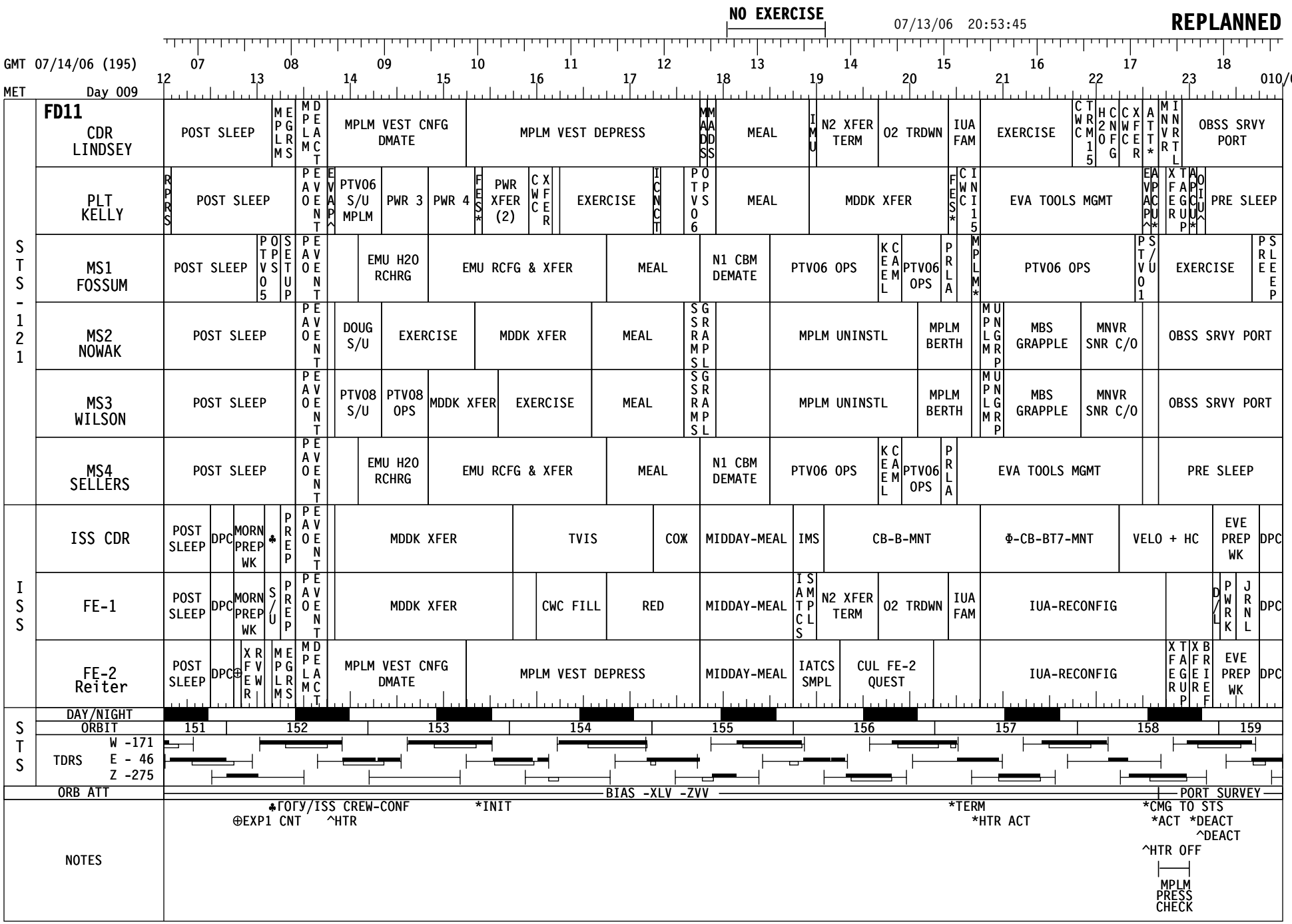
STS-121 / ULF1.1

FD 11 Execute Package

MSG	Page(s)	Title
105A	1 - 2	FD11 Summary Timeline **(pdf)**
097A	3 - 14	FD11 Flight Plan Revision **(pdf)**
098	15 - 16	FD11 Mission Summary **(pdf)**
099	17 - 18	FD11 Transfer Message **(pdf)**
100	19 - 20	FD11 Water Summary **(pdf)**
101	21	Prep WLES for RNDZ Tools Checkout **(pdf)**
103	22 - 28	EVA Tool Management Procedure Update **(pdf)**
104	29	Post EVA Reconfiguration and Transfer Updates **(pdf)**
106	30 - 32	FD10 MMT Summary **(pdf)**
107	33	Late Addition of Mddk Transfer Item **(pdf)**

Approved by FAO: *L. Eadie*

Last Updated: Jul 14 2006 7:00AM GMT
JEDI *(**J**oint **E**xecute package **D**evelopment and **I**ntegration), v2.04.0003*


NO EXERCISE
07/13/06 20:53:45
REPLANNED
GMT 07/14/06 (195)
MET Day 009
07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 010/00
12 13 14 15 16 17 18 19 20 21 22 23
STS-121
FD11
CDR LINDSEY
PLT KELLY
MS1 FOSSUM
MS2 NOWAK
MS3 WILSON
MS4 SELLERS
ISS
ISS CDR
FE-1
FE-2 Reiter
STS
DAY/NIGHT
ORBIT
TDRS W -171 E - 46 Z -275
ORB ATT
BIAS -XLV -ZVV
PORT SURVEY
NOTES
POST SLEEP
MPLM EGRS
MPLM DEACT
MPLM VEST CNFG DMATE
MPLM VEST DEPRESS
MMA DDS
MEAL
IMU
N2 XFER TERM
O2 TRDWN
IUA FAM
EXERCISE
CWC TRM15
H2O CNFG
CWC XFER
ATT*
MNVR INRTL
OBSS SRVY PORT
RPRS
PAO EVENT
EVAP^
PTV06 S/U MPLM
PWR 3
PWR 4
FES*
PWR XFER (2)
CWC XFER
EXERCISE
ICNCT
PTV06 OPS
MEAL
MDDK XFER
FES*
CWC
IN15
EVA TOOLS MGMT
EVA PACPU^*
XFER TAGUP
APCU*
OIU^
PRE SLEEP
PTV05
OPS SETUP
EMU H2O RCHRG
EMU RCFG & XFER
N1 CBM DEMATE
PTV06 OPS
KEEL
CAM
PTV06 OPS
PRLA
MPLM*
PTV01
S/U
EXERCISE
SLEEP
DOUG S/U
EXERCISE
MDDK XFER
SSRMS GRAPPL
MPLM UNINSTL
MPLM BERTH
MPLM UNGRP
MBS GRAPPLE
MNVR SNR C/O
OBSS SRVY PORT
PTV08 S/U
PTV08 OPS
MDDK XFER
EXERCISE
SSRMS GRAPPL
MPLM UNINSTL
MPLM BERTH
MPLM UNGRP
MBS GRAPPLE
MNVR SNR C/O
OBSS SRVY PORT
EMU H2O RCHRG
EMU RCFG & XFER
N1 CBM DEMATE
PTV06 OPS
KEEL
CAM
PTV06 OPS
PRLA
EVA TOOLS MGMT
PRE SLEEP
DPC
MORN PREP WK
♣
PREP
MDDK XFER
TVIS
COX
MIDDAY-MEAL
IMS
CB-B-MNT
Φ-CB-BT7-MNT
VELO + HC
EVE PREP WK
S/U
CWC FILL
RED
IATCS SMPL
N2 XFER TERM
IUA-RECONFIG
D/L
PWRK
JRNL
⊕
XFER RVW
IATCS SMPL
CUL FE-2 QUEST
XFER TAGUP
XFER EIEF
151 152 153 154 155 156 157 158 159
♣ГОГУ/ISS CREW-CONF
⊕EXP1 CNT
^HTR
*INIT
*TERM
*HTR ACT
*CMG TO STS
*ACT *DEACT
^DEACT
^HTR OFF
MPLM PRESS CHECK

GMT 07/14/06 (195): 19 | 20 | 21 | 22 | 23 | 07/15 | 01 | 02 | 03 | 04 | 05 | 06

MET Day 010: 010/00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12

FD11

	Crew	Activities (in time order)
STS-121	CDR LINDSEY	♣ | PRE SLEEP | PMC A/G | PRE SLEEP | SLEEP | DSO | POST SLEEP
	PLT KELLY	MADS | MNVR | -XLV | ATT* | RNDZ TOOLS C/O | PRE SLEEP | SLEEP | DSO | POST SLEEP
	MS1 FOSSUM	PRE SLEEP | SLEEP | DSO | POST SLEEP
	MS2 NOWAK	OBSS SRVY PORT | PRE SLEEP | SLEEP | DSO | POST SLEEP
	MS3 WILSON	OBSS SRVY PORT | PRE SLEEP | SLEEP | DSO | POST SLEEP
	MS4 SELLERS	⊕ | RNDZ TOOLS C/O | PRE SLEEP | SLEEP | DSO | POST SLEEP
ISS	ISS CDR	EVE PREP WK | PRE SLEEP-ISS | SLEEP | POST SLEEP
	FE-1	EVE PREP WK | RENAL | PRE SLEEP-ISS | SLEEP | POST SLEEP
	FE-2	EVE PREP WK | PRE SLEEP-ISS | SLEEP | POST SLEEP
STS	DAY/NIGHT	
	ORBIT	159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167
	TDRS	W -171 / E - 46 / Z -275
ORB ATT		BIAS -XLV -ZVV

NOTES

♣OBSS SRVY PORT

⊕PRE SLEEP

*STS TO CMG

ISS EXTERNAL SURVEY

MSG INDEX

1. WORDS FOR MPLM VESTIBULE OUTFITTING – CONFIGURE FOR DEMATE

Steve and **Thomas:** Today you will be executing MPLM Vestibule Outfitting – Configure for Demate. Since you noted some damage on the V-Band Clamp securing the IMV Supply Jumper to the MPLM IMV flange, we will ask you to inspect the threads of the clamp for any damage prior to re-installing clamp back on the MPLM IMV flange to secure the IMV Cap in place. If you see damaged threads or are unable to torque the nut to the specified value, we will have you execute message 13-0672 (MSG 91) to scavenge a V-Band Clamp for the Node 1 to Airlock Vestibule.

2. RMS HAND CONTROLLER OUT OF DETENT

After crew sleep, at MET 9/03:31, PDRS noticed that the Rotational Hand Controller used for the RMS was out of detent. The ground currently sees 15 counts of +Roll. There is probably something wedged in near the RHC that is causing the problem. Once you have cleared that, please let us know; PDRS would like to make sure that the RHC is usable for RMS ops later in the mission.

3. DESELECT VERNIER JET L5L

Prior to the Shuttle assuming attitude control for the FD11 OBSS survey, please deselect L5L:

GNC 23 RCS

ITEM 2 EXEC - Left Page
ITEM 37 EXEC - Deselect L5L

4. OBSS LDRI SURVEY PROCEDURES UPDATE

Update the following steps to the OBSS LDRI RCC SURVEY - PORT (PDRS, SURVEYS)

Page FS 2-35, step 1, delete the SPEC 23 actions

Page FS 2-52, step 9 ("If performing on FD10" section), delete the SPEC 23 and DAP actions

5. ROBO UPDATES

The SSRMS park position has been updated to account for the PRCS contamination keep-out zones. OCA message 96A(13-0676) FD11 SSRMS MNVR TO SNARE CABLE CHECKOUT has been uplinked to replace 1.316 FD10 LAB PDGF UNGRAPPLE. The only change to the trajectory is the addition of two single joint wrist maneuvers to point the Tip LEE camera away from both Orbiter PRCS and Progress jets. Since the SSRMS will be in a PRCS contamination keep-out zone, the SSRMS elbow cameras will also be stowed at the end of the procedure. **The ISS to STS attitude control handover should not be performed until after the SSRMS cameras have been stowed.** As a get ahead for the ULF1.1 stage, the ground will perform a snare cable viewing and checkout from the new SSRMS park position after all crew ops are complete for the day.

The attitude maneuver to the WLE survey attitude and the SRMS maneuver to survey start position can take place concurrently, however the WLE survey attitude is required prior to starting the inspection.

6. CONTINGENCY DEORBIT PEN AND INK CHANGES

In CONT D/O on page 3-16, on PNL O16:C the ANNUNCIATOR AFT ACA 4/5 (the last cb in the row) does not have a cb in it. There should be a cb there in the CLOSED position.

7. EVA IR CAMERA SANDISK CARD

After EVA3, the EVA IR Camr Sandisk Flashcard was transferred to Shuttle for downlink. Please verify that the card has been returned to EVA IR Camera 0.5 CTB 1141 on ISS. The card will stay on ISS for future use.

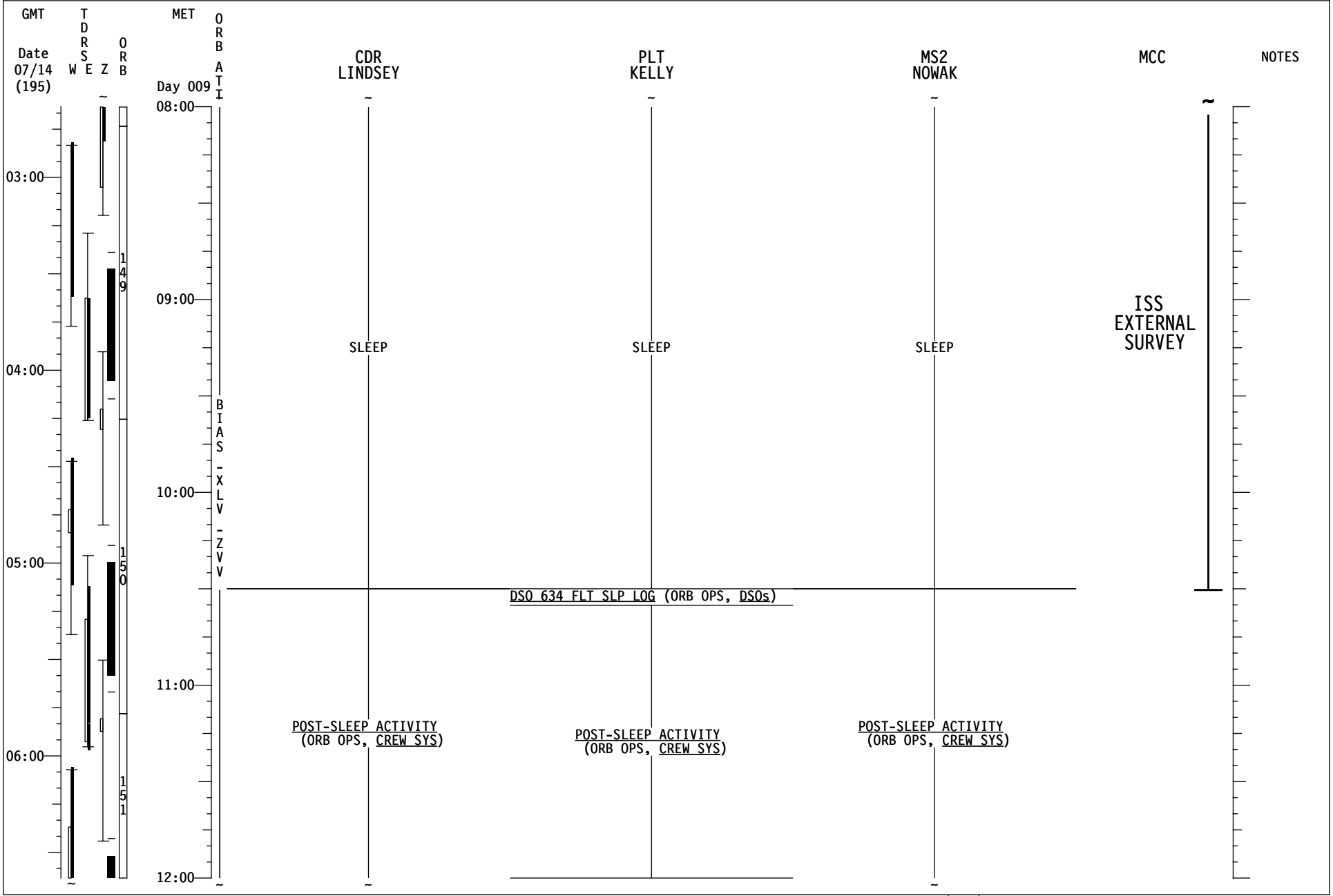
8. HAZMAT DATA FILE

The MCC has uplinked the latest HazMat data file to all networked PGSCs onboard. Corrects Principal Toxic Hazards for Orlan Gloves (stowed in MPLM) and updates payload data.

9. REPLACE PAGES 3-114 THROUGH 3-123.

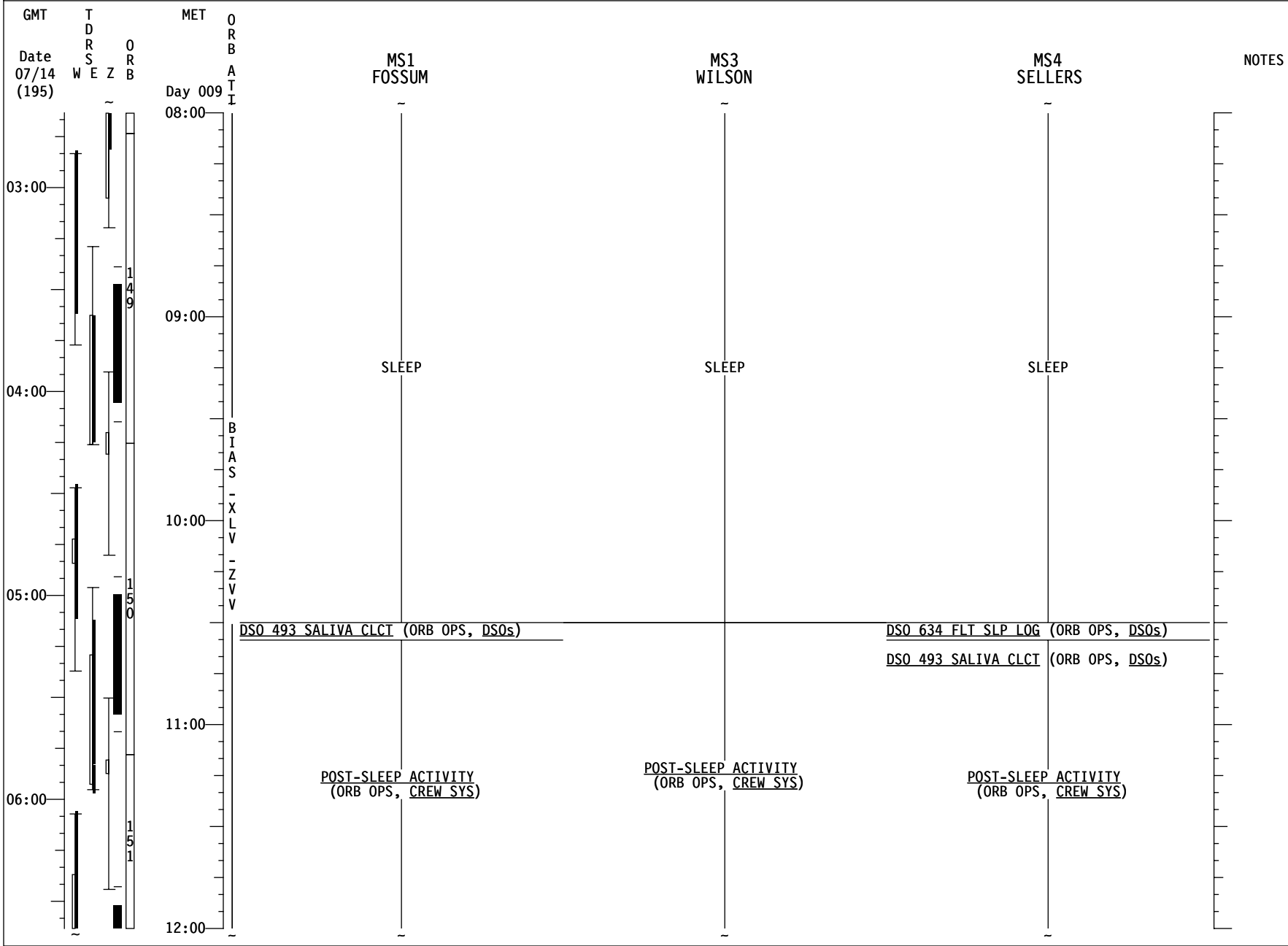
STS-121/ULF 1.1 (FD 11)

REPLANNED



STS-121/ULF 1.1 (FD 11)

REPLANNED



STS-121/ULF 1.1 (FD 11) — REPLANNED

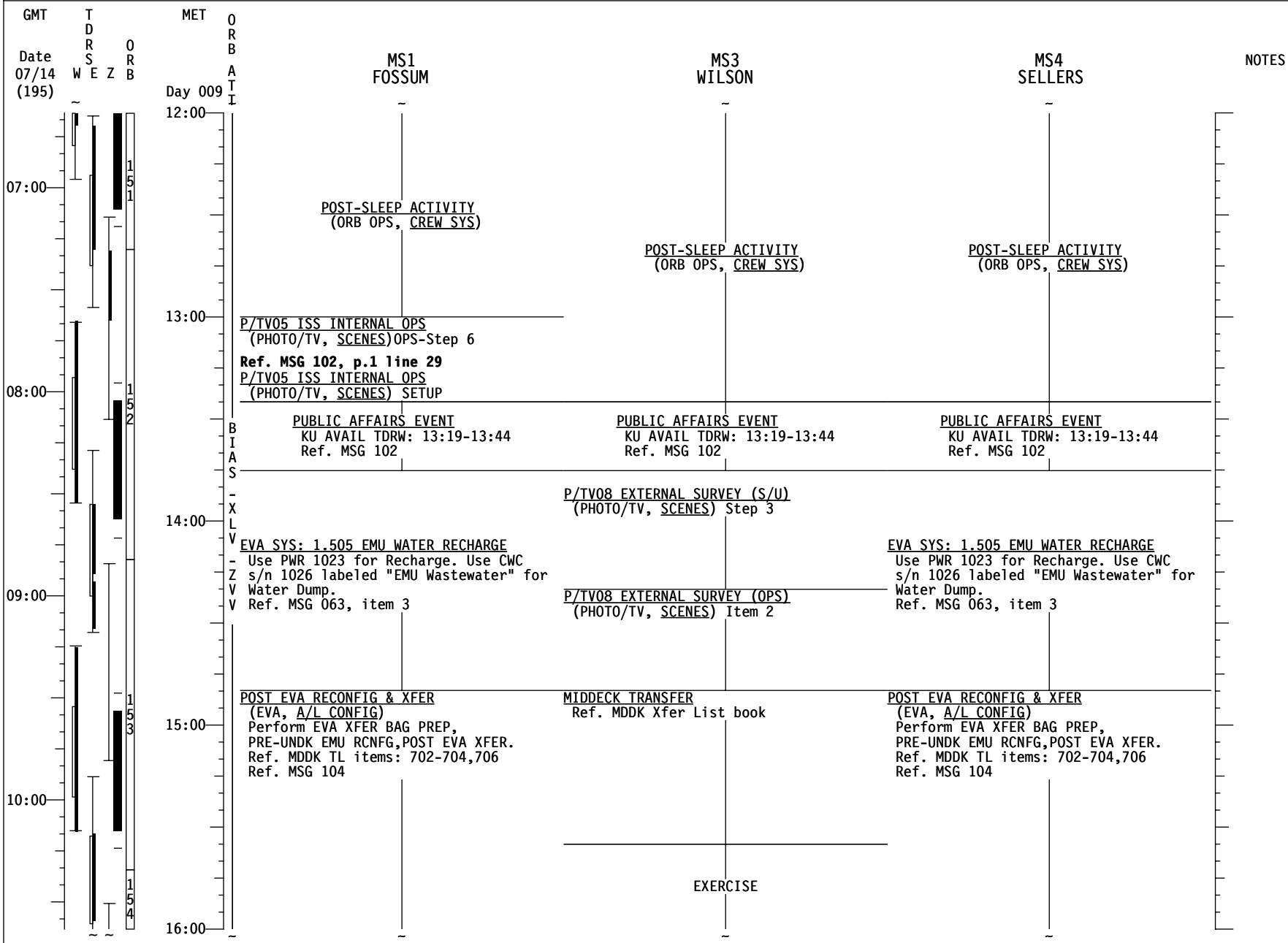
GMT Date 07/14 (195) | TDRS W E Z | ORB 151 152 153 154 | MET Day 009 | ORB ATI | BIAS - XLV - ZVV

MET	CDR LINDSEY	PLT KELLY	MS2 NOWAK	MCC	NOTES
12:00		√MCC prior to start: JNT OPS: 3.108 GENERIC REPRESS			
07:00	POST-SLEEP ACTIVITY (ORB OPS, CREW SYS)	POST-SLEEP ACTIVITY (ORB OPS, CREW SYS)	POST-SLEEP ACTIVITY (ORB OPS, CREW SYS)		
13:00	MPLM: 1.105 MPLM EGRESS Steps 1-14				
08:00	MPLM: 1.106 MPLM DEACTIVATION Steps 1-2,4-6	PUBLIC AFFAIRS EVENT KU AVAIL TDRW: 13:19-13:44 Ref. MSG 102	PUBLIC AFFAIRS EVENT KU AVAIL TDRW: 13:19-13:44 Ref. MSG 102		
	S&M: 1.109 MPLM VESTIBULE-CONFIG FOR DEMATE Do not Perform Step 2, Ref. MSG 097, item 1 MSG 091	L1 TOP EVAP HTR DUCT sel -B NOZ L,R (two) -B AUTO P/TV06 SSRMS ASSY OPS (NON-EVA) (PHOTO/TV, SCENES) SETUP	POC: 1.301 DOUG STARTUP PROCEDURE Step 1 - Ref. MSG 029, page 20		
14:00					
09:00		PWR FILL (ORB OPS, ECLS) INIT #3 Ref. MSG 100			
		PWR FILL (ORB OPS, ECLS) INIT #4 Ref. MSG 100	EXERCISE		
15:00	MPLM: 1.110 N1 TO MPLM VESTIBULE DEPRESS				
10:00		SPLY H2O DUMP W/FES (ORB OPS, ECLS) Step 1 using FES Pri A, Ref. MSG 100 PWR TRANSFER Transfer 2 PWRs to ISS Ref. MSG 100	MIDDECK TRANSFER Ref. MDDK Xfer List book		
		CWC TRANSFER Transfer 1 CWC to ISS			
16:00					

FD11 EZ ACTIVITIES
HARD REBOOT PGSCs (NOT LCC, RPOP)
TEPC (STATUS CK)
(ORB OPS, CREW SYS)
OCAC FILTER INSPECT
L17 Check MCIU Filter Screen

STS-121/ULF 1.1 (FD 11)

REPLANNED



STS-121/ULF 1.1 (FD 11) — REPLANNED

GMT Date 07/14 (195) | MET Day 009 | TDRS W E Z | ORB 154 155 156 | ORBIT BIAS -XLV -ZVV

MET	CDR LINDSEY	PLT KELLY	MS2 NOWAK
16:00	MPLM: 1.110 N1 TO MPLM VESTIBULE DEPRESS	CWC TRANSFER Transfer 1 CWC to ISS Ref. MSG 100	MIDDECK TRANSFER Ref. MDDK Xfer List book
17:00		EXERCISE	MEAL
		I'CNCT: R OMS TO RCS (ORB PKT, RCS)	
18:00	C3 MSTR MADS PWR - ON A6L MADS STRAIN GAUGE - ON	P/TVO6 SSRMS ASSY OPS (NON-EVA) (PHOTO/TV, SCENES) OPS	ROBO: 1.221 MATED MPLM GRAPPLE
	MEAL	MEAL	
19:00	IMU STAR OF OPTY ALIGN (ORB OPS, GNC) JNT OPS: 3.103 NITROGEN TRANSFER TERM	MIDDECK TRANSFER Ref. MDDK Xfer List book	ROBO: 1.222 MPLM UNINSTALL NO EXERCISE during steps 1 & 2
20:00	JNT OPS: 3.122 P/B USING SHUTTLE O2 TEARDOWN		

MCC

A UPLINK
β21°+BOXES
BOX C1
-18<AZ<52
-68<EL<75
BOX C2
-41<AZ<-10
-25<EL<39
BOX C3
-72<AZ<-36
-4<EL<33
BOX D2
-120<AZ<6
-89<EL<-45

NOTES

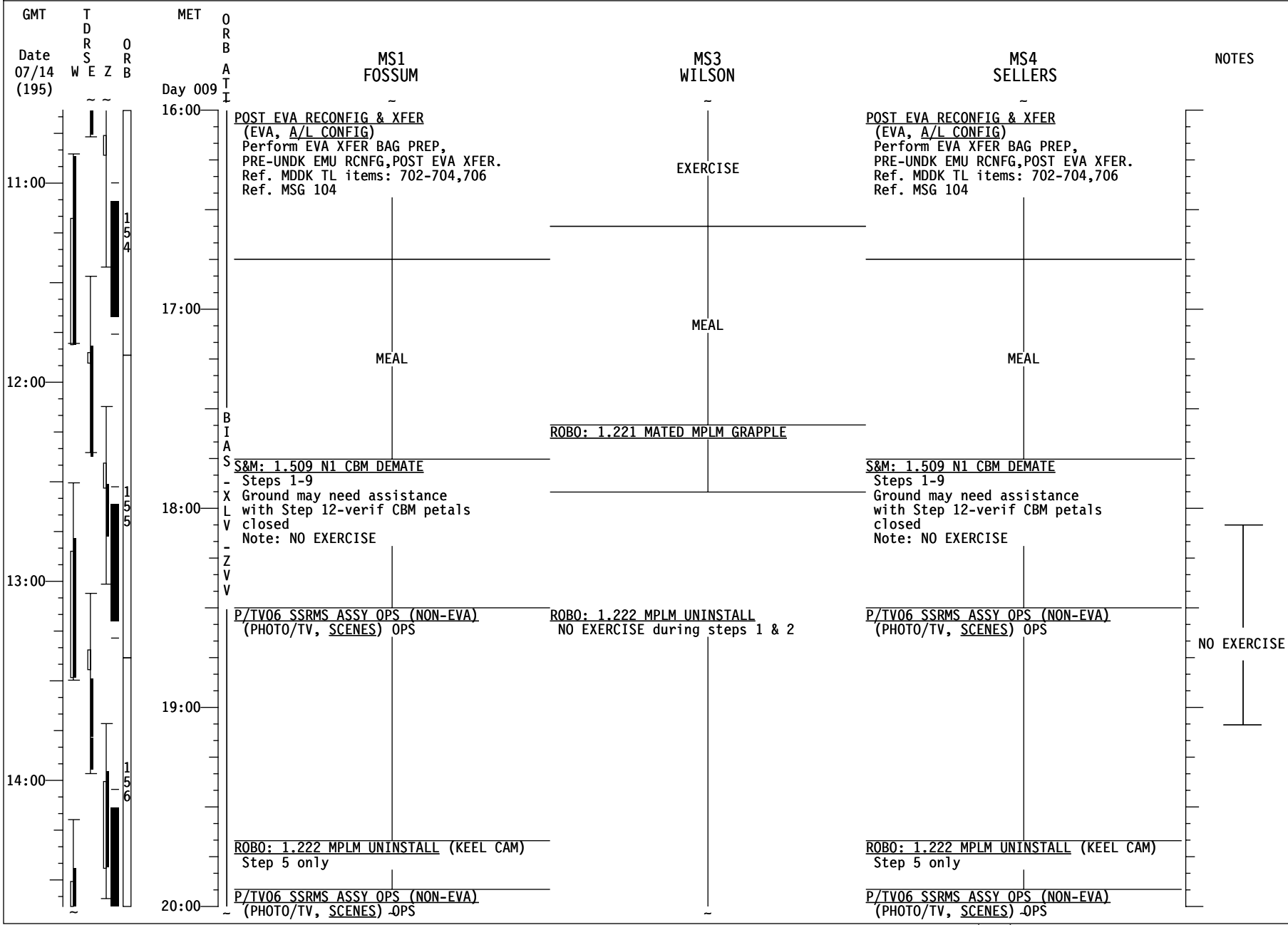
TFL 199

A

NO EXERCISE

STS-121/ULF 1.1 (FD 11)

REPLANNED



STS-121/ULF 1.1 (FD 11)

REPLANNED

GMT Date 07/14 (195) | TDRS W E Z | ORB | MET Day 009 | ORB ATTI

Orbits: 156, 157, 158, 159

GMT: 15:00, 16:00, 17:00, 18:00

MET: 20:00, 21:00, 22:00, 23:00, 00:00

Attitude: BIAS -XLV -ZVV; PORT SURVEY

CDR LINDSEY

JNT OPS: 3.122 P/B USING SHUTTLE O2 TEARDOWN

NADIR IUA RCNFG FAM
Ref. MSG 092

EXERCISE

SHUTTLE/ISS H2O CONT FILL
(ORB OPS, ECLS) TERM
Report B/C and S/N to MCC

NOMINAL H2O CONFIG (ORB OPS, ECLS)
FES Pri A not req'd
Ref. MSG 100

CWC TRANSFER
Transfer 1 CWC to ISS, Ref. MSG 100
Ref. MDDK TL item: 48

JNT OPS: 3.110 H/O ATTITUDE CONTROL
CMG TA to ORBITER

MNVR BIAS -XLV -ZVV
TG=2 BV=5 P=155 Y=351 OM=194
B12/AUTO/ALT Init TRK on MCC GO

OBSS LDRI RCC SRVY - PORT
(PDRS, SURVEYS)
Ref. MSG 097, item 4

PLT KELLY

MIDDECK TRANSFER
Ref. MDDK Xfer List book

SPLY H2O DUMP W/FES (ORB OPS, ECLS)
Step 2, FES not req'd

SHUTTLE/ISS H2O CNTR FILL
(ORB OPS, ECLS) INIT #15
Ref. MSG 100

EVA TOOLS MGMT
(EVA, TOOLS & STOWAGE)
Perform FD11-EVA 3 Tool Dcnfg
Ref. MDDK TL items: 701,622,713,714
Ref. MSG 103

L1 TOP EVAP HTR DUCT sel - OFF
NOZ L,R (two) - OFF

ON MCC GO: SSP1 APCU 1 OUTPUT RLY - CL (tb-gray)

TRANSFER TAGUP
Coordinate with xfer counterpart (PLT,FE-2)

ON MCC GO: SSP1 APCU 1 OUTPUT RLY - OP (tb-bp)
SSP1 OIU PWR - OFF (tb-bp)

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

MS2 NOWAK

ROBO: 1.222 MPLM UNINSTALL
NO EXERCISE during steps 1 & 2

ROBO: 1.223 MPLM BERTH

ROBO: 1.224 BERTHED MPLM UNGRAPPLE

ROBO: 1.315 FD10 WALKOFF TO MBS PDGF 1
Steps 6-10 can be performed by MCC

FD11 SSRMS MNVR TO SNARE CABLE C/O
Ref. MSG 096
MSG 097, item 5

OBSS LDRI RCC SRVY - PORT
(PDRS, SURVEYS)
Ref. MSG 097, item 4

MCC

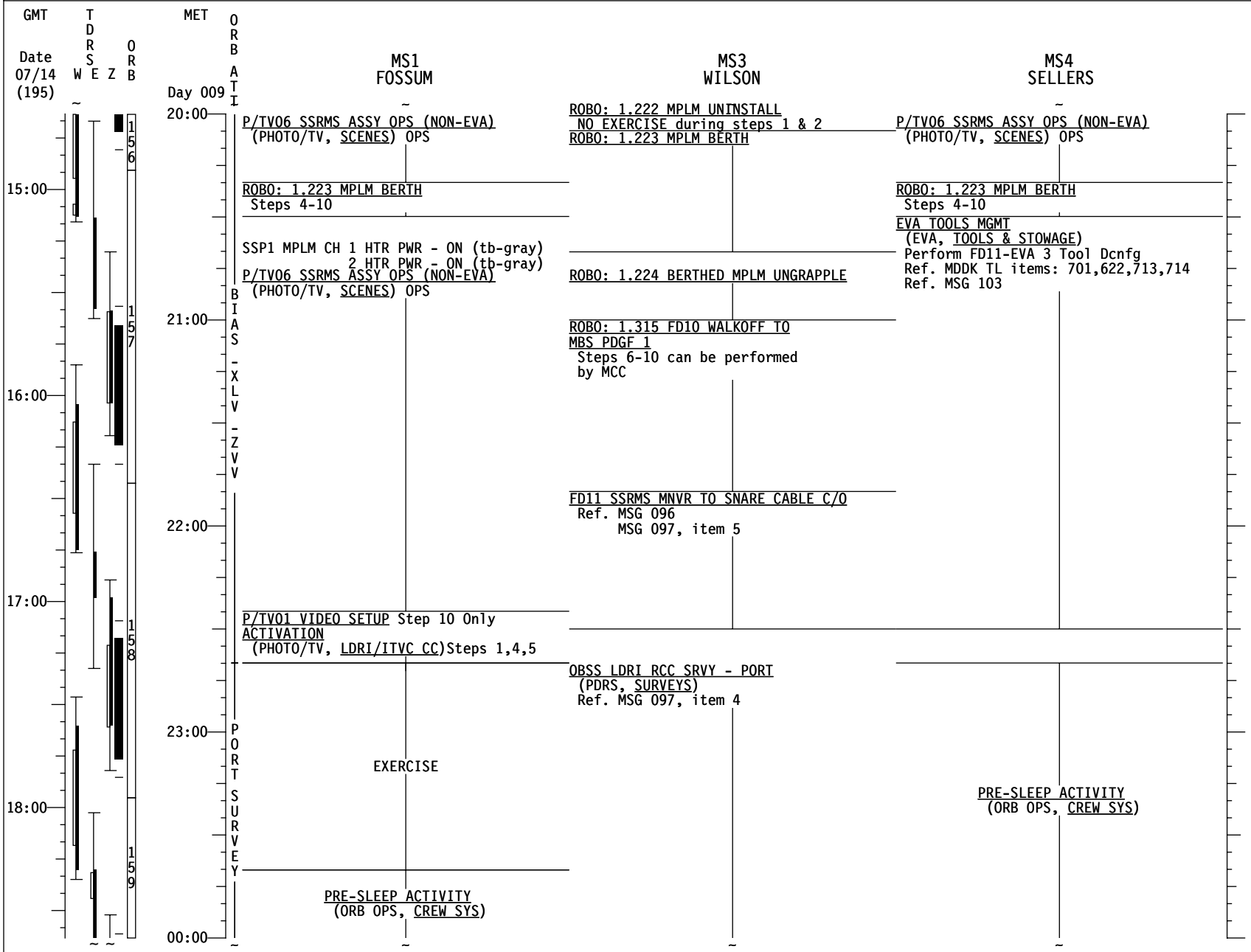
MPLM: 1.101 MPLM ENVIRONMENT CHECK
Steps 1 & 4
PRESS CK (NO fan)

NOTES

UPLINK
β21°+BOXES
BOX C1
-18<AZ<52
-68<EL<75
BOX D2
-120<AZ<6
-89<EL<-45
BOX F1
-92<AZ<5
-82<EL<4
BOX F4
-75<AZ<-10
-29<EL<39

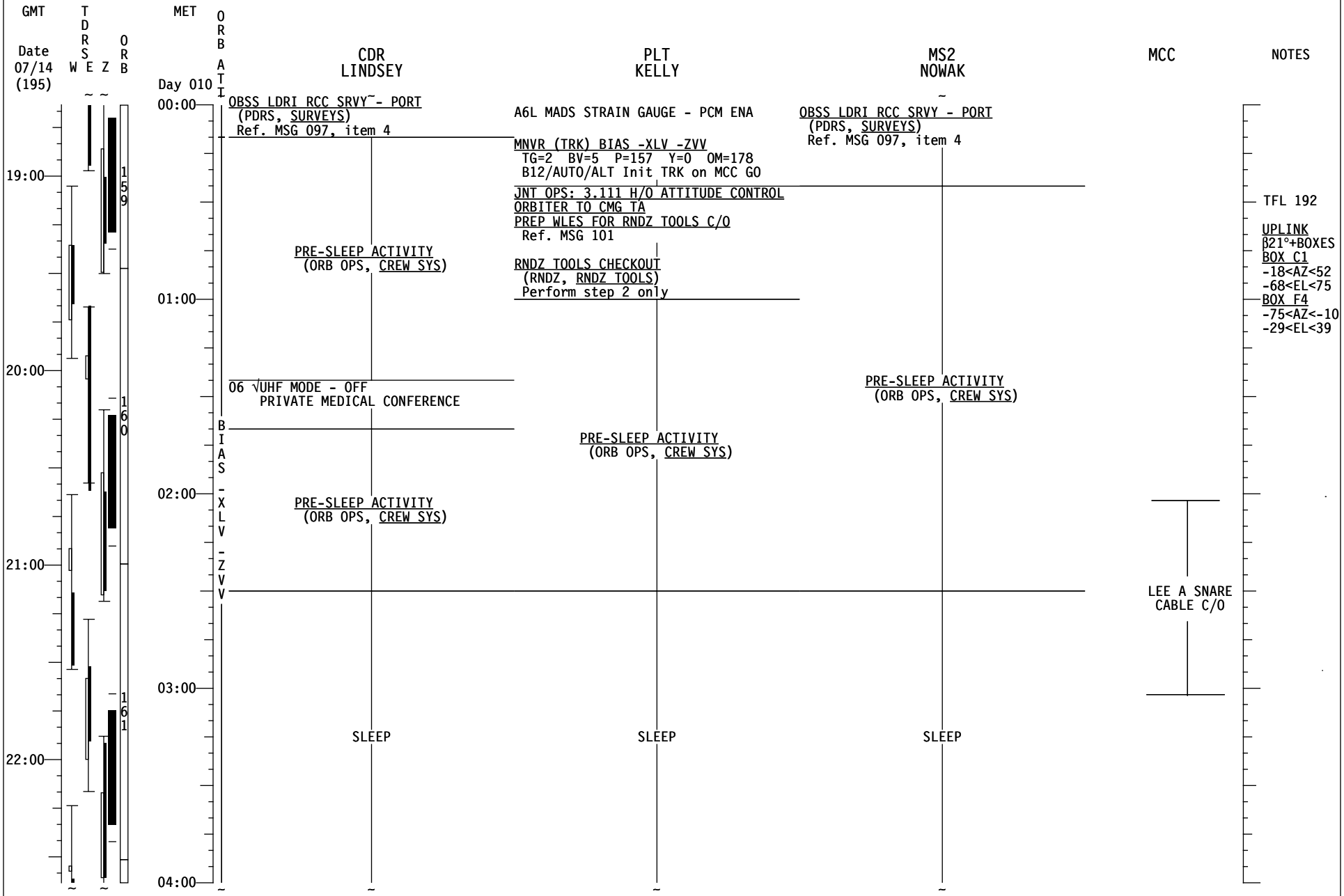
TFL 184

STS-121/ULF 1.1 (FD 11) — REPLANNED



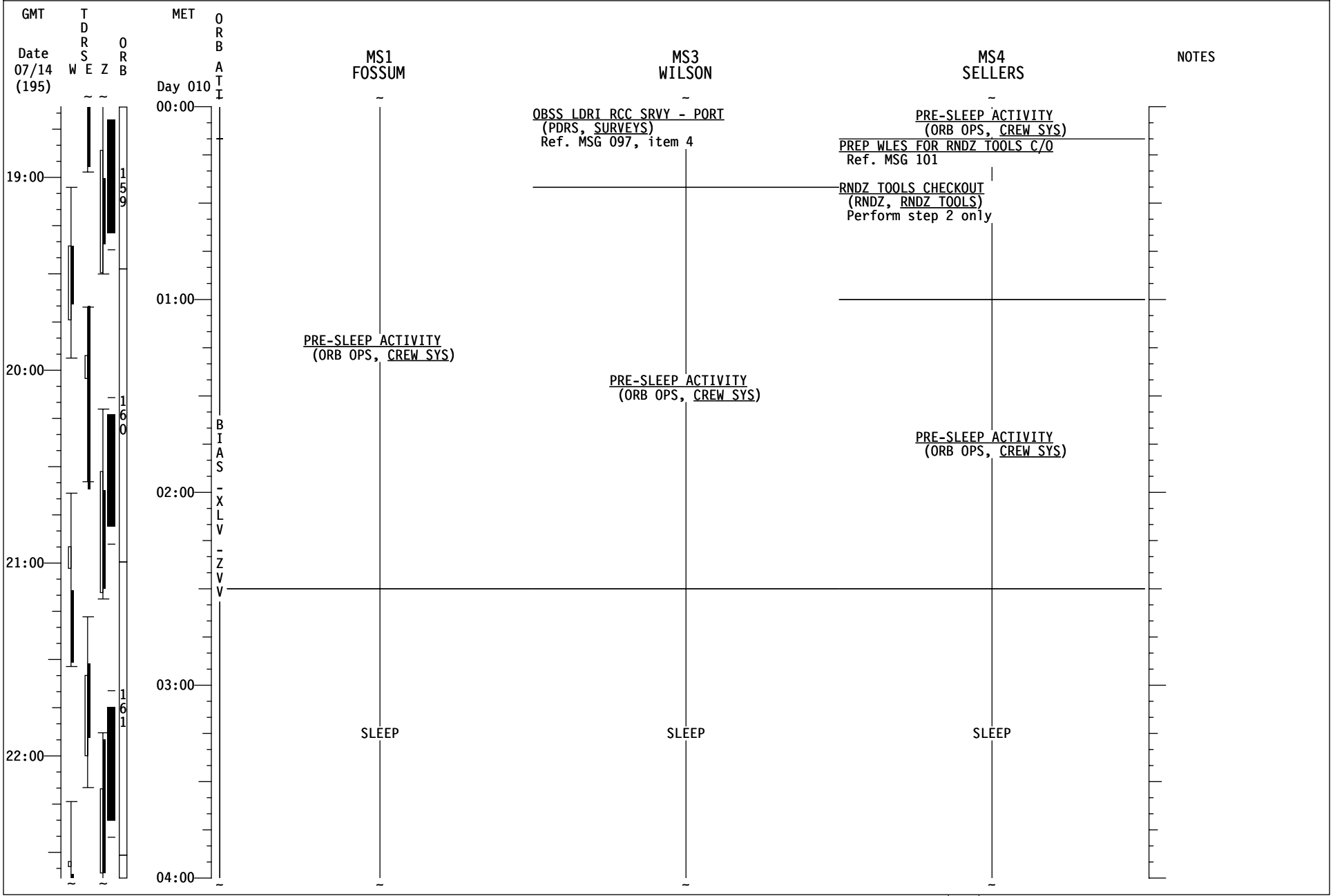
STS-121/ULF 1.1 (FD 11)

REPLANNED



STS-121/ULF 1.1 (FD 11)

REPLANNED



Good morning, Discovery.

We hoped you enjoyed your time off, ‘cause guess what, it’s time for more arm ops. Unofficially, we believe this flight has had the most robotic operations to date. The PDRS and ROBO folks would like to say thanks to you all, and especially the “ROBO chicks”. They have definitely earned the title.

For today’s attitude maneuver with the Shuttle, all we have to say is, “VERNS? We don’t need no stinking VERNS!”

Have fun and enjoy.

YOUR CURRENT ORBIT IS: 191 X 177 NM

NOTAMS:

GUAM (GUA) - RUNWAY END IDENTIFIER LIGHTS 06R UNSERVICEABLE TIL 24 AUG
GUAM (GUA) – RWY 06L/24R CLOSED UNTIL 31 JULY
ORMOND BEACH (KOMN) – TAC (OMN CH 73) AZIMUTH OUT OF SERVICE UFN
LAJES – TACAN 45X OUT OF SERVICE TIL 8 SEP
KING KHALID - VORTAC CH 92X OPERATIONAL BUT CAUTION ADVISED DUE TO NO MONITORING
AMBERLEY (AMB) – CLOSED
RIO GALLEGOS (AWG) - NOT APPROVED
ISTRES (FMI) – 33 RWY REMAINING MARKERS AVAIL ARE 300,600,900M

NEXT 2 PLS OPPORTUNITIES:

EDW22 ORB 157 – 9/21:06 (FEW060 FEW150, 230@10P15)
NOR23 ORB172 – 10/21:30 (BKN120 BKN220, 100@5P7)

OMS TANK FAIL CAPABILITY:

L OMS FAILS: NO
R OMS FAILS: NO

LEAKING OMS PRPLT BURN:

L OMS LEAK: ALWAYS BURN RETROGRADE
R OMS LEAK: ALWAYS BURN RETROGRADE

OMS QUANTITIES(%)

L OMS	OX = 34.6	R OMS OX = 37.2
	FU = 35.1	FU = 37.9

SUBTRACT I’CNCT COUNTER FOR CURRENT OMS QUANTITIES

DELTA V AVAILABLE:

OMS	333 FPS
ARCS (TOTAL ABOVE QTY1)	37 FPS
TOTAL IN THE AFT	370 FPS
ARCS (TOTAL ABOVE QTY2)	67 FPS
FRCS (ABOVE QTY 1)	32 FPS
AFT QTY 1	83 %
AFT QTY 2	45 %

Good morning Thomas, Stephanie, and Steve,
Congratulations on finishing up the MPLM! Woohoo! That was surely the hard part.

Information for crew:
We've added IUA pieces moving to ISS and IUA items returning today. These show up in the Transfer List updates today as items 814-817.

Middeck Stowage folks have defined return locations for the UCB s/n 1089 and the CEVIS Isolator Kit B/C CHCCES03J that Jeff identified on FD10. These show up in the Transfer List updates today as items 818 and 819.

For the Mddk Transfer List, we've uplinked change pages, pages reflecting FD10 calldowns and the Return Sort pages for your reference.

For the MPLM Transfer List Books, we are not uplinking any pages. We've deleted items 806 (PWR foam) and 478.1 (2 Russian Converter Amps [Beta-08s]) on our electronic Transfer List

The information we reported based on the FD10 calldown is as follows:

FD10 MPLM Transfer Status - **100% of total MPLM Transfers** are complete.

FD10 Middeck Transfer Status – 85% of total Middeck Transfers are complete (85% of Middeck Resupply and 86% of Middeck Return).

FD11 (MPLM egress/hatch closure)

- After EMU Reconfig, return EMUs to STS: 2 to Ext A/L; 1 to MDDK.
- Return EMU Systems bags and EVA tools bags, CRM, and IR Camera CTB to Mddk
- Complete middeck transfers (except item 53 BPSMU items – this happens on FD12)

The Transfer List Excel file, FD11_TransferList_STS121.xls, is located on the KFX machine in **C:\OCA-up\transfer.**

For ISS, the Transfer List Excel file, FD11_TransferList_STS121.xls, is located in **K:\OCA-up\transfer.**

Please incorporate uplink pages as follows (call us with any questions):

In the MDDK Transfer List Book
RESUPPLY tab, Replace the following pages:
Page Resupply 1
Page Resupply 6
Page Resupply 8
MDDK RSPLY REALTIME ADDITIONS tab, Replace the following pages
Page Resupply 8
Page Resupply 9
SWAP tab, Replace Page Return 8
RETURN tab, Replace the following pages:
Page Return 4 through Page Return 7
MDDK RTN REALTIME ADDITIONS tab, Replace Page Return 8

RETURN SORT tab
Remove all pages and insert the following pages:
Page Rtn Loc 1 - Page Rtn Loc 4

-The Transfer Team-

MSG 100 - FD11 WATER SUMMARY

Today there will be 2 PWR fills, 1 CWC fill, a FES dump and the supply water system will be returned to the nominal config.

FES Dump and FES Heater Details

At MET 9/13:45 (following the PAO event), perform TOPPING FES STARTUP (ORB OPS, ECLS) p5-21, step 1. The B heaters will be selected. MCC will TMBU all limits. After 90 minutes, perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) p5-9, step 1, DUMP INITIATION with FES PRI A.

On MCC call, at approximately MET 9/20:25, perform SUPPLY WATER DUMP USING FES (ORB OPS, ECLS) p5-9, step 2, DUMP TERMINATION. The FES will not be required.

At MET 9/22:30, perform:

L1	TOP EVAP	HTR	DUCT sel	- OFF
			NOZ L,R (two)	- OFF

PWR Fill Details

Retrieve PWRs S/N 1007 and S/N 1013 temp stowed on Middeck for today's fills. At MET 9/14:20 and MET 9/14:50, fill PWR S/N 1007 and S/N 1013 using PWR FILL (ORB OPS, ECLS) p 5-43. Report Serial Number and Barcode to MCC prior to initiating each fill.

Per the flight plan, transfer PWR S/N 1007 to A/L1D1_B1 and PWR S/N 1013 to A/L1D1_A2 at MET 9/15:25.

CWC Fill Details and Transfer Information

Verify FES PRI A – OFF (FES Dump Terminated) prior to fill initiation.

If not already transferred, per the flight plan, the PLT should transfer CWC #14 (filled on FD10) to the Water Wall (NOD1P2) at MET 9/15:55. If there is insufficient room for the CWC bag at this ISS location, store CWC on the FGB Floor and report to MCC.

The Shuttle/ISS H2O Container Fill initiation scheduled for PLT at MET 9/20:30 should contain the following details:

SHUTTLE/ISS H2O CONT FILL INIT #15
(ORB OPS, ECLS)
Ag Biocide is req'd.
Sample is req'd.
Fill Duration: ~50 minutes
Report Serial Number and Barcode to MCC.

Per the flight plan, transfer the CWC to the Water Wall (NOD1P2) at MET 9/22:15. If there is insufficient room for the CWC bag at this ISS location, store CWC on the FGB Floor and report to MCC.

Nominal H2O Config Details

At MET 9/22:00, CDR should perform NOMINAL H2O CONFIG (ORB OPS, ECLS) p5-51.

The FES will not be required.

To prepare the backup WLES laptop for use as the RPOP laptop, prior to undock, the crew needs to perform the procedure **PREP WLES FOR RNDZ TOOLS CHECKOUT (below)** as part of RNDZ Tools C/O on FD 11 (MET 10/00:10 on MS4 and PLT). This should be performed before any RNDZ tool activities.

PREP WLES FOR RNDZ TOOLS CHECKOUT

1. DEACTIVATE BACKUP WLE SENSORS LAPTOP

STS5 On Backup WLES laptop:

'Enhanced Wideband MicroTAU – WLEFlight 2.2'

Click 'Exit'
At prompt 'Are you sure you want to exit?' click 'Yes'
Disconnect Laptop Receiver Unit from A31p Serial port
Leave attached to laptop with Velcro on A31p

2. DEACTIVATE WLES FILE BACKUP

STS8 On Prime WLES laptop:

'Main'

Click 'System Settings' (left side of display)
'Backup Mode'
Click 'Standard'
Click 'Status' (left side of display)

The EVA TOOLS MANAGEMENT procedure in the 121 EVA Checklist requires some changes due to tool stowage updates. Replace EVA TOOLS MANAGEMENT pages FS 8-17 through FS 8-21 with the attached pages (there are no changes on FS 8-17). Below are some additional notes and questions relative to this procedure.

- It would greatly help the EVA logistics team if you can provide the quantity of each size EVA wire tie used during the EVAs. A summary of the total number of wire ties available is helpful as well if time permits. Jeff stowed all the wire ties he located pre-flight in a mesh bag near the MUT AND MWS PARTS CTB s/n 1013 in AL1O0. We would like all remaining pristine wire ties stowed in the same location.
- During airlock config activities prior to your launch, Jeff reported sm-sm RET s/n 4073 as missing. This is one of the yellow-coded RETs that are slated for return on STS-121. Please report whether or not this tether has come out of hiding.
- Were you ever able to locate sm-sm Adj tether s/n 1033, which was reported missing during EMU PREP FOR ISS TRANSFER on FD3?
- On FD6, you had a question about the location of the Probe that was called out in EVA 2 TOOL CONFIG. We replied that it was not required for the EVA, but please let us know whether you located it and its current location.
- We heard Mike's comments that 55-ft safety tether #66 behaved much better than #59 did for him on EVA 1 and would be interested in any other comments or assessment of #59. If you feel that it is so balky as to be of little use on ISS, we will look into bringing it home for re-work.
- Since the STS-114 crew also reported trouble with a sticky MWS EE (one of the ones returning on STS-121), it would be very helpful if you can identify the s/n of the unit that Piers reported as sticky on EVA 2. The s/n for the MWS T-bar assembly is located on the "stem" of the T-bar on the side closest to the EMU (see attached photo). If you are able to identify the specific unit, please also provide comments as to whether this unit should be relegated to backup status.
- 85-ft safety tether #24 must be returned to Houston in order to re-engage the level-wind mechanism. It is possible to break the level-wind mechanism if it is re-engaged and operated without performing a ground procedure that involves disassembly of the reel housing, non-captive fasteners, alignment of internal springs, etc. It is acceptable to soft-stow this tether with the excess line still extended, but please ensure that it will not get kinked during landing. If it would make stowage easier, you can attempt to reel in the tether line:

  CAUTION
  Do not allow tether cable to retract freely into reel housing at high speeds - damage can occur

  1. Verify that the level-wind cable guide window moves – if it does not, stop and stow the tether with the line extended.
  2. Pull out tether cable until the cable remaining inside the reel housing is wrapped evenly on the reel.
  3. Slowly allow the line to reel in, while manually distributing it across the reel.

Flight Day 8 – EVA 2 Tool Deconfig

NOTE
This procedure assumes that the IUA and its connector caps are still in the airlock and haven't already been reconfigured for landing

1. If necessary, complete steps 7-16 of Flight Day 3 - EVA Tool Transfer
2. Obtain CRM Bag and IR Camera CTB (MF43O); transfer to ISS

IR Camera CTB s/n 1141 Transfer entire CTB as is				b/c 006590J
Locker	**Item Description**	**Qty.**	**Part No.**	**Serial No.**
MF43O	EVA IR Camera Assy	1	1257950-701	1002
	Flash Card	1	SDCFBI-102420100	08
	Compact Flash to PC Card Adapter	1	SDZ12100650-301	1002

3. Deconfigure EMUs
   - ❑ Move 6-in socket from one PGT to EVA Ratchet in Crewlock Bag; move 2-in socket from EVA ratchet to Right Angle Drive
   - ❑ Move 6-in socket from other PGT to socket caddy w/ RADs in Crewlock Bag
   - ❑ Remove battery from one PGT; stow battery in BSA, PGT in "PGT Hardware" CTB s/n 1161 (A/L1O1)
   - ❑ Leave remaining PGT on swingarm until crewlock bag has been emptied (replace battery)
   - ❑ Empty TUS dust caps (7) from EV2 trash bag; stow in SHUTTLE EVA 1-A TOOLS bag
   - ❑ Empty IUA dust caps (3) from EV1 trash bag; stow J1 cap (gas cap) in SHUTTLE EVA
     1-A TOOLS bag, stow cable caps (2) in SHUTTLE EVA 1-B TOOLS bag
   - ❑ Replace wire ties on EV1 and EV2 MWS T-bars (2 ea.)
4. Deconfigure Crewlock Bag
   - ❑ Move exterior and interior tethers (4) to tether staging area
   - ❑ Move Socket Caddy w/ Right Angle Drives (2), 2-in sockets (2), and 6-in socket to Crewlock Bag #2
   - ❑ EVA Ratchet remains in crewlock bag
   - ❑ Digital Camera w/mount should already be out for battery charging
   - ❑ Move Ballstack and MUT EE to Crewlock Bag #3 for Inc. 13 EVA
   - ❑ Move TUS FSE Knob to SHUTTLE EVA 1-A TOOLS bag
   - ❑ Move temp-stowed PGT to crewlock bag
   - ❑ Temp stow crewlock bag for EVA 3 TOOL CONFIG
   - ❑ Move socket caddy w/12-in socket from crewlock bag #3 to EVA 3 crewlock bag
5. Deconfigure Med ORU Bag
   - ❑ Temp Stow IUA w/TUS cable in SHUTTLE EVA 1-B TOOLS bag (for later launch bolt reconfig); install caps (2) on cable ends
   - ❑ Stow Tethers (5) and Fish Stringer on tether staging area
   - ❑ Stow Med ORU Bag in A/L1O0 behind closeout
6. Leave RJMC bag configured in A/L
7. Remove Long Duration Tiedown Tethers (4) and fish stringer from Staging Bag
8. Move Long Duration Tiedown Tethers to SHUTTLE EVA 1-A TOOLS bag, stow fish stringer on tether staging area
9. Perform EVA3 TOOL CONFIG using tools from CRM Bag and IR Camera CTB (Recall that the "Sunshade" was temp-stowed following EVA 1, WIF Adapter is tethered in tether staging area)

Flight Day 11 – EVA 3 Tool Deconfig

NOTE

Steps 1-23 must be performed prior to undock, but bulleted *italicized* items are optional if time allows

While deconfiguring EVA 3 hardware, sort RETs by color (dash no. and s/n stamped on reel housing). Blue RETs stay on ISS, yellow RETs return on shuttle. Red RETs (if unpacked from MPLM transfer) stay on ISS

1. Collect all SHUTTLE EVA X TOOLS bags (3), temp stow nearby
2. Gather Ziploc bags (PI Locker), latex gloves (WCS), goggles (CCK, MA9N), dry and wet wipes (WCS/Vol B)
3. Don latex gloves, goggles
4. Inspect the following for visible NOAX and wipe off with dry wipe (wet wipe may be used on non-fabric surfaces if required)
   - ❑ EMUs, including MWSs and tethers
   - ❑ CRM Bag Exterior
   - ❑ CRM Bag interior and exterior tethers (6 RETs, 7 Adj); stow in tether staging area
   - ❑ CRM Bag fish stringer (stow clean EVA wipes from stringer on a <u>used</u> wire tie in CRM bag)
   - ❑ Crewlock Bag and contents
   - ❑ IR Camera (notify MCC if contamination found on exterior or lens)
   - ❑ Airlock
5. Report any staining to MCC
6. Discard wipes and latex gloves, doff and stow goggles (CCK, MA9N)
7. Stow IR Camera in A/L with **<u>blue</u>** lg-sm and sm-sm RETs (1 ea.) for Inc. 13 EVA
8. Deconfigure Crewlock Bag (bag stays on ISS)
   - ❑ Move broom clip caddy to CRM Bag
   - ❑ Stow RETs (2) on tether staging area
   - *Stow Digital Camera and mount in "EVA Camera Accessories" CTB, s/n 1221, b/c 006717J (A/L1O1 or Node 1 deployed)*
   - *Stow PGT in "PGT Hardware" CTB s/n 1161 (A/L1O1), stow PGT battery in BSA*
   - *Stow EVA Ratchet in Crewlock Bag #4*
   - *Stow 6-in socket on socket caddy w/ 12-in socket*
   - *Stow socket caddy w/ 6-in and 12-in sockets in Crewlock Bag #2*
9. Stow Crewlock Bag in crewlock endcone
10. Remove 85-ft Safety Tether # 23 and EVA Wipe from Staging Bag (A/L endcone)
11. Stow 85-ft safety tether in SHUTTLE EVA 1-A TOOLS bag, stow EVA wipe with other wipes in CRM bag

- *Move prybar from Staging Bag to Crewlock Bag #2*
- *Stow Lg ORU Bag (sunshade) in A/L1O0 behind closeout*

12. Deconfigure RJMC bag (Lg ORU Bag - stays on ISS)
    - ❑ If Lg-sm RET to Airlock is yellow-coded, replace with blue lg-sm, stow yellow RET on tether staging area
    - ❑ Move sm-sm RET and Adj Tether to tether staging area
    - ❑ Leave RJMC in bag for Inc. 13 EVA
    - *Replace covers on RJMC connectors (ziploc bag in "PGT Hardware" CTB s/n 1161 (A/L1O1)*
    - *Stow round scoop in Crewlock Bag #1 (used during EVAs)*
13. Deconfigure CRM Bag
    - ❑ Verify all tethers and Fish Stringer already cleaned and moved to tether staging area
14. Deconfigure EMUs
    - ❑ Move SSRMS LEE Camera cover to SHUTTLE EVA 1-A TOOLS bag
    - ❑ Stow RETs (8) and Adj Tethers (5) on tether staging area
    - *Stow WIF Adapters (2) in Crewlock Bag #2*

15. Inventory items on EMUs:
    - ❑ MWS Baseplates (2) s/n 1007, 1023
        - ❑ MWS T-bars (2) s/n 1006, 1007
        - ❑ MWS swingarms (2) s/n 1003, 1004
        - ❑ BRTs (2) s/n 1009, 1001
        - ❑ Small Trash Bags (2)
        - ❑ Waist tethers (4)
        - ❑ D-ring extenders (4)
        - ❑ 85-ft safety tethers # 22 and 26

16. Inventory items in tether staging area:
    - ❑ Sm-sm RETS (8 yellow, 7 blue, plus 1 blue on IR camera in crewlock)
    - ❑ Sm-sm RETs w/ pip pin (4 yellow, 4 blue)
    - ❑ Lg-sm RETs (6 yellow, 4 blue, plus 2 blue on IR camera and RJMC bag in crewlock)
    - ❑ Sm-sm Adj (13)
    - ❑ Lg-sm Adj (2)
    - ❑ 55-ft safety tethers (3)
    - ❑ Fish Stringers (3)
    - ❑ Waist tethers (2)
    - ❑ D-ring extenders (1 on A/L D-ring)

17. Collect yellow-coded RETs into SHUTTLE EVA 1-A TOOLS BAG for return to shuttle:

    Sm-sm RETs (8)
    ❑ 4057 ❑ 4070 ❑ 4071 ❑ 4073 ❑ 4075 ❑ 4170 ❑ 4271 ❑4272

    Sm-sm RETs w/ pip pin (4)
    ❑ 4238 ❑ 4239 ❑ 4240 ❑ 4241

    Lg-sm RETs (6)
    ❑ 4252 ❑ 4253 ❑ 4254 ❑ 4255 ❑ 4256 ❑ 4257

18. Collect sm-sm Adj tethers into SHUTTLE EVA 1-A TOOLS bag for return to shuttle:
    ❑ 1026 ❑ 1033 ❑ 1067 ❑ 1068

19. Leave all blue-coded RETs in tether staging area (some are tethering items in crewlock):

    Sm-sm RETs (8)
    ❑ 4065 ❑ 4081 ❑ 4083 ❑ 4169 ❑ 4171 ❑ 4173 ❑ 4056 ❑ 4072

    Sm-sm RETs w/ pip pin (4)
    ❑ 4174 ❑ 4243 ❑ 4244 ❑ 4245

    Lg-sm RETs (6)
    ❑ 4055 ❑ 4060 ❑ 4076 ❑ 4077 ❑ 4175 ❑ 4176

20. Stow “backup” items from full CTB s/n 1033 “BACKUP EVA HDW…” in SHUTTLE EVA X TOOLS bags for return:
    - ❑ MWS Baseplates (2) s/n 1003, 1009
        - ❑ MWS T-bars (2) s/n 1005, 1029
    - ❑ 85-ft safety tether (# 24)
    - ❑ BRT (2) s/n 1021, 1017

21. Obtain CTB s/n 1352 (b/c 010533J) from NOD1O4_A2 with STS-114’s IR Camera for return
22. Transfer IR Camera CTB s/n 1352, SHUTTLE EVA X TOOLS bags (3), and CRM Bag to shuttle

23. Temp Stow CRM Bag for FD13 deconfig/stow:

CRM Bag Temp stow entire bag as is for FD12 cleanup				
	Item Description	**Qty.**	**Part No.**	**Serial No.**
Port Ceiling 1	Crack Repair Material bag	□ 1	SED33118750-301	1003
	Palette	□ 2	SED33118670-301	1001, 1002
	Temperature Probe w/gooseneck	□ 1	SED33118700-303	1004
	CRM Applicator w/ TMG	□ 3	SED33119446-301	1004 - 1006
	CRM Applicator Nozzle	□ 3	SED33119448-301	
	Large Trash Bag 5-in spatula EVA Wipes (dirty)	□ 1 □ 1 □	SEG33106937-301 SED33118187-302 SED33116397-70	1007 N/A
	Broom Clip Caddy	□ 2	GD2051000-301	1011, 1012
	EVA Wipe (extras, clean)	□___	SED33116397-701	N/A
	2-in spatula	□ 4	SED33118187-301	1001 -1005
	5-in spatula	□ 1	SED33118187-302	1015

24. Stow remaining tools per tables below:

NOTE

RH swingarms should have been stowed in MPLM on FD4. IWIF should have been transferred/stowed following EVA 1. Nadir IUA TDA and cut TUS cable pigtail will be stowed via OSO procedures following the IVA reconfig; the remainder of the IUA, two cable connector caps and the J1 "gas cap" will remain on ISS

IR Camera CTB s/n 1352 b/c 010533J Stow entire CTB as is				
Locker	**Item Description**	**Qty.**	**Part No.**	**Serial No.**
MF43O	EVA IR Camera Assy Flash Card	1 1	1257950-701 SDCFBI-102420100	**1001** **07**
	Compact Flash to PC Card Adapter	1	SDZ12100650-301	**1001**

Shuttle EVA X Tools Bags				
Locker	**Item Description**	**Qty.**	**Part No.**	**Serial No.**
Port Ceiling 1	SSRMS LEE Camera Cover	□ 1	51617-0052-1	201
Port Floor 1, Bag A	Force Measurement Tool	□ 1	SED33103285-301	1003
	IWIF (if not already stowed)	□ 1	1F15470-1	1002
	85-ft Safety Tether (#24)	□ 1	SED33116109-307	**1004**
Stbd Floor 1, Bag I	**MWS Baseplate**	□ 2	SEG33110490-301 SEG33110490-303	**1009** **1003**
	MWS Gimbal (on baseplates)	□ 2	SEG33110493-303 SEG33110493-305	**1005** **1029**
	BRT	□ 2	SEG33110400-307	1021, 1017
	Sm-sm Adjustable Tether	□ 4	SEG33106945-307	1026, 1033, 1067, 1068
	Sm-sm Retractable Tether	□ 8	SEG33106164-381	4057, 4070, 4071, 4073, 4075, 4170, 4271, 4272
	Sm-sm Retractable Tether w/ pip pin	□ 4	SEG33106164-383	4238 - 4241
	Lg-sm Retractable Tether	□ 6	SEG33106164-385	4252 - 4257
	85-ft Safety Tether (#23)	□ 1	SED33116109-301	**1003**
	Long Duration Tiedown Tether	□ 4	SEG33113860-301	1005 - 1008
Port Floor 2, Bag B	TUS/VSC Connector Cap	□ 7	NZGL-RPC-N-15-0-MS	N/A
	TUS FSE Knob	□ 1	SEG33119805-301	1001
	IUA Blade Blocker	□ 1	1F15871	N/A
EV1 ECOK	Mesh Bag	□ 3		N/A

Flight Day 13 - CRM Bag Disassemble and Stow

1. Obtain CRM Bag from FD11 temp stow location
2. Gather 3 large Ziploc bags (PI Locker), latex gloves (WCS), goggles (CCK, MA9N), dry and wet wipes (WCS/Vol B)
3. As reqd, don latex gloves, goggles
4. Stow items in PORT CEILING 1
    - ❑ Palettes (2)
    - ❑ Broom Clip Caddies (2)
    - ❑ Clean EVA Wipes
    - ❑ 3rd CRM Applicator; place in Ziploc bag, verify nozzle valve remains closed when stowed
    - ❑ Temp stow Lg Trash bag outside CRM bag
5. Place CRM Applicators (2) in Ziploc bags, temp stow
6. Stow small foam blocks (6) for CRM Applicators in CRM Bag
7. Stow CRM Applicators inside CRM Bag; verify nozzle valves remain closed when stowed
8. Obtain foam block from PORT CEILING 1, stow items in it:
    - ❑ 2-in and 5-in spatulas (stow in individual ziploc bags from launch)
    - ❑ Temperature probe
9. Stow Lg Trash Bag in CRM bag spatula area; if necessary, discard dirty EVA wipes, stow 5-in spatula in ziploc in PORT CEILING 1
10. Install foam block with spatulas and temperature probe inside CRM bag
11. Remove CRM Bag lid:
    a. Release quarter turn fasteners and Velcro on door stays and hinge
    b. Fold flaps towards palette pockets, temp stow lid
12. Remove, temp stow foam wedge in PORT CEILING 1
13. Stow CRM Bag in PORT CEILING 1
14. Set CRM Bag lid on top of CRM bag, not attached
15. Install foam wedge on top of CRM bag lid
16. If necessary, complete step 24 of Flight Day 11 - EVA 3 Tool Deconfig to stow any remaining tools

MSG 104 (13-0683) - POST EVA RECONFIGURATION AND TRANSFER UPDATES

Summary:
It turns out that the METOX canisters (S/N 0016 and S/N 0017) that couldn't be found are currently installed in EMUs 3009 and 3010, respectively. These suits are returning home on the Shuttle, and we want to leave those METOX canisters on ISS.

The Helmet Lights and EMU TVs (ERCA) should be left on the suits staying on ISS (EMU 3006 and EMU 3015). Since the launched helmets (from EMU 3006 and 3015) will not stay on ISS, the Helmet Lights and EMU TVs need to be moved from the launched (returning) helmets to the ISS helmets.

Changes:
These changes can be captured in the POST EVA RECONFIGURATION AND TRANSFER (EVA, AIRLOCK CONFIG), PRE-UNDOCK EMU RECONFIGURATION procedure starting on page FS 2-11. Please perform the following changes:

On Page FS 2-13:
Under the EMU 3015 (L) RECONFIGURATION FOR TRANSFER column:
- Add step "1a. Install Helmet Lights and EMU TV from EMU 3010, remove and stow helmet light batteries in M-02 bag."
- In step 10, change "vent port plugs" to "METOX"

Under the EMU 3010 (L) RECONFIGURATION FOR RETURN column:
- Add step "1a. Remove Helmet Lights and EMU TV, transfer to EMU 3015"
- In step 6, change "Vent Port Plugs" to "METOX"
- Add to step 7, "and stow LiOH caps in EMU Sys Transfer Bag #1"

On Page FS 2-14:
Under the EMU 3015 (L) FINAL TRANSFER CONFIG column:
- Change "Vent Port Plugs" to "METOX"

On Page FS 2-15:
Under the EMU 3006 (L) RECONFIGURATION FOR TRANSFER column:
- Add step "1a. Install Helmet Lights and EMU TV from EMU 3009, remove and stow helmet light batteries in M-02 bag."
- In step 9, change "vent port plugs" to "METOX"

Under the EMU 3009 (L) RECONFIGURATION FOR RETURN column:
- Add step "1a. Remove Helmet Lights and EMU TV, transfer to EMU 3006"
- In step 8, change "Vent Port Plugs" to "METOX"
- Add to step 9, "and stow LiOH caps in EMU Sys Transfer Bag #1"

On Page FS 2-16:
Under the EMU 3006 (L) FINAL TRANSFER CONFIG column:
- Change "Vent Port Plugs" to "METOX"

On Page FS 2-17:
In the EMU Sys Transfer Bag #1 table, External Airlock Floor Bag section:
- Change "2 LiOH cartridges" to "2 LiOH cartridges plus 2 extra sets of LiOH caps"

FD10 MMT Crew Summary

Flight Day 10's MMT focused on the two APU anomalies we told you about in yesterday's summary. Before those items, there was a quick review of the attitude control plan for the port wing LDRI survey that you will complete today on FD11. The procedure will be run on Orbiter ALT DAP control and there are no concerns with the RMS/OBSS being over the nose for nominal 80 msec DAP firings.

APU 3 GG/Fuel Line/Pump/Valve Heater – As a quick review, both the A and B heaters appear to be controlling the upper limit on the overtemp thermostat. We are currently on the A heaters and the system is controlling well. Functionally, there are no issues with operating on the overtemp thermostat. We are still investigating the fault tree to try and determine what would cause both the A and B control thermostats to fail. Some work was done at KSC in this area, but neither of the control thermostats was disturbed. The leading theory continues to be that either the thermostats or the heaters may have locally debonded. Workarounds exist for the next failure - if the B heater failed, we would switch back to the A. If that B heater failed, we would change attitudes after undocking to keep APU 3 warm or ask you to perform switch throws to manually control the heaters. If the heater fails on, the crew reaction time is about an hour after you get the alarm so there are no concerns for out of control temps on the fuel line.

APU 3 is not considered failed for entry or to even have a loss of redundancy. There is one small delta for entry - we'll swap to the B heater in the entry checklist to meet the APU injector temperature limits and likely turn the heaters off after APU 3 start.

APU 1 Tank Pressure Decay – The APU 1 fuel tank pressure continues to decay slowly (see attached plot). As of today it does not appear that we will be able to conclusively determine if the leak is N2 or hydrazine. The pressure decay has remained stable throughout the mission and there is no reason to assume that the leak rate will change. If the leak is GN2, we have lost about 18 psi so far and will have lost 33 psi by EOM - there will be plenty of GN2 still remaining to support entry operations on the APU. The minimum start pressure is 100 psi and we expect to be at 213 psi for EOM.

If the leak is hydrazine and of course we are not sure of that, we have lost about 10 lbs so far and will have lost 17 lbs by EOM. The leak rate of hydrazine is calculated to be 18 cubic centimeters per hour - very small. At this leak rate and based on the pod environment, analysis has shown that the hydrazine will phase directly into vapor and not form ice or liquid. The vapor exits the vent doors on orbit and there is a minimal concentration remaining. In fact at this leak rate, the hydrazine vapor concentrations will remain well below the flammability limits in the aft compartment for entry. This theory is somewhat corroborated by the fact that there are no indications of localized cooling on any temp sensors that would be indicative of a liquid fuel leak. Of course that also supports the possibility that the leak is N2, which is obviously the best case.

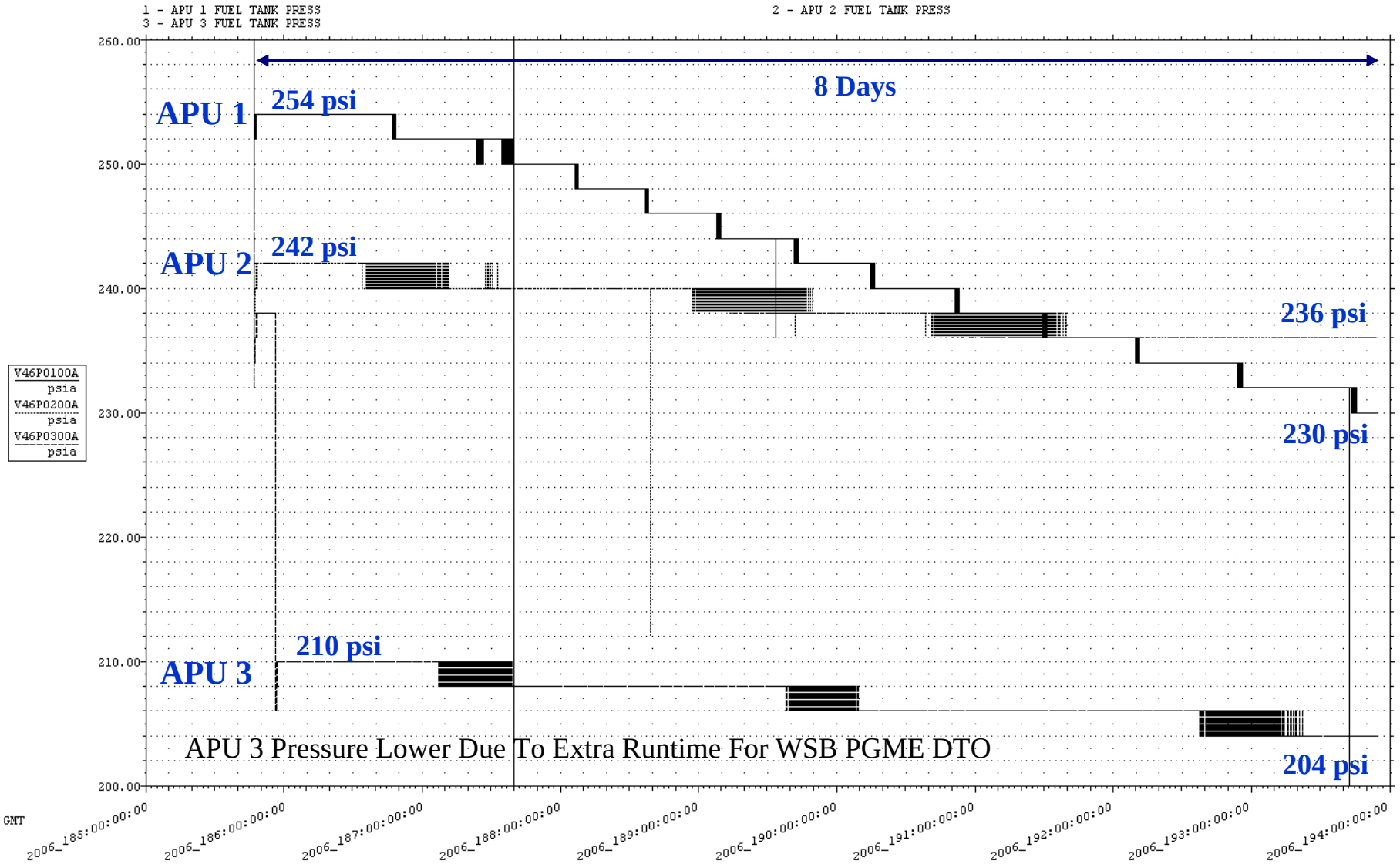
As mentioned yesterday, the N2 fill Quick Disconnect (QD) did have a leak preflight prior to the APU confidence run, but after cycling the QD poppet the leak was cleared (fairly common occurrence) and a flight cap is currently installed on the QD. It is still not clear that this preflight N2 leak could be related to the in-flight leakage we are seeing. The pre-flight data has been reviewed and there was no fuel leak observed pre-launch.

For information the APU 1 and 2 fuel tanks are located on the port sidewall of the aft compartment about 8 feet below the APU's which are near the top of the 1307 bulkhead. The teams continue to work around the clock on the ground to quantify the effects of the small N2 or fuel leak and the forward plan for entry.

APU Fuel Tank Pressure Decay

STS-121 8 day Pressure Decay = 24 psi, 6 psi, 6 psi (APU 1,2,3)

- APU 1 Showed An 8 psi Decay In Each Of The Last 3 Flights (9.75 to 11.25 days)



Conclusion: A "Small", But Real Leak Does Exist (Fuel or GN2?)

Stephanie, Thomas –

We've received a late input to transfer some unused MiniDVCAM tapes for Mike L-A. This is reflected in the attached page.

Please insert Page Resupply 10 in the the MDDK Transfer List Book in the **MDDK RSPLY REALTIME ADDITIONS** tab.