

FLIGHT DATA FILE

Flight Plan

STS-49

(Flight Cycle Trajectory)

Mission Operations Directorate
Operations Division

Final
March 23, 1992

NOTE
All data in this Flight Plan reflects an April 16, 1992 launch. Official launch date is no earlier than April 30, 1992

| EVENT | CDT | | |
|------------------|-------|-----|----------|
| Launch | 04:44 | Thu | April 16 |
| Intelsat Grapple | 04:04 | Sun | April 19 |
| Intelsat Deploy | 07:29 | Sun | April 19 |
| EDW Landing | 04:39 | Thu | April 23 |



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

BRNH CHIEF
B. NUTE
DH41
BOND




MISSION OPERATIONS DIRECTORATE

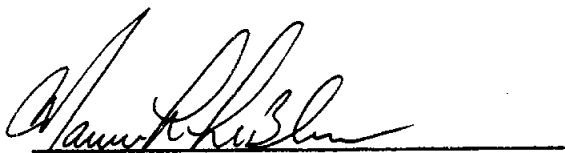
STS-49 FLIGHT PLAN

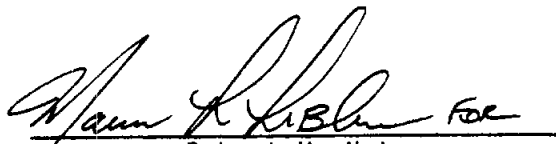
FINAL
March 23, 1992


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| | FLT PLN-1212 | FLT PLN-1248 | MULTI-585 |
| | FLT PLN-1215 | FLT PLN-1256A | MULTI-587C |
| | FLT PLN-1216 | FLT PLN-1257 | MULTI-592A |
| | FLT PLN-1217(I) | FLT PLN-1261 | MULTI-596 |
| | FLT PLN-1219 | FLT PLN-1262 | MULTI-606A |
| | FLT PLN-1220 | FLT PLN-1263 | MULTI-618 |
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(*) - Omit from flight book

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| DAP B8..... | 6-15 | FLT PLN-20b/49/0/A |
| B8..... | 6-15 | FLT PLN-21a/49/0/A |
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INTRODUCTION

The STS-49 Flight Plan is the flight data file article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Rendezvous, EVA, Deorbit Prep, and Entry Checklists. The detailed rendezvous timelines and procedures are in the Rendezvous Checklist. The detailed EVA timelines and procedures are in the EVA Checklist. The deploy procedures required during the deploy time frame are in the Rendezvous Checklist. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-49 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the Flight Cycle version of the STS-49 Flight Initialization Data Pack.

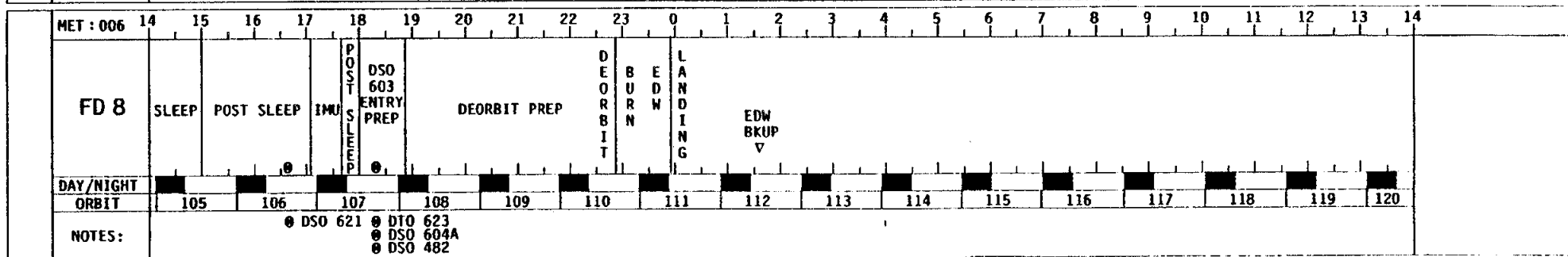
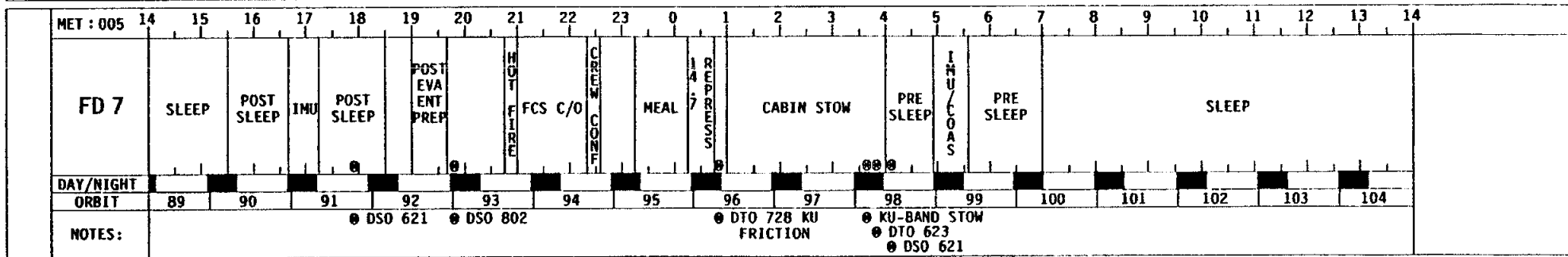
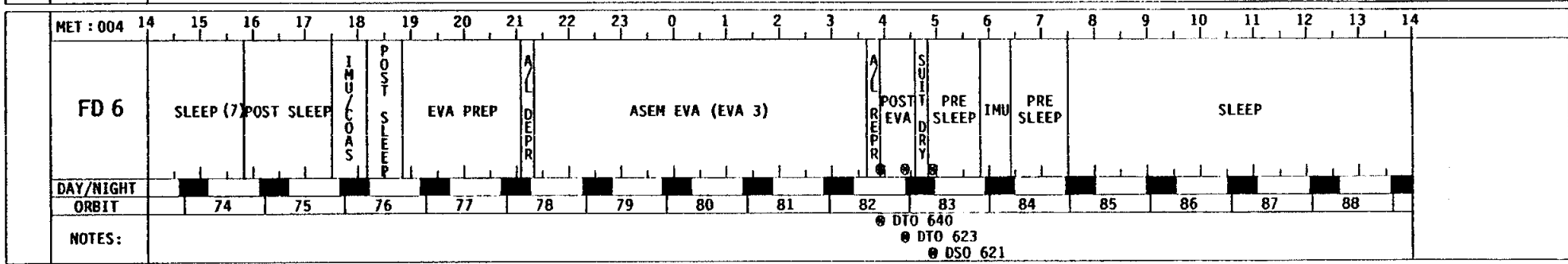
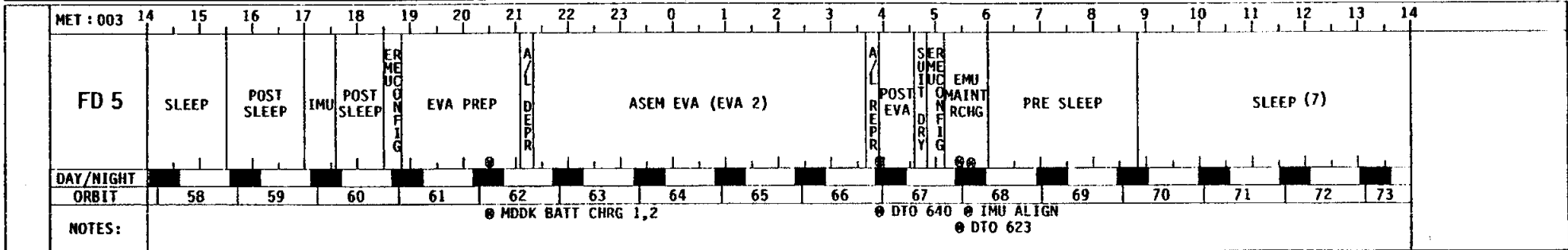
Although launch is planned for no earlier than April 30, 1992, the flight profile used for this Flight Plan is for a launch date of April 16, 1992, at 04:44 CDT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, Rev A, PCN-2, June 1991, has been used to build the timelines contained in this Flight Plan. Crew awake time prior to launch has been increased (launch -8:00 hours) to accommodate crewmembers' circadian rhythm and on-orbit sleep cycles.

The timeline formats used in this Flight Plan are based on JSC-19933, Timeline Format Definitions and Standard Notes, Rev C, May 1990.

STS-49 OVERVIEW

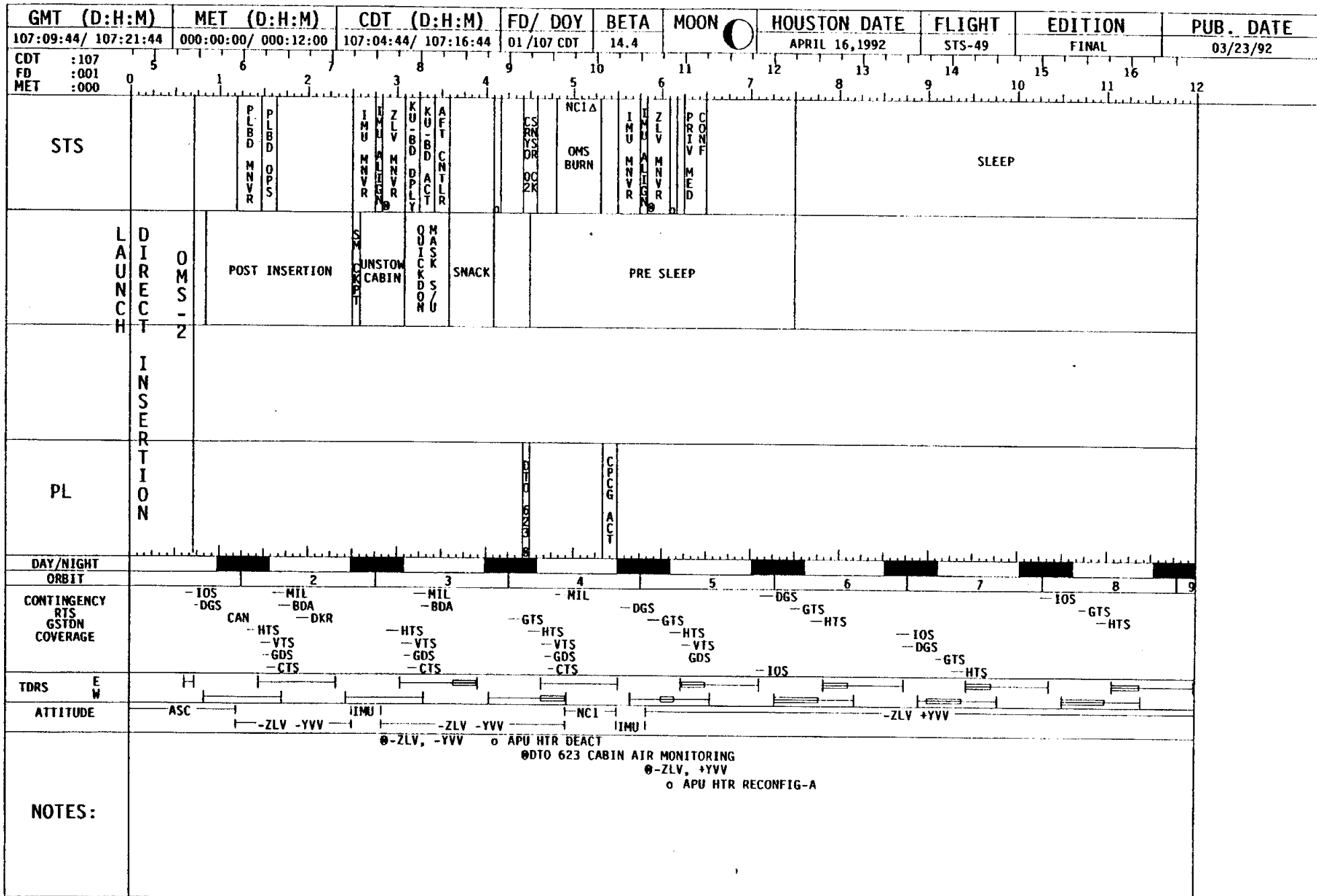
FLIGHT: STS-49 EDITION: FINAL PUB. DATE: 03/23/92



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SUMMARY TIMELINE

SUMMARY TIMELINE



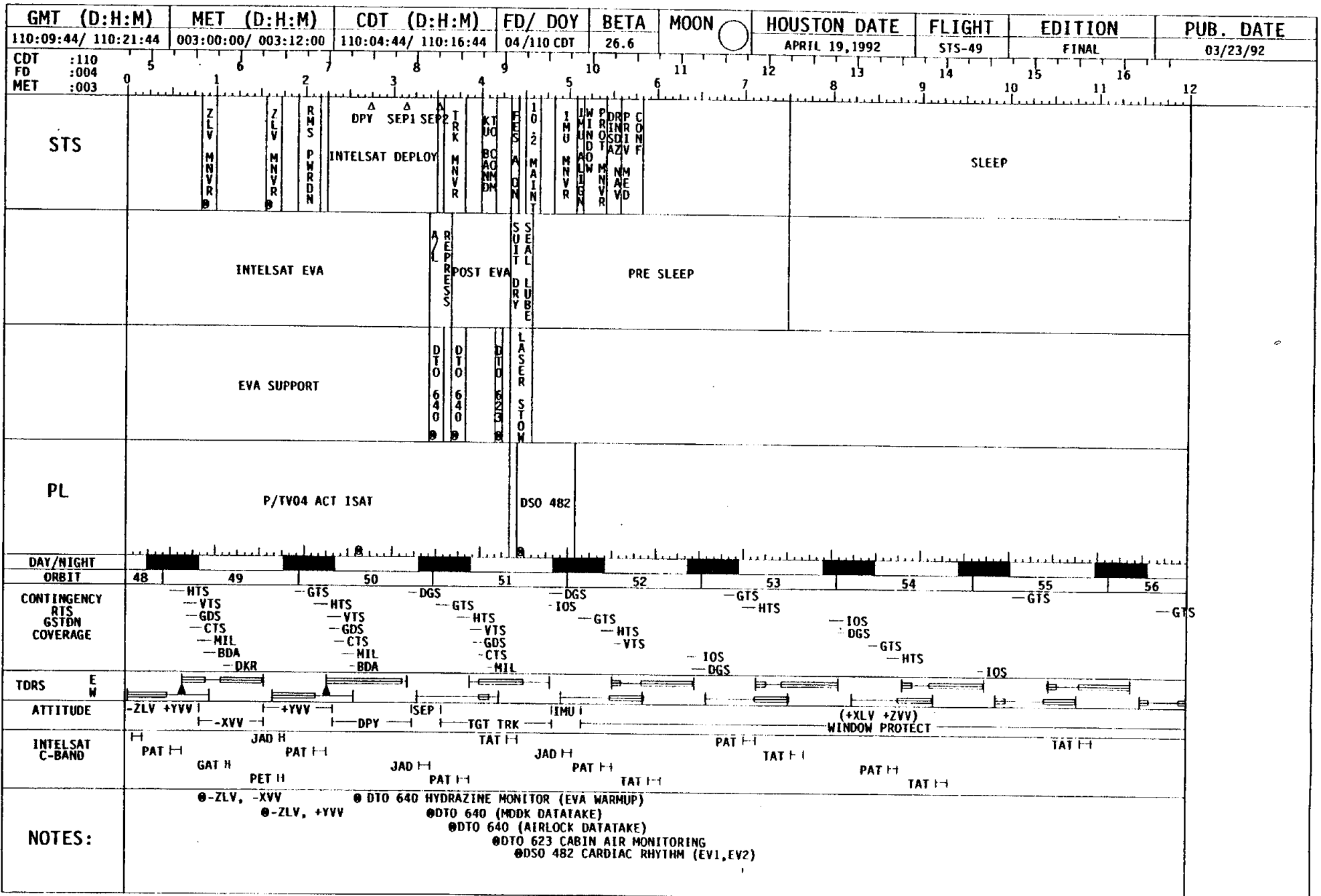
| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|----------------------|----------------------|------------|------|------|----------------|--------|---------|-----------|
| 107:21:44/ 108:09:44 | 000:12:00/ 001:00:00 | 107:16:44/ 108:04:44 | 01/107 CDT | 16.5 | | APRIL 16, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :107 FD :001 MET :000 | | | | | | | | | |
| | | | | | | | | | |
| STS | SLEEP | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| PL | | | | | | | | | |
| DAY/NIGHT | | | | | | | | | |
| ORBIT | | | | | | | | | |
| CONTINGENCY RTS GSTDN COVERAGE | | | | | | | | | |
| TDRS E M | | | | | | | | | |
| ATTITUDE | | | | | | | | | |
| NOTES: | | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE | | | | | | | |
|---|--|-----------------------|--------------------------------|------|------|----------------|--------|---------|-----------|--|--|-------|--|--|--|--|
| 108:09:44 / 108:21:44 | 001:00:00 / 001:12:00 | 108:04:44 / 108:16:44 | 02 / 108 CDT | 18.6 | ☉ | APRIL 17, 1992 | STS-49 | FINAL | 03/23/92 | | | | | | | |
| CDT :108 FD :002 MET :001 | 0 5 1 6 2 7 3 8 4 9 5 10 6 11 7 12 8 13 9 14 10 15 11 16 12 | | | | | | | | | | | | | | | |
| STS | <div style="display: flex; justify-content: space-between;"> <div style="width: 10%;">ESC MODE 3 OPP</div> <div style="width: 10%;">102 MAINT</div> <div style="width: 10%;">NC2 Δ RCS BURN</div> <div style="width: 10%;">ZLV MNV R</div> <div style="width: 10%;">PCONF MED</div> </div> | | | | | | | | | | | | | | | |
| | MEAL | EMU C/O (4 EMUs) | | | | PRE SLEEP | | | | | | SLEEP | | | | |
| | DTO 640 | DTO 651 ERGOMETER | | | | | | | | | | | | | | |
| PL | P/IV05P/IV02 ACT SETUP MODK FLTDK | | P/IV02/05 ACT FLT DECK/MODK | | | | | | | | | | | | | |
| DAY/NIGHT ORBIT | <div style="display: flex; justify-content: space-between;"> <div style="width: 10%;">17</div> <div style="width: 10%;">18</div> <div style="width: 10%;">19</div> <div style="width: 10%;">20</div> <div style="width: 10%;">21</div> <div style="width: 10%;">22</div> <div style="width: 10%;">23</div> <div style="width: 10%;">24</div> </div> | | | | | | | | | | | | | | | |
| CONTINGENCY RTS GSTDN COVERAGE | <div style="display: flex; justify-content: space-between;"> <div style="width: 10%;">-VTS -GDS -CTS -MIL -BDA -DKR</div> <div style="width: 10%;">-HTS -VTS -GDS -CTS -MIL -BDA -DKR</div> <div style="width: 10%;">-GTS -HTS -VTS -GDS -CTS -MIL -BDA</div> <div style="width: 10%;">-DGS -GTS -HTS -VTS -GDS -MIL</div> <div style="width: 10%;">IOS -GTS -HTS -VTS</div> <div style="width: 10%;">-HTS -IOS -DGS -GTS -HTS</div> <div style="width: 10%;">IOS -DGS -GTS</div> <div style="width: 10%;">IOS -GTS</div> </div> | | | | | | | | | | | | | | | |
| TDRS E W | <div style="display: flex; justify-content: space-between;"> <div style="width: 10%;">IOS</div> <div style="width: 10%;">BIASED -ZLV -YVV</div> <div style="width: 10%;">-DGS</div> <div style="width: 10%;">-GTS</div> <div style="width: 10%;">-HTS</div> <div style="width: 10%;">-IOS -DGS</div> <div style="width: 10%;">-GTS</div> <div style="width: 10%;">-ZLV -YVV</div> </div> | | | | | | | | | | | | | | | |
| ATTITUDE | <div style="display: flex; justify-content: space-between;"> <div style="width: 10%;">FNC2</div> <div style="width: 10%;">-ZLV, -YVV</div> </div> | | | | | | | | | | | | | | | |
| NOTES: | <p> ◎DTO 640 HYDRAZINE MONITOR (BASELINE DATATAKE) ◎DTO 651 FLUID LOAD (PLT,MS2) ◎DTO 648 ELECTRONIC STILL CAMERA ◎DTO 651 FLUID LOAD (PLT,MS2) ◎DTO 623 CABIN AIR MONITORING ○ RAD OUT NORM W/FES </p> | | | | | | | | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|----------------------|---|--|--------------|----------------------|--------------------------------------|---|--|----------------|
| 108:21:44/ 109:09:44 | 001:12:00/ 002:00:00 | 108:16:44/ 109:04:44 | 02/108 CDT | 20.7 | ☉ | APRIL 17, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :108 FD :002 MET :001 | 12 17 18 19 | 20 21 22 23 | 0 CDT:109 | 1 2 3 4 | 6 | MET:002 | | | |
| STS | SLEEP | IMU/COAS MNVVR ZLV MNVVR RMS HTR 102 MAINT | | | | | CIRC OMS BURN NPC OMS BURN ZLV MNVVR CBST | | |
| | | POST SLEEP | | | | | RMS PWR UP RMS PWR DN DTO 325 SIMO DUMP | | MEAL |
| | | | | | | | P/TVO3 SETUP P/TVO3 ACT DTO 325 | | |
| PL | | | | | | | P/TVO3 SETUP P/TVO10 DSO 802 | | |
| DAY/NIGHT ORBIT | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | |
| CONTINGENCY RTS GSTDN COVERAGE | -GTS | -DKR -GTS | -DKR -GTS | -DKR -GTS | -DKR -DGS -CAN | -DGS -CAN -MIL -BDA -DKR | -MIL -BDA -DKR -IOS -DGS | -CAN -VTS -CTS -MIL -BDA -DKR | -DGS -CAN |
| TDRS E W | | | | | | | | | |
| ATTITUDE | | -ZLV -YVV | IMU/COAS | | BIASED -ZLV -YVV | | CIRC NPC | BIASED -ZLV -YVV | |
| INTELSAT C-BAND | TAT H | GAT H | GAT H | JAD H | JAD I PET H | JAD I PET H | GAT H | PET H | GAT H PET H |
| NOTES: | | | ⊙AFT STATION ⊙BIASED -ZLV, -YVV ⊙RMS HEATER ACT/MCIU FILTER CK | | | ⊙DTO 325 WASTE AND SUPPLY H2O DUMP | ⊙CONTROL BOX START TIME | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|--|--|--------------------------------------|------------------------|----------------------|------------------------------|------------------------------|----------------------|-----------|
| 109:09:44/ 109:21:44 | 002:00:00/ 002:12:00 | 109:04:44/ 109:16:44 | 03/109 CDT | 22.7 | ☉ | APRIL 18, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :109 FD :003 MET :002 | 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 | | | | | | | | |
| STS | NSR Δ RCS BURN ZLV MNV R | | NC3 Δ OMS BURN ZLV MNV R | IO 2 PRINT MAINT | | | | SLEEP | |
| | P/TV05 SETUP MODK | P/TV05 ACT MODK | ESC MODE 3 OPP | ESC MODE 3 OPP | | | PRE SLEEP | | |
| | | DTO 651 ERGOMETER | | | | | | | |
| PL | | P/TV10 DSO 802 | | ISAT EVA REVIEW | | | | | |
| DAY/NIGHT | [Day/Night Cycle] | | | | | | | | |
| ORBIT | 33 34 35 36 37 38 39 40 | | | | | | | | |
| CONTINGENCY RTS GSTDN COVERAGE | -HTS -VTS -GDS -CTS -MIL -BDA -DKR | -HTS -VTS -GDS -CTS -MIL -BDA | -HTS -VTS -GDS -CTS -MIL | -HTS -VTS -GDS | -HTS -VTS -GDS | -IOS -DGS -GTS -HTS | -IOS -DGS -GTS -HTS | -IOS -GTS -HTS | -GTS |
| TDRS | [TDRS Coverage] | | | | | | | | |
| ATTITUDE | NSR - BIASED -ZLV -YVV - NC3 - BIASED -ZLV -YVV | | | | | | | | |
| INTELSAT C-BAND | GAT PAT JAD PAT TAT JAD PAT TAT PAT TAT PAT TAT | | | | | | | | |
| NOTES: | @DTO 651 FLUID LOAD (PLT,MS2) @BIASED -ZLV, -YVV @DSO 802 EDUCATIONAL ACTIVITIES @DTO 648 ELECTRONIC STILL CAMERA @DTO 651 FLUID LOAD (PLT,MS2) @DTO 623 CABIN AIR MONITORING @BIASED -ZLV, -YVV @ RAD OUT NORM W/FES | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|-----------------------|-----------------------|---------------------------|----------------------|----------------------|---------------------------------|--|--|-----------|
| 109:21:44 / 110:09:44 | 002:12:00 / 003:00:00 | 109:16:44 / 110:04:44 | 03/109 CDT | 24.6 | ☉ | APRIL 18, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :109 FD :003 MET :002 | 17 18 19 | 20 21 22 | 23 24 25 | 26 27 28 | 29 30 31 | 01 02 03 | 04 05 06 | 07 08 09 | MET:003 |
| STS | SLEEP | | NH2 Δ NC4 Δ | | | NCC Δ TI Δ | VBAR Δ | ZLV MNV R | |
| | | POST SLEEP | | P/TV04 SETUP ISAT | | EVA PREP MIP I/B N/B | IS 4 U O I T MIP I/B N/B | Δ CAPTURE BAR INST INTELSAT EVA | |
| | | | | | | EVA SUPPORT | RMS PWRUP | EVA SUPPORT | |
| PL | | | | | | | | P/TV04 ACT ISAT | |
| DAY/NIGHT ORBIT | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | |
| CONTINGENCY RTS GSTDN COVERAGE | -GTS | -DKR | -GTS | -DKR | -MIL -BDA -DKR | -BDA -DKR | -BDA -DKR | -GDS -CTS -MIL -BDA -DKR | |
| TDRS E W | | | | | | | | | |
| ATTITUDE | BIASED -ZLV -YVV | | JAD H INH2 I INC4 I | | | TGT TRK | | -ZLV +YVV INRTL | |
| INTELSAT C-BAND | TAT H GAT H | | JAD H GAT H | JAD H GAT H | JAD H PET H | GAT H PET H | GAT H PET H | GAT H | |
| NOTES: | | | | | | ● RMS HEATER ACT/MCIU FILTER CK | | ● -ZLV +YVV | |
| | | | | | | ● RAD OUT NORM/FES OFF | | | |



| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE | |
|---|-----------------------|-----------------------|--------------|-----------|-----------|----------------|-----------|--------------|-----------|--------------|
| 110:21:44 / 111:09:44 | 003:12:00 / 004:00:00 | 110:16:44 / 111:04:44 | 04 / 110 CDT | 28.4 | ☉ | APRIL 19, 1992 | STS-49 | FINAL | 03/23/92 | |
| CDT :110 FD :004 MET :003 | 12 17 18 19 | 20 21 22 23 | 0 1 2 3 4 | 0 1 2 3 4 | 0 1 2 3 4 | 0 1 2 3 4 | 0 1 2 3 4 | 0 1 2 3 4 | MET:004 | |
| STS | SLEEP | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| PL | | | | | | | | | | |
| DAY/NIGHT | | | | | | | | | | |
| ORBIT | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | |
| CONTINGENCY RTS GSTDN COVERAGE | -DKR | -GTS | -DKR | -DKR | -CAN | -MIL -BDA | -DKR | -IOS -DGS | -CAN | -MIL -BDA |
| TDRS | | | | | | | | | | |
| ATTITUDE | | | | | | | | | | |
| INTELSAT C-BAND | TAT H GAT H | | | | | | | | | |
| NOTES: | | | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|---------------------------|---|---|--------------------|--|--|---|----------------------|--|
| 111:21:44 / 112:09:44 | 004:12:00 / 005:00:00 | 111:16:44 / 112:04:44 | 05 / 111 CDT | 31.8 | ☾ | APRIL 20, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :111 FD :005 MET :004 | 12 17 18 19 20 21 22 23 0 | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0 | FD:006 16 | | | CDT:112 | | | MET:005 |
| STS | SLEEP (7) | | IMU/COAS MNV/R ZLV SDP/LMP DUM/STP SDP/LMP DUM/STP 10-2 MAINT MNV/R ASEM RMS PWRUP GON/AS OPS RAM/SCHEM TDS | | | | | | |
| | | POST SLEEP | | | | EVA PREP 4 S O U I T M I P / I B | | ASEM EVA (EVA 3) | |
| | | | | | | FILTER CLEANING | | | |
| PL | | | | ASEM EVA REVIEW | P / T V O 7 A S E M | | | P/TV07 ACT ASEM | |
| DAY/NIGHT ORBIT | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | HTS |
| CONTINGENCY RTS GSTDN COVERAGE | -GTS | -DKR | -GTS | -DKR | -CAN | -MIL -BDA -DKR | -MIL -BDA -DKR | -MIL -BDA -DKR | -HTS -VTS -GDS -CTS -MIL -BDA -DKR |
| TDRS E W | | | | | | | | | |
| ATTITUDE | | -ZLV -YVV | | | IMU/COAS | BIASED -ZLV -YVV | | | -XLV +ZVV |
| NOTES: | | | | | ⊙AFT STATION ⊙BIASED -ZLV, -YVV | | ⊙RMS HEATER ACT/MCIU FILTER CK ⊙-XLV, +ZVV | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE |
|---|---|-----------------------|--------------|------|------|----------------|--------|---------|-----------|
| 112:09:44 / 112:21:44 | 005:00:00 / 005:12:00 | 112:04:44 / 112:16:44 | 06 / 112 CDT | 33.4 | | APRIL 21, 1992 | STS-49 | FINAL | 03/23/92 |
| CDT :112 FD :006 MET :005 | | | | | | | | | |
| STS | | | | | | | | | |
| ASEM EVA (EVA 3) | | | | | | | | | |
| PL | | | | | | | | | |
| DAY/NIGHT | | | | | | | | | |
| ORBIT | | | | | | | | | |
| CONTINGENCY RTS GSTDN COVERAGE | | | | | | | | | |
| TORS | | | | | | | | | |
| ATTITUDE | | | | | | | | | |
| NOTES: | <ul style="list-style-type: none"> ● DTO 640 HYDRAZINE MONITOR (EVA WARMUP) ● -ZLV, -YVV ● DTO 640 HYDRAZINE MONITOR (MDDK DATATAKE) ● DTO 640 HYDRAZINE MONITOR (AIRLOCK DATATAKE) ● DTO 623 CABIN AIR MONITORING ● -ZLV, -YVV ● DSO 621 FLORINEF ○ RAD OUT NORM W/FES ● DSO 482 CARDIAC RHYTHM (EV1, EV2) | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE | | | | | |
|---|---|-----------------------|--------------|--------------|--------------------|----------------|--------------------|-----------------------|--------------------|---------------|-------------------|---------|--------------------|-------|
| 112:21:44 / 113:09:44 | 005:12:00 / 006:00:00 | 112:16:44 / 113:04:44 | 06 / 112 CDT | 34.9 | | APRIL 21, 1992 | STS-49 | FINAL | 03/23/92 | | | | | |
| CDT :112 FD :006 MET :005 | 17 18 19 20 21 22 | 12 13 14 15 16 17 | FD:007 17 | 18 19 20 | CDT:113 1 2 3 4 | 0 MET:006 | | | | | | | | |
| STS | SLEEP | | IMU MNV R | ZLV MNV R | SDP MYP INIT | 10 2 MAINT | SDP MYP TERM | 18 19 MCH MFLTR | 20 FUEL SERV | TDRS MNV R | 21 FIRE HOT | FCS C/O | 23 ZLV MNV R | |
| | | POST SLEEP | | | | | | | | | ADD V CR | | CREW CONF | MEAL |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| PL | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| DAY/NIGHT | [Day/Night Cycle Bar] | | | | | | | | | | | | | |
| ORBIT | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | | | | | | |
| CONTINGENCY RTS GSTDN COVERAGE | --DKR | --GTS | --DKR | --DKR | --DGS | --CAN | --MIL | --BDA | --MIL | --BDA | --CTS | --MIL | --GDS | --DKR |
| TDRS | [TDRS Coverage Bars] | | | | | | | | | | | | | |
| ATTITUDE | [Attitude Profile: -ZLV -YVV, BIASED -ZLV -YVV, TDRS] | | | | | | | | | | | | | |
| NOTES: | @BIASED -ZLV, -YVV @DSO 621 FLORINEF @DSO 482 CARDIAC RHYTHM (EV3, EV4) @DSO 802 EDUCATIONAL ACTIVITIES o APU HTR ACT @DSO 604A VISUAL VESTIBULAR o APU HTR RECONFIG o -ZLV, -YVV INTEGRATION | | | | | | | | | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE | | |
|---|---|--|--------------------|--------------------------------------|-----------|---|-----------|---------|-----------|--|--|
| 113:09:44 / 113:21:44 | 006:00:00 / 006:12:00 | 113:04:44 / 113:16:44 | 07/113 CDT | 36.3 | | APRIL 22, 1992 | STS-49 | FINAL | 03/23/92 | | |
| CDT :113 FD :007 MET :006 | 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 | | | | | | | | | | |
| STS | 14 R P A R T I C I P A N T S S E N S E R S E N S E R S | ESC MODE 3 OPP | | P R O N T M E D | | I M U C O A S Z L V M N V R | | SLEEP | | | |
| | M E A L | CABIN STOW | | | PRE SLEEP | | | | | | |
| | P /TV05 SETUP MDDK | P A C T I V M O D K | | | | | | | | | |
| PL | D T O 728 | D S O 469C S T O W A G E | D S O 621 | | | | | | | | |
| DAY/NIGHT ORBIT | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | | |
| CONTINGENCY RTS GSTDN COVERAGE | -GTS | -GTS | -GTS | -GTS | -GTS | -GTS | -GTS | -GTS | -GTS | | |
| | -HTS | -HTS | -HTS | -HTS | -HTS | -HTS | -HTS | -HTS | -HTS | | |
| | -VTS | -VTS | -VTS | -VTS | -VTS | -VTS | -VTS | -VTS | -VTS | | |
| | -GDS | -GDS | -GDS | -GDS | -GDS | -GDS | -GDS | -GDS | -GDS | | |
| | -CTS | -CTS | -CTS | -CTS | -CTS | -CTS | -CTS | -CTS | -CTS | | |
| | -MIL | -MIL | -MIL | -MIL | -MIL | -MIL | -MIL | -MIL | -MIL | | |
| | -BDA | -BDA | -BDA | -BDA | -BDA | -BDA | -BDA | -BDA | -BDA | | |
| TDRS | E | W | E | W | E | W | E | W | E | | |
| ATTITUDE | -ZLV -YVV | | | IMU/COAS | | | -ZLV -YVV | | | | |
| NOTES: | <ul style="list-style-type: none"> @DTO 728 KU-BD ANT FRICTION @DTO 648 ELECTRONIC STILL CAMERA @DSO 469C RADIATION DOSE DISTRIBUTION -TISSUE EQUIVALENT PROPORTIONAL COUNTER @DTO 623 CABIN AIR MONITORING @DSO 621 FLORINEF | | | | | <ul style="list-style-type: none"> @FWD STATION @-ZLV, -YVV o RAD OUT NORM W/FES | | | | | |

| GMT (D:H:M) | MET (D:H:M) | CDT (D:H:M) | FD/ DOY | BETA | MOON | HOUSTON DATE | FLIGHT | EDITION | PUB. DATE | | |
|--------------------------------|----------------------|----------------------|------------|---|---------|----------------|------------------------|---------|-----------|-----------------------|--------------|
| 113:21:44/ 114:09:44 | 006:12:00/ 007:00:00 | 113:16:44/ 114:04:44 | 07/113 CDT | 37.5 | | APRIL 22, 1992 | STS-49 | FINAL | 03/23/92 | | |
| CDT :113 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 0 | CDT:114 | | |
| FD :007 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | | |
| MET :006 | | | | FD:008 | | | | | | | |
| STS | SLEEP | | | POST SLEEP | | | DEORBIT PREP | | | DEORBIT BURN* | EDW LANDING* |
| PL | | | | DSO 482 | DSO 603 | DSO 621 | DSO 604A | | | | |
| DAY/NIGHT ORBIT | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | | |
| CONTINGENCY RTS GSTDN COVERAGE | -DKR | -DKR | -CAN | -BDA | -DKR | -MIL | -BDA | -GDS | -CAN | -DKR | -GTS |
| TDRS E W | -ZLV -YVV | | | -DKR | | | -GDS | | | -MIL | |
| ATTITUDE | | | | IMU | XSI | IMU/VERIF | D/O BURN | | | ENT | |
| NOTES: | | | | @DSO 621 FLORINEF @DSO 482 CARDIAC RHYTHM (EV3, EV4) @DSO 603 ORTHOSTATIC FUNCTION @DSO 604A VISUAL VESTIBULAR INTEGRATION (01-1) @OTO 623 CABIN AIR MONITORING | | | * DEORBIT BURN 6/22:49 | | | * EDW LANDING 6/23:55 | |

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DETAILED TIMELINE

DETAILED
TIMELINE

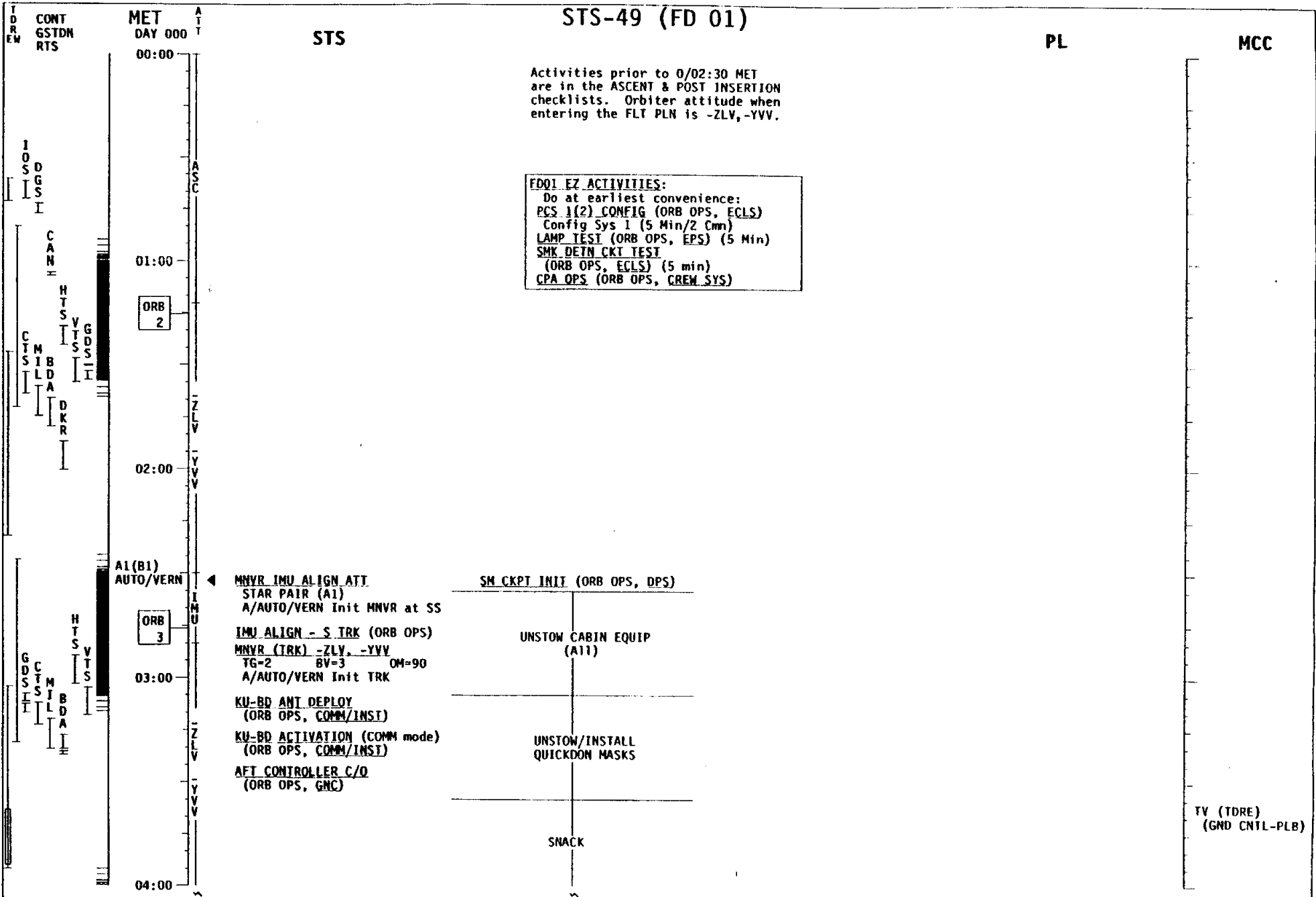
DETAILED TIMELINE

STS-49 (FD 01)

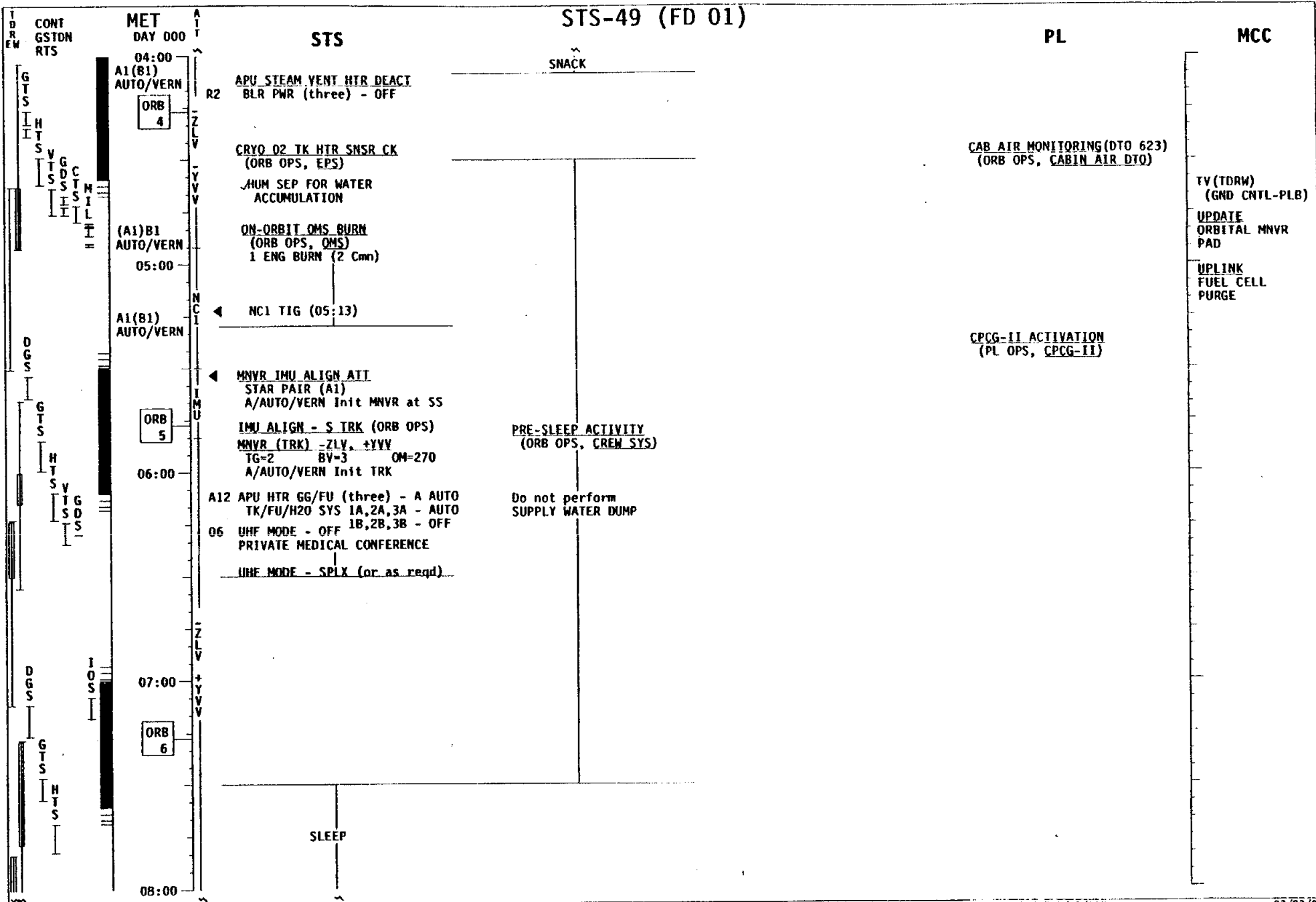
Activities prior to 0/02:30 MET are in the ASCENT & POST INSERTION checklists. Orbiter attitude when entering the FLT PLN is -ZLV,-YVV.

FD01 EZ ACTIVITIES:

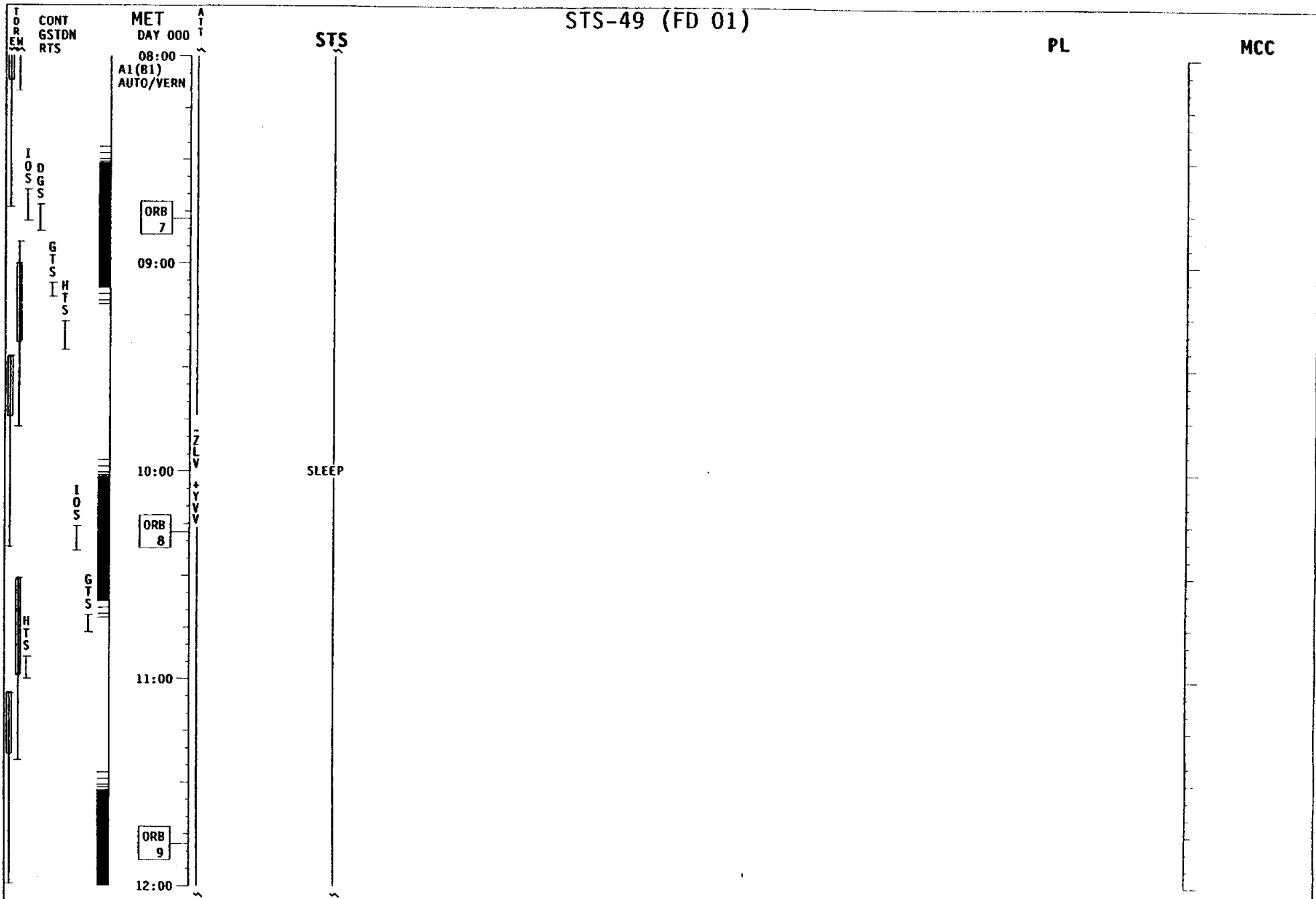
Do at earliest convenience:
 PCS 1(2) CONFIG (ORB OPS, ECLS)
 Config Sys 1 (5 Min/2 Cmn)
 LAMP TEST (ORB OPS, EPS) (5 Min)
 SMK DETN CKT TEST
 (ORB OPS, ECLS) (5 min)
 CPA OPS (ORB OPS, CREW SYS)



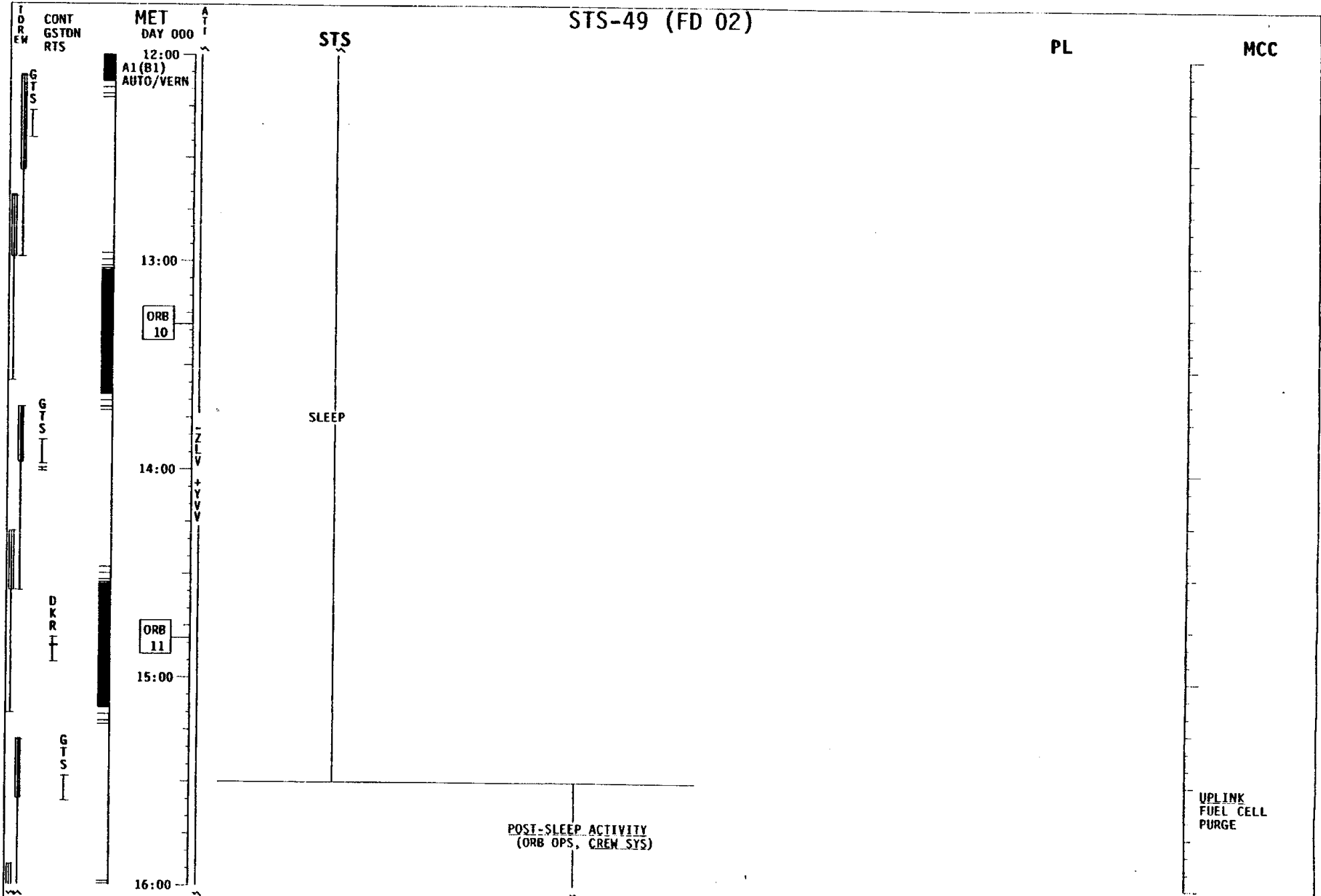
STS-49 (FD 01)



STS-49 (FD 01)



STS-49 (FD 02)



STS-49 (FD 02)

STS

PL

MCC

CONT GSTDN RTS

MET DAY 000

16:00
A1(B1)
AUTO/VERN

ORB 12

17:00

18:00
A1(B5)
INRTL/VERN
A1(B5)
AUTO/VERN

19:00

20:00
A1(B1)
AUTO/VERN

ORB 13

ORB 14

DRKR

DRKR

CAN I

BDKR

IOST

AT

ZLV

+YVV

I MU / COAS

ZLV

-YVV

SUPPLY WATER DUMP, steps 1&2
(ORB OPS, ECLS)

01 .COAS - OFF Mount COAS - FWD
SUPPLY WATER DUMP, step 3
(ORB OPS, ECLS)

◀ MNVR IMU ALIGN ATT
STAR PAIR (A2)
A/AUTO/VERN Init MNVR at SS

IMU ALIGN - S TRK (ORB OPS)
MNVR COAS CAL ATT
R=293 P=341 Y=298
A/AUTO/VERN Init MNVR

COAS CALIBRATION (ORB OPS)
MNVR (TRK) -ZLV, -YVV
TG=2 BV=3 OM=90
A/AUTO/VERN Init TRK

01 .COAS-OFF Stow COAS
Change DAP B to B1

OPEN FIXTURE PRLAs
(PORS OPS, ASEM GEN)

FD02 EZ ACTIVITIES:
EXERCISE (1 Hr/A11)
CPA OPS
(ORB OPS, CREW SYS)
CPCG FAN INLET CLEANING & TEMP CK

CRIM TEMP _ _ _ °C, CMD TEMP _ _ _ °C

SEQ TIME _ _ : _ _ : _ _ , CRIM TIME _ _ : _ _ : _ _

DTO 651 ERGOMETER SETUP
(BIOMED, MED DTOs)
Setup prior to EMU CHECKOUT

MUSCLE PERFORMANCE
(BIOMED, DSO 617)
Record exercise (PLT,MS1,MS3,MS5)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Take one aspirin
(A11 EVA Cmn)

COAS CALIBRATION LOG

STAR ID: +X 22, ALTAIR
STAR AVAIL: 17:51 TO 18:38

+X Δ BIAS _ _ , _ _

UPDATE TIME: _ _ / _ _ : _ _ : _ _

ESC. PDU ASSEMBLY
(PHOTO/TV, ESC SYS)

RAD DOSE DIST (DEPLOYMENT)
(BIOMED, DSO 469C)

PREP FOR 10.2 PSI CABIN
(EVA, 10.2 PSI CABIN) (2 Cmn)

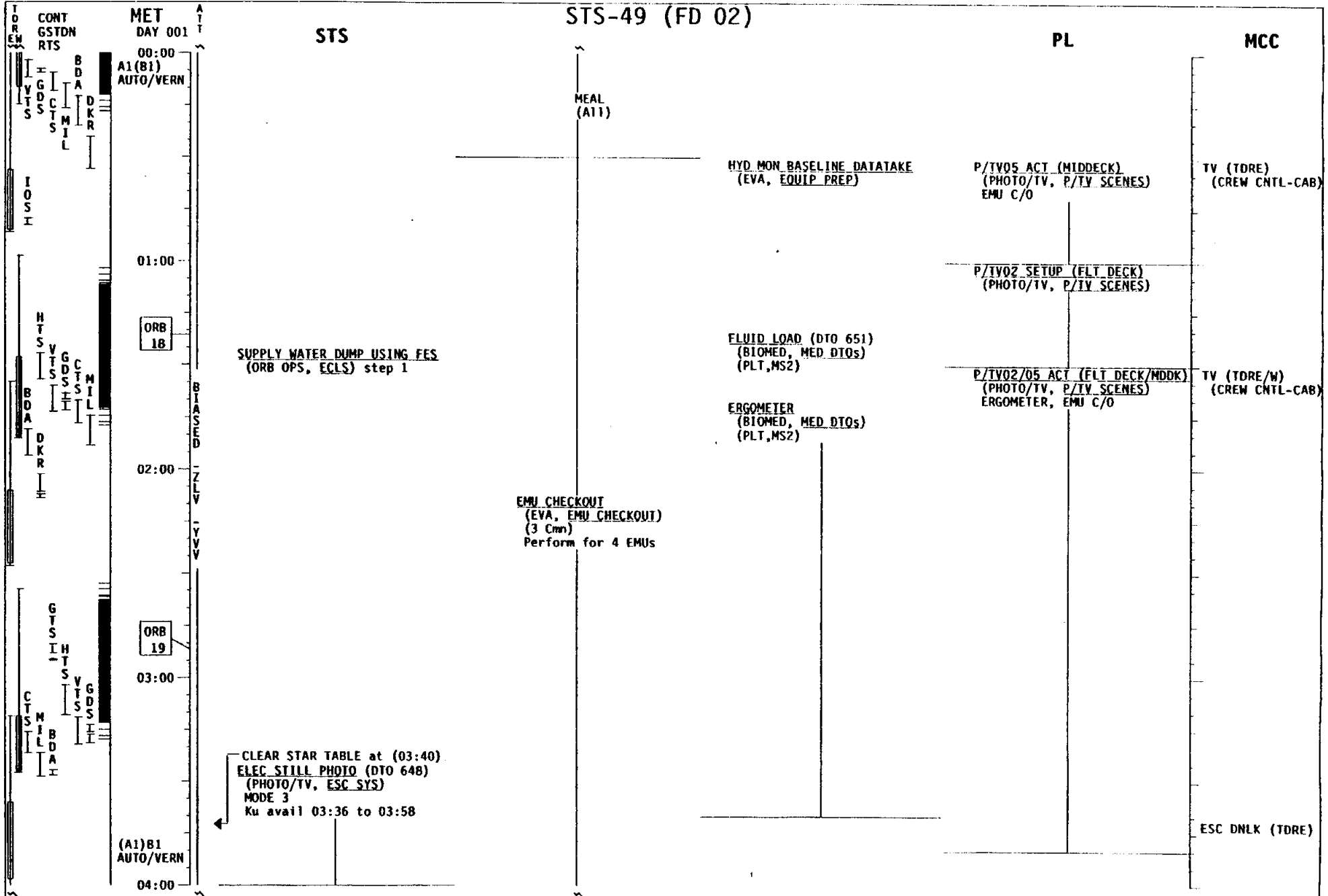
CABIN DEPRESS TO 10.2 PSI
(EVA, 10.2 PSI CABIN)
(2, Cmn)

UPLINK
FUEL CELL
PURGE

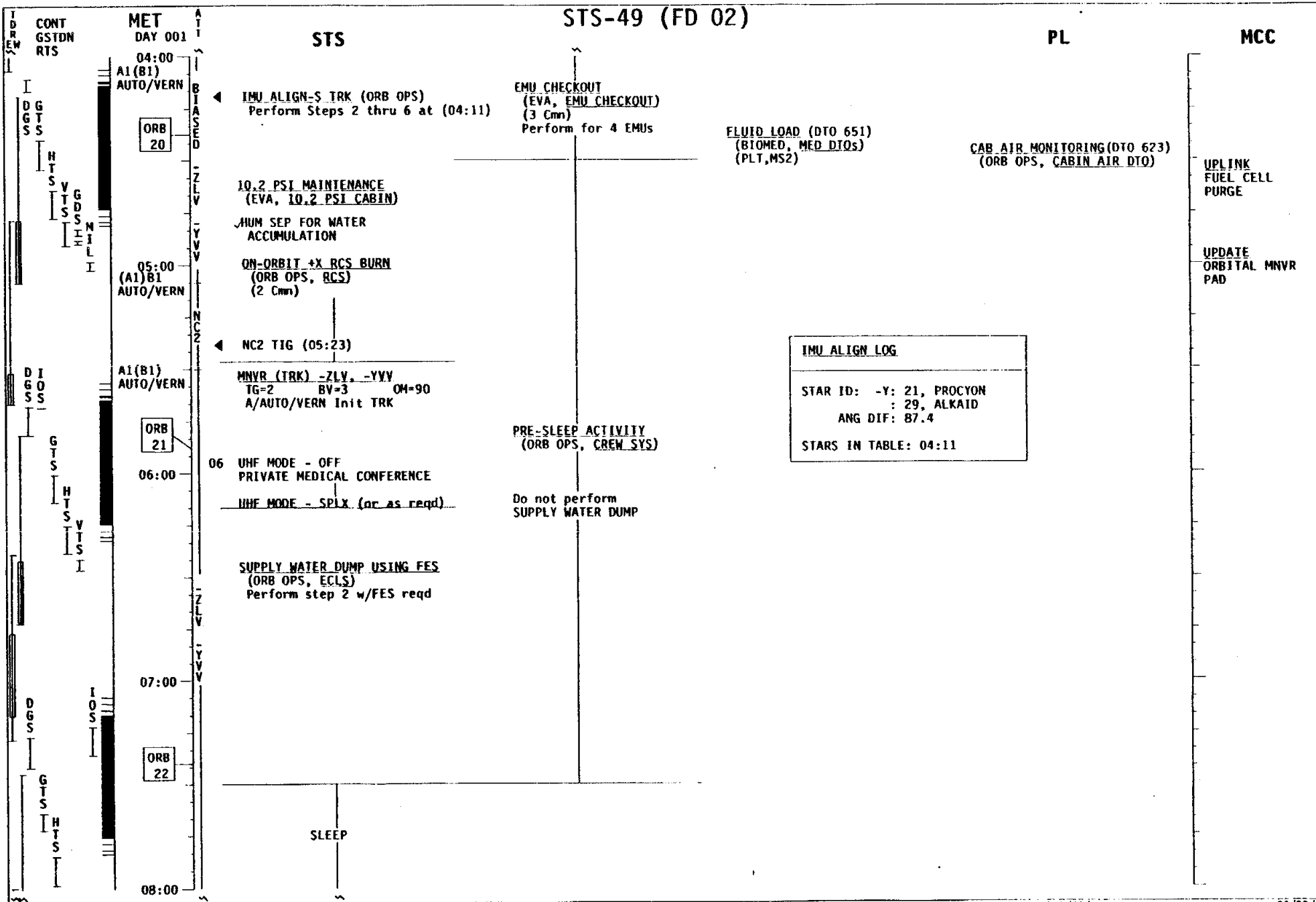
UPDATE
H2O SPLY DUMP
QTY TK A & B

UPLINK
REFSMAT
NORMALIZATION

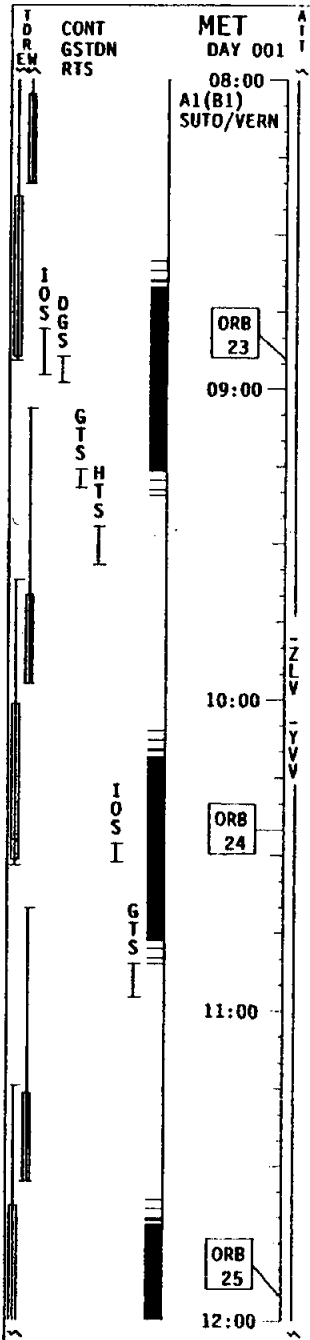
STS-49 (FD 02)



STS-49 (FD 02)



STS-49 (FD 02)



STS

SLEEP

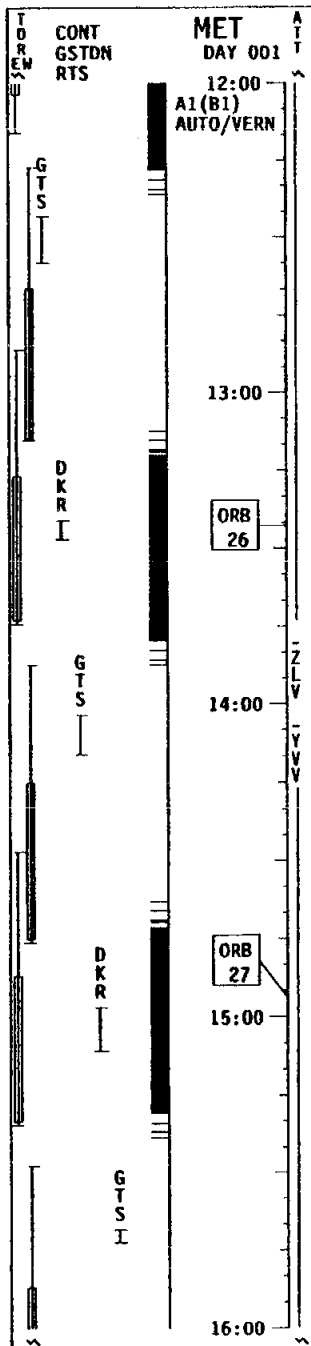
PL

MCC

STS-49 (FD 03)

PL

MCC



STS

SLEEP

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

UPLINK
FUEL CELL
PURGE

STS-49 (FD 03)

STS

PL

MCC

CONT GSTDN RTS

MET DAY 001

16:00
A1(B1)
AUTO/VERN

ORB 28

(A1)B5
INRTL/VERN

A1(B5)
AUTO/VERN

17:00
A1(B1)
AUTO/VERN

ORB 29

18:00

ORB 30

20:00

TDR EM

DKR

CAN I

DKR

DGS

CAN F

BDA

DKR

MILI

BIASED

ZLV

YVY

019 .COAS PWR-OFF Mount COAS-AFT
MNVR IMU ALIGN/COAS CAL ATT
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS

IMU ALIGN - S TRK (ORB OPS)
COAS CALIBRATION (ORB OPS)
MNVR (TRK) BIAS -ZLV -YVY
TG=2 BV=3 OM=110
A/AUTO/VERN Init TRK

019 .COAS PWR - OFF Stow COAS
Change DAP B to B1

ABL PORT RMS HTR (two)-AUTO
L17 Check MCIU filter screen

10.2 PSI MAINTENANCE
(EVA, 10.2 PSI CABIN)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

RMS POWERUP
(PDRS OPS, RMS PWRUP)

SPLY/WASTE SIMO DUMP
(ORB OPS, DIO 325)
(2 Cmn)

EO03 EZ ACTIVITIES:
EXERCISE (1 Hr/A11)
CPA OPS
(ORB OPS, CREW SYS)
CPCG FAN INLET CLEANING & TEMP CK

CRIM TEMP ___ °C, CMD TEMP ___ °C

SEQ TIME ___ : ___ : ___ , CRIM TIME ___ : ___ : ___

MUSCLE PERFORMANCE
(BIOMED, DSO 617)
Record exercise (PLT,MS1,MS3,MS5)

COAS CALIBRATION LOG

STAR ID: -Z 29, ALKAID
STAR AVAIL: 16:14 TO 16:59

-Z Δ BIAS ___ , ___

UPDATE TIME: ___ / ___ : ___ : ___

P/TV03 SETUP (DIO 325)
(PHOTO/TV, P/TV SCENES)

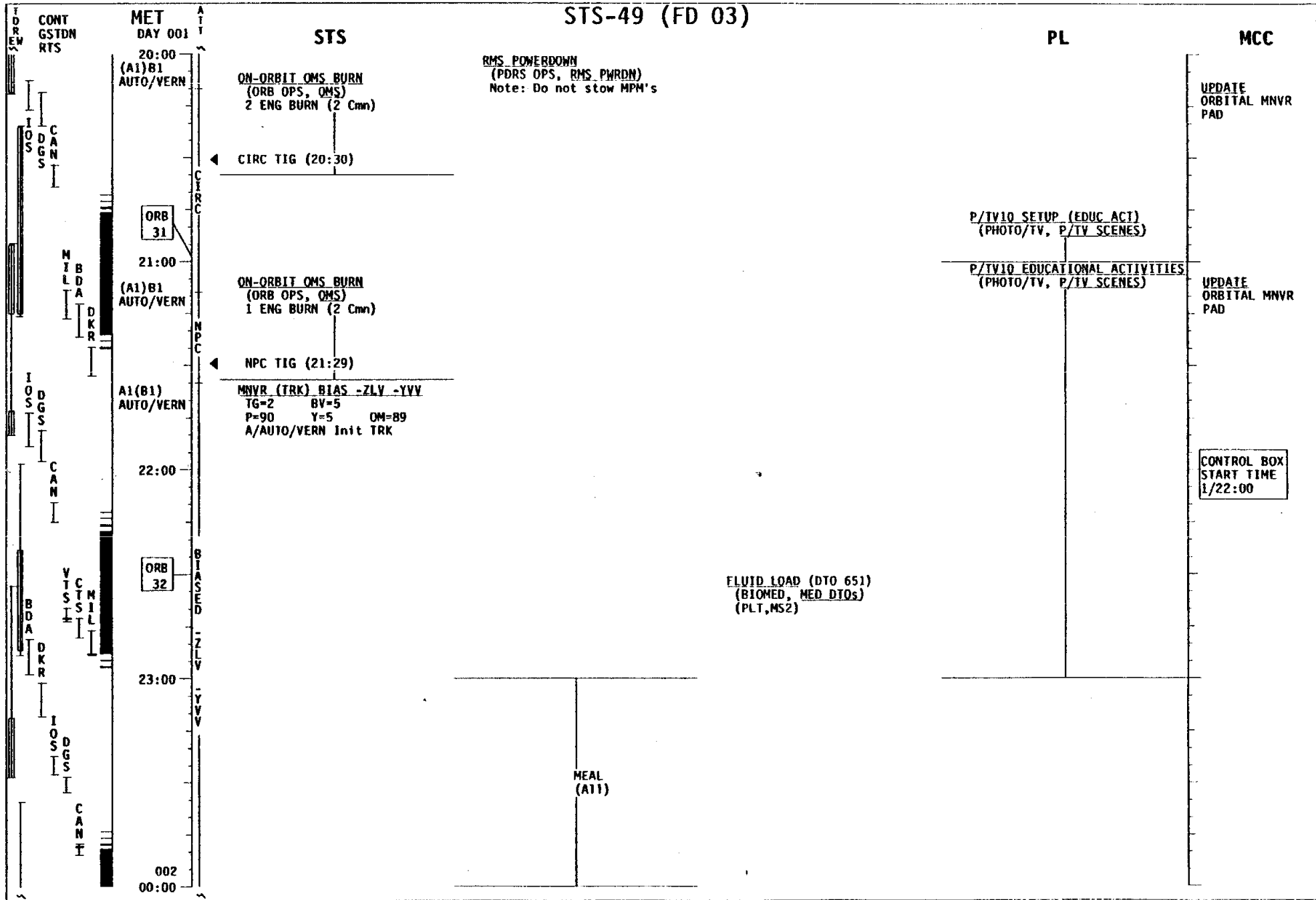
P/TV03 ACT (DIO 325)
(PHOTO/TV, P/TV SCENES)

UPLINK
FUEL CELL
PURGE

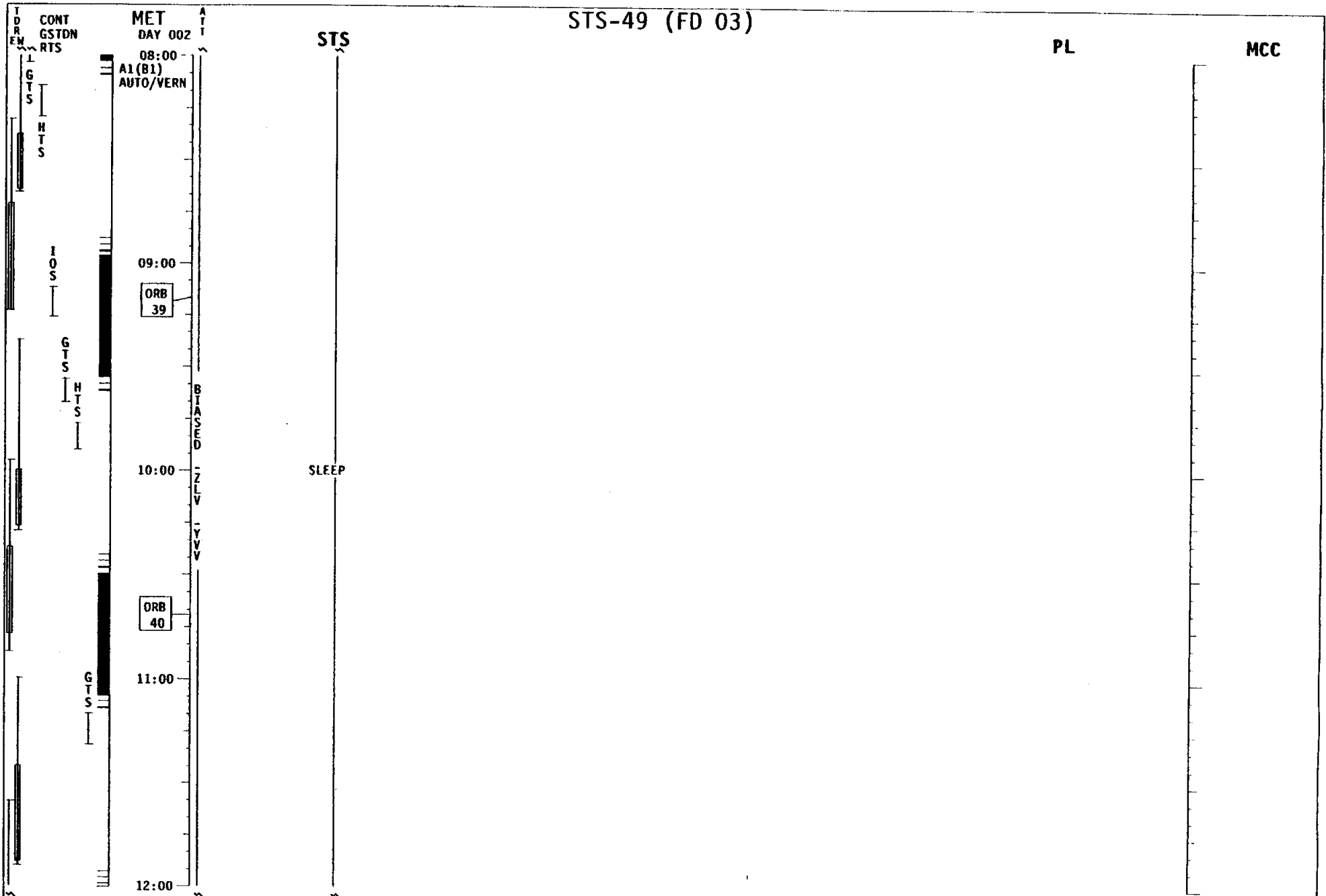
UPDATE
SPLY/WASTE DUMP
QUANTITIES

TV (TORE/W)
(GND CNTL-PLB)

STS-49 (FD 03)



STS-49 (FD 03)



STS-49 (FD 04)

PL

MCC

CONT GSTDN RTS
MET DAY 002
12:00
ORB 41
A1(B1) AUTO/VERN
13:00
14:00
ORB 42
15:00
ORB 43
16:00

BIASED
ZLV
YVV

DRW
GTS
H
RRK
GTS
DKR

STS
SLEEP

IMJ ALIGN LOG

STAR ID: -Y: 41, DENEbola
: 14, VEGA
ANG DIF: 89.9

STARS IN TABLE: 15:19

◀ CLEAR STAR TABLE at (14:50)

◀ **IMJ ALIGN-S TRK (ORB OPS)**
Perform Steps 2 thru 6 at (15:19)

SUPPLY WATER DUMP USING FES
(ORB OPS, ECLS) step 1

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

FD04 EZ ACTIVITIES:
EXERCISE (1 Hr/A11)
CPA OPS
(ORB OPS, CREW SYS)
CPCG FAN INLET CLEANING & TEMP CK

CRIM TEMP ___ °C, CMD TEMP ___ °C

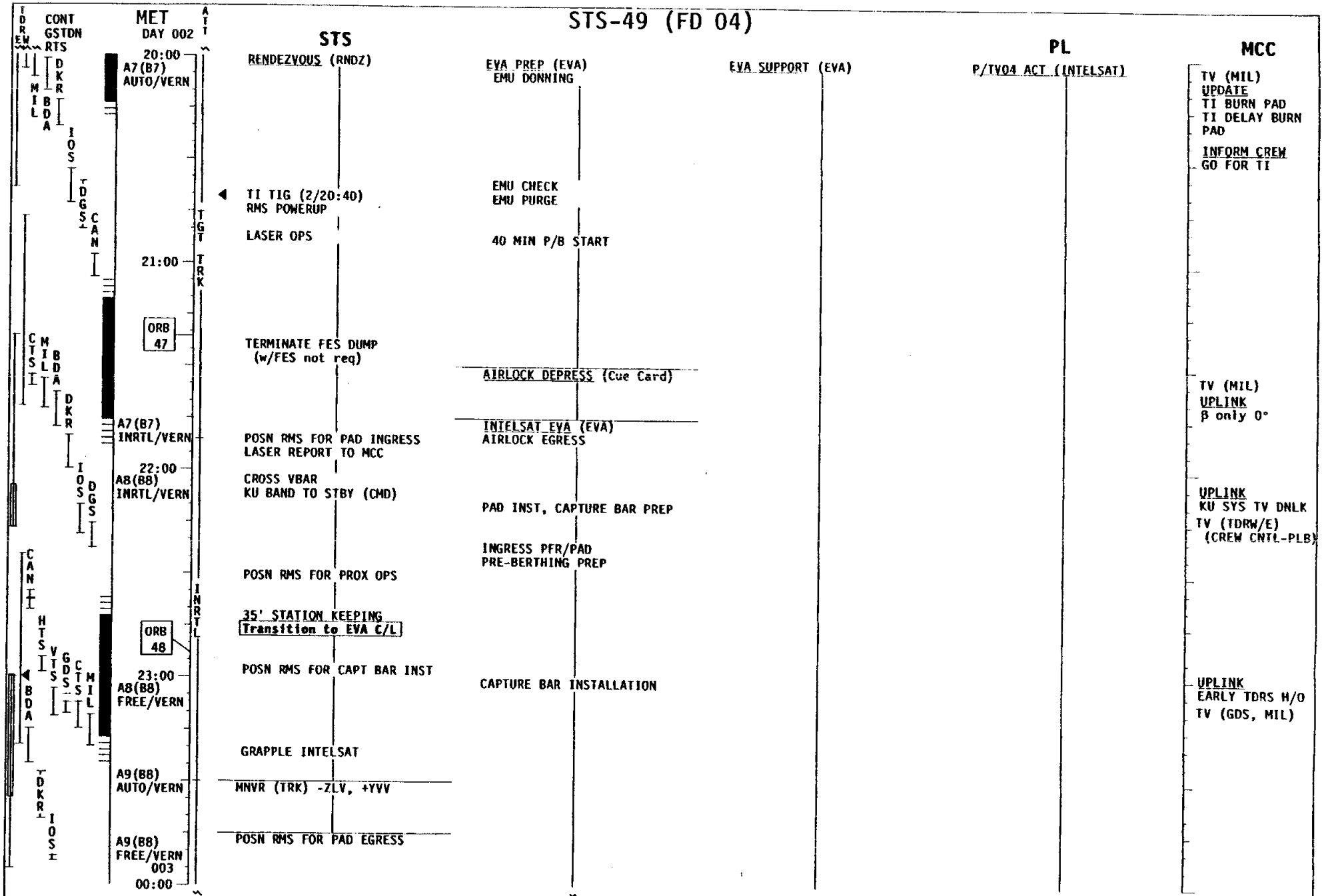
SEQ TIME ___ : ___ : ___ , CRIM TIME ___ : ___ : ___

MUSCLE PERFORMANCE
(BIOMED, DSO 617)
 Record exercise (PLT,MS1,MS3,MS5)

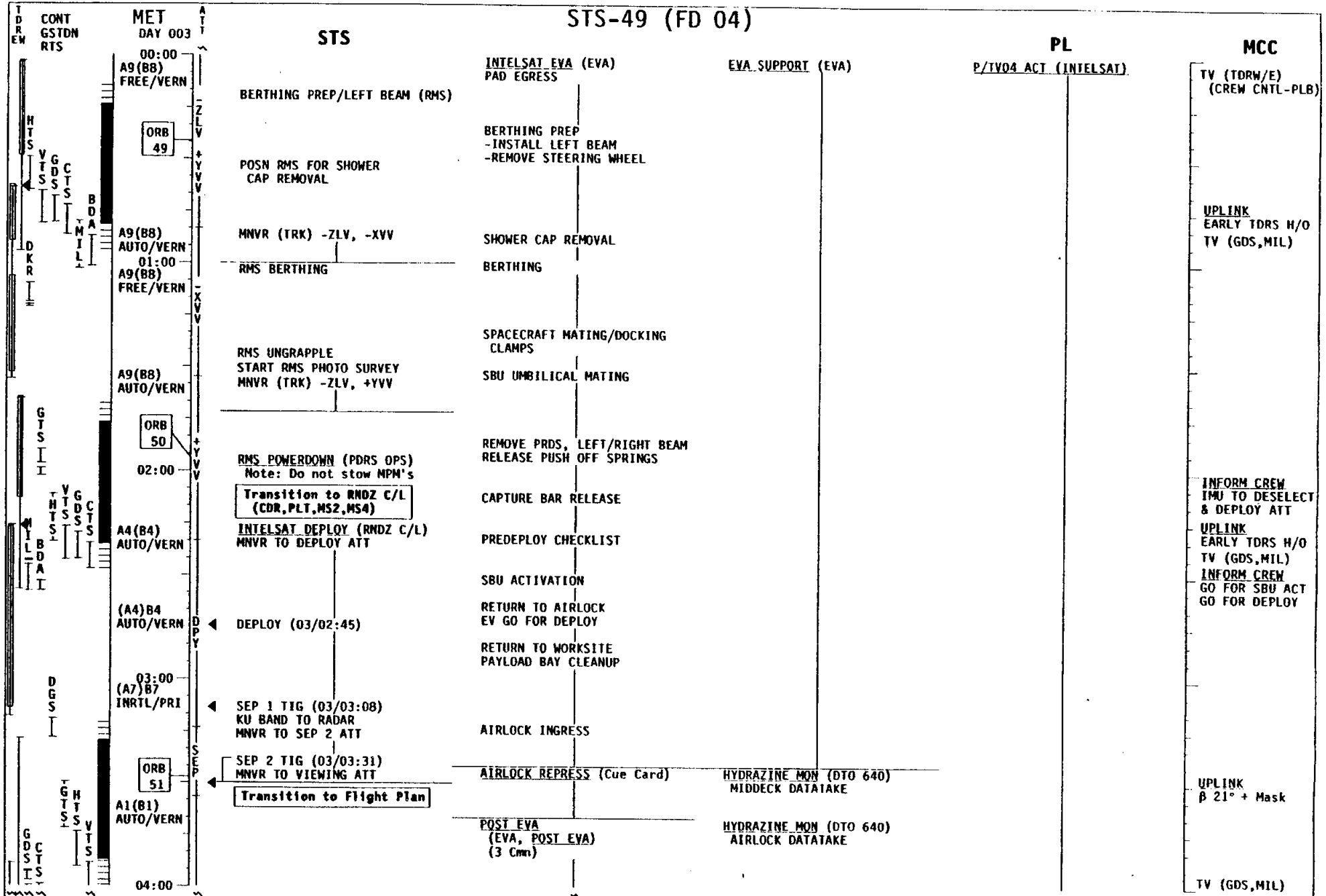
UPLINK
FUEL CELL
PURGE

UPDATE
PLANAR NULL DATA
NH2, NC4, TI
Prelim PADS

STS-49 (FD 04)



STS-49 (FD 04)



STS-49 (FD 04)

STS

PL

MCC

MET DAY 003

04:00
A1(B1)
AUTO/VERN

CONFIG KU BAND FOR COMM [31]
(RNDZ, RNDZ TIMELINE) FS 4-23

POST EVA
(EVA, POST EVA)
(3 Cmn)

CAB AIR MONITORING (DIO 623)
(ORB OPS, CABIN AIR DIO)

P/TV04 ACT (INTELSAT)

TV (GDS, MIL)

TOPPING FES STARTUP
(ORB OPS, ECLS)

SUIT DRYING/SEAL LUBE
(EVA, EMU MAINT/RECHARGE)
EMU 1,2

LASER STOW [D] (DIO 700-2)
(RNDZ, RNDZ TIMELINE) FS4-2b

CARDIAC RHYTHM
(BIOMED, DSO 482)
(EV1, EV2)
Don

UPLINK
FUEL CELL
PURGE

10.2 PSI MAINTENANCE
(EVA, 10.2 PSI CABIN)

ORB 52

◀ MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS

IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) WINDOW PROTECT ATT (+XLV, +ZVV)
TG-2 BV-1 OM-180
A/AUTO/VERN Init TRK

[GNC 33 REL NAV]
RNDZ NAV ENA - ITEM 1 EXEC (no *)

06 UHF MODE - OFF
PRIVATE MEDICAL CONFERENCE

UHF MODE - SPLX (or as reqd)

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

06:00

Do not perform
SUPPLY WATER DUMP

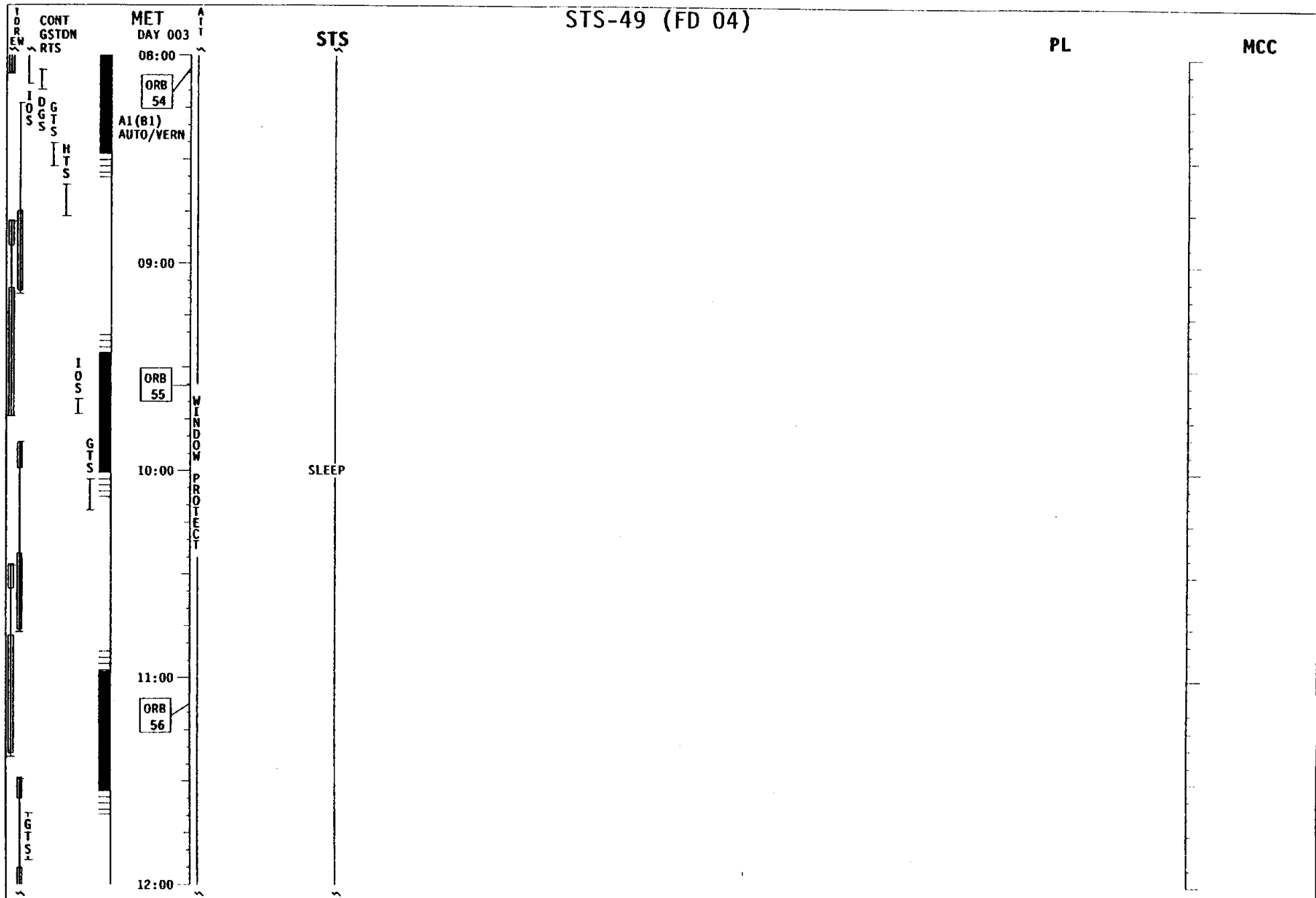
ORB 53

07:00

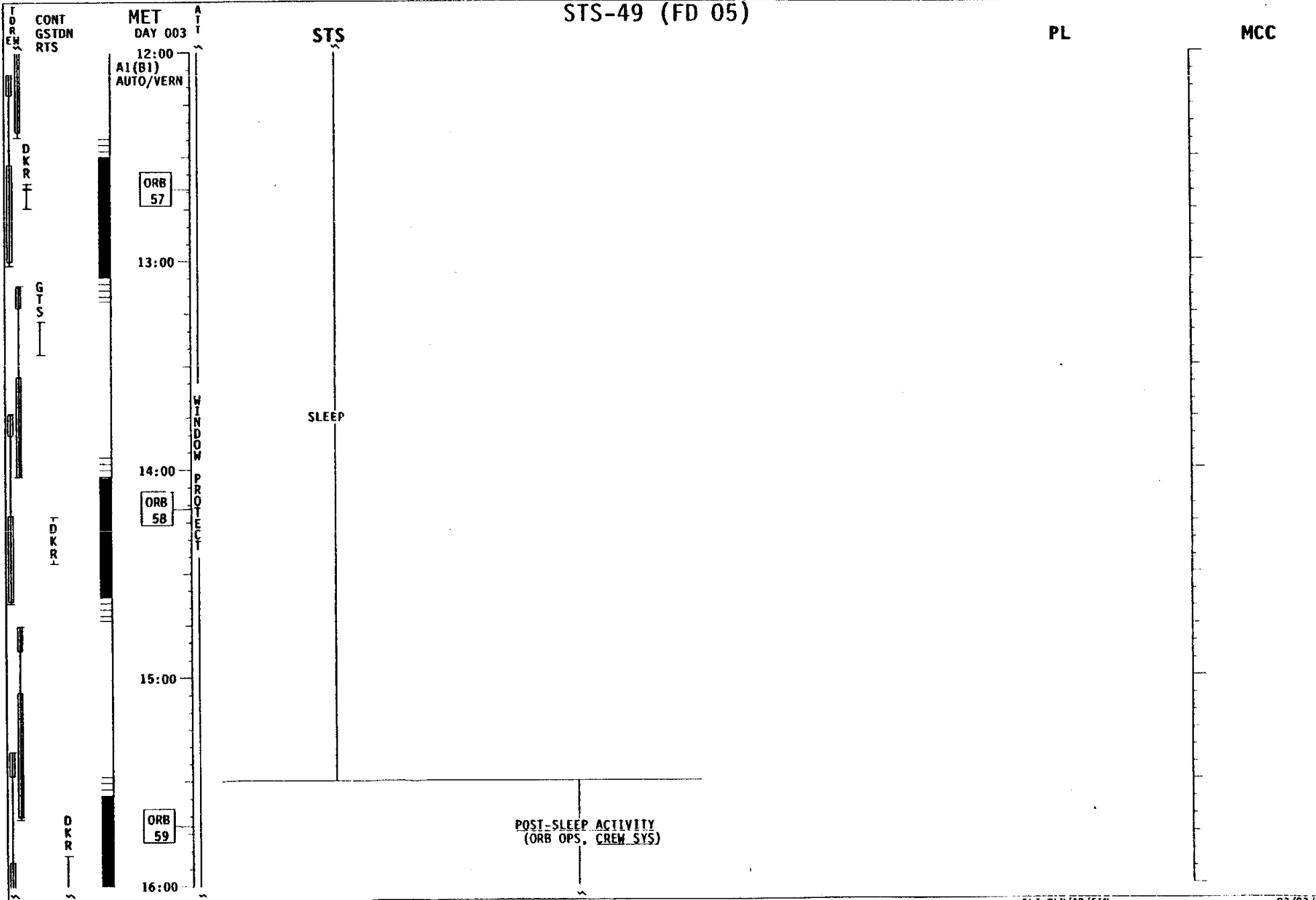
SLEEP

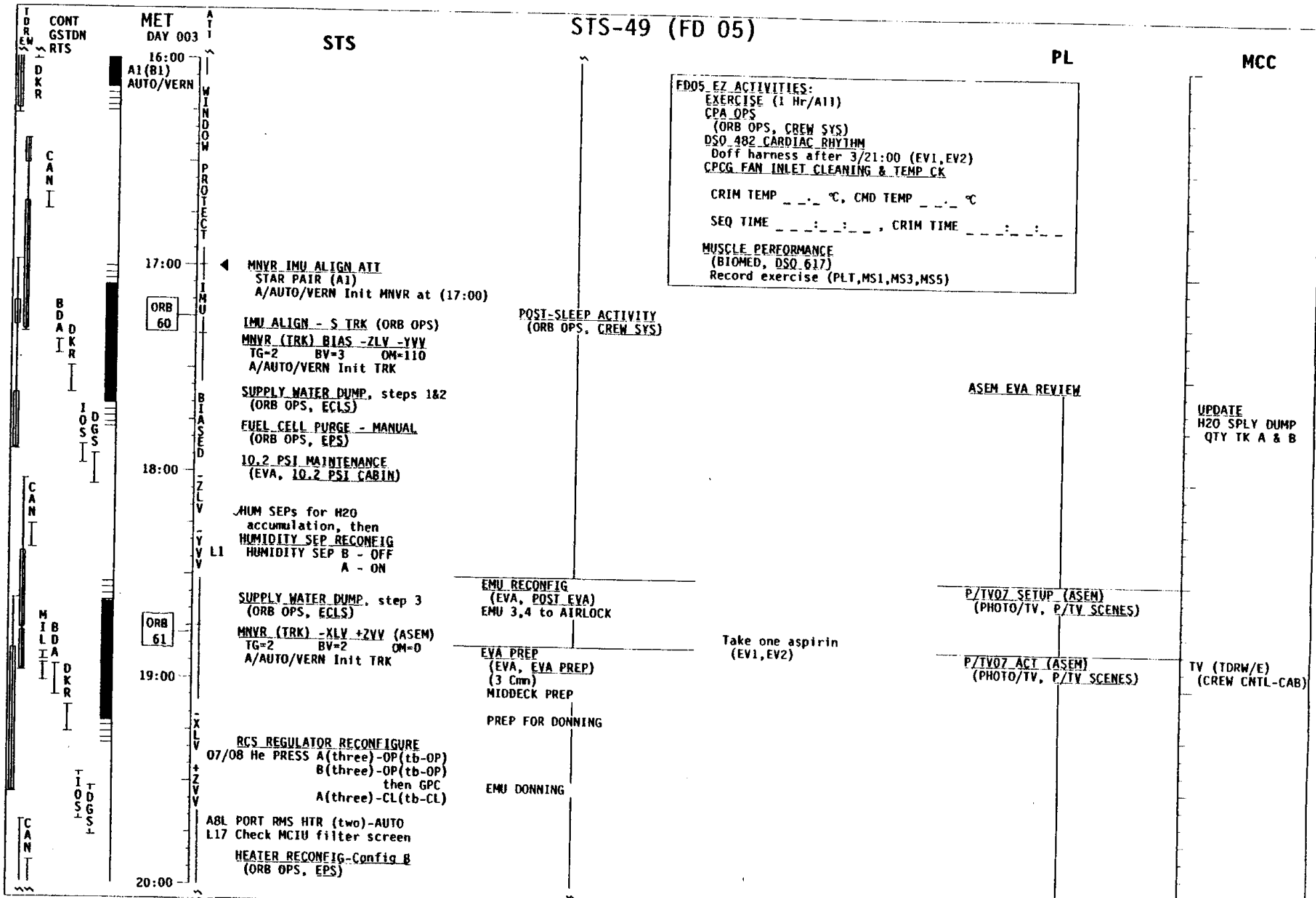
08:00

STS-49 (FD 04)



STS-49 (FD 05)

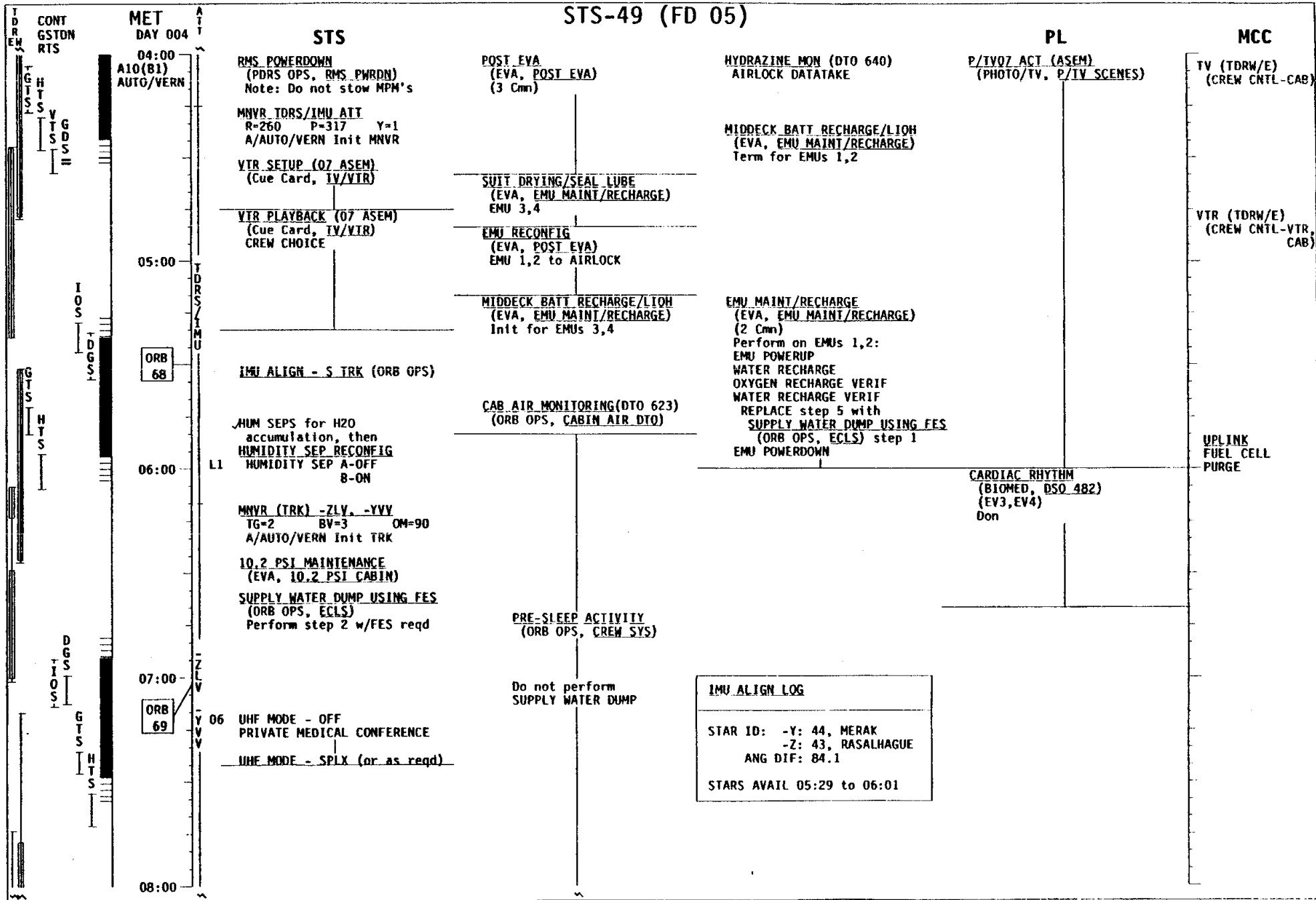




STS-49 (FD 05)

| MET DAY 004 | STS | PL | MCC |
|-------------------------------|--|---|--------------------------------|
| 00:00 A10(B1) FREE/VERN | RMS MNVR TO MPRESS ACCESS POSN | ASEM EVA PROCEDURES (EVA 2) | TV (TDRE/W) (CREW CNTL-PLB) |
| | JRM SEP FOR WATER ACCUMULATION | PALLET LEG INSTALLATIONS | |
| | | SETUP FOR PALLET INSTALL | |
| AUTO/VERN | | | |
| FREE/VERN | RMS RETURN FROM MPRESS ACCESS END CREW MGMT OF KU-BD ANT RMS POSN FOR MATING | | |
| ORB 65 | | | |
| 01:00 | | PALLET INSTALLATION #1 | |
| | RMS POSN FOR MATING | PALLET DISCONNECT | |
| | | PALLET INSTALLATION #2 | TV (GDS, MIL) |
| AUTO/VERN | SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) step 1 | INTERIM STOW | |
| FREE/VERN | RMS RAISE MPRESS FOR EVA MOUNT | PALLET DISCONNECT | |
| | CREW MGMT OF KU-BD ANT/ FWD JETS DISABLE | MOUNT RMS | |
| AUTO/VERN | RMS MNVR TO SSF POSN 1 | ASSEMBLY AREA EVAL #1 | |
| 02:00 | | ASSEMBLY AREA EVAL #2 | |
| FREE/VERN | RMS MNVR TO SSF POSN 2 | | |
| | RMS RETURN FROM SSF POSNS/ RE-ENABLE FWD JETS | | |
| AUTO/VERN | RMS MNVR TO MPRESS ACCESS POSN | DISMOUNT RMS | |
| 03:00 | END CREW MGMT OF KU-BD ANT RMS REBERTH OPS | EMU TV BERTHING, BP, IP EVAL | TV (GDS, MIL) |
| AUTO/VERN | | HYDRAZINE MON (D10 640) EVA WARMUP | |
| | RMS UNGRAPPLE & BACKAWAY | PAYLOAD BAY CLEANUP | |
| | | AIRLOCK INGRESS | |
| | | AIRLOCK REPRESS (Cue Card) | |
| AUTO/VERN | | HYDRAZINE MON (D10 640) MIDDECK DATATAKE | |
| ORB 67 | | HYDRAZINE MON (D10 640) AIRLOCK DATATAKE | UPLINK β 21° + Mask |
| 04:00 | Transition to Flight Plan RMS POWERDOWN Note: Do not stow MPM's | POST EVA (EVA, POST EVA) | |

STS-49 (FD 05)



STS-49 (FD 05)

STS

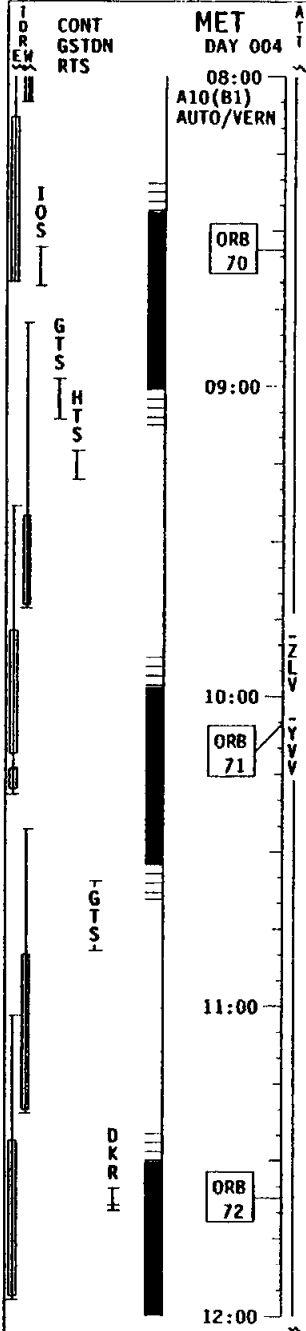
PL

MCC

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

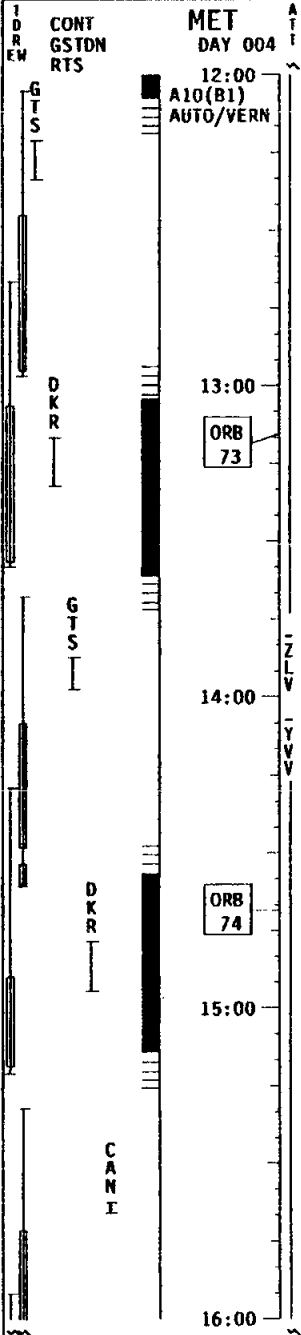
SLEEP (7)



STS-49 (FD 06)

PL

MCC



STS

SLEEP (7)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

STS-49 (FD 06)

STS

PL

MCC

MET DAY 004

16:00

ORB 75

A10(B1)
AUTO/VERN

COAS CALIBRATION LOG

STAR ID: -Z 29, ALKAID
STAR AVAIL: 17:38 TO 18:22

-Z Δ BIAS _____

UPDATE TIME: ___ / ___ : ___ : ___

FD06 EZ ACTIVITIES:

EXERCISE (1 Hr/A11)

CPA OPS

(ORB OPS, CREW SYS)

DSO 482 CARDIAC RHYTHM

Doff harness after 4/22:00 (EV3, EV4)

CPCG FAN INLET CLEANING & TEMP CK

CRIM TEMP ___ °C, CMD TEMP ___ °C

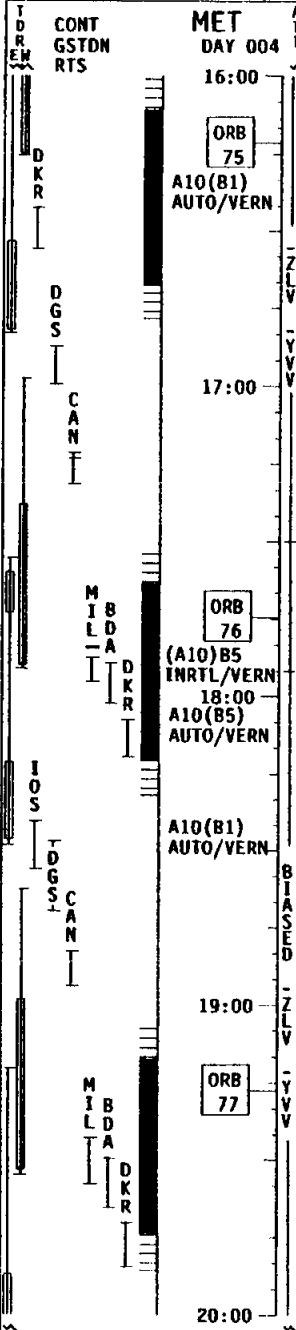
SEQ TIME ___ : ___ : ___ , CRIM TIME ___ : ___ : ___

MUSCLE PERFORMANCE

(BIOMED, DSO 617)

Record exercise (PLT, MS1, MS3, MS5)

UPLINK
FUEL CELL
PURGE



019 COAS PWR-OFF Mount COAS-AFT
 MNVR IMU ALIGN/COAS CAL ATT
 STAR PAIR (A1)
 A/AUTO/VERN Init MNVR at (17:30)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

ORB 76

(A10)B5
INRTL/VERN
18:00
A10(B5)
AUTO/VERN

IMU ALIGN - S TRK (ORB OPS)
 COAS CALIBRATION (ORB OPS)
 MNVR (TRK) BIAS -ZLY -YVY
 TG=2 BV=3 OM=110
 A/AUTO/VERN Init TRK

SUPPLY WATER DUMP, steps 1&2
(ORB OPS, ECLS)

019 COAS PWR - OFF Stow COAS
 Change DAP B to B1

ASEM EVA REVIEW

A10(B1)
AUTO/VERN

SUPPLY WATER DUMP, step 3
(ORB OPS, ECLS)

EVA PREP
(EVA, EVA PREP)
(3 Cmn)
MIDDECK PREP

Take one aspirin
(EV3, EV4)

P/TVOZ SETUP (ASEM)
(PHOTO/TV, P/TV SCENES)

19:00

WASTE WATER DUMP, steps 1,2
(ORB OPS, ECLS)
 Dump Tank to 5%

PREP FOR DONNING

FILTER CLEANING
(IFM, SCHEDULED MAINTENANCE)

P/TVOZ ACT (ASEM)
(PHOTO/TV, P/TV SCENES)

ORB 77

ABL PORT RMS HTR (two)-AUTO
 L17 Check NCIU filter screen

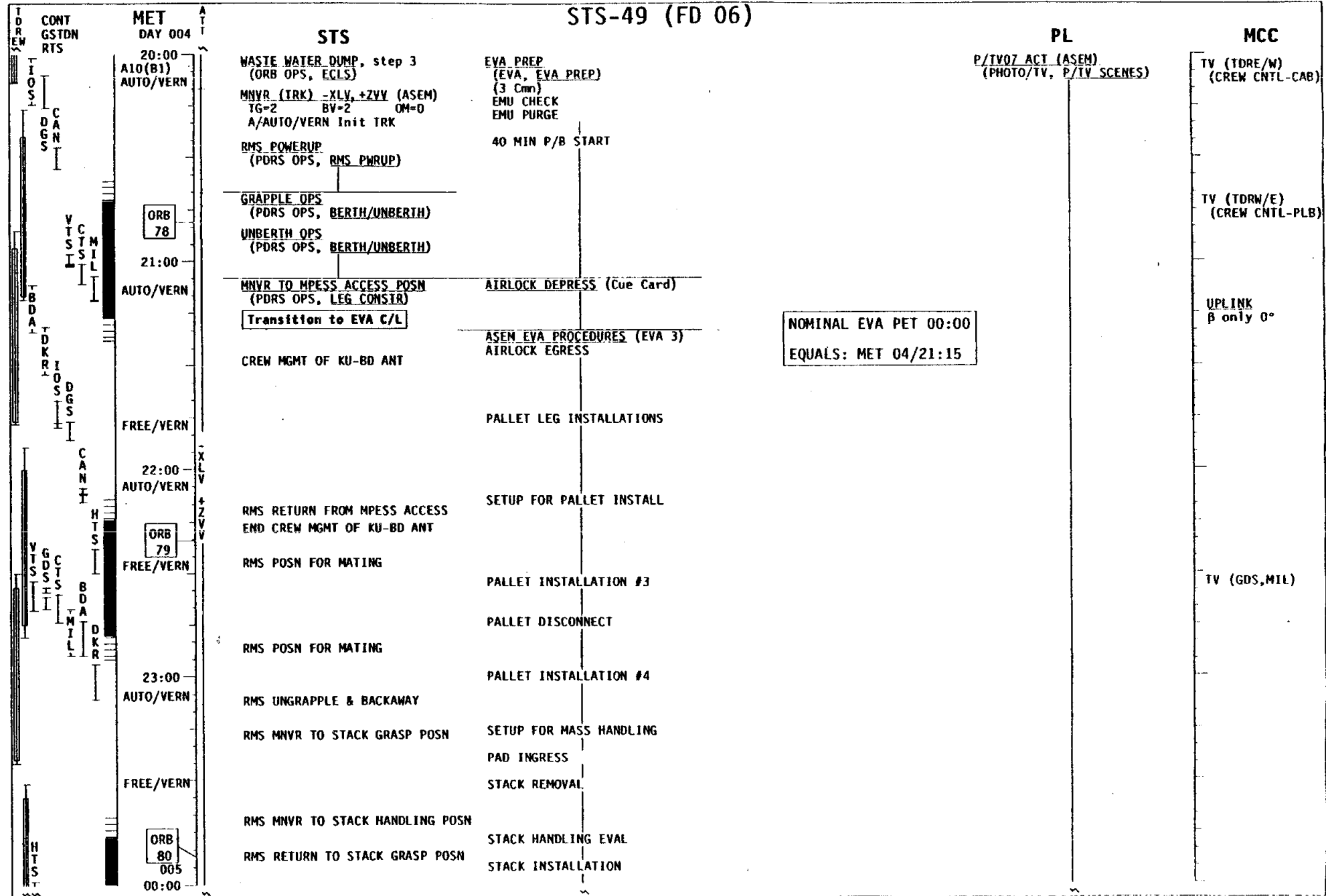
EMU DONNING

10.2 PSI MAINTENANCE
(EVA, 10.2 PSI CABIN)

UPDATE
H2O SPLY DUMP
QTY TK A & B

UPDATE
H2O WASTE
DUMP QTY
TV (TDRW/E)
(CREW CNTL-CAB)

STS-49 (FD 06)

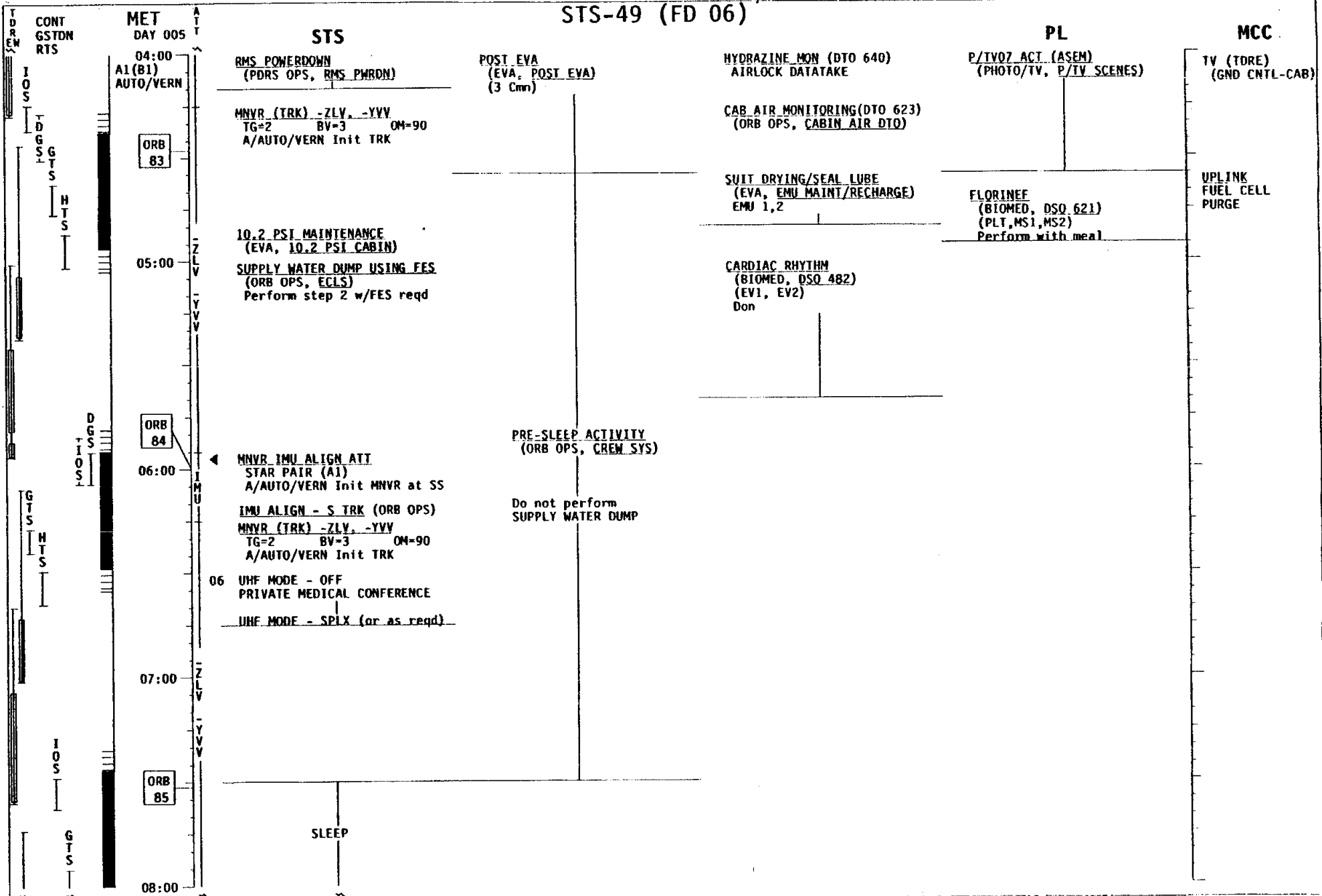


STS-49 (FD 06)

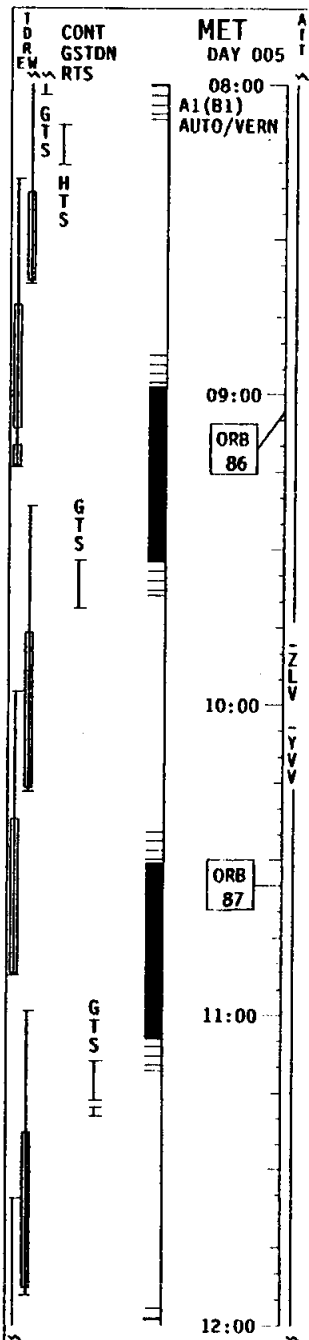
| MET DAY 005 | STS | PL | MCC |
|-------------------------------|---|--|---|
| 00:00 A10(B1) AUTO/VERN | ASEM EVA PROCEDURES (EVA 3) PAD EGRESS | P/TVOZ ACT (ASEM) (PHOTO/TV, P/TV SCENES) | TV (TDRW/E) (CREW CNTRL-PLB) TV (GDS,MIL) |
| FREE/VERN | INTERIM STOW PALLET DISCONNECT | | |
| AUTO/VERN | RMS RAISE MPRESS FOR EVA MOUNT CREW MGMT OF KU-BD ANT/JETS DISA MOUNT RMS SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) step 1 | | |
| 01:00 | RMS MNVR TO SSF POSN 1 RMS MNVR TO SSF POSN 2 | | |
| AUTO/VERN | DIMINISHED LIGHTING EVAL #1 DIMINISHED LIGHTING EVAL #2 | | |
| 02:00 | RMS RETURN FROM SSF POSNS/ RE-ENABLE FWD JETS | | |
| FREE/VERN | DISMOUNT RMS | | |
| AUTO/VERN | END CREW MGMT OF KU-BD ANT | | |
| 02:00 | RMS REBERTH OPS | | |
| FREE/VERN | EVA VOICE BERTHING/BISTEM POLE EVAL INFLATABLE POLE EVAL | | TV (GDS,MIL) |
| AUTO/VERN | RMS UNGRAPPLE & BACKAWAY RMS ASSEMBLY VIEWING | | |
| 02:00 | MIDDECK BATT RECHARGE/LIION (EVA, EMU MAIN/RECHARGE) Term for EMUs 3,4 | | |
| FREE/VERN | FINAL/DIAGONAL STOW VERT/DIAGONAL STOW BOTTOM PLANE STOW | | |
| AUTO/VERN | CPD EVAL | HYDRAZINE MON (DTO 640) EVA WARMUP | |
| 03:00 | ORBITER +X, -X TRANSLATION | | |
| 03:00 | PAYLOAD BAY CLEANUP | | |
| | AIRLOCK INGRESS | | |
| | AIRLOCK REPRESS (Cue Card) | HYDRAZINE MON (DTO 640) MIDDECK DATATAKE | |
| 04:00 | POST EVA (EVA, POST EVA) | HYDRAZINE MON (DTO 640) AIRLOCK DATATAKE | UPLINK β 21° + Mask |

Transition to Flight Plan
RMS POWERDOWN
(PDRS OPS, RMS PWRDN)

STS-49 (FD 06)



STS-49 (FD 06)

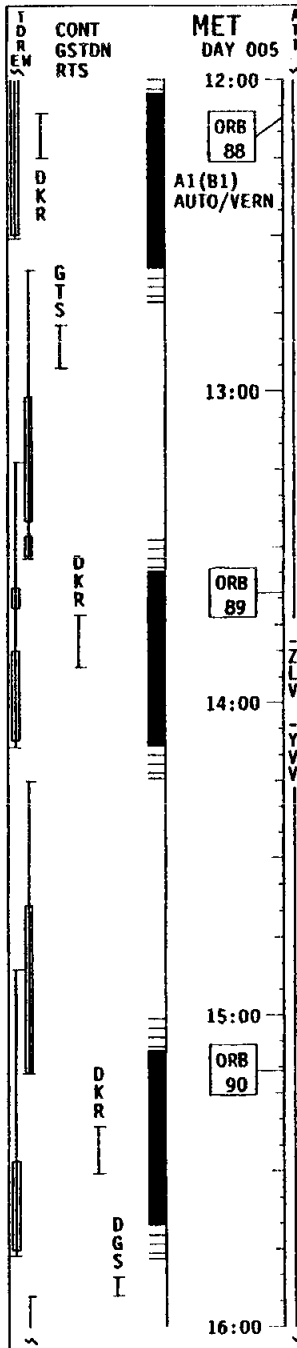


STS

PL

MCC

STS-49 (FD 07)



STS

SLEEP

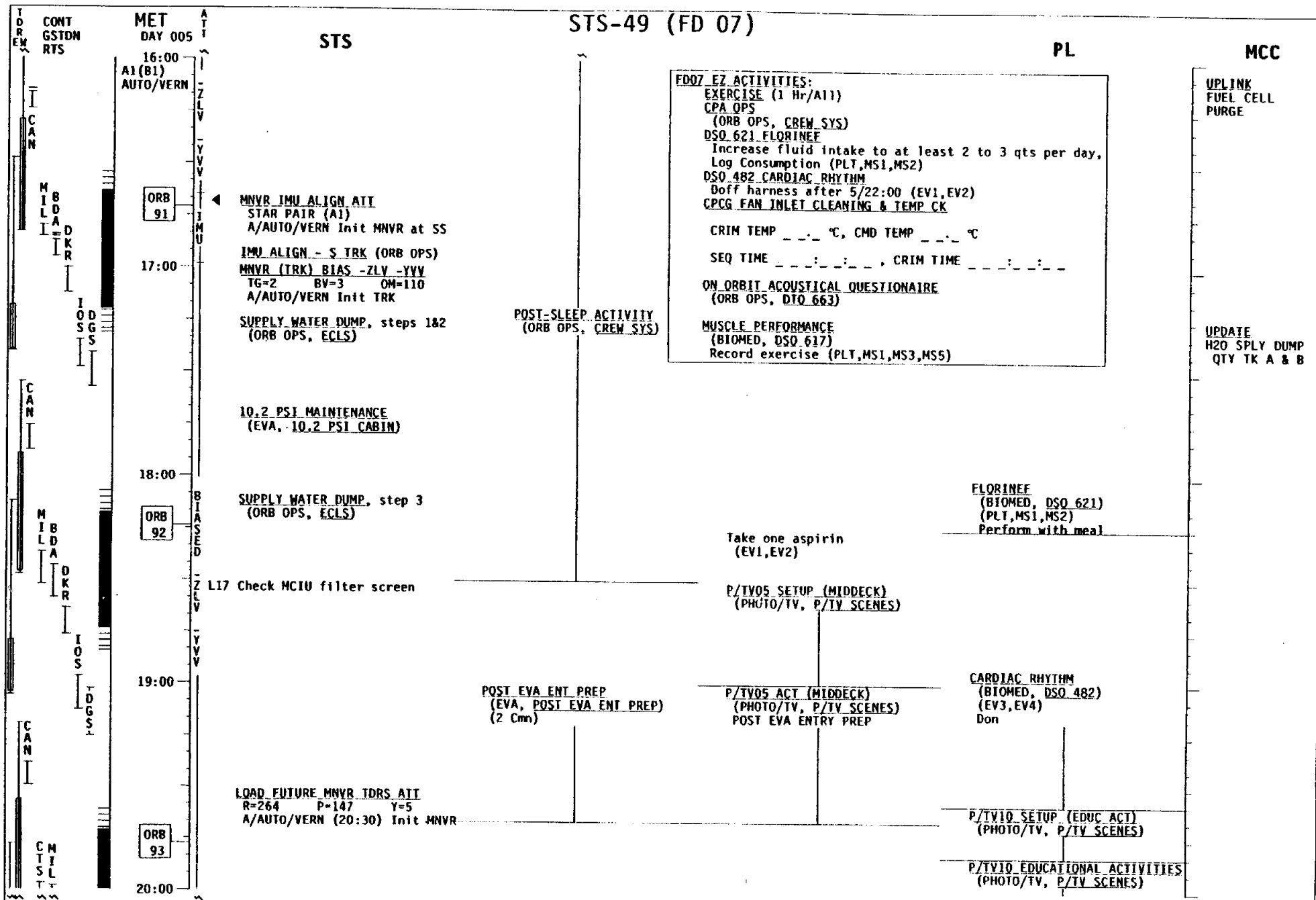
POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

PL

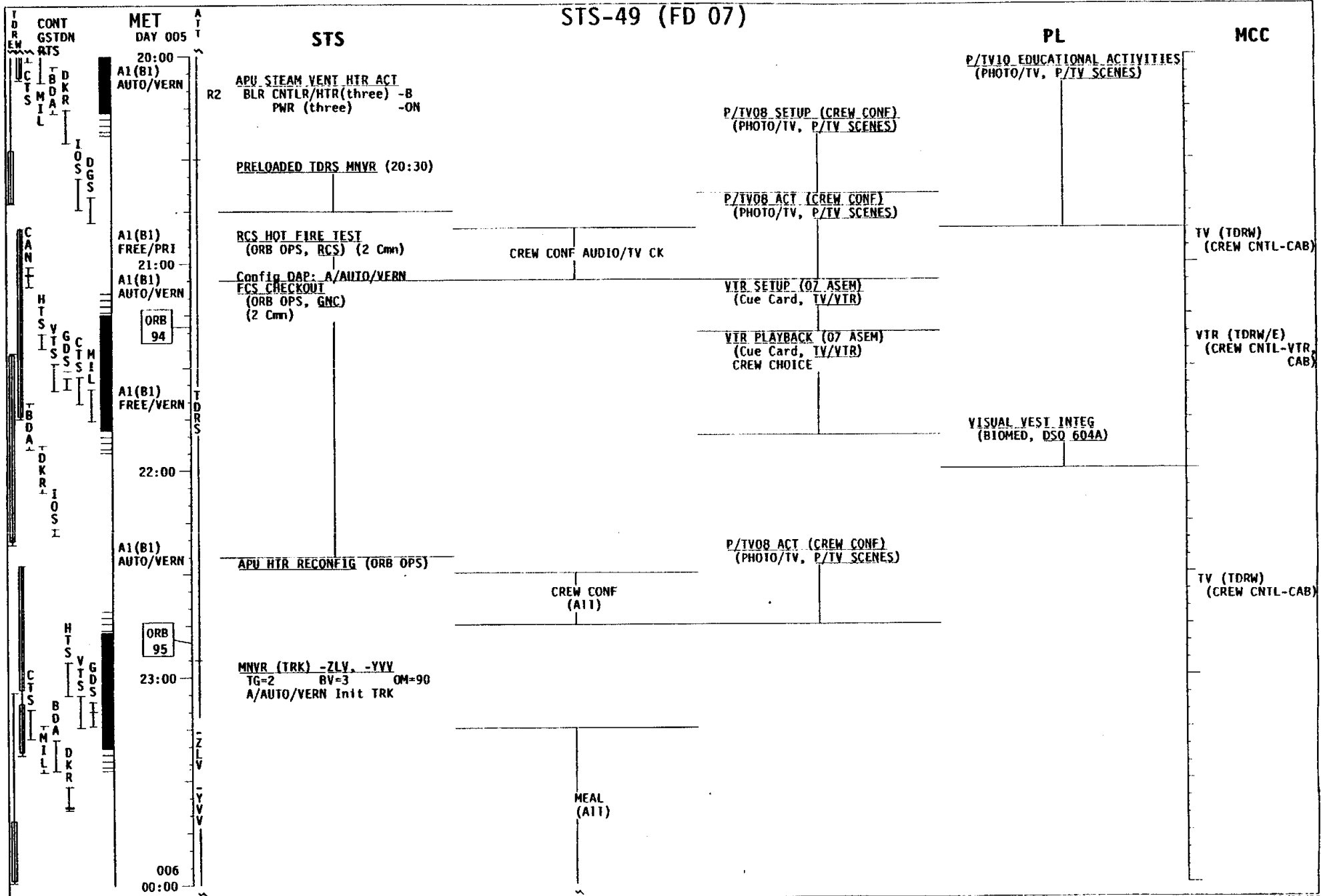
MCC

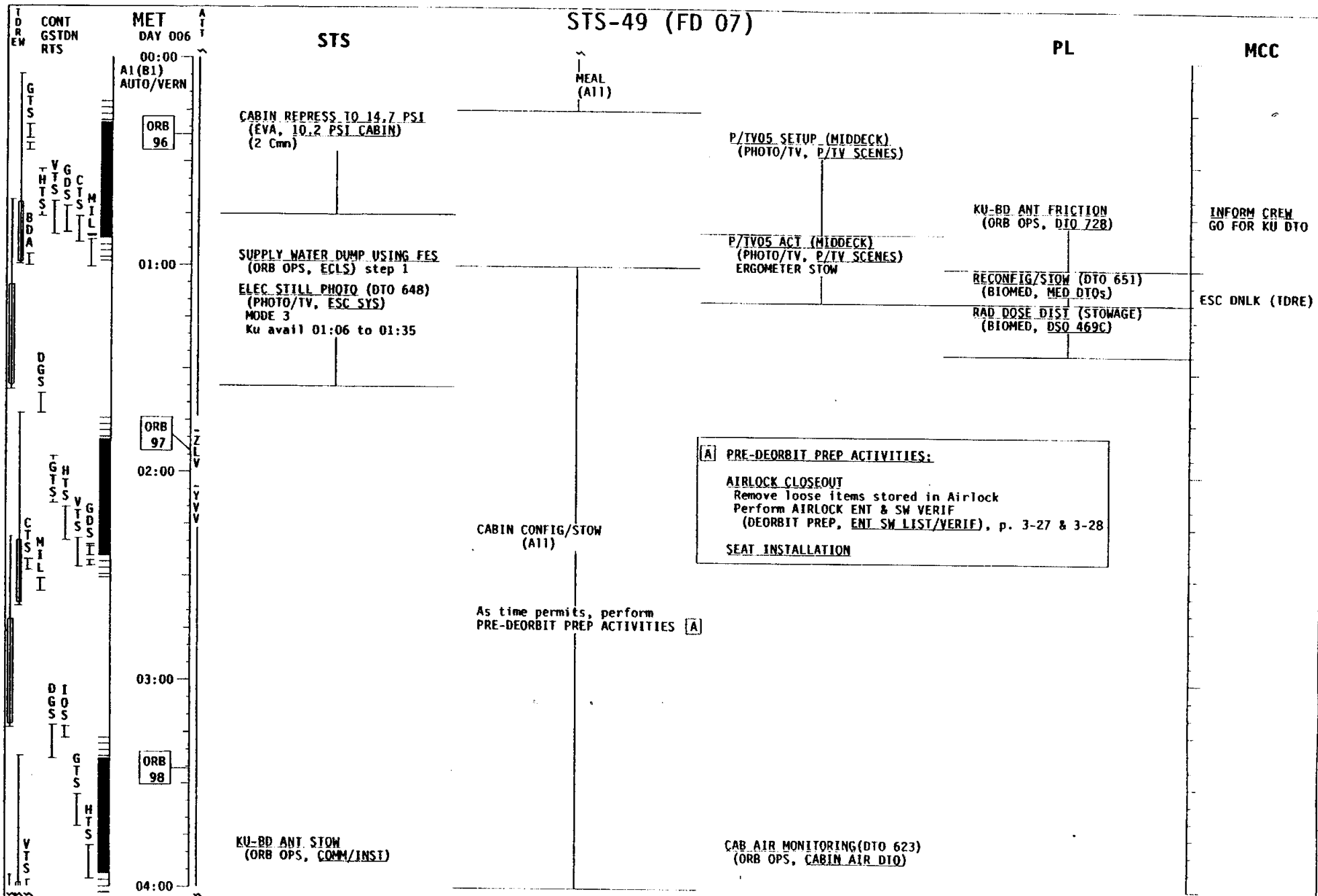
UPLINK
FUEL CELL
PURGE

STS-49 (FD 07)



STS-49 (FD 07)





STS-49 (FD 07)

STS

PL

MCC

FLORINEE
(BIOMED, DSO 621)
(PLT, MS1, MS2)
Perform with meal

UPLINK
FUEL CELL
PURGE

CONT GSTDN RTS
I O S
L V T S
D G S
G T S
H T S
I O S
D G S
G T S
H T S

MET DAY 006

04:00
A1(B1)
AUTO/VERN

05:00
ORB 99

(A1)B5
AUTO/VERN
A1(B5)
AUTO/VERN

06:00
A1(B1)
AUTO/VERN
ORB 100

07:00

08:00

06 UHF MODE - OFF
PRIVATE MEDICAL CONFERENCE
UHF MODE - SPLX (or as reqd)

01 COAS - OFF Mount COAS - FWD

05:00
MNVN IMU ALIGN ATT
STAR PAIR (A2)
A/AUTO/VERN Init MNVN at SS
IMU ALIGN - S TRK (ORB OPS)
MNVN COAS CAL ATT
R=293 P=341 Y=298
A/AUTO/VERN Init MNVN

COAS CALIBRATION (ORB OPS)
MNVN (TRK) -ZLV, -YVY
TG=2 BV=3 OM=90
A/AUTO/VERN Init TRK

SUPPLY WATER DUMP USING FES
(ORB OPS, ECLS)
Perform step 2 w/FES reqd

06:00
01 COAS-OFF Stow COAS
Change DAP B to B1

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

SLEEP

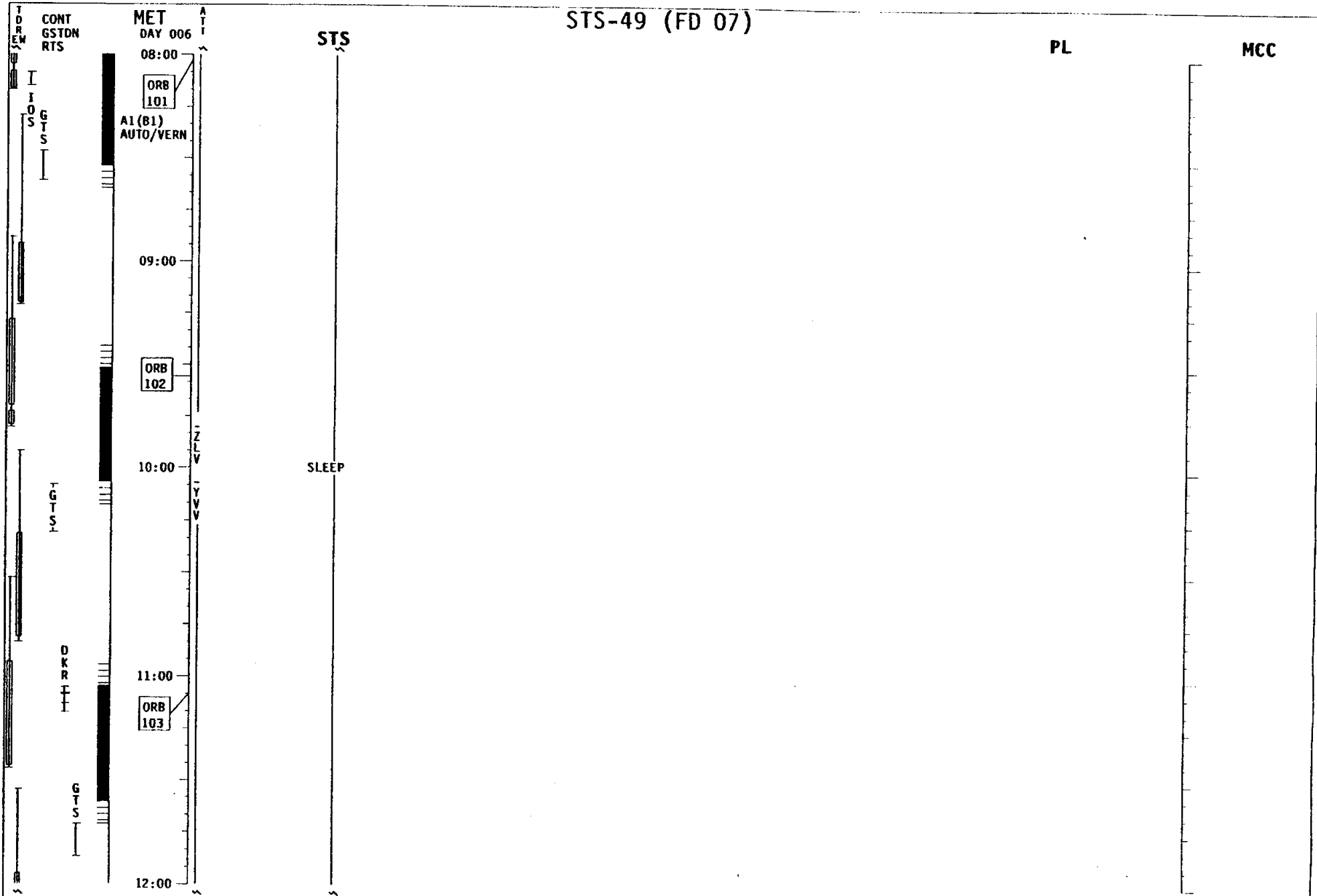
COAS CALIBRATION LOG

STAR ID: +X 22, ALTAIR
STAR AVAIL: 05:09 TO 05:58

+X Δ BIAS _____

UPDATE TIME: ___ / ___ : ___ : ___

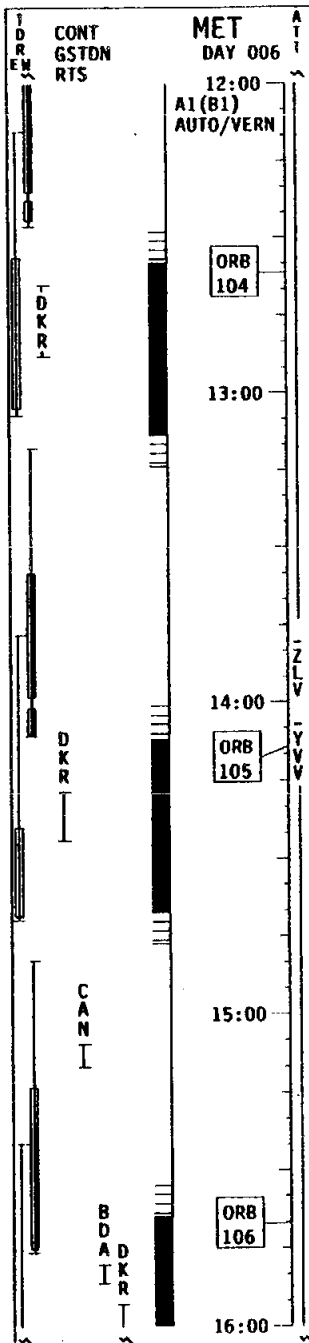
STS-49 (FD 07)



STS-49 (FD 08)

PL

MCC



STS

SLEEP

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

UPLINK
FUEL CELL
PURGE

INTELSAT OVERNIGHT CONTINGENCY TIMELINE

The FD4 & FD5 Intelsat EVA timeline will be used if the Intelsat spacecraft and the vertical perigee stage (VPS) cannot be mated and deployed in a single EVA on FD4. The maximum allowable time for the FD4 EVA is based on EMU limitations and is PET 6:30. The timeline will show additional time available for EVA growth or EVA start delay and identifies the latest possible beginning of airlock repress. The contingency timeline is designed to allow the EV 1 & 2 crewmembers to perform the follow-up EVA on FD5, an ASEM EVA performed by EV 3 & 4 on FD6 and the nominal landing on FD8. Post EVA (including EMU Battery Recharge) and Suit Drying & Seal Lubrication will be required on FD4 in order to prepare EMUs 1 & 2 for the FD5 EVA. EMU Maintenance & Recharge and Middeck EMU Battery Recharge will be delayed to FD5.

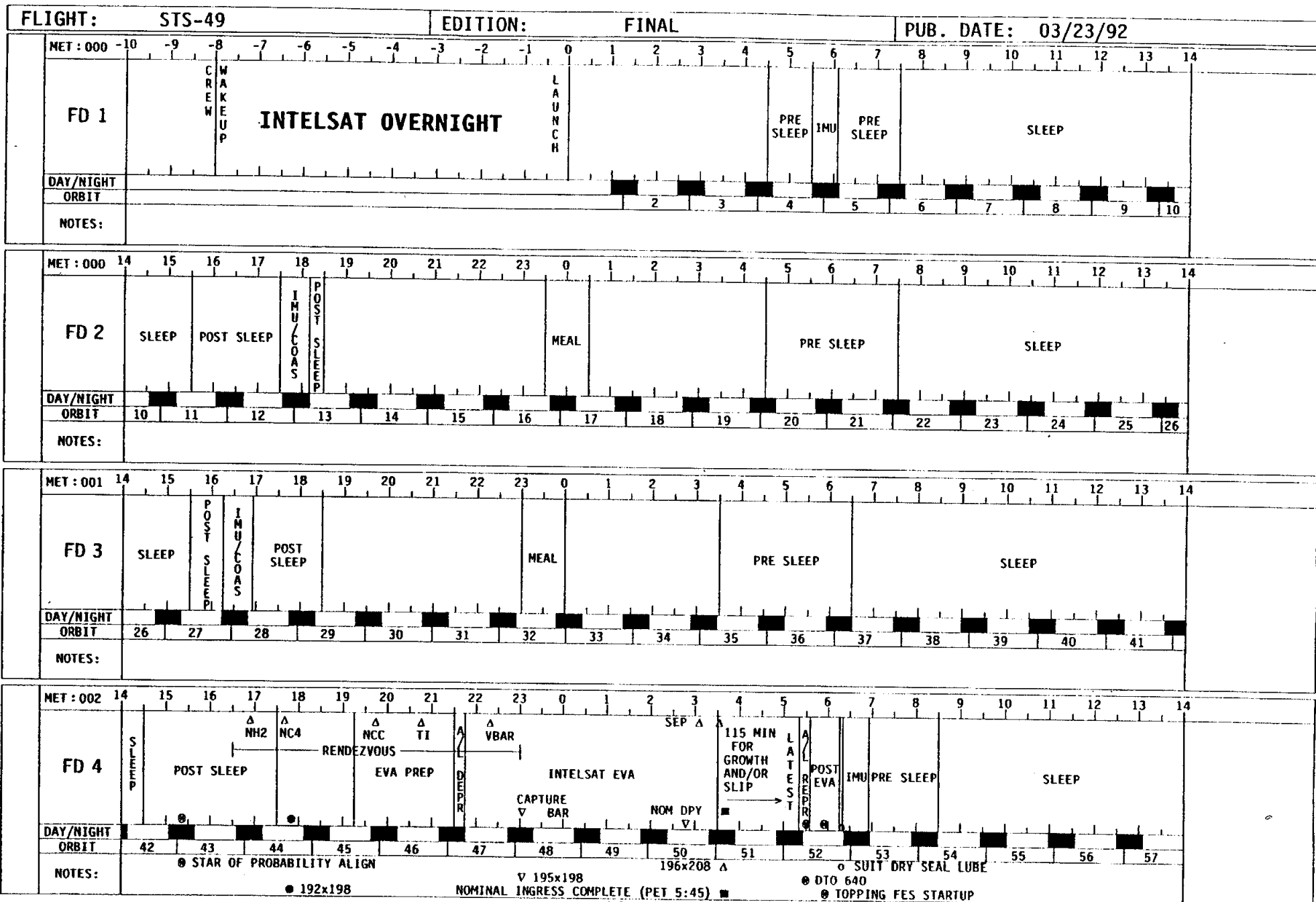
ASSUMPTIONS:

- TIMELINE ASSUMES THAT TWO EVAs WILL BE REQUIRED TO COMPLETE INTELSAT EVA TASKS.
- EV CREWMEMBERS 1&2 WILL PERFORM THE 2ND INTELSAT EVA ON FD5.
- AFTER THE INTELSAT DEPLOYMENT IS COMPLETE, ASEM EVA ACTIVITIES MAY BE PERFORMED BY EV 1&2.
- THE MINIMAL AMOUNT OF POST EVA ACTIVITIES WILL BE PERFORMED ON FD4 IN ORDER TO MAXIMIZE THE TIME AVAILABLE FOR THE FD4 EVA. POST EVA & EMU SUIT DRYING/SEAL LUBE WILL BE PERFORMED FOLLOWING THE EVA.
- FD4 IS AN 18-HOUR CREWDAY (MAXIMUM ALLOWABLE).
- FD4 PRE-SLEEP IS 2 HOURS (MINIMUM ALLOWABLE).
- FD5 EVA DURATION IS SHORTENED TO MEET SLEEP SHIFTING REQUIREMENTS FOR LANDING. THIS ALSO PROTECTS FOR A FULL DURATION EVA ON FD6.

CONCLUSIONS:

- THE LATEST TIME THAT A/L REPRESS CAN START IS 14 HOURS AND 50 MINUTES AFTER CREW WAKEUP.
- THE EVA MAY END UP TO 115 MINUTES LATER THAN NOMINALLY SCHEDULED. THIS MAY ACCOMMODATE EVA GROWTH AND/OR A DELAYED START.

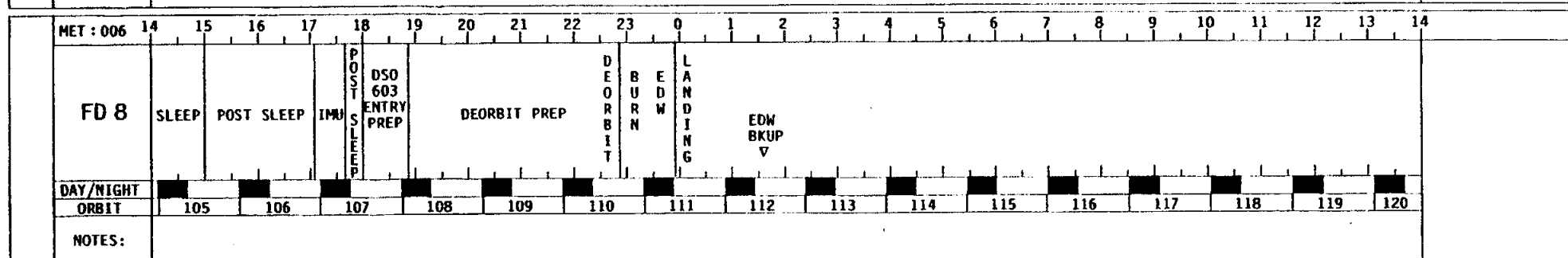
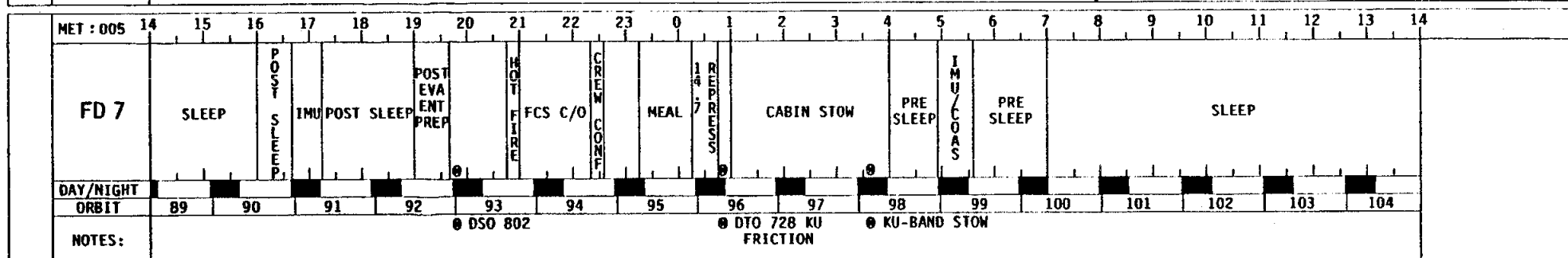
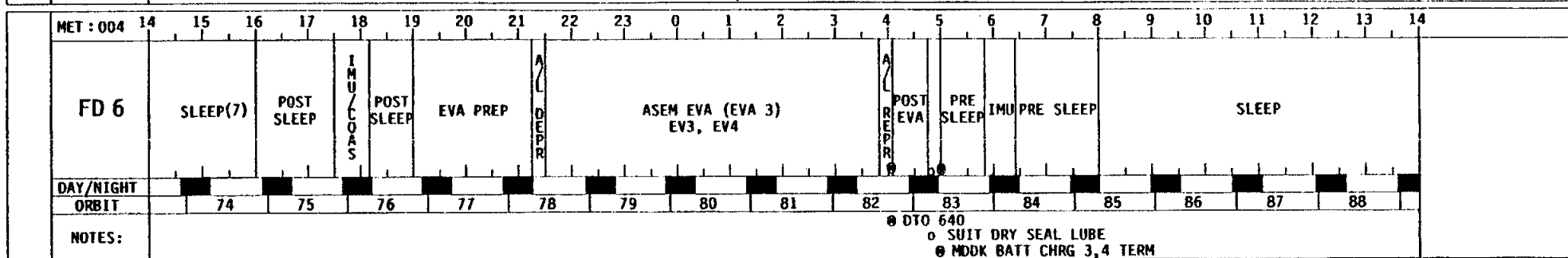
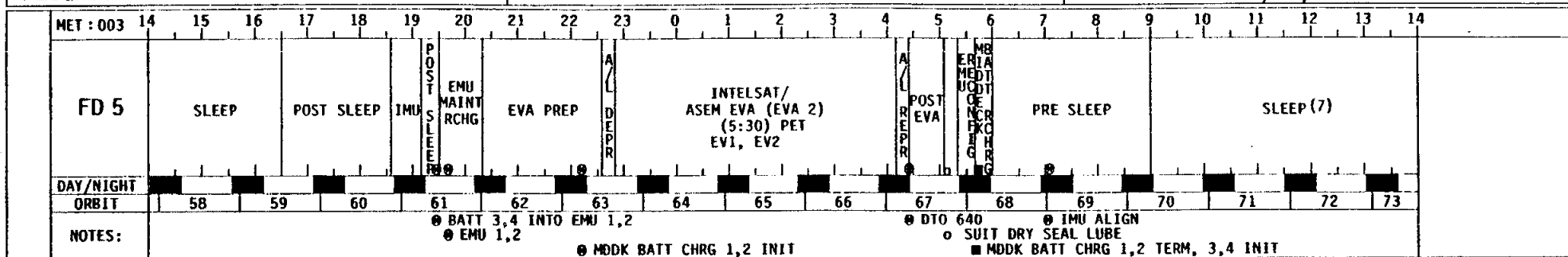
INTELSAT OVERNIGHT



FLIGHT: STS-49

EDITION: FINAL

PUB. DATE: 03/23/92



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will not be included in flight copies.

ATTITUDE TIMELINE

ATTITUDE
TIMELINE

| Attitude Timeline | | | | | | | |
|---|---|--------------------|---------------------------------------|------------------------|---------------------------------------|--------------------------------------|--|
| GMT/MET | MNVR OPTION | DAP | E/S | REF ATT/REMARKS | EVENT | | |
| 1 000/01:12:00 MET 22:34 107/10:56:00 GMT 11:06:34 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO PRI | DSC 0.200 DB AT 5.00 DB RT 0.20 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | PLBD OPENING -ZLV -YVV | |
| 2 000/02:30:00 MET 37:06 107/12:14:00 GMT 21:06 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 118 P 105 | STAR PAIR A1 -Y: 53 -Z: 29 | IMU ALIGN | |
| 3 000/02:50:00 MET 03:01:38 107/12:34:00 GMT 45:38 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV | |
| 4 000/04:55:00 MET 05:04:50 107/14:39:00 GMT 48:50 | INRTL R=298.40 MNVR P=167.90 Y= 11.70 | B1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 153 P 144 | | NC1 | |
| 5 000/05:30:00 MET 34:18 107/15:14:00 GMT 18:18 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 118 P 105 | STAR PAIR A1 | IMU ALIGN | |
| 6 000/05:50:00 MET 06:03:42 107/15:34:00 GMT 47:42 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 360 P 90 | LVLH R= 0.00 P=180.00 Y= 90.00 | -ZLV +YVV H2O DUMP | |
| 7 000/17:34:00 MET 47:09 108/03:18:00 GMT 31:09 | INRTL R=287.00 MNVR P=335.00 Y=293.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 151 P 92 | STAR PAIR A2 -Y: 29 -Z: 53 | IMU ALIGN | |
| 8 000/17:54:00 MET 28 108/03:38:00 GMT 28 | INRTL R=293.00 MNVR P=341.00 Y=298.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 150 P 87 | +X: 22 | +X COAS CAL | |
| 9 000/18:14:00 MET 27:33 108/03:58:00 GMT 04:11:33 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV | |
| 10 000/20:45:00 MET 55:09 108/06:29:00 GMT 39:09 | INRTL R= 61.50 MNVR P=352.20 Y=351.60 | B1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 35 P 33 | | NH1 | |
| 11 000/21:10:00 MET 19:14 108/06:54:00 GMT 07:03:14 | TGT=2 BV=5 P= 90.00 Y= 5.00 OM= 69.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 5 P 90 | LVLH R=355.00 P=180.00 Y=291.00 | BIASED -ZLV -YVV STARS OF PROB | |
| 12 001/05:05:00 MET 16:13 108/14:49:00 GMT 15:00:13 | INRTL R=298.50 MNVR P=174.20 Y= 7.20 | B1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 142 P 147 | | NC2 | |

*** ALL ATTITUDES IN MEAN OF 1950 ***
*** PYR EULER SEQUENCE ***

Attitude Timeline

| GMT/MET | MNVR OPTION | DAP | E/S | REF ATT/REMARKS | EVENT | |
|--|---|--------------------|---------------------------------------|------------------------|--|--|
| 1 001/05:30:00 MET 37:33 108/15:14:00 GMT 21:33 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV |
| 2 001/16:14:00 MET 21:29 109/01:58:00 GMT 02:05:29 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 117 P 104 | STAR PAIR A1 -Z: 29 | IMU ALIGN -Z COAS CAL |
| 3 001/16:40:00 MET 53:57 109/02:24:00 GMT 37:57 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=110.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R=180.00 P= 0.00 Y=290.00 | BIASED -ZLV -YVV H2O DUMP 20 DEG OOP POSI |
| 4 001/20:10:00 MET 19:22 109/05:54:00 GMT 06:03:22 | INRTL R=298.60 MNVR P=176.70 Y= 7.20 | B1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 137 P 146 | | CIRC |
| 5 001/21:09:00 MET 23:27 109/06:53:00 GMT 07:07:27 | INRTL R= 0.00 MNVR P= 0.00 Y= 0.00 | B1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 113 P 28 | | NPC |
| 6 001/21:35:00 MET 45:59 109/07:19:00 GMT 29:59 | TGT=2 BV=5 P= 90.00 Y= 5.00 OM= 89.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 5 P 90 | LVLH R=355.00 P=180.00 Y=271.00 | BIASED -ZLV -YVV STARS OF PROB |
| 7 002/00:44:00 MET 56:15 109/10:28:00 GMT 40:15 | INRTL R= 0.00 MNVR P= 0.00 Y= 0.00 | A1 AUTO PRI | DSC 0.200 DB AT 5.00 DB RT 0.20 | SUN R 113 P 28 | | NSR |
| 8 002/01:10:00 MET 21:47 109/10:54:00 GMT 11:05:47 | TGT=2 BV=5 P= 90.00 Y= 5.00 OM= 89.00 | A1 AUTO PRI | DSC 0.200 DB AT 5.00 DB RT 0.20 | EARTH R 5 P 90 | LVLH R=355.00 P=180.00 Y=271.00 | BIASED -ZLV -YVV STARS OF PROB |
| 9 002/03:30:00 MET 39:21 109/13:14:00 GMT 23:21 | INRTL R=161.80 MNVR P=251.00 Y=299.90 | A1 AUTO PRI | DSC 0.200 DB AT 5.00 DB RT 0.20 | SUN R 206 P 115 | | NC3 |
| 10 002/04:00:00 MET 08:01 109/13:44:00 GMT 52:01 | TGT=2 BV=5 P= 90.00 Y= 5.00 OM= 89.00 | A1 AUTO PRI | DSC 0.200 DB AT 5.00 DB RT 0.20 | EARTH R 5 P 90 | LVLH R=355.00 P=180.00 Y=271.00 | BIASED -ZLV -YVV STARS OF PROB |
| 11 002/16:30:00 MET 40:39 110/02:14:00 GMT 24:39 | INRTL R= 37.20 MNVR P=317.20 Y=306.30 | B7 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 26 P 84 | | NH2 |
| 12 002/16:52:00 MET 110/02:36:00 GMT | | A7 LVLH VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 360 P 80 | LVLH R=180.05 HOLD P=349.65 Y=359.96 | LVLH HOLD |

*** ALL ATTITUDES IN MEAN OF 1950 ***
*** PYR EULER SEQUENCE ***

Attitude Timeline

| GMT/MET | MNVR OPTION | DAP | E/S | REF ATT/REMARKS | EVENT | |
|--|---|--------------------|---------------------------------------|------------------------|--|--|
| 002/17:15:00 MET 22:28 110/02:59:00 GMT 03:06:28 | INRTL R=322.70 MNVR P=137.50 Y= 53.70 | B7 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 154 P 96 | | NC4 |
| 002/17:38:00 MET 44:00 110/03:22:00 GMT 28:00 | TGT=1 BV=3 P= 90.00 Y= 0.00 OM= 0.00 | B7 AUTO PRI | DSC 0.500 DB AT 2.00 DB RT 0.20 | | RNDZ NAV must be enabled | TGT TRK NCC TI |
| 002/21:51:00 MET 110/07:35:00 GMT | INRTL HOLD | A7 INRT VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 231 P 36 | INRTL R=239.23 HOLD P= 0.67 Y=352.26 | INRTL HOLD TF |
| 002/23:30:00 MET 42:01 110/09:14:00 GMT 26:01 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00 | A9 AUTO VERN | DSC 0.200 DB AT 2.00 DB RT 0.04 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y= 90.00 | -ZLV +YVV INTELSAT EVA |
| 003/00:50:00 MET 57:30 110/10:34:00 GMT 41:30 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 0.00 | A9 AUTO VERN | DSC 0.200 DB AT 2.00 DB RT 0.04 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y= 0.00 | -ZLV -XVV INTELSAT EVA |
| 003/01:33:00 MET 40:30 110/11:17:00 GMT 24:30 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00 | A9 AUTO VERN | DSC 0.200 DB AT 2.00 DB RT 0.04 | EARTH R 360 P 90 | LVLH R= 0.00 P=180.00 Y= 90.00 | -ZLV +YVV INTELSAT EVA |
| 003/02:20:00 MET 34:44 110/12:04:00 GMT 18:44 DPY - 00:25 | TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 45.00 DPY 3/02:45:00 | A4 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 132 P 23 | INRTL R=249.76 P=324.15 Y= 19.59 | RA/DEC TRK INTELSAT DEPLOY SEP 1 |
| 003/03:14:00 MET 26:12 110/12:58:00 GMT 13:10:12 DPY + 00:29 | INRTL R=343.20 MNVR P=256.50 Y=298.90 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 30 P 113 | | SEP 2 |
| 003/03:34:00 MET 42:53 110/13:18:00 GMT 26:53 | TGT=1 BV=3 P= 90.00 Y= 0.00 OM=270.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | | RNDZ NAV must be enabled | TGT TRK P/L VIEWING |
| 003/04:50:00 MET 58:47 110/14:34:00 GMT 42:47 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 117 P 102 | STAR PAIR A1 | IMU ALIGN |
| 003/05:10:00 MET 18:58 110/14:54:00 GMT 15:02:58 | TGT=2 BV=1 P= 0.00 Y= 0.00 OM=180.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 86 P 0 | LVLH R=180.00 P=270.00 Y= 0.00 | +XLV +ZVV WINDOW PROTECT |
| 003/17:00:00 MET 13:01 111/02:44:00 GMT 57:01 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 116 P 102 | STAR PAIR A1 | IMU ALIGN |

*** ALL ATTITUDES IN MEAN OF 1950 ***
*** PYR EULER SEQUENCE ***

Attitude Timeline

| GMT/MET | MNVR OPTION | DAP | E/S | REF ATT/REMARKS | EVENT | |
|---|---|---------------------|---------------------------------------|-------------------------|---------------------------------------|--|
| 1 003/17:20:00 MET 31:02 111/03:04:00 GMT 15:02 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=110.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R=180.00 P= 0.00 Y=290.00 | BIASED -ZLV -YVV H2O DUMP 20 DEG OOP POSI |
| 2 003/18:45:00 MET 56:01 111/04:29:00 GMT 40:01 | TGT=2 BV=2 P=180.00 Y= 0.00 OM= 0.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 13 P 180 | LVLH R= 0.00 P= 90.00 Y= 0.00 | -XLV +ZVV ASEM EVA |
| 3 004/04:15:00 MET 25:16 111/13:59:00 GMT 14:09:16 | INRTL R=260.00 MNVR P=317.00 Y= 1.00 | A10 AUTO VERN | DSC 0.200 DB AT 3.00 DB RT 0.20 | SUN R 145 P 39 | -Y: 44 -Z: 43 | TDRS/IMU ALIGN |
| 4 004/06:10:00 MET 21:21 111/15:54:00 GMT 16:05:21 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A10 AUTO VERN | DSC 0.200 DB AT 3.00 DB RT 0.20 | EARTH R 0 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV |
| 5 004/17:30:00 MET 37:20 112/03:14:00 GMT 21:20 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A10 AUTO VERN | DSC 0.200 DB AT 3.00 DB RT 0.20 | SUN R 116 P 101 | STAR PAIR A1 -Z: 29 | IMU ALIGN -Z COAS CAL |
| 6 004/17:55:00 MET 18:07:08 112/03:39:00 GMT 51:08 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=110.00 | A10 AUTO VERN | DSC 0.200 DB AT 3.00 DB RT 0.20 | EARTH R 0 P 90 | LVLH R=180.00 P= 0.00 Y=290.00 | BIASED -ZLV -YVV H2O DUMP 20 DEG OOP POSI |
| 7 004/20:10:00 MET 21:01 112/05:54:00 GMT 06:05:01 | TGT=2 BV=2 P=180.00 Y= 0.00 OM= 0.00 | A10 AUTO VERN | DSC 0.200 DB AT 3.00 DB RT 0.20 | EARTH R 133 P 180 | LVLH R= 0.00 P= 90.00 Y= 0.00 | -XLV +ZVV ASEM EVA |
| 8 005/04:15:00 MET 25:00 112/13:59:00 GMT 14:09:00 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R=179.53 P=359.43 Y=270.00 | -ZLV -YVV |
| 9 005/05:55:00 MET 06:03:47 112/15:39:00 GMT 47:47 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 116 P 101 | STAR PAIR A1 | IMU ALIGN |
| 10 005/06:15:00 MET 28:05 112/15:59:00 GMT 16:12:05 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 360 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV |
| 11 005/16:39:00 MET 47:56 113/02:23:00 GMT 31:56 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 116 P 100 | STAR PAIR A1 | IMU ALIGN |
| 12 005/16:59:00 MET 17:12:29 113/02:43:00 GMT 56:29 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM=110.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 0 P 90 | LVLH R=180.00 P= 0.00 Y=290.00 | BIASED -ZLV -YVV H2O DUMP 20 DEG OOP POSI |

*** ALL ATTITUDES IN MEAN OF 1950 ***
*** PYR EULER SEQUENCE ***

| Attitude Timeline | | | | | | |
|--|---|--------------------|---------------------------------------|------------------------|---------------------------------------|--------------------------|
| GMT/MET | MNVR OPTION | DAP | E/S | REF ATT/REMARKS | EVENT | |
| 1 005/20:30:00 MET 40:57 113/06:14:00 GMT 24:57 | INRTL R=264.00 MNVR P=147.00 Y= 5.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 213 P 141 | | TDRS ATT CREW CONF |
| 2 005/22:55:00 MET 23:08:56 113/08:39:00 GMT 52:56 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 360 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV |
| 3 006/04:55:00 MET 05:04:01 113/14:39:00 GMT 48:01 | INRTL R=287.00 MNVR P=335.00 Y=293.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 153 P 97 | STAR PAIR A2 | IMU ALIGN |
| 4 006/05:15:00 MET 28 113/14:59:00 GMT 28 | INRTL R=293.00 MNVR P=341.00 Y=298.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 153 P 91 | +X: 22 | +X COAS CAL |
| 5 006/05:35:00 MET 48:39 113/15:19:00 GMT 32:39 | TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | EARTH R 360 P 90 | LVLH R= 0.00 P=180.00 Y=270.00 | -ZLV -YVV |
| 6 006/17:11:00 MET 20:17 114/02:55:00 GMT 03:04:17 | INRTL R=332.00 MNVR P=169.00 Y= 51.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 115 P 99 | STAR PAIR A1 | IMU ALIGN |
| 7 006/17:31:00 MET 38:10 114/03:15:00 GMT 22:10 | TGT=4 BV=5 P=184.00 Y= 0.00 OM= 90.00 RA= 30.433 DEC= 12.390N | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 180 P 176 | INRTL R= 4.35 P=161.12 Y=329.97 | TAIL SUN |
| 8 006/19:51:00 MET 20:04:44 114/05:35:00 GMT 48:44 | INRTL R=185.00 MNVR P=205.00 Y=346.00 | A1 AUTO VERN | DSC 0.200 DB AT 1.00 DB RT 0.02 | SUN R 205 P 140 | -Y: 21 -Z: 17 | DEORBIT IMU |
| 9 006/20:10:00 MET 15:25 114/05:54:00 GMT 59:25 | INRTL R=350.00 MNVR P=178.00 Y= 31.00 | B1 AUTO PRI | DSC 0.500 DB AT 3.00 DB RT 0.20 | SUN R 88 P 118 | -Y: 48 -Z: 49 | DEORBIT VERIF |
| 10 006/20:20:00 MET 24:17 114/06:04:00 GMT 08:17 | INRTL R=307.00 MNVR P= 64.00 Y=305.00 TIG 6/22:49:12 | * AUTO * | DSC 0.500 DB AT 3.00 DB RT 0.20 | SUN R 206 P 108 | | D/O BURN ATT COMM ATT |

*** ALL ATTITUDES IN MEAN OF 1950 ***
*** PYR EULER SEQUENCE ***

STS-49 DAP BOOK

DAP A CONFIGURATIONS.

| | ITEM # | A1* | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 |
|--------------------|--------|-------|-------|-------|-------|-------|-------|--------|-------|--------|---------|
| <u>TRANSLATION</u> | | | | | | | | | | | |
| PULSE ft/sec | 1 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.05 | 0.10 | 0.10 |
| <u>ROTATION</u> | | | | | | | | | | | |
| DSC RT NORM °/sec | 2 | 0.200 | 0.400 | 0.200 | 0.500 | 0.200 | 0.200 | 0.200 | 0.200 | 0.100 | 0.100 |
| VERN °/sec | 3 | 0.200 | 0.400 | 0.008 | 0.200 | 0.200 | 0.200 | 0.200 | 0.200 | 0.200 | 0.200 |
| PULSE NORM °/sec | 4 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.04 | 0.04 |
| VERN °/sec | 5 | 0.010 | 0.010 | 0.010 | 0.010 | 0.050 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| COMP NORM °/sec | 6 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 | .00 |
| VERN °/sec | 7 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 | .000 |
| <u>DEADBAND</u> | | | | | | | | | | | |
| ATT NORM (deg) | 8 | 5.00 | 1.00 | 1.00 | 3.00 | 5.00 | 5.00 | 2.00 | 2.00 | 5.00 | 5.00 |
| VERN (deg) | 9 | 1.000 | 1.000 | 0.070 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 2.000 | 3.000 |
| RATE NORM °/sec | 10 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| VERN °/sec | 11 | .020 | .020 | .010 | .020 | .020 | .020 | .020 | .020 | .040 | .200 |
| <u>JET OPT</u> | | | | | | | | | | | |
| P | 12 | 1 | 1 | 1 | 1 | 1 | 3 | 1 or 3 | 1 | 1 or 3 | 1 or 3 |
| Y | 13 | 1 | 1 | 3 | 1 | 1 | 3 | 1 or 3 | 1 | 1 or 3 | 1 or 3 |
| <u>CNTL ACCEL</u> | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,2 | 2,3,4,5 |

*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

| | ITEM # | B1* | B2 | B3 | B4 | B5 | B6 | B7 | B8 |
|--------------------|--------|-------|-------|-------|-------|-------|----|--------|-------|
| <u>TRANSLATION</u> | | | | | | | | | |
| PULSE ft/sec | 15 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | | 0.05 | 0.01 |
| <u>ROTATION</u> | | | | | | | | | |
| DSC RT NORM °/sec | 16 | 0.500 | 0.200 | 0.200 | 0.200 | 0.200 | | 0.500 | 0.200 |
| VERN °/sec | 17 | 0.200 | 0.200 | 0.200 | 0.008 | 0.016 | | 0.200 | 0.200 |
| PULSE NORM °/sec | 18 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | | 0.04 | 0.04 |
| VERN °/sec | 19 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | | 0.002 | 0.002 |
| COMP NORM °/sec | 20 | .00 | .00 | .00 | .00 | .00 | | .00 | .00 |
| VERN °/sec | 21 | .000 | .000 | .000 | .000 | .000 | | .000 | .000 |
| <u>DEADBAND</u> | | | | | | | | | |
| ATT NORM (deg) | 22 | 3.00 | 3.00 | 3.00 | 0.30 | 3.00 | | 2.00 | 2.00 |
| VERN (deg) | 23 | 1.000 | 1.000 | 1.000 | 0.100 | 0.033 | | 1.000 | 1.000 |
| RATE NORM °/sec | 24 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | | 0.20 | 0.20 |
| VERN °/sec | 25 | .020 | .020 | .020 | .010 | .020 | | .020 | .020 |
| <u>JET OPT</u> | | | | | | | | | |
| P | 26 | 1 | 3 | 1 | 3 | 3 | | 1 or 3 | 1 |
| Y | 27 | 1 | 3 | 1 | 3 | 3 | | 1 or 3 | 1 |
| <u>CNTL ACCEL</u> | 28 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |

*I-LOADED OPS-2 DAP Configuration

ALT DAP CONFIGURATIONS

| | ITEM # | ALT1* | ALT2 | ALT3 TBS | ALT4 |
|----------------|--------|-------|-------|-------------|--------|
| RATE DEADBAND | 32 | 0.200 | 0.100 | | 0.200 |
| JET OPTION | 33 | 1 | 1,3 | | 1 or 3 |
| NUMBER OF JETS | 34 | 2 | 2 | | 1 |
| ON TIME | 35 | 0.08 | 0.08 | | 0.08 |
| DELAY | 36 | 0.00 | ** | | 0.00 |

*I-LOADED OPS-2 DAP Configuration

**DELAY: INTELSAT

10.0 POST-GRAPPLE
PAD EGRESS

11.5 SHOWER CAP RMVL (HOVER 6)
HOVER 5

DELAY: ASEM

3.9 HOVER
MPRESS ACCESS
SJ MPRESS ACCESS

6.3 SSF POSN 1

7.2 SSF POSN 2
EXT PARK/CONT REL



| <u>DAP</u> | <u>PURPOSE</u> | <u>DAP</u> | <u>PURPOSE</u> |
|------------|---|------------|--|
| A1 | - NOMINAL IMU ALIGN LOSS OF VERN (NOSE & TAIL) | B1 | - NOMINAL PRCS IMU ALIGN OMS & RCS BURNS |
| A2 | - PTC | B2 | - LOSS OF VERN (TAIL ONLY) |
| A3 | - GG | B3 | - LOSS OF VERN (NOSE & TAIL) GG MNVR |
| A4 | - PRE/POST DEPLOY | B4 | - SSUS DEPLOY |
| A5 | - IMU ROTATION | B5 | - COAS CAL |
| A6 | - LOSS OF VERN (TAIL ONLY) | B6 | - (Blank) |
| A7 | - RENDEZVOUS | B7 | - RENDEZVOUS |
| A8 | - PROX OPS | B8 | - PROX OPS |
| A9 | - RMS/INTELSAT | | |
| A10 | - RMS/ASEM ASEM FIXTURE | | |

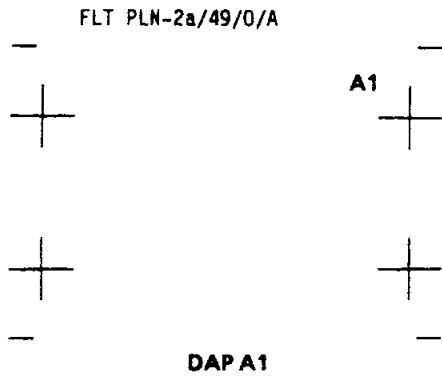
FLT PLN-1a/49/0/B



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FLT PLN-1b/49/0/A

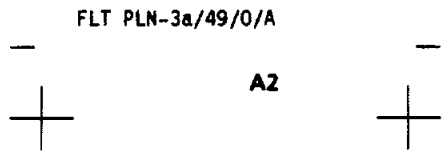
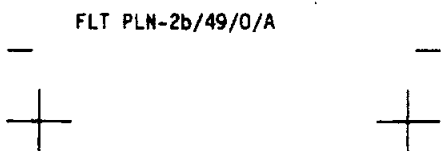




PURPOSE:
 NOMINAL
 IMU ALIGN
 LOSS OF VERN
 (NOSE & TAIL)

A1

| | | |
|----------|----|----------------------|
| 0.1 0 | 1 | TRANSLATION PULSE |
| ROTATION | | |
| 0.2 0 0 | 2 | DSC RT NORM |
| 0.2 0 0 | 3 | VERN |
| 0.1 0 0 | 4 | PULSE NORM |
| 0.0 1 0 | 5 | VERN |
| 0.0 0 0 | 6 | COMP NORM |
| 0.0 0 0 | 7 | VERN |
| DEADBAND | | |
| 5.0 0 | 8 | ATT NORM |
| 1.0 0 0 | 9 | VERN |
| 0.2 0 | 10 | RATE NORM |
| 0.2 0 | 11 | VERN |
| 1 | 12 | JET OPT P |
| 1 | 13 | Y |
| 0 | 14 | CNTL ACCEL |





A1

DAP A2

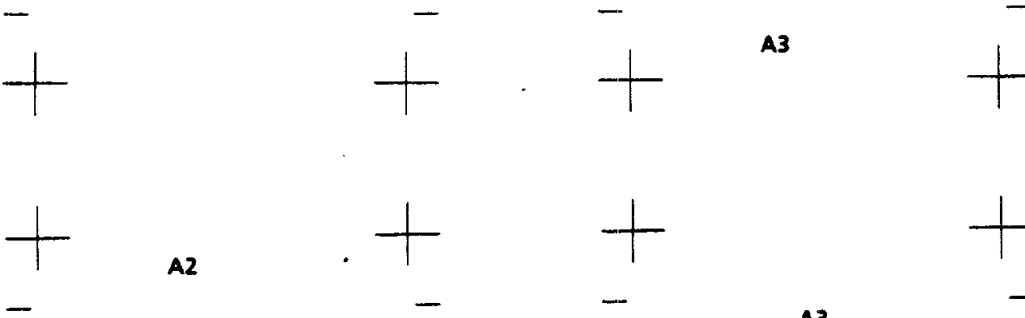
PURPOSE:
PTC

A2

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.4 0 0 | 2 | DSC RT | NORM |
| 0.4 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| 0.0 0 0 | 6 | COMP | NORM |
| 0.0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 1.0 0 | 8 | ATT | NORM |
| 1.0 0 0 | 9 | | VERN |
| 0.2 0 | 10 | RATE | NORM |
| 0.2 0 | 11 | | VERN |
| 1 | 12 | JET OPT | P |
| 1 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-3b/49/0/A

FLT PLN-4a/49/0/A



A3

A2

DAP A3

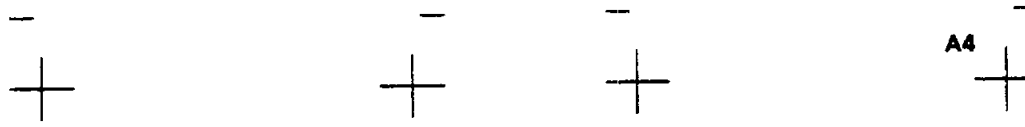
PURPOSE:
GG

A3

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.2 0 0 | 2 | DSC RT | NORM |
| 0.0 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| 0.0 0 0 | 6 | COMP | NORM |
| 0.0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 1.0 0 | 8 | ATT | NORM |
| 0.0 7 0 | 9 | | VERN |
| 0.2 0 | 10 | RATE | NORM |
| 0.1 0 | 11 | | VERN |
| 1 | 12 | JET OPT | P |
| 3 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-4b/49/0/A

FLT PLN-5a/49/0/A



A4



DAP A4

PURPOSE:
PRE/POST DEPLOY

FLT PLN-5b/49/0/A



A4

DAP A5

PURPOSE:
IMU ROTATION

FLT PLN-6b/49/0/A



A3

A4

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.5 0 0 | 2 | DSC RT | NORM |
| 0.2 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| 0.0 0 0 | 6 | COMP | NORM |
| .0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 3.0 0 | 8 | ATT | NORM |
| 1.0 0 0 | 9 | | VERN |
| 0.2 0 | 10 | RATE | NORM |
| .0 2 0 | 11 | | VERN |
| 1 | 12 | JET OPT | P |
| 1 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-6a/49/0/B

A5

A5

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.2 0 0 | 2 | DSC RT | NORM |
| 0.2 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 5 0 | 5 | | VERN |
| .0 0 0 | 6 | COMP | NORM |
| .0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 5.0 0 | 8 | ATT | NORM |
| 1.0 0 0 | 9 | | VERN |
| 0.2 0 | 10 | RATE | NORM |
| .0 2 0 | 11 | | VERN |
| 1 | 12 | JET OPT | P |
| 1 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-7a/49/0/A

A6



A5

DAP A6

PURPOSE:

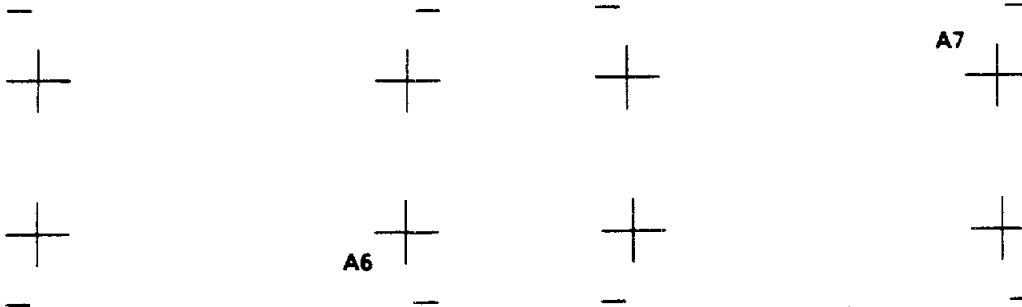
LOSS OF VERN
(TAIL ONLY)

A6

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.2 0 0 | 2 | DSC RT | NORM |
| 0.2 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| .0 0 0 | 6 | COMP | NORM |
| .0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 5.0 0 | 8 | ATT | NORM |
| 1.0 0 0 | 9 | | VERN |
| RATE | | | |
| 0.2 0 | 10 | | NORM |
| .0 2 0 | 11 | | VERN |
| JET OPT | | | |
| 3 | 12 | | P |
| 3 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-7b/49/0/A

FLT PLN-8a/49/0/A



A7

A6

DAP A7

PURPOSE:

RENDEZVOUS

A7

| | | | |
|----------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| ROTATION | | | |
| 0.2 0 0 | 2 | DSC RT | NORM |
| 0.2 0 0 | 3 | | VERN |
| 0.1 0 0 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| .0 0 0 | 6 | COMP | NORM |
| .0 0 0 | 7 | | VERN |
| DEADBAND | | | |
| 2.0 0 | 8 | ATT | NORM |
| 1.0 0 0 | 9 | | VERN |
| RATE | | | |
| 0.2 0 | 10 | | NORM |
| .0 2 0 | 11 | | VERN |
| JET OPT | | | |
| 1 or 3 | 12 | | P |
| 1 or 3 | 13 | | Y |
| 0 | 14 | CNTL ACCEL | |

FLT PLN-8b/49/0/A

FLT PLN-9a/49/0/A



A8



A7

DAP A8

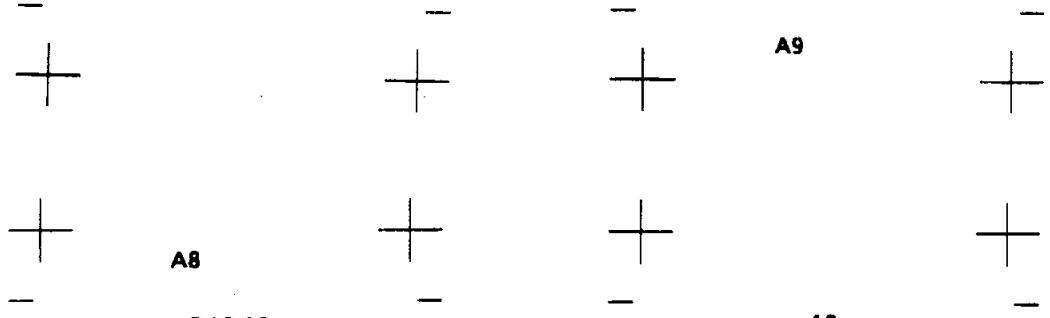
PURPOSE:
PROX OPS

A8

- 0.0 5 1 TRANSLATION PULSE
- 0.2 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.1 0 0 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 0 6 COMP NORM
- .0 0 0 7 VERN
- 2.0 0 8 DEADBAND ATT NORM
- 1.0 0 0 9 VERN
- 0.2 0 10 RATE NORM
- .0 2 0 11 VERN
- 1 12 JET OPT P
- 1 13 Y
- 0 14 CNTL ACCEL

FLT PLN-9b/49/0/A

FLT PLN-10a/49/0/A



A9

A8

DAP A9

PURPOSE:
RMS/INTELSAT

A9

- 0.1 0 1 TRANSLATION PULSE
- 0.1 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.0 4 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 0 6 COMP NORM
- .0 0 0 7 VERN
- 5.0 0 8 DEADBAND ATT NORM
- 2.0 0 0 9 VERN
- 0.2 0 10 RATE NORM
- .0 4 0 11 VERN
- 1 or 3 12 JET OPT P
- 1 or 3 13 Y
- 1, 2 14 CNTL ACCEL

FLT PLN-10b/49/0/B

FLT PLN-11a/49/0/B



A10



A9



DAP A10

PURPOSE:

RMS/ASEM
ASEM FIXTURE

A10

| | | | |
|------------|----|-------------|------|
| 0.1 0 | 1 | TRANSLATION | |
| | | PULSE | |
| | | ROTATION | |
| 0.1 0 0 | 2 | DSC RT | NORM |
| 0.2 0 0 | 3 | | VERN |
| 0.0 0 4 | 4 | PULSE | NORM |
| 0.0 1 0 | 5 | | VERN |
| .0 0 0 | 6 | COMP | NORM |
| .0 0 0 | 7 | | VERN |
| | | DEADBAND | |
| 5.0 0 | 8 | ATT | NORM |
| 3.0 0 0 | 9 | | VERN |
| 0.2 0 | 10 | RATE | NORM |
| .2 0 0 | 11 | | VERN |
| 1 or 3 | 12 | JET OPT | P |
| 1 or 3 | 13 | | Y |
| 2, 3, 4, 5 | 14 | CNTL ACCEL | |

FLT PLN-11b/49/0/B



FLT PLN-12a/49/0/B



A10



DAP B

FLT PLN-12b/49/0/A



FLT PLN-13a/49/0/B

B1





DAP B1

PURPOSE:

NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

B1

| | | |
|----|-------|-----|
| 15 | 0.0 | 2 |
| 16 | 0.5 | 0 0 |
| 17 | 0.2 | 0 0 |
| 18 | 0.0 | 4 |
| 19 | 0.0 | 0 2 |
| 20 | 0.0 | 0 0 |
| 21 | .0 | 0 0 |
| 22 | 3.0 | 0 |
| 23 | - 1.0 | 0 0 |
| 24 | 0.2 | 0 |
| 25 | .0 | 2 0 |
| 26 | | 1 |
| 27 | | 1 |
| 28 | | 0 |

FLT PLN-13b/49/0/A

FLT PLN-14a/49/0/A



B2



B1

DAP B2

PURPOSE:

LOSS OF VERN
(TAIL ONLY)

B2

| | | |
|----|-------|-----|
| 15 | 0.0 | 2 |
| 16 | 0.2 | 0 0 |
| 17 | 0.2 | 0 0 |
| 18 | 0.0 | 4 |
| 19 | 0.0 | 0 2 |
| 20 | 0.0 | 0 0 |
| 21 | .0 | 0 0 |
| 22 | 3.0 | 0 |
| 23 | - 1.0 | 0 0 |
| 24 | 0.2 | 0 |
| 25 | .0 | 2 0 |
| 26 | | 3 |
| 27 | | 3 |
| 28 | | 0 |

FLT PLN-14b/49/0/A

FLT PLN-15a/49/0/A



B3

+

B2

+

DAP B3

PURPOSE:
 LOSS OF VERN
 (NOSE & TAIL)
 GG MNVR

| | |
|----|---------|
| 15 | 0.0 2 |
| 16 | 0.2 0 0 |
| 17 | 0.2 0 0 |
| 18 | 0.0 0 4 |
| 19 | 0.0 0 2 |
| 20 | 0.0 0 0 |
| 21 | .0 0 0 |

| | |
|----|-----------|
| 22 | 3.0 0 |
| 23 | - 1.0 0 0 |
| 24 | 0.2 0 |
| 25 | .0 2 0 |
| 26 | 1 |
| 27 | 1 |
| 28 | 0 |

FLT PLN-15b/49/0/A

FLT PLN-16a/49/0/A

+

+

B3

+

DAP B4

PURPOSE:
 SSUS DEPLOY

| | |
|----|---------|
| 15 | 0.0 2 |
| 16 | 0.2 0 0 |
| 17 | 0.0 0 0 |
| 18 | 0.0 0 4 |
| 19 | 0.0 0 2 |
| 20 | 0.0 0 0 |
| 21 | .0 0 0 |

| | |
|----|-----------|
| 22 | 0.3 0 |
| 23 | - 0.1 0 0 |
| 24 | 0.2 0 |
| 25 | - .0 1 0 |
| 26 | 3 |
| 27 | 3 |
| 28 | 0 |

FLT PLN-16b/49/0/A

FLT PLN-17a/49/0/A

+

+

B5

+



B4

DAP B5

PURPOSE:

COAS CAL

FLT PLN-17b/49/0/A



B5

DAP B6

PURPOSE:

(Blank)

FLT PLN-18b/49/0/A



B5

15 0.0 2

16 0.2 0 0
17 0.0 1 6
18 0.0 0 4
19 0.0 0 2
20 0.0 0 0
21 0.0 0 0

22 3 0 0
23 0.0 3 3

24 0.2 0
25 0.2 0

26 3
27 3

28 0

FLT PLN-18a/49/0/A



B6



B6

15 . - - -

16 - - - -
17 - - - -
18 - - - -
19 - - - -
20 - - - -
21 - - - -

22 - - - -
23 - - - -

24 - - - -
25 - - - -

26 -
27 -

28 -

FLT PLN-19a/49/0/A



B7

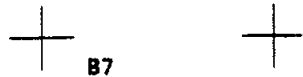


B6

DAP B7

PURPOSE:
RENDEZVOUS

FLT PLN-19b/49/0/A



B7

DAP B8

PURPOSE:
PROX OPS

FLT PLN-20b/49/0/A



B7

| | |
|----|-----------|
| 15 | 0.0 5 |
| 16 | 0.5 0 0 |
| 17 | 0.2 0 0 0 |
| 18 | 0.0 0 4 |
| 19 | 0.0 0 0 2 |
| 20 | .0 0 0 0 |
| 21 | .0 0 0 0 |
| 22 | 2.0 0 |
| 23 | - 1.0 0 0 |
| 24 | 0.2 0 |
| 25 | .0 2 0 |
| 26 | 1 or 3 |
| 27 | 1 or 3 |
| 28 | 0 |

FLT PLN-20a/49/0/A



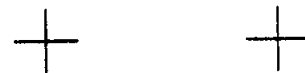
B8



B8

| | |
|----|-----------|
| 15 | 0.0 1 |
| 16 | 0.2 0 0 |
| 17 | 0.2 0 0 0 |
| 18 | 0.0 0 4 |
| 19 | 0.0 0 0 2 |
| 20 | .0 0 0 0 |
| 21 | .0 0 0 0 |
| 22 | 2.0 0 |
| 23 | - 1.0 0 0 |
| 24 | 0.2 0 |
| 25 | .0 2 0 |
| 26 | 1 |
| 27 | 1 |
| 28 | 0 |

FLT PLN-21a/49/0/A



+ +
B8
|

+ +
DAP PURPOSE
ALT1 - NOMINAL
 I-LOAD
ALT2 - RMS/ISAT
 RMS/ASEM
 ASEM FIXT
ALT3 - INTELSAT
 LATCHED
 TO PKM
ALT4 - LOSS VERN
FLT PLN-22a/49/0/B

+ ALT1 +

FLT PLN-21b/49/0/B

+ +

+ +
DAP ALT1
PURPOSE:
NOMINAL I-LOAD

FLT PLN-22b/49/0/A

+ +
ALT1
RATE DB
32 0.2 0 0
JET OPT
33 1
JETS
34 2
ON TIME
35 - 0.0 8
DELAY
36 - 0.0 0
FLT PLN-23a/49/0/A

+ + ALT2 +

+ DAP ALT2 +

PURPOSE:

RMS/INTELSAT
RMS/ASEM
ASEM FIXTURE

FLT PLN-23b/49/0/B

+ ALT2 +

RATE DB
32 0.1 0 0
JET OPT
33 1, 3
JETS
34 2
ON TIME
35 - 0.0 8
DELAY
36 *

FLT PLN-24a/49/0/A

+ ALT1 +

+ +

+ * DELAY: INTELSAT +

10.0 POST-GRAPPLE
PAD EGRESS
11.5 SHOWER CAP
RMVL
(HOVER 6)
HOVER 5

FLT PLN-24b/49/0/A

+ * DELAY: ASEM +

3.9 HOVER
MPRESS ACCESS
SJ MPRESS ACCESS
PRE-ATTACH
6.3 SSF POSN 1
7.2 SSF POSN 2
EXT PARK/CONT
REL

FLT PLN-25a/49/0/A

+ +

+ ALT3 +

+ +

DAP ALT3
PURPOSE:
INTELSAT
LATCHED TO PKM

FLT PLN-25b/49/0/A

+ +

ALT3
RATE DB
32
JET OPT - - - -
33
JETS -
34
ON TIME -
35
DELAY - - - -
36
 - - - -
FLT PLN-26a/49/0/A

+ +

ALT2

+ +

ALT4

+ +

DAP ALT4
PURPOSE:
LOSS OF VERNIS
(MCC CALL)

FLT PLN-26b/49/0/A

+ +

ALT4
RATE DB
32 0.2 0 0
JET OPT
33 1 or 3
JETS
34 1
ON TIME
35 - 0.0 8
DELAY
36 - 0.0 0
FLT PLN-27a/49/0/A

+ +

ALT3

+ +



FLT PLN-27b/49/0/A



ALT4



| UNIV PTG | |
|-------------|--|
| TGT ID | = 1 Orbiting Vehicle = 2 Earth ctr = 3 Earth tgt Input LAT (± 90) LON (± 180 , + = East) ALT (-3444.0 to 20000.0 nm) = 4 Sun ctr = 5 Celestial tgt Input RA (0-359.99) DEC (± 90) = 11-110 Nav Stars |
| BODY VECT | = 1 +X* = 2 -X* = 3 -Z* = 4 -Y Star Tracker* = 5 Optional Input P (0-359.99) Y (270-359.99,0-90) * input OM \rightarrow OM (0-359.99) |
| MON AXIS | = 1 +X = 2 -X |
| CNTL ACCEL | = 0 Orbiter Alone = 1 Intelsat Grapple = 2 Intelsat Hover, PAD Egress = 3 ASEM Hover MPRESS Access SJ MPRESS Access Pre-Attach = 4 ASEM SSF Posn 1 Ext Park/Cont Rel = 5 ASEM SSF Posn 2 |
| PRI JET OPT | = 1 Normal = 2 Nose only = 3 Tail only |
| ALT JET OPT | = 1 Normal = 2 illegal entry = 3 Tail only |

FLT PLN-28a/49/0/B



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FLT PLN-28b/49/0/A



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ANTENNA OVERLAYS

CRT OVERLAYS FOR MANUAL KU MANAGEMENT

The attached overlays will be used for manual Ku management during the ASEM EVAs. They are designed to fit over the onboard ANTENNA spec. The shaded areas on the overlays encompass an EVA working volume about the MPESS (legs attached). The shaded areas are defined by corresponding antenna elevation and azimuth angles as follows:

MPESS ACCESS POSN: elevation < 10 deg

SSF POSN #1 and #2: -25 deg < elevation < 80 deg
-30 deg < azimuth < 75 deg

A Ku beta limit of 0 deg (beta only) will be used during the ASEM EVAs. This will protect the EVA crewmembers for all operations except when they are on the MPESS with the RMS in the following positions: MPESS ACCESS, SSF POSN #1 and #2, and HOVER.

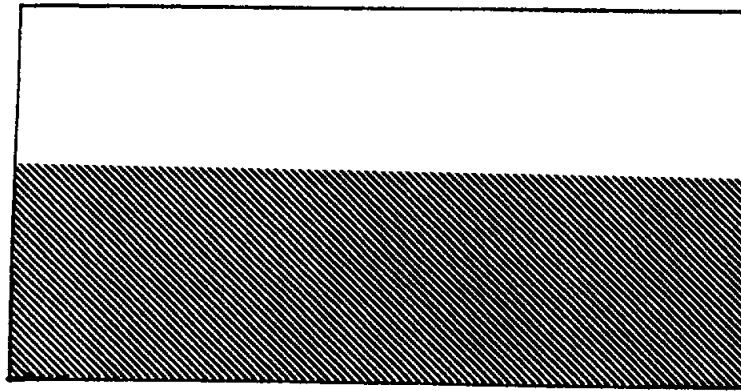
The overlays and Ku EL/AZ digitals will be used to manually manage the Ku antenna during activities utilizing the MPESS ACCESS and SSF positions so that the crewmembers will be protected from Ku radiation. Because the overlays do not provide a high degree of resolution, they should be used for general reference only. The EL/AZ digitals more accurately describe the areas that need to be protected.

Since the MPESS/crew/RMS are only in the HOVER position for very short periods of time, an overlay was not developed for that position. The Ku antenna will be taken to standby for those periods.

ANTENNA
OVERLAYS

Note: fabricate as a transparency

MPESS ACCESS POSN

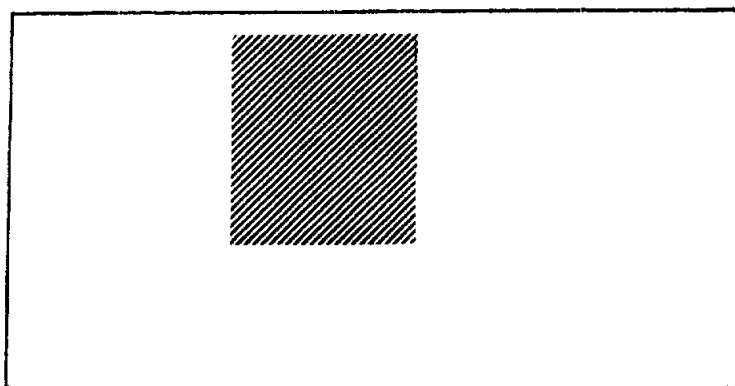


ANTENNA
OVERLAYS

FLT PLN-29a/49/O/A

Note: fabricate as a transparency

SSF POSN #1 AND #2



FLT PLN-29b/49/O/A

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STS-49
FLIGHT PLAN NOTES

FLT PLN NOTES

FLIGHT PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-49 (OV-105) launch from KSC is scheduled for no earlier than April 30, 1992. However, all data in this Flight Plan reflects a launch on April 16, 1992, (Flight Cycle) into a 137 x 183 nm orbit at an inclination of 28.35 degrees. The Intelsat retrieval altitude is 195 x 198 nm. The mission duration will be 7 days. Nominal landing occurs at EDW on April 23, 1992.

Landing opportunities are:

| | | <u>Landing Orbit No.</u> | <u>Site</u> | <u>Local Time</u> |
|-------------|--------------|------------------------------|-------------|-------------------|
| Nominal | Primary | 111 | EDW | 02:39 PDT |
| | 1 Rev Late | 112 | EDW | 04:16 PDT |
| | Weather Alt. | 111 | KSC | 05:47 EDT |
| 1 Day Late | Primary | 127 | EDW | 03:12 PDT |
| | 1 Rev Late | 128 | EDW | 04:49 PDT |
| | Weather Alt. | 127 | KSC | 06:21 EDT |
| 2 Days Late | Primary | 142 | EDW | 02:08 PDT |
| | 1 Rev Late | 143 | EDW | 03:45 PDT |
| | Weather Alt. | 142 | KSC | 05:17 EDT |

Major Events

LAUNCH (KSC) April 16, 1992
 MET (DD/HH:MM) 00/00:00
 Day of year 107
 CDT/GMT 04:44/09:44

OMS-2
 MET (DD/HH:MM) 00/00:41
 DV (fps) 186.1
 ORBIT hp/ha (nm) 137/183

NC-1
 MET (DD/HH:MM) 00/05:13
 DV (fps) 8.0
 ORBIT hp/ha (nm) 141/183

NH-1
 MET (DD/HH:MM) 00/21:04
 DV (fps) 12.3
 ORBIT hp/ha (nm) 141/190

NC-2
 MET (DD/HH:MM) 01/05:23
 DV (fps) 4.0
 ORBIT hp/ha (nm) 143/190

CIRC
 MET (DD/HH:MM) 01/20:30
 DV (fps) 82.0
 ORBIT hp/ha (nm) 190/190

FLT PLN NOTES

| | |
|-------------------------------|-------------|
| <u>NPC</u> | |
| <u>MET</u> (DD/HH:MM) | 01/21:29 |
| DV (fps) | 0.48 |
| ORBIT hp/ha (nm) | 190/190 |
| <u>Control Box Start Time</u> | |
| <u>MET</u> (DD/HH:MM) | 01/22:00 |
| ORBIT hp/ha (nm) | 190/190 |
| <u>NSR</u> | |
| <u>MET</u> (DD/HH:MM) | 02/01:04 |
| DV (fps) | 0.0 |
| ORBIT hp/ha (nm) | 190/190 |
| <u>NC-3</u> | |
| <u>MET</u> (DD/HH:MM) | 02/03:52 |
| DV (fps) | 7.5 |
| ORBIT hp/ha (nm) | 186/190 |
| <u>NH-2</u> | |
| <u>MET</u> (DD/HH:MM) | 02/16:51 |
| DV (fps) | 12.9 |
| ORBIT hp/ha (nm) | 186/198 |
| <u>NC-4</u> | |
| <u>MET</u> (DD/HH:MM) | 02/17:36 |
| DV (fps) | 11.3 |
| ORBIT hp/ha (nm) | 192/198 |
| <u>TI</u> | |
| <u>MET</u> (DD/HH:MM) | 02/20:40 |
| DV (fps) | 3.2 |
| ORBIT hp/ha (nm) | 194/198 |
| <u>INTELSAT GRAPPLE</u> | |
| <u>MET</u> (DD/HH:MM) | 02/23:20 |
| ORBIT hp/ha (nm) | 195/198 |
| <u>DEPLOY</u> | |
| <u>MET</u> (DD/HH:MM) | 03/02:45 |
| DV (fps) | 0.68 |
| ORBIT hp/ha (nm) | 195/198 |
| <u>RCS SEP-1</u> | |
| <u>MET</u> (DD/HH:MM) | 03/03:07 |
| DV (fps) | 2.0 |
| ORBIT hp/ha (nm) | 195/198 |
| <u>RCS SEP-2</u> | |
| <u>MET</u> (DD/HH:MM) | 03/03:30 |
| DV (fps) | 18.0 |
| ORBIT hp/ha (nm) | 196/208 |
| <u>DEORBIT BURN</u> | |
| <u>MET</u> (DD/HH:MM) | 06/22:49 |
| DV (fps) | 315 |
| <u>LANDING (EDW)</u> | |
| <u>MET</u> (DD/HH:MM) | 06/23:55 |
| Day of year | 114 |
| CDT/GMT | 04:39/09:39 |

B. CREW

1. The seven crewmembers flying this mission are:

CDR - Daniel C. Brandenstein
PLT - Kevin P. Chilton
MS1/EV2 - Richard J. Hieb
MS2 - Bruce E. Melnick
MS3/EV1 - Pierre J. Thuot
MS4/EV3 - Kathryn C. Thornton
MS5/EV4 - Thomas D. Akers

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink real-time command (RTCs) coordinated with the crew.
- b. TDRS coverage is assumed to be supported by TDRS-E (41 degrees W) and TDRS-W (SPARE) (171 degrees W) and is the prime mode of communication coverage.
- c. There are six GN sites available for on-orbit contingency support: MIL (MLX), BDA (BDX), DKR, and GDS (GDY). MAD (MAX) and CAN are emergency sites. (Two-hour lead time required).
- d. TDRS Ku-band is the prime mode of real-time TV; however, there are also two GN sites available as backups on GDS (GDY), and MIL (MLX) (90-minute lead time required). GDS and MIL will be up for S-band FM, TV downlink for additional TV coverage during the EVAs.
- e. TDRS-E and TDRS-W (SPARE) are available for ascent and entry support. IOS (RTS site) is available for UHF voice in an emergency. (Four-hour lead time required).
- f. TDRS-E and TDRS-W are available to support Ku-band uplink (e.g., TAGS).
- g. S-band HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.
- h. RTS sites are available for contingency support or when scheduled in advance (Four-hour lead time required): HTS, GTS, VTS, IOS, CTS, NHS, and DGS.

D. TELEVISION/PHOTOGRAPHY

1. The CCTV systems provide one color, wide-angle camera and two Canon A1 camcorders for in-cabin coverage. There will also be four PLB TV cameras. There are three different lens assemblies for the PLB cameras (color lens assembly, monochrome lens assembly, and wide-angle lens assembly). The type of lens assembly for each PLB camera is documented in the Flight Requirements Document. There will also be an RMS wrist, RMS elbow, and a keel camera flown.

2. There are two Office of Aeronautics and Space Technology (OAST) video tape recorders available with 30-minute cassettes.
3. Three camera systems are available: 35mm, 16mm, and 70mm.

E. PAYLOADS

1. Intelsat Reboost Mission

The Intelsat reboost mission hardware consists of a vertically installed deployable perigee stage with a solid motor adapter supported by a uniquely designed cradle.

A modified Control Box Rendezvous technique will be used to maneuver the Intelsat satellite into a predefined region relative to the orbiter called the control box. Combined rendezvous and phasing by both the orbiter and Intelsat satellite will be required for a FD4 rendezvous. Once the satellite is within the control box the orbiter will complete the rendezvous phase.

Upon arrival an EVA crewmember located in the RMS Portable Foot Restraint Attachment Device (PAD) will attach the capture bar across the aft end of the slowly rotating satellite. The satellite is then lowered into the PLB and secured to the interstage docking adapter. The spacecraft will then be deployed using a Super*Zip system fired from the Standard Switch Panel (SSP).

The Intelsat satellite requires line-of-sight (LOS) with Intelsat C-band telemetry and command (T&C) ground stations approximately once per orbit during rendezvous and EVA post capture. The Intelsat C-band stations are located at Paumalu-Hawaii, Tangua-Brazil, Jatiluhur-Indonesia, Perth-Australia, and Gandoul-Senegal.

2. Assembly of Station by EVA Methods (ASEM)

The ASEM payload will demonstrate various Space Station Freedom (SSF) EVA maintenance and assembly capabilities. The ASEM consists of hardware necessary to construct a partial bay of truss and additional hardware necessary to demonstrate pallet installation, ORU handling, EVA augmented berthing, crew self-rescue techniques, and work in the space station assembly position above the crew cabin.

The major objective of the ASEM mission will be to perform three EVAs on consecutive days. This requires that two ASEM EVAs be scheduled in addition to one Intelsat EVA.

On the first EVA, crewmembers will attach nodes and struts together to assemble an attachment fixture for the MPESS. From a foot restraint on the RMS/PAD a crewmember will unberth, handle, and reberth the MPESS manually. The RMS will grapple and position the MPESS carrier so that the EVA crewmembers can attach legs to it and then mate the MPESS to the truss bay attachment fixture. Leg removal will occur over the crew cabin where qualitative evaluations of this worksite will be made. Crew self-rescue devices will be evaluated during RMS maneuvers. The fixture will remain assembled overnight after the first ASEM EVA, and will be disassembled prior to the second (final) ASEM EVA. Similar evaluations will be performed on the second ASEM EVA.

Handling of the entire MPESS/fixture combination will be performed in place of MPESS handling in this EVA.

3. Commercial Protein Crystal Growth (CPCG) Block II

The CPCG payload is designed to conduct experiments which will supply information on the scientific methods and commercial potential for growing large, high-quality protein crystals in microgravity. The CPCG will be installed and operated on the orbiter middeck.

4. Air Force Maui Optical Site (AMOS) Calibration Test

The purpose is to obtain orbiter signature data and calibrate ground based sensors located on the island of Maui. Crew and orbiter participation are required on cooperative overflights of the Maui site. Cooperative overflights are defined as those planned times when AMOS test conditions can be met and the STS mission timeline and propellant budget permit the requested orbiter activities to be performed.

5. Ultraviolet Plume Instrument (UVPI)

The UVPI is an instrument on the Low-power Atmospheric Compensation Experiment (LACE) satellite in orbit at 43 deg inclination and approximately 290 nm altitude. It is desired to use the orbiter during cooperative encounters of the LACE satellite to obtain imagery and/or signature data to support the calibration of the UVPI space-based sensors and to observe orbiter events.

F. ON-ORBIT DTOs

1. Forward RCS Flight Test 12-Second Pulse (DTO 249)

RCS flight test maneuvers will be initiated during entry in order to obtain flight data showing the aerodynamic effects created when the FRCS side firing thrusters are used as a means of eliminating RCS propellant. The flight data will be used to verify and validate existing wind tunnel data and verify the safety of performing a FRCS dump during a GRTLS or TAL abort. This test will only be performed if prop is available.

2. Waste/Supply Water Dumps (DTO 325)

The objective of this DTO is to perform inflight verification of new water dump nozzle performance. The RMS end effector camera will be moved into position to view the waste and supply water dump nozzles. A simultaneous supply and waste dump will be performed on STS-49.

3. Cabin Air Monitoring (DTO 623)

This DTO will use the solid sorbent sampler to continuously sample the orbiter atmosphere throughout the flight. The sampler collects trace levels of volatile contaminants which are used to determine spacecraft air quality and the effectiveness of the ECLSS in removing these compounds from the air.

4. Hydrazine Monitor (DTO 640)

During EVA the potential exists for hydrazine to contaminate the EVA suit and be inadvertently released into the shuttle atmosphere at the conclusion of an EVA. The hydrazine monitor will sample the airlock and cabin air to detect the presence of hydrazine or monomethylhydrazine after completion of an EVA to ensure the safety of the crew.

5. Electronic Still Photography Test (with downlink) (DTO 648)

Electronic still photography is a new technology which provides the means for a handheld camera to electronically capture and digitize an image with resolution approaching film quality. The digital image is stored on disks and can be converted to a format suitable for downlink transmission or enhanced using image processing software. The ability to enhance and/or downlink high resolution images in real-time will greatly improve capabilities in Earth observations. The objective of this DTO is to determine camera response to the photographic conditions encountered on orbit using a variety of lenses and camera settings.

6. Cycle Ergometer Hardware Evaluation (DTO 651)

This DTO will evaluate the cycle ergometer as an alternative to the shuttle treadmill. Treadmill use has raised several concerns including noise, vibration, subject discomfort, and inability to quantify workload. These concerns warrant evaluation of alternate in-flight exercise hardware. Vibration and physical discomfort will be documented and biomedical analysis will be performed in conjunction with various protocols/workloads. Heart rate will be recorded for evaluation of the resistive workload settings in zero-g.

7. Acoustical Dosimeter (DTO 663)

This DTO will gather data on the acoustic environment. The CPCG CRIM, ergometer, and new galley may negatively influence the overall cabin noise levels. This data will provide information to help determine new specification levels for intermittent noises as well as a maximum 24-hr exposure level.

8. Laser Range and Range Rate Device (DTO 700-2)

The purpose of this Laser Range and Range Rate DTO is to demonstrate the capability to provide the orbiter flight crew with range and range rate data for rendezvous, proximity operations, and deploy operations. The DTO will assess the usefulness of the data to assist the pilot in achieving the desired trajectory conditions.

9. Ku-band Antenna Friction (DTO 0728)

The purpose of this DTO is to provide Ku-band antenna gimbal friction data after eight radar high speed scans.

G. ON-ORBIT DSOs

1. Inflight Radiation Dose-Distribution (TEPC) (DSO 469C)

The purpose of this DSO is to establish, evaluate, and verify analytical and measurement methods for assessing and managing health risks from exposure to space radiation. This DSO will measure the radiation environment inside the Shuttle at a thinly shielded region: dosimetry #2 location (DLOC #2) on the right middeck wall (MR85B).

2. Cardiac Rhythm Disturbances During Extravehicular Activity (DSO 482)

The purpose of this DSO is to investigate the presence of dysrhythmias during EVA, preflight EVA training, and nominal daily activities using passive ECG recordings. Dysrhythmias can decrease cardiovascular efficiency, impacting EVA productivity.

3. Orthostatic Function During Entry, Landing, and Egress (DSO 603)

The objective of this DSO is to measure the changes in orthostatic function of crewmembers during the actual stresses of entry, landing, and egress from the orbiter. Crewmembers will don equipment prior to donning the LES during deorbit preparation. Equipment consists of a blood pressure monitor, accelerometers, an Impedance Cardiograph, and Transcranial Doppler hardware. The crewmember wears the equipment and records verbal comments throughout entry.

4. Visual-Vestibular Integration as a Function of Adaptation (OI-1) (DSO 604A)

The purpose of this DSO is to investigate visual-vestibular and perceptual adaptive responses as a function of longer missions and to determine the operational impact on performance of entry, landing, and egress procedures. These data will be used to develop training and/or countermeasures to assure the safety and success of extended missions by promoting optimal neurosensory function needed for entry, landing, and possible emergency egress.

5. Evaluation of Functional Skeletal Muscle Performance Following Space Flight (DSO 617)

The purpose of DSO 617 is to determine the physiological effects of long duration space flight on skeletal muscle strength, endurance, and power. It will provide knowledge necessary to support the development of future countermeasure prescriptions essential for nominal muscle performance.

6. In-Flight Use of Florinef to Improve Orthostatic Intolerance Postflight (DSO 621)

The objective of this DSO is to evaluate the efficiency of Florinef on postflight orthostatic tolerance using heart rate, blood pressure, stroke volume, and other cardiovascular responses to orthostatic stress. Florinef, a plasma expander, has been

effective in restoring or maintaining plasma volume and orthostatic tolerances during postbedrest tests.

7. Educational Activities (DSO 802)

The objective of this DSO is to use the attraction of space-flight to capture the interest of students and motivate them toward careers in science, engineering, and mathematics. The Educational Activity Video for STS-49 will compare Captain Cook's voyage on the HMS sailing vessel Endeavour to the first flight of the Space Shuttle Endeavour.

8. Documentary Television (DSO 901)

The purpose of DSO 901 is to provide live television or VTR dumps of crew activities, orbiter operations, payload deployment/retrieval and operations, Earth views, rendezvous and proximity operations. Telecasts are planned for communication periods with seven or more minutes of uninterrupted viewing time. The broadcast is accomplished using operational air-to-ground and/or operational intercom audio. VTR recording may be used when live television is not possible.

9. Documentary Motion Picture Photography (DSO 902)

The purpose of DSO 902 is to provide documentary and public affair motion picture photography of the orbiter basic capabilities and key flight objectives. Documentation shall include launch, crew activities, payload deployment, landing and unscheduled activities of special interest.

10. Documentary Still Photography (DSO 903)

The purpose of DSO 903 is to provide still photography of crew activities, orbiter operations, payload deployment/retrieval and operations, Earth views, and unscheduled items of interest.

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