

# Orbit Operations Checklist

## STS-109 Flight Supplement

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**Mission Operations Directorate  
Operations Division**

**Basic  
July 6, 2001**

National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas



ORBIT OPERATIONS, STS-109 Flt Suppl

BASIC (July 6, 2001)

## PCN-2 (Jan 18, 2002) Sheet 1 of 1

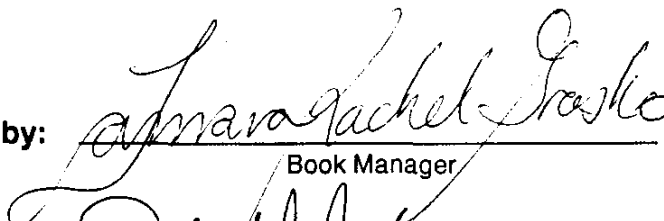
List of Implemented Change Requests (482s):

|                 |              |              |
|-----------------|--------------|--------------|
| ORB OPS-1902B   | ORB OPS-1947 | ORB OPS-1952 |
| ORB OPS-1937    | ORB OPS-1948 |              |
| ORB OPS-1938(S) | ORB OPS-1949 |              |
| ORB OPS-1940    | ORB OPS-1950 |              |
| ORB OPS-1941    | ORB OPS-1951 |              |

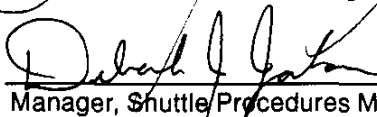
Incorporate the following:

1. Replace FS iii thru FS vi
2. Replace section 2 (4 pages)
3. Replace section 3 (14 pages)
4. Replace section 4 (2 pages)
5. Replace FS 6-3 and FS 6-4
6. Delete section 8
7. Replace section 9 (6 pages)
8. After FS CC 10-2, add FS CC 10-2a and FS CC 10-2b

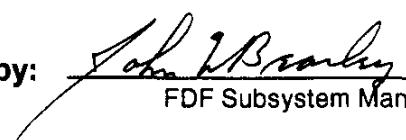
Prepared by:

  
Book Manager

Approved by:

  
Manager, Shuttle Procedures Management (USA)

Accepted by:

 1/25/02  
FDF Subsystem Manager (NASA)

Encl: 34 pages

**File this PCN immediately behind the front cover as a permanent record**

MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST  
STS-109 FLIGHT SUPPLEMENT**

BASIC  
July 6, 2001

PREPARED BY:

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Tamara R. Grosko  
Book Manager

APPROVED BY:

ACCEPTED BY:

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Deborah J. Jackson  
Manager, Shuttle  
Procedures Management  
(USA)

---

*(Deferred until Final)*  
John W. Bearley  
FDF Subsystem Manager  
(NASA)

This document is under the configuration control of the Crew Procedures Control Board (CPCB). Except for discrepancy notices (DN) approved at the flight operations review (FOR), all proposed changes must be submitted on JSC Form 482 to DO3/FDF Manager.

Additional distribution of this book for official use must be requested in writing to DO3/FDF Manager. The request must include justification and requester's name, organization, position, and phone number. Contractor requests are made through the NASA or DOD organization supported. Deletions, reduction in quantity, or change of address may be submitted to DO3/FDF Management Office, 281-244-1184.

ORB OPS/109/BAS

|                                   |
|-----------------------------------|
| Incorporates the following:       |
| 482#: NONE – Establishes Baseline |

AREAS OF TECHNICAL RESPONSIBILITY

|                  |               |              |
|------------------|---------------|--------------|
| Book Manager     | DO3/T. Grosko | 281-483-3727 |
| Alt Book Manager | DO3/C. Simon  | 281-483-0656 |

ORBIT OPERATIONS CHECKLIST  
STS-109 FLIGHT SUPPLEMENT

**LIST OF EFFECTIVE PAGES**

BASIC 07/06/01  
PCN-1 09/05/01  
PCN-2 01/18/02

|                |             |               |                                             |
|----------------|-------------|---------------|---------------------------------------------|
| Sign Off ..... | * 109/BAS   | FS 4-1 .....  | 109/BAS 2                                   |
| FS ii .....    | * 109/BAS   | FS 4-2 .....  | 109/BAS 2                                   |
| FS iii .....   | * 109/BAS 2 | FS 4-3 .....  | deleted                                     |
| FS iv .....    | * 109/BAS 2 | FS 4-4 .....  | deleted                                     |
| FS v .....     | 109/BAS 2   | FS 5-1 .....  | deleted                                     |
| FS vi .....    | 109/BAS 2   | FS 5-2 .....  | deleted                                     |
| FS 1-1 .....   | 109/BAS 1   | FS 6-1 .....  | 109/BAS                                     |
| FS 1-2 .....   | 109/BAS     | FS 6-2 .....  | 109/BAS                                     |
| FS 1-3 .....   | 109/BAS 1   | FS 6-3 .....  | 109/BAS 2                                   |
| FS 1-4 .....   | 109/BAS     | FS 6-4 .....  | 109/BAS                                     |
| FS 1-5 .....   | 109/BAS 1   | FS 6-5 .....  | <input checked="" type="checkbox"/> 109/BAS |
| FS 1-6 .....   | 109/BAS 1   | FS 6-6 .....  | 109/BAS                                     |
| FS 2-1 .....   | 109/BAS     | FS 7-1 .....  | 109/BAS                                     |
| FS 2-2 .....   | 109/BAS 2   | FS 7-2 .....  | 109/BAS                                     |
| FS 2-3 .....   | 109/BAS 2   | FS 7-3 .....  | 109/BAS                                     |
| FS 2-4 .....   | 109/BAS     | FS 7-4 .....  | 109/BAS                                     |
| FS 3-1 .....   | 109/BAS 2   | FS 8-1 .....  | deleted                                     |
| FS 3-2 .....   | 109/BAS 1   | FS 8-2 .....  | deleted                                     |
| FS 3-3 .....   | 109/BAS 2   | FS 8-3 .....  | deleted                                     |
| FS 3-4 .....   | 109/BAS     | FS 8-4 .....  | deleted                                     |
| FS 3-5 .....   | 109/BAS 2   | FS 9-1 .....  | 109/BAS 2                                   |
| FS 3-6 .....   | 109/BAS 2   | FS 9-2 .....  | 109/BAS                                     |
| FS 3-7 .....   | 109/BAS 2   | FS 9-3 .....  | 109/BAS 2                                   |
| FS 3-8 .....   | 109/BAS 2   | FS 9-4 .....  | 109/BAS 2                                   |
| FS 3-9 .....   | 109/BAS 2   | FS 9-5 .....  | 109/BAS 2                                   |
| FS 3-10 .....  | 109/BAS 2   | FS 9-6 .....  | 109/BAS 1                                   |
| FS 3-11 .....  | 109/BAS 2   | FS 9-7 .....  | deleted                                     |
| FS 3-12 .....  | 109/BAS 2   | FS 9-8 .....  | deleted                                     |
| FS 3-13 .....  | 109/BAS 2   | FS 10-1 ..... | * 109/BAS                                   |
| FS 3-14 .....  | 109/BAS 2   | FS 10-2 ..... | * 109/BAS                                   |

\* - Omit from flight book

☒ - Prelift-off information reqd

FS iii

ORB OPS/109/BAS 2

|                  |           |                  |           |
|------------------|-----------|------------------|-----------|
| FS CC 10-2a .. * | 109/BAS 2 | FS CC 10-5 ... * | 109/BAS 1 |
| FS CC 10-2b .. * | 109/BAS 2 | FS CC 10-6 ... * | 109/BAS 1 |
| FS CC 10-3 ... * | 109/BAS   | FS CC 10-7 ... * | 109/BAS 1 |
| FS CC 10-4 ... * | 109/BAS   | FS CC 10-8 ... * | 109/BAS 1 |

## ORBIT OPS CUE CARDS

| <u>Title</u>         | <u>Ref. Page</u> | <u>Card No.</u>              |
|----------------------|------------------|------------------------------|
| SINGLE SHIFT ORBITER |                  |                              |
| FLIGHT DAY 3 DOCKING |                  |                              |
| CO2 ABSORBER         |                  |                              |
| REPLACEMENT          |                  |                              |
| (Front) .....        | FS CC 10-2a      | ORB OPS-29a/109/O/A          |
| LiOH CANISTER        |                  |                              |
| STOWAGE LOCATIONS    |                  |                              |
| (Back) .....         | FS CC 10-2b      | ORB OPS-29b/109/O/A          |
| ORBIT BURN MONITOR   |                  |                              |
| (Front) .....        | FS CC 10-3       | ORB OPS-31a/<br>MEDS/109/O/A |
| OMS FAILURES         |                  |                              |
| (Back) .....         | FS CC 10-4       | ORB OPS-31b/109/O/A          |
| FLIGHT SLEEP LOG     |                  |                              |
| (Front) .....        | FS CC 10-5       | ORB OPS-38a/109/O/A          |
| (Back) .....         | FS CC 10-6       | ORB OPS-38b/109/O/A          |
| SALIVA SAMPLE/KSS    |                  |                              |
| (Front) .....        | FS CC 10-7       | ORB OPS-39a/109/O/A          |
| (Back) .....         | FS CC 10-8       | ORB OPS-39b/109/O/A          |

\* – Omit from flight book

| <u>CONTENTS</u>                                                                        | <u>PAGE</u> |
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| AUTO REBOOST .....                                                                     | FS 4-2      |
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| <u>SHUTTLE COMPOUND SPECIFIC ANALYZER –<br/>    COMBUSTION PRODUCTS (CSA-CP)</u> ..... | deleted     |

|                                                                                                                      |         |
|----------------------------------------------------------------------------------------------------------------------|---------|
| <u>DETAILED SUPPLEMENTARY OBJECTIVES</u>                                                                             |         |
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| REACTIVATION AND SHEDDING (DSO 493) ....                                                                             | FS 9-5  |
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COMM/INST

|                         |        |
|-------------------------|--------|
| LOAD PCMMU FORMAT ..... | FS 1-2 |
| PDI DECOM FORMAT .....  | FS 1-4 |

COMM/  
INST

FS 1-1

ORB OPS/109/BAS 1

## LOAD PCMMU FORMAT

- C3 1. ✓OI PCMMU FORMAT – GPC  
SM 62 PCMMU/PL COMM
- CRT 2. FORMAT:  
FXD – ITEM 1 EXEC (\*)  
SEL ID – ITEM 3 +X X X EXEC
3. ✓SM COMM BUF – RDY  
LOAD – ITEM 4 EXEC  
✓LOAD, ITEM 4 – RUN,CPLT

If LOAD – CPLT:  
Repeat steps 2 and 3 for second ID

```
* If LOAD – FAIL and ERR MSG – 'I/O *
* ERR MMU 1(2)': *
* Go to 5.2a, 'I/O ERR MMU 1(2)' (MAL, *
* DPS) >> *
* *
* If LOAD – FAIL and a first load attempt: *
* Repeat steps 2 and 3 for failed ID *
* *
* If LOAD – FAIL and a subsequent load *
* attempt: *
* ✓MCC *
* OI PCMMU PWR – 2(1) *
* ✓ERR MSG – 'I/O ERR PCM' *
* I/O RESET PCM – ITEM 5 EXEC (*) *
* Repeat steps 2 and 3 *
```

C3

CRT

4. When final LOAD – CPLT:  
PGM – ITEM 2 EXEC (\*)

| DNLIST<br>COMPATIBILITY | PHASE                             | FORMAT<br>ID<br>64/128 | CONFIG<br>NO. |
|-------------------------|-----------------------------------|------------------------|---------------|
| G1,BFS                  | ASCENT                            | 102/129                | –             |
| G2,G8,S2                | ORBIT/ORBIT BURN/FCS C/O          | 103/161                | –             |
| G2,S2                   | HST 32K OPS (PRIME)               | 103/179                | 757           |
| G2,S2                   | HST 32K OPS (B/U)                 | 103/203                | 765           |
| G2,S2                   | HST 32K & 486 MEM DUMP<br>(PRIME) | 103/183                | 759           |
| G2,S2                   | HST 32K & 486 MEM DUMP<br>(B/U)   | 103/204                | 766           |
| G2,S2                   | HST 4K OPS (PRIME)                | 103/184                | 760           |
| G2,S2                   | HST 4K OPS (B/U)                  | 103/205                | 767           |
| G2,S2                   | HST 32K OPS (INVERTED)<br>(PRIME) | 103/185                | 761           |
| G2,S2                   | HST 32K OPS (INVERTED)<br>(B/U)   | 103/206                | 768           |
| G3,BFS                  | ENTRY                             | 102/164                | –             |
| G2,S2,OPS0              | OPS 0                             | –/163                  | –             |
| G2,S2,P9                | MMU C/O                           | –/163                  | –             |
| G3,G9,S2                | LOSS OF 2 GNC GPCs                | –/172                  | –             |
| GNC,BFS                 | –                                 | 102/FXD                | –             |

NOTE

LDR TFL may affect PCMMU BITE. If PCMMU  
or SM 2 GPC switched since last TFL, ID 64  
and 128 will not reflect current state

**Figure 1**

## SM 62 PCMMU/PL COMM

1. PDI:

CRT

|            |   |                                           |
|------------|---|-------------------------------------------|
| ✓I/O RESET | - | ITEM 8 (*)                                |
| SEL DECOM  | - | ITEM 9 + <u>X</u> EXEC                    |
| SEL FMT    | - | ITEM 10 + <u>X</u> <u>X</u> <u>X</u> EXEC |
| LOAD       | - | ITEM 11 EXEC                              |

If LOAD – CPLT:

```
SEL INPUT - ITEM 12 +X EXEC
LOAD      - ITEM 13 EXEC
```

Repeat step 1 for additional DECOMs/FPM

```
* If LOAD – FAIL and ERR MSG – 'I/O          *
* ERR MMU 1(2)':                                *
*   Go to 5.2a, 'I/O ERR MMU 1(2)' (MAL,      *
*   DPS) >>                                     *
```

```
* If LOAD – FAIL and a first load attempt:      *
```

```
* | Repeat step 1                                   *
```

```
* If LOAD – FAIL and a subsequent load      *
* attempt:                                     *
```

|   |                                     |   |
|---|-------------------------------------|---|
| * | <u>NOTE</u>                         | * |
| * | Power cycling PDI will cause PDI to | * |
| * | lose DFLs previously loaded         | * |

```
*      ✓MCC                                     *
```

```
*      S-BD CNTL – PNL                         *
```

```
*      PL DATA INTLVR PWR – OFF,ON           *
```

```
*      ✓ERR MSG – ‘S62 BCE BYP PL’            *
```

```
*              ✓‘S62 BCE BYP PDI’             *
```

```
*      S-BD CNTL – CMD                         *
```

```
*      PCM:                                     *
```

```
* PDI: *
```

```
* I/O RESET – ITEM 8 EXEC (*) *
```

```
* Repeat step 1 for all of config (XXX) *
```

A1L

CRT

| CONFIG                           | DECOM                     | FMT                       | INPUT                          | USE                                                                           |
|----------------------------------|---------------------------|---------------------------|--------------------------------|-------------------------------------------------------------------------------|
| 757<br>HST 32K OPS               | 1<br>2<br>3<br>4<br>5-FPM | 9<br>16<br>-<br>-<br>501  | 1(2)<br>1(2)<br>-<br>-<br>-    | HST (32K) *<br>HST FMT D (4K) *<br>-<br>-<br>L-H-H **                         |
| (PRIME)<br>TFL 179               |                           |                           |                                |                                                                               |
| 765<br>HST 32K OPS               | 1<br>2<br>3<br>4<br>5-FPM | -<br>-<br>19<br>16<br>509 | -<br>-<br>1(2)<br>1(2)<br>-    | -<br>-<br>HST (32K) *<br>HST FMT D (4K) *<br>L-H-H **                         |
| (B/U)<br>TFL 203                 |                           |                           |                                |                                                                               |
| 759<br>HST 32K &<br>486 MEM DUMP | 1<br>2<br>3<br>4<br>5-FPM | 1<br>-<br>19<br>-<br>506  | 1(2)<br>-<br>1(2)<br>-<br>-    | HST FMT M (4K) *<br>-<br>HST (32K) *<br>-<br>L-H-H **                         |
| (PRIME)<br>TFL 183               |                           |                           |                                |                                                                               |
| 766<br>HST 32K &<br>486 MEM DUMP | 1<br>2<br>3<br>4<br>5-FPM | 9<br>-<br>-<br>11<br>502  | 1(2)<br>-<br>-<br>1(2)<br>-    | HST (32K) *<br>-<br>-<br>HST FMT M (4K) *<br>L-H-H **                         |
| (B/U)<br>TFL 204                 |                           |                           |                                |                                                                               |
| 760<br>HST 4K OPS                | 1<br>2<br>3<br>4<br>5-FPM | 2<br>16<br>7<br>11<br>503 | 3<br>1(2)<br>1(2)<br>1(2)<br>- | SSV *<br>HST FMT D (4K) *<br>HST FMT A (4K) *<br>HST FMT M (4K) *<br>H-H-H ** |
| (PRIME)<br>TFL 184               |                           |                           |                                |                                                                               |
| 767<br>HST 4K OPS                | 1<br>2<br>3<br>4<br>5-FPM | 1<br>3<br>7<br>16<br>504  | 1(2)<br>3<br>1(2)<br>1(2)<br>- | HST FMT M (4K) *<br>SSV *<br>HST FMT A (4K) *<br>HST FMT D (4K) *<br>H-H-H ** |
| (B/U)<br>TFL 205                 |                           |                           |                                |                                                                               |
| 761<br>HST 32K OPS<br>(INVERTED) | 1<br>2<br>3<br>4<br>5-FPM | -<br>16<br>-<br>8<br>508  | -<br>1(2)<br>-<br>1(2)<br>-    | -<br>HST FMT D (4K) *<br>-<br>HST (32K INVERTED)<br>L-H-H **                  |
| (PRIME)<br>TFL 185               |                           |                           |                                |                                                                               |

\* Denotes Downlinked Format

\*\* OI-GNC-SM, Orbiter Downlist Data Rates (High or Low)

- No Entry Req'd

FS 1-5

ORB OPS/109/BAS 1

| CONFIG      | DECOM | FMT | INPUT | USE                |
|-------------|-------|-----|-------|--------------------|
| 768         | 1     | —   | —     | —                  |
| HST 32K OPS | 2     | —   | —     | —                  |
| (INVERTED)  | 3     | 7   | 1(2)  | HST FMT A (4K) *   |
|             | 4     | 8   | 1(2)  | HST (32K INVERTED) |
| (B/U)       | 5-FPM | 510 |       |                    |
| TFL 206     |       |     |       | L-H-H **           |

\* Denotes Downlinked Format

\*\* OI-GNC-SM, Orbiter Downlist Data Rates (High or Low)

— No Entry Req'd

FS 1-6

ORB OPS/109/BAS 1

PTG

|                      |        |
|----------------------|--------|
| STAR PAIRS PAD ..... | FS 2-2 |
| PAIRS .....          | FS 2-3 |

**PTG**

FS 2-1

ORB OPS/109/BAS

PTG

| STAR PAIRS PAD |         |            |        |              |        |            |        |              |        |
|----------------|---------|------------|--------|--------------|--------|------------|--------|--------------|--------|
|                |         | ATT SET 1  |        |              |        | ATT SET 2  |        |              |        |
| PAIR           | ANG SEP | DUAL S TRK |        | SINGLE S TRK |        | DUAL S TRK |        | SINGLE S TRK |        |
|                |         |            |        | -Z           | -Y     |            |        | -Z           | -Y     |
| A              | 86.6    | -Y:21      | R+ 185 | R+ 103       | R+ 268 | -Y:17      | R+ 81  | R+ 359       | R+ 174 |
|                |         | -Z:17      | P+ 205 | -Z:21        | P+ 219 | -Y:17      | P+ 197 | -Z:17        | P+ 30  |
|                |         | Y+ 346     | Y+ 340 | Y+ 340       | Y+ 334 | Y+ 25      | Y+ 13  | -Y:21        | P+ 27  |
| B              | 85.5    | -Y:36      | R+ 327 | R+ 239       | R+ 59  | -Y:27      | R+ 305 | R+ 220       | R+ 28  |
|                |         | -Z:27      | P+ 196 | -Z:36        | P+ 190 | -Z:36      | P+ 13  | -Z:27        | P+ 12  |
|                |         | Y+ 332     | Y+ 332 | Y+ 346       | Y+ 338 | Y+ 11      | Y+ 25  | -Y:36        | P+ 27  |
| C              | 91.2    | -Y:59      | R+ 310 | R+ 224       | R+ 19  | -Y:33      | R+ 326 | R+ 229       | R+ 82  |
|                |         | -Z:33      | P+ 24  | -Z:59        | P+ 21  | -Z:59      | P+ 210 | -Z:33        | P+ 200 |
|                |         | Y+ 52      | Y+ 52  | Y+ 67        | Y+ 51  | Y+ 290     | Y+ 304 | -Y:59        | P+ 240 |

| PAIR   |         | COAS ALIGN<br>ATTITUDE 1 |    |     | ANG<br>SEP            | COAS ALIGN<br>ATTITUDE 2 |    |     |
|--------|---------|--------------------------|----|-----|-----------------------|--------------------------|----|-----|
| C<br>O | +X COAS | 25                       | R+ | 279 | NOSE<br>→<br>UP       | 20                       | R+ | 279 |
|        |         |                          | P+ | 194 |                       |                          | P+ | 203 |
|        |         |                          | Y+ | 28  |                       |                          | Y+ | 329 |
| A<br>S | -Z COAS | 25                       | R+ | 106 | 60<br>TAIL<br>→<br>UP | 20                       | R+ | 255 |
|        |         |                          | P+ | 212 |                       |                          | P+ | 5   |
|        |         |                          | Y+ | 299 |                       |                          | Y+ | 302 |

SINGLE S TRK MIN MNVR OPT  
TGT ID = 11-110 NAV STAR #  
BODY VECTOR = 5

|   | -Z S TRK | -Y S TRK |
|---|----------|----------|
| P | 87.7     | 0        |
| Y | 358      | 280.6    |

MET Applicable: 01/01:0:0 - 11/0:0:0  
Date L/O: 02/28/02  
GMT L/O: 059/11:52:32

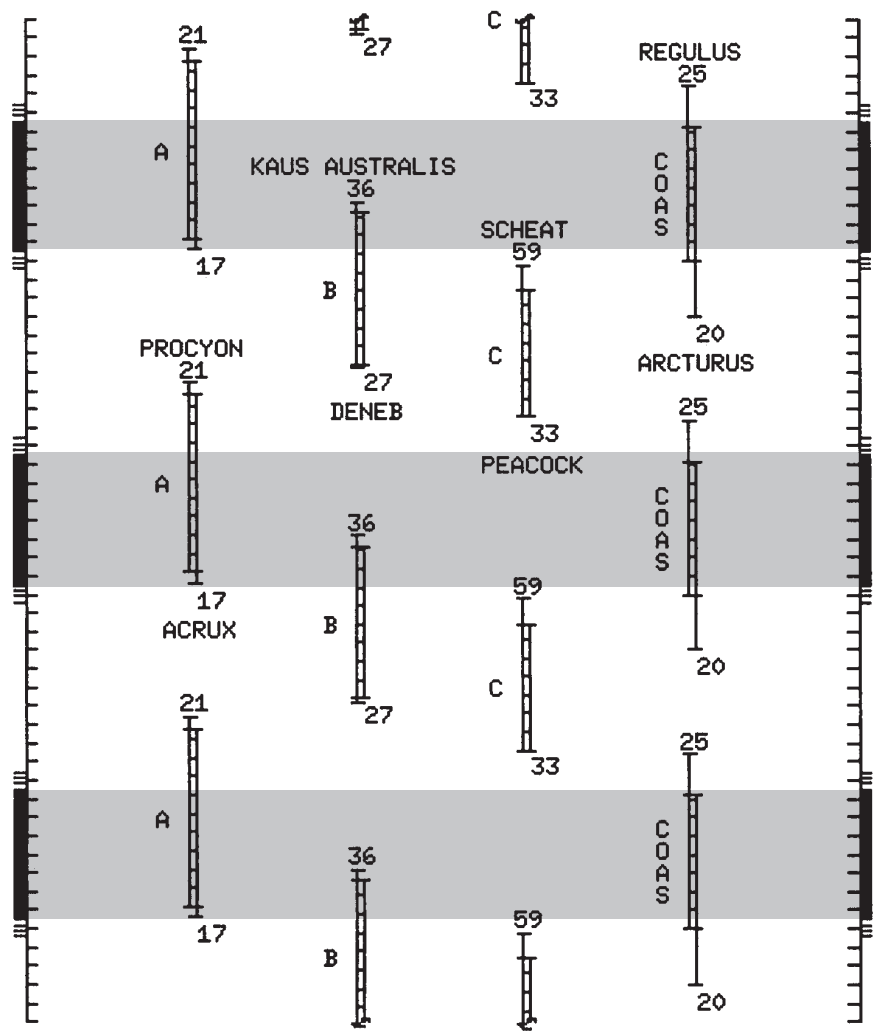
STAR PAIRS PAD

FS 2-2

ORB OPS/109/BAS 2



STAR PAIRS



MET Applicable: 01/01:0:0 - 11/0:0:0  
Date L/O: 02/28/02  
GMT L/O: 059/11:52:32

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## GPS

|                                         |         |
|-----------------------------------------|---------|
| GPS DEVELOPMENT FLIGHT TEST .....       | FS 3-3  |
| OPS 2 GPS TEST .....                    | FS 3-3  |
| SINGLE STRING GLOBAL POSITIONING SYSTEM |         |
| (DTO 700-14) .....                      | FS 3-5  |
| MAGR UNSTOW .....                       | FS 3-5  |
| ONORBIT SETUP .....                     | FS 3-7  |
| ENTRY SETUP .....                       | FS 3-8  |
| PGSC SCHEMATIC .....                    | FS 3-11 |
| DOWNLINK (CONTINGENCY) .....            | FS 3-12 |
| HARD DRIVE SWAP (CONTINGENCY) ..        | FS 3-13 |

GPS

GPS

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## GPS DEVELOPMENT FLIGHT TEST

### OPS 2 GPS TEST

1. GPS POWER UP
- A12      ✓GPS PWR – ON
- CRT      \*
- \* If receiver not powered, \*
  - \* GPS PWR – ON \*
  - \* ✓GPS ENCRYPT – NORMAL \*
  - \* Wait at least 30 sec \*
  - \* GNC I/O RESET \*
  - \* \*
  - \* GNC 55 GPS STATUS \*
  - \* INIT – ITEM 15 EXEC (\*) \*
  - \* ✓MODE – INIT \*
  - \* NAV – ITEM 18 EXEC (\*) \*
  - \* ✓MODE – INS \*
  - \* On MCC GO, proceed to next step \*
2. GPS SHORT PWR CYCLE
- CRT      ✓NAV – ITEM 18 (\*)
- A12      GPS PWR – OFF (5 sec), ON
- (expect 'BCE STRG 2 GPS')
- Wait 10 sec
- CRT      GNC I/O RESET
- ✓MODE – INS
- ✓SATELLITES – tracking 4 satellites
- ✓MCC before proceeding
3. GPS LONG PWR CYCLE
- CRT      ✓NAV – ITEM 18 (\*)
- A12      GPS PWR – OFF (at least 30 sec), ON
- (expect 'BCE STRG 2 GPS')
- Wait at least 30 sec
- CRT      GNC I/O RESET

Cont next page

CRT

INIT – ITEM 15 EXEC (\*)

✓MODE – INIT

NAV – ITEM 18 EXEC (\*)

✓MODE – INS

✓SATELLITES – tracking 4 satellites  
(may take up to 12 min to acquire 4 or more  
satellites)

✓MCC before proceeding

4. GPS FILTER RESTART

✓MODE – INS

RESTART – ITEM 21 EXEC (\*)

Wait 5 sec

✓RESTART – ITEM 21 (no \*)

**SINGLE STRING GLOBAL POSITIONING SYSTEM  
(DTO 700-14)**

**MAGR UNSTOW**

- MA9D 1. Open locker door
2. ✓Temp strip – rightmost three blocks black
- |       |                                            |   |
|-------|--------------------------------------------|---|
|       | * If Temp strip rightmost three blocks not | * |
|       | * black (temp > 122 degF)                  | * |
| MO13Q | * DC UTIL PWR – OFF                        | * |
|       | * Wait 10 min                              | * |
| MA9D  | * Expansion Chassis pwr – off              | * |
|       | * ✓Temp strip rightmost three blocks black | * |
| MO13Q | * DC UTIL PWR – ON                         | * |
| MA9D  | * Expansion Chassis pwr – on               | * |
|       | * PGSC pwr – on                            | * |
|       | * ✓MCC                                     | * |
- MA9D 3. Remove PGSC top foam assy and MAGR PGSC
- MAGR 4. Open PGSC monitor  
PGSC ✓Data Display
- \* If data not updating, ✓MCC \*
5. Press [ESC] twice to exit data collection program  
✓‘C:\GPS>’ appears on display
6. Enter ‘cflash’ [RETURN]  
Record number of files in directory from upper  
flash card. Press [ENTER] and then record  
number of files in directory from lower flash  
card. Report to MCC and press [ENTER]

**NOTE**

PGSC may be stowed in locker w/top foam  
assy in place and locker door closed during  
orbit operations (crew option). Steps 7-14  
are reqd only if PGSC remains out of locker

Cont next page

- 7. PGSC pwr – off  
Expansion Chassis pwr – off

MO13Q 8. DC UTIL PWR – OFF

NOTE

Leave GPS RS-422 data cable connected to inside locker door interface. Demate cables at PGSC Expansion Chassis

MA9D 9. Demate locker door internal power and GPS RS-422 connections at PGSC Expansion Chassis

10. Demate power and GPS RS-422 pre-routed cables from outside of locker door

MAGR PGSC 11. Mate power and GPS RS-422 data pre-routed cables to PGSC Expansion Chassis

12. Place PGSC outside of locker; stow top foam assy and close locker door

MO13Q 13. DC UTIL PWR – ON

MAGR PGSC 14. Expansion Chassis pwr – on  
PGSC pwr – on



## MAGR ONORBIT SETUP

MAGR  
PGSC

1. At 'C:\GPS>', enter 'GPS'
2. At intro display, select 'orbit' [RETURN]
  - \* If error msg appears, ✓MCC \*
3. When intro display returns, press [F1]
4. ✓Data Display is updating
5. ✓Data is being recorded
  - If recording, the following should appear in  
FLAGS blocks:  
'Recording'  
Filename  
'ON'
  - \* If not recording, \*
  - \* enter [F8] to toggle recording \*
6. Record approx GMT DATE/TIME from display  
\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_  
  
Record drive letter and filename located in  
FLAGS block \_\_\_\_\_.\_\_\_\_\_.\_\_\_\_\_  
  
Record Disk space remaining in Mbytes located  
below FLAGS block \_\_\_\_\_ Mb
7. Call MCC (report step 6 results)

## 1

1. ✓ Data Display is updating

If recording, following should appear in FLAGS blocks:

```
* If not recording, *
* enter [F8] to toggle recording *
```

Record drive letter and filename located in  
 FLAGS block \_\_\_\_:\_\_\_\_.\_\_\_\_

4. Call MCC (report step 3 results)

NOTE

6. PGSC pwr – off  
Expansion Chassis pwr – off

Cont next page

- MA9D 9. Mate power and GPS RS-422 pre-routed cables to locker door external connectors
10. Open locker door and mate locker door internal power and GPS RS-422 cable connectors to PGSC Expansion Chassis
- MO13Q 11. DC UTIL PWR – ON
- MAGR 12. Expansion Chassis pwr – on  
PGSC PGSC pwr – on
13. ✓DOS prompt appears on display  
✓Expansion Chassis fan running
14. ✓Flash cards (two) installed in PCMCIA slots
- MA9D 15. Unstow top foam assy
- MAGR 16. At 'C:\GPS>' prompt, enter 'dflash' to erase data  
PGSC on PCMCIA cards
17. When DOS prompt returns, enter 'GPS'
18. At intro display, select 'entry' [RETURN]
- \* If error msg appears, ✓MCC \*
- MAGR 19. ✓Data Display is updating  
PGSC
20. ✓Data recording OFF (lower right corner of screen)

NOTE

For Entry configuration, recording should automatically remain OFF while in MM201. Recording will automatically resume when MM301 is detected

- \* If recording, press [F8] to toggle \*
- \* recording OFF \*

Cont next page

21. Record approx GMT DATE/TIME from display  
\_\_\_\_:\_\_\_\_:\_\_\_\_

22. Call MCC (report step 21 result)

MA9D 23. Close monitor

24. Place PGSC inside locker and insert top foam  
assy

Close locker door

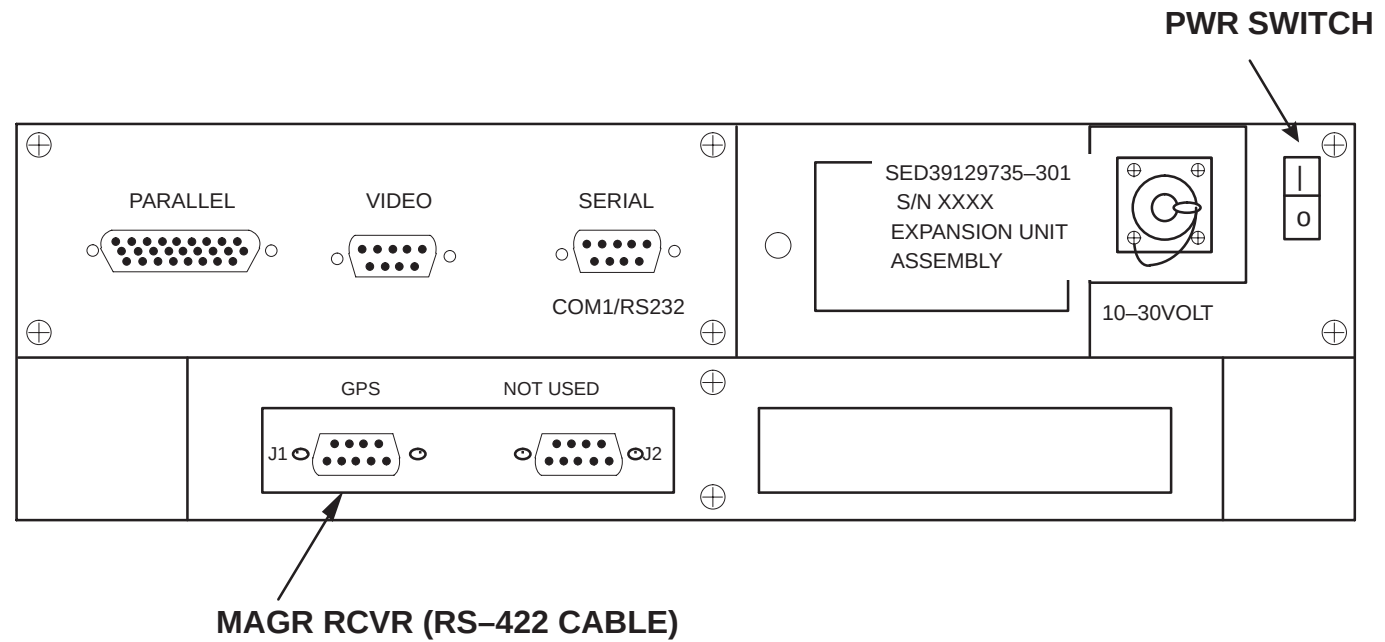
✓PGSC cable connections secure

✓Locker fan running

## MAGR PGSC SCHEMATIC

FS 3-11

ORB OPS/109/BAS 2



## MAGR DOWNLINK (CONTINGENCY)

### NOTE

GPS Filenames are: GPSXXX.001 –  
GPSXXX.999 where XXX is Julian day.

Files are located in C:\GPS subdirectory.

When Recording Bit toggled OFF/ON,  
new file is created

- |      |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PGSC | <ol style="list-style-type: none"><li>1. Exit GPS program (press [ESC] twice)</li><li>2. Insert OCA data disk into floppy drive</li><li>3. From 'C:\GPS&gt;' subdirectory, enter "copy<br/>GPSXXX.XXX a:" to copy GPS data file to<br/>floppy drive where "GPSXXX.XXX" is GPS data<br/>file to be downlinked</li><li>4. Remove disk from floppy drive</li><li>5. Perform MAGR ONORBIT SETUP, steps 1 thru 4</li></ol> |
| OCA  | <ol style="list-style-type: none"><li>6. Insert OCA data disk into OCA PGSC floppy drive<br/>Go to OCA DOWNLINK VIA GROUND CMD<br/>(<u>OCA</u>) to downlink desired file(s)</li></ol>                                                                                                                                                                                                                                 |

## **MAGR HARD DRIVE SWAP (CONTINGENCY)**

- |              |                                                                                                                   |
|--------------|-------------------------------------------------------------------------------------------------------------------|
| MAGR<br>PGSC | 1. Enter ESC twice to exit data collection program<br>✓'C:\GPS>' appears on display                               |
|              | 2. PGSC pwr – off<br>Expansion Chassis pwr – off                                                                  |
| MA9D         | 3. Obtain spare DTO 700–14 3GB hard drive from<br>foam assy and remove packaging                                  |
| MAGR<br>PGSC | 4. Open monitor                                                                                                   |
|              | 5. Pull keyboard release latches (same latches<br>used to open monitor) forward until 'snap';<br>lift keyboard up |
|              | 6. Using blue tabs, pull up handle on hard drive<br>(hard drive is located in front, right–hand side)             |
|              | 7. Pull up and back on handle to remove hard drive                                                                |
| MA9D         | 8. Stow removed hard drive in foam assy                                                                           |
| MAGR<br>PGSC | 9. Place fresh hard drive in PGSC and snap handle<br>into place to secure                                         |
|              | 10. Pull keyboard release latches forward and close<br>keyboard                                                   |
|              | 11. Expansion Chassis pwr – on<br>PGSC pwr – on<br>✓DOS prompt appears on display                                 |

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REBOOST

AUTO REBOOST ..... FS 4-2

REBOOST

FS 4-1

ORB OPS/109/BAS 2

## REBOOST

- O14,  
O15,  
O16

- ## GNC 20 DAP CONFIG

If Reboost Config 1 or 4:

If Reboost Config 3:

#### 4. Set up Future Reboost

GNC UNIV PTG

START TIME – ITEM 1 +      +      +      +     

EXEC

RBST – ITEM 25 EXEC (FUT – \*)

- C3

Reboost can be aborted with an item 26 on UNIV PTG or by selecting FREE on the DAP

- C3  
O14,  
O15,  
O16

Pri RJD LOGIC, DRIVER (sixteen) – as reqd

FS 4-2

ORB OPS/109/BAS 2

## GALLEY IODINE REMOVAL

|                                       |        |
|---------------------------------------|--------|
| GALLEY IODINE REMOVAL ASSEMBLY (GIRA) |        |
| INSTALLATION .....                    | FS 6-2 |
| GALLEY OVERNIGHT CONFIG .....         | FS 6-4 |
| MORNING CONFIG .....                  | FS 6-4 |
| WATER SAMPLE .....                    | FS 6-5 |
| GIRA STOWAGE .....                    | FS 6-6 |

GIRA

## **GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION**

(Time: 1 hr)

### EQUIPMENT PREPARATION

Unstow following from MF28E:  
MCV (short metal cartridge)  
ACTEX hose (labeled #3,4,5)  
ACTEX (large insulated cartridge labeled #2,3)  
Hose/Microbe filter (wrapped in washcloth)  
assembly (labeled #1,2)

### NOTE

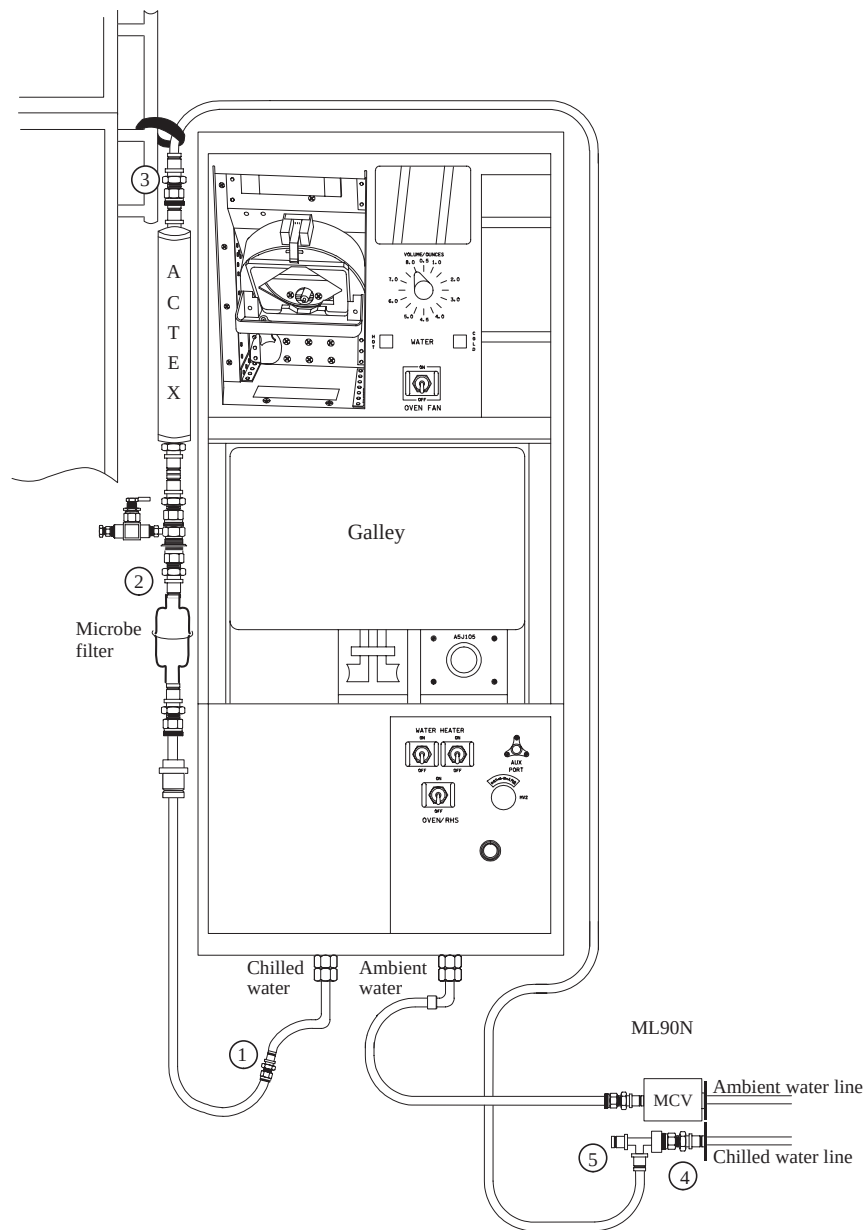
Have towel ready for possible release of water  
when mating/demating any connections.  
Numbered figure labels are indicated in ()

**GIRA**

- |        |                                                                                                                                                                                  |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ML90N  | 1. Remove tie-wrap (if present) connecting Galley Ambient and Chilled hoses<br>Detach Galley Ambient and Chilled hoses from QD bracket                                           |
|        | 2. Install MCV on Ambient (uninsulated) supply line by connecting MCV to Ambient QD at QD bracket and connecting Galley Ambient supply hose to other end of MCV (See figure 6-1) |
|        | 3. Connect Hose (#1) assembly to Galley Chilled (insulated) hose                                                                                                                 |
|        | 4. Attach ACTEX (#2) to Hose/Microbe filter assembly (#2)                                                                                                                        |
|        | 5. Attach ACTEX hose (#3) to ACTEX assembly (#3)                                                                                                                                 |
|        | 6. Connect ACTEX hose (#4) to Chilled QD at QD bracket                                                                                                                           |
|        | 7. Secure ACTEX assembly as reqd (Reference figure 6-1)<br>Ensure access to locker MF14O                                                                                         |
| Galley | 8. Circulate water through galley:<br>OVEN/RHS – OFF, ON                                                                                                                         |

FS 6-2

ORB OPS/109/BAS



GIRA2.ai

Figure 6–1.– GIRA configuration (connections and routing).

## **GALLEY OVERNIGHT CONFIG**

(Time: 5 min)

### NOTE

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

- |        |                                                                                             |
|--------|---------------------------------------------------------------------------------------------|
| ML90N  | 1. Disconnect Galley Chilled hose from GIRA hose (#1)                                       |
|        | 2. Connect Galley Chilled hose to free end (#5) of Tee attached to Chilled QD at QD bracket |
| Galley | 3. Circulate water through galley:<br>OVEN/RHS – OFF,ON                                     |

## **GALLEY MORNING CONFIG**

(Time: 5 min)

### NOTE

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

- |        |                                                                                      |
|--------|--------------------------------------------------------------------------------------|
| ML90N  | 1. Disconnect Galley Chilled hose from Tee (#5) attached to Chilled QD at QD bracket |
|        | 2. Connect Galley Chilled hose to GIRA hose (#1)                                     |
| Galley | 3. Circulate water through galley:<br>OVEN/RHS – OFF,ON                              |

## **GALLEY WATER SAMPLE**

(Time: 5 min)

### NOTE

Each Galley Water Sample Kit consists of a Ziploc-type bag containing a Sample Bag and Teflon Luer adapter. The Luer adapter is inside a sterile pouch

Retrieve Galley Water Sample Kits from \_\_\_\_\_:

1. Un-package Luer adapter and Sample Bag from one kit
2. Remove tethered cap from bag sample port
3. Affix Luer adapter to Sample Bag
4. Wipe RHS needle with Wet Wipe
5. Fill one Sample Bag with 8 oz hot water
6. Detach Luer adapter from Sample Bag
7. Replace cap on bag sample port
8. Fill out label (circle hot or cold, record MET)
9. Return Sample Bag and Luer adapter to Galley Water Sample Kit
10. Repeat steps 1 thru 9 EXCEPT, in step 5, fill Sample Bag with 8 oz chilled water
11. Stow Sample Kits in an empty fresh food locker

## GIRA STOWAGE

(Time: 15 min)

### NOTE

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

- |                |                                                                                                                                                                                                            |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MAR/<br>Galley | 1. Remove all black Velcro/Gray Tape from Chilled line assembly and hoses<br>Leave insulation covers in place                                                                                              |
| ML90N          | 2. Detach Galley Chilled hose (insulated) from Hose/ Microbe filter (#1)<br>Disconnect ACTEX hose from QD bracket                                                                                          |
|                | 3. Detach Galley Ambient hose (uninsulated) from MCV<br>Remove MCV from QD bracket<br>Reconnect Galley Ambient and Chilled hoses to QD bracket                                                             |
|                | 4. Break down assembly formerly installed on Chilled line into sub-assemblies as follows:<br>Between ACTEX hose and ACTEX cartridge (#3)<br>Between ACTEX cartridge and Hose/ Microbe filter assembly (#2) |
|                | 5. Resecure Galley Ambient and Chilled hoses with tie wrap (if present)                                                                                                                                    |
|                | 6. Return hardware to launch stowage location                                                                                                                                                              |



FRED

|                  |        |
|------------------|--------|
| FRED SETUP ..... | FS 7-2 |
| STOWAGE .....    | FS 7-3 |

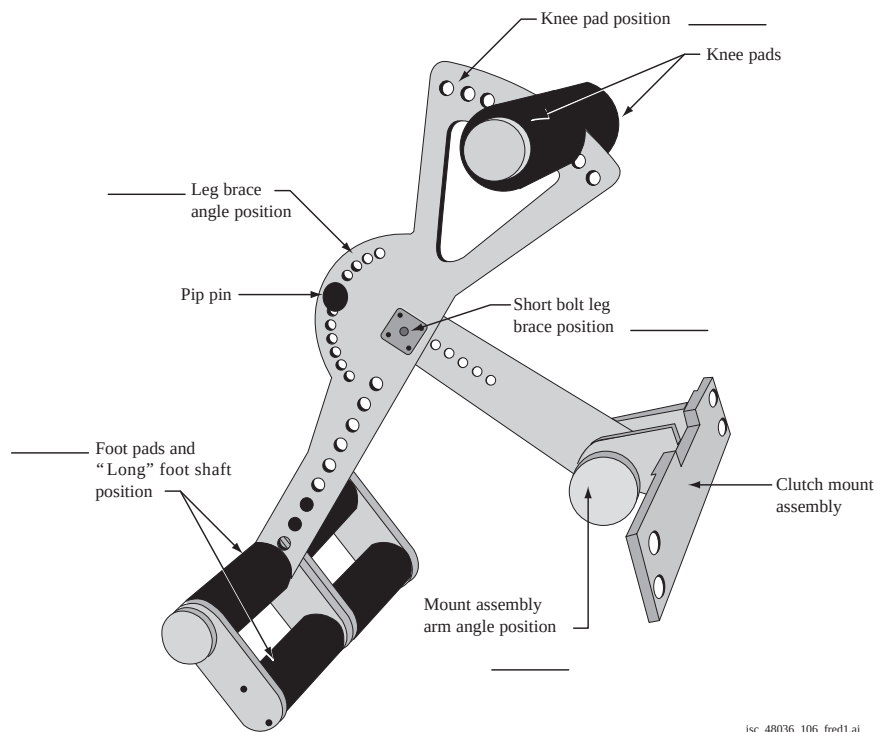
FRED

FS 7-1

ORB OPS/109/BAS

## FRED SETUP

- MF57G, A16 1. Unstow FRED tray and FRED leg brace
- A8L 2. Attach clutch bracket mount assy below aft panel A8 with captive fasteners (four)
3. Assemble FRED as shown and adjust to desired position. Note positions



FRED

Cont next page

FS 7-2

ORB OPS/109/BAS

## **FRED STOWAGE**

1. Disassemble FRED and set clutch bracket mount  
assy to #8 angle position
- MF57G 2. Stow FRED in locker tray cushion. Re-adjust  
clutch bracket mount assy as required
- A16 3. Stow leg brace

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DETAILED SUPPLEMENTARY OBJECTIVES (DSOs)

DSO 490 (PROTOCOL B), BIOAVAILABILITY  
& PERFORMANCE EFFECTS OF  
PROMETHAZINE (PMZ) DURING SPACE FLIGHT .. FS 9-3  
DSO 634, SLEEP-WAKE ACTIGRAPHY ..... FS 9-3 |

MONITORING LATENT VIRUS REACTIVATION  
AND SHEDDING (DSO 493) ..... FS 9-5  
SALIVA COLLECTION (ALL FLIGHT DAYS) .... FS 9-5  
VIRAL CULTURE COLLECTION  
(CONTINGENCY ONLY) ..... FS 9-6 |

DSOs

DSOs

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**DSO 490 (PROTOCOL B), BIOAVAILABILITY &  
PERFORMANCE EFFECTS OF PROMETHAZINE (PMZ)  
DURING SPACE FLIGHT**

**DSO 634, SLEEP-WAKE ACTIGRAPHY**

**ASAP** after entry into orbit:

A. DON ACTILIGHT WATCH

- MF14G 1. Unstow Actilight Watch

NOTE

If necessary to remove Actilight Watch,  
record doff/don time on FLIGHT SLEEP  
LOG

2. Don Actilight Watch on non-dominant arm  
and wear continuously thruout mission
3. Deploy FLIGHT SLEEP LOG and record  
required information daily (within 15 min  
after waking)

NOTE

Perform B. PMZ PROTOCOL if SMS  
is experienced. If unable to collect  
saliva sample pre-dose PMZ, collect  
saliva sample at some other  
drug-free time during mission

B. PMZ PROTOCOL

- MF14H 1. Unstow:  
Saliva Sample Kit  
SALIVA SAMPLE/KSS Cue Card
2. Temp stow SALIVA SAMPLE/KSS Cue Card  
w/Saliva Sample Kit

If PMZ dose is taken pre-sleep:

3. Collect saliva samples per SALIVA  
SAMPLE/KSS Cue Card; record MET  
before sleep, immediately upon wakeup,  
and 24,36, and 48 hrs post-dose

Cont next page

If second PMZ dose is taken within 48 hr:

4. Begin PMZ protocol again; record MET in second column of SALIVA SAMPLE/KSS Cue Card
5. Collect saliva samples per SALIVA SAMPLE/KSS Cue Card
  - a. Unstow appropriate saliva tube

NOTE

Do not touch cotton w/fingers.  
Do not bite/chew cotton

- b. Place small cotton roll in mouth and lightly roll w/tongue ~2 min
- c. Replace saturated cotton roll into tube
- d. Tighten cap
- e. Record MET on tube and on SALIVA SAMPLE/KSS Cue Card
- f. Record additional information required on SALIVA SAMPLE/KSS Cue Card
- g. Stow tube in Saliva Sample Kit
- h. Temp stow Saliva Sample Kit
- i. Repeat steps a–h following schedule on SALIVA SAMPLE/KSS Cue Card

MF14H 6. If last saliva sample, stow Saliva Sample Kit

C. DOFFING ACTILIGHT WATCH

On final day of orbit:

MF14G 1. Remove Actilight Watch, stow



**MONITORING LATENT VIRUS REACTIVATION AND  
SHEDDING (DSO 493)**

**SALIVA COLLECTION (ALL FLIGHT DAYS)**

- MF280      Immediately post-sleep (before brushing teeth):
1. Unstow:  
Saliva Kit Assy

NOTE

DO NOT touch cotton w/fingers.  
DO NOT bite down or chew cotton

2. Remove Salivette Bag Assy w/cotton rolls from 'UNUSED' pocket
3. Open Salivette Bag Assy w/cotton roll, remove cotton roll using Forceps
4. Lightly roll cotton in mouth w/tongue until saturated (2 min max)
5. Replace Salivette Bag Assy w/cotton rolls in 'UNUSED' pocket
6. Place cotton roll in Collection Bag Assy by guiding w/tongue
7. Close seal on Collection Bag Assy, remove clamp, mix preservative w/cotton roll
8. Reclamp across top of Collection Bag Assy
9. Stow Collection Bag Assy in 'USED' pocket
10. Temp stow Saliva Kit
11. If last FD, stow Saliva Kit

## **VIRAL CULTURE COLLECTION (CONTINGENCY ONLY) |**

If lesion appears:

- Saliva Kit
1. Unstow: Viral Culturette (1)
  2. Uncap culturette, remove swab, swab lesion once
  3. Reinsert swab, recap culturette  
Squeeze bottom of culturette to break Ampule
  4. Record MET, ID on Viral Culturette, stow

CUE  
CARDS

CUE CARD CONFIGURATION

NOT FLOWN

FS 10-1

ORB OPS/109/BAS

CUE  
CARDS

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NOT FLOWN

FS 10-2

ORB OPS/109/BAS

TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
FLIGHT DAY 3 DOCKING  
CO2 ABSORBER REPLACEMENT**  
(7 Crewmembers/1 Shift/FD 1-14)

| FLIGHT DAY | POS A | POS B | CK CMPLT |
|------------|-------|-------|----------|
| LAUNCH     | 1*    | 2     |          |
| PRE FD1    | "     | 3     |          |
| POST FD2   | 4     | 5     |          |
| PRE FD2    | 6     | 7     |          |
| POST FD3   | 8     | 9     |          |
| PRE FD3    | 10    | "     |          |
| POST FD4   | 11    | 12    |          |
| PRE FD4    | 13    | "     |          |
| POST FD5   | 14    | 15    |          |
| PRE FD5    | 16    | "     |          |
| POST FD6   | 17    | 18    |          |
| PRE FD6    | 19    | "     |          |
| POST FD7   | 20    | 21    |          |
| PRE FD7    | 22    | "     |          |
| POST FD8   | 23    | 24    |          |
| PRE FD8    | 25    | "     |          |
| POST FD9   | 26    | 27    |          |
| PRE FD9    | 28    | 29    |          |
| POST FD10  | 30    | 31    |          |
| PRE FD10   | 32    | 33    |          |
| POST FD11  | 34    | 35    |          |
| PRE FD11   | 36    | 37    |          |
| POST FD12  | 38    | 39    | EOM      |
| PRE FD12   | 40    | "     |          |
| POST FD13  | 41    | 42    | EOM + 1  |
| PRE FD13   | 43    | 44    |          |
| POST FD14  | 45    | 46    | EOM + 2  |

\* Reseal LiOH cans w/Gray Tape and stow

ORB OPS-29a/109/O/A

**NOTE**

This card is specifically used for STS-109 mission with orbiter conducting single shift ops with crew size of 7

(reduced copy)

FAB USE ONLY

FS CC 10-2a

ORB OPS/109/BAS 2

TOP  
BACK OF 'SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT'

HOOK  
VELCRO

**LiOH CANISTER STOWAGE  
LOCATIONS**

MD52M (LiOH): Cans 3-31  
MA9J: Cans 32-40  
MA9C: Can 41  
Vol D: Cans 42-46

ORB OPS-29b/109/O/A

(reduced copy)

FAB USE ONLY

FS CC 10-2b

ORB OPS/109/BAS 2

TOP

HOOK  
VELCRO

HOOK  
VELCRO

### ORBIT BURN MONITOR

|                                   |                                                                            |          |          |                                        |
|-----------------------------------|----------------------------------------------------------------------------|----------|----------|----------------------------------------|
| <b>OMS TEMP*</b>                  |                                                                            | <b>L</b> | <b>R</b> |                                        |
| FU IN P $\geq$                    |                                                                            | 225      | 221      | OMS ENG FAIL                           |
| $\leq$                            |                                                                            | 211      | 200      | OMS PRPLT FAIL                         |
| or No FU IN P                     |                                                                            |          |          |                                        |
| <b>OMS PC* &amp; OMS</b> ↓        |                                                                            |          |          |                                        |
| ENG VLV 1 or 2 < 70               |                                                                            |          |          | OMS ENG FAIL                           |
| or OX IN P > 227                  |                                                                            |          |          |                                        |
| OX IN P $\leq$ 227                |                                                                            |          |          | OMS PRPLT FAIL                         |
| or No OX IN P                     |                                                                            |          |          |                                        |
| <b>OMS OX/FU TK P</b> (✓ENG IN P) |                                                                            |          |          |                                        |
| OX/FU LOW                         |                                                                            |          |          | He PRESS/VAP ISOL (two) – OP           |
|                                   |                                                                            |          |          | If aff TK P not incr:                  |
|                                   |                                                                            |          |          | OMS PRPLT FAIL                         |
| OX & FU HIGH                      |                                                                            |          |          | He PRESS/VAP ISOL (two) – CL           |
|                                   |                                                                            |          |          | Cycle He A(B) to maintain TK P 234–284 |
| <b>OMS N2 REG P HIGH or LOW</b>   |                                                                            |          |          | OMS ENG – ARM                          |
| <b>OMS N2 TK P LOW</b>            |                                                                            |          |          | At N2 TK P < 470:                      |
| (✓OMS/MPS)                        |                                                                            |          |          | OMS ENG – ARM                          |
| <b>OMS GMBL</b>                   | PRI fail                                                                   |          |          | L(R) OMS GMBL – SEC (twice)            |
|                                   | SEC fail                                                                   |          |          | If high RCS usage: OMS ENG FAIL        |
| <b>GPC</b>                        | <input type="checkbox"/> ( <input type="checkbox"/> ) &<br>Burning OMS aff |          |          | aff GPC PWR – OFF                      |
|                                   |                                                                            |          |          | If SEC GMBL avail:                     |
|                                   |                                                                            |          |          | aff MDM FF 1(4) – OFF, ON              |
|                                   |                                                                            |          |          | L(R) OMS GMBL – SEC (twice)            |
|                                   | SEC GMBL lost                                                              |          |          | If high RCS usage: OMS ENG FAIL        |
|                                   | 2 FAs lost                                                                 |          |          | ✓MAN SHUTDN                            |
| <b>I/O ERROR FA</b>               | 1(4)                                                                       |          |          | L(R) OMS GMBL – SEC                    |
|                                   |                                                                            |          |          | I/O RESET                              |
|                                   | 2 FAs lost                                                                 |          |          | If high RCS usage: OMS ENG FAIL        |
|                                   |                                                                            |          |          | ✓MAN SHUTDN                            |
|                                   |                                                                            |          |          |                                        |
| <b>BCE STRG D</b>                 |                                                                            |          |          | I/O RESET (if recov: >>)               |
|                                   | 1(4)                                                                       |          |          | If high RCS usage:                     |
|                                   |                                                                            |          |          | L(R) OMS GMBL – SEC (twice)            |
|                                   |                                                                            |          |          |                                        |
| <b>GPC SET SPLIT</b>              | Non–crit burn                                                              |          |          | STOP BURN: OMS ENG(s) – OFF            |
|                                   | Crit burn                                                                  |          |          | Go to "GPC" above                      |
| <b>I/O ERROR PCM</b>              |                                                                            |          |          | OI PCMMU PWR – 2(1)                    |
| <b>BCE BYP OA</b>                 |                                                                            |          |          | SM I/O RESET                           |

\*If XFD, BLDN, or sensor fail, monitor ENG IN P for off–nominal performance

ORB OPS–31a/MEDS/109/O/A

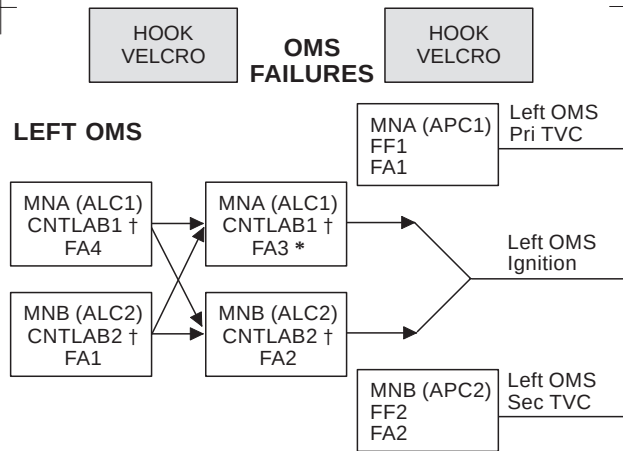
(reduced copy)

FAB USE ONLY

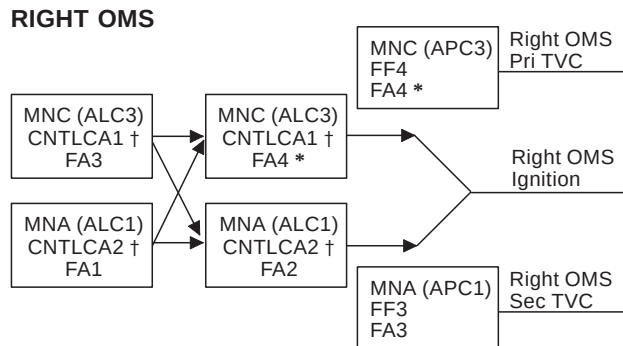
FS CC 10–3

ORB OPS/109/BAS

TOP  
BACK OF 'ORBIT BURN MONITOR'



† If CNTL AB1 or AB2 (CA1 or CA2) failed and ign path still exists at OMS fail, assume L(R) OMS ↓ is PRPLT FAIL  
 \* If L(R) Pc failed high during burn or FA3(4) failed, at L(R) OMS fail, no guidance downmode after L(R) OMS ENG switch OFF (TGO slow, ADI needles in error, 6 ft/s underburn)



| If two FA MDMs lost |                       |                            |
|---------------------|-----------------------|----------------------------|
| MDMs                | Preburn:<br>ENG – OFF | During burn:<br>MAN SHUTDN |
| 1,2                 | LEFT (TVC)            | BOTH                       |
| 1,3                 | RIGHT (IGN)           | LEFT                       |
| 1,4                 | LEFT (IGN)            | RIGHT                      |
| 2,3                 | LEFT (IGN)            | RIGHT                      |
| 2,4                 | RIGHT (IGN)           | LEFT                       |
| 3,4                 | RIGHT (TVC)           | BOTH                       |

ORB OPS-31b/109/O/A

(reduced copy)

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FS CC 10-4

ORB OPS/109/BAS



TOP

### FLIGHT SLEEP LOG

Crew ID: \_\_\_\_\_ Actilight Watch Dot Color: \_\_\_\_\_

Current Time: \_\_\_\_\_ [ddd:hh:mm (MET)]

Lights Out: \_\_\_\_\_ [ddd:hh:mm (MET)]

Lights On: \_\_\_\_\_ [ddd:hh:mm (MET)]

1. How long did you take to fall asleep last night? \_\_\_\_\_ (hrs) \_\_\_\_\_ (mins)
2. How long did you sleep last night? \_\_\_\_\_ (hrs) \_\_\_\_\_ (mins)
3. How many times did you awaken during the night? \_\_\_\_\_
4. After the end of your sleep period, how long did you remain in bed before getting up?  
\_\_\_\_\_ (hrs) \_\_\_\_\_ (mins)
5. Where did you sleep last night? [Flight deck / Middeck / Spacehab / Sleepstation]
6. Was your sleep disturbed: [Yes / No] (If Yes, check all that apply)  
☐ shuttle noise      ☐ mission duties      ☐ voids, # of voids: \_\_\_\_\_ ☐ other crew  
☐ physical discomfort      ☐ too hot      ☐ too cold      ☐ other \_\_\_\_\_
7. How did you sleep last night?  
poorly | \_\_\_\_\_ | great
8. How do you feel right now?  
sleepy | \_\_\_\_\_ | alert
9. Did you have any caffeine yesterday? [Yes / No] (If Yes, indicate how much)  
coffee \_\_\_\_\_ (cups)      caffeine pills \_\_\_\_\_ (100mg) \_\_\_\_\_ (200mg)  
tea \_\_\_\_\_ (cups)      caffeinated soft drinks \_\_\_\_\_ (glasses)  
Indicate how long before bed your last caffeine intake was: \_\_\_\_\_ (hrs) \_\_\_\_\_ (mins)
10. Did you experience any symptoms of SMS yesterday? [Yes / No]
11. Did you take any medications yesterday? [Yes / No / Decline] (If Yes, list all)  
\_\_\_\_\_
12. If Actilight Watch was removed, record times:  
Time Off: \_\_\_\_\_ Back On: \_\_\_\_\_  
[ddd:hh:mm (MET)] [ddd:hh:mm (MET)]

Comments:

ORB OPS-38a/109/O/A

(reduced copy)

FAB USE ONLY

FS CC 10-5

ORB OPS/109/BAS 1



TOP  
BACK OF 'FLIGHT SLEEP LOG'



HOOK  
VELCRO

HOOK  
VELCRO



ORB OPS-38b/109/O/A



(reduced copy)

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FS CC 10-6

ORB OPS/109/BAS 1



TOP

**SALIVA SAMPLE/KSS**

NOTE

To be performed ONLY if PMZ taken

Crewmember \_\_\_\_\_

Complete log:

1. Record saliva collection MET
2. Before PMZ, 1, 2, 4, 8, 24, 36, and 48 hours after PMZ dose:  
Record appropriate number (1 to 9) to describe sleepiness during the past 5 minutes using key shown:
  - 1 – very alert
  - 2
  - 3 – alert, normal level
  - 4
  - 5 – neither alert nor sleepy
  - 6
  - 7 – sleepy, but no effort to keep awake
  - 8
  - 9 – very sleepy, great effort to keep awake

| Activity Time (hr)<br>Post-PMZ Dose | PMZ Dose One     |                   | PMZ Dose Two     |                   |
|-------------------------------------|------------------|-------------------|------------------|-------------------|
|                                     | KSS<br>(see key) | Saliva Sample MET | KSS<br>(see key) | Saliva Sample MET |
| 0                                   |                  |                   |                  |                   |
| 1                                   |                  |                   |                  |                   |
| 2                                   |                  |                   |                  |                   |
| 4                                   |                  |                   |                  |                   |
| 8                                   |                  |                   |                  |                   |
| 24                                  |                  |                   |                  |                   |
| 36                                  |                  |                   |                  |                   |
| 48                                  |                  |                   |                  |                   |

ORB OPS-39a/109/O/A

(reduced copy)

FAB USE ONLY

FS CC 10-7

ORB OPS/109/BAS 1

TOP  
BACK OF 'SALIVA SAMPLE/KSS'

HOOK  
VELCRO

HOOK  
VELCRO

ORB OPS-39b/109/O/A

(reduced copy)

FAB USE ONLY

FS CC 10-8

ORB OPS/109/BAS 1

Space Shuttle Program  
FLIGHT DATA FILE

JSC-48036-109  
BASIC



# ORBIT OPS CHECKLIST

STS  
**109**

Flight Cover (trim bottom to expose tabs)

TOP

HOOK  
VELCRO

**SINGLE SHIFT ORBITER  
FLIGHT DAY 3 DOCKING  
CO2 ABSORBER REPLACEMENT**  
(7 Crewmembers/1 Shift/FD 1–14)

| FLIGHT DAY | POS A | POS B | CK CMPLT |
|------------|-------|-------|----------|
| LAUNCH     | 1*    | 2     |          |
| PRE FD1    | "     | 3     |          |
| POST FD2   | 4     | 5     |          |
| PRE FD2    | 6     | 7     |          |
| POST FD3   | 8     | 9     |          |
| PRE FD3    | 10    | "     |          |
| POST FD4   | 11    | 12    |          |
| PRE FD4    | 13    | "     |          |
| POST FD5   | 14    | 15    |          |
| PRE FD5    | 16    | "     |          |
| POST FD6   | 17    | 18    |          |
| PRE FD6    | 19    | "     |          |
| POST FD7   | 20    | 21    |          |
| PRE FD7    | 22    | "     |          |
| POST FD8   | 23    | 24    |          |
| PRE FD8    | 25    | "     |          |
| POST FD9   | 26    | 27    |          |
| PRE FD9    | 28    | 29    |          |
| POST FD10  | 30    | 31    |          |
| PRE FD10   | 32    | 33    |          |
| POST FD11  | 34    | 35    |          |
| PRE FD11   | 36    | 37    |          |
| POST FD12  | 38    | 39    | EOM      |
| PRE FD12   | 40    | "     |          |
| POST FD13  | 41    | 42    | EOM + 1  |
| PRE FD13   | 43    | 44    |          |
| POST FD14  | 45    | 46    | EOM + 2  |

\* Reseal LiOH cans w/Gray Tape and stow

ORB OPS–29a/109/O/A

NOTE

This card is specifically used for STS–109 mission with orbiter conducting single shift ops with crew size of 7

FS CC 10–2a (FQ)

TOP  
BACK OF 'SINGLE SHIFT ORBITER  
CO2 ABSORBER REPLACEMENT'

HOOK  
VELCRO

**LiOH CANISTER STOWAGE  
LOCATIONS**

MD52M (LiOH): Cans 3–31  
MA9J: Cans 32–40  
MA9C: Can 41  
Vol D: Cans 42–46

ORB OPS–29b/109/O/A

FS CC 10–2b (FQ)