM INERT

- ACTIVATION
- R2 1. MPS PNEU He ISOL – OP
 - R4 2. MPS FILL/DRAIN LH2 OUTBD – CL
Wait 15 sec
 - 3. MPS FILL/DRAIN LH2 OUTBD – OP

TERMINATION

NOTE

After 1 min or on MCC call

- 4. MPS FILL/DRAIN LH2 OUTBD – CL
Wait 15 sec
- 5. MPS FILL/DRAIN LH2 OUTBD – GND
- R2 6. PNEU He ISOL – GPC

OMS

ON-ORBIT OMS BURN 9-2

OMS

9-1

ORB OPS/ALL/GEN H

OMS

ON-ORBIT OMS BURN

1. OMS BURN PREP
C2 Install OMS-2/ORBIT OMS BURNS
Wedge Cue Cards (two) and ORBIT BURN
MONITOR Cue Cards (two) (F6,F8)

GNC 55 GPS STATUS
✓GPS TO NAV – INH (*)

- CRT If OPS 2:
1: GNC 20 DAP CONFIG
✓DAP Config A1,B1
1: GNC UNIV PTG
CNCL – ITEM 21 EXEC
GNC, OPS 202 PRO
1: GNC ORBIT MNVR EXEC
2: GNC SYS SUMM 2

- If OPS 3:
GNC, OPS 302 PRO
1: GNC DEORB MNVR EXEC
3: BFS, GNC SYS SUMM 2

- F7 ✓OMS PRESS He TK L(R) > 640 psia
✓N2 TK L(R) > 564 psia

WARNING
If OMS PRESS not within limits,
do not execute on-orbit burn

- O14:F, ✓Pri RJD LOGIC,DRIVER (sixteen) – ON
O15:F,
O16:F

- O14:E, ✓cb DDU (six) – cl
O15:E,
O16:E

Cont next page

2. LOAD TGT DATA
 Load TGT DATA per Burn Pad
 LOAD – ITEM 22 EXEC
 TIMER – ITEM 23 EXEC
 ✓ BURN DATA per Burn Pad
 C3 DAP: If OPS 2, B/AUTO/VERN
 If OPS 3, AUTO
 CRT1 MNVR – ITEM 27 EXEC (*)
3. PERFORM OMS BURN
 If xfeed Burn:
 O8 ✓L(R) OMS TK ISOL (two) – OP (tb-OP)
 ✓R(L) OMS TK ISOL (two) – CL (tb-CL)
 ✓L,R OMS XFEED B (two) – OP (tb-OP)
 If straight feed:
 ✓L,R OMS TK ISOL (four) – OP (tb-OP)
- F7/F8 FLT CNTLR PWR (two) – ON
- Perform OMS-2/ORBIT OMS BURNS
 (Cue Card), then:
4. OMS POST BURN RECONFIGURATION
 CRT1 Perform OMS TVC GMBL CK as reqd
- * If down arrow(s) or M(s), *
 * select good GMBL *
- F7/F8 FLT CNTLR PWR (two) – OFF
 O14:E, cb DDU (six) – as reqd
 O15:E,
 O16:E
- O8 L,R OMS He PRESS/VAP ISOL (four) – CL

Cont next page

OMS BOTH	1	<input type="text"/>	
L	2	<input type="text"/>	
R	3	<input type="text"/>	
RCS SEL	4	<input type="text"/>	
TV ROLL	5	<input type="text"/>	
TRIM LOAD			
P	6	<input type="text"/>	
LY	7	<input type="text"/>	
RY	8	<input type="text"/>	
WT	9	<input type="text"/>	
TIG	10	<input type="text"/>	
TGT PEG 7			
ΔV_X	19	<input type="text"/>	
ΔV_Y	20	<input type="text"/>	
ΔV_Z	21	<input type="text"/>	

ORBITAL MANEUVER PAD FOR _____

BURN ATT							
R	24	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
P	25	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Y	26	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ΔV_{TOT}		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TGO		<input type="text"/>	:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO X		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Y		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Z		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HA		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HP		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TGT		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

NOTES																																										
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OMS BOTH	1	<input type="text"/>	<p>+X -X MULTI-AXIS</p>
L	2	<input type="text"/>	
R	3	<input type="text"/>	
RCS SEL	4	<input type="text"/>	
TV ROLL	5	<input type="text"/>	
TRIM LOAD			
P	6	<input type="text"/>	
LY	7	<input type="text"/>	
RY	8	<input type="text"/>	
WT	9	<input type="text"/>	
TIG	10	<input type="text"/>	
TGT PEG 7			
ΔV_X	19	<input type="text"/>	
ΔV_Y	20	<input type="text"/>	
ΔV_Z	21	<input type="text"/>	

ORBITAL MANEUVER PAD FOR _____

BURN ATT							
R	24	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
P	25	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Y	26	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ΔV_{TOT}		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TGO		<input type="text"/>	:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO X		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Y		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Z		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HA		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HP		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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RCS

RCS HOT FIRE TEST	10-2
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RECOVERY OF VERNIERS	10-19
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RCS

RCS HOT FIRE TEST

NOTE

If RMS not cradled, verify RMS not in jet impingement zone (✓MCC if desired)

1. CONFIGURE FOR JET TEST
DAP: A1/INRTL/VERN
2. PERFORM RCS JET TEST
Wait 3 sec between pulses
Monitor CRT for JET FAIL msgs
Monitor ADI rates to verify jet on or jet fail

RCS

NOTE

If failed RCS JET detected, wait 30 sec before next pulse, deselect any failed RCS JET not auto deselected, complete TEST, then go to MAL, RCS, 10.1a (MAL, RCS)

O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
O15, ✓cb MNA, B DDU L (two) – cl
O16

DAP TRANS: PULSE/PULSE/PULSE
DAP: A/FREE/PRI
F6 ADI RATE – LO
F7/F8 FLT CNTLR PWR – ON

GNC 23 RCS

CRT
RCS FWD – ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
✓1 OP – ITEM 40
✓2 OP – ITEM 41
3 CL – ITEM 42 EXEC
4 CL – ITEM 43 EXEC
JET DES F2U – ITEM 21 EXEC (*)

Cont next page

RCS L – ITEM 2 EXEC (*)

MANF VLVS STAT OVRD

✓1 OP – ITEM 40

2 CL – ITEM 41 EXEC

3 CL – ITEM 42 EXEC

4 CL – ITEM 43 EXEC

RCS R – ITEM 3 EXEC (*)

MANF VLVS STAT OVRD

✓1 OP – ITEM 40

2 CL – ITEM 41 EXEC

3 CL – ITEM 42 EXEC

4 CL – ITEM 43 EXEC

Perform following pulse sequence twice:

F5

THC: +X, 1 PULSE (fires jets R1A,L1A)

-X, 1 PULSE (fires jets F1F,F2F)

+Z, 1 PULSE (fires jets F1U,R1U,L1U)

F6

+Y, 1 PULSE (fires jets F1L,L1L)

-Y, 1 PULSE (fires jets F2R,R1R)

CRT

✓RCS R, ITEM 3 – (*)

MANF VLVS STAT OVRD

1 CL – ITEM 40 EXEC

2 OP – ITEM 41 EXEC

✓3 CL – ITEM 42

✓4 CL – ITEM 43

RCS L – ITEM 2 EXEC (*)

MANF VLVS STAT OVRD

1 CL – ITEM 40 EXEC

2 OP – ITEM 41 EXEC

✓3 CL – ITEM 42

✓4 CL – ITEM 43

RCS F – ITEM 1 EXEC (*)

JET DES F1U – ITEM 17 EXEC (*)

F2U – ITEM 21 EXEC (no *)

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F2U,L2U,R2U)

-Z, 1 PULSE (fires jets F1D,F2D,L2D,R2D)

+Y, 1 PULSE (fires jets F1L,L2L)

-Y, 1 PULSE (fires jets F2R,R2R)

Cont next page

✓RCS F, ITEM 1 – (*)
JET DES F1U – ITEM 17 EXEC (no *)
MANF VLVS STAT OVRD
1 CL – ITEM 40 EXEC
2 CL – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
4 OP – ITEM 43 EXEC

CRT
RCS L – ITEM 2 EXEC (*)
MANF VLVS STAT OVRD
✓1 CL – ITEM 40
2 CL – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
✓4 CL – ITEM 43

RCS R – ITEM 3 EXEC (*)
MANF VLVS STAT OVRD
✓1 CL – ITEM 40
2 CL – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
✓4 CL – ITEM 43

Perform following pulse sequence twice:
THC: +X, 1 PULSE (fires jets L3A,R3A)
-X, 1 PULSE (fires jet F3F)
-Z, 1 PULSE (fires jets F3D,F4D,L3D,R3D)
+Y, 1 PULSE (fires jets F3L,L3L)
-Y, 1 PULSE (fires jets F4R,R3R)

✓RCS R, ITEM 3 – (*)
MANF VLVS STAT OVRD
✓1 CL – ITEM 40
✓2 CL – ITEM 41
3 CL – ITEM 42 EXEC
4 OP – ITEM 43 EXEC

RCS L – ITEM 2 EXEC (*)
MANF VLVS STAT OVRD
✓1 CL – ITEM 40
✓2 CL – ITEM 41
3 CL – ITEM 42 EXEC
4 OP – ITEM 43 EXEC

Cont next page

Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F3U,L4U,R4U)
-Z, 1 PULSE (fires jets F3D,F4D,L4D,R4D)
+Y, 1 PULSE (fires jets F3L,L4L)
-Y, 1 PULSE (fires jets F4R,R4R)

F7/F8 DAP: A/INRTL/VERN
FLT CNTLR PWR – OFF

3. RECONFIGURE JET SELECT

CRT ✓RCS L, ITEM 2 – (*)
MANF VLVS STAT OVRD
1 OP – ITEM 40 EXEC
2 OP – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
✓4 OP – ITEM 43

RCS R – ITEM 3 EXEC (*)
MANF VLVS STAT OVRD
1 OP – ITEM 40 EXEC
2 OP – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
✓4 OP – ITEM 43

RCS F – ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
1 OP – ITEM 40 EXEC
2 OP – ITEM 41 EXEC
✓3 OP – ITEM 42
✓4 OP – ITEM 43

R15:C 4. CONFIG FOR VERN MANIFOLD VLV TEST
cb MNC MANF ISOL L5,R5,F5 ENA (three) – op

5. PERFORM TEST

NOTE

If any vernier manifold closes, ignore DAP RECONFIG message, reopen affected manifold, complete TEST, and notify MCC

O7,O8 L,R,F RCS MANF ISOL 5 (three) – CL (tb–OP)

6. CLEANUP
R15:C cb MNC MANF ISOL L5,R5,F5 ENA (three) – cl
O14,O15, Pri RJD LOGIC,DRIVER (sixteen) – as reqd
O16 ✓cb MNA,B DDU L (two) – as reqd
Reconfig to FLIGHT PLAN DAP

3. VEHICLE RECOVERY AND FES RESTART

DAP: A3/FREE/VERN(ALT)

If VERN jets avail:

O14:F,
O15:F,
O16:F

✓All RJD LOGIC,DRIVER (seventeen) – ON

If VERN jets not avail:

✓Pri RJD LOGIC,DRIVER (sixteen) – ON

F6,F8

ADI ATT – as reqd

Reconfig to FLIGHT PLAN DAP

DAP: INRTL

If FES reqd:

SM 88 APU/ENVIRON THERM

CRT(O1)

If FREON EVAP OUT

L1

TEMP > 41 and ≤ 47 degF:

RAD CNTLR OUT TEMP – HI

CRT(O1)

When FREON EVAP OUT TEMP > 50 degF,

L1

RAD CNTLR OUT TEMP – NORM,

then immediately:

FLASH EVAP CNTLR PRI A(B) – ON

CRT(O1)

If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:

L1

FLASH EVAP CNTLR PRI A(B) – ON

GRAVITY GRADIENT BODY VECTORS

		ATT ID	EXEC DATA			BODY RATES (±0.002)		
		ATT ID	P	Y	OM	R	P	Y
+ X L V	PLBD	A	357.51	0.97	249.18	0.002	0.024	-0.062
	NORTH SOUTH	B	357.51	359.23	110.91	-0.002	0.024	0.062
- X L V	PLBD	C	177.51	0.77	69.09	0.002	-0.024	-0.062
	NORTH SOUTH	D	177.51	359.03	290.82	-0.002	-0.024	0.062

PRCS PTC

1. MNVR TO PTC ATTITUDE

NOTE

If crew sleep, use tail-only control for all DAPs

DAP: A1/AUTO/ALT

CRT

GNC UNIV PTG

TGT ID - ITEM 8 +4 EXEC
BODY VECT - ITEM 14 +5 EXEC
P - ITEM 15 +2 7 0 EXEC
Y - ITEM 16 +0 EXEC
OM - ITEM 17 +2 7 0 EXEC
TRK - ITEM 19 EXEC (CUR - *)

2. INITIATE PTC ROTATION

GNC 20 DAP CONFIG

Change DAP A to A2

GNC UNIV PTG

BODY VECT - ITEM 14 +1 EXEC
ROT - ITEM 20 EXEC (CUR - *)

3. TERMINATE PTC ROTATION

GNC UNIV PTG

CNCL - ITEM 21 EXEC
Reconfig to FLIGHT PLAN DAP

VRCS PTC

1. MNVR TO PTC ATTITUDE
DAP: A1/AUTO/VERN

CRT

GNC UNIV PTG

TGT ID – ITEM 8 +4 EXEC
BODY VECT – ITEM 14 +5 EXEC
P – ITEM 15 +2 7 0 EXEC
Y – ITEM 16 +0 EXEC
OM – ITEM 17 +2 7 0 EXEC
TRK – ITEM 19 EXEC (CUR – *)

2. INITIATE PTC ROTATION

When in attitude:

GNC UNIV PTG

BODY VECT – ITEM 14 +1 EXEC
ROT – ITEM 20 EXEC (CUR – *)

When rates have stabilized (~60 sec):

G20 DAP CONFIG

Change DAP A to A2

3. TERMINATE PTC ROTATION

G20 DAP CONFIG

Change DAP A to A1

When rates have stabilized (~60 sec):

GNC UNIV PTG

CNCL – ITEM 21 EXEC

When rates have damped:

Reconfig to FLIGHT PLAN DAP

ON-ORBIT +X RCS BURN, MM202

O14:F, ✓Pri RJD LOGIC,DRIVER (sixteen) – ON
O15:F,
O16:F

O14:E, ✓cb DDU (six) – cl
O15:E,
O16:E

GNC 55 GPS STATUS

✓GPS TO NAV – INH (*)

1. AFT RCS/OMS SYSTEM CHECK

If I'CNCT: L(R) OMS to RCS

F7 ✓OMS PRESS He TK L,R > 1500 psia
O3 ✓L,R OXID,FUEL > 234 psia
C3 DAP: FREE
O7 AFT L,R RCS
 TK ISOL (six) – CL (tb-CL)
 XFEED (four) – OP (tb-OP)
O8 L(R) OMS
 He PRESS/VAP ISOL A(B) – OP
 L,R OMS
 ✓He PRESS/VAP ISOL B(A)
 (two) – CL
 ✓TK ISOL A,B (four) – OP (tb-OP)
 ✓XFEED A (two) – CL (tb-CL)
 L(R) OMS XFEED B – OP (tb-OP)
C3 DAP: as reqd

CRT

GNC 23 RCS

OMS PRESS ENA,L(R) OMS –
ITEM 5(6) EXEC

If no I'CNCT:

O3 ✓RCS PRESS L,R OXID,FUEL > 190 psia
 ✓He > 456 psia
O7 AFT L,R RCS
 ✓He PRESS A(B) (two) – GPC
 (tb-OP)
 ✓He PRESS B(A) (two) – CL (tb-CL)
 ✓TK ISOL (six) – OP (tb-OP)
 ✓XFEED (four) – CL (tb-CL)

Cont next page

2. LOAD TGT DATA AND MNVR TO BURN

C3

ATT

DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

CNCL – ITEM 21 EXEC

GNC, OPS 202 PRO

1: GNC ORBIT MNVR EXEC

2: GNC SYS SUMM

Enter or verify TGT DATA per

ORB MNVR PAD

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

✓BURN DATA per PAD

MNVR – ITEM 27 EXEC (*)

3. BURN EXEC

TIG–3:00 F6(F8)

ADI ERR/RATE – MED

ATT – INRTL

✓ADI ATT, then:

ATT – REF

REF pb – push

F7(F8)

FLT CNTLR PWR – ON

C3

DAP TRANS: NORM/PULSE/PULSE

TIG–0:30

DAP: B1/INRTL/PRI

TIG THC

Trim VGOs < 0.2 fps critical burn

< 2.0 fps noncritical burns

Cont next page

4. POST BURN RECONFIG
 F7(F8) FLT CNTLR PWR – OFF
 CRT GNC, OPS 201 PRO
 C3 DAP TRANS: PULSE/PULSE/PULSE
 DAP: as reqd

O14:E, cb DDU (six) – as reqd
 O15:E,
 O16:E

```

  . . . . .
  , If I'CNCT RETURN
  , DAP: FREE
  ,
  , GNC 23 RCS
  , OMS PRESS ENA,OFF – ITEM 7 EXEC
  O8 , L,R OMS XFEED (four) – CL (tb-CL)
      , He PRESS/VAP ISOL A – CL
  O7 , AFT L,R RCS
      , ✓He PRESS A(B) (two) – GPC (tb-OP)
      , B(A) (two) – CL (tb-CL)
      , XFEED (four) – CL (tb-CL)
      , TK ISOL (six) – OP (tb-OP)
  C3 , DAP: as reqd
  . . . . .
  
```

5. RECONFIG FOR GROUP B(C)
 If Group B(C) Pwrdsn:
 O14:F, PriRJDLOGIC,DRIVER (sixteen) – OFF
 O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
 O16:F

ON-ORBIT -X RCS BURN, MM202

O14:F, ✓Pri RJD LOGIC,DRIVER (sixteen) – ON
O15:F,
O16:F

O14:E, ✓cb DDU (six) – cl
O15:E,
O16:E

GNC 55 GPS STATUS

✓GPS TO NAV – INH (*)

1. FWD RCS SYSTEM CHECK

O3 ✓RCS PRESS FWD OXID,FUEL > 190 psia
✓He > 456 psia

O8 ✓FWD RCS He PRESS A(B) – GPC (tb-OP)
✓B(A) – CL (tb-CL)

2. MNVR TO BURN ATT AND LOAD TGT DATA

C3 DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

Perform Auto Mnvr to Burn Att,

TGT ID – ITEM 8 +2 EXEC

BODY VECTOR – ITEM 14 +5 EXEC

	Posigrade Heads Up	Retrograde Heads Up	Burn Att from MNVR PAD
P – ITEM 15	+276.0	+280.0	_____
Y – ITEM 16	+0.0	+0.0	_____
OM – ITEM 17	+180.0	+0.0	_____

Init TRK – ITEM 19 EXEC (CUR – *)

GNC, OPS 202 PRO

1: GNC ORBIT MNVR EXEC

2: GNC SYS SUMM

Enter or verify TGT DATA per
ORB MNVR PAD

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

✓BURN DATA per PAD

Cont next page

NOTE

Ignore computed attitude,
perform burn in current attitude

- TIG-3:00
3. BURN EXEC
ADI ERR/RATE – MED
ATT – LVLH
✓ADI ATT
- | | Posigrade
Heads Up | Retrograde
Heads Up | Burn Att from
MNVR PAD |
|---|-----------------------|------------------------|---------------------------|
| R | +180.0 | +0.0 | _____ |
| P | +186.0 | +350.0 | _____ |
| Y | +0.0 | +0.0 | _____ |
- FLT CNTLR PWR – ON
DAP TRANS: NORM/PULSE/PULSE
- TIG-0:30>
- DAP: B1/INRTL/PRI
ADI ATT – REF
REF pb – push
- TIG
- THC: Trim VGOs < 0.2 fps critical burns,
< 2.0 fps noncritical burns
4. POST BURN RECONFIG
FLT CNTLR PWR – OFF
GNC, OPS 201 PRO
DAP TRANS: PULSE/PULSE/PULSE
DAP: as reqd
- O14:E,
O15:E,
O16:E
- cb DDU (six) – as reqd
5. RECONFIG FOR GROUP B(C)
If Group B(C) Pwrn:
Pri RJDLOGIC,DRIVER (sixteen) – OFF
RJDA 1A L2/R2 MANF DRIVER – ON
- O14:F,
O15:F,
O16:F

ON-ORBIT MULTI-AXIS RCS BURN, MM202

O14:F, ✓Pri RJD LOGIC,DRIVER (sixteen) – ON
O15:F,
O16:F

O14:E, ✓cb DDU (six) – cl
O15:E,
O16:E

GNC 55 GPS STATUS

✓GPS TO NAV – INH (*)

1. AFT RCS/OMS SYSTEM CHECK

If I'CNCT: L(R) OMS to RCS

F7 ✓OMS PRESS He TK L,R > 1500 psia
O3 ✓L,R OXID,FUEL > 234 psia
C3 DAP: FREE
O7 AFT L,R RCS
 TK ISOL (six) – CL (tb-CL)
 XFEED (four) – OP (tb-OP)
O8 L(R) OMS
 He PRESS/VAP ISOL A(B) – OP
 L,R OMS
 ✓He PRESS/VAP ISOL B(A)
 (two) – CL
 ✓TK ISOL A,B (four) – OP (tb-OP)
 ✓XFEED A (two) – CL (tb-CL)
 L(R) OMS XFEED B – OP (tb-OP)
C3 DAP: as reqd

CRT

GNC 23 RCS

OMS PRESS ENA,L(R) OMS –
ITEM 5(6) EXEC

If no I'CNCT:

O3 ✓RCS PRESS L,R OXID,FUEL > 190 psia
 ✓He > 456 psia
O7 AFT L,R RCS
 ✓He PRESS A(B) (two) – GPC
 (tb-OP)
 ✓He PRESS B(A) (two) – CL (tb-CL)
 ✓TK ISOL (six) – OP (tb-OP)
 ✓XFEED (four) – CL (tb-CL)

Cont next page

10-15

ORB OPS/ALL/GEN H

4. POST BURN RECONFIG
FLT CNTLR PWR – OFF
GNC, OPS 201 PRO
DAP: VERN
DAP: A/AUTO

O14:E, cb DDU (six) – as reqd
O15:E,
O16:E

```

      . . . . .
      | If I'CNCT RETURN
C3    | DAP: FREE
      |
      | GNC 23 RCS
C3    |
C3    | OMS PRESS ENA,OFF – ITEM 7 EXEC
O8    | L,R OMS XFEED (four) – CL (tb-CL)
      |       He PRESS/VAP ISOL A – CL
O7    | AFT L,R RCS
      |    ✓He PRESS A(B) (two) – GPC (tb-OP)
      |        ✓B(A) (two) – CL (tb-CL)
      |       XFEED (four) – CL (tb-CL)
      |       TK ISOL (six) – OP (tb-OP)
C3    | DAP: as reqd
      |
      . . . . .

```

5. RECONFIG FOR GROUP B(C)

If Group B(C) Pwrdn:
O14:F, Pri RJDLOGIC,DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F

LOSS OF VERNIERS

NOTE

DAPs called out in this procedure should only be used if flight-specific loss of VERN DAPs not specified in flight-specific checklists (Deploy, RNDZ, PDRS, EVA). Use Tail-only for crew sleep; Nose and Tail for all other times

1. CONFIG DAP

✓DAP: FREE

If Tail-only control desired:

Change DAP A,B to A6,B2

If Nose and Tail control desired:

Change DAP A,B to A5,B3

2. ESTABLISH CONTROL

O14:F,
O15:F,
O16:F
O16:F

✓Pri RJD LOGIC,DRIVER (sixteen) – ON

✓RJD L5/F5/R5 DRIVER – OFF

DAP: A/FREE/ALT
A/AUTO/ALT

RECOVERY OF VERNIERS

DAP: FREE

1. CONFIG DAP
Reconfig to FLIGHT PLAN DAP
2. CONFIG FOR VERNIER (PRIMARY) CONTROL
RJD L5/F5/R5 DRIVER – ON
Wait 5 sec
DAP: A/AUTO/VERN(PRI)

O16:F

10-21

ORB OPS/ALL/GEN H

OMS BOTH	1	<input type="text"/>	<table border="0"> <tr> <td><input type="text"/></td> <td>+X</td> </tr> <tr> <td><input type="text"/></td> <td>-X</td> </tr> </table> MULTI-AXIS	<input type="text"/>	+X	<input type="text"/>	-X
<input type="text"/>	+X						
<input type="text"/>	-X						
L	2	<input type="text"/>					
R	3	<input type="text"/>					
RCS SEL	4	<input type="text"/>					
TV ROLL	5	<input type="text"/> <input type="text"/> <input type="text"/>					
TRIM LOAD							
P	6	<input type="text"/> () <input type="text"/>					
LY	7	<input type="text"/> () <input type="text"/>					
RY	8	<input type="text"/> () <input type="text"/>					
WT	9	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>					
TIG	10	<input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>					
TGT PEG 7							
ΔV_X	19	<input type="text"/> () <input type="text"/>					
ΔV_Y	20	<input type="text"/> () <input type="text"/>					
ΔV_Z	21	<input type="text"/> () <input type="text"/>					

ORBITAL MANEUVER PAD FOR _____

BURN ATT

R	24	<input type="text"/> <input type="text"/> <input type="text"/>
P	25	<input type="text"/> <input type="text"/> <input type="text"/>
Y	26	<input type="text"/> <input type="text"/> <input type="text"/>

ΔV_{TOT}

<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
TGO
<input type="text"/> : <input type="text"/> <input type="text"/>

VGO X

()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Y	()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Z	()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

HA

HP

TGT

()

NOTES

OMS GMBL CK:

	PRE	POST-BURN
L PRI	<input type="text"/>	<input type="text"/>
L SEC	<input type="text"/>	<input type="text"/>
R PRI	<input type="text"/>	<input type="text"/>
R SEC	<input type="text"/>	<input type="text"/>

RCS I'CNCT:

<input type="text"/>	L OMS	RCS
<input type="text"/>	R OMS	RCS
<input type="text"/>	NONE	

DOWN MODE OPTIONS:

<input type="text"/>	2 OMS	1 OMS	RCS
<input type="text"/>	2 OMS	1 OMS	
<input type="text"/>	1 OMS	RCS	
<input type="text"/>	NONE		

OMS HE REG TEST:
L,R OMS HE P/VAP ISOL

	GPC	OP	CL
A	<input type="text"/>	<input type="text"/>	<input type="text"/>
B	<input type="text"/>	<input type="text"/>	<input type="text"/>

-X RCS BURNS:

	BURN ATT	LVLH ATT
P 15	<input type="text"/> <input type="text"/> <input type="text"/>	R <input type="text"/> <input type="text"/> <input type="text"/>
Y 16	<input type="text"/> <input type="text"/> <input type="text"/>	P <input type="text"/> <input type="text"/> <input type="text"/>
OM 17	<input type="text"/> <input type="text"/> <input type="text"/>	Y <input type="text"/> <input type="text"/> <input type="text"/>

10-22

ORB OPS/ALL/GEN H

OMS BOTH	1	<input type="text"/>	<table border="0"> <tr><td><input type="text"/></td><td>+X</td></tr> <tr><td><input type="text"/></td><td>-X</td></tr> <tr><td><input type="text"/></td><td>MULTI-AXIS</td></tr> </table>	<input type="text"/>	+X	<input type="text"/>	-X	<input type="text"/>	MULTI-AXIS
<input type="text"/>	+X								
<input type="text"/>	-X								
<input type="text"/>	MULTI-AXIS								
L	2	<input type="text"/>							
R	3	<input type="text"/>							
RCS SEL	4	<input type="text"/>							
TV ROLL	5	<input type="text"/> <input type="text"/> <input type="text"/>							
TRIM LOAD									
P	6	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
LY	7	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
RY	8	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
WT	9	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
TIG	10	<input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> : <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
TGT PEG 7									
ΔV_X	19	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
ΔV_Y	20	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							
ΔV_Z	21	<input type="text"/> () <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>							

ORBITAL MANEUVER PAD FOR _____

BURN ATT							
R	24	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
P	25	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Y	26	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
ΔV_{TOT}		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TGO		<input type="text"/>	:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO X		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Y		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VGO Z		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HA		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
HP		()	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
TGT		<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

NOTES																																										
<p>OMS GMBL CK:</p> <table border="0"> <tr> <td></td> <td>PRE</td> <td>POST-BURN</td> </tr> <tr> <td>L PRI</td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>L SEC</td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>R PRI</td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>R SEC</td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>		PRE	POST-BURN	L PRI	<input type="text"/>	<input type="text"/>	L SEC	<input type="text"/>	<input type="text"/>	R PRI	<input type="text"/>	<input type="text"/>	R SEC	<input type="text"/>	<input type="text"/>	<p>RCS I'CNCT:</p> <table border="0"> <tr> <td><input type="text"/></td> <td>L OMS</td> <td>RCS</td> </tr> <tr> <td><input type="text"/></td> <td>R OMS</td> <td>RCS</td> </tr> <tr> <td><input type="text"/></td> <td>NONE</td> <td></td> </tr> </table>	<input type="text"/>	L OMS	RCS	<input type="text"/>	R OMS	RCS	<input type="text"/>	NONE		<p>DOWN MODE OPTIONS:</p> <table border="0"> <tr> <td><input type="text"/></td> <td>2 OMS</td> <td>1 OMS</td> <td>RCS</td> </tr> <tr> <td><input type="text"/></td> <td>2 OMS</td> <td>1 OMS</td> <td></td> </tr> <tr> <td><input type="text"/></td> <td>1 OMS</td> <td>RCS</td> <td></td> </tr> <tr> <td><input type="text"/></td> <td>NONE</td> <td></td> <td></td> </tr> </table>	<input type="text"/>	2 OMS	1 OMS	RCS	<input type="text"/>	2 OMS	1 OMS		<input type="text"/>	1 OMS	RCS		<input type="text"/>	NONE		
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<p>OMS HE REG TEST: L,R OMS HE P/VAP ISOL</p> <table border="0"> <tr> <td></td> <td>GPC</td> <td>OP</td> <td>CL</td> </tr> <tr> <td>A</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>B</td> <td><input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> </table>		GPC	OP	CL	A	<input type="text"/>	<input type="text"/>	<input type="text"/>	B	<input type="text"/>	<input type="text"/>	<input type="text"/>	<p>-X RCS BURNS:</p> <table border="0"> <tr> <td></td> <td>BURN ATT</td> <td>LVLH ATT</td> </tr> <tr> <td>P</td> <td>15 <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> <td>R <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> </tr> <tr> <td>Y</td> <td>16 <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> <td>P <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> </tr> <tr> <td>OM</td> <td>17 <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> <td>Y <input type="text"/><input type="text"/><input type="text"/><input type="text"/></td> </tr> </table>		BURN ATT	LVLH ATT	P	15 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	R <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Y	16 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	P <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	OM	17 <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>	Y <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>																	
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SEP MANEUVER

SEP MANEUVER 11-2

**SEP
MNVR**

11-1 ORB OPS/ALL/GEN H

SEP MANEUVER

SEP
MNVR

- A6U
1. SET UP AFT STATION
√ SENSE -Z
DAP: A1/INRTL/PRI
DAP TRANS: as reqd
GNC 25 RM ORBIT
SW RM INH - ITEM 16 EXEC (*)
FLT CNTLR PWR - ON
SW RM INH - ITEM 16 EXEC (no *)
 2. OBTAIN VISUAL CONTACT THRU OVHD WINDOW
DAP ROT: as reqd
RHC: as reqd

When adequate visual contact obtained,
DAP ROT: DISC/DISC/DISC
 3. NULL CLOSING RATE
THC: +Z (out)
As reqd to null closing rate
- A1U
4. PERFORM RR ACQ (if desired)
KU MODE - RDR PASSIVE
RADAR OUTPUT - LO
sel - AUTO TRK
CNTL - PNL

Slew antenna to target

KU SEARCH - SEARCH (tb-gray)

If no lock-on within 1 min,
repeat SEARCH as convenient

Cont next page

A6U 5. OBTAIN ~1 FPS OPENING RATE
DAP TRANS: NORM/NORM/NORM

- * If Norm Z sep desired: *
- * DAP: no LO Z *
- * THC: +Z (out) for 3 sec *
- * If LO Z sep desired (MCC call): *
- * DAP: LO Z *
- * THC: +Z (out) for 25 sec *

CRT 6. PERFORM OUT-OF-PLANE MANEUVER
GNC UNIV PTG
CNCL – ITEM 21 EXEC
GNC, OPS 202 PRO

GNC ORBIT MNVR EXEC
RCS SEL – ITEM 4 EXEC (*)

- * If time critical, *
- * Set TIG to current time + 2.00 *
- * If not time critical, *
- * Set TIG to current time +22.00 *

TGT PEG 7 ΔV_x – ITEM 19 +0 EXEC
 ΔV_y – ITEM 20 +2 EXEC
 ΔV_z – ITEM 21 +0 EXEC
LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

✓VGO Z ≥ 0; if VGO Z < 0

- * TGT PEG 7 ΔV_y – ITEM 20 -2 EXEC *
- * LOAD – ITEM 22 EXEC *
- * TIMER – ITEM 23 EXEC *
- * ✓VGO Z ≥ 0 *

Do NOT MNVR to BURN ATT

A6U ✓DAP: no LO Z
At TIG, deflect THC to null VGOs

Cont next page

7. PERFORM FINAL SEP

GNC ORBIT MNVR EXEC

CRT ✓ RCS SEL – ITEM 4 (*)

If ΔVY (block 6) +2:

TV ROLL – ITEM 5 +2 7 0 EXEC

If ΔVY (block 6) -2:

TV ROLL – ITEM 5 +0 9 0 EXEC

Set TIG to TIG from step 6 +15:00

TGT PEG 7 ΔVx – ITEM 19 +3 EXEC

ΔVy – ITEM 20 +0 EXEC

ΔVz – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

DAP: B1/AUTO/PRI

At TIG-8:00, MNVR – ITEM 27 EXEC (*)

A6U At TIG, deflect THC to null VGOs
FLT CNTLR PWR – OFF

8. MNVR TO MINIMUM DRAG ATTITUDE

(-ZLV/-XVV)

A6U DAP: A/AUTO/VERN

CRT GNC, OPS 201 PRO

GNC UNIV PTG

✓ TGT ID: 2

BODY VECT: 3

OM: 0

START TRK – ITEM 19 EXEC (CUR – *)

PGSC

PGSC ACT 12-3
OCA, PROSHARE, AND PCMMU EXPANSION
 CARDS 12-8
PGSC HARD DISK LATE UPDATE 12-9
OCA SETUP 12-11
 CABLE DIAGRAM 12-16
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 DIRECTORY STRUCTURE 12-18
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 S-BAND MODEM (MFX) ACTIVATION 12-21
VIDEO CONFERENCING 12-23
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APPLICATION SHARING 12-26
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 CAMERA (KCA CAMERA CNTL) 12-27
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 WITHOUT RHC 12-62
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PGSC

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GRAFTRAK KEYBOARD REF	12-74
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RELOAD STS PGSC	12-78

FIGURES

12-1	Side view of printer and trays, ready for assembly	12-47
12-2	Printer (top view/back view), PGSC (parallel port)	12-48

PGSC

PGSC ACT

- A. PGSC WITH EXPANSION UNIT
1. If activating OCA Router PGSC, go to OCA SETUP, 12-11
 2. Unstow:
PGSC with Expansion Unit
AC PWR cable

If PGSC to be networked:
PCMCIA Ethernet card, adapter assemblies
Ethernet cables
Network T-connectors
Network terminators (two)
Network barrel connectors (if reqd)

If WinDecom to be run:
PCMMU data cable (if not prerouted)
RS-232 Y data cable (if reqd)
RS-422 Y data cable (if reqd)
RS-422 PCMCIA cards, adapter boxes (if reqd)
 3. See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use
 4. ✓ AC UTIL PWR – OFF

F1
(MO13Q,
A15,
MO52J,
ML85E)

NOTE

If needed, reference PGSC pictorials on 12-7 and 12-8 to identify PGSC ports, connectors

5. Connect PGSC AC PWR cable from AC Util Pwr outlet to Expansion Unit Pwr port

Cont next page

12-3

ORB OPS/ALL/GEN H

6. ✓ PGSC Expansion Unit fan/louver not obstructed
7. If multiple PGSCs to be powered from same AC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet
8. AC UTIL PWR – ON
9. If reqd, perform PGSC HARD DISK LATE UPDATE, 12–9, then:
10. ✓ Windows shut down

- PGSC
11. Repeat steps 1 thru 10 for each PGSC to be networked
 12. If PGSC to be networked, go to PGSC NETWORK – A. Initial Setup, 12–30 >>

- PGSC
13. PGSC pwr – on
 14. Sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]
 15. Go to appropriate application setup procedure (e.g., WINDECOM OPS, 12–37, and/or WORLD MAP INITIALIZATION, 12–44), as needed >>

B. PGSC WITHOUT EXPANSION UNIT

1. Unstow:
 - PGSC
 - DC PWR SPLY
 - DC PWR cable
 - DC PWR SPLY cable
- If PGSC to be networked:
 - PCMCIA Ethernet card, adapter assemblies
 - Ethernet cables
 - Network T-connectors
 - Network terminators (two)
 - Network barrel connectors (if reqd)

Cont next page

PWR
SPLY

2. ✓DC PWR SPLY PWR sw1 – OFF
3. See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use

F1
(MO13Q,
A11,A15,
MO30F,
MO52J,
ML85E,
O19,L12)

4. ✓DC UTIL PWR – OFF

NOTE

If needed, reference PGSC pictorials on 12-7 and 12-8 to identify PGSC ports, connectors

5. Connect PGSC DC PWR cable from DC Util Pwr outlet to DC Pwr Sply outlet (J1)
Connect DC PWR SPLY cable from DC Pwr Sply outlet (J2) to PGSC pwr port
6. ✓PGSC fan/louver (at center rear of PGSC) not obstructed
7. If multiple PGSCs to be powered from same DC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet
8. DC UTIL PWR – ON

PWR
SPLY

9. DC PWR SPLY PWR sw1 – ON (It on)

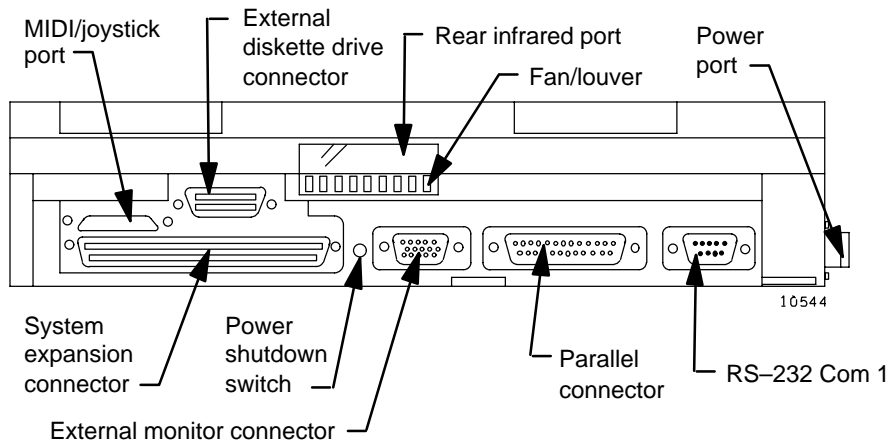
10. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:

PGSC

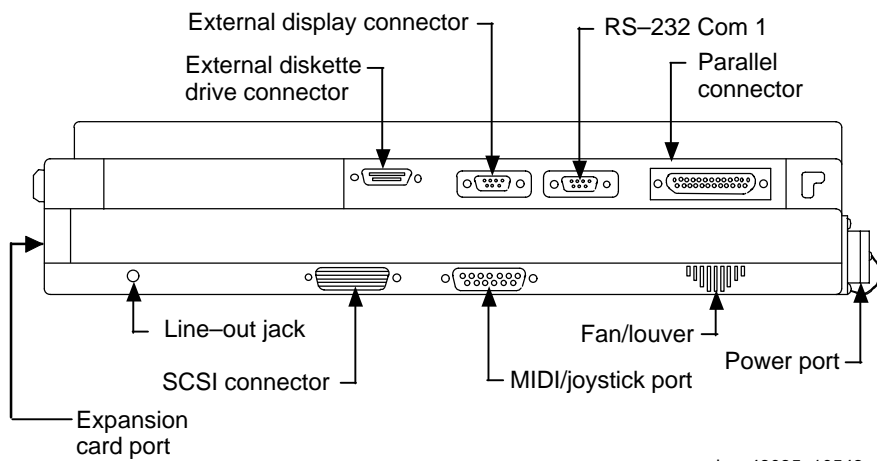
11. ✓Windows shut down
12. Repeat steps 1 thru 11 for each PGSC to be networked

Cont next page

- PGSC
13. If PGSC to be networked, perform PGSC NETWORK – A. Initial Setup, 12–30
 14. PGSC pwr – on
 15. Go to appropriate application setup procedure (e.g., WORLD MAP INITIALIZATION, 12–44), as needed



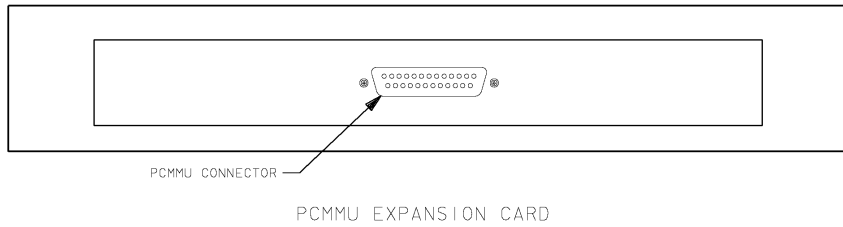
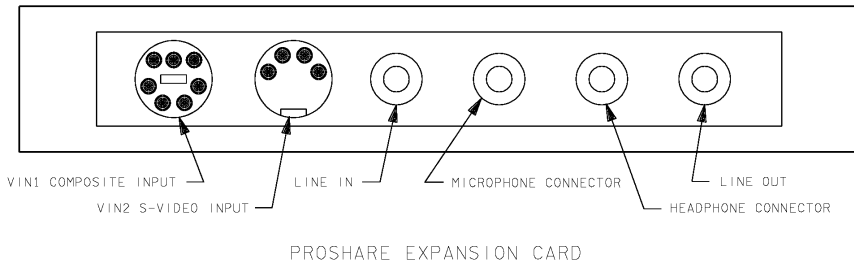
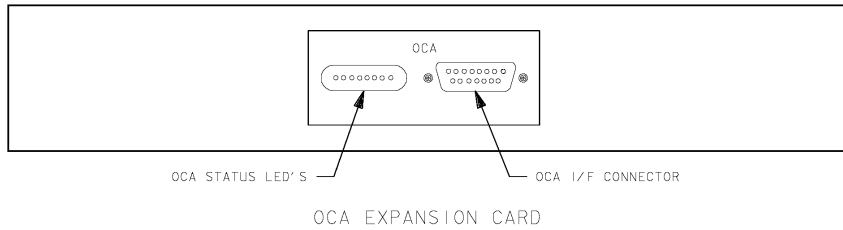
PGSC without Expansion Unit



jsc_48035_10543.cv5

PGSC with Expansion Unit

OCA, PROSHARE, AND PCMMU EXPANSION CARDS



480351207, PNL 3

PGSC HARD DISK LATE UPDATE

If late update reqd on STS PGSC portion of OCA Router PGSC hard disk:

- PGSC
- If running Windows NT (OCA Router s/w):
 1. Press [CNTL]/[ALT]/[DEL]
Sel 'Shut Down' at 'Logon Information' dialog box
Sel 'OK'
When prompted:
PGSC pwr – off
 - If running Windows 98:
 2. Go to step 5
 - 3. PGSC pwr – on
Within 15 sec, click on 'STS PGSC' at 'Boot Magic' boot-up menu
Sel 'Docked (OCA Card)' config at Startup Menu, then press [ENTER]
 - 4. ✓PGSC pwr – on

CAUTION

If PCMCIA card is inserted in PCMCIA card slot for extended period of time, PCMCIA card may become hot

5. Insert PCMCIA card containing late PGSC updates

Cont next page

6. ✓'PCMCIA card' icon appears in system tray

- * If 'PCMCIA card' icon does not appear in *
- * system tray: *
- * ✓PCMCIA card properly inserted with *
- * correct side up (bottom release button *
- * extends outward and can be folded in) *
- * If no joy, eject PCMCIA card and *
- * reinsert *
- * If still no joy: *
- * Shut down Windows *
- * Eject PCMCIA card *
- * Power up in Windows 98 *
- * Repeat steps 5 and 6 *

7. Double-click 'Shuttle Apps'>'Late PGSC Update'

8. If referred to this procedure from OCA SETUP or PGSC ACT, follow instructions on PGSC monitor but shut down Windows (versus restart) >>

9. Follow instructions on PGSC monitor

OCA SETUP

1. Unstow:

- OCA Router PGSC with Expansion Unit
- ProShare PGSC with Expansion Unit
- AC Pwr cables (if not prerouted)
- OCA I/F cable (if not prerouted)
- PGSC Modem cable (if MFX ops reqd)
- PCMCIA Ethernet card, adapter assemblies
- Ethernet cables
- Network T-connectors
- Network terminators (2)
- Network barrel connectors (if reqd)

NOTE

At a minimum, network equipment should be configured for OCA Router and ProShare PGSCs.

Network must always be properly terminated when connected to powered PGSCs

If adding OCA Router PGSC to existing network, perform the following for each PGSC on network:

PGSC

2. If time permits for PGSC shutdown and bootup process:
 - Shut down Windows
 - Go to step 6If time not available, proceed with step 6
3. Click on 'PCMCIA card' icon in system tray
Click on popup window displaying 'Stop *NAME_OF_NETWORK_CARD*', wait for prompt
4. Press [ENTER] at network card dialog box displaying 'You may safely remove this device'
5. Remove PCMCIA Ethernet card from PCMCIA card slot
6. Repeat steps 2 thru 5 for each PGSC on network

Cont next page

OCA ROUTER PGSC SETUP

7. Config network equipment for OCA Router PGSC, ProShare PGSC, and Color Printer (if reqd) per:
NETWORK SETUP DIAGRAM, 12-35
PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR)
8. Config switches for Ku-Band file xfer:
✓MCC for:
Ku-band rate _____
Pnl location of:
PDIP Pwr cb
KuBand Rate sw
_____ cb PDIP PWR 2 KU BAND RLY - cl
_____ Ku BAND RATE - LO(HI)
9. Config PGSC Modem cable (if MFX ops reqd) and OCA I/F cable per OCA CABLE DIAGRAM, 12-16
10. See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use
11. ✓AC UTIL PWR - OFF
12. Connect AC PWR cable between AC Util Pwr outlet and OCA Router PGSC per:
PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR)

NOTE

Following two steps will prevent unnecessary pwrdn of AC Util Pwr outlet

13. If OCA Router and ProShare PGSCs powered from same AC Util Pwr outlet, connect AC PWR cable to ProShare PGSC

Cont next page

12-12 ORB OPS/ALL/GEN H

14. If reqd, perform COLOR PRINTER UNSTOW AND ASSEMBLE, 12-46, then:
15. AC UTIL PWR – ON

OCA
Router
PGSC

16. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:
17. ✓ Windows shut down
18. Insert PCMCIA Ethernet card into PCMCIA card slot

NOTE

After powering on OCA Router PGSC, allow approx 2 min for completion of bootup process

19. PGSC pwr – on
20. Press [CTRL]/[ALT]/[DEL] to logon to Windows NT
 ✓ Password field blank on 'Logon Information' dialog box
 Sel 'OK'
 Wait approx 10 sec for logon sequence to complete
21. Verify data rate:
 Double-click 'OCA Control Panel Applet' icon on desktop

- * If error msg displayed: *
- * Acknowledge msg *
- * PGSC pwr – off *
- * Eject,reinsert PCMCIA card *
- * Repeat steps 19 thru 21 *
- * If no joy: *
- * PGSC pwr – off *
- * Replace PCMCIA card,adapter *
- * Repeat steps 19 thru 21 *

Cont next page

- √‘Local OCA Card–1’ display on desktop
- In ‘OCA–FLIGHT VC–2D’ section of ‘Local OCA Card–1’ display:
- √SEND – 2(4)M

- * If send rate out of config: *
- * Sel ‘Control’>‘Transmit Rate’>‘2(4) *
- * Mbps OCA internal clock (Shuttle *
- * Ku Channel 2(3))’ *

PROSHARE PGSC SETUP

22. If ProShare PGSC already connected to AC PWR cable per step 13 of OCA SETUP, go to step 27
23. See UTILITY OUTLET PLUG–IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use
24. √AC UTIL PWR – OFF
25. Connect AC PWR cable between AC Util Pwr outlet and ProShare PGSC per:
PGSC Usage Chart (if available) or UTILITY OUTLET PLUG–IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR)
26. AC UTIL PWR – ON

ProShare

- PGSC 27. If reqd, perform PGSC HARD DISK LATE UPDATE, 12–9, then:
28. √Windows shut down
29. Insert PCMCIA Ethernet card into PCMCIA card slot
30. If PGSC powered off:
PGSC pwr – on
If reqd, sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]

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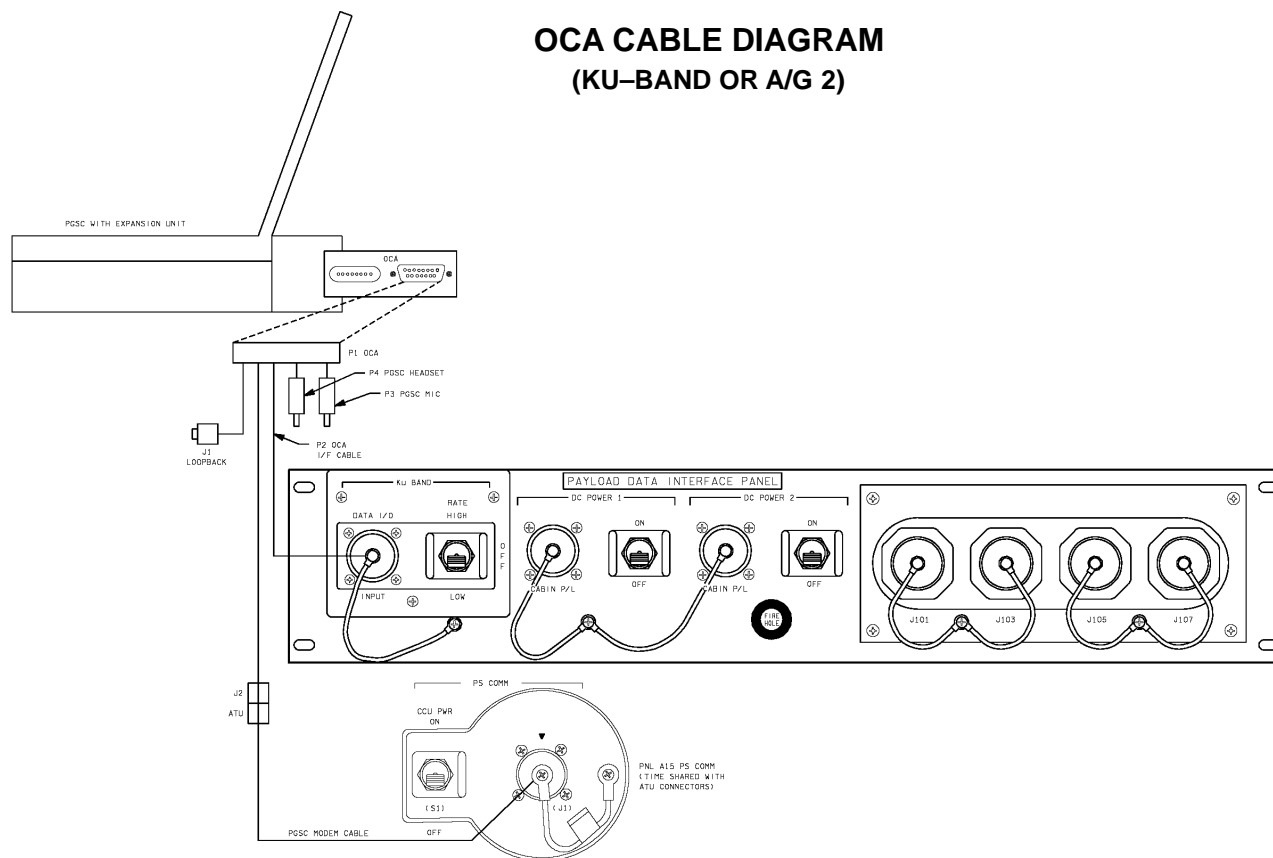
12–14 ORB OPS/ALL/GEN H

31. Press [ENTER] for any of the following:
 - 'Enter Network Password' dialog box (if displayed)
 - 'Restoring Network Connections' dialog boxes
 - 'Windows Networking' dialog boxes (if displayed)
32. Repeat steps 29 thru 31 for each PGSC to be added to network
33. If reqd, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-49, then:
34. Verify network connectivity using PingMaster:
 - Double-click 'Shuttle Apps'>'Network Config'>'PingMaster'
 - ✓ 'Status' column of 'Network Primary' and 'Network Nodes' sections for networked PGSCs
 - If status is 'Good Response' for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)
 - * If status is not 'Good Response', verify *
 - * proper network cable and card *
 - * connections, then recheck status in *
 - * PingMaster *

ProShare

- PGSC 35. Double-click 'Shuttle Apps'>'KFX'
 Arrange 'KFX' window as desired
36. Retrieve OCA Data Diskette from FDF
 Insert diskette in floppy drive of ProShare PGSC

OCA CABLE DIAGRAM (KU-BAND OR A/G 2)



480351205, PNL_g

12-16 ORB OPS/ALL/GEN H

OCA DOWNLINK VIA GROUND CMD

1. MOVE FILE(S) TO DOWNLINK DIRECTORIES

NOTE

Files downlinked via ground cmd
unless MCC instructs otherwise

See OCA DIRECTORY STRUCTURE, 12-18
See OCA FILENAMES, 12-19, for file naming
convention

PGSC

Copy(Move) desired files to
c:\oca-down\dc(payloads)
Notify MCC when complete

2. MONITOR KFX DOWNLINK (if desired)

When link established:

From 'KFX' window:

- ✓REMOTE KFX – green
- ✓Uplink arrow ('↑' next to send rate) – green
- ✓Dnlink arrow ('↓' next to send rate) – green

- ✓KFX application activated
- ✓File Transfer Status dialog (displayed during file xfer)

3. MONITOR MFX DOWNLINK (if desired)

If MFX application not activated:

Perform OCA S-BAND MODEM (MFX)
ACTIVATION, 12-21, then:

If minimized:

- ✓Icon Title displaying File Name, Send/Receive Status

NOTE

For detailed file xfer information, following
steps must be completed prior to file xfer
initiation

- Sel 'File' on menu bar of MFX application
- ✓Show Status During File Xfers – (✓)
- ✓Z MODEM(1K-X MODEM) display appears
- ✓Displaying File Name, Send/Receive Status

OCA DIRECTORY STRUCTURE

```
C:\
├── OCA-DOWN
│   ├── DCS
│   └── PAYLOADS *
├── OCA-UP
│   ├── MAIL
│   ├── MESSAGES
│   ├── OTHER
│   ├── PAYLOADS
│   ├── SPOC **
│   └── WEB
└── OCA—SW (ground use only)
```

* PAYLOADS Directory: Directory may contain flight-specific subdirectory

** SpOC Directory: Directory will contain latest SpOC updates. To create SpOC update disk, copy all files in c:\oca-up\spoc\uplink to a:\uplink

OCA FILENAMES

UPLINKED FILES

LOCATION

SpOC updates:	a:\uplink\ (c:\oca-up\spoc\)
Ops notes:	c:\oca-up\other\opsxxxx.doc
Graphics files:	c:\oca-up\other\othrxxxx.bmp
Uplinked personal mail*:	c:\oca-up\mail\
Uplinked Payload files:	c:\oca-up\payloads\

DOWNLINKED FILES

LOCATION

Personal mail, other*:	c:\oca-down\mail\
Payload files:	c:\oca-down\payloads\

STD FILENAMES

filename.doc	WORD documents only
filename.txt	ASCII text file (NOTEPAD or WORD)
filename.bmp	Graphics file (Paint)
filename.pcx	Graphics file (Paint)
famcdr01.doc*	family mail: CDR → family on FD01
cdrfam02.doc*	family mail: family → CDR on FD02
fltcd02.doc*	message: CDR → FLT Director on FD02

*Outlook OST files are nominally used for personal mail. If Outlook is not working properly, the above file locations and nomenclature will be used

NOTE

Do not downlink medical data. Downlink directories will be cleared of all files at end of each OCA session. To retain archive copy of downlink msgs, save in personal directory

OCA KU-BAND (KFX) MANUAL DOWNLINK

- PGSC
1. CONFIGURE S/W FOR FILE DOWNLINK
If reqd, enlarge 'KFX' window

From 'KFX' window:
 - ✓REMOTE KFX – green
 - ✓Uplink arrow ('↑' next to send rate) – green
 - ✓Dnlink arrow ('↓' next to send rate) – green
 2. SELECT FILE(S) TO DOWNLINK
Use WINDOWS EXPLORER to sel files/directories to transfer
Drag files over KFX window
Rel mouse button
 - ✓'KFX File Transfer Preview' display appears with selected file(s) listed
 3. ADD ADDITIONAL FILE FOR DOWNLINK (if reqd)
 - ✓'KFX File Transfer Preview' display active
 - Sel 'add to list' button (button with documents, '+' symbols)
 - ✓'Select Files for Transfer' display appears
 - Sel desired file from file listbox
 - Sel 'Select' button
 - Repeat for each additional file as reqd
 - Sel 'Done' button
 4. REMOVE FILE FROM DOWNLINK (if reqd)
 - ✓'KFX File Transfer Preview' display active
 - Sel desired file(s) in listbox
 - Sel 'delete' button (button with 'X')
 5. START FILE DOWNLINK

NOTE

User may halt transfer while in progress by sel 'Abort' button

- ✓'KFX File Transfer Preview' display active
- Sel 'downlink' button (button with '↓')
- ✓'File Transfer Status' display appears
- ✓Displaying xfer status

* If error displayed, repeat step 5 *

OCA S-BAND MODEM (MFX) ACTIVATION

1. ESTABLISH LINK

On MCC GO:

A15 PS COMM CCU PWR – OFF

L9 PS AUD PWR – AUD
A/G 1 – OFF
A/G 2 – T/R
A/A – OFF
ICOM (two) – OFF
VOL A/G 2 tw – 0
XMIT/ICOM MODE – PTT/PTT

CAUTION

Loss of A/A (UHF) will occur if OCA PGSC Modem cable connected to COMM OUTLET and A/A in T/R on ATU

O9 R AUD A/G 2 – OFF
O5 L AUD A/G 2 – OFF
R10 MS AUD A/G 2 – OFF
A13(OV102) OS AUD A/G 2 – OFF
MO42F MIDDECK SPKR AUD A/G 2 – OFF

A15 ✓PGSC Modem cable connected to PS COMM outlet

2. ACTIVATE FILE XFER S/W

OCA Router PGSC If PGSC not running Windows 98:
Restart (or pwr on) PGSC
Within 15 sec, click on 'STS PGSC' at 'Boot Magic' bootup menu
Sel 'Docked (OCA Card)' config at Startup Menu, then press [ENTER]

Double-click 'Shuttle Apps'>'OCA ProShare'>'MFX'

✓'MFX' display appears
✓WINDOW – OFFLINE
Arrange 'MFX' window as reqd

Cont next page

12-21 ORB OPS/ALL/GEN H

3. VERIFY PRINTER SETTINGS
MFX PGSC Click 'Start'>'Settings'>'Printers'
In "Printers" window, right-click "NETWORK
EPSON1" printer
On popup menu:
Verify "Set as Default" checked
Verify "Use Printer Offline" NOT checked
Close "Printers" window

VIDEO CONFERENCING

1. Unstow:
 - Headset
 - Minicam
 - ProShare Video/Pwr cable
 - VLHS to VTS I/F cable
2. ✓OCA SETUP, 12–11, complete
3. Config cables per P/TV04 VIDEO
CONFERENCING (PHOTO/TV FS, SCENES)

ProShare
PGSC

4. Double-click 'Shuttle Apps'>'ProShare Video'
5. ✓Video active in 'Local' window
6. Adjust Thinkpad display tilt angle, camera posn,
iris, focus so oper's face centered in 'Local'
video window
7. ✓Picture quality and position
 - * If picture quality poor:
 - * From 'Local' video window: *
 - * Sel 'Adjusts video' button ('slide *
 - * bar' icon) *
 - * Adjust picture quality as reqd *
 - * Sel 'Close' button *
 - * If 'Save camera control settings?' *
 - * appears, sel 'Yes' button *
 - * *
 - * From 'Local' video window: *
 - * ✓'Zooms in' button (mag glass) in *
 - * out position *
8. TO RECEIVE CALL
Notify MCC when ready to receive video
conference call, wait for MCC to initiate

Cont next page

12–23

ORB OPS/ALL/GEN H

9. TO INITIATE CALL

Notify MCC when ready to place video conference call, wait for MCC confirmation
Sel 'Dial List' button
Sel 'MCC, PC'
Sel 'Dial' button

NOTE

Title of remote video window changes to designate caller when video conference established

10. CONDUCT VIDEO CONFERENCE

NOTE

Video conference performance may be affected if other applications are active

- ✓ Remote video window active, audio active
Sel 'Split' button on handset
Move remote video window directly beneath camera
Adjust audio volume using slide bar under remote video window
- ✓ Headset/speaker Toggle button configured for headset audio (button not depressed)

11. TERMINATE VIDEO CONFERENCE

NOTE

When video conference completed, either side can terminate call. If MCC has disconnect, 'Hang Up' button will change to 'Dial'

From ProShare Video handset:
Sel 'Hang Up' button
Sel System Menu (upper left corner)
Sel 'Exit' ([ALT]/[SHIFT]/[F4])

PROSHARE CHALKBOARD

1. If not already completed, perform VIDEO CONFERENCING, steps 1 thru 8(9), 12–23, then:
2. TO RECEIVE CHALKBOARD SESSION
Notify MCC when ready to receive chalkboard session, wait for MCC to initiate

PGSC

From ProShare Video handset, sel 'Split' button
If 'Local' video remains on screen, minimize 'Local' video window

3. TO INITIATE CHALKBOARD SESSION
Notify MCC when ready to initiate chalkboard session, wait for MCC confirmation

From ProShare Video handset, sel 'Share Document' button

Sel 'Yes' at 'Do you want to share notebook?' dialog box

Minimize all unused windows

4. TERMINATING CHALKBOARD SESSION

NOTE

When chalkboard session completed, either side can terminate session

From ProShare Personal Conferencing menu bar:
Sel 'Conference'
Sel 'UnShare Notebook' menu

If MCC has terminated session, sel 'OK' in 'The other participant closed the notebook'

From ProShare Personal Conferencing menu bar:
Sel 'File'
Sel 'Exit'

NOTE

Operator will be prompted to save chalkboard session in 'xxxx.mtg' file

APPLICATION SHARING

- PGSC
1. Launch desired application
 2. Perform PROSHARE CHALKBOARD, steps 1 and 2(3), 12–25, then:
 3. From ProShare Personal Conferencing menu bar:
Sel 'Application'
Sel 'Share Application View..'
 4. From 'Share Application View' dialog box:
Sel desired application
Sel 'OK'
 5. Perform application edits with MCC when application is shared

NOTE

Mouse operation, shared between MCC and flight operator, must be coordinated using conference audio

6. TERMINATING APPLICATION SHARING
Either side can terminate application sharing by exiting application

**REMOTE PAN/TILT/ZOOM CONTROL OF GROUND
CAMERA (KCA CAMERA CNTL)**

NOTE

PAN/TILT control only available if ground workstation involved in video conference has PAN/TILT and ground PAN/TILT camera running

1. Perform VIDEO CONFERENCING, steps 1 thru 8(9), 12–23, then:
ProShare2. Double-click 'Shuttle Apps'>'OCA–ProShare'>
PGSC 'ProShare Pan–Tilt'
3. Sel 'Help' in KCA Camera Control menu bar for instructions
4. When camera control ops complete, close KCA camera control application

OCA LOOPBACK TEST

NOTE

Perform procedure on OCA Router
PGSC running in Windows NT

1. LOGON TO WINDOWS NT
OCA Router Press [CTRL]/[ALT]/[DEL] to logon to Windows NT
PGSC Sel 'OK' on 'Logon Information' dialog box
Wait approx 10 sec for logon sequence to complete
Double-click 'OCA Control Panel Applet' icon on
desktop
✓'Local OCA Card-1' display on desktop
2. INITIATE INTERNAL LOOPBACK TEST
From 'Local OCA Card-1' display:
Sel 'OCA Self Tests' on menu bar
Sel 'Internal Loopback'

✓'Local OCA Card-1' display:
Successful Test – Animated signal moving
inside PC icon
Unsuccessful Test – 'Frowny face' displayed
inside PC icon
Inform MCC of results
3. TERMINATE INTERNAL LOOPBACK TEST
From 'Local OCA Card-1' display:
Sel 'OCA Self Tests' on menu bar
Sel 'Stop Loopback Testing'
4. INITIATE EXTERNAL LOOPBACK TEST
Disconnect OCA I/F cable from PDIP panel
Connect PDIP end of OCA I/F cable to loopback
port on PGSC end of cable
See OCA CABLE DIAGRAM – LOOPBACK,
12-28, for cable config

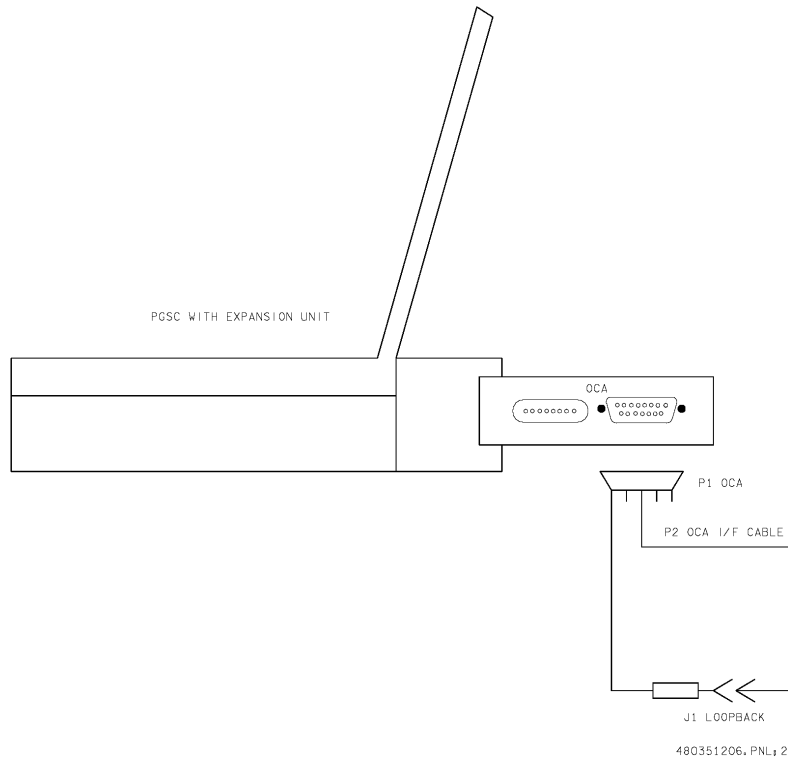
From 'Local OCA Card-1' display:
Sel 'OCA Self Tests' on menu bar
Sel 'External Loopback #1'

Cont next page

- √'Local OCA Card-1' display:
 - Successful Test – Animated signal moving outside PC icon
 - Unsuccessful Test – 'Frowny face' displayed inside PC icon
- Inform MCC of results

5. TERMINATE EXTERNAL LOOPBACK TEST
 - From 'Local OCA Card-1' display:
 - Sel 'OCA Self Tests' on menu bar
 - Sel 'Stop Loopback Testing'

OCA CABLE DIAGRAM – LOOPBACK



PGSC NETWORK

A. INITIAL SETUP

NOTE

Procedure assumes PGSC ACT, 12-3, performed for each PGSC to be networked

1. If setting up network for OCA Router PGSC, go to OCA SETUP 12-11

NOTE

Use red color-coded terminators and T-connectors for PGSC network

2. Unstow:
 - PCMCIA Ethernet card, adapter assemblies
 - Ethernet cables
 - Network T-connectors
 - Network terminators (2)
 - Network barrel connectors (if reqd)
 3. Configure network equipment per:
 - NETWORK SETUP DIAGRAM, 12-35
 - PGSC Usage Chart (if available) or
 - UTILITY OUTLET PLUG-IN PLAN
 - ORBIT CONFIGURATION (REF DATA FS, UTIL PWR)
- ✓ Network properly terminated

NOTE

If another resource (e.g., ESC) requires use of a specific PCMCIA card slot, use PCMCIA card slot which would avoid network card reconfiguration

PGSC

4. Insert PCMCIA Ethernet card into any PCMCIA card slot of unpowered PGSCs
5. PGSC pwr – on

Cont next page

12-30

ORB OPS/ALL/GEN H

6. If Expansion Unit attached:
Sel appropriate Expansion Unit config at
Startup Menu, then press [ENTER]

7. If PGSC locks up during bootup or during
network ops:

- * ✓PCMCIA Ethernet cards are properly *
- * inserted into PCMCIA card slots *
- * ✓Adapters are properly mated to *
- * network T-connectors *
- * ✓Network cables and terminators are *
- * properly mated to T-connectors *

8. ✓'PCMCIA card' icon appears in system tray

- * If 'PCMCIA card' icon does not appear in *
- * system tray: *
- * ✓PCMCIA Ethernet card is properly *
- * inserted with correct side up (bottom *
- * release button will extend outward *
- * and can be folded in) *
- * If no joy, eject PCMCIA Ethernet card *
- * and reinsert *
- * If still no joy, shut down Windows, *
- * repeat steps 5 thru 8 *

NOTE

Windows will attempt to connect to all
mapped drives

9. Press [ENTER] for any of the following:
Network password prompt (if displayed)
'Restoring Network Connections' dialog
boxes
'Windows Networking' dialog boxes
(if displayed)

10. Repeat steps 4 thru 9 for each PGSC to be
networked

Cont next page

11. Verify network connectivity using PingMaster:
 - Double-click 'Shuttle Apps'>'Network Config'>'PingMaster'
 - ✓'Status' column of 'Network Primary' and 'Network Nodes' sections for networked PGSCs
 - If status is 'Good Response' for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)
 - * If status is not 'Good Response', *
 - * verify proper network cable and *
 - * card connections then recheck *
 - * status in PingMaster *
12. For each networked PGSC, go to appropriate application setup procedure (e.g., WINDECOM OPS, 12-37 and/or WORLD MAP INITIALIZATION, 12-44) as needed >>

B. RECONFIG

NOTE

Procedure assumes PGSC ACT, 12-3, performed for each PGSC to be added to network.

Use red color-coded terminators and T-connectors for PGSC network

1. If reqd, unstow additional network cables, cards, adapters, terminators, T-connectors
- PGSC 2. If OCA Router PGSC on network and running Windows NT:
 - Press [CTRL]/[ALT]/[DEL] to logon to Windows NT
 - Sel 'Shut Down' at 'Logon Information' dialog box
 - Sel 'OK'

Cont next page

When prompted:

PGSC pwr – off

3. If time permits for shutdown and bootup process of non-OCA Router PGSCs on network:
Shut down Windows
Go to step 7
If time not available, proceed with step 4
4. Click on 'PCMCIA card' icon in system tray
Click on popup window displaying 'Stop *NAME_OF_NETWORK_CARD*', wait for prompt
5. Press [ENTER] at network card dialog box displaying 'You may safely remove this device'
6. Remove PCMCIA Ethernet card from PCMCIA card slot
7. Repeat steps 3 thru 6 for each PGSC on network

NOTE

Network must always be properly terminated when connected to powered PGSCs

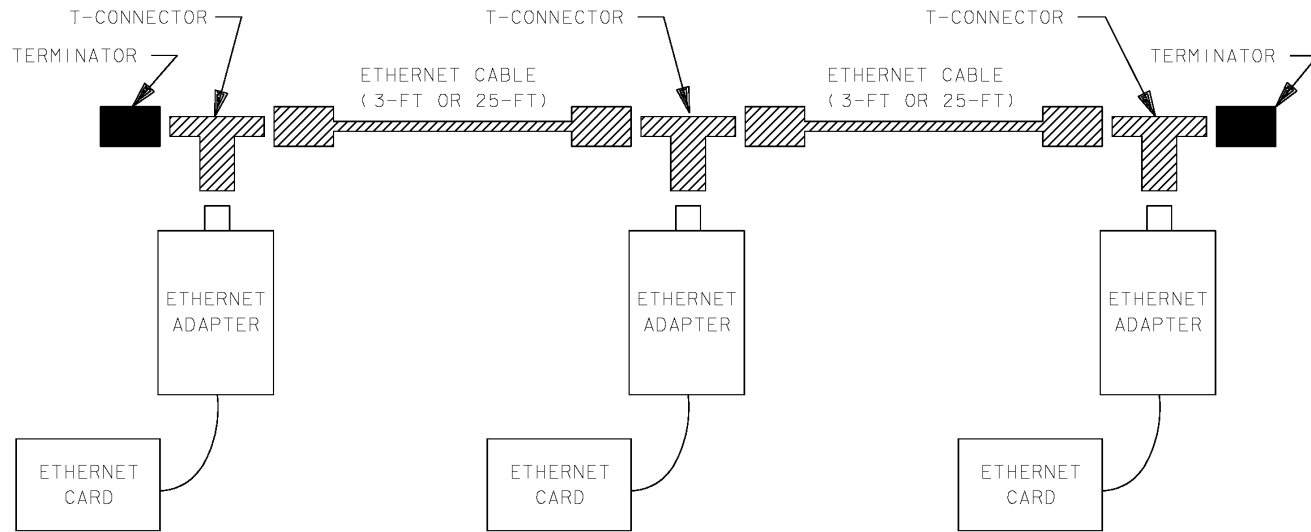
8. Reconfigure network cables, cards, adapters, terminators, T-connectors per:
NETWORK SETUP DIAGRAM, 12-35
PGSC Usage Chart (if available) or
UTILITY OUTLET PLUG-IN PLAN
ORBIT CONFIGURATION (REF DATA FS, UTIL PWR)
✓ Network properly terminated
9. Insert PCMCIA Ethernet cards into PCMCIA card slots of all PGSCs to be networked
10. If PGSC powered off:
PGSC pwr – on
If reqd, sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]

Cont next page

11. Perform PGSC NETWORK – A. Initial Setup, 12–30, steps 8 thru 12

- PGSC
- C. TEARDOWN
1. Single-click 'PCMCIA Card' icon in system tray
 2. Click on popup window displaying 'Stop *NAME_OF_NETWORK_CARD*', wait for prompt
 3. Press [ENTER] at dialog box displaying 'You may safely remove this device'
 4. Depress release button to eject PCMCIA card from PCMCIA card slot
 5. Remove PCMCIA card
 6. Disconnect network cables from network T-connectors
 7. Disconnect network T-connectors from network adapters
 8. Stow network equipment
- D. PGSC NAMING
- PGSC
1. ✓MCC for new PGSC name
 2. Double-click 'Shuttle Apps'>'Network Config'>'Rename PGSC'
 3. Sel 'Yes' to run 'Unique Client Config' program
 4. At 'Network Client Config' dialog box, sel appropriate computer name assigned by MCC
 5. Sel 'Update' button
 6. Sel 'OK' at 'Verification' and 'Update' dialog boxes
 7. Sel 'Yes' to restart PGSC

NETWORK SETUP DIAGRAM



ETHERNET CARDS CAN BE
INSERTED INTO EITHER PCMCIA
CARD SLOT ON NETWORK PGSC

48035002_109. ART 1

12-35

ORB OPS/ALL/GEN H

PCMCIA CARD REMOVAL

- PGSC
1. If RS-422 PCMCIA card:
Shut down Windows
✓Power off completed
Go to step 5
 2. Single-click 'PCMCIA Card' icon in system tray
 3. Click on popup window displaying 'Stop
NAME_OF_CARD', wait for prompt
 4. Press [ENTER] at dialog box displaying 'You may
safely remove this device'

CAUTION

If PCMCIA hard disk drive is inserted in
PCMCIA card slot for extended period
of time, PCMCIA card may be hot

5. Depress release button to eject PCMCIA card
from PCMCIA card slot
6. Remove PCMCIA card

WINDECOM OPS

A. ACT

1. Unstow data cables, cards, adapters:
PCMMU data cable (if not prerouted)
RS-232 Y data cable (if reqd)
RS-422 Y data cable (if reqd)
RS-422 PCMCIA cards, adapter boxes
(if reqd)
2. OI PCMMU PWR – 1(2)
If using pnl O5 to receive PCMMU feed,
verify jumper plug connected to PCMMU
1(2) outlet
If using pnl MO30F to receive PCMMU feed,
disconnect jumper plug from PCMMU 1(2)
outlet
3. Connect PCMMU data cable from PCMMU
1(2)outlet to PGSC PCMMU expansion
card port
4. If sending WinDecom data via serial
connection(s):
See UTILITY OUTLET PLUG-IN PLAN
ORBIT CONFIGURATION (REF DATA
FS, UTIL PWR) or PGSC Usage Chart
(if available) for appropriate data
cable/card connections from
WinDecom PGSC to end user PGSC(s)
5. If sending WinDecom data via network:
See UTILITY OUTLET PLUG-IN PLAN
ORBIT CONFIGURATION (REF DATA
FS, UTIL PWR) or PGSC Usage Chart
(if available) for appropriate network
cable connections from WinDecom
PGSC to end user PGSC(s)
If not already done so, perform PGSC
NETWORK, 12-30

Cont next page

6. Double-click 'Shuttle Apps' > 'WinDecom' > appropriate WinDecom application
After approx 30 sec, verify 'Tlm Pkt-Net' and 'Tlm Pkt-Com' displays appear

End user
PGSC

7. ✓ S/W application(s) on end user PGSC(s) receiving WinDecom data

- * If S/W application(s) on end user *
- * PGSC(s) not receiving WinDecom *
- * data, go to WINDECOM OPS - *
- * C. Troubleshooting, 12-38 * > >

B. DEACT

Win
Decom
PGSC

1. Double-click 'Shuttle Apps' > 'WinDecom' > 'WinDecom Shutdown'
Sel 'OK' to shut down telemetry system >>

C. TROUBLESHOOTING

NOTE

The following individual steps may fix the problem. Exit procedure as needed

PCSC

If dynamic data not displayed on WinDecom 'Tlm Pkt - Net' and/or 'Tlm Pkt - Com' displays:

1. ✓ PGSC PCMMU card receiving data from orbiter PCMMU stream:
From WinDecom 'Tlm Pkt-Net' and/or 'Tlm Pkt-Com' displays, sel 'Packets' tab and verify 'send at' GMT times are dynamic

If no joy, verify PCMMU data cable properly connected at orbiter PCMMU port and PGSC Expansion Unit PCMMU port, repeat WINDECOM OPS - C. TROUBLESHOOTING, 12-38, step 1

- ✓ End user PGSC(s) receiving WinDecom data

Cont next page

12-38

ORB OPS/ALL/GEN H

2. Repeat WINDECOM OPS – A. ACT, 12–37, step 2
3. Disconnect PCMMU cable at both ends, connect backup PCMMU cable between orbiter PCMMU port and PGSC Expansion Unit PCMMU port
4. Replace WinDecom PGSC with backup PGSC with PCMMU Expansion Unit

If end user PGSC(s) not receiving WinDecom data:

5. ✓ Data being sent out from network and/or com ports on WinDecom PGSC:
From WinDecom 'Tlm Pkt–Net' and/or 'Tlm Pkt–Com' displays, sel 'Ports' tab and verify 'Bytes' indicator is dynamic
6. ✓ Network, RS–232 Y, and/or RS–422 Y data cables properly connected on WinDecom and end user PGSC(s)
If applicable, verify RS–422 PCMCIA card(s) properly inserted and RS–422 adapters properly connected
7. If sending WinDecom data via network, check network status using PingMaster:
Double–click 'Shuttle Apps'> 'Network Config'>'PingMaster' on any networked PGSC
✓ 'Status' column of 'Network Nodes' section for WinDecom PGSC and end user PGSC(s)
If status is 'Good Response' for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)
If status is not 'Good Response':
✓ Proper network cable and card connections, then recheck status in PingMaster
Double–click 'Telemetry Server' icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data
Sel 'File' on menu bar, then sel 'Reset Server'

Cont next page

8. If end user application supports Telemetry Server and PGSC set up to receive serial data, verify port and baud rate selections:
- Double-click 'Telemetry Server' icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data
 - Sel 'Source' on menu bar of Telemetry Server
 - ✓ 'Serial' selected ("✓")
 - Sel 'Port' on menu bar
 - ✓ Com port selected ("✓") same as com port receiving WinDecom data
 - ✓ Correct baud rate selected for com port:
 - Open 'Packet & TFL Info' table (from 'Shuttle Apps' > 'WinDecom' of any PGSC)
 - ✓ Footnotes of table to determine proper baud rate for each com port, then minimize file
 - Sel 'Baud' on menu bar of Telemetry Server
 - ✓ Baud rate selected (✓) matches rate shown in footnote of table for particular com port
9. ✓ Current TFL and WinDecom data output config can support end user application(s):
- Open 'Packet & TFL Info' table (from 'Shuttle Apps' > 'WinDecom' of any PGSC)
 - Reference table to verify current loaded TFL supports particular end user application(s)
 - ✓ 'Output' column of table for packet output from WinDecom (com ports and network), compare info to cabling on WinDecom PGSC

Cont next page

10. If end user application supports Telemetry Server, from 'Help' on menu bar of Telemetry Server of each end user PGSC not receiving data:
Sel 'Trouble-shooting' for more troubleshooting info

SETTING TIMES AND STATE VECTOR

- PGSC
1. Double-click 'Shuttle Apps' > 'Time Utilities' > 'Time-Vector Server'
 2. Sel 'Update' on menu bar
Sel 'Time Values'
 3. If PGSC configured to receive WinDecom data:
At bottom of 'Update Time Values' dialog box,
verify 'Auto Synch PGSC with PCMMU'
checked ("✓") on
✓ 'Receiving PCMMU data' is displayed
 - * If 'Not receiving PCMMU data' *
 - * displayed: *
 - * Sel 'Exit' to close dialog box *
 - * Perform WINDECOM OPS – C. *
 - * Troubleshooting, 12–38, then: *
 - * Repeat steps 2–3 *Sel 'Exit' to close dialog box

Sel 'Update' on menu bar
Sel 'State Vector'
At bottom of 'Update State Vector' dialog box,
verify 'PCMMU feed' checked ("✓") on
✓ 'Receiving vector PCMMU data' is displayed
Sel 'Exit' to close dialog box
Minimize 'Time/State Vector Server'
application
 4. If PGSC not configured to receive WinDecom data:
Set GMT, MET, and/or launch values as reqd
Sel 'Apply'
Sel 'Exit' to close 'Update Time Values' dialog box
Sel 'Update' on menu bar
Sel 'State Vector'

Cont next page

GNC 34 ORBIT TGT

PGSC

Update state vector info using data from SPEC
34 display
Sel 'Apply'
Sel 'Exit' to close 'Update State Vector' dialog
box
Sel 'File' on menu bar
Sel 'Exit'

WORLD MAP INITIALIZATION

- PGSC
1. Double-click 'Shuttle Apps' > 'World Map'
 2. If 'World Map Initialization' dialog box displays "ERROR: vector > 4 days...":
 - Sel 'OK'
 - Go to step 4If 'World Map Initialization' dialog box displays "For best results, update GMT and State Vector...", sel 'OK'
 3. Proceed to initialization sequence by selecting 'NO' at 'World Map Initialization' dialog box
 4. At 'Update Time Values' dialog box, verify correct GMT of launch
 5. If PGSC configured to receive WinDecom data:
 6. At bottom of 'Update Time Values' dialog box, verify 'Auto Synch PGSC with PCMMU' checked ("✓") on ✓ 'Receiving PCMMU data' is displayed
 - * If 'Not receiving PCMMU data' *
 - * displayed: *
 - * Sel 'Exit' to close dialog box *
 - * Sel 'Exit' to close 'Update *
 - * Orbiter State Vector' dialog box *
 - * Perform WINDECOM OPS – *
 - * C. Troubleshooting, 12–38 *
 - * then: *
 - * Sel 'File' from WorldMap menu *
 - * bar *
 - * Sel 'Update' *
 - * Sel 'Time Values' *
 - * ✓ 'Receiving PCMMU data' is *
 - * displayed in dialog box *
 - * Sel 'Exit' *
 - * Sel 'File' from menu bar *
 - * Sel 'Update' *
 - * Sel 'State Vector' *
 - * Go to step 8 *

Cont next page

7. Sel 'Exit' to close dialog box
8. At bottom of 'Update Orbiter State Vector' dialog box, verify 'PCMMU Feed' checked ("✓") on
 - ✓ 'Receiving vector PCMMU data' displayedSel 'Exit'

9. If PGSC not configured to receive WinDecom data:

At 'Update Time Values' dialog box, verify current GMT displayed
Update GMT, if reqd
✓ 'Auto Synch PGSC with PCMMU' not checked (no "✓")
Sel 'Apply'
Sel 'Exit'

GNC 34 ORBIT TGT

PGSC

At 'Update Orbiter State Vector' dialog box, update state vector info using data from SPEC 34 display
✓ 'PCMMU Feed' not checked (no "✓")
Sel 'Apply'
Sel 'Exit'

COLOR PRINTER UNSTOW AND ASSEMBLE

NOTE

Power off Printer when not in use

1. UNSTOW
Printer
AC Pwr Cable (if reqd)
Printer Data Cable (one of the following):
 - 6–ft parallel data cable
 - 25–ft parallel data cable
 - 25–ft network data cable and T–connectorPrinter paper
Printer Paper Feeder Tray
Paper Output Tray

 2. ASSEMBLE PRINTER
Printer
Align arrows on Paper Feeder Tray and back of Printer
Insert white tabs on Paper Feeder Tray (near arrows) into black outlined slots on Printer (see fig 12–1)
Slide tray downward
Attach Paper Feeder Tray to Printer (secure via thumbscrews)
Attach Paper Output Tray to Printer (secure via thumbscrews)

 3. See UTILITY OUTLET PLUG–IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use

 4. ✓AC UTIL PWR – OFF
- Printer ✓AC PWR cable connected to AC Util Pwr panel
Connect AC PWR cable to Printer Power Port (see fig 12–2)

NOTE

Network must always be properly terminated when connected to powered PGSCs

Cont next page

If Printer to be set up as Network Printer:
Connect network cable, T-connector to
Printer Network Port (see fig 12-2)
Connect other end of network cable to
T-connector of networked PGSC
If Printer to be set up as Local Printer:
Connect parallel cable between Printer
Parallel Port and ProShare PGSC Parallel
Port (see fig 12-2)

Insert 8.5" x 11" paper into Paper Feeder Tray
(~50 sheets)

Attach Printer to wall of desired area (example:
AFD or Airlock ditch) using Velcro

If OCA Router not configured, perform OCA
SETUP, 12-11

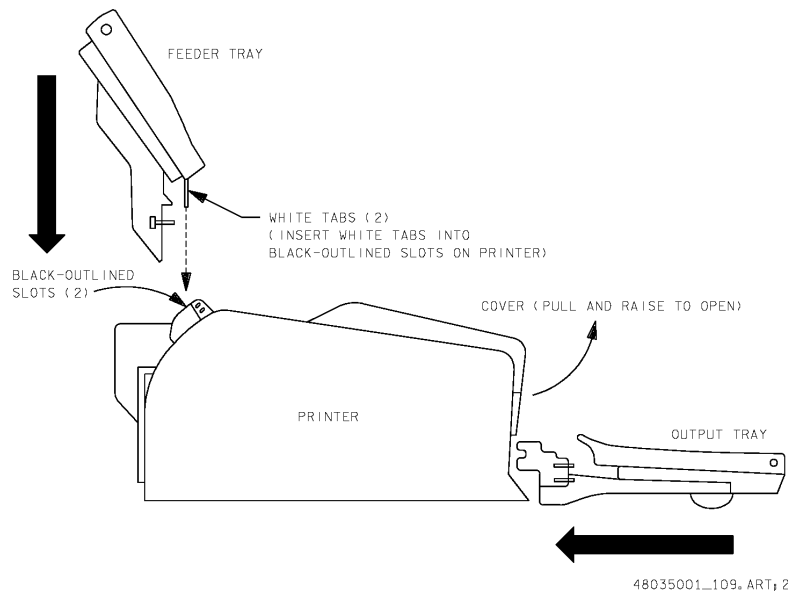
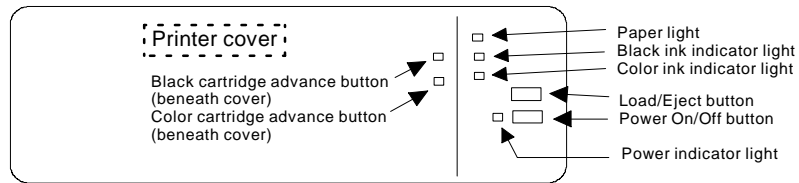
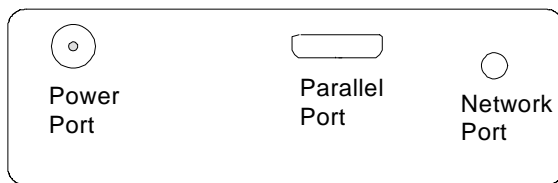


Figure 12-1.- Side view of printer and trays, ready for assembly.

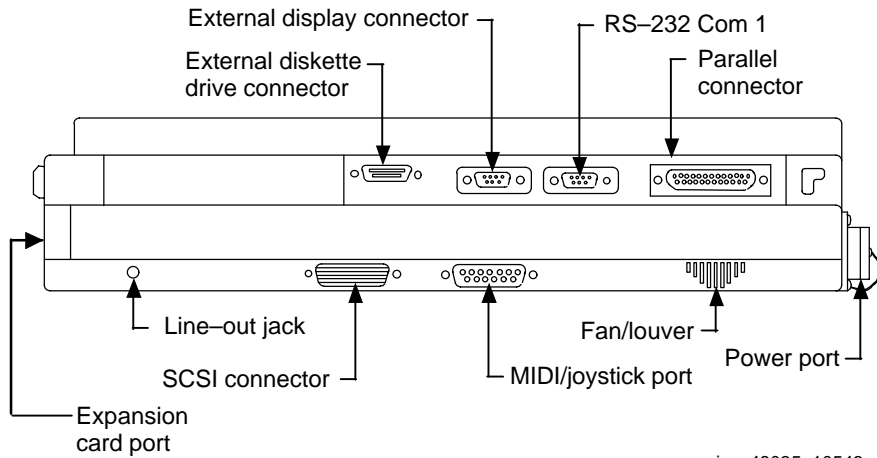
PRINTER Top View (Inside Cover)



PRINTER Back View



PGSC with Expansion Unit



jsc_48035_10543.cv5

Figure 12-2.- Printer (top view/back view), PGSC (parallel port).

COLOR PRINTER WARMUP AND SELF-TEST

WARMUP

1. See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use
2. AC UTIL PWR – ON
- PGSC 3. ✓OCA Router PGSC pwr – on
✓ProShare PGSC pwr – on
- Printer 4. Printer pwr – on (see fig 12-2)
✓Flashing green pwr light (~5 min)
5. ✓Printer ready
Ready when pwr light is steady green

SELF-TEST

NOTE

After successful test print, terminate SELF-TEST by powering printer OFF

- Printer 1. Printer pwr – off
2. Press and hold Load/Eject button, then press power button
Hold Load/Eject button for 3 sec after depressing power button, then release
3. Observe printing of one black text page and one color text page
4. ✓Print quality
Look for missing sections in Nozzle Check section
5. If print quality not acceptable, go to CLEANING PRINTER HEADS, 12-54
6. If paper jam, go to COLOR PRINTER PAPER JAM, 12-51
7. If printer quality acceptable, Printer pwr – off (to terminate SELF-TEST)
8. Notify MCC: Status of SELF-TEST results

COLOR PRINTER STOW

- Printer
1. Printer pwr – off (press power button once)
✓Printer lt – off
Wait for unit to stop moving. Printer head should be at right side and locked into place
 2. See UTILITY OUTLET PLUG-IN PLAN ORBIT CONFIGURATION (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use

AC UTIL PWR – OFF
 3. Disconnect AC PWR cable from AC Util Pwr outlet, if reqd
 4. Remove paper from Paper Feeder Tray and stow it
- Printer
5. Remove Paper Feeder Tray from Printer (disconnect via thumbscrews)
 6. Remove Paper Output Tray from Printer (disconnect via thumbscrews)
 7. Disconnect AC PWR cable from Printer
 8. If Printer set up as Network Printer:
Disconnect network cable, T-connector from Printer Network Port (see fig 12-2)
If Printer set up as Local Printer:
Disconnect parallel cable between Printer Parallel Port and ProShare PGSC Parallel Port (see fig 12-2)
 9. Stow:
Printer
AC PWR cable (if reqd)
Printer Data cable(s)
Printer paper
Printer Paper Feeder Tray
Paper Output Tray

CHECK COLOR PRINTER SETTINGS

NOTE

Perform following procedure to verify Printer settings on PGSC from which printing is being executed (i.e., settings are not on Printer)

- PGSC
1. Sel 'Start' from Windows taskbar
 2. Sel 'Settings'
 3. Sel 'Printers'
 4. Right-click appropriate printer icon:
Parallel: Local Color Printer
Network: Network Color Printer
 5. Verify 'Set as default' selected (✓)
 6. Sel 'Properties'
 7. Sel 'Main' tab
 8. Verify 'Automatic' selected (●)
 9. Sel 'OK' to exit

COLOR PRINTER PAPER JAM

- Printer
1. Printer pwr – off (press power button once)
 2. ✓Printer It – off
 3. ✓Paper Feeder Tray clear of obstruction
✓Paper Output Tray clear of obstruction
 4. Raise Printer cover (see fig 12-1)
✓Inside of Printer clear from obstruction
 5. If paper jam cleared, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-49, then:
 6. If paper jam continues, **notify MCC**
 7. If reqd, go to COLOR PRINTER STOW, 12-50

INK CARTRIDGE CHANGEOUT

NOTE

Perform if color(black) ink cartridge light illuminated. Changeout of color and black cartridges takes approx 5 min.

If color(black) ink cartridge light flashing, ink is low.

If color(black) ink cartridge light is solid, ink is out

- Printer
1. ✓Printer ready (notice steady green pwr light)
 2. Raise Printer cover (see fig 12-1)

NOTE

Printer will reset if step 4 not performed within 1 min after step 3. If reset experienced, repeat step 3

3. Press and hold "color(black) ink cartridge advance button" (~3 sec) and release. Color(black) ink cartridge will move and become accessible

CAUTION

Do **NOT** squeeze ink cartridges

4. Lift tab on purple cover
Remove color(black) ink cartridge
5. Cover opening on used cartridge with Gray Tape
Stow old cartridge in Ziploc Bag
Place Ziploc in printer locker
6. Unstow new cartridge from sealed pack
Remove small yellow plastic tab on top (Do not remove white tab; reference instructions on cartridge)

Cont next page

- Printer
7. Insert new cartridge (arrow should be pointing toward back of printer)
 8. Lower and latch tab on purple cover
(Do not reopen)
If also changing other cartridge, go to step 3
 9. Lower and close Printer cover
 10. Press Load/Eject button; Printer will perform a cleaning that will last approx 3 min
 11. Go to COLOR PRINTER WARMUP AND SELF-TEST, SELF-TEST, 12-49, to ensure proper operation

CLEANING PRINTER HEADS (Black and/or Color)

NOTE

Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

- Printer
1. ✓Printer pwr – on
 2. ✓Ink cartridge lt – OFF
If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12–52

NOTE

Perform following steps from PGSC connected to Printer via parallel cable or networked to Printer

- PGSC
3. Sel 'Start' from Windows taskbar
 4. Sel 'Settings'
 5. Sel 'Printers'
 6. Right-click appropriate printer icon:
Parallel: Local Color Printer
Network: Network Color Printer
 7. Verify 'Set as default' selected (✓)
 8. Sel 'Properties'
 9. Sel 'Utility' tab
 10. Sel 'Head Cleaning'
Sel 'Next'
 11. Sel 'Black', 'Color', or 'Both'
Sel 'Next'
 12. When cleaning complete (~5 min), sel 'Nozzle Check'
If test still missing sections, repeat steps 10 and 11
 13. If nozzle test nominal, click 'OK' to exit

PRINTER HEAD ALIGNMENT

NOTE

Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

- Printer
1. ✓Printer pwr – on
 2. ✓Ink cartridge lt – off
If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12–52
 3. Verify paper Feeder Tray has at least ten sheets of paper

NOTE

Perform following steps from PGSC connected to Printer via parallel cable or networked to Printer

- PGSC
4. Sel 'Start' from Windows taskbar
Sel 'Settings'
Sel 'Printers'
 5. Right-click appropriate printer icon:
Parallel: Local Color Printer
Network: Network Color Printer
 6. Verify 'Set as default' selected (✓)
Sel 'Properties'
 7. Sel 'Utility' tab
Sel 'Print Head Alignment' button
At 'Printer Head Alignment' dialog box, sel 'Next' button
 8. At second 'Printer Head Alignment' dialog box, sel 'Next' button
 9. Examine printed sheet "A"
If alignment satisfactory, sel 'Cancel' twice to exit
If alignment not satisfactory, follow directions on screen
 10. When alignment complete (~5 min), sel 'OK' to exit

EXECUTE PACKAGE PRINTING

NOTE

Perform following procedure(s) if instructed by MCC. Perform from PGSC connected to Printer via parallel cable or networked to Printer

DOCUMENTS

PGSC Double-click 'Shuttle Apps'>'Color Printer'>'DOCS Printing'

PICTURES

Double-click 'Shuttle Apps'>'Color Printer'>'PICS Printing'

PILOT WITH RHC

NOTE

It is assumed PGSC (with STS load)
has been set up without expansion unit

A. EQUIPMENT SETUP

1. Unstow:
 - PILOT HC
 - PILOT Y-Cable
 - Elastic Strap (1)
 - Tie Wraps (2)
2. Secure elastic strap to Towel Rack and Window Handhold (right or left, to match seat used) with tie wraps

CAUTION

Once secure, pushing buckle will allow it to release, freeing RHC. When pushing buckle lever to release, keep thumb clear from underneath (pinch hazard)

3. Extend (pull) PILOT HC straps and position HC on aft portion of orbiter RHC pedestal. Secure lower strap over pedestal, pull strap taut and pull out firmly on buckle; repeat with upper strap
4. Shut down Windows
5. DC PWR SPLY PWR sw1 – off
6. DC UTIL PWR – OFF (utility outlet for PGSC)
7. If present, disconnect any cable from PGSC RS-232 port and secure
8. Disconnect DC PWR SPLY cable from PGSC pwr port
9. PILOT HC pwr – OFF (down posn)

Cont next page

- | | |
|------------------|--|
| PILOT
Y-Cable | 10. Connect PILOT Y-Cable to PGSC RS-232 port
Connect PILOT Y-Cable to PGSC pwr port
PILOT HC
(See PILOT WITH RHC SETUP DIAGRAM, 12-61) |
| | 11. Connect DC PWR SPLY cable to PILOT HC |

NOTE

Adjust elastic strap so as not to press screen suspend sw (small vertical button by left hinge) or else screen will blank

- | | |
|----------|---|
| PGSC | 12. Position and secure PGSC in front of HUD and behind elastic strap (top of display touching bottom of eyebrow panel). Duct tape can be used as needed to secure PGSC |
| F1 | 13. DC UTIL PWR – ON (utility outlet for PGSC) |
| PWR SPLY | 14. DC PWR SPLY PWR sw1 – ON |

B. PILOT OPERATION WITH RHC

- | | |
|----------|---|
| PGSC | 1. PGSC pwr – on |
| PILOT HC | 2. PILOT HC pwr – ON (up position) |
| PGSC | 3. Double-click 'Shuttle Apps'> 'PILOT w/RHC'
Agree to quit all Windows Apps |
| | 4. Follow instructions for HC calibration (after ~30 sec) |
| | 5. Menu Selection Values:
Modify as desired
'Enter' twice to run simulation |

Cont next page

6. Simulation Begins (~15 sec)
 - 'z' – toggles between instruments and out-the-window displays
 - [space bar] – HUD declutter or if WOW, drag chute deploy
 - 'a' – switch to auto
 - 'c' – switch to CSS (same as HC breakout)
 - 'p' – pause sim, 'p' again resumes
7. Post Simulation
 - [space bar] – cycles through data to main menu
 - 'b' – cycles back through post run data
8. Terminate PILOT
 - Enter 'q' to quit (returns to Windows)

PILOT HC 9. PILOT HC pwr – OFF (down posn)

NOTE

PGSC will function with HC off. If cable config changed, all pwr must be off

C. PILOT DISCONNECT and STOWAGE

- | | |
|---------------|--|
| PILOT HC | 1. Confirm PILOT HC pwr – OFF (down posn) |
| PGSC | 2. Shut down Windows |
| PWR SPLY | 3. DC PWR SPLY PWR sw1 – OFF |
| F1 | 4. DC UTIL PWR – OFF (utility outlet for PGSC) |
| PILOT Y-Cable | 5. Disconnect cables from PGSC and HC (remove PGSC from behind elastic if necessary) |

CAUTION

When pushing buckle lever to release, keep thumb clear from underneath (pinch hazard)

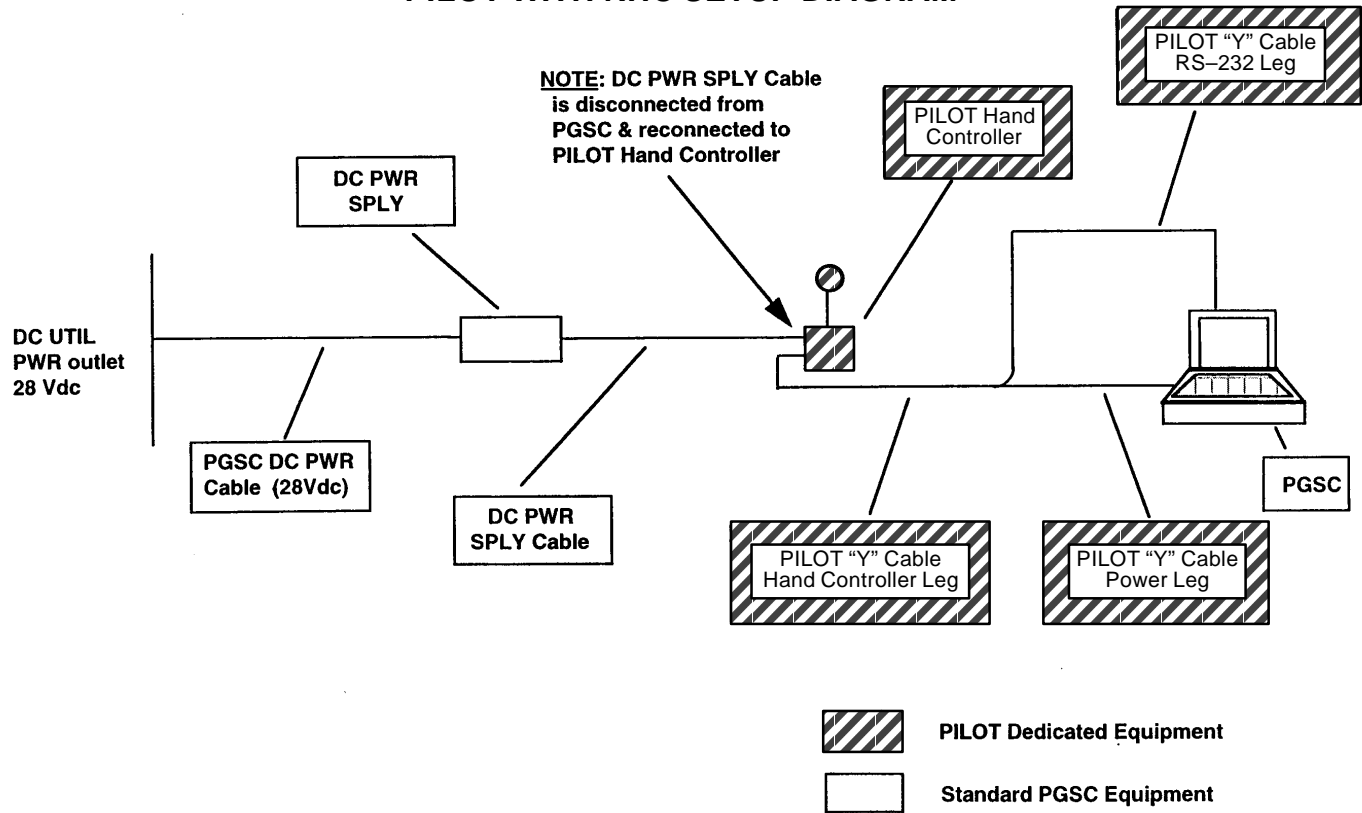
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- PILOT HC
 - 6. Unsecure HC, press buckle on top strap, loosen strap, repeat for bottom strap
 - 7. Stow PILOT HC and Y-Cable in original locker
 - 8. Cut loose tie wraps and elastic strap from window and secure after final on-orbit PILOT session
- PGSC
 - 9. Reconfigure PGSC as desired

D. TROUBLESHOOTING

- 1. If HC appears to have bias, calibrate HC at main menu – enter 'c', follow onscreen instructions
- 2. If DOS prompt appears (sometimes after bad sim crash), enter 'win' to restart Windows
- 3. If program hangs:
 - Enter [CTRL]/[C] to get to DOS prompt, once at prompt, restart Windows (step 2), restart PILOT normally
 - If [CTRL]/[C] does not work, force Windows restart with [CTRL]/[ALT]/[DELETE] simo

PILOT WITH RHC SETUP DIAGRAM



12-61

ORB OPS/ALL/GEN H

PILOT WITHOUT RHC

NOTE

No PILOT equipment reqd,
only PGSC with STS load

- PGSC A. PILOT OPERATION WITHOUT RHC
1. Double-click 'Shuttle Apps' > 'PILOT w/out RHC'
Agree to quit all Windows Apps

2. Menu Selection Values:

NOTE

Sim must be in 'auto' to keep from crashing:
Sel 'Auto' at startup (item 7)
Otherwise, modify as desired
'Enter' twice to run simulation

3. Simulation Begins (~15 sec)
 - 'z' – toggles between instruments and out-the-window displays
 - [space bar] – HUD declutter or if WOW, drag chute deploy
 - 'p' – pause sim, 'p' again resumes
4. Post Simulation
 - [space bar] – cycles thru data to main menu
 - 'b' – cycles back thru post run data
5. Terminate PILOT
Enter 'q' to quit (returns to Windows)

B. TROUBLESHOOTING

1. If DOS prompt appears (sometimes after bad sim crash), enter 'win' to restart Windows

Cont next page

2. If program hangs:
Enter [CTRL]/[C] to get to DOS prompt,
once at prompt, restart Windows
(step 1), restart PILOT normally
If [CTRL]/[C] does not work, force
Windows restart with
[CTRL]/[ALT]/[DELETE] simo

UPDATING SpOC APPLICATIONS USING OCA DATA DISKETTE (ODD)

NOTE

Procedure assumes KFX application run from ProShare PGSC during OCA ops. Crew not reqd to perform following procedure for PGSC(s) networked to OCA Router PGSC during OCA ops.

MCC ground personnel automatically update SpOC applications on PGSC(s) on STS network during OCA ops

- PGSC
1. If OCA Data Diskette (ODD) was not in ProShare PGSC floppy drive during OCA ops:
Retrieve ODD from FDF
Insert ODD into ProShare PGSC floppy drive
Copy all files under
C:\OCA-UP\SPOC\UPLINK to A:\UPLINK
 2. Insert ODD into PGSC requiring updates to SpOC applications
 3. Double-click 'Shuttle Apps' > 'Floppy Update'
 4. At 'Floppy Update' dialog box, sel 'OK'
 5. At 'Floppy Update Status' dialog box, verify no errors generated
If errors generated, contact MCC >>
 6. If asked to view complete update status:
Sel 'Yes' or 'No'
Go to step 7

Sel 'OK'
 7. Remove ODD, repeat steps 2 thru 6 for other PGSCs as needed
 8. Reinsert ODD into ProShare PGSC floppy drive

PCANYWHERE ACT/DEACT

NOTE


Procedure assumes both PGSCs
powered and connected via network

ON HOST PGSC (PGSC SENDING DISPLAY)

- PGSC 1. Double-click 'Shuttle Apps'>'pcANYWHERE'
- ✓'Be A Host PC' box is selected
- Double-click 'NETWORK' icon in pcANYWHERE window

ON REMOTE PGSC (PGSC RECEIVING DISPLAY)

2. Double-click 'Shuttle Apps'>'pcANYWHERE'
- Sel 'Remote Control' box
- Double-click 'NETWORK' icon in pcANYWHERE window
- After 'pcANYWHERE waiting' dialog box appears, double-click host PGSC name to establish connection
- After approx 10 sec, verify window appears showing image of host PGSC display

To maximize to full screen, sel  button on title bar

To cancel full screen, press [ALT]/[ENTER]

- ✓'Execute Locally' is selected and sel 'OK'

EXIT APPLICATION ON HOST PGSC

3. Right-click 'pcANYWHERE' on bottom taskbar
- Sel 'pcANYWHERE'>'End Session'
 - Right-click 'pcANYWHERE' on bottom task bar
 - Sel 'Close'
 - Sel 'Exit' box in pcANYWHERE window

EXIT APPLICATION ON REMOTE PGSC

4. After exiting application on host PGSC, sel 'Exit' box in pcANYWHERE window

PGSC HARD DISK SWAP

- PGSC
1. If running Windows NT (OCA Router s/w) on OCA Router PGSC:
Press [CNTL]/[ALT]/[DEL]
Sel 'Shut Down' at 'Logon Information' dialog box
Sel 'OK'
When prompted:
PGSC pwr – off
Go to step 3
 2. Shut down Windows
✓Automatic power off of PGSC
 3. Open PGSC monitor to 180°
Slide two side latches back and hold latches in back position
Open Keyboard

CAUTION

Some components under Keyboard contain sharp edges

4. Remove hard disk (right component):
Pull plastic tape to expose hard disk drive handle
Slide thumbs under handle
Lift to remove
5. Insert new hard disk:
Press only on shaded area until it snaps into connector
Push hard disk drive handle under lip
Stow old hard disk drive in carrying case
6. Close keyboard
7. PGSC pwr – on
8. If PGSC intended for use on STS network, go to PGSC NETWORK – D. PGSC Naming, 12–34

PGSC SWAP ON EXPANSION UNIT

- PGSC1
1. Shut down Windows
✓Automatic pwr off of PGSC
 2. Close PGSC monitor
 3. Firmly turn security key to 'eject' position until PGSC slides away from Expansion Unit
 4. Remove, stow PGSC
- PGSC2
5. ✓Sliding door of PGSC Sys Expansion connector – op
 6. Slide PGSC onto Expansion Unit
 7. Push PGSC back, connecting PGSC Sys Expansion connector to Expansion Unit connector
 8. ✓Connection secure
 9. Security key – locked
 10. PGSC pwr – on

PGSC DEACT

- PGSC
1. ✓ Floppy disk drive – empty
Stow floppy disk(s) in originating locker
 2. If running Windows NT (OCA Router s/w) on
OCA Router PGSC:
Press [CNTL]/[ALT]/[DEL]
Sel 'Shut Down' at 'Logon Information'
dialog box
Sel 'OK'
When prompted:
PGSC pwr – off
Go to step 6
 3. Close any running applications
Shut down Windows
- ✓ Automatic power off of PGSC
If no Expansion Unit attached:
- PWR SPLY
4. DC PWR SPLY PWR sw1 – OFF
(It off)
- F1
(MO13Q,
A11,A15,
MO30F,
O19, L12,
MO52J,
ML85E)
- If Expansion Unit attached:
- F1
6. AC UTIL PWR – OFF
(MO13Q,
A15,MO52J,
ML85E)
7. Disconnect cables
 8. Stow PGSC assembly, PGSC accessories

WINDOWS KEYBOARD REF

NOTE

Simo key combinations linked by slash marks.
Sequential key combinations linked by commas

WINDOWS DESKTOP

Shut down Windows	[CTRL]/[ESC], [↑], [ENTER]
Sel and open desktop icon	[CTRL]/[ESC], [ESC], [TAB], [TAB], [Arrow keys], [ENTER]
Program item icons contained in folder:	
Sel program item icon	[Arrow keys]
Start program	Sel program item, [ENTER]

WINDOWS EXPLORER

Sel previous/next directory or subdirectory	[↑] or [↓]
Page forward/backward	[PG DN] or [PG UP]
Sel root directory	[HOME]
Sel last directory	[END]
Expand current selection (if in left pane and not expanded)	[→]
Collapse current selection (if in left pane and expanded)	[←]
Toggle between panes	[TAB] or [F6]
Refresh screen	[F5]

Cont next page

FILE MANIPULATION IN WINDOWS EXPLORER

Sel adjacent files	[SHIFT]/[Up or down arrow keys]
Sel nonadjacent files	[CTRL]/[Up or down arrow keys to move to desired file], [spacebar], repeat as needed
Sel all items	[CTRL]/[A]
Move sel files or dir	[CTRL]/[X], sel drive/dir to move files/dir to, [CTRL]/[V]
Copy sel files or dir	[CTRL]/[C], sel drive/dir to copy files/dir to, [CTRL]/[V]

OPERATING PROGRAMS IN WINDOWS: STARTING, QUITTING, AND SWITCHING BETWEEN PROGRAMS

Start Windows or DOS program	Sel icon on Windows desktop, [ENTER]
Cycle between open applications	[ALT]/[TAB] or [ALT]/[ESC] (sel applications in forward direction) or [SHIFT]/[ALT]/[ESC] (sel applications in reverse direction)
Display Task List Dialog Box	[CTRL]/[ALT]/[DELETE]
Cycle between selections in Dialog Box	[TAB] (forward dir) or [SHIFT]/[TAB] (reverse dir)
Cancel menu currently displayed	[ESC]
Quit active application	[ALT]/[F4] or [ALT], [spacebar], [C] or [ALT], [F], [X]

Cont next page

SIZING, CLOSING, AND MOVING WINDOWS

NOTE

Maximized window cannot be resized;
use Restore to config window for resizing

Restore window from maximized configuration	[ALT], [spacebar], [R]
Resize active program window	[ALT], [spacebar], [S], [press arrow keys to adjust window size], [ENTER]

NOTE

Document window is working area window
inside applications main window

Resize document window	[ALT], [S], [press arrow keys to adjust window size], [ENTER]
Close window	[ALT], [spacebar], [C]
Close document window	[ALT], [C]
Move window	[ALT], [spacebar], [M], [use arrow keys to move window to desired location], [ENTER]
Move document window	[ALT], [M], [use arrow keys to move window to desired location], [ENTER]
Minimize program or document window to icon	[ALT], [spacebar], [N]
Maximize program or document window to full screen	[ALT], [spacebar], [X]

Cont next page

PROGRAM CURRENTLY RUNNING

Sel menu and perform task	[ALT], [underlined menu letter], [underlined task letter]
Move between areas (lists, buttons, etc) in Dialog Box	[TAB] or [SHIFT]/[TAB] or [ALT]/[underlined letter]
Sel pulldown list within Dialog Box	[ALT]/[underlined letter]
Cancel pulldown list	[ESC]
Cancel menu sel	[ESC]

CLIPBOARD FUNCTIONS

Copy displayed image to Clipboard	[CTRL]/[C]
Cut image to Clipboard	[CTRL]/[X]
Paste object from Clipboard to document, spreadsheet, etc	[CTRL]/[V]

GETTING HELP

Get Help	[F1] or [ALT], [H]
----------	--------------------

WORLD MAP KEYBOARD REF

NOTE

Simo key combinations linked by slash marks.
Sequential key combinations linked by commas

Help Index	[F1]
Zoom in	[CTRL]/[I], [+], or [PG UP]
Zoom out	[CTRL]/[O], [-], or [PG DN]
Toggle click and drag zoom on/off	[CTRL]/[F12]
Zoom on point clicked	Right click, sel zoom option
Toggle night colors on/off	[CTRL]/[N]
Restore nadir zoom from point zoom	[ESC]
Identify point on map	Left double-click
Toggle previous/next longitude of ascending node (LAN)	[CTRL]/[L]
Exit application	[ALT]/[F4]

GRAFTRAK KEYBOARD REF

NOTE

Simo key combinations linked by slash marks

Toggle zoom and auto zoom	[CTRL]/[Z]
Exit other modes and return to track mode	[T]
Cycle thru three available zoom factors	[Z]
Observer selection menu	[O]
Enter epoch mode to set display to any past or future time	[E]
Return display to current date and time	[ESC]
Quit (exit program)	[Q]
Display help screens (full command list)	[H]
Display 3-D perspective view of Earth as seen from shuttle	[3]
Next observer	[ALT]/[N]
Previous observer	[ALT]/[P]
Change screen colors	[C]
Start/stop clock (freeze/unfreeze display)	[G]
Move time cursor one digit left	[←]
Move time cursor one digit right	[→]
Step date/time cursor digit up by one	[+]
Step date/time cursor digit down by one	[-]
Step time forward one orbit	[PG UP]
Step time backward one orbit	[PG DN]
Search forward to next zero elevation	[↑]
Search backward to last zero elevation	[↓]
Step forward to next TCA	[HOME]
Step backward to previous TCA	[END]
Enter fixed map mode. (Map remains centered on input longitude)	[L]
Alternate satellite selection (shows Mir range circle)	[ALT]/[S]
Enter auto switchover observer mode	[F1]
Calculate next AOS time for all observers in data file	[F2]
Find next AOS for selected observer	[/]
Change default shutter speed and ASA	[ALT]/[C]
Input launch date and time for MET display	[ALT]/[M]

STARS KEYBOARD REF

NOTE

Simo key combinations linked by slash marks

	<u>Run-time Keys</u>
Mnvr at discrete step size or continuous rate	[Arrow keys]
In combination with above to move at greater rate	[SHIFT] or [CTRL]
Terminate continuous mnvr; or, if in cursor mode, recenter cursor. If on menu page, sends user to view selected	[ESC]
Zoom in by 10% (smaller FOV)	[+] or [=]
Zoom out by 10% (larger FOV)	[-] or [_]
Sel star from star table for mnvr. Set inertial hold	[F1]
Sel a specific RA, DEC, and roll. Set inertial hold	[SHIFT]/[F1]
Sel UNIV PTG display	[F2]
Toggle between 'Cursor Mode' and 'Maneuver Mode'. In 'Cursor Mode' arrow keys move cursor/LOS. In 'Maneuver Mode' whole FOV moves	[F3]
Decr discrete step size, for cursor/LOS movement, to a min of 0.1 deg/sec	[SHIFT]/[F3]
Incr discrete step size, for cursor/LOS movement, to max of 100 deg	[CTRL]/[F3]
Decr mnvr rate, to min of 0.1 deg/sec	[SHIFT]/[F4]
Incr mnvr rate, to max of 8 deg/sec	[CTRL]/[F4]
Sel VIEW/FOV display	[F5]
Sel sequentially available vehicle modes: +X COAS, -Z COAS/STRK, W1/-Y STRK, CAMR D, Hercules, and User Select	[SHIFT]/[F5]

Cont next page

NOTE

If CAMR D sel, using [F1] or [SHIFT]/[F1] while LVLH hold sel will cause camera angles to change to track object while orbiter maintains LVLH hold

Sel VIEW/FOV page	[F6]
Sel sequentially available FOVs:	[SHIFT]/[F6]
30 x 23	
40 x 30	
50 x 38	
64 x 48	
80 x 60	
175 x 131	
Cycle backward through available FOVs, see above	[CTRL]/[F6]
Sel TIME/SV page	[F8]
Step GMT forward 5 min/step	[SHIFT]/[F8]
Return to current GMT from previous offset	[CTRL]/[F8]
“ETC....” menu page. Includes:	[F9]
a. Map detail control	
b. Star magnitude control	
c. Star size control	
d. Display screen aspect ratio	
Allow resizing displayed image to account for monitor variations	[SHIFT]/[F9]
Exit program	[SHIFT]/[F10]
If printer enabled, print hard copy 'P' enables printer for hard copies	[CTRL]/[F1]

POC STATE VECTOR PADS

L/O _____
 YEAR DAY HOUR MIN SEC

SET STATE VECTOR

OPS 2: OPS 3:
 SPEC 34 GNC 0 GPC MEMORY
 ITEM 26 +2 1 0 EXEC

X	BE40	VX	BE4C
Y	BE44	VY	BE50
Z	BE48	VZ	BE54

S/V _____ / _____ : _____ : _____
 DAY HR MIN SEC

X() _____ . _____
 Y() _____ . _____
 Z() _____ . _____
 VX() _____ . _____
 VY() _____ . _____
 VZ() _____ . _____

S/V _____ / _____ : _____ : _____
 DAY HR MIN SEC

X() _____ . _____
 Y() _____ . _____
 Z() _____ . _____
 VX() _____ . _____
 VY() _____ . _____
 VZ() _____ . _____

S/V _____ / _____ : _____ : _____
 DAY HR MIN SEC

X() _____ . _____
 Y() _____ . _____
 Z() _____ . _____
 VX() _____ . _____
 VY() _____ . _____
 VZ() _____ . _____

S/V _____ / _____ : _____ : _____
 DAY HR MIN SEC

X() _____ . _____
 Y() _____ . _____
 Z() _____ . _____
 VX() _____ . _____
 VY() _____ . _____
 VZ() _____ . _____

S/V _____ / _____ : _____ : _____
 DAY HR MIN SEC

X() _____ . _____
 Y() _____ . _____
 Z() _____ . _____
 VX() _____ . _____
 VY() _____ . _____
 VZ() _____ . _____

RELOAD STS PGSC

- PGSC
1. PGSC pwr – on (while holding [F1] key down)
 2. Sel 'Config' at Easy–setup main menu
 3. Sel 'Initialize'
 4. Sel 'OK' to initialize system settings
 5. Sel 'Exit'
 6. Insert 'AutoXD Configurator' disk in floppy drive
 7. Click 'Restart' on easy setup window
 8. Sel 'OK'
 9. Allow timeout prompts to proceed with defaults
 10. Verify that AutoXD reported no errors during config process (config completed successfully)
 11. After config process complete, remove disk from floppy drive
 12. PGSC pwr – off
 13. Insert bootable PGSC Software Reload Diskette into floppy drive
 14. PGSC pwr – on
 15. When prompted, sel 'Y' to overwrite hard drive
 16. Insert CD when prompted
 17. When light stops blinking, press any key to continue (software recovery program now loading)
 18. After hard drive updated, remove PGSC Software Reload Diskette and remove CD
 19. Press 'Ctrl–Alt–Del' to reboot PGSC

COMPOUND SPECIFIC ANALYZER – COMBUSTION
PRODUCTS (CSA-CP)

COMPOUND SPECIFIC ANALYZER –
COMBUSTION PRODUCTS CHECKOUT
AND ZERO CALIBRATION OPS 13-2
PASSIVE SAMPLING WITH DATA LOGGING 13-5
ACTIVE SAMPLING WITH PUMP AND DATA
LOGGING 13-7
CSA-CP BATTERY CHANGEOUT 13-9
SAMPLING PUMP BATTERY CHANGEOUT 13-11
ZERO CALIBRATION 13-12
DATA LOGGER ACTIVATION/DEACTIVATION ... 13-15
ALARM DISABLE/ENABLE 13-16
DATA RECORDING TABLE 13-17

CSA-CP

**COMPOUND SPECIFIC ANALYZER – COMBUSTION
PRODUCTS CHECKOUT AND ZERO CALIBRATION OPS**

NOTE

Function of Zero calibration filter is to remove all target gases (if present) in air stream so that sensors can be rezeroed. Capacity to remove target gases is severely reduced if tethered filter caps are not immediately replaced and tightened after use

- _____ 1. Unstow:
CSA-CP Kit
- CSA-CP 2. Unstow:
Kit CSA-CP/Sampling Pump
Zero Filter
3. Sampling Pump sw – ON

NOTE

MODE pb (black) located between two red alarm lights.

Audible beeps occur when MODE pb depressed during unit activation

4. Activate CSA-CP
Press, hold MODE pb until 'RELEASE' displayed

NOTE

Wait approx 1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

5. ✓ Display indicates readings for O₂, HCN, HCL, CO and record values in Data Recording Table, 13-15

CSA-CP

Cont next page

6. Sampling Pump sw OFF
7. If any reading higher than listed values below, proceed to step 8 for sensor rezeroing
CO \leq 4 ppm
HCL \leq 0.4 ppm
HCN \leq 0.4 ppm
If readings less than or equal to listed values, go to step 22
8. Unscrew, remove Sampling Pump Inlet (blue) Filter; temp stow
9. Unscrew tethered end caps on Zero Filter

NOTE

Pump inlet fitting has outside
and inside threads

10. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug
Arrow on Zero Filter should point toward Sampling Pump
11. Sampling Pump sw – ON
12. After 2 min, press MODE pb (11 times) until 'GO CAL' displayed at top
13. Press "E" button,
✓'SET SPAN' displayed at top
14. Press "+" button,
✓'ZERO' displayed at top
15. Press "E" button, verify 'ZEROING' displayed, wait 15 sec
✓'ZERO' displayed at top

Cont next page

16. Press MODE pb once
After 15 sec, verify nominal display
(gas concentrations)
17. ✓ Display readings for CO, HCN, HCL less than
or equal to values below
If readings higher than values below, notify MCC
CO ≤ 4 ppm
HCL ≤ 0.4 ppm
HCN ≤ 0.4 ppm
18. Sampling Pump sw – OFF
19. Remove Zero Filter from Sampling Pump inlet.
Replace tethered endcaps and tighten
finger tight
- CSA-CP Kit 20. Stow Zero Filter

NOTE

Damage to O-ring can occur if overtightened

21. Replace Sampling Pump Inlet Filter and tighten
until snug

NOTE

CSA-CP can be used in active sampling
mode using pump or in passive mode
without pump. Use of pump provides faster
response times for some contaminants.

Audible beeps occur when MODE pb
depressed during unit activation

22. Deactivate CSA-CP
Press, hold 'MODE' pb until 'RELEASE'
displayed
- _____ 23. Temp stow:
CSA-CP/Sampling Pump at crew discretion
location. Call MCC with location
- _____ 24. Stow CSA-CP Kit

PASSIVE SAMPLING WITH DATA LOGGING

1. Unstow:
CSA-CP Kit
- CSA-CP 2. Unstow:
Kit CSA-CP/Sampling Pump
3. Demate CSA-CP ← | → Sampling Pump
- CSA-CP 4. Stow:
Kit Sampling Pump

NOTE

Audible beeps occur when MODE pb depressed during unit activation

5. Press, hold MODE pb until 'RELEASE' displayed

NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

6. ✓ Display indicates readings for O₂, CO, HCN, HCL

NOTE

When activated, there is an audible beep, fault LED illuminates momentarily, and power LED stays illuminated

7. Transfer CSA-CP to desired location

NOTE

After activating/deactivating logger, nominal display (gas concentrations) returns in ~10 sec

Cont next page

8. Press MODE pb (9 times) until 'LOG OFF' or 'LOG ON' displayed
If reqd, press "+" button to reset data logger to 'LOG ON' displayed
✓'LOG ON' displayed
Notify MCC to discuss sampling plan
9. Conduct sampling session
10. Record value
Notify MCC of results
11. Press, hold MODE pb until 'RELEASE' displayed
✓Unit off

CSA-CP12. Unstow:
Kit Sampling Pump

NOTE

CSA-CP should be oriented with display visible when facing front panel of sampling pump

13. CSA-CP ← | → Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

CSA-CP14. Stow:
Kit CSA-CP/Sampling Pump

_____ 15. Stow:
CSA-CP Kit

ACTIVE SAMPLING WITH PUMP AND DATA LOGGING

_____ 1. Unstow:
CSA-CP Kit

CSA-CP 2. Unstow:
Kit CSA-CP/Sampling Pump

NOTE

Audible beeps occur when MODE pb depressed during unit activation

3. Press, hold MODE pb until 'RELEASE' displayed

NOTE

Wait approx 1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

4. ✓ Display indicates readings for O₂, CO, HCN, HCL

NOTE

When activated, there is an audible beep, fault LED illuminates momentarily, and power LED stays illuminated

5. Sampling Pump switch ON

6. Transfer active sampling assembly to desired location

NOTE

After activating/deactivating logger, nominal display (gas concentrations) returns in approx 10 sec

Cont next page

7. Press MODE pb (9 times) until 'Log OFF' or 'LOG ON' displayed
If reqd, press "+" button to reset data logger to 'LOG ON'
✓'LOG ON' displayed
Notify MCC to discuss sampling plan
8. Conduct active sampling session
Record values
Notify MCC of results
9. At end of active sampling, press, hold MODE pb until 'RELEASE' displayed
✓Unit off
10. Sampling Pump switch off
- CSA-CP11. Stow:
Kit CSA-CP/Sampling Pump
- _____ 12. Stow:
CSA-CP Kit

CSA-CP BATTERY CHANGEOUT

1. If CSA-CP/Sampling Pump active:
Sampling Pump switch OFF
Press, hold MODE pb until 'RELEASE'
displayed
✓CSA-CP off
If not active, go to step 3
2. CSA-CP ← | → Sampling Pump
- CSA-CP 3. Unstow:
Kit Batt Pack, marker
4. Replace battery, turn fasteners (two) on back panel 1/4 turn ccw; temp stow panel

NOTE

Stored data maintained for a maximum of 30 min without battery installed. All data lost if battery installation delayed more than 30 min

5. Grasp Batt Pack pull tab, remove pack
6. Mark Batt Pack "DISCHARGED" with marker
- CSA-CP 7. Stow:
Kit Used Batt Pack
8. Install replacement Batt pack, press firmly to seat electrodes
9. Replace Panel, press firmly, turn fasteners (two) 1/4 turn cw to lock

NOTE

CSA-CP should be oriented with display visible when facing front panel of sampling pump

10. CSA-CP → | ← Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps

Cont next page

11. If contingency, activate CSA-CP/Sampling Pump:
Press, hold MODE pb until 'RELEASE' displayed
✓ CSA-CP on
Sampling Pump sw ON
- CSA-CP Kit
- If not contingency, stow CSA-CP/Sampling Pump

12. Stow:
CSA-CP Kit

SAMPLING PUMP BATTERY CHANGEOUT

- IFM Kit 1. Unstow:
Small Flathead Screwdriver
Marker
- CSA-CP Kit 2. Unstow:
Spare Batt Pack
3. Turn screw on back panel ccw 3 to 4 turns
 4. Remove panel
Temp stow
 5. Grasp Batt Pack pull tab, remove Batt Pack
 6. Mark Batt Pack "DISCHARGED" with marker
 7. Install replacement Batt Pack, press firmly to seat electrodes
 8. Replace cover plate, turn screw cw until tight
- IFM Kit 9. Stow:
Screwdriver
- CSA-CP Kit 10. Stow:
Used Batt Pack

ZERO CALIBRATION

NOTE

Function of zero calibration filter is to remove all target gases (if present) in the air stream so that sensors can be rezeroed. Capacity to remove target gases is severely reduced if tethered filter caps are not immediately replaced and tightened after use

1. Unstow:
CSA-CP Kit
- CSA-CP 2. Unstow:
Kit CSA-CP/Sampling Pump
Zero Filter

NOTE

Audible beeps occur when MODE pb depressed during unit activation

3. Press, hold MODE pb until 'RELEASE' displayed

NOTE

Wait approx 1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

4. ✓ Display indicates readings for O₂, HCN, HCL, CO
5. Unscrew, remove Sampling Pump Inlet (blue) Filter
Temp stow
6. Unscrew tethered end caps on Zero Filter

NOTE

Pump inlet fitting has outside and inside threads

Cont next page

13-12

ORB OPS/ALL/GEN H

7. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug
Arrow on Zero Filter should point toward Sampling Pump
8. Sampling Pump sw ON
9. After 2 min, press MODE pb (11 times) until 'GO CAL' is displayed at top
10. Press "E" button
✓'SET SPAN' displayed at top
11. Press "+" button,
✓'ZERO' displayed at top
12. Press "E" button, verify 'ZEROING displayed,
wait 15 sec
✓'ZERO' displayed at top
13. Press MODE pb once
After 15 sec, verify nominal display (gas concentrations)
14. Sampling Pump sw OFF
15. Remove Zero Filter from Sampling Pump inlet.
Replace tethered endcaps and tighten finger tight

NOTE

Damage to O-ring can occur if overtightened

16. Replace Sampling Pump Inlet Filter and tighten until snug

NOTE

CSA-CP can be used in active sampling mode using pump or in passive mode without pump. Use of pump provides faster response times for some contaminants

Cont next page

17. If passive operation of the CSA-CP is desired, then:
| CSA-CP ← | → Sampling Pump
If active sampling desired, use as configured

CSA-CP18. Stow:
Kit Zero Filter
 Sampling Pump (for passive operation)
Notify MCC

19. Transfer CSA-CP to desired location for
sampling session

DATA LOGGER ACTIVATION/DEACTIVATION

NOTE

After activating/deactivating Data Logger,
nominal display (gas concentrations)
returns in approx 10 sec

- CSA-CP 1. Press MODE pb (9 times) until 'LOG OFF'
(for activation) or 'LOG ON' (for deactivation)
displayed
2. Press "+" button to activate or deactivate Data
Logger
✓'LOG ON' or 'LOG OFF' displayed, as desired

ALARM DISABLE/ENABLE

NOTE

Disabling CSA–CP alarm function removes audio and visual annunciation (flashing red lights) if target gas thresholds are exceeded. However, any target gas concentration(s) above preset threshold(s) continue to be indicated by blinking display

1. Notify MCC prior to disabling alarm function

NOTE

Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until 'RELEASE' displayed

NOTE

Wait ~1 min while unit runs self–check routine. A single beep occurs when self–check routine complete

3. ✓ Display indicates readings for OXYGEN, HCN, HCL, CO

NOTE

Operating mode reverts to nominal display after 10 sec

4. Press MODE pb (10 times) until 'MUTE' or 'UNMUTE' is displayed
5. Press "+" button to disable/enable alarms, as desired
✓ Display indicates alarm enabled/disabled

DATA RECORDING TABLE

MET	LOCATION	DATA READINGS	REMARKS
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	
/:--		1. O2 _____ 2. CO _____ 3. HCN _____ 4. HCL _____	

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SHUTTLE AUDIO DOSIMETER

ACTIVATION	14-2
SOUND LEVEL METER (SLM) MODE	14-2
Lavg/Leq MODE	14-3
DEACTIVATION	14-4

**SHUTTLE
AUD DOS**

ACTIVATION

- VOL 3B
1. Unstow:
Audio Dosimeter
 2. Slide front panel up ~1 inch on audio dosimeter
 3. O/I sw → I (on)

NOTE

Front panel LED will light for ~10 sec while circuits test battery, then flash at intervals of ~2 sec to show circuits functioning

4. ✓ 'BATT OK' appears in top left of display and does not blink after ~10 sec
✓ '0:00 time' appears on display

SOUND LEVEL METER (SLM) MODE

1. Depress and release front black pb until 'SLM dB' appears on display

NOTE

Do not read SLM dB data when talking. This may interfere with real-time decibel measurement.

An 'OFL' (memory overflow) msg may appear momentarily on display if dosimeter measures sound ≥ 99 dB. Ignore msg and continue measurements

2. Hold mic in front of desired location for ~10 sec to take measurement
3. Record:
SLM dB _____ dB
Location _____
MET Time ____/____:____:____
4. Call down recorded data to MCC

Lavg/Leq MODE

1. Depress and release front black pb until 'Lavg/Leq' appears on display
 2.

For Crew Worn:	For Static Deployment:
Attach dosimeter to belt	Place dosimeter in specified location
Run mic underneath shirt	Slide front panel down to cover display
Attach mic to collar as close to ear as possible	Attach mic ~60 cm (2 ft) away from dosimeter
 3. Record:
Deployed Location: _____
MET Start Time ____/____:____:____
- NOTE**
- An 'OFL' (memory overflow) msg may appear momentarily on display if dosimeter measures sound ≥ 99 dB or if dosimeter has been on ≥ 20 hr. Ignore msg and continue measurements
4. Retrieve dosimeter from location or crewmember after specified time (~24 hr) of deployment expired
 5. Record:
MET Stop Time ____/____:____:____
Lavg/Leq _____ dBA
 6. Call down recorded location, MET Start and Stop Time, and Lavg/Leq dBA to MCC

DEACTIVATION

1. Slide front panel up, if not already up
2. O/I sw → O (off)
3. Slide front panel down
- VOL 3B 4. Stow dosimeter

CUE CARD
CONFIG

CUE CARD CONFIGURATION

FAB USE ONLY

15-1

ORB OPS/ALL/GEN H

CUE CARD
CONFIG

TOP

WCCS COMM PLAN

CREW/CHNL	WALL UNIT	A/G1	A/G2	A/A	ICOM A	ICOM B
_____/A1 _____/A2	A	_____	_____	_____	_____	_____
_____/B1 _____/B2	B	_____	_____	_____	_____	_____
_____/C1 _____/C2	C	_____	_____	_____	_____	_____
_____/D1 _____/D2	D	_____	_____	_____	_____	_____
_____/E1 _____/E2	E	_____	_____	_____	_____	_____

ORB OPS-1a/O/A

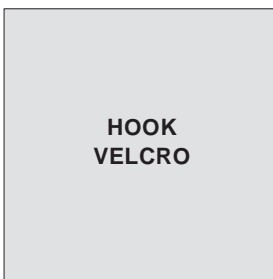
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FAB USE ONLY

CC 15-2

ORB OPS/ALL/GEN H

TOP
BACK OF 'WCCS COMM PLAN'



ORB OPS-1b/O/A

FAB USE ONLY

(reduced copy)
CC A15-3

MEDS
ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

HOOK
VELCRO

NO	GNC SPEC	OPS		NO	SM OPS 2		
		2	8		SPEC	NO	SPEC
43	CONTROLLERS		X	88	APU/ENVIRON THERM	97	PL RETENTION
20	DAP CONFIG	X		86	APU/HYD	89	PRPLT THERMAL
1	DPS UTILITY	X	X	76	COMMUNICATIONS	60	SM TABLE MAINT
6	GPC/BUS STATUS	X	X	68	CRYO SYSTEM	2	TIME
0	GPC MEMORY	X	X	8	CRYO PALLET		
21	IMU ALIGN	X		1	DPS UTILITY		
45	NWS		X	67	ELECTRIC		
34	ORBIT TGT	X		66	ENVIRONMENT		
23	RCS	X	X	77	EVA - MMU/FSS		
33	REL NAV	X		69	FUEL CELLS		
41	RGA/ADTA/RCS		X	6	GPC/BUS STATUS		
25	RM ORBIT	X		0	GPC MEMORY		
40	SENSOR TEST		X	87	HYD THERMAL		
22	S TRK/COAS CNTL	X		85	MASS MEMORY R/W		
44	SWITCHES		X	62	PCMMU/PL COMM		
42	SWITCH/SURF		X	94	PDRS CONTROL		
2	TIME	X	X	95	PDRS OVERRIDE		
55	GPS STATUS	X	X	96	PDRS STATUS		
ORBIT SPEC (R11)				900-902	TEXT SPEC INDEX		MEDS

ORB OPS-2a/MEDS/O/F

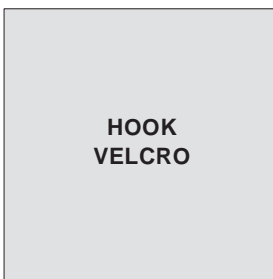
FAB USE ONLY

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CC A15-4

ORB OPS/MEDS/GEN H

MEDS

TOP
BACK OF 'WCCS COMM PLAN'



ORB OPS-1b/O/A

FAB USE ONLY

(reduced copy)
CC B15-3

NOM
ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

HOOK
VELCRO

NO	GNC SPEC	OPS		NO	SM OPS 2		
		2	8		SPEC	NO	SPEC
43	CONTROLLERS		X	88	APU/ENVIRON THERM	97	PL RETENTION
20	DAP CONFIG	X		86	APU/HYD	89	PRPLT THERMAL
1	DPS UTILITY	X	X	76	COMMUNICATIONS	60	SM TABLE MAINT
6	GPC/BUS STATUS	X	X	68	CRYO SYSTEM	2	TIME
0	GPC MEMORY	X	X	8	CRYO PALLET		
21	IMU ALIGN	X		1	DPS UTILITY		
45	NWS		X	67	ELECTRIC		
34	ORBIT TGT	X		66	ENVIRONMENT		
23	RCS	X	X	77	EVA - MMU/FSS		
33	REL NAV	X		69	FUEL CELLS		
41	RGA/ADTA/RCS		X	6	GPC/BUS STATUS		
25	RM ORBIT	X		0	GPC MEMORY		
40	SENSOR TEST		X	87	HYD THERMAL		
22	S TRK/COAS CNTL	X		85	MASS MEMORY R/W		
44	SWITCHES		X	62	PCMMU/PL COMM		
42	SWITCH/SURF		X	94	PDRS CONTROL		
2	TIME	X	X	95	PDRS OVERRIDE		
				96	PDRS STATUS		
ORBIT SPEC (R11)				900-902	TEXT SPEC INDEX		NOM

ORB OPS-35a/NOM/O/A

FAB USE ONLY

(reduced copy)
CC B15-4

ORB OPS/NOM/GEN H

NOM

FAB USE ONLY

(reduced copy)

ORB OPS/ALL/GEN H

TOP
BACK OF 'ORBIT SPEC (R11)'

PRIMARY C/W PARAMETER MATRIX

ORB OPS-2b/O/B

HOOK VELCRO

HOOK VELCRO

	0	1	2	3	4	5	6	7	8	9
00	TK1	TK1 HTR 1	FC1 O2	MNA	CABIN P	1	OX TK P	OX TK P	1 EGT	C He TK P
01	TK2	TK1 HTR 2	FC1 H2	MNB	O2 SYS 1 FLOW	2	FU TK P	FU TK P	2 EGT	L He TK P
02	TK3	TK2 HTR 1	FC2 O2	MNC	O2 SYS 2 FLOW	3	LEAK/TK P	ENG	3 EGT	R He TK P
03	TK4	TK2 HTR 2	FC2 H2	AC1	CABIN PPO2 A	4	OX TK P	OX TK P	1 OIL IN T	C He REG P
04	PLBK	TK3 HTR 1	FC3 O2	AC2	CABIN PPO2 B	5	FU TK P	FU TK P	2 OIL IN T	L He REG P
05	TK1	TK3 HTR 2	FC3 H2	AC3	N2 SYS 1 FLOW	1	LEAK/TK P	ENG	3 OIL IN T	R He REG P
06	TK2	TK4 HTR 1	FC1	AC1	N2 SYS 2 FLOW	2	OX TK P	OMS TVC	APU 1	L02 MANF P
07	TK3	TK4 HTR 2	FC2	AC2	CABIN FAN ΔP	3	FU TK P	OX TK P	APU 2	LH2 MANF P
08	TK4	PLBK TK HTR	FC3	AC3	AV BAY 1 T	4	LEAK/TK P	FU TK P	APU 3	
09	PLBK	ADTA	FC1	RGA/AA	AV BAY 2 T	5	RCS JET	PAYLOAD CAUTION	APU 1	SYS 1
10	L RHC	FCS SAT	FC2	IMU	AV BAY 3 T	1 OUT P	1 FLOW	1 EVAP OUT T	APU 2	SYS 2
11	R/AFT RHC	FCS CH BYPASS	FC3		CAB HX OUT T	2 OUT P	2 FLOW	2 EVAP OUT T	APU 3	SYS 3

ZIPTONED PARAM USED WHEN PL/KIT INSTALLED

PARAM INH IF KIT NOT INSTALLED

PARAM INH ON-ORBIT

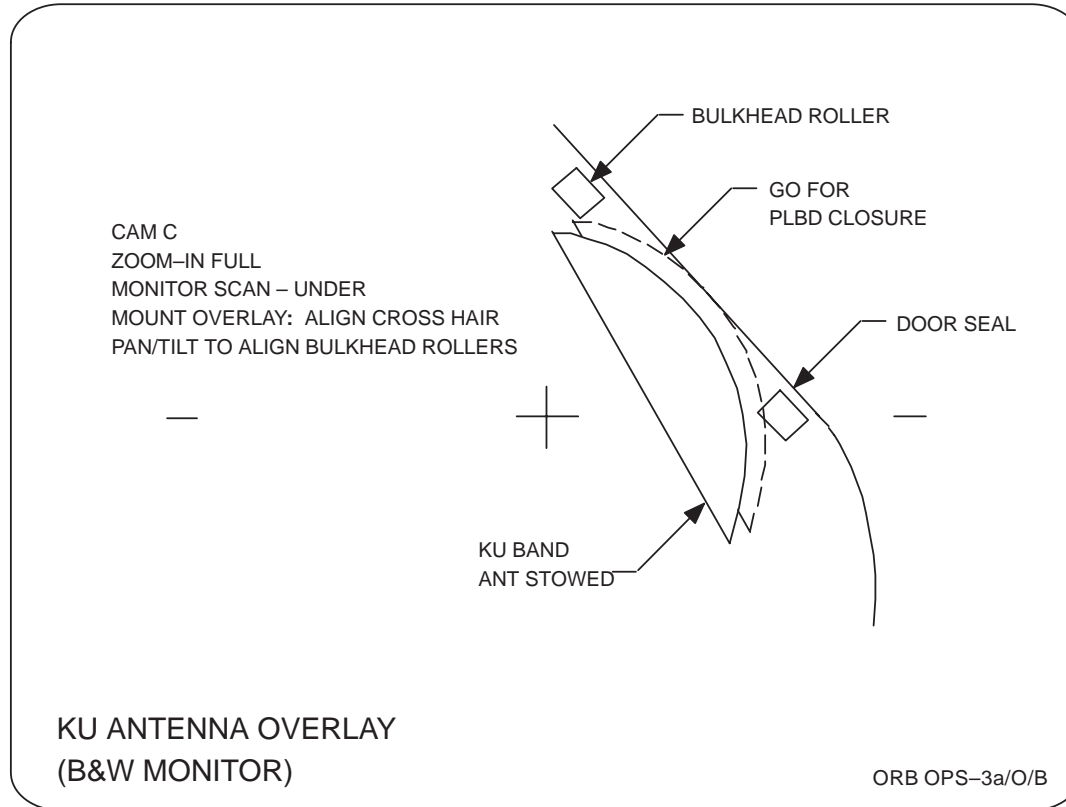
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04/27/92

FAB USE ONLY

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CC 15-6

ORB OPS/ALL/GEN H

Fabricate as a Transparency



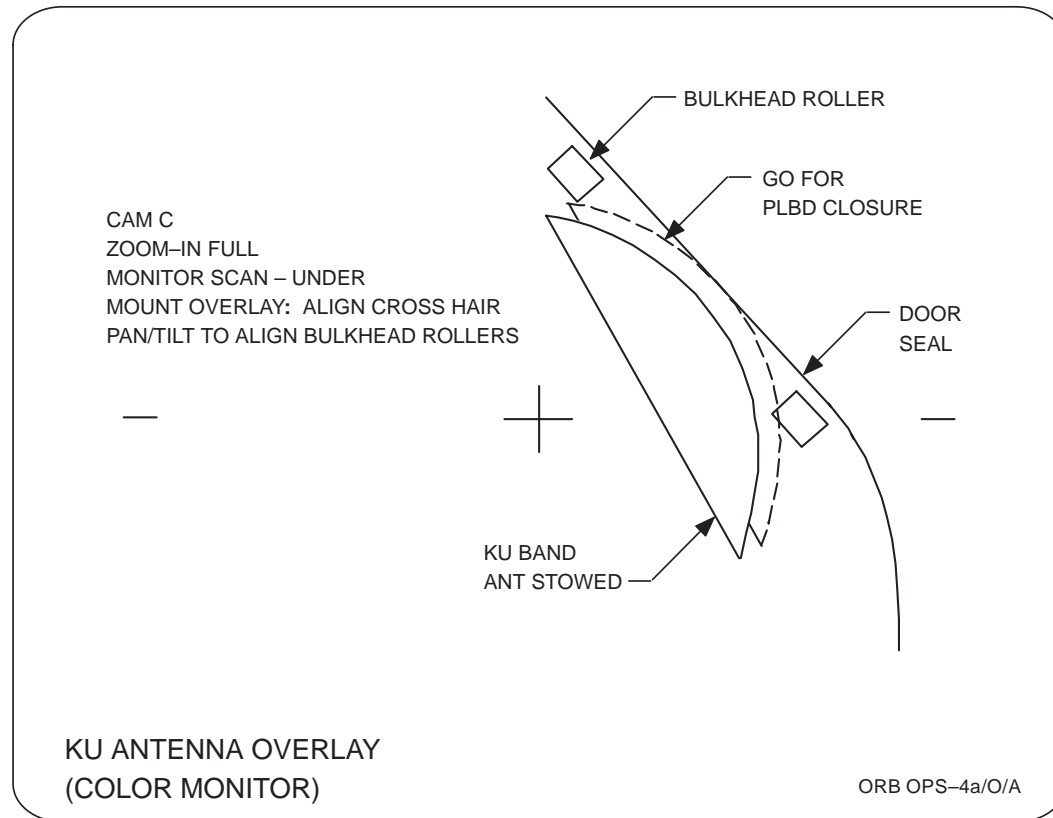
FAB USE ONLY

(reduced copy)

CC 15-7

ORB OPS/ALL/GEN H

Fabricate as a Transparency



KU ANTENNA OVERLAY
(COLOR MONITOR)

ORB OPS-4a/O/A

FAB USE ONLY

(reduced copy)

ORB OPS/ALL/GEN H

URINE COLLECTION (w/o UMS)

- ✓ FAN SEP same as HOSE BLOCK
- ✓ MODE – AUTO
- ✓ CRADLE – AUTO
- Unstow hose and install urinal funnel
- ✓ Airflow
- ✓ WCS ON It – on
- Urinate
- Remove, clean, stow urinal funnel

NOTE

FAN SEP will run for ~30 sec after hose stowage

- Stow hose in cradle
- ✓ WCS ON It – off

URINE/FECES COLLECTION

- ✓ FAN SEP same as HOSE BLOCK
- ✓ New bag in WCS Coffee Can
- MODE – COMMODE/MANUAL/EMU

NOTE

CRADLE sw disabled when MODE sw in COMMODE/MANUAL/EMU position

- Unstow hose and install urinal funnel
- ✓ Airflow
- ✓ WCS ON It – on
- COMMODE CNTL – UP (wait 15 sec)
- FWD

- Ensure proper seal, restrain body
- Urinate/defecate
- ✓ Transport tube – clean if reqd

NOTE

No WCS Coffee Can airflow until slide vlv cl

- COMMODE CNTL – OFF (BACK/DN)
- Remove, clean, stow urinal funnel
- Clean seat as reqd
- Close WCS trash bag, place in WCS trash module
- Place new bag in WCS Coffee Can

NOTE

FAN SEP will run for ~30 sec after MODE – AUTO

- Stow hose in cradle
- MODE – AUTO
- ✓ WCS ON It – off

NOTE

This Cue Card to fly for missions manifesting WCS w/o UMS

TOP

HOOK
VELCRO

WCS COMPACTOR OPS (DUAL-VANE)

- Tools reqd: 1/4-in Torque Wrench
- 6-in Extension
- 1/4-in to 3/8-in Adapter
- Set Torque Wrench to 50 in-lb (first or second compaction)

- ✓ MODE – AUTO

FIRST COMPACTION

Rotate Compactor crank – cw. Stop when torque limit obtained
 At completion of compaction, ✓ net clear of transport tube. If torque limit reached while gauge in yellow region, ✓ MCC before proceeding to CONTINGENCY OPS

SECOND COMPACTION

Rotate Compactor crank – ccw. Stop when torque limit obtained
 At completion of compaction, ✓ net clear of transport tube. If torque limit reached while gauge in yellow region, ✓ MCC before proceeding to CONTINGENCY OPS

- * CONTINGENCY OPS (Vanes will not rotate or
- * jammed vane)
- * MODE – COMMODE/MANUAL/EMU (✓ airflow)
- * COMMODE CNTL – UP (wait 20 sec)
- * – FWD
- * ✓ WCS ON It – on
- * Allow 5 min for commode contents to soften, then
- * reattempt compaction. If no joy, attempt compaction
- * once more after 5 min. If still no joy, inspect vanes for
- * attached debris. If debris present, remove/
- * redistribute using scraper tool (wear gloves).
- * Re-attempt compaction. If still no joy, ✓ MCC
- * If compactor net blocking transport tube, use scissors to
- * cut elastic net to clear tube
- * When complete:
- * COMMODE CNTL – OFF (BACK/DN)
- * MODE – AUTO
- * ✓ WCS ON It – off

Stow tools

HOOK
VELCRO

ORB OPS-5a/O/G

FAB USE ONLY

(reduced copy)
CC 15-9

ORB OPS/ALL/GEN H

TOP
BACK OF 'URINE COLLECTION (w/o UMS)'

**CONT WASTE COLLECTION –
UCD/APOLLO BAG**

NOTE

WCS Compactor Ops must be performed
before stowing Apollo Bags in commode

Unstow Bags
Complete urination in UCD
Remove Apollo Bag Seal Cover
Seal to buttocks and defecate
Force gas out and seal
Stow Apollo Bag in commode or wet trash
Stow UCD in wet trash

FAN SEP SWITCHING

- ✓MODE – AUTO
- ✓CRADLE – AUTO
- ✓Hose stowed in cradle
- ✓WCS ON It – off
- FAN SEP SEL sw – OFF
- HOSE BLOCK – SEP 2(1)

NOTE

In next step, alternate fan sep will turn
on for 30 sec. Normal ops may proceed
after 30–sec run complete

FAN SEP SEL sw – 2(1)

If airflow still low or if no airflow, ✓MCC

HOOK
VELCRO

WCS CLEANING

Urinal:

NOTE

Hose must be stowed in cradle
to take switch to AUTO INHIBIT

CRADLE – AUTO INHIBIT
Inspect/replace prefilter (once/day or as reqd)
Discard old prefilter in WCS dry trash
Inspect/clean urinal Hose Screen (disconnect Hose
from Hose Block)
CRADLE – AUTO

Commode:

Use Sanitation Agent/Dry Wipes to clean seat
and transport tube above gate vlv
Discard in WCS trash module

HOOK
VELCRO

ORB OPS–5b/O/F

FAB USE ONLY

(reduced copy)
CC 15-10

ORB OPS/ALL/GEN H

URINE COLLECTION (w/UMS)

- Y-Vlv - WCS
- WCS/UMS sw - WCS
- Install urinal funnel
- ✓FAN SEP same as HOSE BLOCK
- ✓MODE - WCS/EMU (✓airflow)
- Urinate
- Remove, clean, stow urinal funnel

CAUTION
Allow FAN SEP to run for
30 sec before proceeding

- WCS/UMS sw - UMS
- Y-Vlv - UMS

URINE/FECES COLLECTION

- Y-Vlv - WCS
- WCS/UMS sw - WCS
- Install urinal funnel
- ✓New bag in WCS trash can
- ✓FAN SEP same as HOSE BLOCK
- ✓MODE - WCS/EMU (✓airflow)
- COMMODE CNTL - UP (wait 15 sec)
- FWD
- Ensure proper seal, restrain body
- Urinate/defecate
- ✓Transport tube

NOTE

No WCS Trash Can airflow until slide vlv cl

- COMMODE CNTL - OFF (BACK/DN)
- Remove, clean, stow urinal funnel
- Clean seat as reqd
- Seal WCS trash bag, place in WCS trash module
- Place new bag in WCS trash can

CAUTION
Allow FAN SEP to run for
30 sec before proceeding

- WCS/UMS sw - UMS
- Y-Vlv - UMS

NOTE

This Cue Card to fly for missions manifesting WCS, UMS

TOP

HOOK
VELCRO

WCS COMPACTOR OPS (DUAL-VANE)

- Tools reqd: 1/4-in Torque Wrench
- 4-in Extension
- 1/4-in to 3/8-in Adapter
- Set Torque Wrench to 50 in-lb (first or second compaction)

MODE - OFF

FIRST COMPACTION

Rotate Compactor crank - cw. Stop when torque limit obtained. At completion of compaction, ✓net clear of transport tube. If torque limit reached while gauge in yellow region, go to CONTINGENCY OPS

SECOND COMPACTION

Rotate Compactor crank - ccw. Stop when torque limit obtained. At completion of compaction, ✓net clear of transport tube. If torque limit reached while gauge in yellow region, go to CONTINGENCY OPS

- * **CONTINGENCY OPS** (Vaness won't rotate or jammed vane): *
- * MODE - WCS/EMU (✓airflow) *
- * COMMODE CNTL - UP (wait 20 sec) *
- * - FWD *
- * Allow 5 min for commode contents to soften, then reattempt compaction. If no joy, attempt compaction every 5 min. If still no joy, inspect vanes for attached debris. If debris present, remove/redistribute using scraper tool (wear gloves). Re-attempt compaction. If still no joy, ✓MCC *
- * If compactor net blocking transport tube, use scissors to cut elastic net to clear tube *
- * When complete: *
- * COMMODE CNTL - DN *
- * MODE - OFF *

Stow tools

ORB OPS-6a/O/H

HOOK
VELCRO

FAB USE ONLY

(reduced copy)
CC 15-11

ORB OPS/ALL/GEN H

TOP
BACK OF 'URINE COLLECTION (w/UMS)'

**UMS CONT WASTE COLLECTION -
UCD/APOLLO BAG**

NOTE

WCS Compactor Ops must be performed before stowing Apollo Bags in commode

Unstow Bags
Complete urination in UCD
Remove Apollo Bag Seal Cover
Seal to buttocks and defecate
Force gas out and seal
Place Apollo Bag in Outer Bag
Remove Outer Bag Internal Seal Cover
Force gas out and seal
Stow Apollo Bag in commode or wet trash
Stow UCD in wet trash

FAN SEP FAILURE

CAUTION

Do not run both FAN SEPARATORS at same time

If low or no airflow in WCS:
MODE - OFF
HOSE BLOCK - SEP 2(1)

NOTE

In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete

FAN SEP SEL sw - 2(1)
MODE - WCS/EMU (✓airflow)

If airflow still low or if no airflow, ✓MCC

HOOK
VELCRO

WCS CLEANING

Urinal:

Inspect/replace prefilter (once/day or as reqd)
Discard old prefilter in WCS dry trash
Disconn Y-Vlv w/bracket and stem hose
Inspect/replace urinal Hose Screen
Reconn Y-Vlv w/bracket and stem hose to WCS

Commode:

Use Sanitation Agent/Dry Wipes to clean seat and transport tube above gate vlv
Discard in WCS trash module

HOOK
VELCRO

ORB OPS-6b/O/G

(reduced copy)

EDO WCS URINE COLLECTION

- Unstow urinal hose
- ✓Airflow
- ✓URINAL READY It – on (5–15 sec)
- Install urinal funnel
- Urinate
- Remove, clean, and stow urinal funnel
- Stow urinal hose

EDO WCS URINE/FECES COLLECTION

- Unstow urinal hose
- ✓Airflow
- ✓URINAL READY It – on (5–15 sec)
- Install urinal funnel
- Open commode lid
 - ✓Fecal bag installed (gold dot UP)
 - ✓COMMODOE FAN – ON (audible 1–15 sec)
 - ✓All Its – off (except URINAL READY It)
 - * If COMMODOE FAULT It – on: *
 - * Verify airflow (commode Fan 1 fault) *
 - * Controller has started Fan 2) *
 - * Continue w/commode use *
 - * If COMMODOE FAULT It – blinking: *
 - * ✓MCC *
 - * If SERVICE CANISTER It – on: *
 - * Fecal Canister will need servicing soon *
 - * Continue w/commode use *
 - * If SERVICE CANISTER It – blinking: *
 - * Go to EDO WCS FECAL CANISTER *
 - * CHANGEOUT (Cue Card) *
- Restrain body
- Urinate/defecate
- Remove, clean, and stow urinal funnel
- Stow urinal hose
- Clean seat as reqd
- Raise seat
- Insert fecal bag lid (tab up), ✓Lid seated

(Cont Next Column)

NOTE

This Cue Card to fly in place of current urine collection Cue Card for missions manifesting EDO WCS

TOP

HOOK
VELCRO

EDO WCS URINE/FECES COLLECTION (Cont)

- Unlatch compactor and rotate to compact position,
 - ✓Engaged in 3 slide brackets
 - Latch compactor in place
 - * If compactor rotation impeded: *
 - * ✓COMPACTOR ARM LOCK PIN – raised *
 - * ✓COMPACTOR CLEANING LATCH *
 - * PIN – engaged *
 - ✓READY TO COMPACT It – on
 - COMPACT pb – push
 - ✓READY TO COMPACT It – off (as compacting begins)
 - on (as compacting ends)
 - * If Commode FAULT It – on: *
 - * ✓MCC *
 - Unlatch compactor and rotate to stowed position
 - Latch compactor in place
 - ✓All Its – off
 - Install new fecal bag (gold dot UP)
 - Lower seat
 - Close commode lid, ✓Seat lid latch – latched
- EDO WCS CLEANING**
- Urinal:
 - Inspect/replace urine screen (once/day or as reqd)
 - Discard old prefilter in AUX WET TRASH
 - Commode:
 - Use Sanitation Agent/Dry Wipes to clean seat
 - Discard in AUX WET TRASH

HOOK
VELCRO

TOP
BACK OF 'EDO WCS URINE/FECES COLLECTION'

EDO WCS FECAL CANISTER CHANGEOUT

Commode lid – up
 Remove used canister:
 CANISTER HANDLE – loosen
 CANISTER – Rotate to position 4 (LOAD)
 – Remove
 Install CANISTER LID (snap in place on full used canister)
 Stow used canister

Install new canister:
 CANISTER – Align black mark w/arrow at position 4 (LOAD)
 – Insert into PLENUM
 – Rotate to position 3 (LOCK)
 CANISTER HANDLE – Tighten
 – Fold flat against canister
 RESET/TEST – CANISTER RESET
 ✓SERVICE CANISTER It – off
 Commode lid – cl

EDO WCS SWITCH FUNCTION

URINAL SEL sw – Selects which fan/separator will be in use when urinal ops controlled by EDO WCS controller automatically

WCS PWR SEL sw – AUTO 1(2) defines which power source used by controller. AUTO 1 is MNA. AUTO 2 is MNB

MAN 1(2) position turns on fan/separator 1(2) for manual ops (no fault lts). Commode Fan 1(2) will turn on as well

FAN PWR sw – AUTO position lets controller select commode Fan (#1 always first); will automatically switch to commode Fan 2 if commode fault detected. Fan 1(2) positions activate commode Fan 1(2) as desired

HOOK
VELCRO

**EDO WCS URINE OR FECES COLLECTION
MANUAL OVERRIDE PROCEDURE**

NOTE

These procedures assume all attempts at operating EDO WCS thru controller have failed. Select system 1 first; use system 2 if system 1 fails. Fault LEDs will not operate when in manual

Commode:

Close commode lid
 ✓URN DIV VLV – FAN SEP 1(2)
 WCS PWR SEL – MAN 1, OFF 2(OFF 1, MAN 2)
 ✓Commode Fan Start (audible)
 Raise commode lid
 ✓Airflow of commode
 Defecate
 Compact – Using MANUAL COMPACTION (Cue Card) procedures
 Close commode lid
 WCS PWR SEL – OFF 1, OFF 2
 Use this procedure for remainder of flight

Urinal:

URN DIV VLV – FAN SEP 1(2)
 WCS PWR SEL – MAN 1, OFF 2(OFF 1, MAN 2)
 ✓Urinal airflow
 Urinate
 Wait 30 sec (allows for full clearing of liquids), then:
 WCS PWR SEL – OFF 1, OFF 2
 Use this procedure for remainder of flight

CONT WASTE COLLECTION – UCD/APOLLO BAG

Unstow bags
 Complete urination in UCD
 Remove Apollo Bag Seal Cover
 Seal to buttocks and defecate
 Force gas out and seal
 Place Apollo Bag in Outer Bag
 Remove Outer Bag Internal Seal Cover
 Force gas out and seal
 Stow Apollo Bag in wet trash
 Stow UCD in wet trash

HOOK
VELCRO

TOP

EDO WCS MANUAL COMPACTION

WITH TOOLS

OBJECTIVE: Extend/retract Compactor Piston w/battery-powered Screwdriver or Robbin's Wrench in event of compactor failure

TOOLS REQD: 1/4-in to 3/8-in Adapter
Battery-powered Screwdriver or Robbin's Wrench

1. Raise seat
2. Install Fecal Bag lid
3. Unlatch Compactor, rotate to compact position, latch in place
 - * If Compactor rotation impeded: *
 - * ✓COMPACTOR ARM LOCK PIN – raised *
 - * ✓COMPACTOR CLEANING LATCH PIN – engaged *
4. Rotate Manual Drive cw to extend Compactor Piston
5. Rotate Manual Drive ccw to retract Compactor Piston
6. Unlatch Compactor, rotate to stowed position, latch in place
7. Install new Fecal Bag
8. Lower seat
9. Close commode lid

BY HAND (No more than three times consecutively)

OBJECTIVE: Manually compact Fecal Bag in event of Compactor failure

TOOLS REQD: None

1. Raise seat
2. Install Fecal Bag lid
3. Push Fecal Bag and lid to bottom of Transport Tube
4. Install new Fecal Bag
5. Lower seat
6. Close commode lid

ORB OPS-8a/O/A

NOTE: This Cue Card to fly for missions manifesting EDO WCS

(reduced copy)

FAB USE ONLY

CC 15-14

ORB OPS/ALL/GEN H

TOP
BACK OF 'EDO WCS MANUAL COMPACTION'

HOOK
VELCRO

ORB OPS-8b/O/A

FAB USE ONLY

(reduced copy)
CC 15-15

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**

(5 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1	2	
POST BLUE FD2	3	"	
PRE BLUE FD2	"	4	
POST BLUE FD3	5*	6	
PRE BLUE FD3	7	"	
POST BLUE FD4	"	8	
PRE BLUE FD4	9	"	
POST BLUE FD5	"	10	
PRE BLUE FD5	11	"	
POST BLUE FD6	12*	13	
PRE BLUE FD6	14	"	
POST BLUE FD7	"	15	
PRE BLUE FD7	16	"	
POST BLUE FD8	"	17	
PRE BLUE FD8	18	"	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-11a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-17

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (5 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST BLUE FD9	19*	20	
PRE BLUE FD9	21	"	
POST BLUE FD10	"	22	
PRE BLUE FD10	23	"	
POST BLUE FD11	"	24	
PRE BLUE FD11	25	"	
POST BLUE FD12	26*	27	
PRE BLUE FD12	28	"	
POST BLUE FD13	"	29	
PRE BLUE FD13	30	"	
POST BLUE FD14	"	31	
PRE BLUE FD14	32	"	
POST BLUE FD15	33*	34	
PRE BLUE FD15	35	"	
POST BLUE FD16	"	36	
PRE BLUE FD16	37	"	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-11b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-18

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(5 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
LAUNCH	1	2	
POST RED FD2	3	"	
PRE RED FD2	"	4	
POST RED FD3	5*	6	
PRE RED FD3	7	"	
POST RED FD4	"	8	
PRE RED FD4	9	"	
POST RED FD5	"	10	
PRE RED FD5	11	"	
POST RED FD6	12*	13	
PRE RED FD6	14	"	
POST RED FD7	"	15	
PRE RED FD7	16	"	
POST RED FD8	"	17	
PRE RED FD8	18	"	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-12a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-19

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**

(5 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	19*	20	
PRE RED FD9	21	"	
POST RED FD10	"	22	
PRE RED FD10	23	"	
POST RED FD11	"	24	
PRE RED FD11	25	"	
POST RED FD12	26*	27	
PRE RED FD12	28	"	
POST RED FD13	"	29	
PRE RED FD13	30	"	
POST RED FD14	"	31	
PRE RED FD14	32	"	
POST RED FD15	33*	34	
PRE RED FD15	35	"	
POST RED FD16	"	36	
PRE RED FD16	37	"	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-12b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-20

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**

(6 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1	2	
POST BLUE FD2	3	4	
POST RED FD3	5	"	
POST BLUE FD3	6	7*	
POST RED FD4	"	8	
POST BLUE FD4	9*	10	
POST RED FD5	11	"	
POST BLUE FD5	"	12	
POST RED FD6	13	14	
POST BLUE FD6	"	15	
POST RED FD7	16	"	
POST BLUE FD7	17	18	
POST RED FD8	"	19*	
POST BLUE FD8	20	21	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-13a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-21

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (6 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	22*	"	
POST BLUE FD9	23	24*	
POST RED FD10	"	25*	
POST BLUE FD10	26	27	
POST RED FD11	28	"	
POST BLUE FD11	"	29	
POST RED FD12	30	"	
POST BLUE FD12	31	32	
POST RED FD13	33	"	
POST BLUE FD13	34	35	
POST RED FD14	"	36	
POST BLUE FD14	37*	38	
POST RED FD15	39*	"	
POST BLUE FD15	40	41*	
POST RED FD16	"	42*	
POST BLUE FD16	43	44	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-13b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-22

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(6 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1	2	
POST RED FD2	3	4	
POST BLUE FD3	5	"	
POST RED FD3	6	7*	
POST BLUE FD4	"	8	
POST RED FD4	9*	10	
POST BLUE FD5	11	"	
POST RED FD5	"	12	
POST BLUE FD6	13	14	
POST RED FD6	"	15	
POST BLUE FD7	16	"	
POST RED FD7	17	18	
POST BLUE FD8	"	19*	
POST RED FD8	20	21	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-14a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-23

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (6 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
POST BLUE FD9	22*	"	
POST RED FD9	23	24*	
POST BLUE FD10	"	25*	
POST RED FD10	26	27	
POST BLUE FD11	28	"	
POST RED FD11	"	29	
POST BLUE FD12	30	"	
POST RED FD12	31	32	
POST BLUE FD13	33	"	
POST RED FD13	34	35	
POST BLUE FD14	"	36	
POST RED FD14	37*	38	
POST BLUE FD15	39*	"	
POST RED FD15	40	41*	
POST BLUE FD16	"	42*	
POST RED FD16	43	44	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-14b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-24

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**

(7 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1*	2	
PRE BLUE FD1	3*	"	
POST BLUE FD2	4	5	
PRE BLUE FD2	6	"	
POST BLUE FD3	7	8	
PRE BLUE FD3	9	"	
POST BLUE FD4	10	11	
PRE BLUE FD4	12*	13*	
POST BLUE FD5	14	15	
PRE BLUE FD5	16	"	
POST BLUE FD6	17	18	
PRE BLUE FD6	19	"	
POST BLUE FD7	20	21	
PRE BLUE FD7	22*	23*	
POST BLUE FD8	24	25	
PRE BLUE FD8	26	"	

*Reseal LiOH cans w/Gray Tape and stow
ORB OPS-15a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-25

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**

(7 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
POST BLUE FD9	27	28	
PRE BLUE FD9	29*	30*	
POST BLUE FD10	31	32	
PRE BLUE FD10	33	"	
POST BLUE FD11	34	35	
PRE BLUE FD11	36*	37*	
POST BLUE FD12	38	39	
PRE BLUE FD12	40	"	
POST BLUE FD13	41	42	
PRE BLUE FD13	43	"	
POST BLUE FD14	44	45	
PRE BLUE FD14	46*	47*	
POST BLUE FD15	48	49	
PRE BLUE FD15	50	"	
POST BLUE FD16	51	52	
PRE BLUE FD16	53*	54*	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-15b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-26

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(7 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1*	2	
PRE RED FD1	3*	"	
POST RED FD2	4	5	
PRE RED FD2	6	"	
POST RED FD3	7	8	
PRE RED FD3	9	"	
POST RED FD4	10	11	
PRE RED FD4	12*	13*	
POST RED FD5	14	15	
PRE RED FD5	16	"	
POST RED FD6	17	18	
PRE RED FD6	19	"	
POST RED FD7	20	21	
PRE RED FD7	22*	23*	
POST RED FD8	24	25	
PRE RED FD8	26	"	

*Reseal LiOH cans w/Gray Tape and stow
ORB OPS-16a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-27

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (7 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
POST RED FD9	27	28	
PRE RED FD9	29*	30*	
POST RED FD10	31	32	
PRE RED FD10	33	"	
POST RED FD11	34	35	
PRE RED FD11	36*	37*	
POST RED FD12	38	39	
PRE RED FD12	40	"	
POST RED FD13	41	42	
PRE RED FD13	43	"	
POST RED FD14	44	45	
PRE RED FD14	46*	47*	
POST RED FD15	48	49	
PRE RED FD15	50	"	
POST RED FD16	51	52	
PRE RED FD16	53*	54*	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-16b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-28

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**

(8 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1*	2	
POST RED FD2	3	"	
POST BLUE FD2	4	5	
POST RED FD3	6*	7*	
POST BLUE FD3	8	9	
POST RED FD4	10*	11*	
POST BLUE FD4	12	13	
POST RED FD5	14	15	
POST BLUE FD5	16	17	
POST RED FD6	18*	19*	
POST BLUE FD6	20	21	
POST RED FD7	22*	23*	
POST BLUE FD7	24	25	
POST RED FD8	26*	27*	
POST BLUE FD8	28	29	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-17a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-29

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (8 Crewmembers/RED sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST RED FD9	30*	31*	
POST BLUE FD9	32	33	
POST RED FD10	34*	35*	
POST BLUE FD10	36	37	
POST RED FD11	38*	39*	
POST BLUE FD11	40	41	
POST RED FD12	42	"	
POST BLUE FD12	43	44	
POST RED FD13	45*	46*	
POST BLUE FD13	47	48	
POST RED FD14	49*	50*	
POST BLUE FD14	51	52	
POST RED FD15	53	54	
POST BLUE FD15	55*	56*	
POST RED FD16	57	58	
POST BLUE FD16	59*	60*	

*Reseal LiOH cans w/Gray Tape and stow
 ORB OPS-17b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-30

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**DUAL SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**

(8 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
LAUNCH	1*	2	
POST BLUE FD2	3	"	
POST RED FD2	4	5	
POST BLUE FD3	6*	7*	
POST RED FD3	8	9	
POST BLUE FD4	10*	11*	
POST RED FD4	12	13	
POST BLUE FD5	14	15	
POST RED FD5	16	17	
POST BLUE FD6	18*	19*	
POST RED FD6	20	21	
POST BLUE FD7	22*	23*	
POST RED FD7	24	25	
POST BLUE FD8	26*	27*	
POST RED FD8	28	29	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-18a/NON-RCRS/A

NOTE

Cue Card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-31

ORB OPS/ALL/GEN H

TOP
 BACK OF 'DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**DUAL SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**

(8 Crewmembers/BLUE sleeps 1st/FD 1-16)

FLIGHT DAY	POS A	POS B	CK CMLPT
POST BLUE FD9	30*	31*	
POST RED FD9	32	33	
POST BLUE FD10	34*	35*	
POST RED FD10	36	37	
POST BLUE FD11	38*	39*	
POST RED FD11	40	41	
POST BLUE FD12	42	"	
POST RED FD12	43	44	
POST BLUE FD13	45*	46*	
POST RED FD13	47	48	
POST BLUE FD14	49*	50*	
POST RED FD14	51	52	
POST BLUE FD15	53	54	
POST RED FD15	55*	56*	
POST BLUE FD16	57	58	
POST RED FD16	59*	60*	

*Reseal LiOH cans w/Gray Tape and stow

ORB OPS-18b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-32

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**SINGLE SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(5 Crewmembers/1 Shift/FD 1-6)

FLIGHT DAY	POS A	POS B	CK CMPLT
FD1 LAUNCH	1*	2	
FD1 PRE SLEEP	3	"	
FD2 POST SLEEP	"	4	
FD2 PRE SLEEP	5	"	
FD3 POST SLEEP	"	6	
FD3 PRE SLEEP	7	"	
FD4 POST SLEEP	"	8	
FD4 PRE SLEEP	9	"	
FD5 POST SLEEP	"	10	
FD5 PRE SLEEP	11*	12	
FD6 POST SLEEP	13	"	
FD6 PRE SLEEP	"	14	

(FLIGHT DAYS 7-12 ON BACK)

*Reseal LiOH cans #1/11/18/19/27
with Gray Tape and stow

ORB OPS-19a/NON-RCRS/A

NOTE: Cue card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-33

ORB OPS/ALL/GEN H

TOP
 BACK OF 'SINGLE SHIFT ORBITER CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**SINGLE SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (5 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMLPT
FD7 POST SLEEP	15	"	
FD7 PRE SLEEP	"	16	
FD8 POST SLEEP	17	"	
FD8 PRE SLEEP	"	18*	
FD9 POST SLEEP	19*	20	
FD9 PRE SLEEP	21	"	
FD10 POST SLEEP	"	22	
FD10 PRE SLEEP	23	"	
FD11 POST SLEEP	"	24	
FD11 PRE SLEEP	25	"	
FD12 POST SLEEP	"	26	
FD12 PRE SLEEP	27*	28	
FD13 POST SLEEP	29	"	

ORB OPS-19b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-34

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**SINGLE SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(6 Crewmembers/1 Shift/FD 1-6)

FLIGHT DAY	POS A	POS B	CK CMLPT
1 LAUNCH	1*	2	
1 PRE SLEEP	3	"	
2 POST SLEEP	"	4	
2 PRE SLEEP	5*	6	
3 POST SLEEP	7	"	
3 PRE SLEEP	"	8	
4 POST SLEEP	9	10	
4 PRE SLEEP	11	"	
5 POST SLEEP	"	12	
5 PRE SLEEP	13*	14	
6 POST SLEEP	15	"	
6 PRE SLEEP	"	16	

(FLIGHT DAYS 7-12 ON BACK)

*Reseal LiOH cans #1/5/13/21/29
with Gray Tape and stow

ORB OPS-20a/NON-RCRS/A

NOTE: Cue card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-35

ORB OPS/ALL/GEN H

TOP
 BACK OF 'SINGLE SHIFT ORBITER CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**SINGLE SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (6 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMLPT
7 POST SLEEP	17	18	
7 PRE SLEEP	19	"	
8 POST SLEEP	"	20	
8 PRE SLEEP	21*	22	
9 POST SLEEP	23	"	
9 PRE SLEEP	"	24	
10 POST SLEEP	25	26	
10 PRE SLEEP	27	"	
11 POST SLEEP	"	28	
11 PRE SLEEP	29*	30	
12 POST SLEEP	31	"	
12 PRE SLEEP	"	32	
13 POST SLEEP	33	34	
13 PRE SLEEP	35	"	
14 POST SLEEP	"	36	

ORB OPS-20b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-36

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**SINGLE SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(7 Crewmembers/1 Shift/FD 1-6)

FLIGHT DAY	POS A	POS B	CK CMPLT
1 LAUNCH	1*	2	
1 PRE SLEEP	3	"	
2 POST SLEEP	5	4*	
2 PRE SLEEP	"	6	
3 POST SLEEP	7	8	
3 PRE SLEEP	9	"	
4 POST SLEEP	11	10	
4 PRE SLEEP	"	12	
5 POST SLEEP	13	14	
5 PRE SLEEP	15	"	
6 POST SLEEP	17	16	
6 PRE SLEEP	"	18	

(FLIGHT DAYS 7-12 ON BACK)

*Reseal LiOH cans #1/4/21/22
with Gray Tape and stow

ORB OPS-21a/NON-RCRS/A

NOTE: Cue card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-37

ORB OPS/ALL/GEN H

TOP
 BACK OF 'SINGLE SHIFT ORBITER CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**SINGLE SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (7 Crewmembers/1 Shift/FD 7-12)

FLIGHT DAY	POS A	POS B	CK CMPLT
7 POST SLEEP	19	20	
7 PRE SLEEP	21*	22*	
8 POST SLEEP	23	24	
8 PRE SLEEP	"	25	
9 POST SLEEP	26	27	
9 PRE SLEEP	28	"	
10 POST SLEEP	30	29	
10 PRE SLEEP	"	31	
11 POST SLEEP	32	33	
11 PRE SLEEP	34	"	
12 POST SLEEP	36	35	
12 PRE SLEEP	"	37	
13 POST SLEEP	38	39	

ORB OPS-21b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-38

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

**SINGLE SHIFT ORBITER
CO2 ABSORBER REPLACEMENT**
(8 Crewmembers/1 Shift/FD 1-8)

FLIGHT DAY	POS A	POS B	CK CMPLT
1 LAUNCH	1	2	
1 PRE SLEEP	3	"	
2 POST SLEEP	4	5	
2 PRE SLEEP	6	7	
3 POST SLEEP	8	9	
3 PRE SLEEP	10	11	
4 POST SLEEP	12	13	
4 PRE SLEEP	14	15	
5 POST SLEEP	16	17	
5 PRE SLEEP	18	19	
6 POST SLEEP	20	21	
6 PRE SLEEP	22	23	
7 POST SLEEP	24	25	
7 PRE SLEEP	26	27	
8 POST SLEEP	28	29	
8 PRE SLEEP	30	31	

ORB OPS-22a/NON-RCRS/A

NOTE: Cue card not flown for missions manifesting RCRS

(reduced copy)

FAB USE ONLY

CC 15-39

ORB OPS/ALL/GEN H

TOP
 BACK OF 'SINGLE SHIFT ORBITER CO2 ABSORBER REPLACEMENT'

HOOK
 VELCRO

**SINGLE SHIFT ORBITER
 CO2 ABSORBER REPLACEMENT**
 (8 Crewmembers/1 Shift/FD 9-14)

FLIGHT DAY	POS A	POS B	CK CMPLT
9 POST SLEEP	32	33	
9 PRE SLEEP	34	35	
10 POST SLEEP	36	37	
10 PRE SLEEP	38	39	
11 POST SLEEP	40	41	
11 PRE SLEEP	42	"	
12 POST SLEEP	43	44	
12 PRE SLEEP	45	46	
13 POST SLEEP	47	48	
13 PRE SLEEP	49	50	
14 POST SLEEP	51	52	

ORB OPS-22b/NON-RCRS/A

(reduced copy)

FAB USE ONLY

CC 15-40

ORB OPS/ALL/GEN H

TOP

HOOK
VELCRO

URINE PRETREAT CHANGEOUT

NOTE

Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

- Retrieve new OHS from large Ziploc Bag
- Remove Combitherm Bag from OHS
- Record H/N from OHS label and 'installed' MET on Cue Card for new OHS
- Remove caps from new OHS; temp stow
- Detach used OHS from prefilter housing and hose block extension
- Place caps on used OHS
- Place used OHS in Ziploc Bag labeled 'Trash'; stow in large Ziploc Bag
- Attach new OHS to prefilter housing and hose block extension

FD	OHS H/N	MET INSTALLED
1	N/A	N/A
2		
3		
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ORB OPS-23a/O/C

(reduced copy)

FAB USE ONLY

CC 15-41

ORB OPS/ALL/GEN H

TOP
BACK OF "URINE PRETREAT CHANGEOUT"

HOOK
VELCRO

URINE PRETREAT SETUP

NOTE

Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

Retrieve OHS kit, temp stow large Ziploc Bag
Retrieve new OHS from large Ziploc Bag
Remove Combitherm Bag from OHS
Record H/N from OHS label and 'installed' MET on Cue Card for new OHS
Remove caps from new OHS; temp stow
Detach empty urinal hose section from prefilter housing and hose block extension
Place caps on empty hose section
Fasten empty hose section to WCS via Velcro strap
Attach new OHS to prefilter housing and hose block extension

URINE PRETREAT ENTRY PREP

NOTE

Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

Unfasten empty hose section from WCS
Remove caps from empty hose section; temp stow
Detach used OHS from prefilter housing and hose block extension
Place caps on used OHS
Place used OHS in Ziploc Bag labeled 'Trash'; stow in large Ziploc Bag
Attach empty hose section to prefilter housing and hose block extension
Record H/N from OHS label and 'installed' MET on Cue Card for empty hose section
Stow OHS kit for Entry

ORB OPS-23b/O/C

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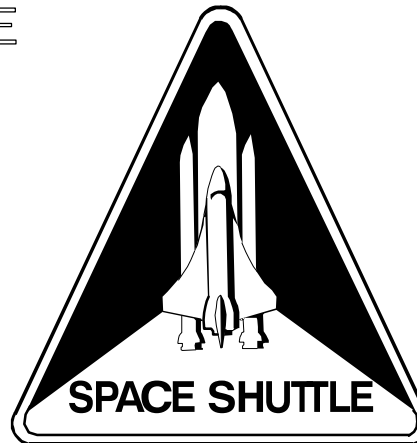
FAB USE ONLY

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ORB OPS/ALL/GEN H

Space Shuttle Program
FLIGHT DATA FILE

JSC-48035
GENERIC, REV H



**ORBIT OPS
CHECKLIST**

**STS
ALL**

Flight Cover (trim bottom to expose tabs)