

# FLIGHT DATA FILE

*Shuttle*

## Flight Plan

### STS-52

(Proposed FRR Cycle)

*PCN-1 9-22-92*

Mission Operations Directorate  
Operations Division

Final  
September 7, 1992

<u>EVENT</u>	<u>CDT/CST</u>		
Launch	10:10	Thur	Oct. 15
LAGEOS Deploy	06:57	Fri	Oct. 16
CTA Deploy	02:59	Sat	Oct. 24
KSC Landing	05:56	Sun	Oct. 25



National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

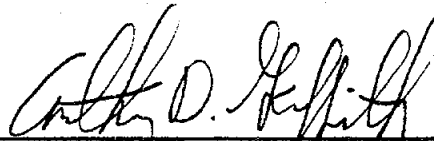


## MISSION OPERATIONS DIRECTORATE

## STS-52 FLIGHT PLAN


FINAL  
September 7, 1992

PREPARED BY:

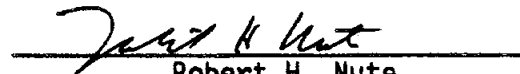


Anthony D. Griffith  
Book Manager

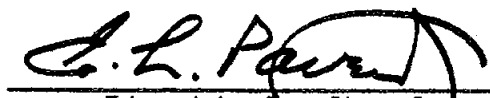
APPROVED BY:



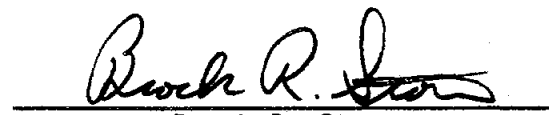
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STS-52 FLIGHT PLAN

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(\*)- Omit from flight book

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DAP A7.....	6-9	FLT PLN-8b/52/0/A
A7.....	6-9	FLT PLN-9a/52/0/A
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B4.....	6-13	FLT PLN-16a/52/0/A
DAP B5.....	6-13	FLT PLN-16b/52/0/A
B5.....	6-13	FLT PLN-17a/52/0/A
DAP B6.....	6-14	FLT PLN-17b/52/0/A
B6.....	6-14	FLT PLN-18a/52/0/A
DAP B7.....	6-14	FLT PLN-18b/52/0/A
B7.....	6-14	FLT PLN-19a/52/0/A
DAP B8.....	6-15	FLT PLN-19b/52/0/A
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DAP B9.....	6-15	FLT PLN-20b/52/0/A
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## INTRODUCTION

The STS-52 Flight Plan is the Flight Data File article that contains the on-orbit timeline. The Ascent, Post Insertion, Deorbit Prep, and Entry Checklists contain the detailed timelines that the Flight Plan does not cover. The Deploy Checklist contains the procedures required during the deploy time frame. For continuity the summary level timeline includes the entire flight.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-52 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the Proposed FRR Cycle version of the STS-52 Flight Initialization Data Pack.

The flight profile used for this Flight Plan is for a launch date of October 15, 1992, at 10:10 CDT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

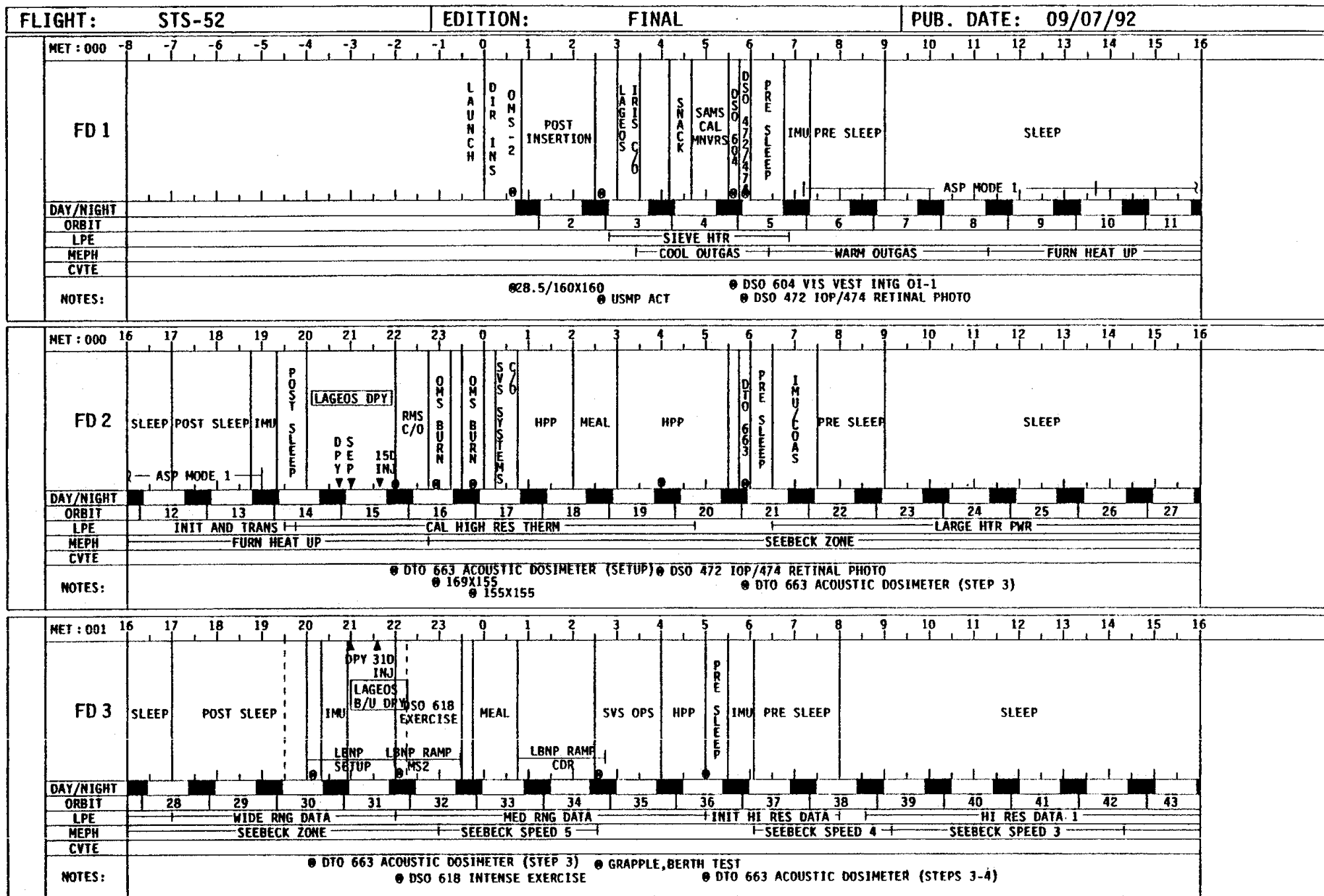
The trajectory used for the timelines is propagated from the Proposed FRR Cycle state vectors.

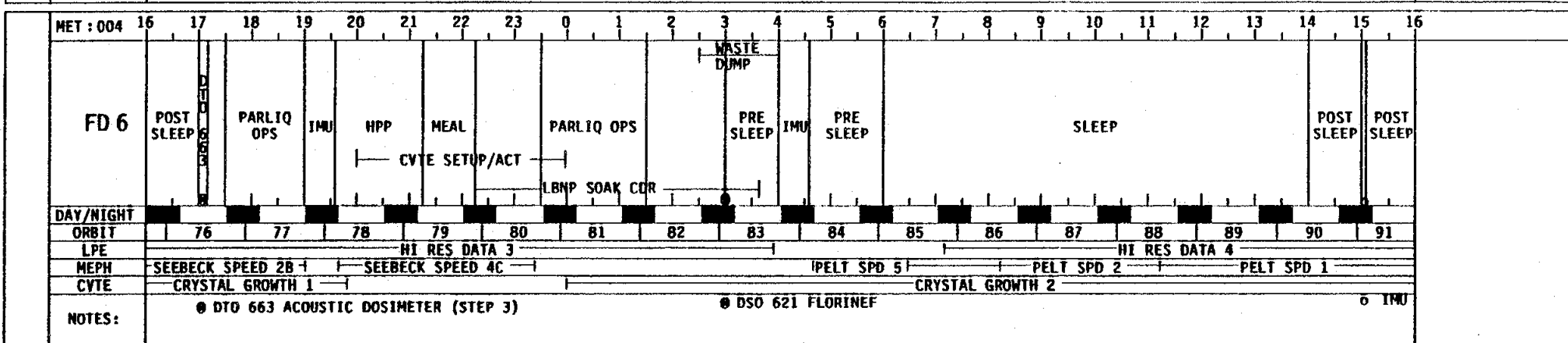
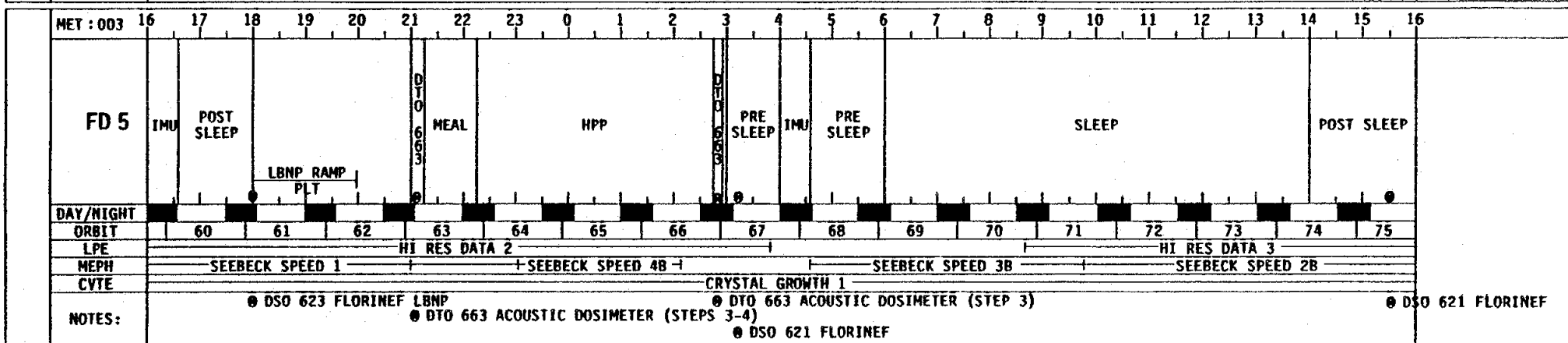
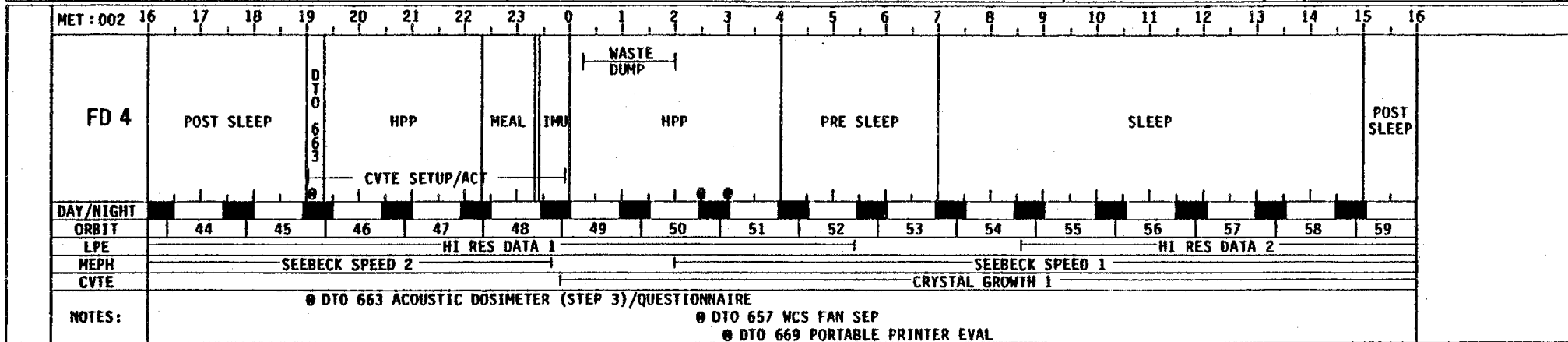
JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, Rev A, January 1990, has been used to build the timelines contained in this Flight Plan.

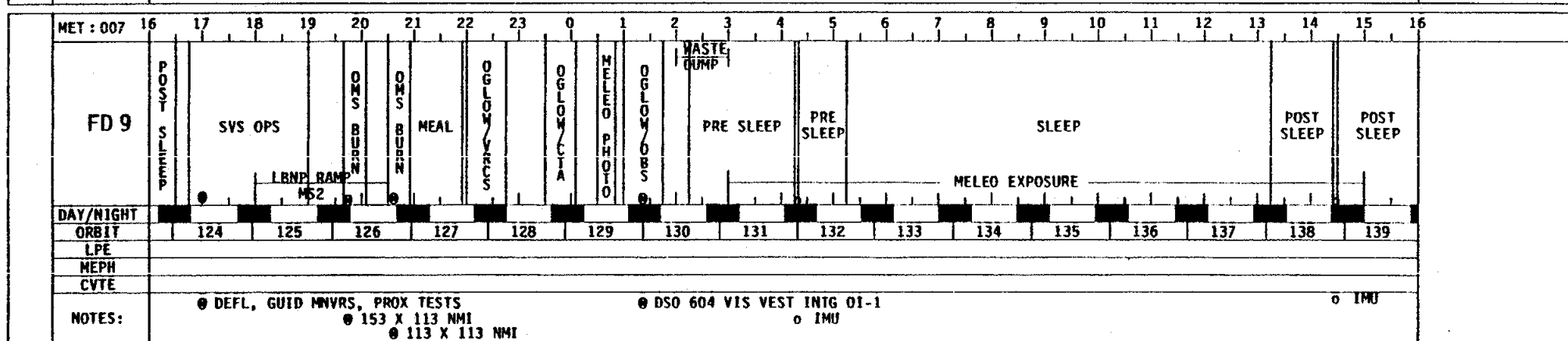
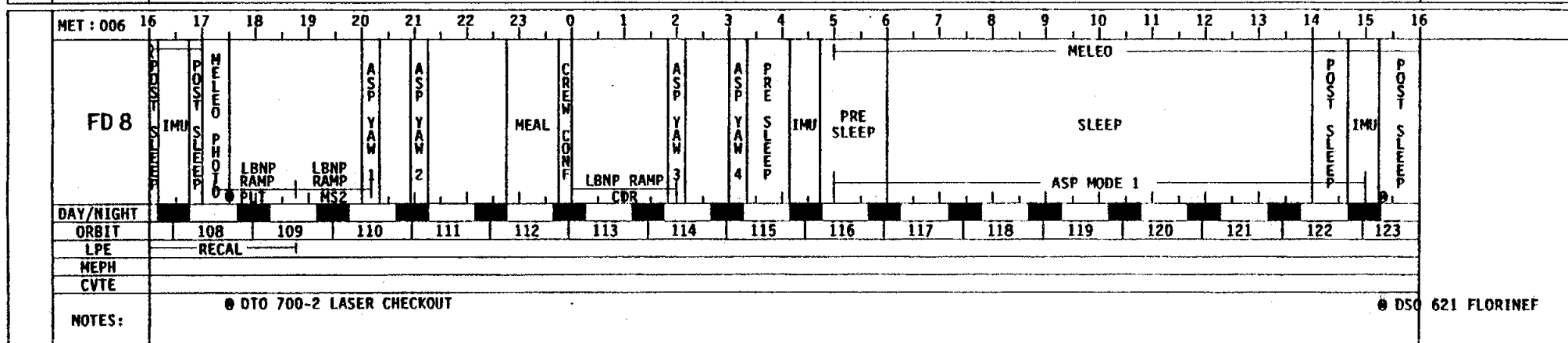
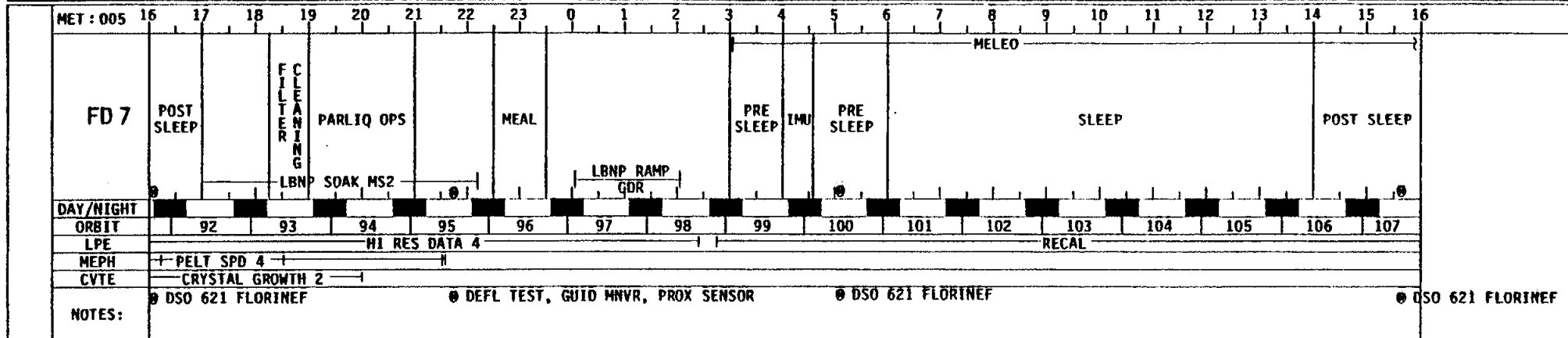
The timeline formats used in this Flight Plan are based on JSC-19933, Timeline Format Definitions and Standard Notes, Rev C, May 1990.

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STS-52 OVERVIEW







MET: 008	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD 10	POST SLURP	CTA REL	DSO 618 EXERCISE	RRS PWRDN	FCS C/O	HOT FIRE	MEAL	CABIN STOW	WASTE DUMP	PRE SLEEP	IMPRE SLEEP	SPIE BAKEOUT	SLEEP	POST SLEEP	IMM	POST SLURP	ENTRY DSO PREP								
	REL V																								
	DAY/NIGHT																								
	ORBIT	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155								
LPE																									
MEPH																									
CVTE																									
NOTES:	◎ DSO 618 INTENSE EXERCISE ◎ DTO 700-2 LASER CHECKOUT      ◎ DSO 472 IOP/474 RETINAL PHOTO															◎ ENTRY DSO PREP 603B, ◎ MPRESS DEACT ◎ DEORBIT PREP									

MET: 009	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD 11		DEORBIT PREP		DEORBIT	BURN	KSC	LANDING																		
	DAY/NIGHT																								
	ORBIT	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172							
	LPE																								
MEPH																									
CVTE																									
NOTES:																									

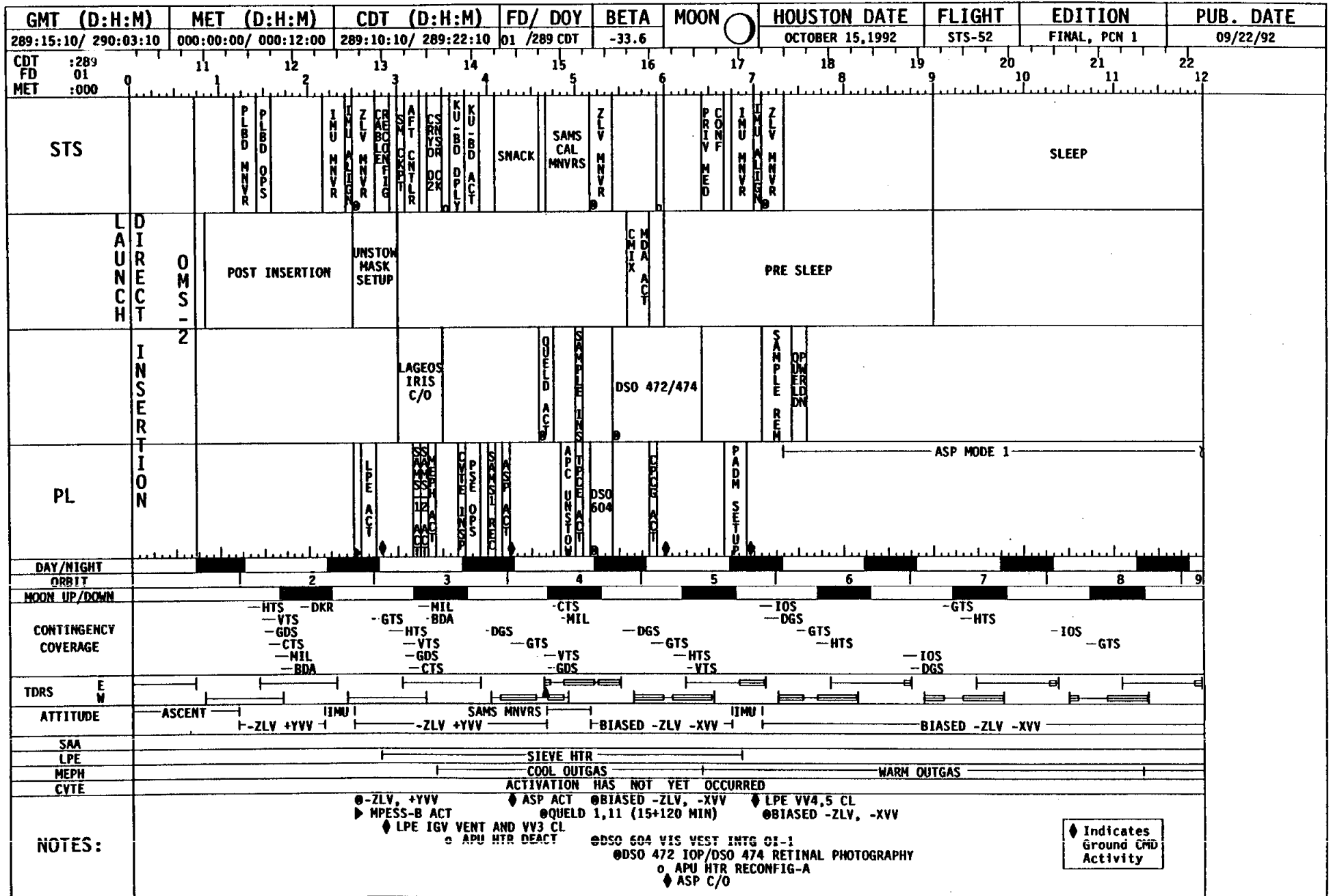
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FD 12																									
	DAY/NIGHT																								
	ORBIT	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188							
	LPE																								
MEPH																									
CVTE																									
NOTES:																									

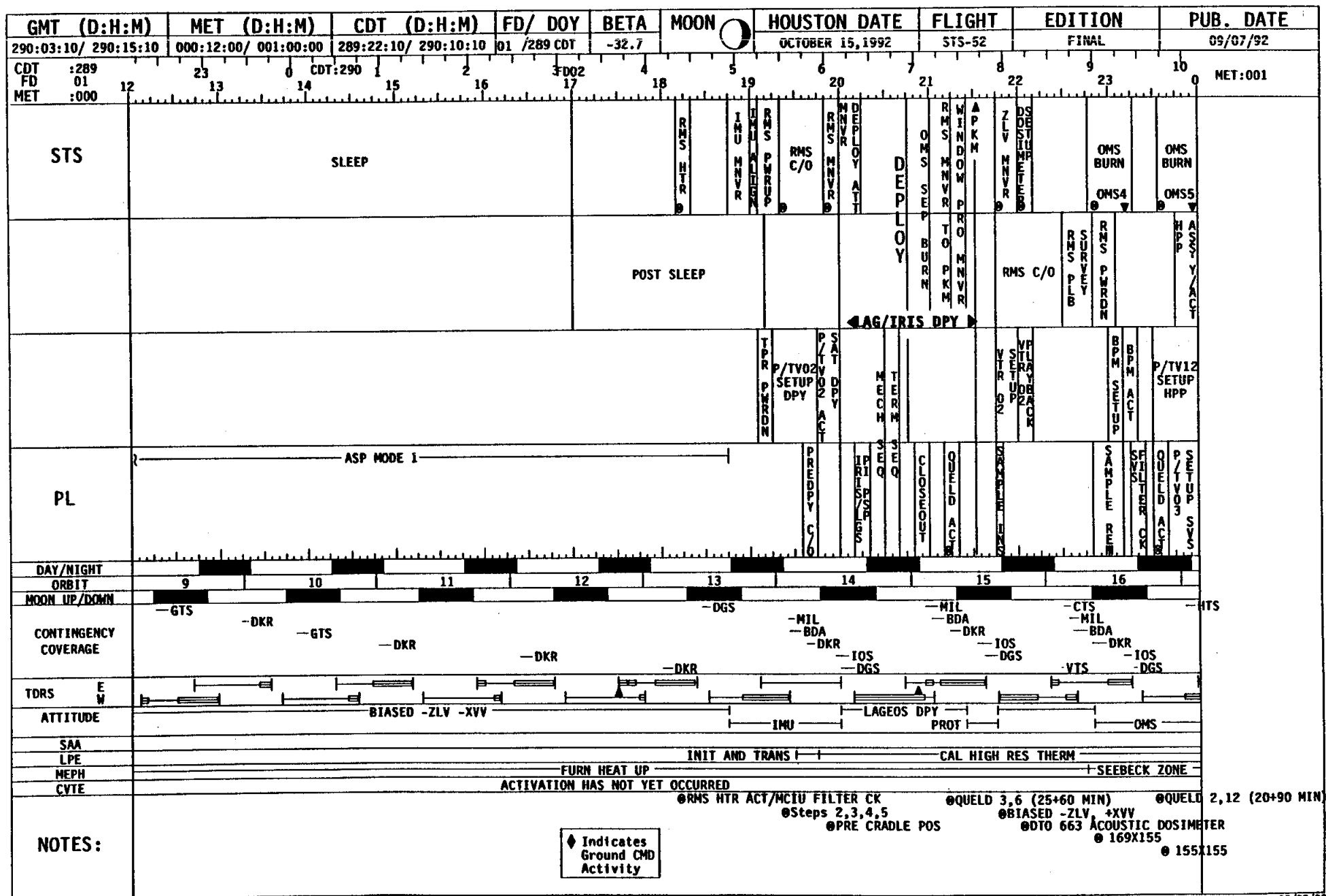


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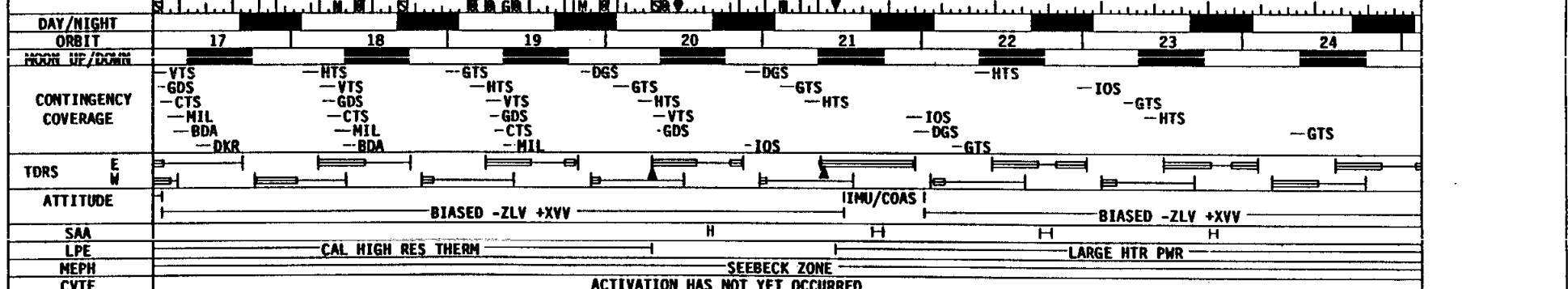
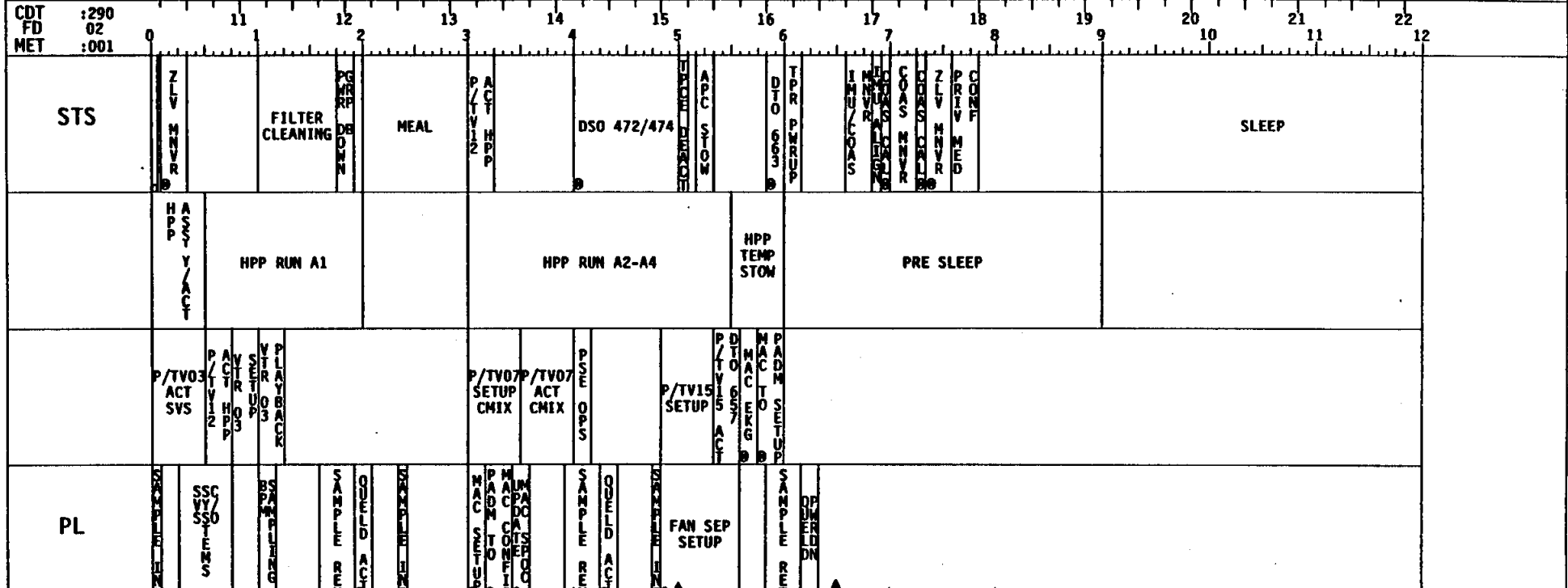
SUMMARY TIMELINE

# SUMMARY TIMELINE





GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
290:15:10/ 291:03:10	001:00:00/ 001:12:00	290:10:10/ 290:22:10	02 /290 CDT	-31.6		OCTOBER 16, 1992	STS-52	FINAL, PCN 1	09/22/92



**NOTES:**

- OMS BURN
- BIASED -ZLV, +XVV
- QUELD 4, 17 (15+90 MIN)
- DTO 1209 MAC EVAL
- DTO 1209 MAC EVAL
- DTO 1209 MAC EVAL
- DTO 1209 MAC EVAL
- DSO 472 TOP/DSO 474 RETINAL PHOTOGRAPHY
- QUELD 5, 18 (20+60 MIN)
- DTO 657 WCS FAN SEP
- ACOUSTICAL DOSIMETER (STEP 3)
- ACTIVATION HAS NOT YET OCCURRED
- VV3 OP
- FWD STATION
- BIASED -ZLV, +XVV
- CAL LARGE HTR INIT/SAMS 2 REC ACT
- CAL LARGE HTR PHOTOGRAPHY
- AFT STATION

◆ Indicates Ground CMD Activity

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
291:03:10/ 291:15:10	001:12:00/ 002:00:00	290:22:10/ 291:10:10	02 /290 CDT	-30.3		OCTOBER 16, 1992	STS-52	FINAL, PCN 1	09/22/92							
CDT :290	23	0	CDT:291	1	2	3	FD03	4	5	6	7	8	9	10	MET:002	
FD 02	12	13	14	15	16	17	18	19	20	21	22	23	0			
MET :001																
STS	SLEEP				POST SLEEP				DSO 618 EXERCISE				MEAL			
									P/TV04 SETUP MDDK				P/TV04 & 10 ACT			
									LBNP SETUP				LBNP PREP	LBNP RAMP (MS2)	FORMING	
PL													FIELD AC	FIELD AC		
DAY/NIGHT ORBIT	25		26		27		28		29		30		31		32	
MOON UP/DOWN	-GTS		-DKR		-GTS		-DKR		-IOS		-DGS		-DGS		-DKR	
CONTINGENCY COVERAGE			-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR	
TDRS	E		W		E		W		E		W		E		W	
ATTITUDE	BIASED -ZLV +XVV								IMU 1				BIASED -ZLV +XVV			
SAA	LARGE HTR PMR				SEEBECK ZONE				WIDE RNG DATA				MED RNG DATA			
LPE																
MEPH																
CVTE																
NOTES:	◆ KU BAND INHIBIT (30 MIN)				◆ SAMS 2 REC DEACT				◆ QUELD 9, 14 (20+45 MIN)				◆ MOONSET			
													◆ DSO 478 LBNP			
													◆ DSO 618 INTENSE EXERCISE			
													◆ ACOUSTICAL DOSIMETER (STEP 3)			
													◆ DSO 478 LBNP			
													◆ MOONSET			
													◆ DSO 478 LBNP			
													◆ QUELD 15, 39 (25+30 MIN)			

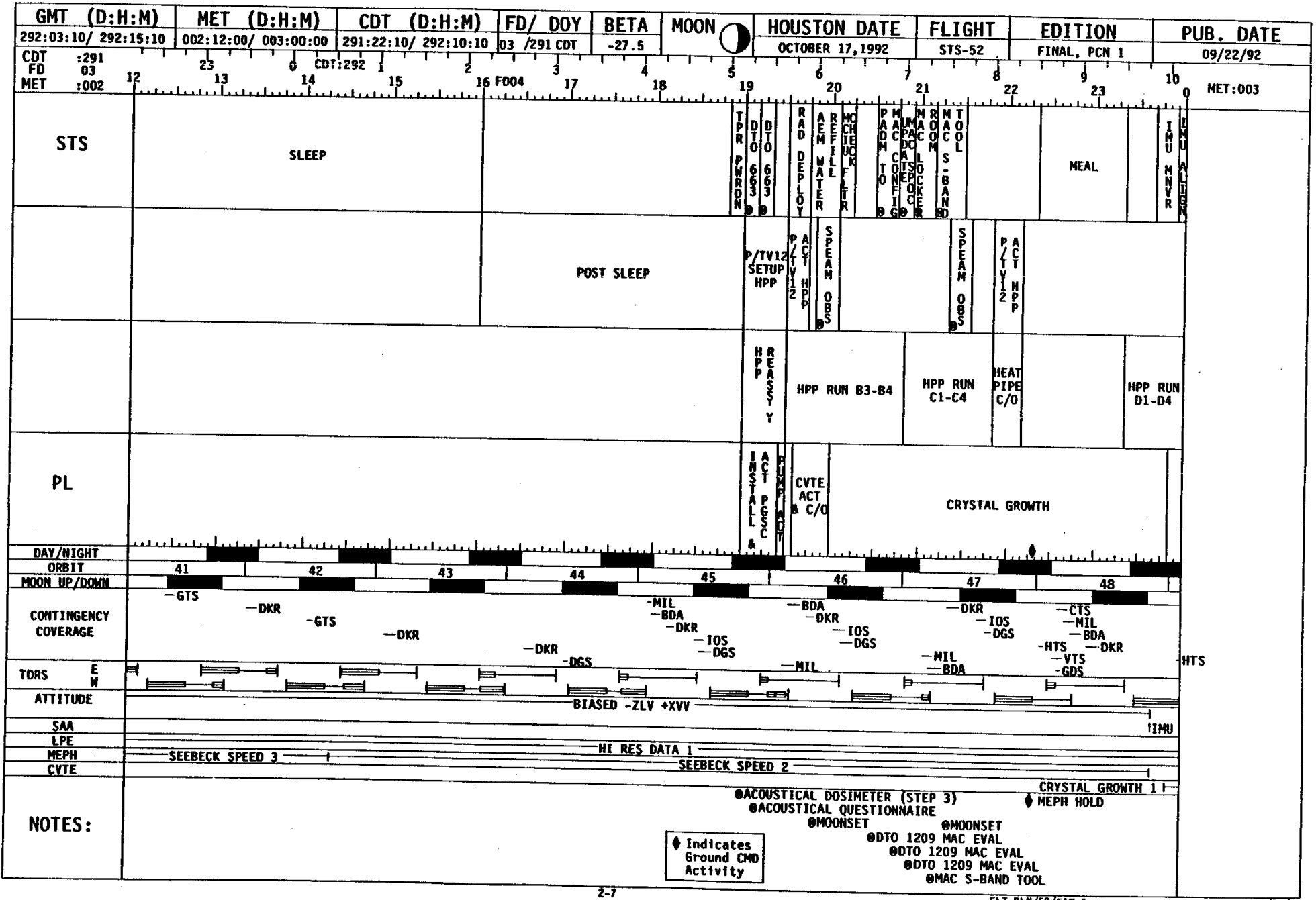
◆ Indicates Ground CMD Activity

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
291:15:10 / 292:03:10	002:00:00 / 002:12:00	291:10:10 / 291:22:10	03 / 291 CDT	-29.0		OCTOBER 17, 1992	STS-52	FINAL, PCN 1	09/22/92
CDT :291 FD :03 MET :002									
STS	MEAL								SLEEP
PL									
DAY/NIGHT									
ORBIT									
MOON UP/DOWN									
CONTINGENCY COVERAGE									
TDRS									
ATTITUDE									
SAA									
LPE									
MEPH									
CVTE									
NOTES:									

@DSO 478 LBNP  
 @RMS HTR ACT/MCIU FILTER CK  
 @QUELD 16,19 (10+120 MIN)  
 @DSO 478 LBNP  
 ♦ MEPH HOLD  
 @DSO 478 LBNP  
 @DSO 478 LBNP

ACTIVATION HAS NOT YET OCCURRED  
 @MAC S-BAND TOOL ♦ MEPH RESTART (SPEED 4)  
 @QUELD 26,36 (20+90 MIN)  
 @DTO 1209 MAC EVAL  
 @DTO 1209 MAC EVAL  
 @ACOUSTICAL DOSIMETER (STEPS 3-4)  
 ♦ SAMS-2 REC ACT  
 @BIASED -ZLV, +XVV

♦ Indicates  
 Ground CMD  
 Activity

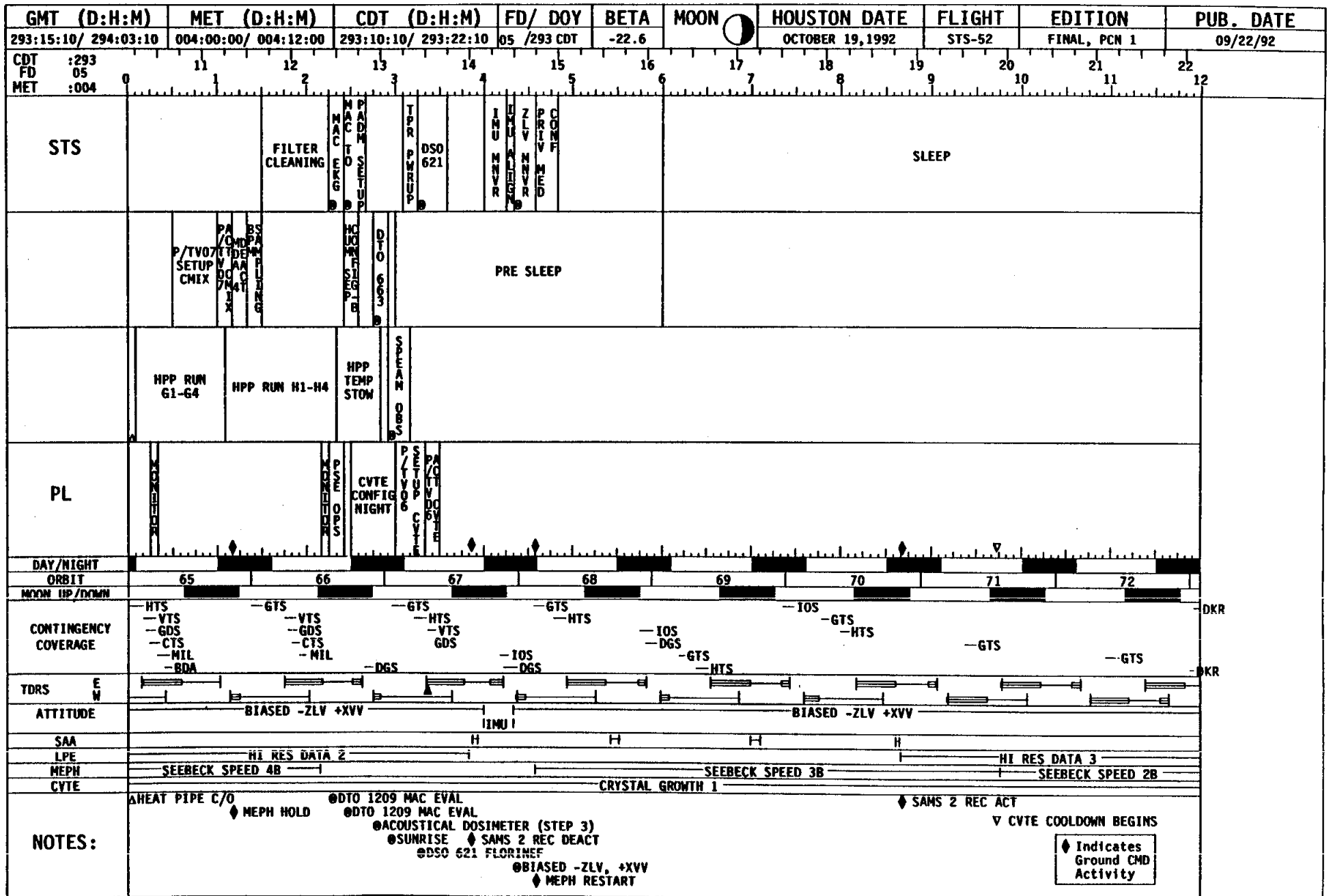




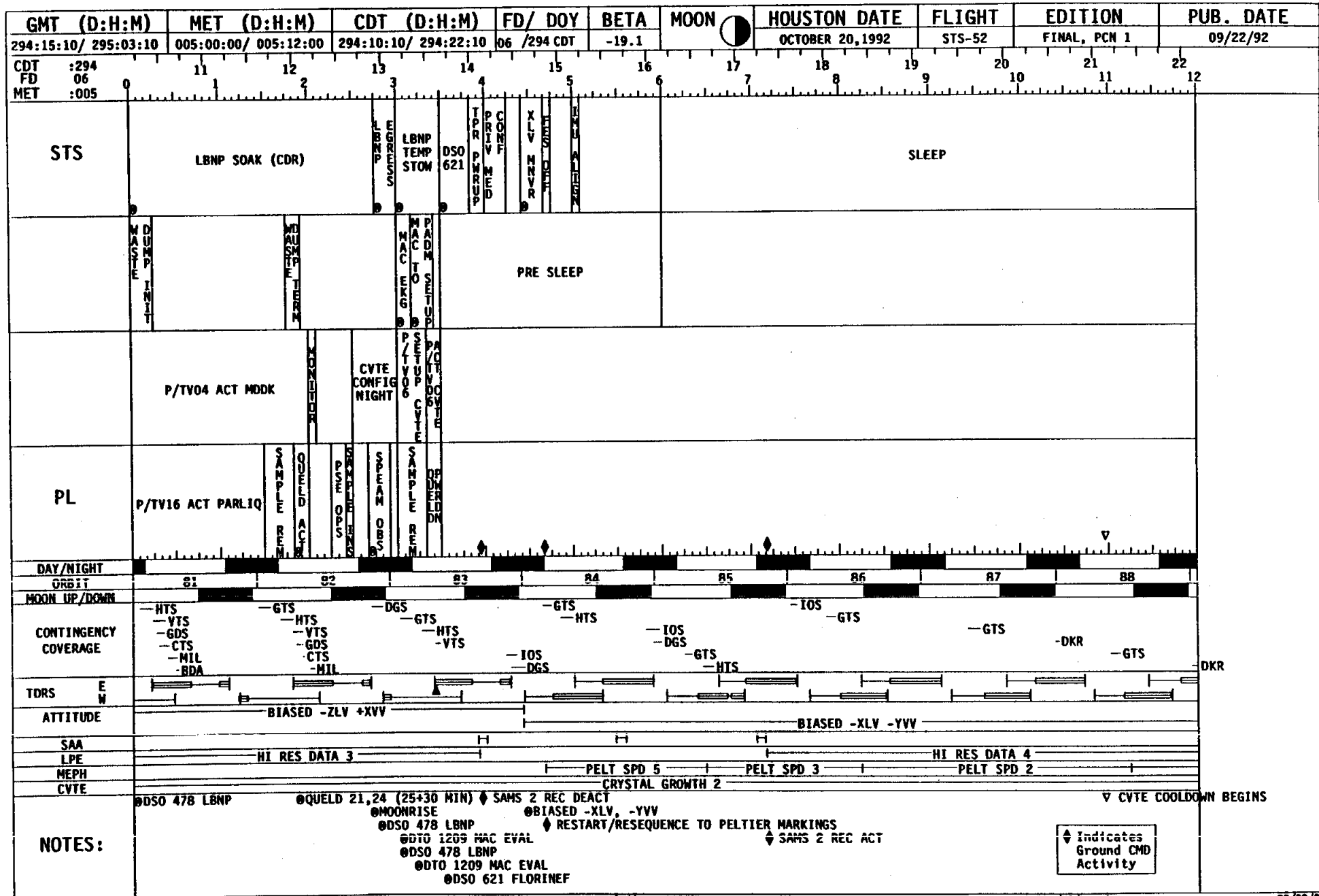


GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
293:03:10/ 293:15:10	003:12:00/ 004:00:00	292:22:10/ 293:10:10	04 /292 CDT	-24.3		OCTOBER 18, 1992	STS-52	FINAL, PCN 1	09/22/92								
CDT :292	FD :04	MET :003	12	23	0	CDT:293	1	2	3	4	5	6	7	8	9	10	MET:004
STS	SLEEP																
PL																	
DAY/NIGHT																	
ORBIT	57	58	59	60	61	62	63	64									
MOON UP/DOWN																	
CONTINGENCY COVERAGE	-GTS	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS																	
ATTITUDE																	
SAA																	
LPE																	
MEPH																	
CVTE																	
NOTES:																	

◆ Indicates Ground CMD Activity







Indicates Ground CMD Activity

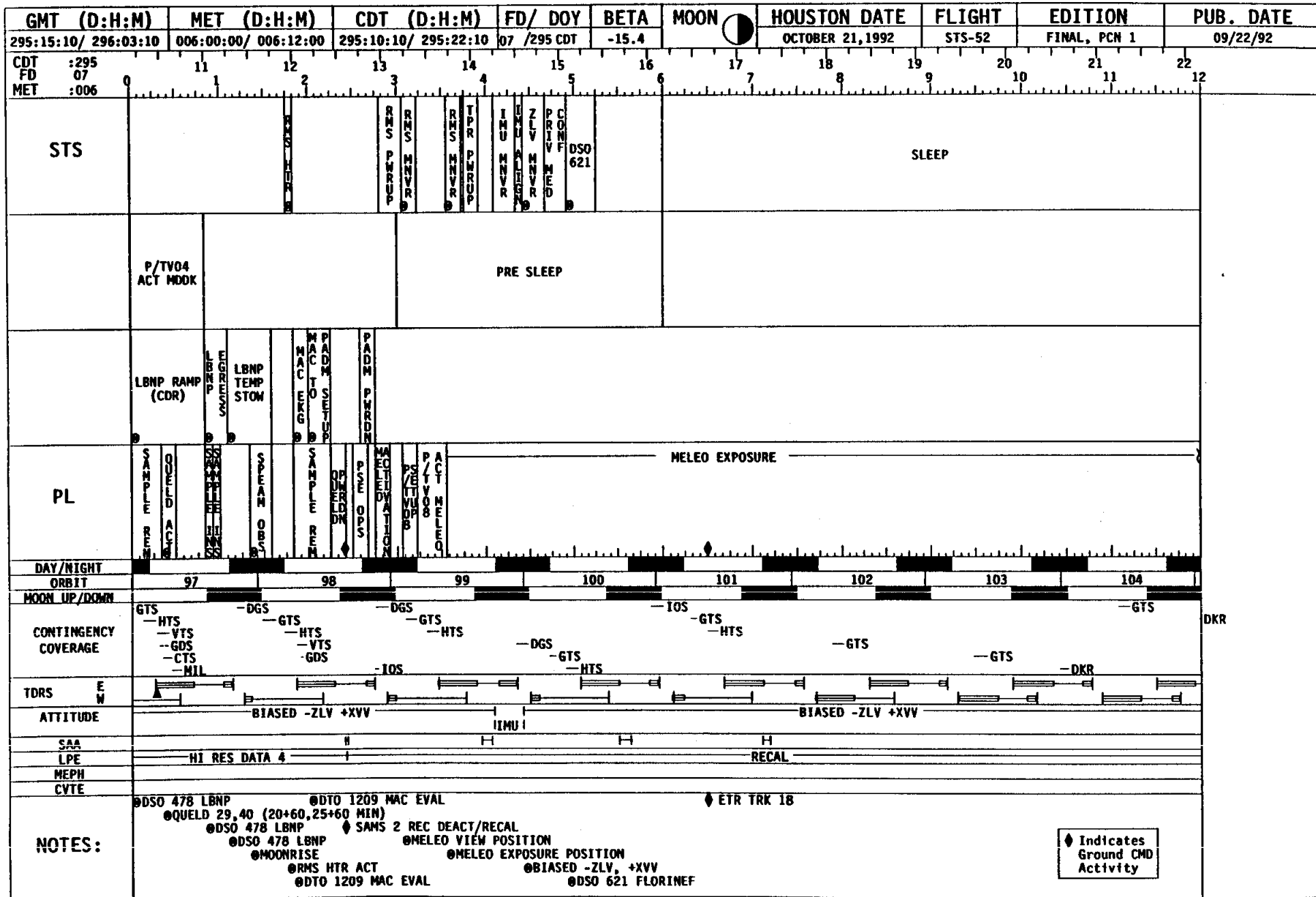
GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
295:03:10/ 295:15:10	005:12:00/ 006:00:00	294:22:10/ 295:10:10	06 /294 CDT	-17.3		OCTOBER 20, 1992	STS-52	FINAL, PCN 1	09/22/92					
CDT :294 FD :06 MET :005	23	0	CDT:295	1	2	3	4	5	6	7	8	9	10	MET:006
STS	SLEEP													
PL														
DAY/NIGHT														
ORBIT	89	90	91	92	93	94	95	96						
MOON UP/DOWN														
CONTINGENCY COVERAGE	-DKR -GTS	-DKR	-DKR -DGS	-DKR -DGS -MIL	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA	-DKR -DGS -MIL -BDA
TDRS														
ATTITUDE														
SAALPE														
MEPH														
CVTE														
NOTES:														

◆ Indicates Ground CMD Activity

CRYSTAL GROWTH 2  
 @BIASED -ZLV, +XVV  
 @DSO 621 FLORINEF (15+90, 10+120 MIN)  
 @QUELD 8,37  
 @DTO 1209 MAC EVAL  
 @DSO 478 LBNP  
 @CVTE CAMCORDER REMOVAL  
 @DTO 1209 MAC EVAL  
 @DSO 478 LBNP

MOONRISE  
 MEPH EXP SHUTDOWN  
 @SUNRISE @SUNSET  
 @DSO 478 LBNP  
 @DTO 663 ACOUSTICAL DOSIMETER  
 @QUELD 13,33 (15+60, 20+45 MIN)  
 @DSO 478 LBNP

@SUNSET

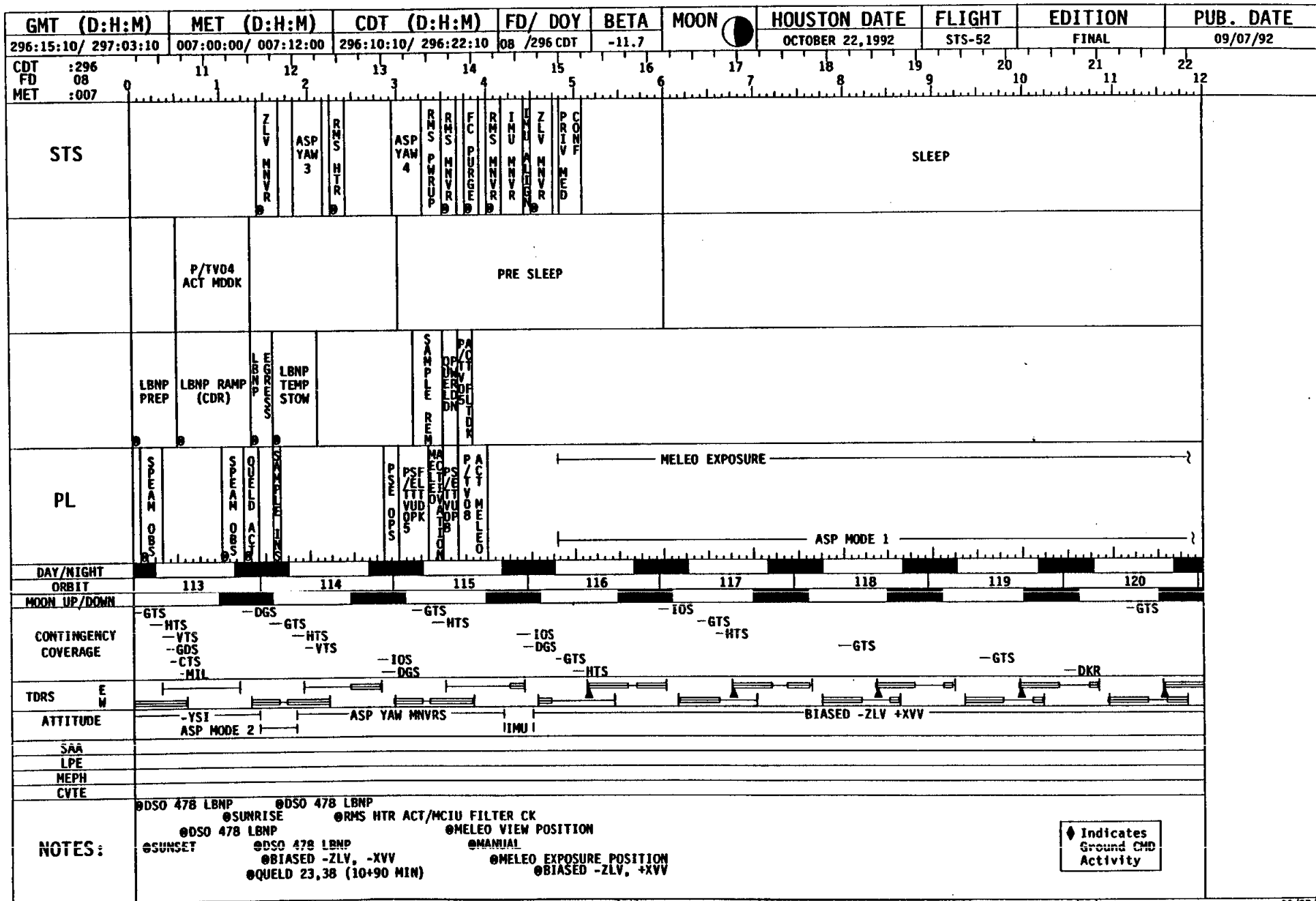


♦ Indicates Ground CMD Activity

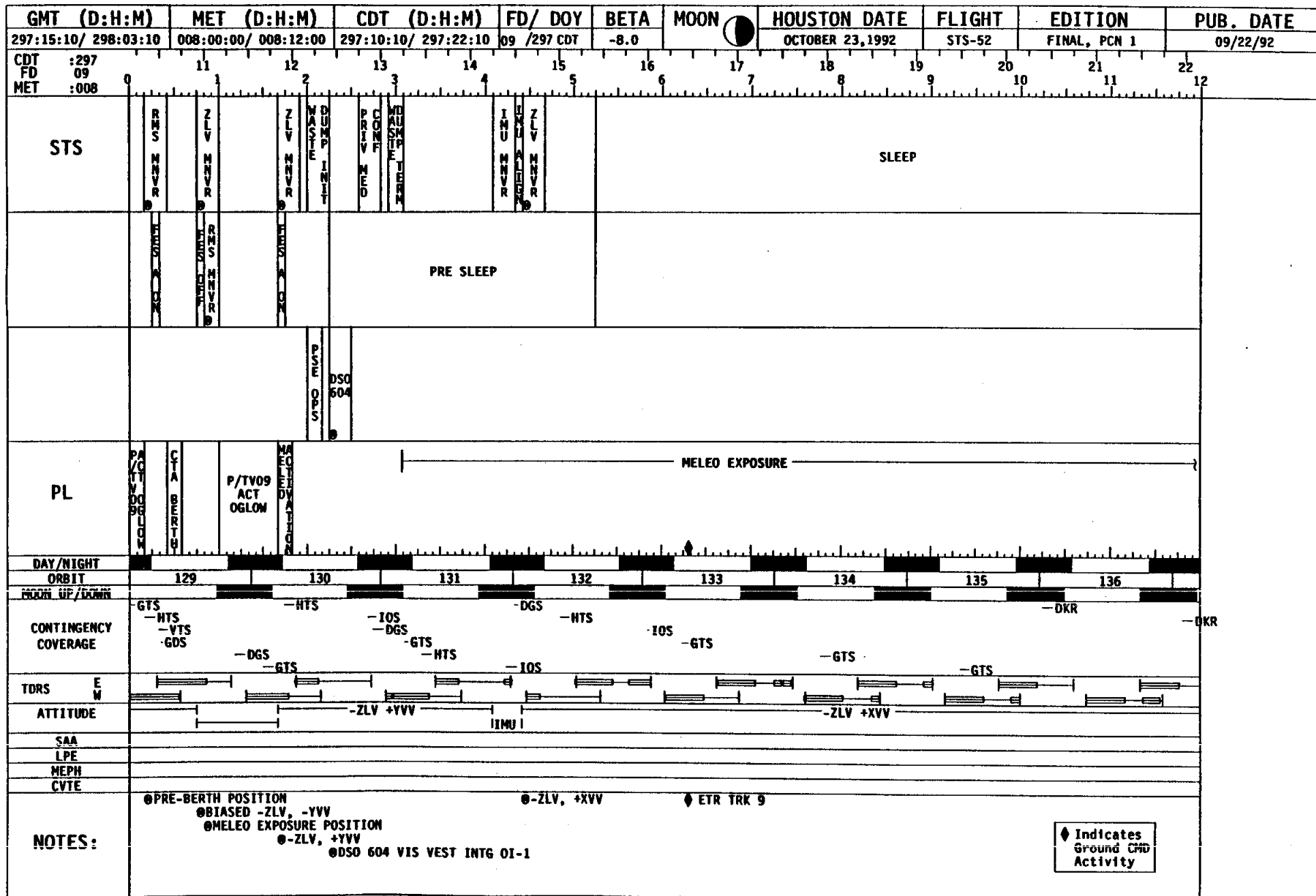
GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
296:03:10/ 296:15:10	006:12:00/ 007:00:00	295:22:10/ 296:10:10	07 /295 CDT	-13.6		OCTOBER 21, 1992	STS-52	FINAL	09/07/92								
CDT :295	23	0	CDT:296	1	2	3	4	5	6	7	8	9	10	MET:007			
FD 07	12	13	14 FD08	15	16	17	18	19	20	21	22	23	0				
MET :006																	
STS	SLEEP		DSO 621	IMU	ZLV	TPRR	DSO 623	STOW	RMS	ZLV	PADM	ASP YAW 1	ASP YAW 2	YSI	CAUD/TVCK	MEAL	CREW CONF
							P/TVO4 SETUP MDDK	P/TVO4 ACT MDDK	RAD STOW	MELECOT		P/TVO4 ACT MDDK		P/TV14 SETUP CONF	PACT/V14		PACT CONF
							LBNP PREP	LBNP RAMP (PLT)	LBNP PREP	LBNP RAMP (MS2)							
PL		MELEO EXPOSURE					SVS-4 CHAR TEST										
DAY/NIGHT																	
ORBIT	105	106	107	108	109	110	111	112									
MOON UP/DOWN																	
CONTINGENCY COVERAGE	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS																	
ATTITUDE		BIASED -ZLV +XVV															
SA																	
LPE																	
MEPH																	
CVTE																	
NOTES:																	


◆ Indicates Ground CMD Activity





GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
297:03:10 / 297:15:10	007:12:00 / 008:00:00	296:22:10 / 297:10:10	08 / 296 CDT	-9.9		OCTOBER 22, 1992	STS-52	FINAL, PCN 1	09/22/92					
CDT :296	23	0	CDT:297	1	2	3	4	5	6	7	8	9	10	MET:008
FD 08	12	13	14 FD09	15	16	17	18	19	20	21	22	23	0	
MET :007														
STS	SLEEP													
PL														
DAY/NIGHT														
ORBIT	121	122	123	124	125	126	127	128						
MOON UP/DOWN														
CONTINGENCY COVERAGE	-DKR	-DKR	-DGS	-MIL -BDA -DKR	-MIL -BDA -DKR	-VTS -GDS -CTS -MIL -BDA -DKR	-HTS -DKR	-GTS -HTS -GDS -CTS	-MIL					GTS
TDRS														
ATTITUDE	BIASED -ZLV +XVV				+ZLV -YVV						OMS		-ZLV -YVV	
SAA														
LPE														
MEPH														
CVTE														
NOTES:														



GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON 	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
298:03:10/ 298:15:10	008:12:00/ 009:00:00	297:22:10/ 298:10:10	09 /297 CDT	-6.1		OCTOBER 23, 1992	STS-52	FINAL, PCN 1	09/22/92					
CDT :297	23	0	CDT:298	1	2	3	4	5	6	7	8	9	10	MET:009
FD 09	12	13	FD10	14	15	16	17	18	19	20	21	22	23	
MET :008														
STS	SLEEP									FCS C/O		MEAL		FAN SEP STOW
PL	MELEO EXPOSURE													
DAY/NIGHT														
ORBIT	137	138	139	140	141	142	143	144	145					
MOON UP/DOWN														
CONTINGENCY COVERAGE														
TDRS														
ATTITUDE														
SAA														
LPE														
MEPH														
CVTE														
NOTES:														





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DETAILED TIMELINE

DETAILED  
TIMELINE









# STS-52 (FD 01)

STS

PL

MCC

MET DAY 000

08:00  
A1(B1)  
AUTO/VERN

ORB 7

09:00

ORB 8

11:00

ORB 9

12:00

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

Do not perform  
SUPPLY WATER DUMP

SLEEP

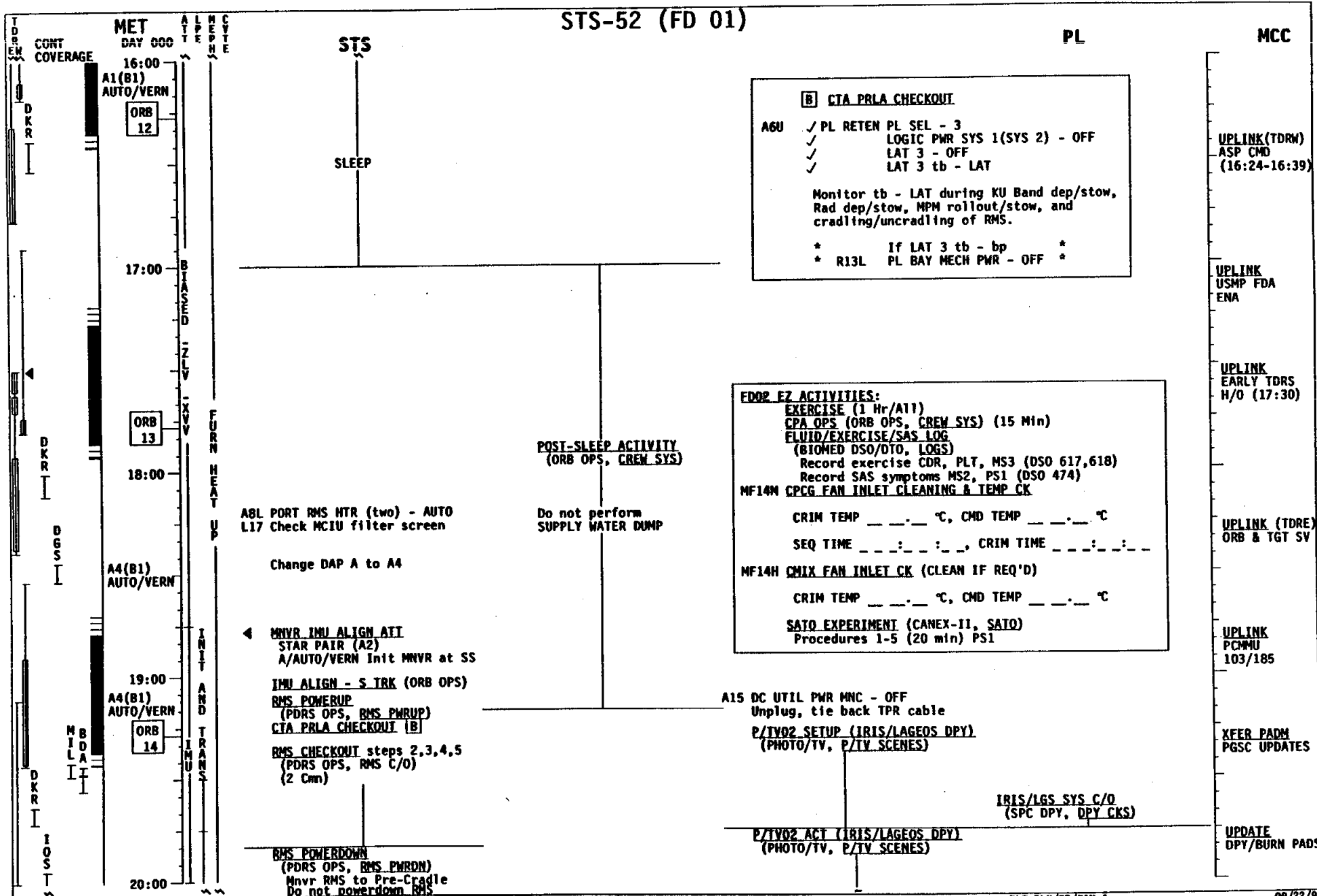
UPLINK  
USMP FDA  
INH

UPLINK (TDRW)  
ASP CMD  
(9:02-9:17)

UPLINK (TDRW)  
ASP CMD  
(10:50-11:10)



STS-52 (FD 01)



**MET**  
DAY 000

16:00  
A1(B1)  
AUTO/VERN  
ORB 12

17:00

ORB 13

18:00

A4(B1)  
AUTO/VERN

19:00  
A4(B1)  
AUTO/VERN

ORB 14

20:00

**STS**

SLEEP

POST-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

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

Do not perform  
SUPPLY WATER DUMP

Change DAP A to A4

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

IMU ALIGN - S TRK (ORB OPS)

RMS POWERUP  
(PDRS OPS, RMS PWRUP)

CTA PRLA CHECKOUT [B]

RMS CHECKOUT steps 2,3,4,5  
(PDRS OPS, RMS C/O)  
(2 Cmn)

RMS POWERDOWN  
(PDRS OPS, RMS PWRDN)  
Mnvr RMS to Pre-Cradle  
Do not powerdown RMS

**PL**

**[B] CTA PRLA CHECKOUT**

- AGU / PL RETEN PL SEL - 3
- / LOGIC PWR SYS 1(SYS 2) - OFF
- / LAT 3 - OFF
- / LAT 3 tb - LAT

Monitor tb - LAT during KU Band dep/stow,  
Rad dep/stow, MPM rollout/stow, and  
cradling/uncradling of RMS.

- \* If LAT 3 tb - bp \*
- \* R13L PL BAY MECH PWR - OFF \*

**FLOOR E2 ACTIVITIES:**

- EXERCISE (1 Hr/AT1)
- CPA OPS (ORB OPS, CREW SYS) (15 Min)
- FLUID/EXERCISE/SAS LOG  
(BIOMED DSO/DTO, LOGS)  
Record exercise CDR, PLT, MS3 (DSO 617,618)  
Record SAS symptoms MS2, PS1 (DSO 474)
- MF14M CPCG FAN INLET CLEANING & TEMP CK

CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C

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

MF14H CHIX FAN INLET CK (CLEAN IF REQ'D)

CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C

SATO EXPERIMENT (CANEX-II, SATO)  
Procedures 1-5 (20 min) PS1

A15 DC UTIL PWR MNC - OFF  
Unplug, tie back TPR cable

P/TV02 SETUP (IRIS/LAGEOS DPY)  
(PHOTO/TV, P/TV SCENES)

IRIS/LGS SYS C/O  
(SPC DPY, DPY CKS)

P/TV02 ACT (IRIS/LAGEOS DPY)  
(PHOTO/TV, P/TV SCENES)

**MCC**

UPLINK (TDRW)  
ASP CMD  
(16:24-16:39)

UPLINK  
USMP FDA  
ENA

UPLINK  
EARLY TDRS  
H/O (17:30)

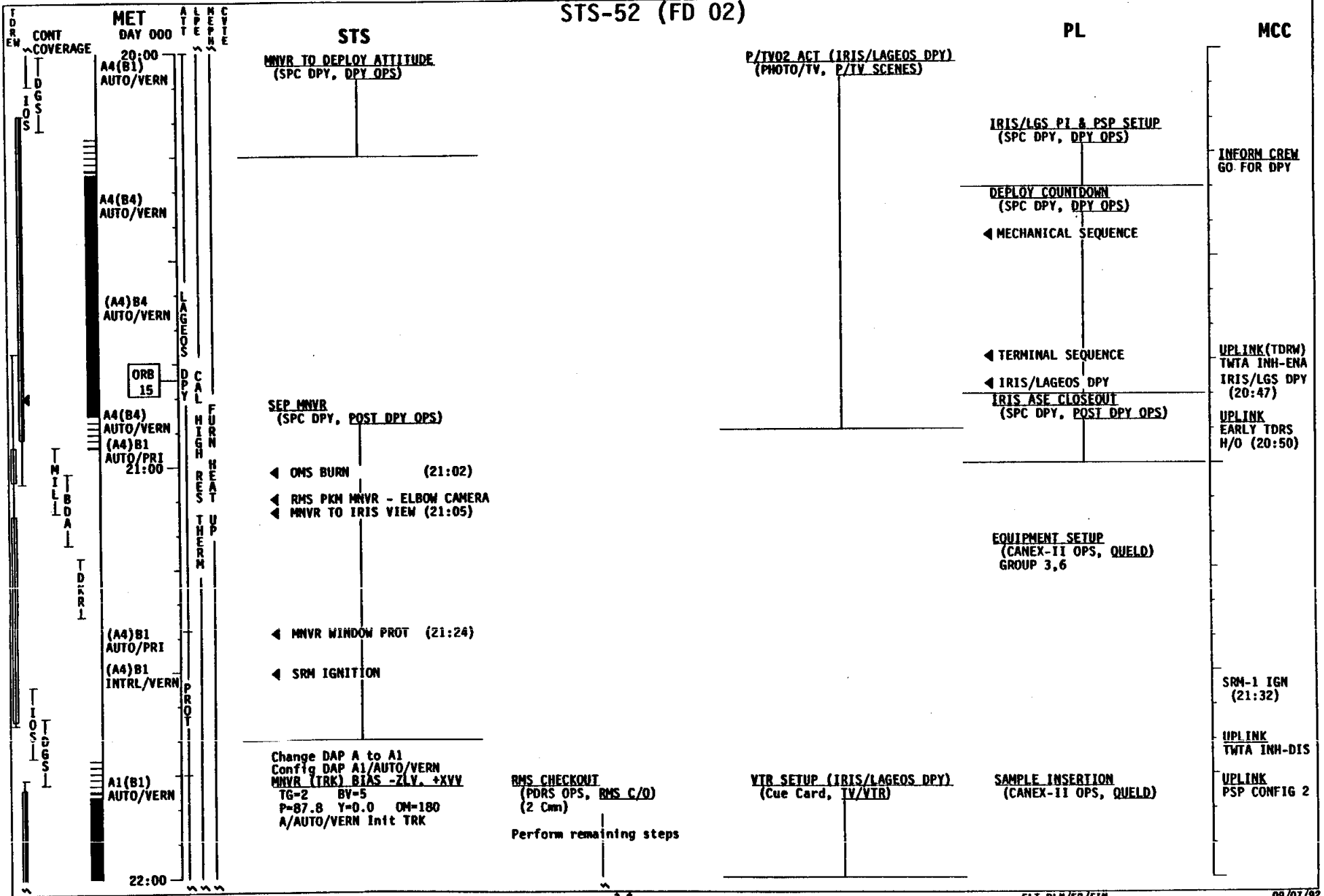
UPLINK (TDRE)  
ORB & TGT SV

UPLINK  
PCM/U  
103/185

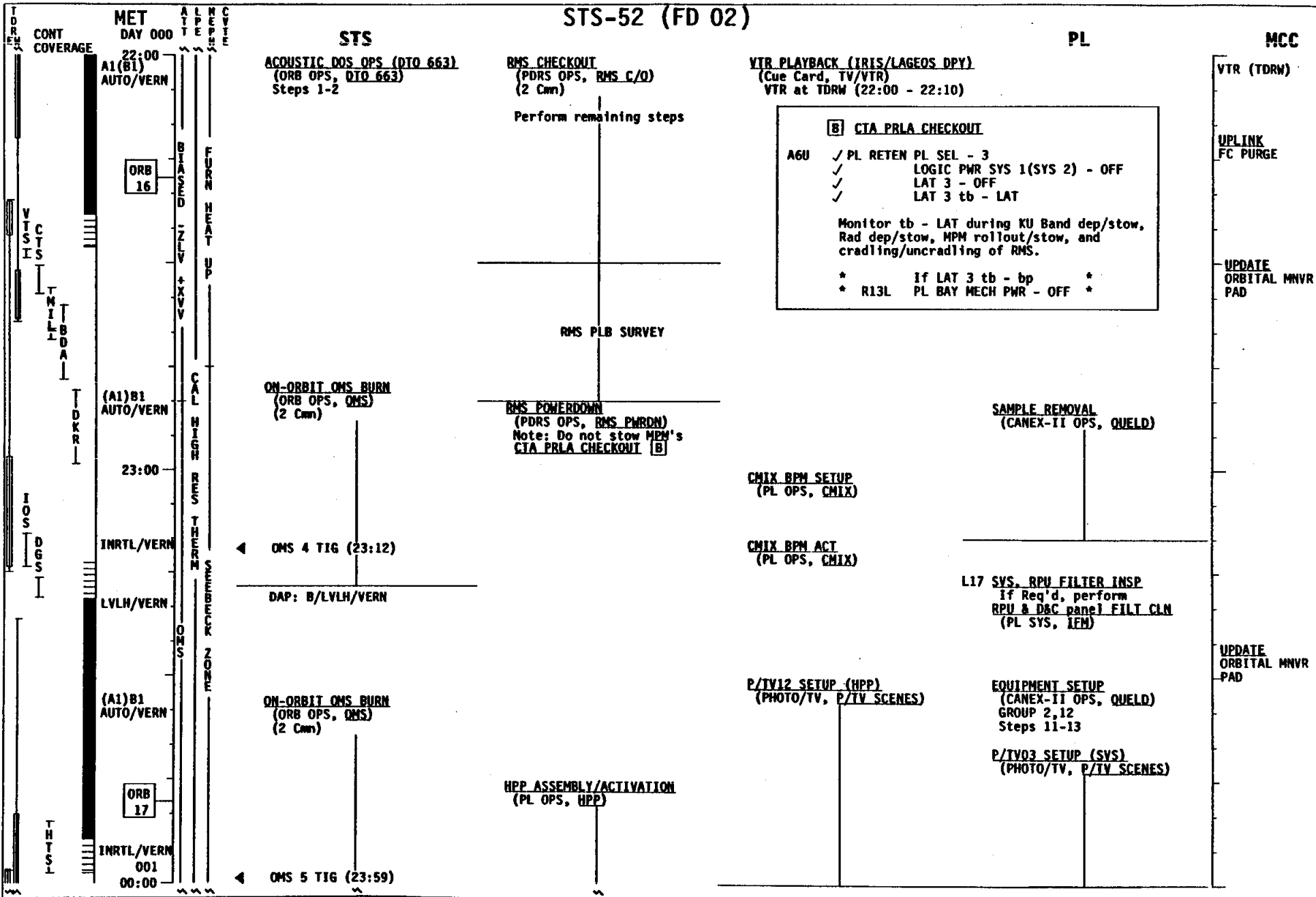
KFER PADM  
PGSC UPDATES

UPDATE  
DPY/BURN PADS

# STS-52 (FD 02)



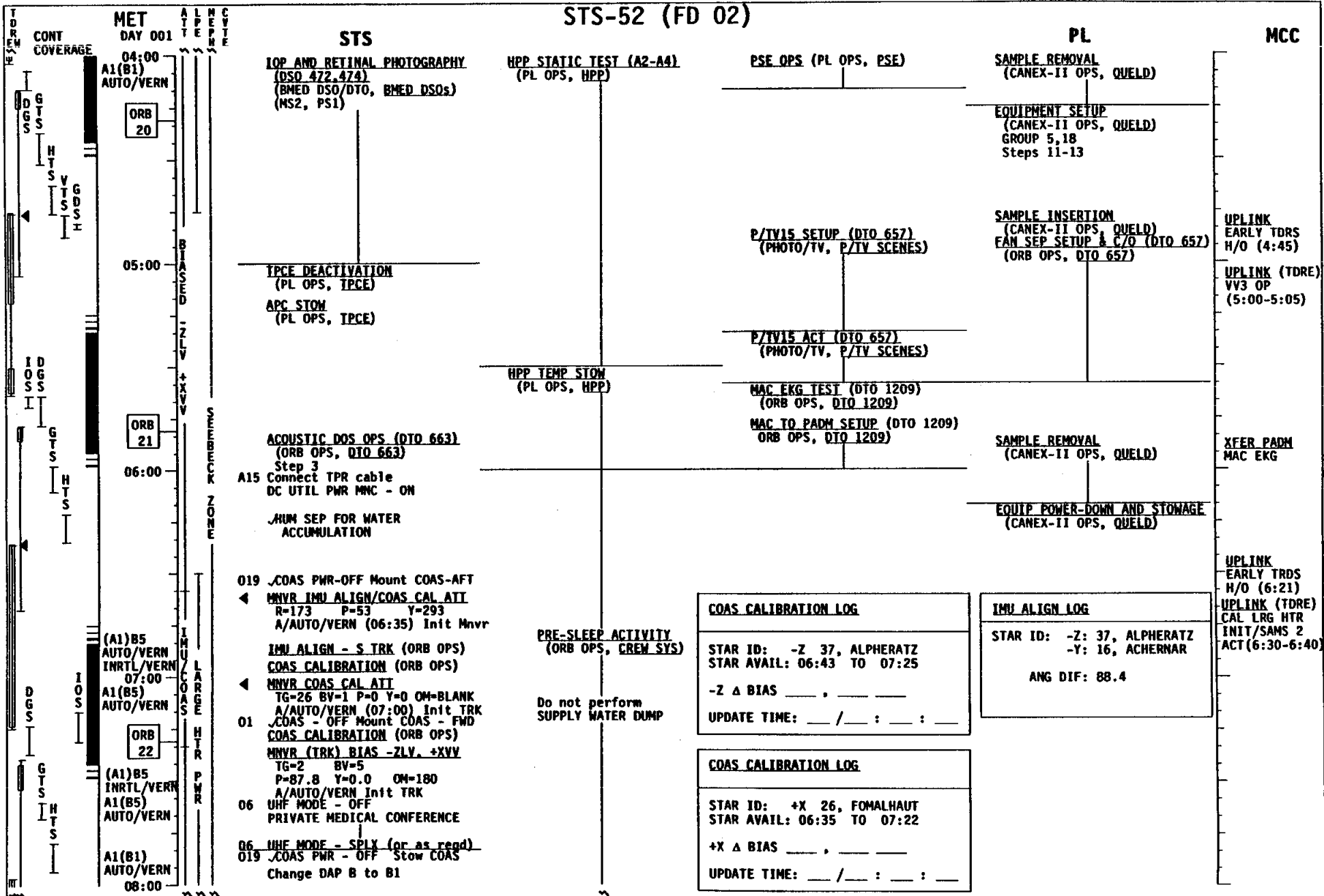
# STS-52 (FD 02)

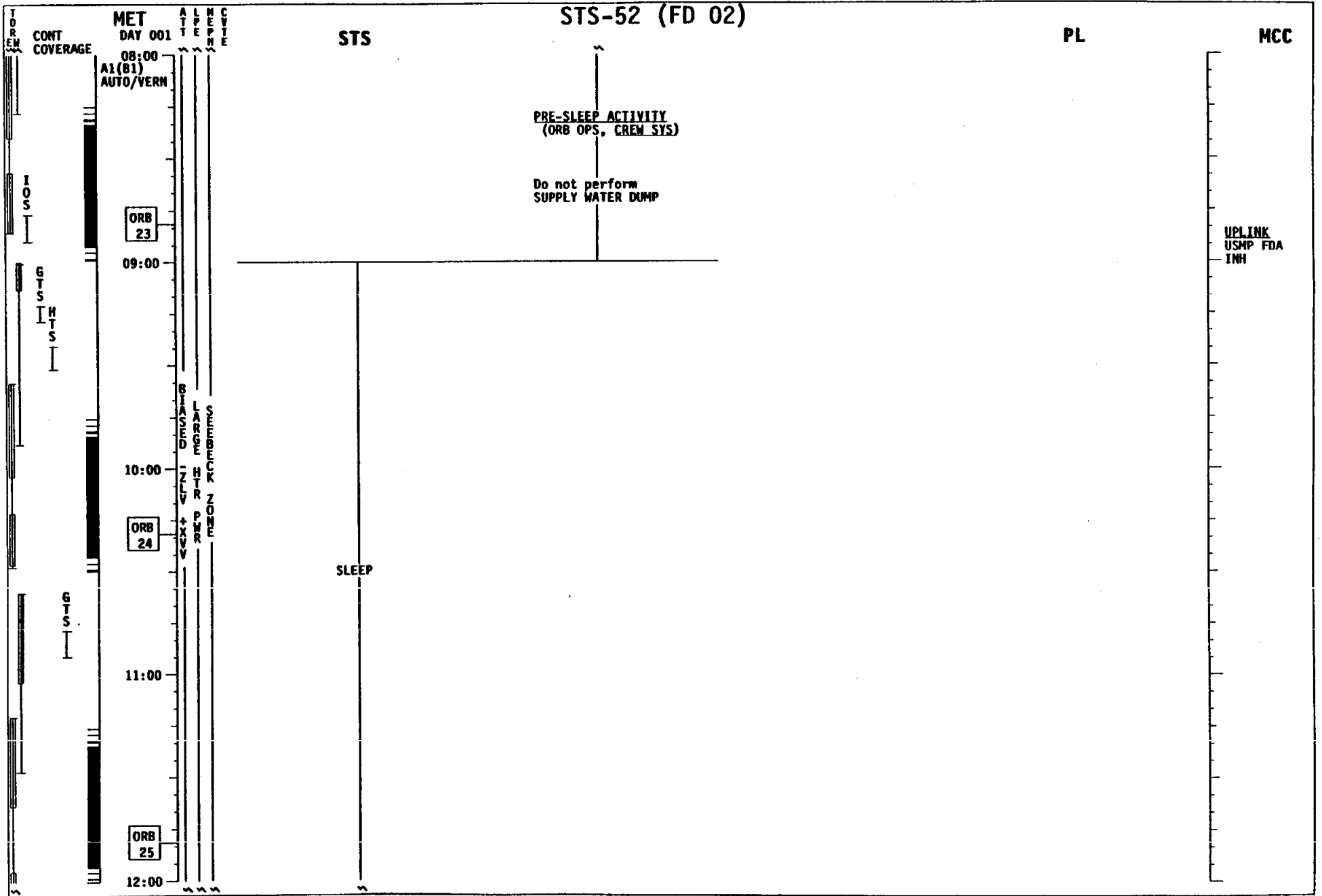






# STS-52 (FD 02)

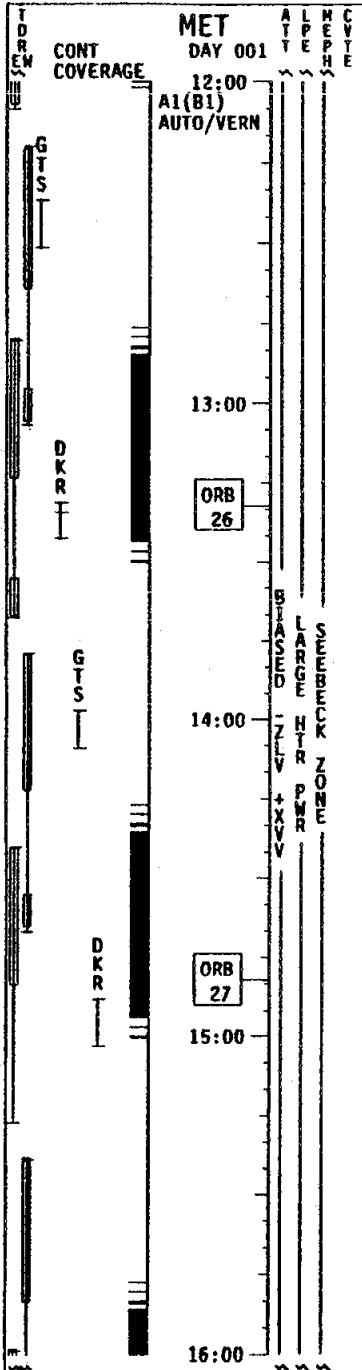




# STS-52 (FD 02)

PL

MCC



UPLINK  
KU-STANDBY  
(12:15-12:45)

STS-52 (FD 02)

PL

MCC

**MET DAY 001**  
**16:00**  
**A1(B1)**  
**AUTO/VERN**

**ORB 28**

**17:00**

**ORB 29**

**18:00**

**ORB 30**

**19:00**

**20:00**

CONT COVERAGE  
 D K R R  
 B O A D  
 I O O S G S  
 M I L D A  
 D K R R

L P P E  
 M E P H E  
 C V T E  
 L A R G E  
 H T R  
 P W R  
 S U B B A C K  
 Z O N E  
 W I D E  
 R N G  
 D A T A

STS  
 SLEEP

POST-SLEEP ACTIVITY  
 (ORB OPS, CREW SYS)

Do not perform  
 SUPPLY WATER DUMP

**FD03 EZ ACTIVITIES:**  
EXERCISE (1 Hr/AT1)  
CPA OPS (ORB OPS, CREW SYS) (15 Min)  
FLUID/EXERCISE/SAS LOG  
 (BIOMED DSO/DTO, LOGS)  
 Record exercise CDR, PLT, MS3 (DSO 617,618)  
 Record SAS symptoms MS2, PSI (DSO 474)  
MF14M CPG FAN INLET CLEANING & TEMP CK  
 CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C  
 SEQ TIME \_\_\_\_ : \_\_\_\_ : \_\_\_\_ , CRIM TIME \_\_\_\_ : \_\_\_\_ : \_\_\_\_  
MF14H CMIX FAN INLET CK (CLEAN IF REQ'D)  
 CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C  
SATO EXPERIMENT (CANEX-II, SATO)  
 Procedures 1-5 (20 min) PSI

EQUIPMENT SETUP  
 (CANEX-II OPS, QUELD)  
 GROUP 9,14

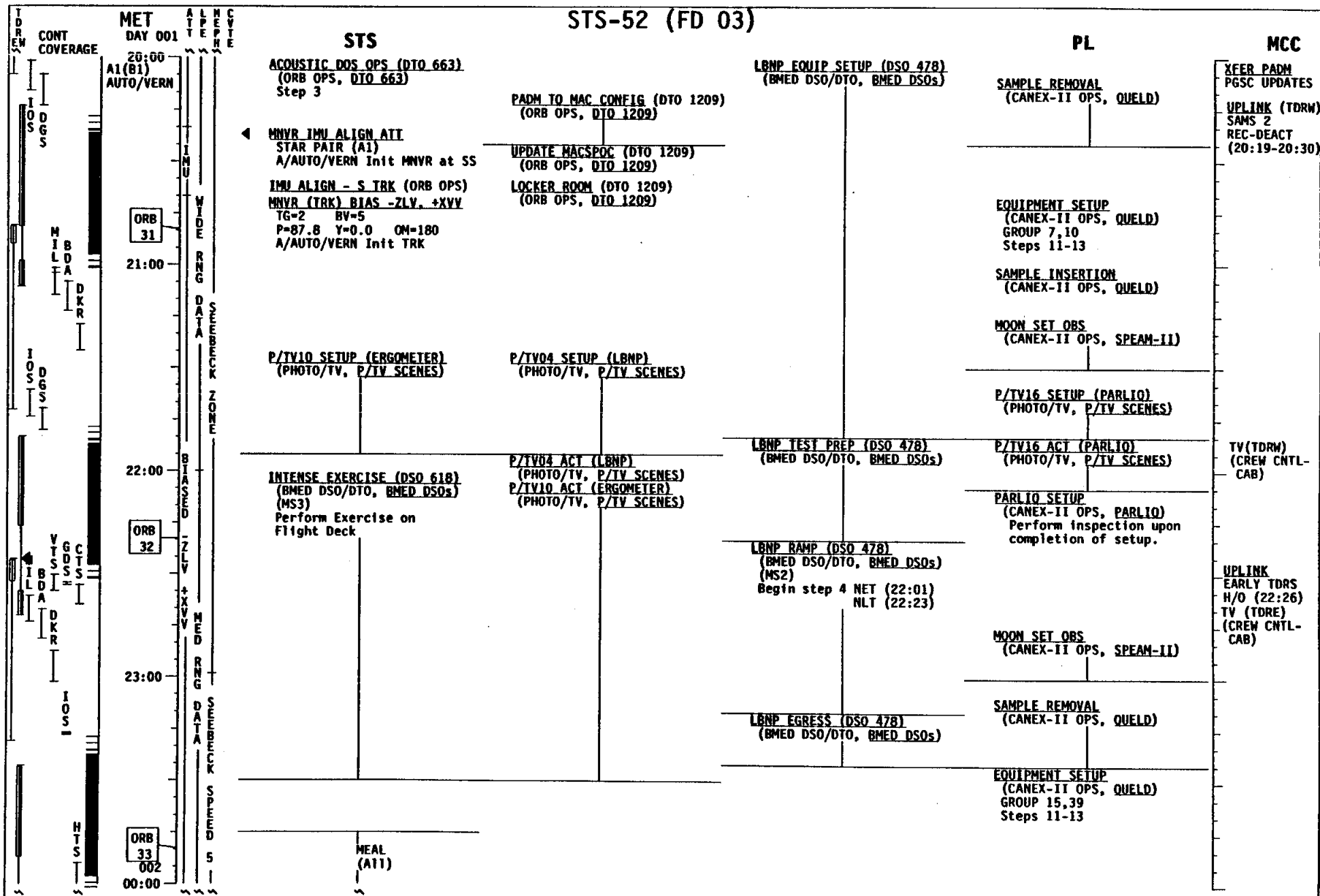
SAMPLE INSERTION  
 (CANEX-II OPS, QUELD)  
SUN RISE OBS  
 (CANEX-II OPS, SPEAM-II)

LBNP EQUIP SETUP (DSO 478)  
 (BMED DSO/DTO, BMED DSOs)

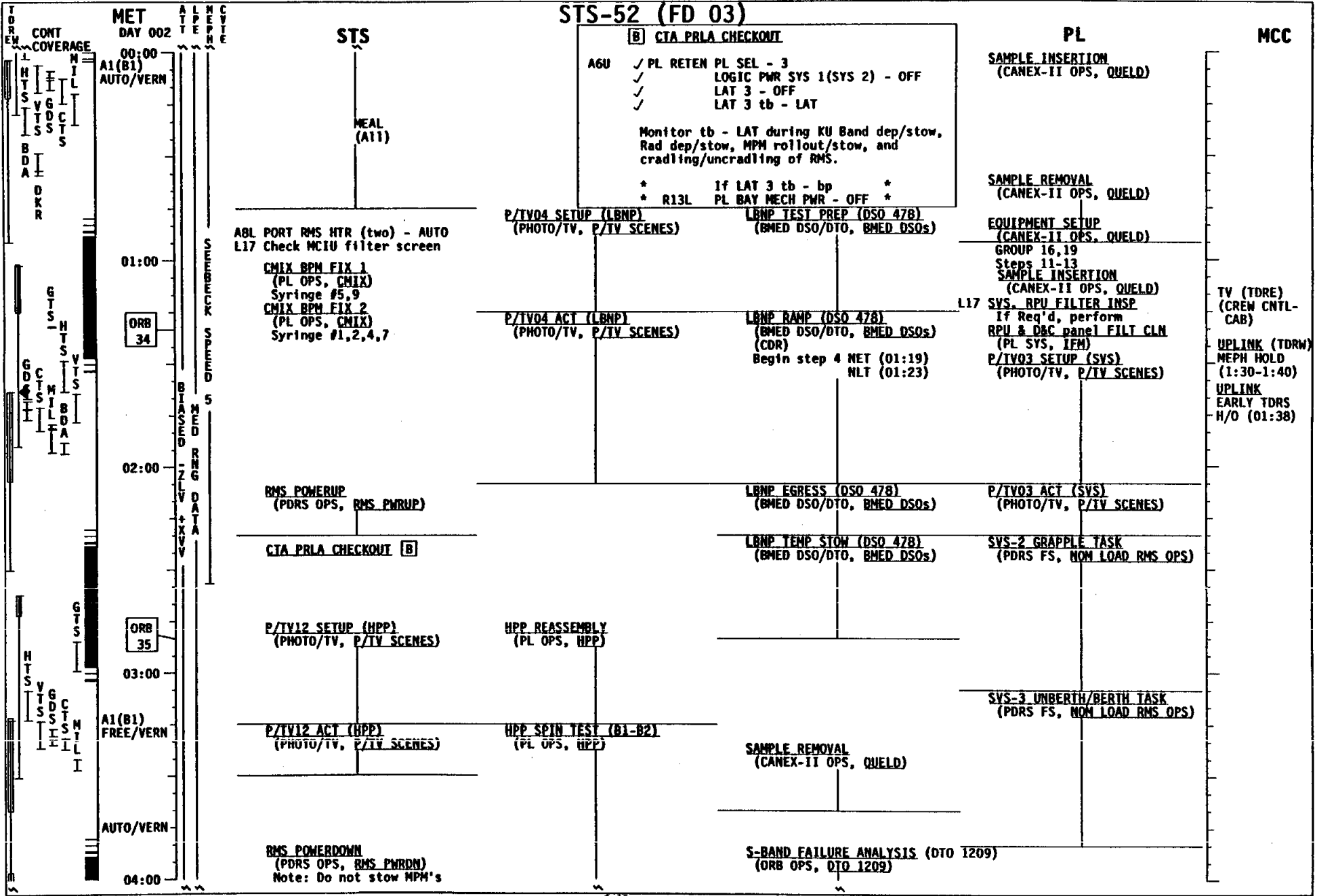
A15 DC UTIL PWR MNC - OFF  
 Unplug, tie back TPR cable

UPLINK (TORW)  
SAMS 2 REC  
DEACT  
 (17:00-17:10)  
UPLINK  
USMP FDA  
ENA

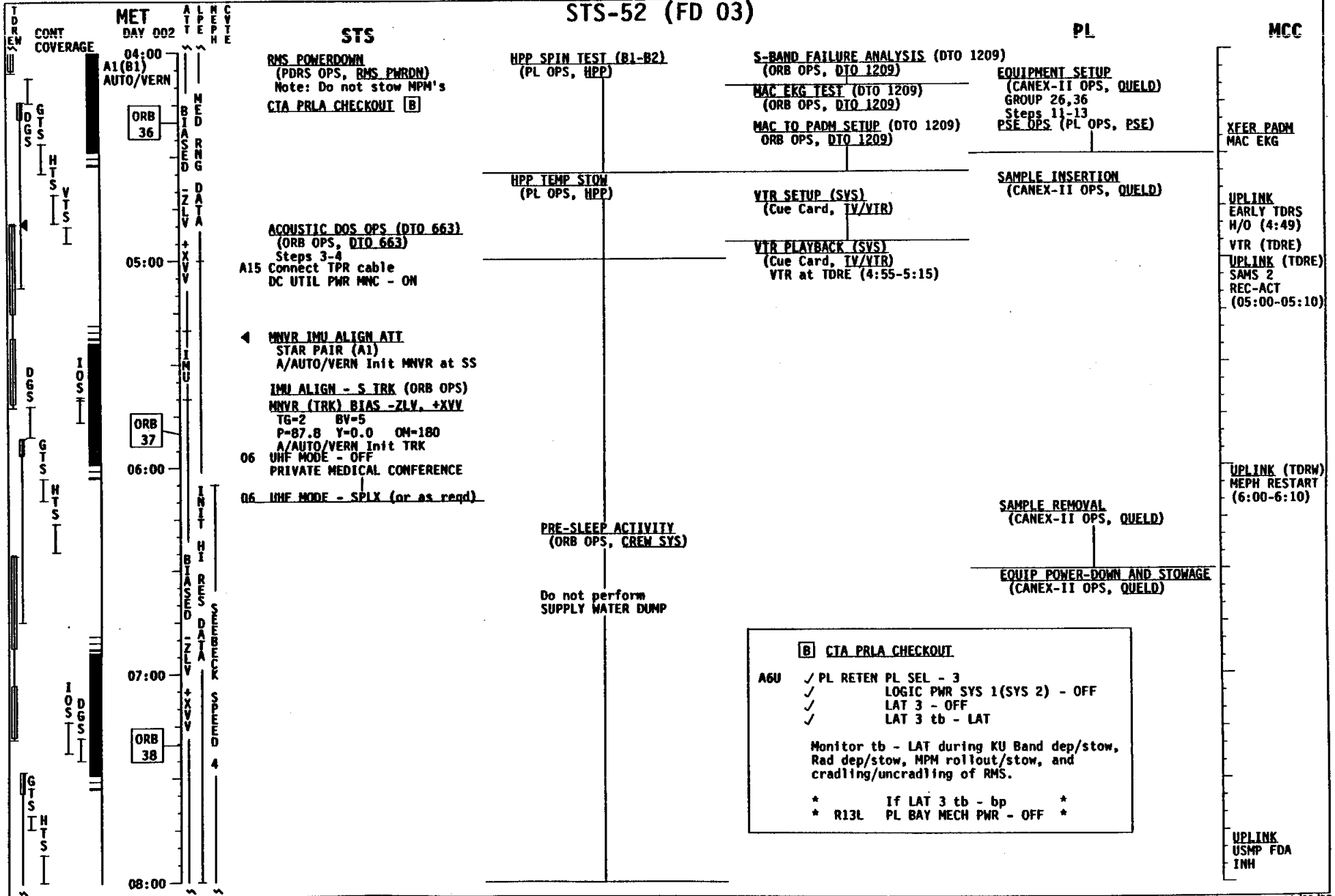
# STS-52 (FD 03)



# STS-52 (FD 03)

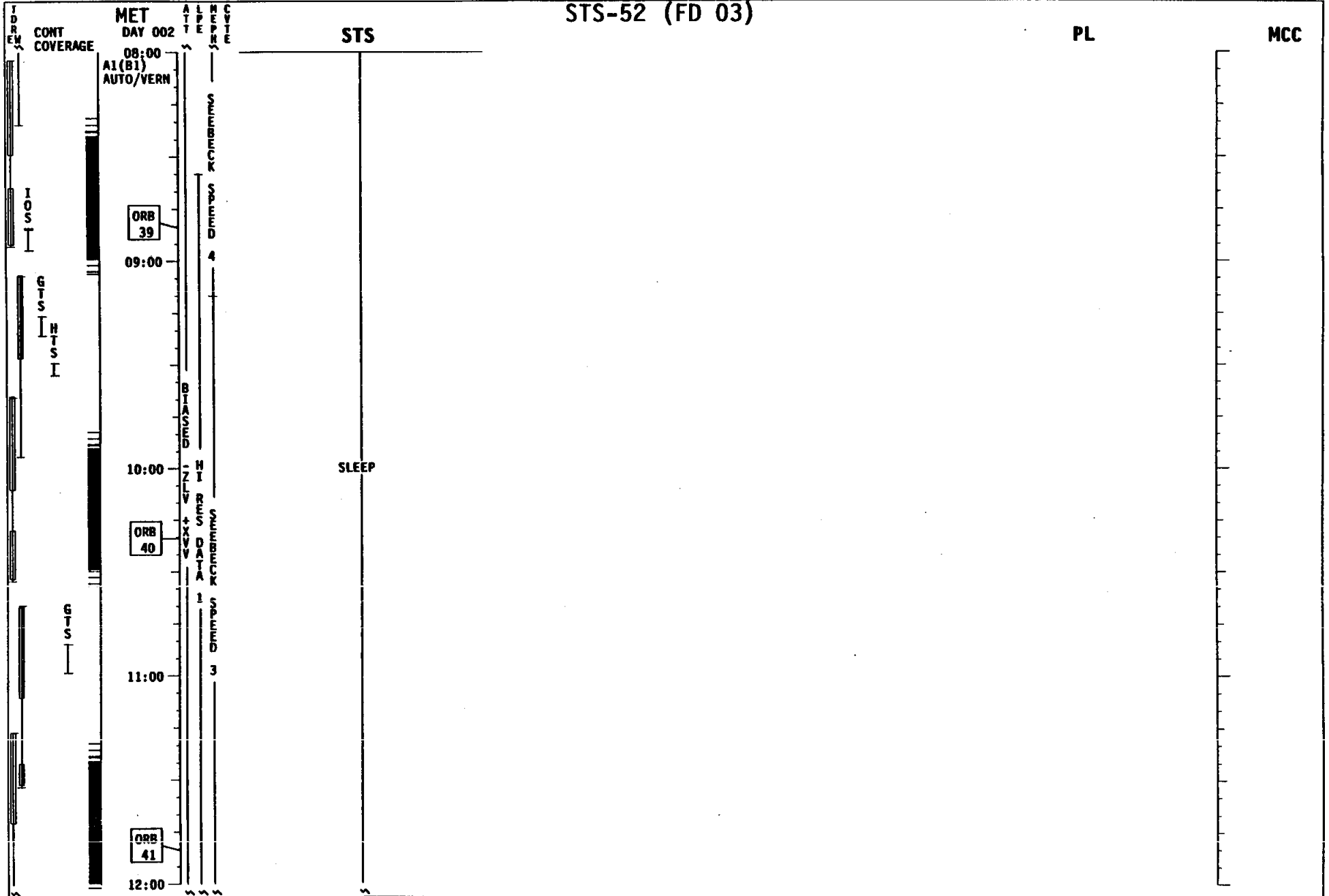


# STS-52 (FD 03)





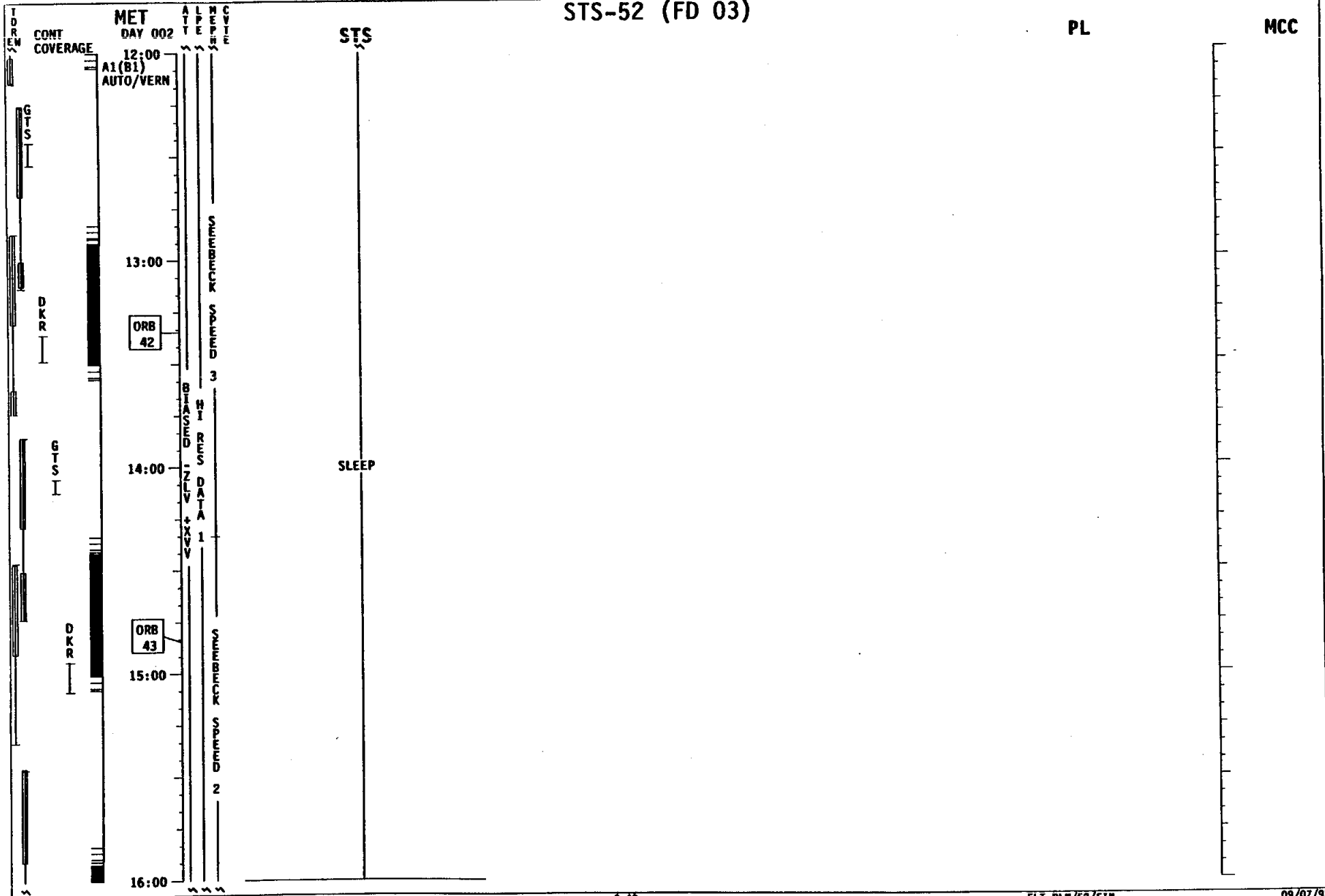
# STS-52 (FD 03)



# STS-52 (FD 03)

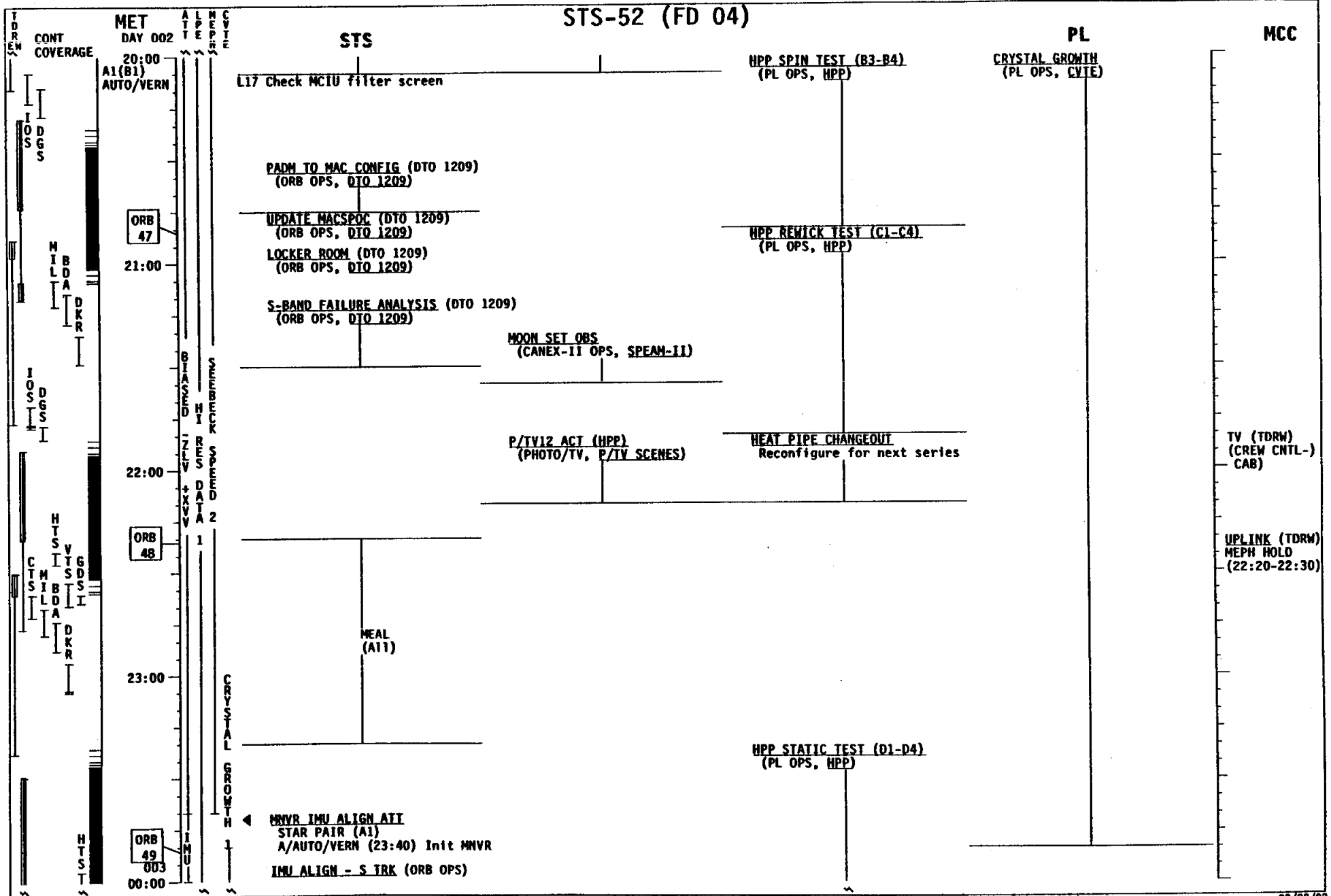
PL

MCC

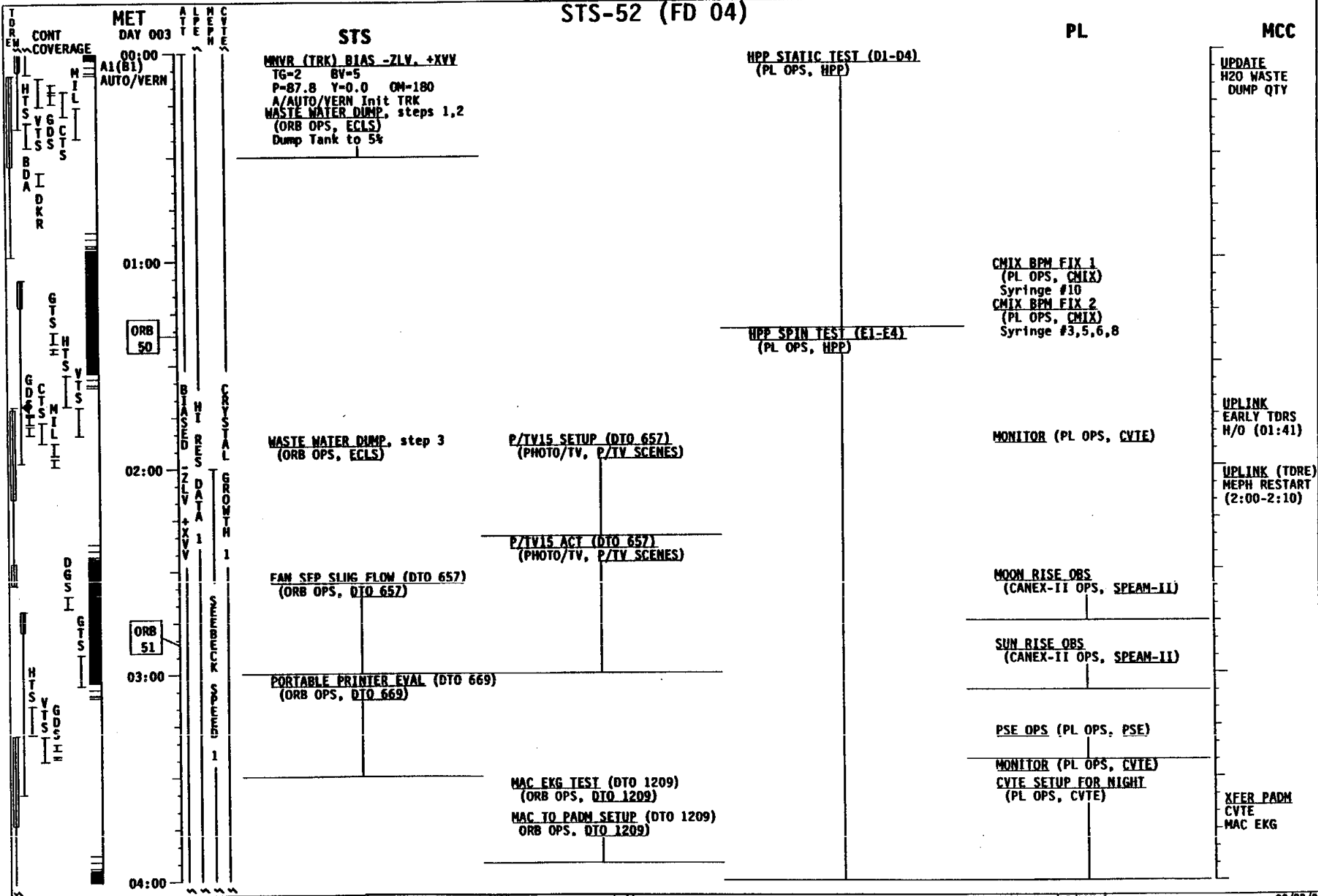




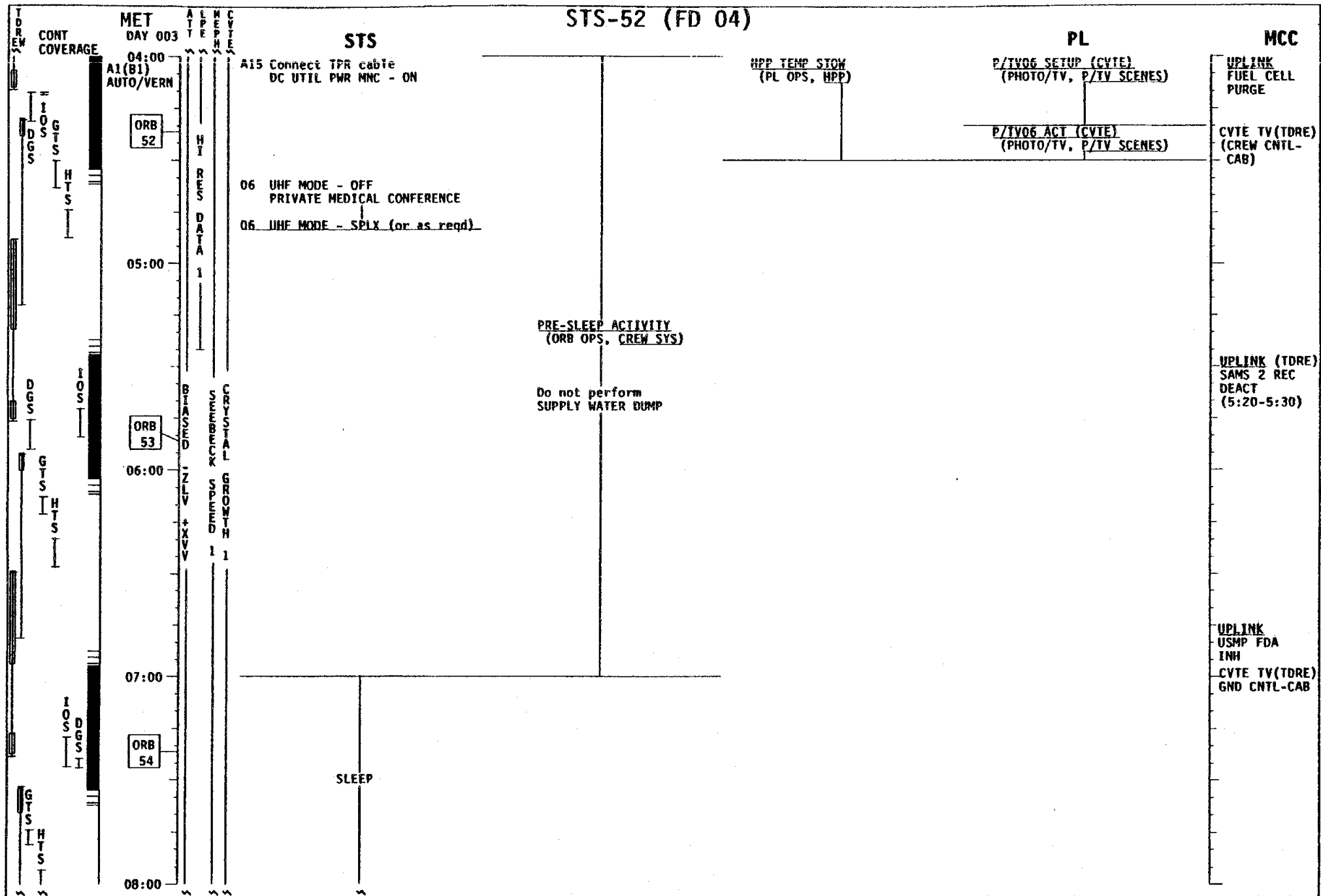
# STS-52 (FD 04)



# STS-52 (FD 04)



# STS-52 (FD 04)



MET  
DAY 003

STS

PL

MCC

04:00  
A1(B1)  
AUTO/VERN

ORB  
52

A15 Connect TPR cable  
DC UTIL PWR MNC - ON

HPP TEMP SLOW  
(PL OPS, HPP)

P/TVO6 SETUP (CVTE)  
(PHOTO/TV, P/TV SCENES)

UPLINK  
FUEL CELL  
PURGE

05:00

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

P/TVO6 ACT (CVTE)  
(PHOTO/TV, P/TV SCENES)

CVTE TV(TDRE)  
(CREW CNTL-  
CAB)

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

ORB  
53

Do not perform  
SUPPLY WATER DUMP

UPLINK (TDRE)  
SAMS 2 REC  
DEACT  
(5:20-5:30)

06:00

07:00

ORB  
54

SLEEP

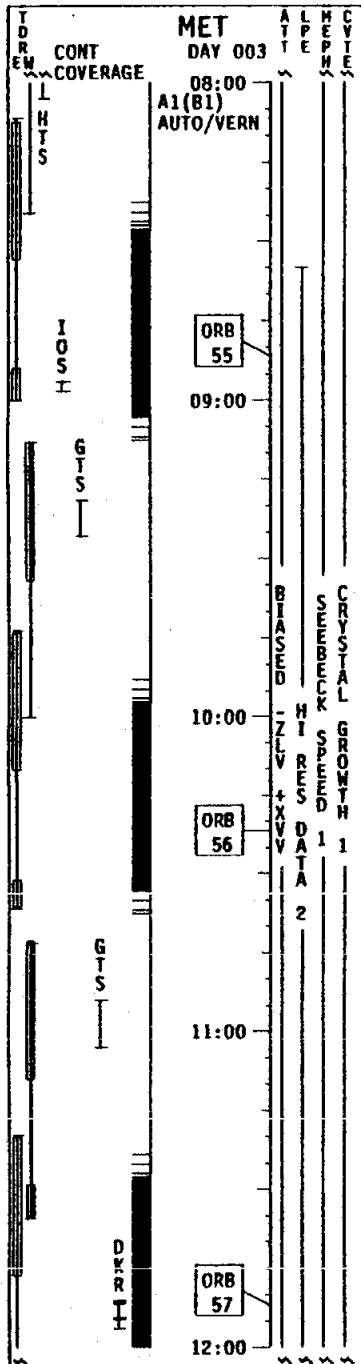
UPLINK  
USMP FDA  
INH  
CVTE TV(TDRE)  
GND CNTL-CAB

08:00

STS-52 (FD 04)

PL

MCC



STS  
 SLEEP

CVTE TV (TDRE)  
 GND CNTL-CAB

UPLINK (TDRE)  
 SAMS 2 REC  
 ACT  
 (08:30-08:40)

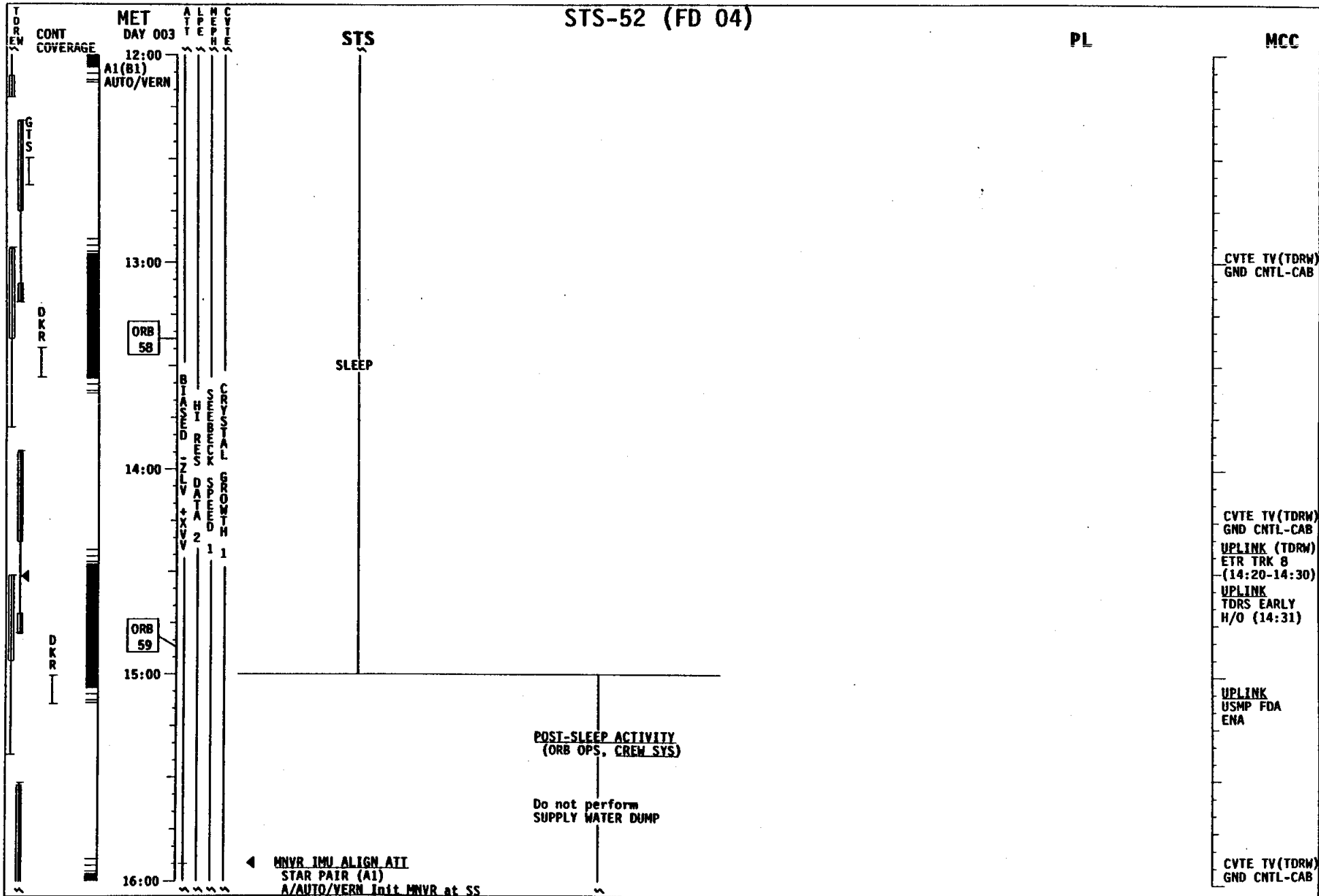
CVTE TV (TDRW)  
 GND CNTL-CAB

CVTE TV (TDRW)  
 GND CNTL-CAB

# STS-52 (FD 04)

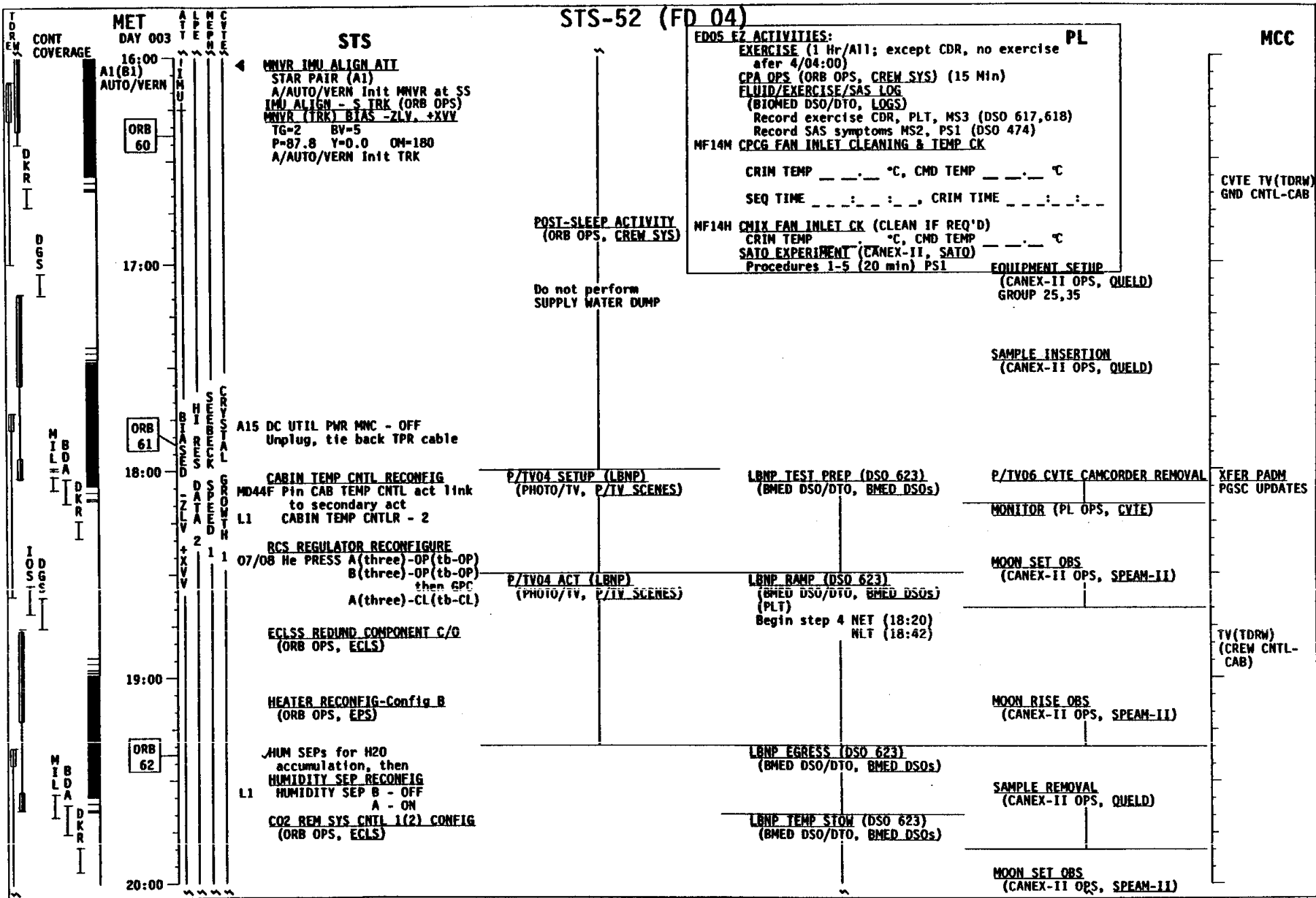
PL

MCC

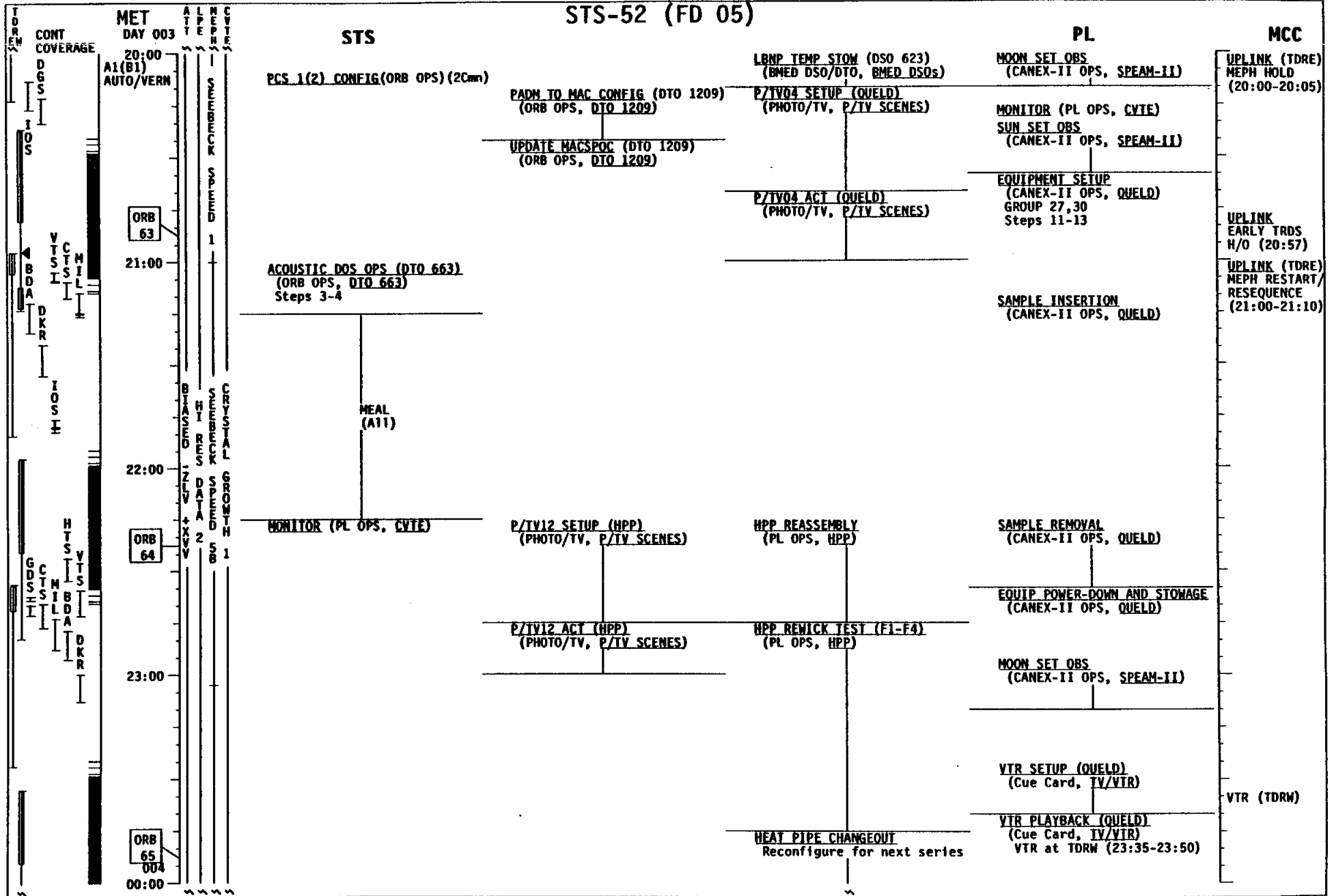




STS-52 (FD 04)



# STS-52 (FD 05)





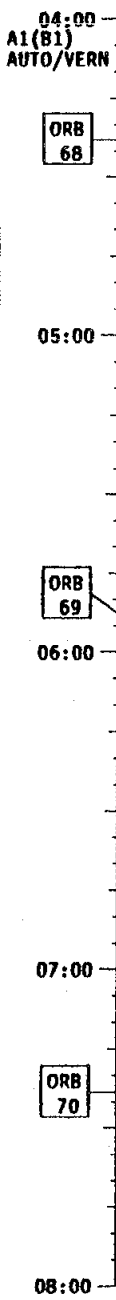
# STS-52 (FD 05)

PL

MCC

MET DAY 004

STS



**MNVR IMU ALIGN ATT**  
 STAR PAIR (A1)  
 A/AUTO/VERN Init MNVR at SS  
  
**IMU ALIGN - S TRK (ORB OPS)**  
**MNVR (TRK) BIAS -ZLV, +XVY**  
 TG=2 BV=5  
 P=87.8 Y=0.0 OM=180  
 A/AUTO/VERN Init TRK  
 06 UHF MODE - OFF  
 PRIVATE MEDICAL CONFERENCE  
 06 UHF MODE - SPLX (or as reqd)

**PRE-SLEEP ACTIVITY**  
 (ORB OPS, CREW SYS)

Do not perform  
 SUPPLY WATER DUMP

SLEEP

CVTE TV(TDRW)  
GND CNTL-CAB

UPLINK (TDRW)  
 MEPH RESTART  
 (4:25-4:35)

UPLINK  
 USMP FOA  
 INH

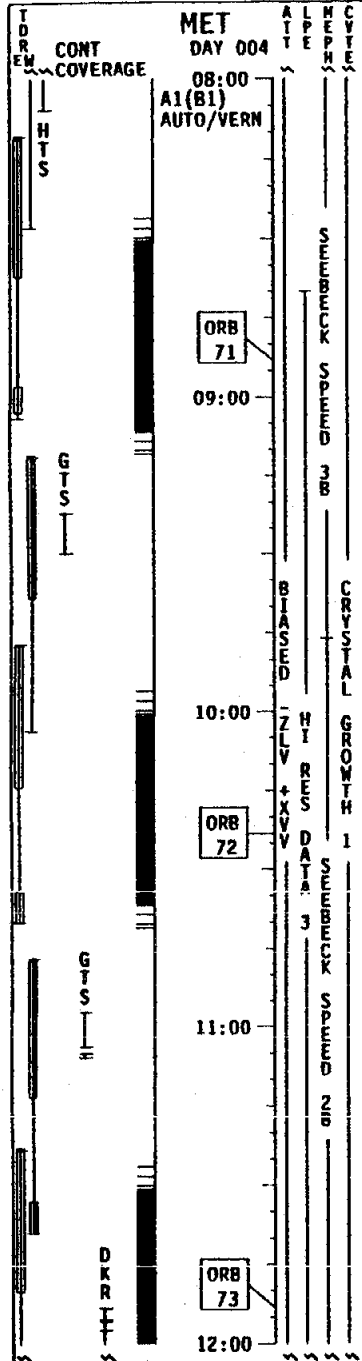
CVTE TV(TDRW)  
GND CNTL-CAB

CVTE TV(TDRW)  
GND CNTL-CAB

# STS-52 (FD 05)

PL

MCC



STS

SLEEP

UPLINK (TDRE)  
SAMS 2 REC ACT  
(8:35-8:45)

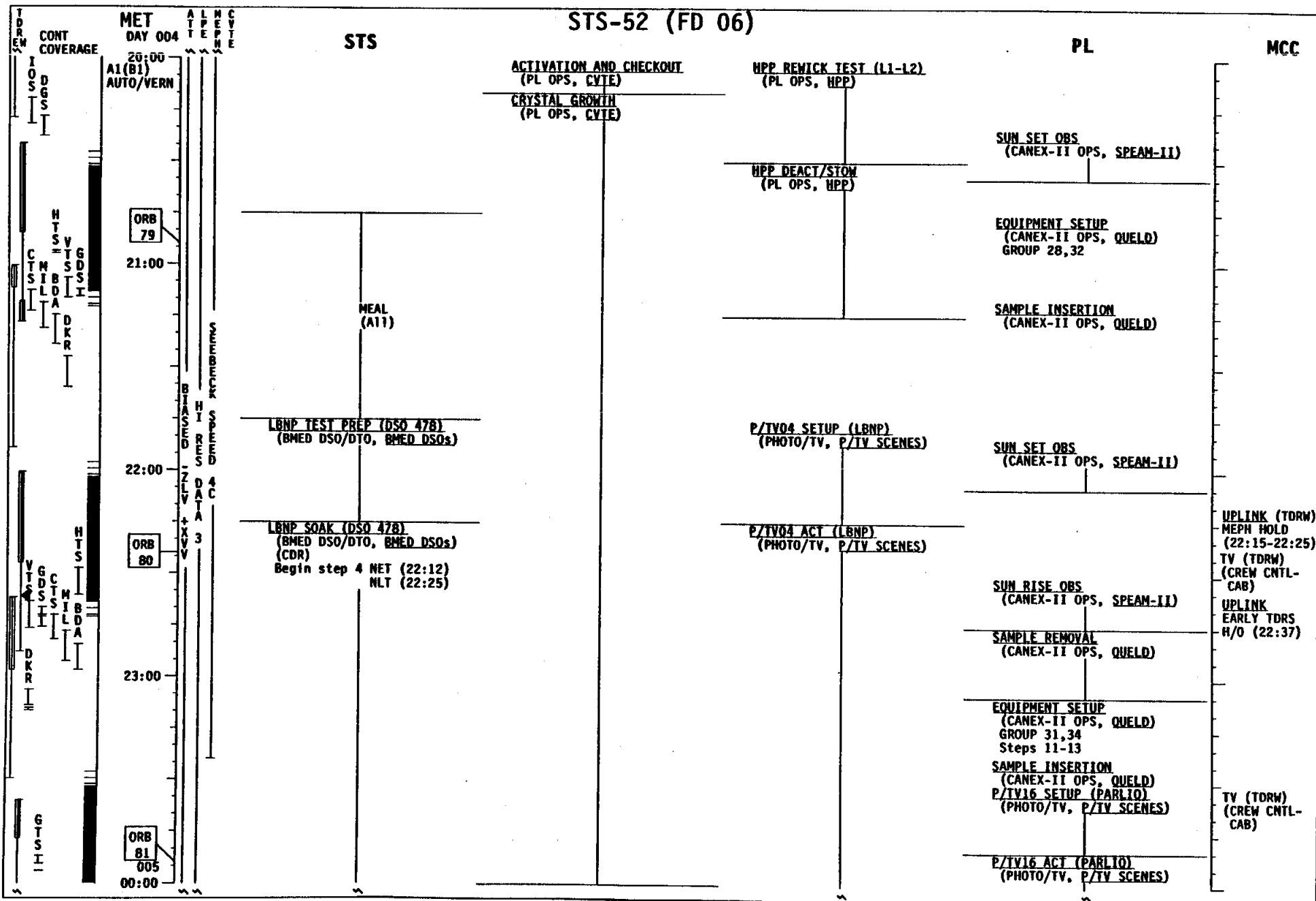
CVTE TV (TDRW)  
GND CNTL-CAB

CVTE TV (TDRW)  
GND CNTL-CAB



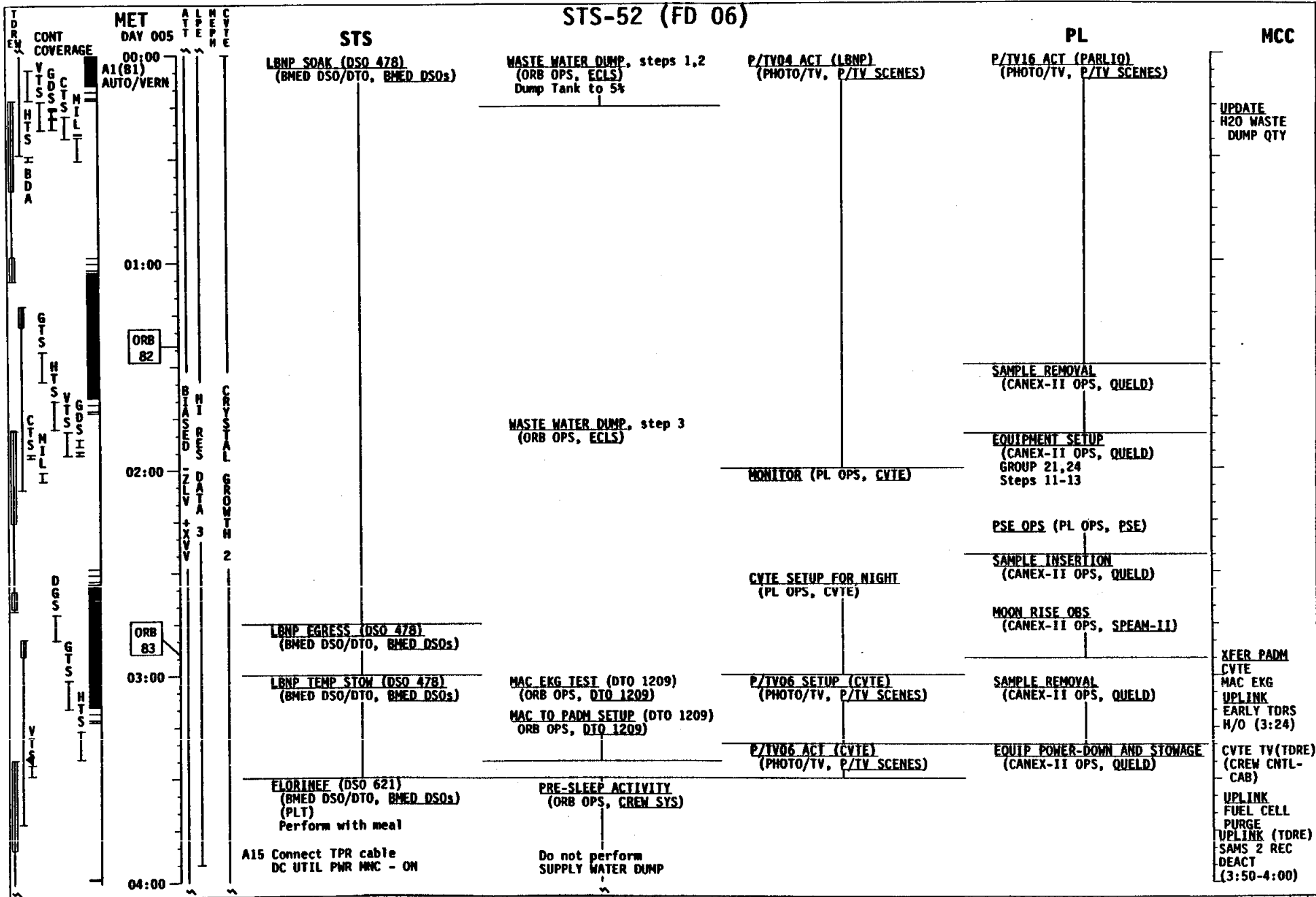


# STS-52 (FD 06)





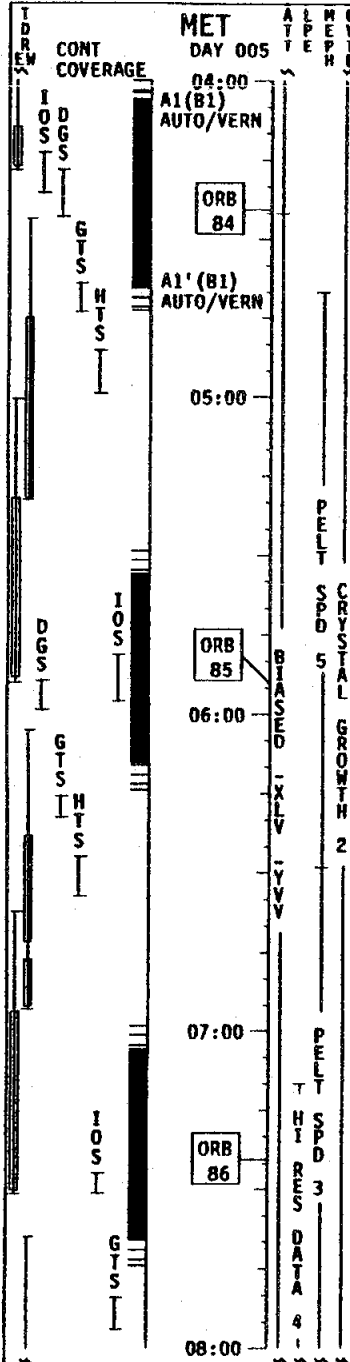
# STS-52 (FD 06)



# STS-52 (FD 06)

PL

MCC



## STS

- 06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE
- 06 UHF MODE - SPLX (or as reqd)  
Clear Star Table
- MNVR (TRK) BIAS -XLV, -YVY  
TG-2 BV-5 P-178 Y=1 OM-69  
A/AUTO/VERN(04:25) Init TRK
- ← **G20 DAP CONFIG**  
ITEM 9 + 5 EXEC
- L1 FLASH EVAP CNTLR PRI A(B)-OFF  
IMU ALIGN - S TRK (ORB OPS)

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

Do not perform  
SUPPLY WATER DUMP

SLEEP

CVTE TV(TDRW)  
GND CNTL-CAB

UPLINK(TDRW)  
RESTART/RESECT  
TO PELTIER  
(4:35-4:45)

UPLINK  
USMP FDA  
INH  
CVTE TV(TDRW)  
GND CNTL-CAB

UPLINK (TDRE)  
SAMS 2 REC ACT  
(7:05-7:15)

CVTE TV(TDRW)  
GND CNTL-CAB

# STS-52 (FD 06)

PL

MCC

**MET DAY 005**  
08:00  
A1' (81)  
AUTO/VERN

**CONT COVERAGE**

**ORB 87** 09:00

**ORB 88** 10:00

**ORB 89** 12:00

DRK H  
G S  
S R K S

CRYSTAL  
BIASED  
RES DATA  
X LV  
Y V V

PELT SPD 2  
ORR GORWTH 2

PELT SPD 1

STS

SLEEP

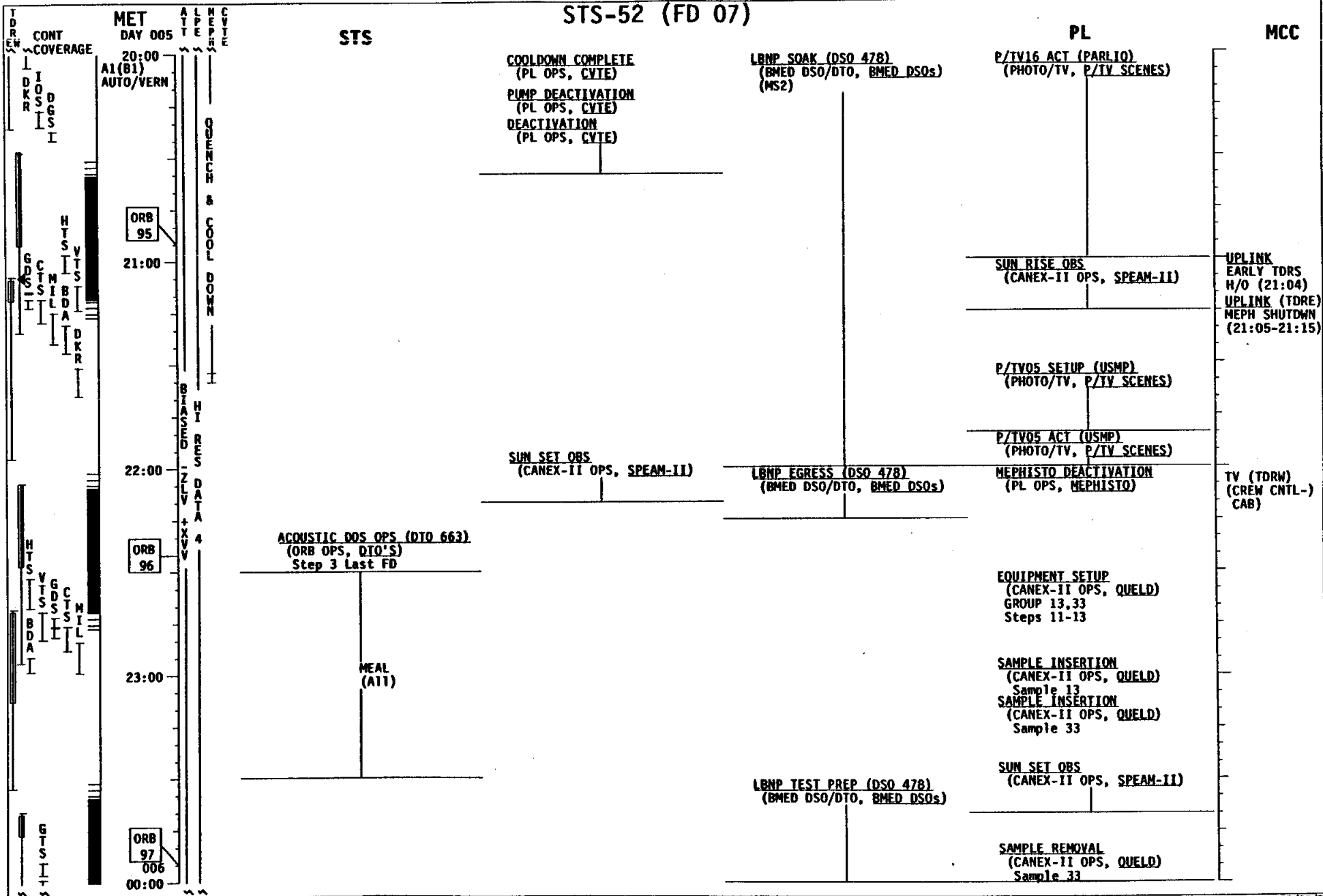
CVTE TV (TDRW)  
GND CNTL-CAB

CVTE TV (TDRW)  
GND CNTL-CAB





# STS-52 (FD 07)



# STS-52 (FD 07)

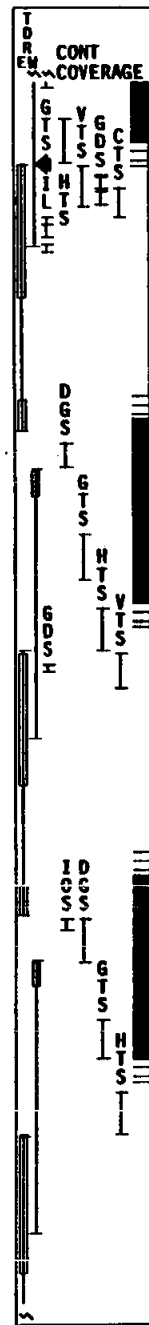
**STS**

**PL**

**MCC**

**MET DAY 006**

A1(B1)  
AUTO/VERN



00:00

01:00

02:00

03:00

04:00



**P/TV04 ACT (LBNP)**  
(PHOTO/TV, P/TV SCENES)

**LBNP RAMP (DSO 478)**  
(BMED DSO/DTO, BMED DSOs)  
(CDR)  
Begin step 4 NET (23:58)  
NLT (00:03)

**SAMPLE REMOVAL**  
(CANEX-II OPS, QUELD)  
Sample 13

**UPLINK**  
EARLY TDRE  
H/O (00:16)  
TV (TDRE)  
(CREW CNTL-CAB)

**EQUIPMENT SETUP**  
(CANEX-II OPS, QUELD)  
GROUP 29,40  
Steps 11-13

**LBNP EGRESS (DSO 478)**  
(BMED DSO/DTO, BMED DSOs)

**SAMPLE INSERTION**  
(CANEX-II OPS, QUELD)  
Sample 29

**LBNP TEMP STOW (DSO 478)**  
(BMED DSO/DTO, BMED DSOs)

**SAMPLE INSERTION**  
(CANEX-II OPS, QUELD)  
Sample 40

**MOON RISE OBS**  
(CANEX-II OPS, SPEAM-II)

**ABL PORT RMS HTR (two)-AUTO**

**[B] CTA PRLA CHECKOUT**

- A6U ✓ PL RETEN PL SEL - 3
- ✓ LOGIC PWR SYS 1(SYS 2) - OFF
- ✓ LAT 3 - OFF
- ✓ LAT 3 tb - LAT

Monitor tb - LAT during KU Band dep/stow,  
Rad dep/stow, NPM rollout/stow, and  
cradling/uncradling of RMS.

- \* if LAT 3 tb - bp \*
- \* R13L PL BAY MECH PWR - OFF \*

**RMS POWERUP**  
(PDRS OPS, RMS PWRUP)  
**CTA PRLA CHECKOUT [B]**

◀ **HWVR BETWEEN PRE-CRADLE**  
**AND MELEO VIEW (03:03)**  
(PDRS FS, UNLOADED RMS OPS)

◀ **MELEO EXPOSURE +XVY (03:23)**  
(PDRS FS, UNLOADED RMS OPS)

A15 Connect TPR cable  
DC UTIL PWR MNC - ON

**MAC EKG TEST (DTO 1209)**  
(ORB OPS, DTO 1209)

**SAMPLE REMOVAL**  
(CANEX-II OPS, QUELD)

**XFER PADM**  
MAC EKG

**MAC TO PADM SETUP (DTO 1209)**  
(ORB OPS, DTO 1209)

**EQUIP POWER-DOWN AND STOWAGE**  
(CANEX-II OPS, QUELD)

**UPLINK (TDRE)**  
SAMS 2 REC  
DEACT/LPE  
RECAL  
(2:25-3:35)

**PADM POWERDOWN**  
(ORB OPS, CREW SYS)

**PSE OPS (PL OPS, PSE)**

**MELEO ACTIVATION**  
(PDRS FS, MELEO/SPIE ACT)

**P/TV08 SETUP (MELEO)**  
(PHOTO/TV, P/TV SCENES)

**P/TV08 ACT (MELEO)**  
(PHOTO/TV, P/TV SCENES)

**PRE-SLEEP ACTIVITY**  
(ORB OPS, CREW SYS)

Do not perform  
SUPPLY WATER DUMP

# STS-52 (FD 07)

PL

MCC

MET  
DAY 006

STS

TDRW  
CONT  
COVERAGE

04:00  
A1(B1)  
AUTO/VERN

ORB  
100

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

IMJ ALIGN - S TRK (ORB OPS)

MNVR (TRK) BIAS -ZLV, +XVY

TG-2 BV-5

P-87.8 Y-0.0 OM-180

A/AUTO/VERN Init TRK

06 UHF MODE - OFF

PRIVATE MEDICAL CONFERENCE

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

06 UHF MODE - SPLX (or as reqd)

FLORINEE (DSO 621)

(BMED DSO/DTO, BMED DSOs)

(PLT)

Perform with meal

Do not perform  
SUPPLY WATER DUMP

05:00

ORB  
101

06:00

07:00

ORB  
102

08:00

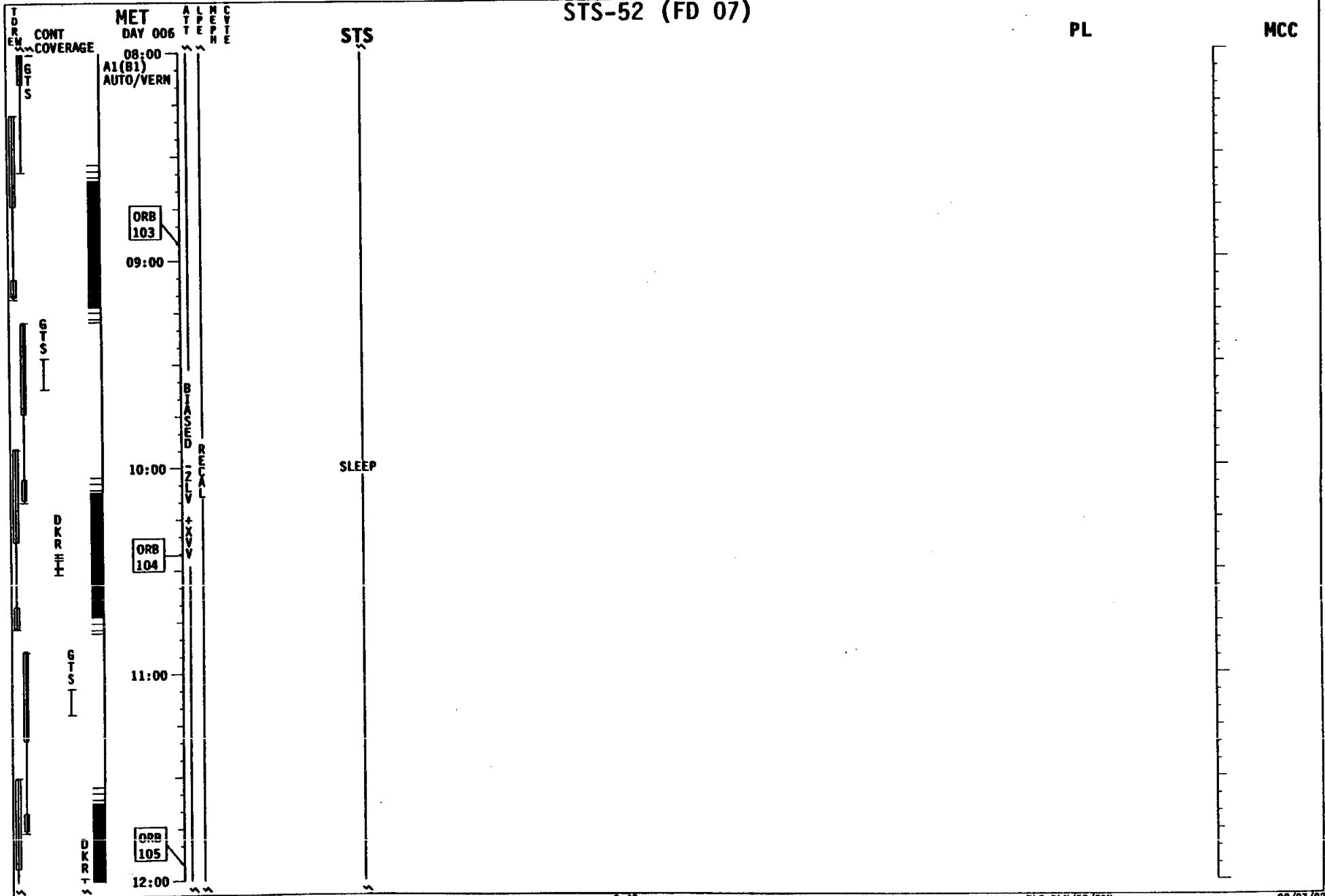
SLEEP

UPLINK  
USMP FDA  
INH

UPLINK (TDRW)  
ETR TRK 18  
(06:30-06:40)



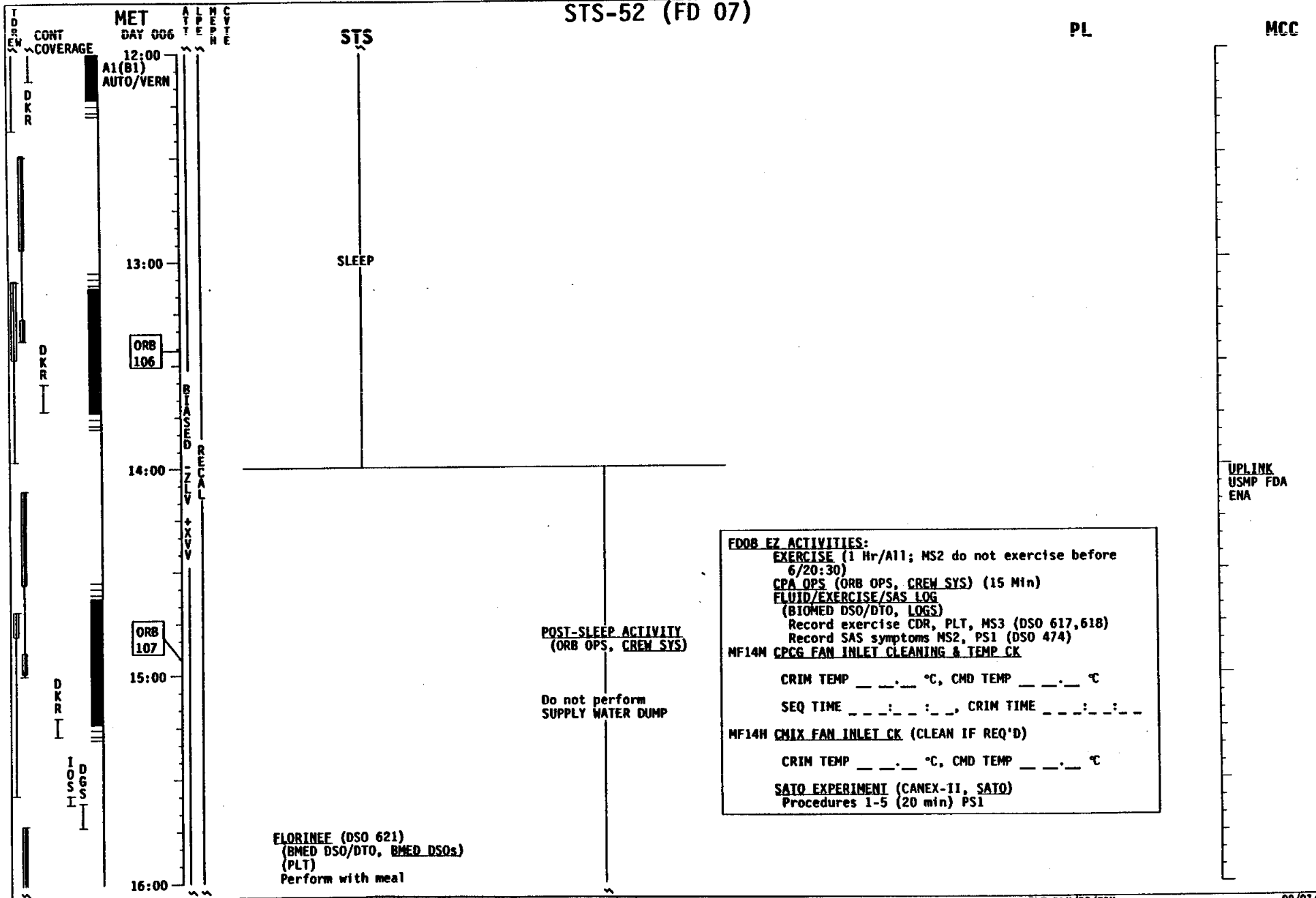
# STS-52 (FD 07)

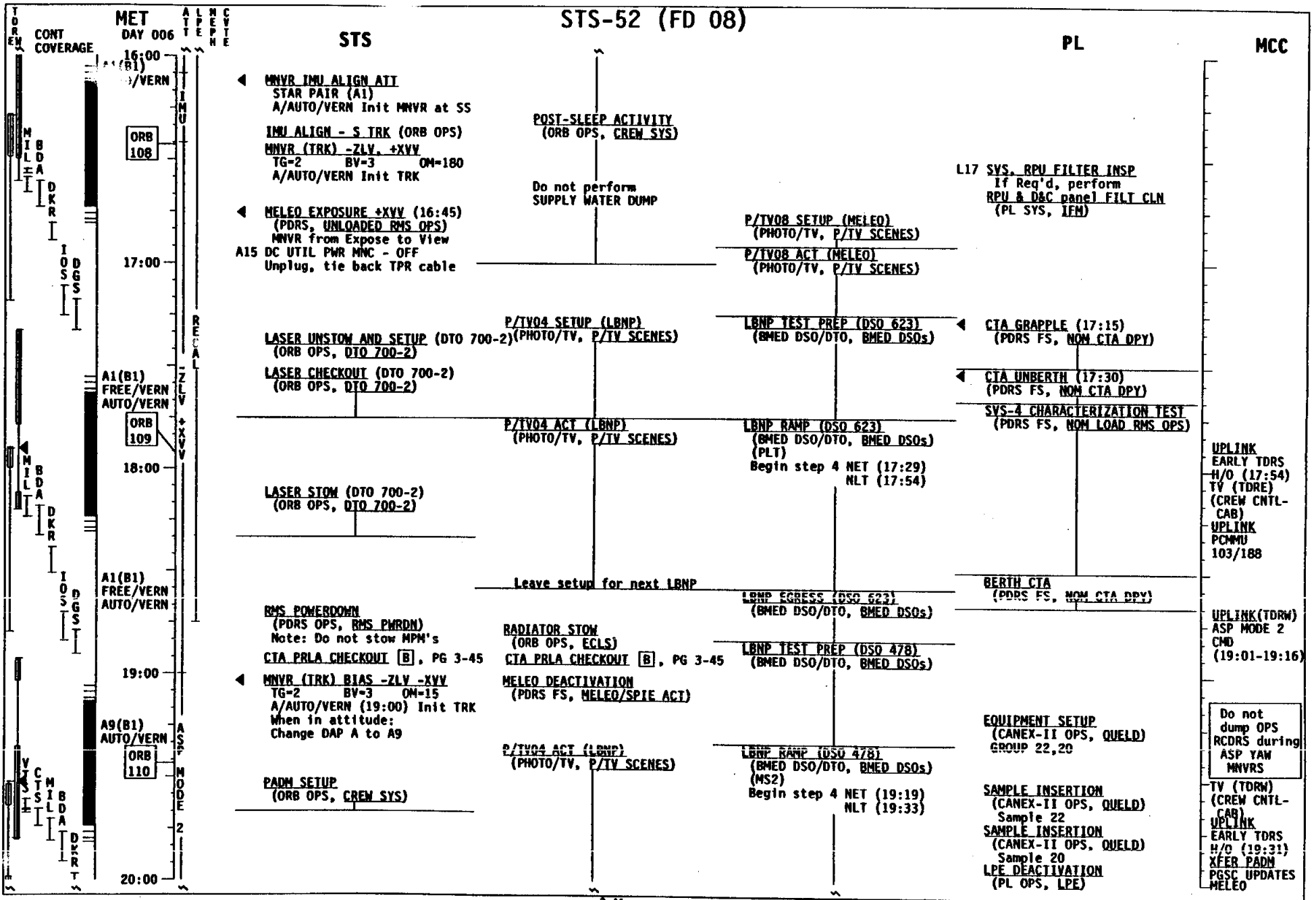


STS-52 (FD 07)

PL

MCC





# STS-52 (FD 08)

**TDRW**  
**CONT COVERAGE**  
**MET DAY 006**  
**20:00**  
**A9(B1) AUTO/VERN**  
**21:00**  
**A1(B1) AUTO/VERN**  
**22:00**  
**ORB 112**  
**23:00**  
**ORB 113 007**  
**00:00**

**D I K O R S I**  
**H T S**  
**V T S**  
**G D S**  
**C T S**  
**M I L D A**  
**D K R**  
**H T S**  
**V T S**  
**G D S**  
**C T S**  
**M I L D A**  
**H T S**  
**V T S**  
**G D S**  
**C T S**  
**M I L D A**  
**H T S**  
**V T S**  
**G D S**  
**C T S**  
**M I L D A**

**ASP**  
**YAW**  
**MNVR**  
**YSI**

**STS**

◀ **MNVR ASP YAW #1**  
 TG-2 BV-3 OM-345  
 A/AUTO/VERN (20:01) Init TRK

---

◀ **MNVR ASP YAW #2**  
 TG-2 BV-3 OM-15  
 A/AUTO/VERN (20:57) Init TRK

---

Change DAP A to A1  
**MNVR (IRK) - YSI**  
 TG-4 BV-5  
 P=0 Y-270 OM-270  
 A/AUTO/VERN Init TRK

Leave setup for next LBNP

**LBNP EGRESS (DSO 478)**  
 (BMED DSO/OTO, BMED\_DSOs)

**[B] CTA PRLA CHECKOUT**

A6U ✓ PL RETEN PL SEL - 3  
 ✓ LOGIC PWR SYS 1(SYS 2) - OFF  
 ✓ LAT 3 - OFF  
 ✓ LAT 3 tb - LAT

Monitor tb - LAT during KU Band dep/stow.  
 Rad dep/stow, MPM rollout/stow, and  
 cradling/uncradling of RMS.

\* If LAT 3 tb - bp \*  
 \* R13L PL BAY MECH PWR - OFF \*

**PL**

**LPE DEACTIVATION**  
 (PL OPS, LPE)  
**VTR SETUP (SYS)**  
 (Cue Card, TV/VTR)

**VTR PLAYBACK (SYS)**  
 (Cue Card, TV/VTR)  
 VTR at TDRW (20:31-20:37)

**SAMPLE REMOVAL**  
 (CANEX-II OPS, QUELD)  
 Sample 20

**SAMPLE REMOVAL**  
 (CANEX-II OPS, QUELD)  
 Sample 22

**SUN RISE OBS**  
 (CANEX-II OPS, SPEAM-II)

**SUN SET OBS**  
 (CANEX-II OPS, SPEAM-II)

**SUN RISE OBS**  
 (CANEX-II OPS, SPEAM-II)

**P/TV14 SETUP (CONF)**  
 (PHOTO/TV, P/TV SCENES)

**CREW CONF AUDIO/TV CK**

**P/TV14 ACT (CONF)**  
 (PHOTO/TV, P/TV SCENES)

**MEAL (A11)**

**CREW CONF (A11)**

**P/TV14 ACT (CONF)**  
 (PHOTO/TV, P/TV SCENES)

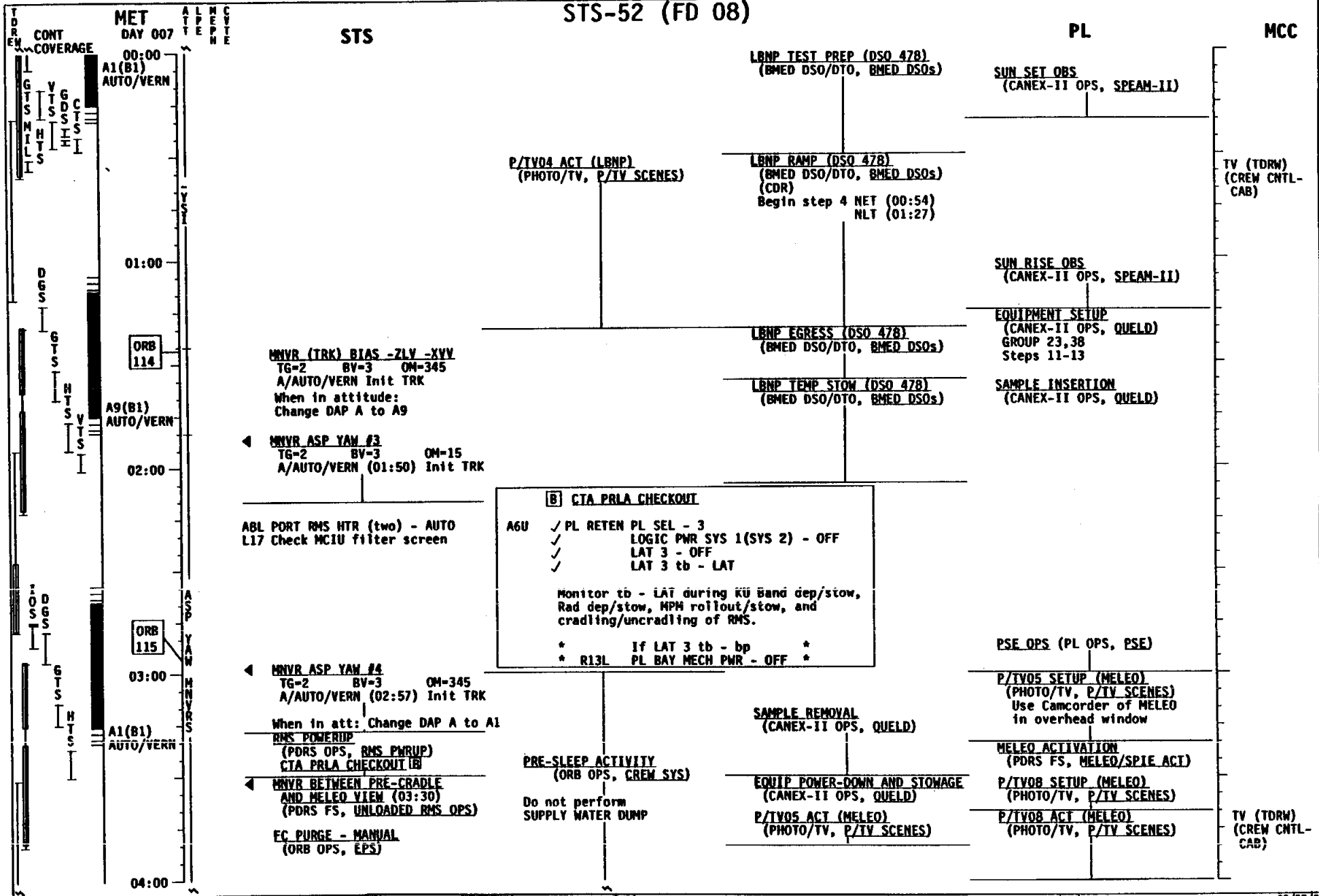
**MCC**

**VTR (TDRW)**

**TV (TDRW)**  
 (CREW CNTL-CAB)

**TV (TDRW)**  
 (CREW CNTL-CAB)

# STS-52 (FD 08)



# STS-52 (FD 08)

PL

MCC

MET  
DAY 007

ALPH  
TYPE  
LH  
EPT  
HE

## STS

04:00  
A1(B1)  
AUTO/VERN

ORB  
116

05:00

ORB  
117

06:00

07:00

ORB  
118

08:00

◀ MELEO EXPOSURE +XVV (04:00)  
(PORS FS, UNLOADED RMS OPS)

◀ MNVR IMU ALIGN ATT  
STAR PAIR (A1)  
A/AUTO/VERN Init MNVR at 55

IMU ALIGN - S TRK (ORB OPS)  
MNVR (TRK) BIASED -ZLV. +XVV  
TG=2 BV=5  
P=90 Y=355 OM=180  
A/AUTO/VERN Init TRK

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SPLX (or as reqd)

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

Do not perform  
SUPPLY WATER DUMP

SLEEP

UPLINK (TDRE)  
ASP CMD  
(4:55-5:10)  
UPLINK  
EARLY TORS  
H/O (05:07)

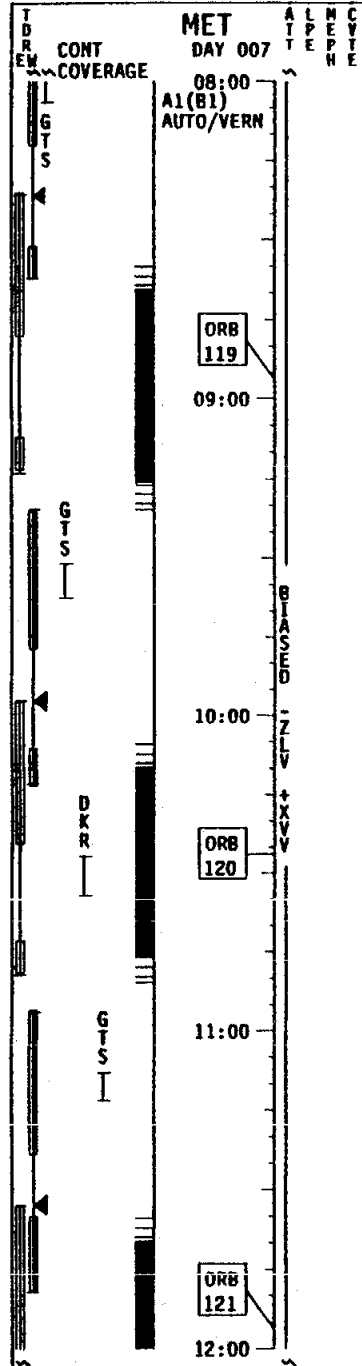
UPLINK (TDRW)  
ASP CMD  
(6:25-6:40)

UPLINK  
EARLY TORS  
H/O (06:43)

# STS-52 (FD 08)

PL

MCC



STS

SLEEP

**UPLINK (TDRW)**  
ASP CMD  
(8:00-8:15)  
**UPLINK**  
EARLY TDRS  
H/O (08:21)

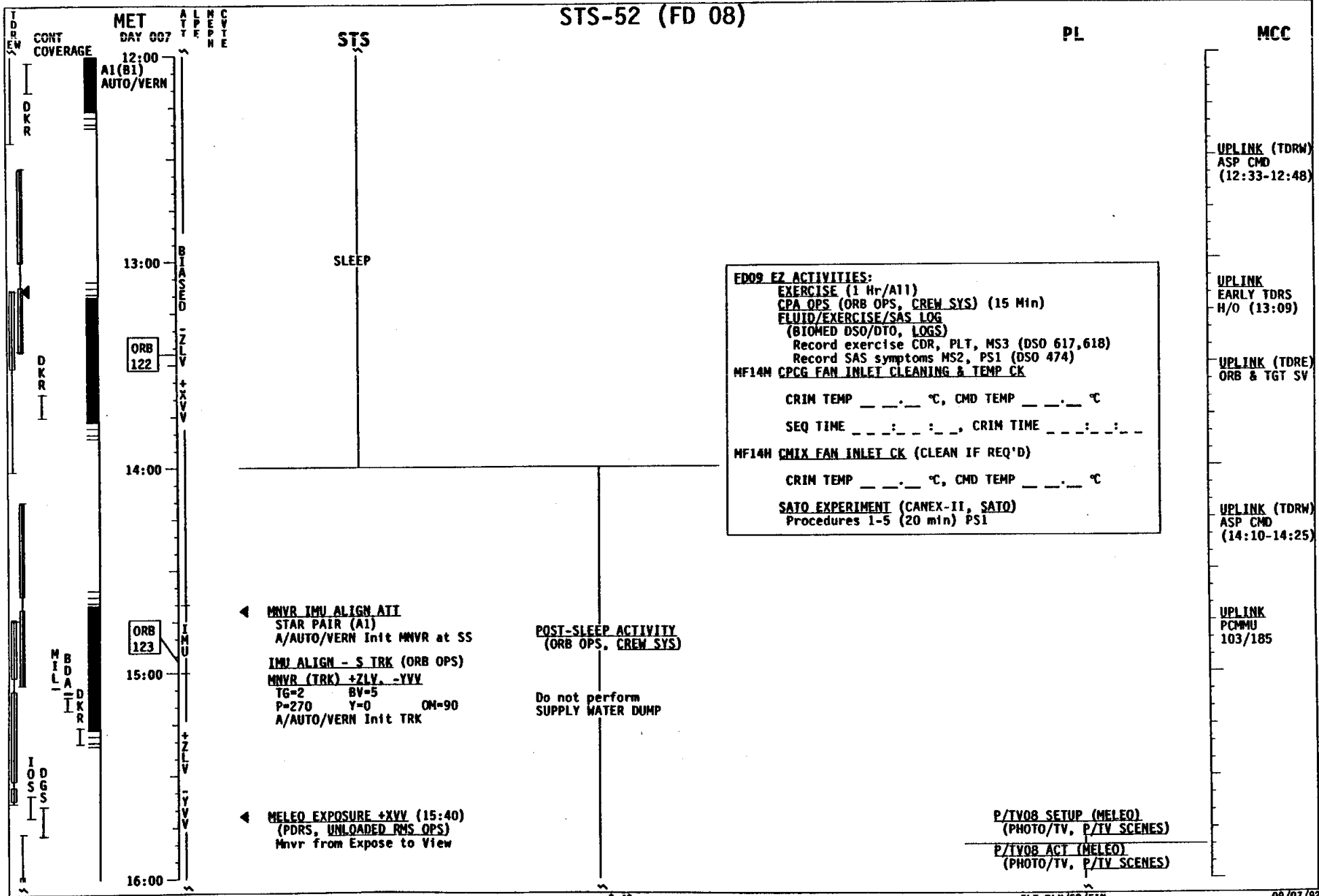
**UPLINK (TDRW)**  
ASP CMD  
(9:27-9:42)

**UPLINK**  
EARLY TDRS  
H/O (09:57)

**UPLINK (TDRW)**  
ASP CMD  
(10:55-11:10)

**UPLINK**  
EARLY TDRS  
H/O (11:33)

# STS-52 (FD 08)





# STS-52 (FD 09)

STS

PL

MCC

**MET DAY 007**

16:00 A1(B1) AUTO/VERN

17:00 A1(B1) FREE/VERN AUTO/VERN

18:00 A1(B1) FREE/VERN AUTO/VERN

19:00 A1(B1) FREE/VERN AUTO/VERN

(A1)B1 AUTO/VERN

20:00 INRTL/VERN

CONT COVERAGE

MILDA

DKR

ISGS

HTSV

ITGC

SDTI

SSLI

BDIA

INRTL/VERN

**POST-SLEEP ACTIVITY (ORB OPS, CREW SYS)**

Do not perform SUPPLY WATER DUMP

**AEM WATER REFILL (PL OPS, PSE)**

**P/TVO4 SETUP (LBNP) (PHOTO/TV, P/TV SCENES)**

**P/TVO4 ACT (LBNP) (PHOTO/TV, P/TV SCENES)**

**P/TVO4 ACT (MELEO) (PHOTO/TV, P/TV SCENES)**

**MELEO DEACTIVATION (PDRS FS, MELEO/SPIE ACT)**

**L17 SYS. RPU FILTER INSP**  
If Req'd, perform RPU & D&C panel FILT CLN (PL SYS, IFM)

◀ **CTA GRAPPLE (16:55) (PDRS FS, NOM CTA DPY)**

◀ **CTA UNBERTH (17:05) (PDRS FS, NOM CTA DPY)**

**LBNP TEST PREP (DSO 478) (BMED DSO/DTO, BMED DSOs)**

**LBNP RAMP (DSO 478) (BMED DSO/DTO, BMED DSOs) (MS2)**  
Begin step 4 NET (17:33)  
NLT (18:06)

**LBNP EGRESS (DSO 478) (BMED DSO/DTO, BMED DSOs)**

**LBNP STOW (DSO 478) (BMED DSO/DTO, BMED DSOs)**

**SYS-9 RMS STRUCT DEFL TEST (PDRS FS, NOM LOAD RMS OPS)**

**SYS-5 GUIDANCE MNVRS (PDRS FS, NOM LOAD RMS OPS)**

**SYS-6 SHORT RANGE PROX SENSOR (PDRS FS, NOM LOAD RMS OPS)**

**BERTH CTA (PDRS FS, NOM CTA DPY)**

**VTR SETUP (SVS) (Cue Card, TV/VTR)**

**VTR PLAYBACK (SVS) (Cue Card, TV/VTR)**  
TV at TDRE (19:25-19:40)

**RMS POWERDOWN (PDRS OPS, RMS PWRDN)**  
Note: Do not stow MPM's  
CTA PRLA CHECKOUT (B), PG 3-51

**PRE BURN CONFIG**  
014:E, cb MNA DDU L (two) - cl  
015:E  
014:F RJD LOGIC (eight) - ON  
015:F, DRIVER (eight) - ON  
016:F

**ON-ORBIT OMS BURN (ORB OPS, OMS) (2 Cmn)**

◀ **OMS 6 TIG (20:00)**

**UPLINK FUEL CELL PURGE**

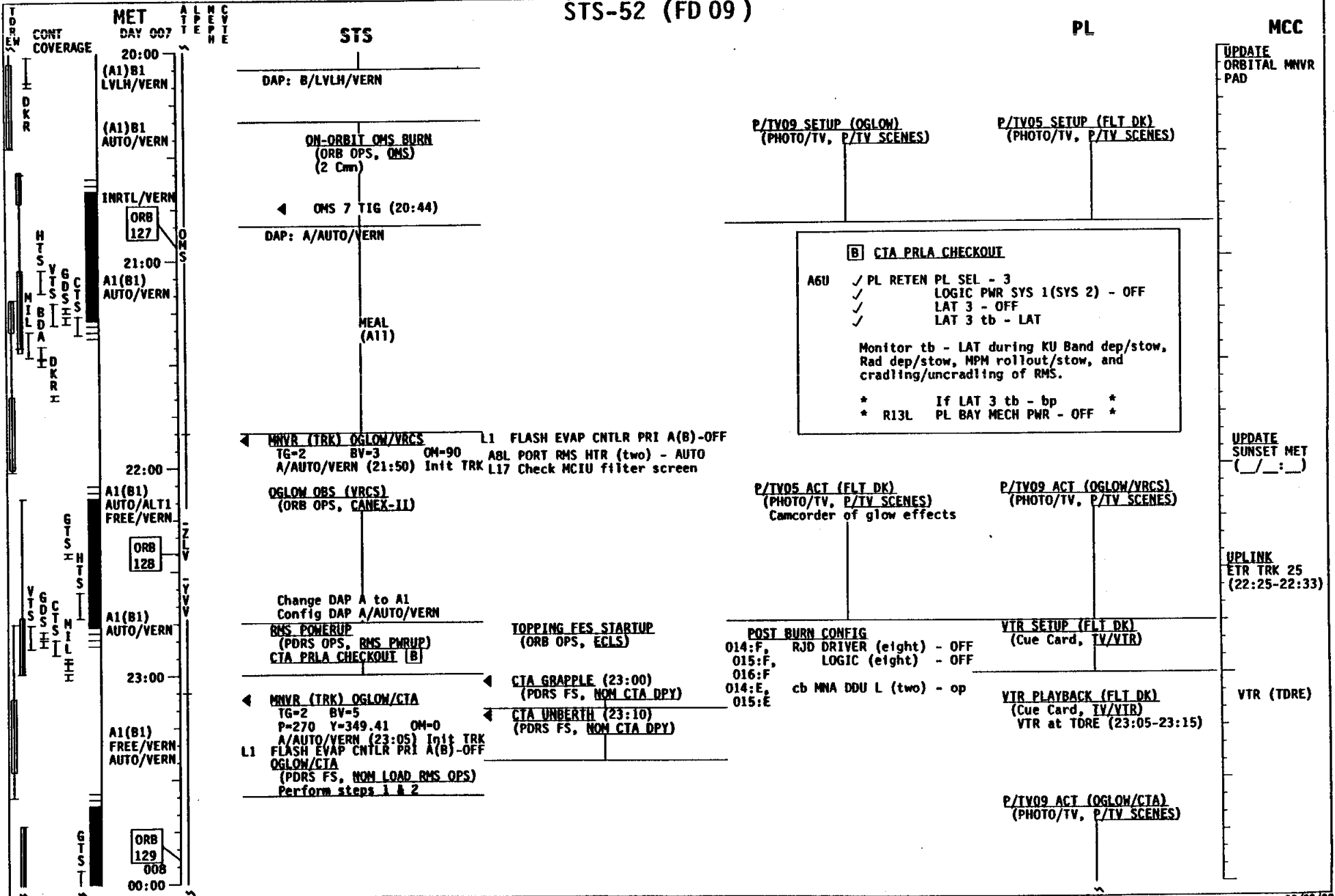
**XFER PADM PGSC UPDATES MELEO**

**TV (TORW) (CREW CNTL-CAB)**

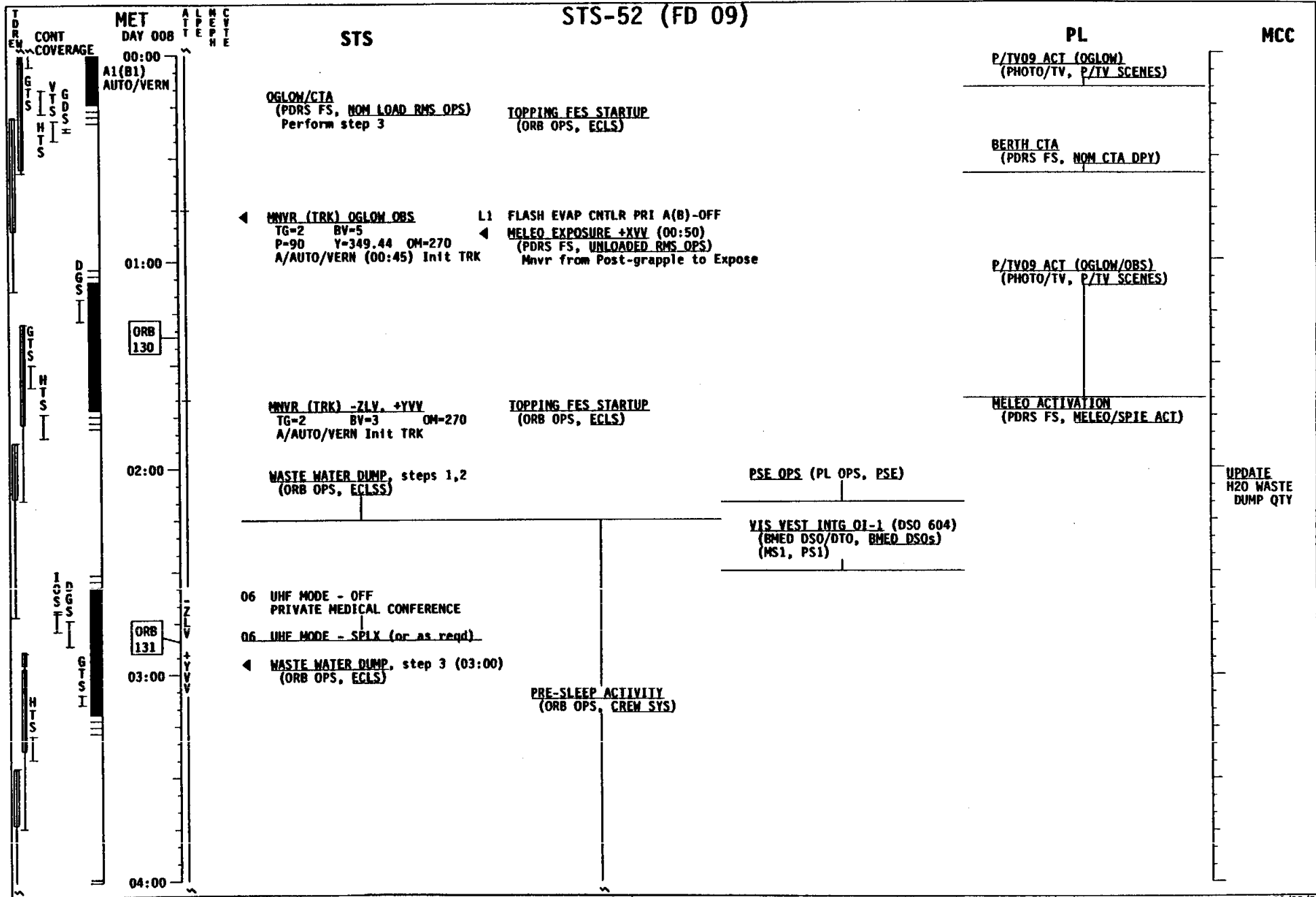
**UPLINK EARLY TDRS H/O (17:58)**

**UPDATE ORBITAL MNVR PAD VTR (TDRE)**

# STS-52 (FD 09)



# STS-52 (FD 09)



**STS**

**PL**

**MCC**

**MET DAY 008**

00:00

A1(B1) AUTO/VERN

OGLow/CTA  
(PDRS FS, NOM LOAD RMS OPS)  
Perform step 3

TOPPING FES STARTUP  
(ORB OPS, ECLS)

P/TVO9 ACT (OGLow)  
(PHOTO/TV, P/TV SCENES)

BERTH CTA  
(PDRS FS, NOM CTA DPY)

◀ MNRV (TRK) OGLow OBS  
TG-2 BV-5  
P-90 Y-349.44 OM-270  
A/AUTO/VERN (00:45) Init TRK

L1 FLASH EVAP CNTLR PRI A(B)-OFF  
◀ MELEO EXPOSURE +XVV (00:50)  
(PDRS FS, UNLOADED RMS OPS)  
Mnvr from Post-grapple to Expose

P/TVO9 ACT (OGLow/OBS)  
(PHOTO/TV, P/TV SCENES)

01:00

ORB 130

MNRV (TRK) -ZLV, +YVV  
TG-2 BV-3 OM-270  
A/AUTO/VERN Init TRK

TOPPING FES STARTUP  
(ORB OPS, ECLS)

MELEO ACTIVATION  
(PDRS FS, MELEO/SPIE ACT)

02:00

WASTE WATER DUMP, steps 1,2  
(ORB OPS, ECLSS)

PSE OPS (PL OPS, PSE)

UPDATE H2O WASTE DUMP QTY

VIS VEST INTG 01-1 (DSO 604)  
(BMED DSO/DTO, BMED DSOs)  
(MS1, PS1)

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SPLX (or as reqd)

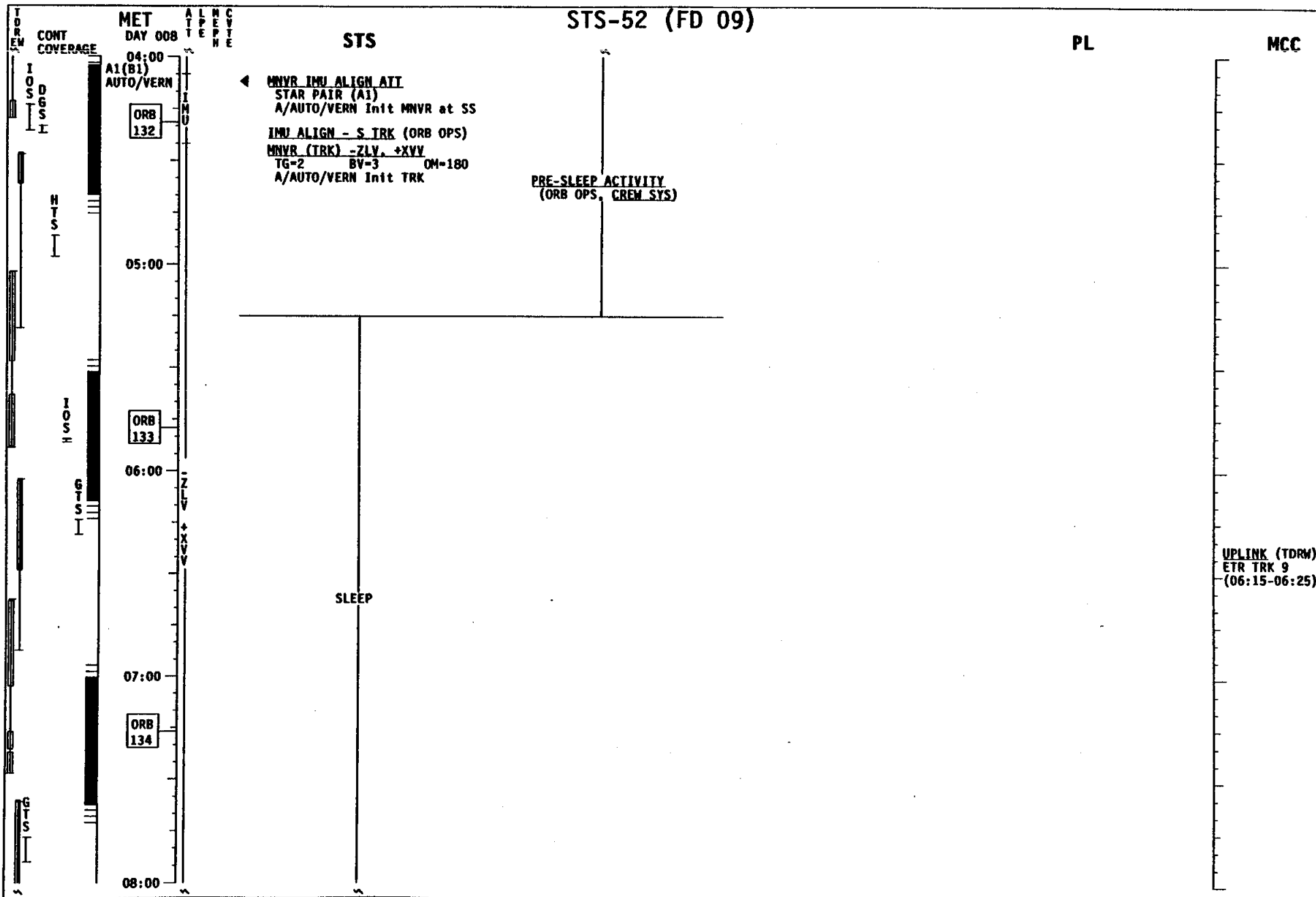
ORB 131

◀ WASTE WATER DUMP, step 3 (03:00)  
(ORB OPS, ECLS)

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

03:00

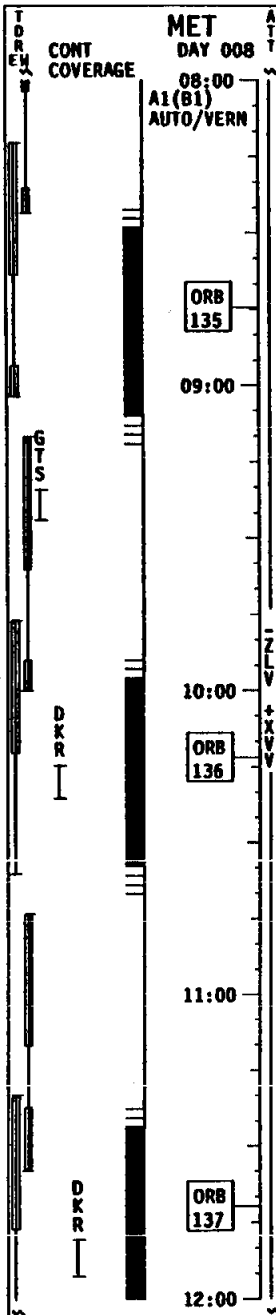
04:00



# STS-52 (FD 09)

PL

MCC



# STS-52 (FD 09)

PL

MCC

**MET DAY 008**  
**12:00**  
**A1(B1) AUTO/VERN**

**13:00**  
**ORB 138**

**14:00**

**15:00**  
**ORB 139**

**16:00**  
**A1(B1) FREE/VERN AUTO/VERN**

CONT COVERAGE  
 ID REW  
 DKRR  
 BDA  
 IODSS

ATT  
 LPE  
 MCVTE

STS

SLEEP

- ◀ **MNVR IMJ ALIGN ATT**  
 STAR PAIR (A1)  
 A/AUTO/VERN Init MNVR at SS
- ◀ **IMJ ALIGN - S TRK (ORB OPS)**
- ◀ **MNVR (TRK) -XLV -YV**  
 TG-2 BV-2 OM-90  
 A/AUTO/VERN (14:45) Init TRK

**POST-SLEEP ACTIVITY**  
 (ORB OPS, CREW SYS)

**PRIORITY PWRUP GROUP B**  
 (ORB PKT, PRIOR PWRON)

**L17 SYS. RPU FILTER INSP**  
 If Req'd, perform  
 RPU & DAC panel FILT CLN  
 (PL SYS, IFM)

**FD10 EZ ACTIVITIES:**

**EXERCISE (1 Hr/A11)**  
**CPA OPS (ORB OPS, CREW SYS) (15 Min)**  
**FLUID/EXERCISE/SAS LOG**  
 (BIOMED DSO/DTO, LOGS)  
 Record exercise CDR, PLT, MS3 (DSO 617,618)  
 Record SAS symptoms MS2, PS1 (DSO 474)

**MF14M CPCG FAN INLET CLEANING & TEMP CK**

CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C

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

**MF14H CHIX FAN INLET CK (CLEAN IF REQ'D)**

CRIM TEMP \_\_\_\_ °C, CMD TEMP \_\_\_\_ °C

**SATO EXPERIMENT (CANEX-II, SATO)**  
 Procedures 1-5 (20 min) PS1

◀ **MELEO EXPOSURE +XVY (14:50)**  
 (PDRS, UNLOADED RMS OPS)  
 Mnv from Expose to View

**P/TV08 SETUP (MELEO)**  
 (PHOTO/TV, P/TV SCENES)

**P/TV08 ACT (MELEO)**  
 (PHOTO/TV, P/TV SCENES)

**MELEO DEACTIVATION**  
 (PDRS FS, MELEO/SPIE ACT)

**SPIE ACTIVATION**  
 (PDRS FS, MELEO/SPIE ACT)

**P/TV03 SETUP (SVS)**  
 (PHOTO/TV, P/TV SCENES)

◀ **CTA GRAPPLE (15:40)**  
 (PDRS FS, NOM CTA DPY)

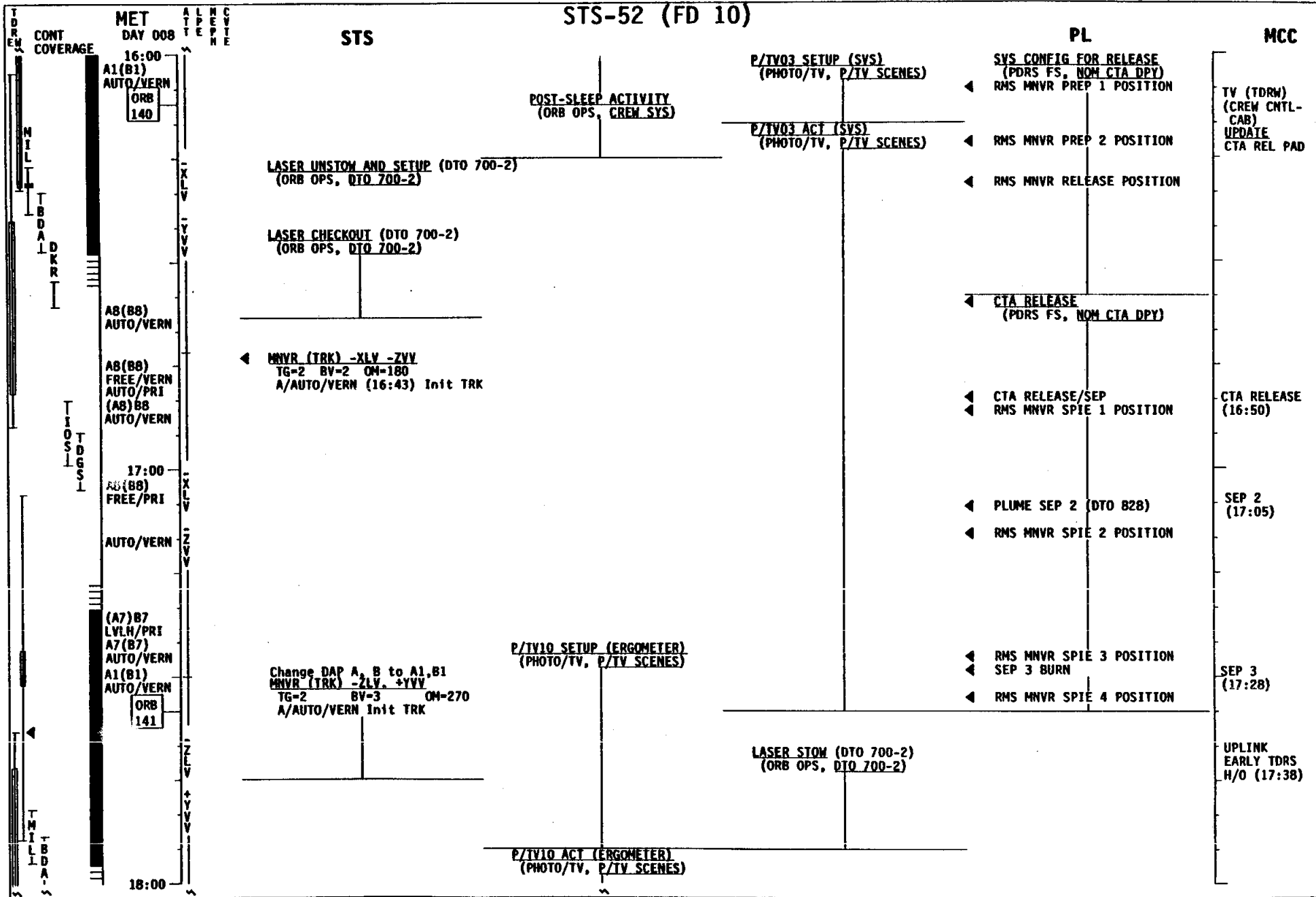
◀ **CTA UNBERTH (15:50)**  
 (PDRS FS, NOM CTA DPY)

**UPLINK**  
**EARLY TDRS**  
**H/O (12:54)**

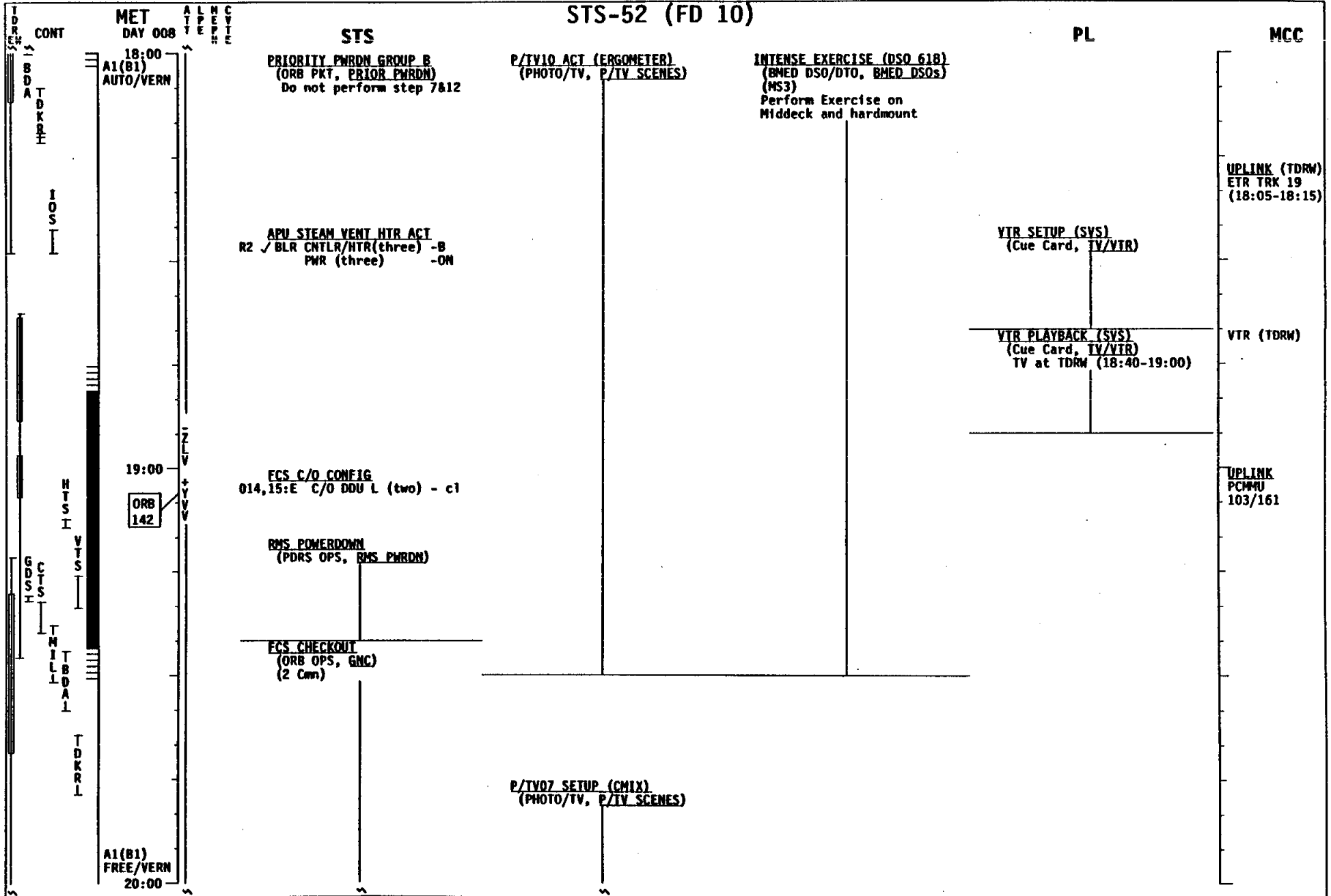
**XFER PADM**  
**PGSC UPDATES**  
**MELEO**

**UPDATE**  
**CRT TIMER**  
**SETUP PAD**

# STS-52 (FD 10)



# STS-52 (FD 10)

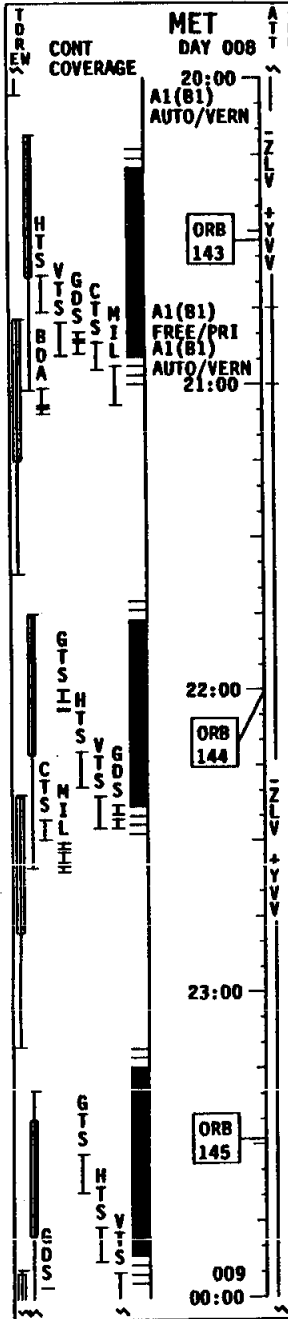




# STS-52 (FD 10)

PL

MCC



## STS

**ECS CHECKOUT**  
 (ORB OPS, GNC)  
 (2 Cmn)

**P/TV07 SETUP (CMIX)**  
 (PHOTO/TV, P/TV SCENES)

**P/TV07 ACT (CMIX)**  
 (PHOTO/TV, P/TV SCENES)

**RCS HOT FIRE TEST**  
 (ORB OPS, RCS) (2 Cmn)

Config DAP: A/AUTO/VERN

MEAL  
 (All)

**POST ECS C/O CONFIG**  
 014,15:E C/O DDU L (two) - c1

**APU HTR RECONFIG (ORB OPS)**

**FAN SEP TAKEDOWN (DTG 657)**  
 (ORB OPS, DTG 657)

**CABIN CONFIG/STOW**  
 (All)

As time permits, perform  
**PRE-DEORBIT PREP ACTIVITIES [A]**

**CMIX MDA 2.3 DEACTIVATION**  
 (PL OPS, CMIX)

**CMIX ENTRY PREPARATION**  
 (PL OPS, CMIX)

**[A] PRE-DEORBIT PREP ACTIVITIES:**

**AIRLOCK CLOSEOUT**  
 Remove loose items stored in Airlock  
 Perform Airlock ENT & SW VERIF  
 (DEORBIT PREP, ENT SW LIST/VERIF).  
 p. 3-29 AND 3-30

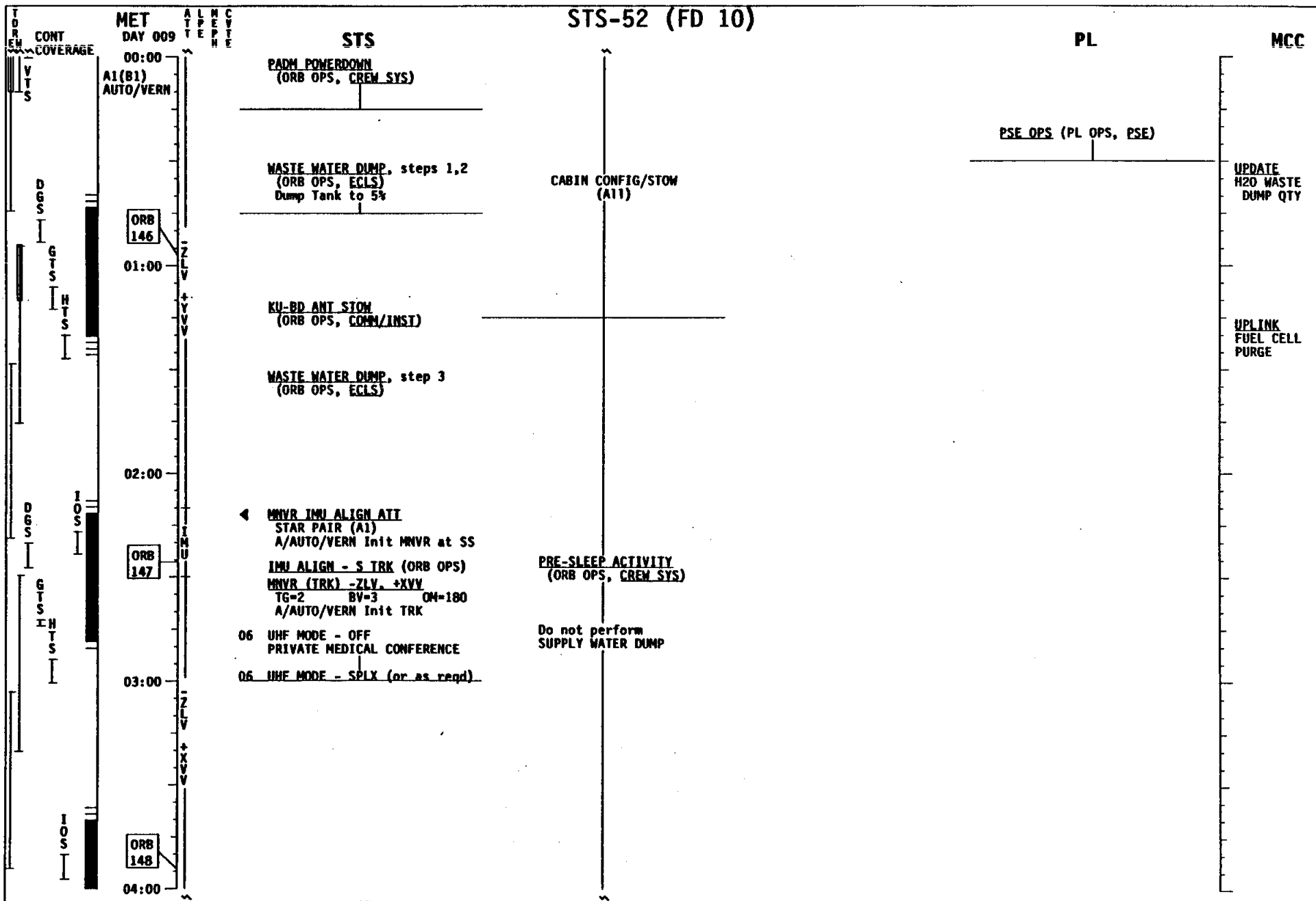
**STOW QUICKDON MASKS**  
 MD54G Remove depleted LiOH can  
 MD54M Remove unused LiOH can and stow  
 depleted LiOH can  
 MD54G Install bagged, unused LiOH can

**NOTE**  
 The unused can will be unbagged  
 during D/O Prep.

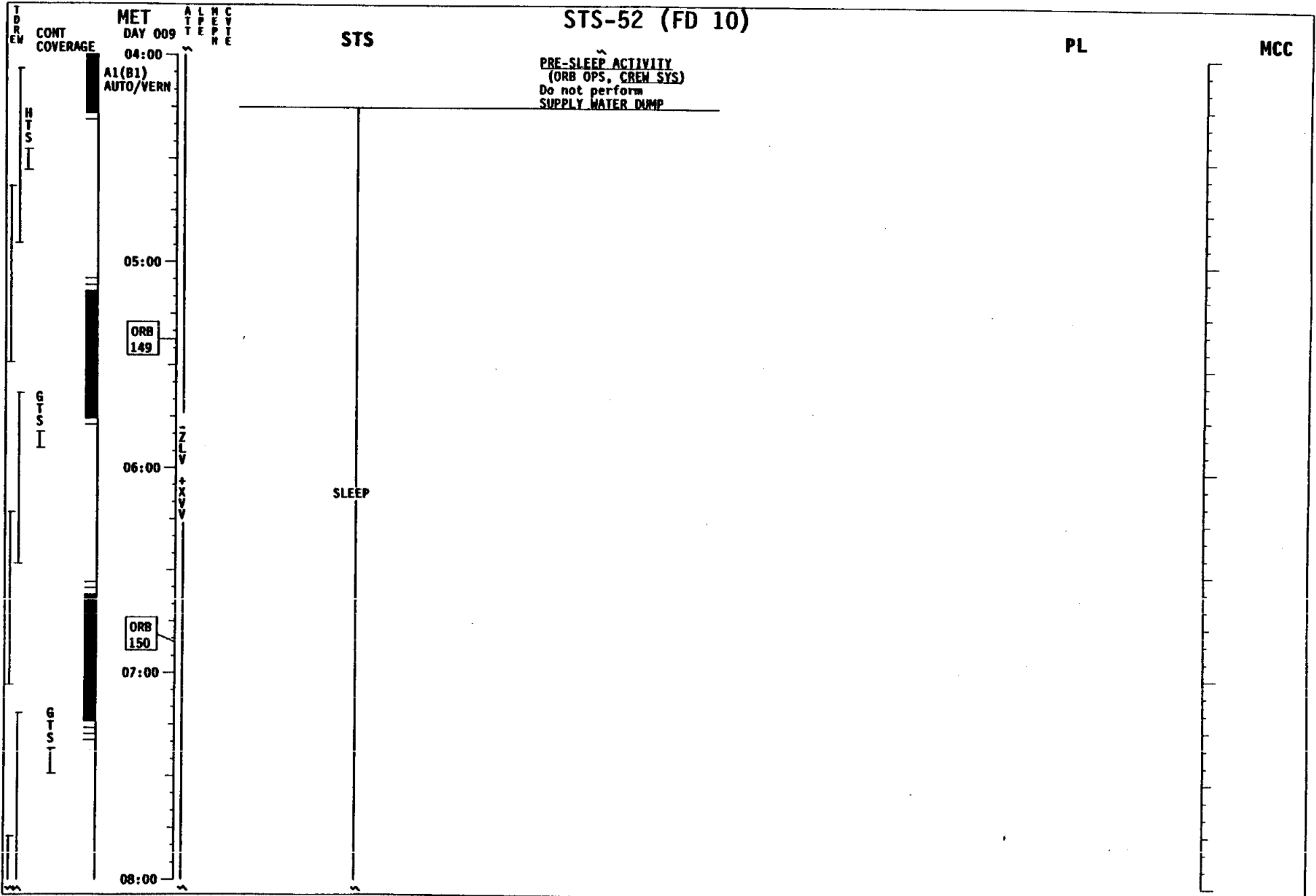
**IOP AND RETINAL PHOTOGRAPHY**  
 (DSO 472,474)  
 (BMED DSO/DTO, BMED DSOs)  
 (MS2, PS1)

UPLINK  
 PCMMU  
 103/185

# STS-52 (FD 10)



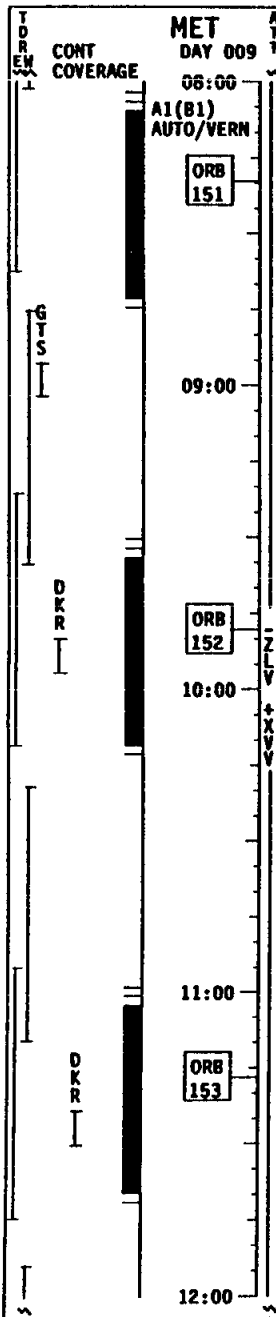
# STS-52 (FD 10)



STS-52 (FD 10)

PL

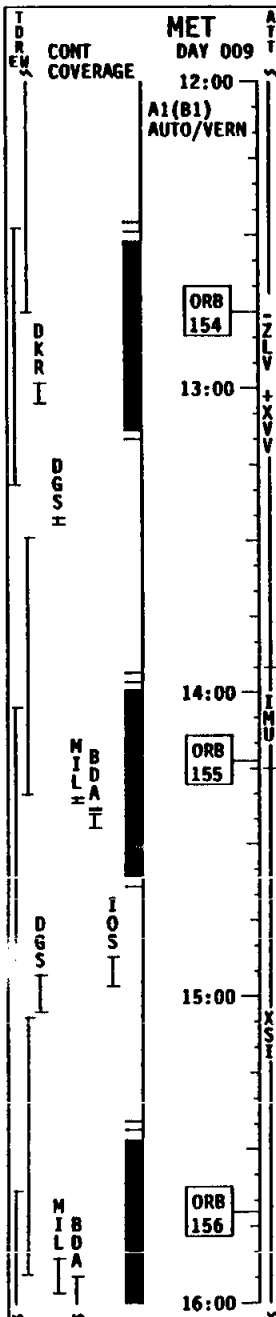
MCC



# STS-52 (FD 10)

PL

MCC



STS  
SLEEP

**EZ ACTIVITIES BEFORE LEAVING FLT PLN:**  
**AIR SAMPLE**  
 Rcd MET on bottle  
**FLUID LOADING PREP**  
 Fill 6 drink containers with  
 8 oz H2O each (per person)

**POST-SLEEP ACTIVITY**  
 (ORB OPS, CREW SYS)

Do not perform  
 SUPPLY WATER DUMP

- ◀ **MNVR IMU ALIGN ATT**  
 STAR PAIR (A1)  
 A/AUTO/VERN Init MNVR at SS
- IMU ALIGN - S TRK (ORB OPS)**
- ◀ **MNVR (TRK) BIASED -XSI**  
 TG-4 BV-5  
 P-184 Y-0 OM-90  
 A/AUTO/VERN (14:15) Init TRK
- 06 **UHF MODE - OFF**  
 PRIVATE MEDICAL CONFERENCE
- 06 **UHF MODE - SPLX (or as reqd)**

- SPIE DEACT AND STOW**  
 (PL OPS, SPIE)
- ENTRY CABLE RECONFIG**  
 (PL OPS, CABLE CONFIG)
- PRIORITY PMRUP GROUP B**  
 (ORB PKT, PRIOR PWRDN)

- ORTHOSTATIC FUNC (DSO 603B)**  
 BEFORE DEORBIT PREP
- VIS VEST INTG 01-3 (DSO 604)**  
 ENTRY PREP PROCEDURE  
 (BMED DSO/DTO, BMED DSOs)

- ETR ACTIVATION**  
 (SN 220 USMP-1 SUBSYS)
- ETR PWR-ON - ITEM 3 EXEC (\*)
- ETR RECORD - ITEM 4 EXEC (\*)
- ASP DEACTIVATION**  
 (PL OPS, ASP)
- SAMS-1 REC DEACTIVATION**  
 (PL OPS, SAMS)
- SAMS-1,2 DEACTIVATION**  
 (PL OPS, SAMS)
- MPESS-B DEACTIVATION**  
 (PL OPS, MPESS-B)

**GO TO DEORBIT PREP AT 9/15:57**

CONTINGENCY TIMELINES

4D LAGEOS/IRIS INSERTION.....	4A-1
31D LAGEOS/IRIS INSERTION.....	4B-1
MINIMUM DURATION FLIGHT (MDF) TIMELINE.....	4C-1

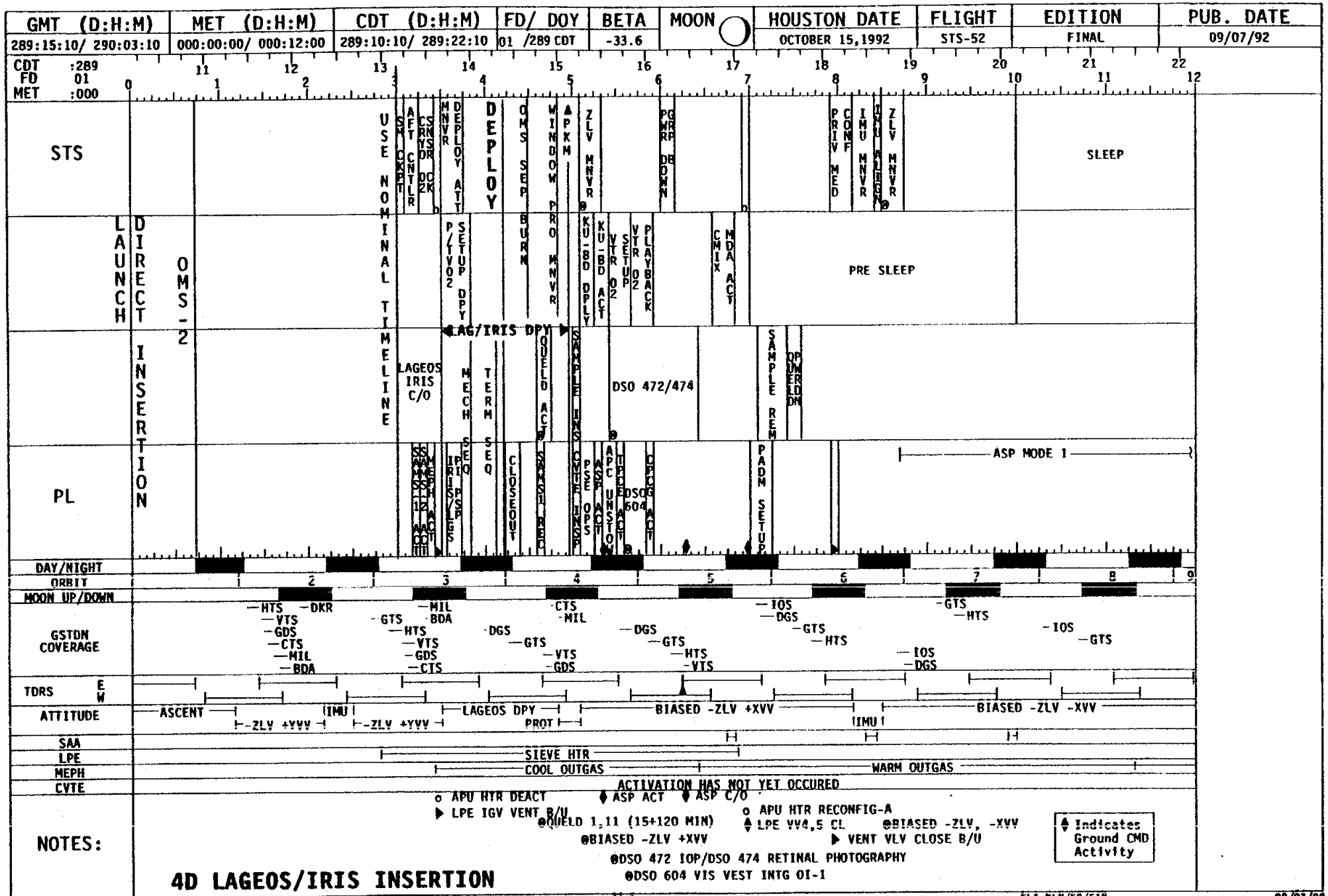
CONTINGENCY  
TIMELINES

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#### 4D LAGEOS/IRIS INSERTION

The 4D IRIS Insertion timeline is designed to accommodate deployment of IRIS at the 4D Insertion opportunity. The nominal timeline is used until the GO/NO-GO point, which is assumed to occur during the FD1 LAGEOS/IRIS checkout. This timeline provides SRM injection at a node, but outside the IRIS longitude injection band requirements.





# STS-52 (FD 01) 4D LAGEOS/IRIS INSERTION

STS

PL

MCC

MET DAY 000

02:00

A1(B1)  
AUTO/PRI

A1(B1)  
AUTO/VERN

ORB  
3

03:00

SM CKPT INIT (ORB OPS, DPS)

DAY 1 C/O  
(SPC DPY, PREDPY CKS)

AFT CONTROLLER C/O  
(ORB OPS, GNC)

CRYO 02 TK HTR SNR CK  
(ORB OPS, EPS)

SAMS1 ACT (PL OPS, SAMS)

SAMS2 ACT (PL OPS, SAMS)

MEPHISTO ACT  
(PL OPS, MEPHISTO)

IGV VENT (B/U)  
(PL OPS, LPE)

APU STEAM VENT HTR DEACT  
R2 BLR PWR (three) - OFF  
Change DAP A to A4  
MNR TO DEPLOY ATTITUDE  
(SPC DPY, DPY OPS)

P/TV02 SETUP (IRIS/LAGEOS DPY)  
(PHOTO/TV, P/TV SCENES)

IRIS/LGS PI & PSP SETUP  
(SPC DPY, DPY OPS)

A4(B1)  
AUTO/VERN

Change DAP B to B4

DEPLOY COUNTDOWN  
(SPC DPY, DPY OPS)

MECHANICAL SEQUENCE

A4(B4)  
AUTO/VERN

04:00

P/TV02 ACT (IRIS/LAGEOS DPY)  
(PHOTO/TV, P/TV SCENES)

UPDATE (TDRE)  
DPY FLT RULES

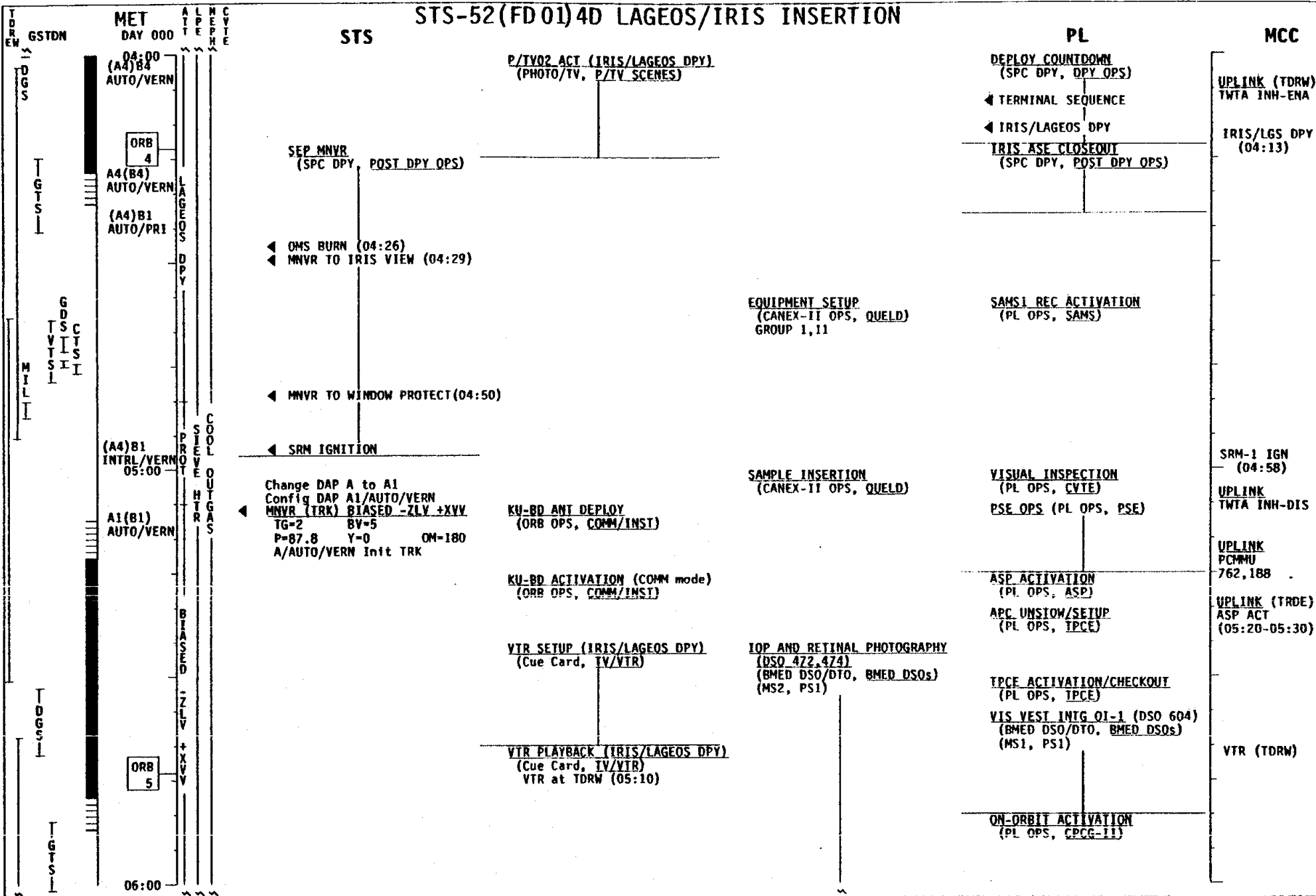
UPLINK (TDRE)  
DPY/BURN PADS

**ASSUMPTIONS:**

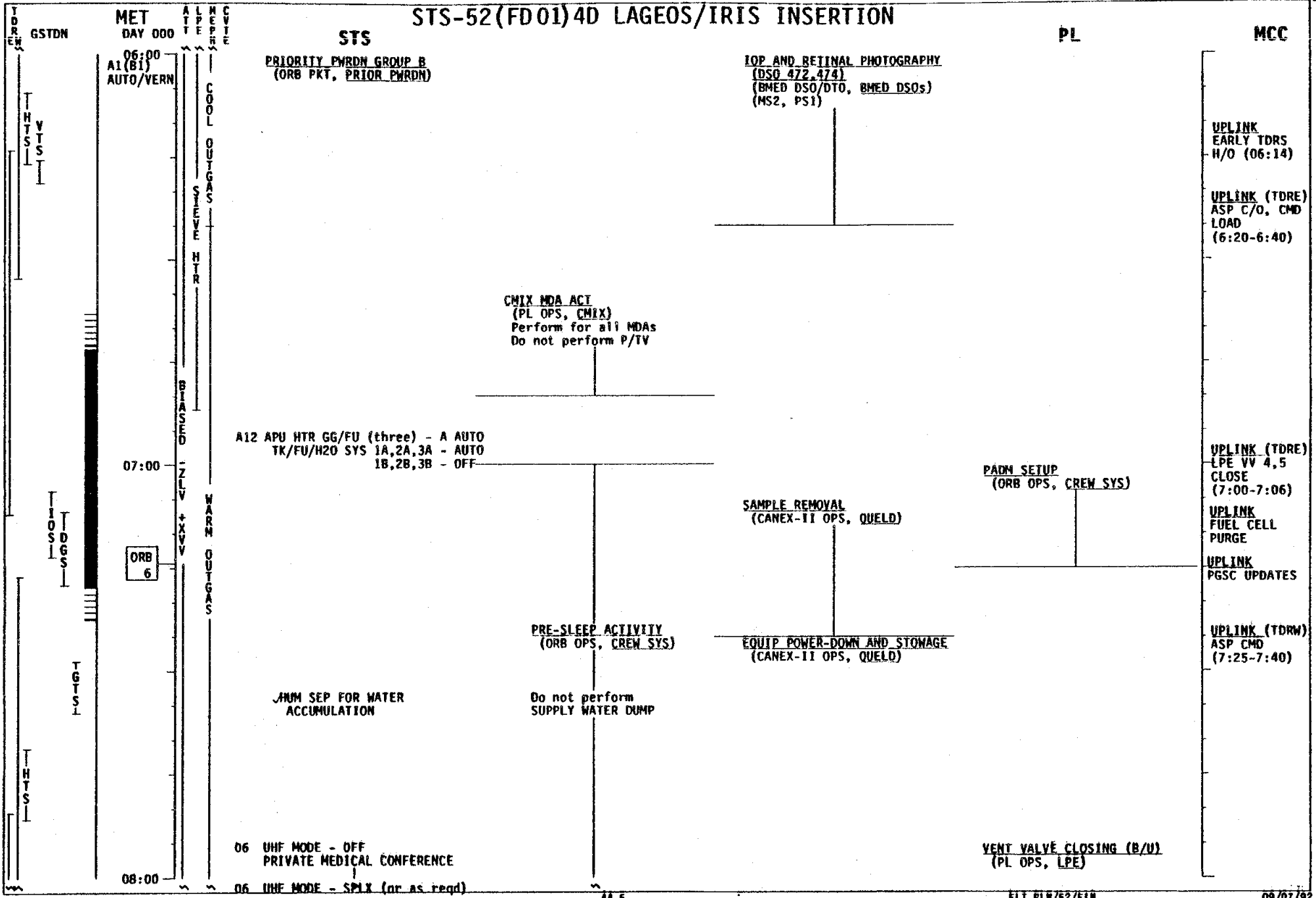
- CONTINGENCY DEPLOY IS NECESSARY DUE TO A FAILURE FOUND DURING THE FLIGHT DAY 1 LAGEOS/IRIS CHECKOUT.
- DEPLOY TIME IS BASED ON NODAL CONSTRAINTS AND NOT LIGHTING.
- DUE TO LACK OF TIME PKM MONITOR WILL NOT BE PERFORMED.
- SAMS CALIBRATION MNRVS WILL BE RESCHEDULED TO THE MORNING OF FD2.
- ORBIT ADJUST BURNS WILL BE RESCHEDULED ON FD2.
- WAKEUP WILL OCCUR AT 0/18:00 MET.
- FD 283 WILL BE REPLANNED REALTIME, WILL RETURN TO NOMINAL TIMELINE AT 2/10:00.
- PROPOSED FRR TRAJECTORY IS USED FROM THE NOMINAL TIMELINE.

USE NOMINAL TIMELINE UNTIL 3:00 MET

# STS-52(FD01)4D LAGEOS/IRIS INSERTION



# STS-52 (FD01) 4D LAGEOS/IRIS INSERTION



# STS-52 (FD 01) 4D LAGEOS/IRIS INSERTION

PL

MCC

**MET DAY 000**  
**A1(B1)**  
**AUTO/VERN**

08:00  
 09:00  
 10:00  
 11:00  
 12:00

CONT  
 I O S G S  
 G T S H T S  
 I O S  
 G T S

IMU  
 WARM  
 OUTGAS  
 B I A S E D  
 Z L V  
 X V V

TYPE  
 N  
 E  
 V  
 T  
 E

- 06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

---

- 06 UHF MODE - SPLX (or as reqd)  
 ◀ MNVR IMU ALIGN ATT  
 STAR PAIR (A1)  
 A/AUTO/VERN Init MNVR at SS  
 IMU ALIGN - 5 TRK (ORB Ops)
- ◀ MNVR (TRK) BIAS -ZLV -XVV  
 TG=2 BV=3 OM=355  
 A/AUTO/VERN Init TRK (08:30)

PRE-SLEEP ACTIVITY  
 (ORB OPS, CREW SYS)

Do not perform  
 SUPPLY WATER DUMP

SLEEP

UPLINK (TDRW)  
 ASP CMD  
 (08:55-09:10)

UPLINK (TDRW)  
 ASP CMD  
 (10:35-10:50)

ORB 7

ORB 8

ORB 9

### 31D LAGEOS/IRIS INSERTION

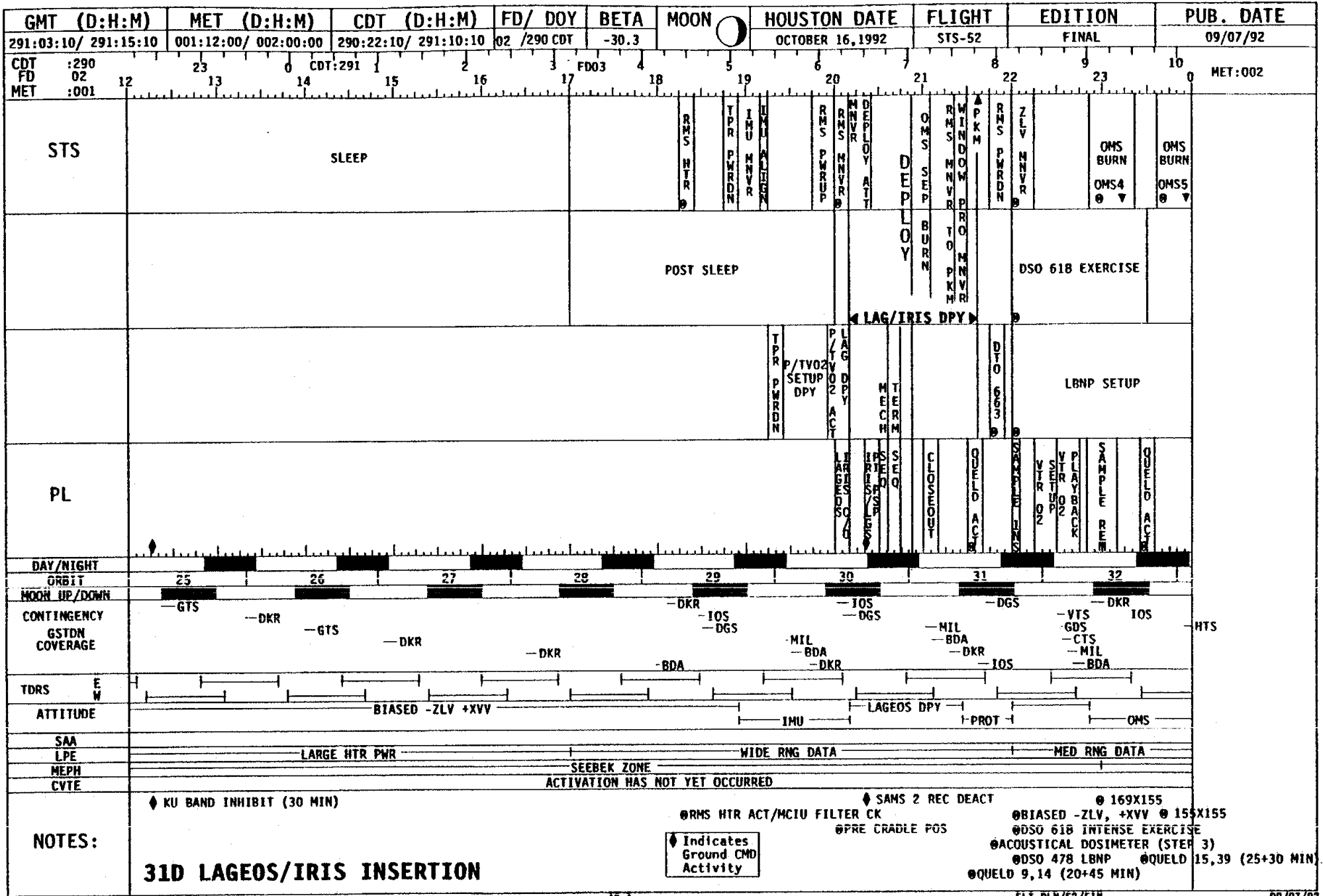
The 31D IRIS Insertion timeline is designed to accommodate delaying deployment of IRIS/LAGEOS to the 31D Insertion opportunity. The nominal timeline is used until the GO/NO-GO point. For this timeline, the wave-off could occur as late as the Go/No-Go point in deploy countdown for the 15D opportunity. The 31D opportunity is designed as a backup that maintains the IRIS longitude injection band requirements.



GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
290:15:10/ 291:03:10	001:00:00/ 001:12:00	290:10:10/ 290:22:10	02 /290 CDT	-31.6		OCTOBER 16, 1992	STS-52	FINAL	09/07/92				
CDT :290 FD :02 MET :001	0	11	12	13	14	15	16	17	18	19	20	21	22
STS		FILTER CLEANING	MEAL	P/TV12 ACT HPP	DSO 472/474	HPP RUN A1-A2	HPP RUN A3-A4	HPP RUN B1	HPP TEMP STOW	PRE SLEEP	SLEEP		
	P/TV03 ACT SVS	VTR O3	PLAY BACK	P/TV07 SETUP CMIX	P/TV07 ACT CMIX	P/TV15 SETUP							
PL	SSC VY/ SSO	BS PULUNG	SAMPLE REM	ODELD ACT	SAMPLE REM	ODELD ACT	FAN SEP SETUP	SAMPLE REM	OP UN LDN				
DAY/NIGHT	[Shaded bars indicating day/night cycle]												
ORBIT	[Shaded bars indicating orbit cycle]												
MOON UP/DOWN	[Shaded bars indicating moon up/down cycle]												
CONTINGENCY GSTDN COVERAGE	VTS -GDS -CTS -MIL -BDA -OKR	-HTS -GDS -CTS -MIL -BDA	-GTS -HTS -GDS -CTS -MIL	-GTS -HTS -GDS -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -CTS -MIL	-HTS -GTS -HTS -VTS -GDS -CTS -MIL	-HTS -GTS -HTS -VTS -GDS -CTS -MIL	-HTS -GTS -HTS -VTS -GDS -CTS -MIL	-HTS -GTS -HTS -VTS -GDS -CTS -MIL
TORS	[Timeline with E and M markers]												
ATTITUDE	BIASED -ZLV +XVV												
SAA	[Timeline with H markers]												
LPE	CAL HIGH RES THERM												
MEPH	[Timeline with H markers]												
CVTE	[Timeline with H markers]												
NOTES:	<p>ACTIVATION HAS NOT YET OCCURRED</p> <p>⊙QUELD 4,17 (15+90 MIN) ⊙DSO 472 IOP/DSO 474 RETINAL PHOTOGRAPHY ⊙V3 OP</p> <p>⊙QUELD 5,18 (20+60 MIN) ⊙CAL LARGE HTR INIT</p> <p>⊙ACOUSTICAL DOSIMETER (STEP 3)</p> <p>⊙AFT STATION</p> <p>⊙FWD STATION</p> <p>⊙BIASED -ZLV, +XVV</p> <p>◆ Indicates Ground CMD Activity</p>												

### 31D LAGEOS/IRIS INSERTION





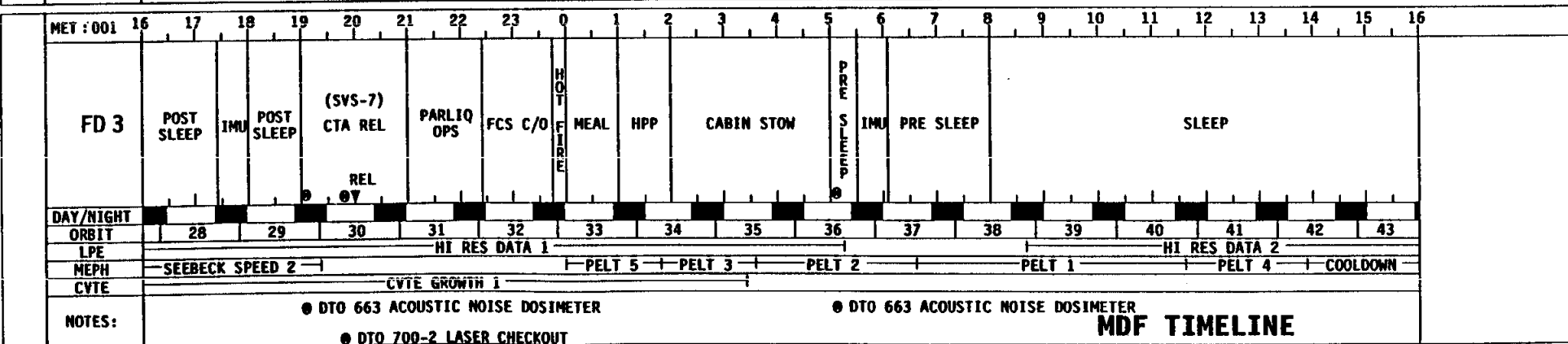
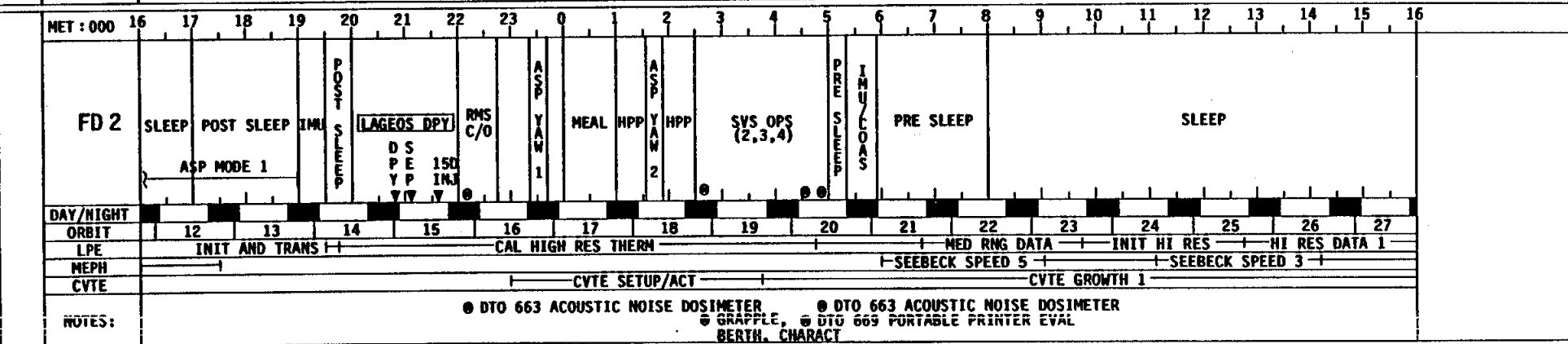
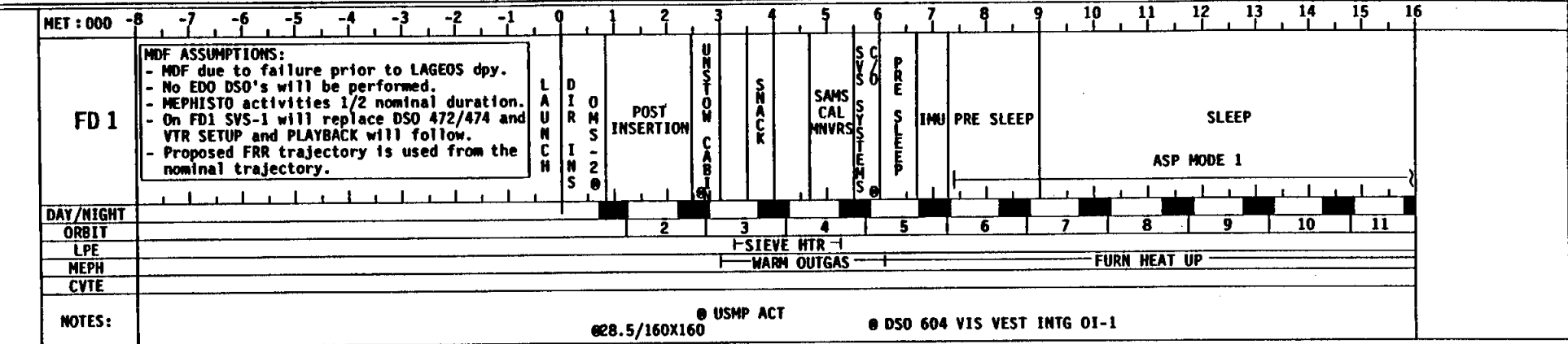
GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE		
291:15:10 / 292:03:10		002:00:00 / 002:12:00		291:10:10 / 291:22:10		03 / 291 CDT	-29.0		OCTOBER 17, 1992	STS-52	FINAL	09/07/92		
CDT	:291	11	12	13	14	15	16	17	18	19	20	21	22	
FD	03	0	1	2	3	4	5	6	7	8	9	10	11	12
MET	:002													
STS		MEAL									SLEEP			
PL														
DAY/NIGHT														
ORBIT														
MOON UP/DOWN														
GSTDN COVERAGE														
TDRS														
ATTITUDE														
SAA														
LPE														
MEPH														
CVTE														
NOTES:	<p>ACTIVATION HAS NOT YET OCCURRED</p> <p>①DSO 478 LBNP    ♦MEPH HOLD    ①DSO 478 LBNP ①QUELD 26:36 (20:00 MIN)</p> <p>①BIASED -ZLV, +XVV    ①DSO 478 LBNP    ♦MEPH RESTART (SPEED 4)</p> <p>①DSO 478 LBNP    ①DSO 478 LBNP    ①ACOUSTICAL DOSIMETER (STEPS 3-4)</p> <p>①RMS HTR ACT/MCIU FILTER CK    ①DSO 478 LBNP    ♦SAMS-2 REC ACT</p> <p>①QUELD 16:19 (10+120 MIN)</p> <p>①DSO 478 LBNP    ①BIASED -ZLV, +XVV</p> <p>①DSO 478 LBNP    ♦MEPH Restart</p> <p style="text-align: center;"><b>31D LAGEOS/IRIS INSERTION</b></p>													

♦ Indicates Ground CMD Activity

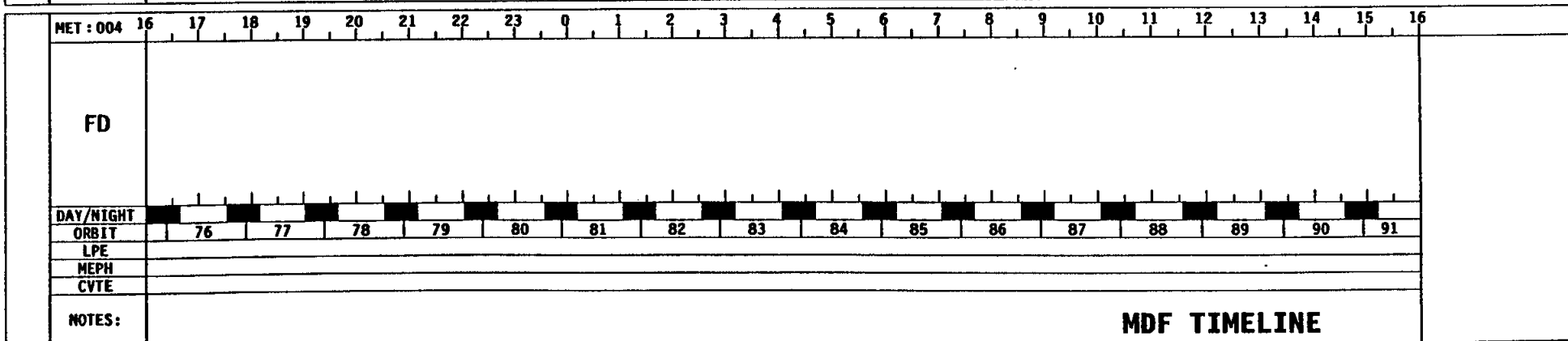
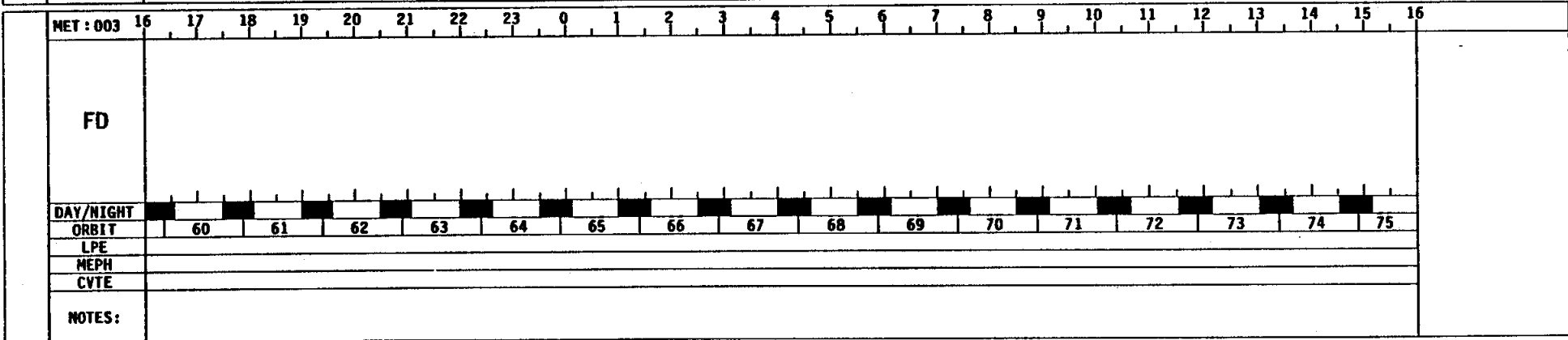
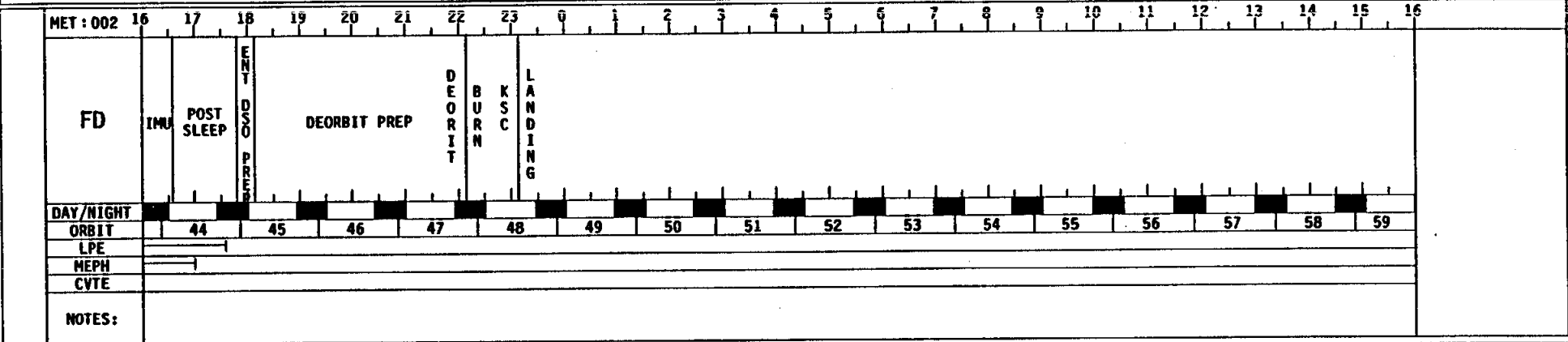
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### MINIMUM DURATION FLIGHT (MDF) TIMELINE

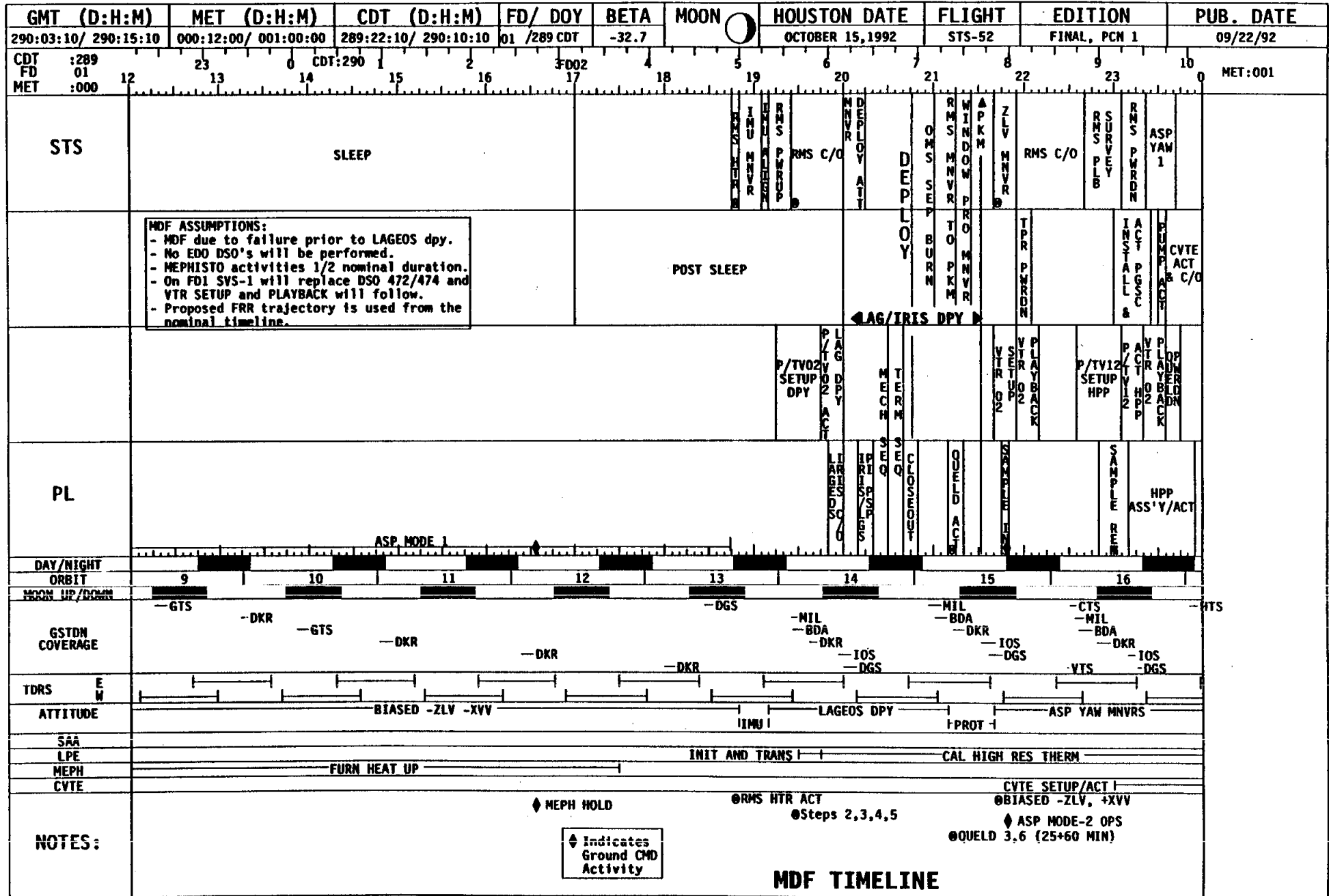
The MDF timeline assumes that a failure occurred during or shortly after ascent which places the orbiter in an MDF posture. The timeline assumes a mission of approximately 72 hours, designed to achieve the highest priority mission objectives.



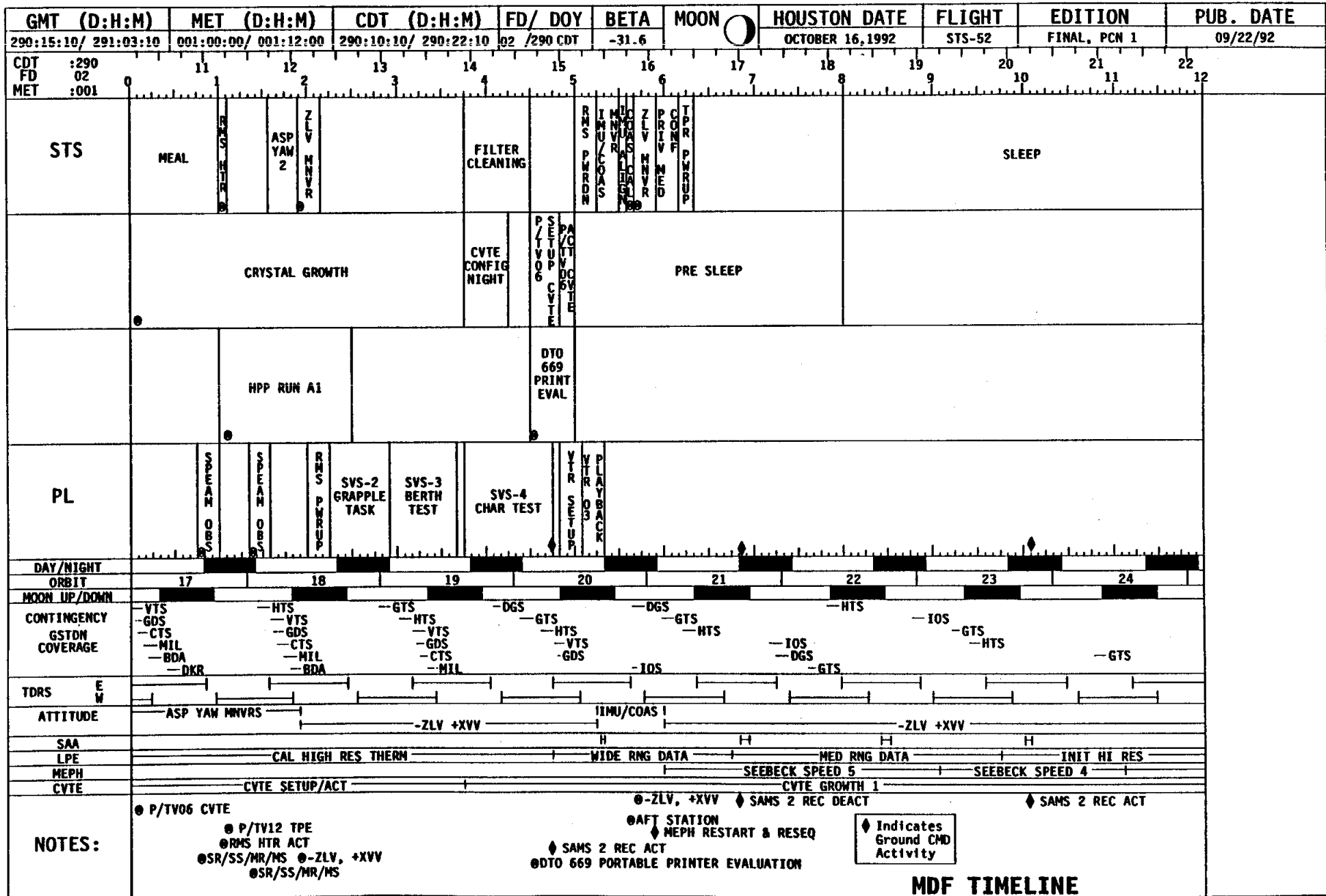
**MDF TIMELINE**



**MDF TIMELINE**



### MDF TIMELINE



**MDF TIMELINE**

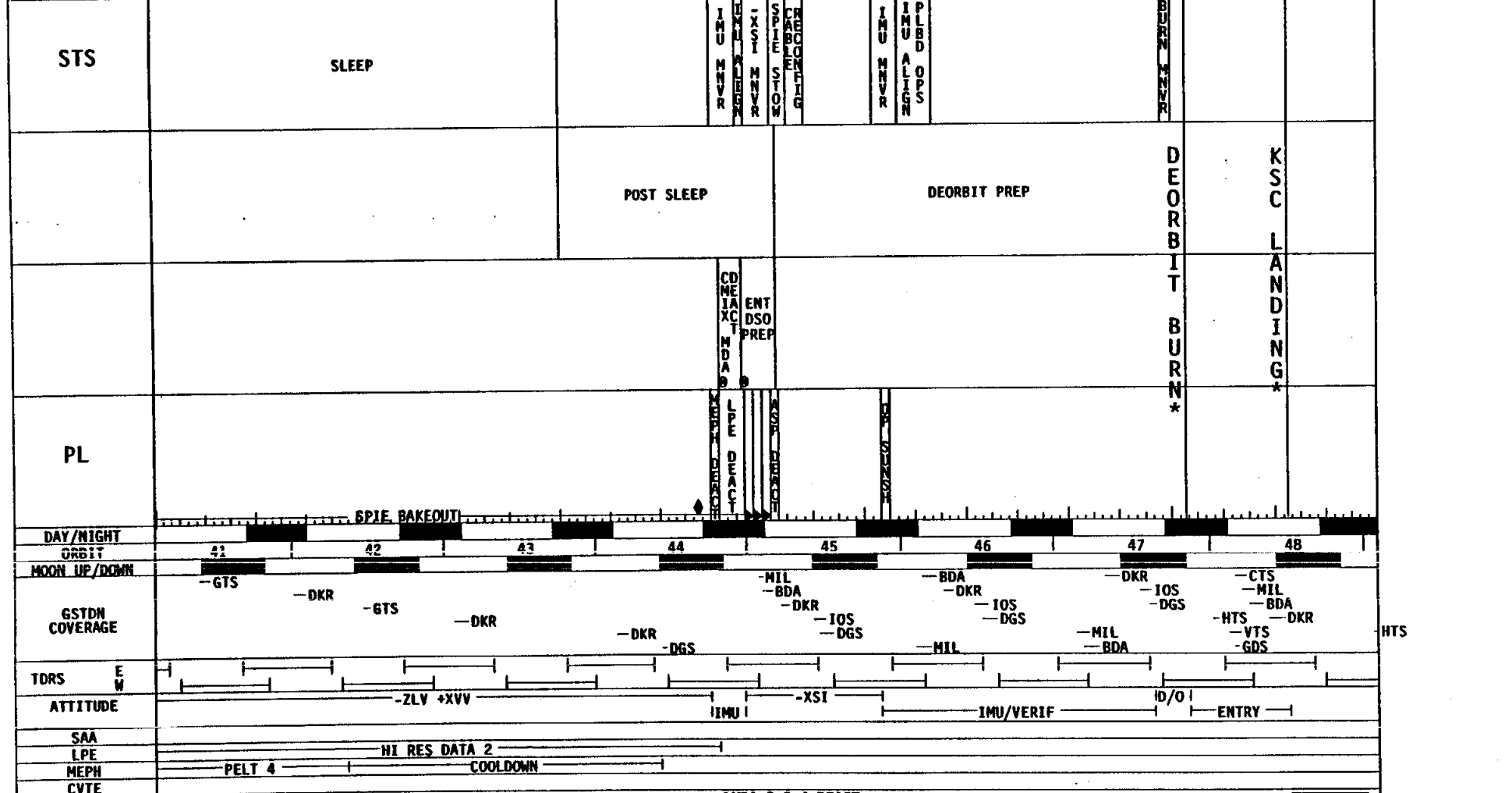






GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
292:03:10/ 292:15:10	002:12:00/ 003:00:00	291:22:10/ 292:10:10	03 /291 CDT	-27.5		OCTOBER 17, 1992	STS-52	FINAL, PCN 1	09/22/92

CDT :291	23	0	CDT:292	1	2	3	4	5	6	7	8	9	10	MET:003
FD 03	12	13	14	15	16	17	FD04	18	19	20	21	22	23	
MET :002														



**NOTES:**

- ◊ MDA 2,3,4 DEACT
- ◊ ENTRY DSO PREP:603B,604
- ▶ SAMS-2 DEACT
- ▶ SAMS-1 DEACT
- ▶ MPSS-B DEACT
- ◊ MEPH EXP SHUTDOWN
- ◆ Indicates Ground CMD Activity
- \* DEORBIT BURN 2/22:06
- \* KSC LANDING 2/23:08

**MDF TIMELINE**  
FLT PLR/52/FIR 1

The sections following this divider page  
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 23:03 289/16:22:00 GMT 33:03	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	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= 90.00	POST INSERTION -ZLV NOSE SOUTH
2 000/02:10:00 MET 23:14 289/17:20:00 GMT 33:14	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 142 P 125	STAR PAIR A1 -Y: 57 -Z: 40	IMU ALIGN
3 000/02:30:00 MET 43:10 289/17:40:00 GMT 53:10	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 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
4 000/04:39:30 MET 289/19:49:30 GMT		A1 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 159 P 57	INRTL R=173.55 HOLD P=118.45 Y= 3.89	INERTIAL HOLD TO PREPARE FOR SAMS CAL ROTATIONS
5 000/04:40:00 MET 289/19:50:00 GMT	INRTL ROTR BV=1 P= 0.00 Y= 0.00	B9 AUTO PRI	DSC 1.000 DB AT 3.00 DB RT 0.20		INRTL R=173.55 P=118.45 Y= 3.89	SAMS CAL ROLL ROTATION
6 000/04:43:00 MET 289/19:53:00 GMT		B9 INRT PRI	DSC 1.000 DB AT 3.00 DB RT 0.20	SUN R 339 P 57	INRTL R=353.55 HOLD P=118.45 Y= 3.89	STOP ROLL ROT
7 000/04:45:00 MET 289/19:55:00 GMT	INRTL ROTR BV=5 P= 0.00 Y= 90.00	B9 AUTO PRI	DSC 1.000 DB AT 3.00 DB RT 0.20		INRTL R=353.55 P=118.45 Y= 3.89	SAMS CAL PITCH ROTATION
8 000/04:48:00 MET 289/19:58:00 GMT		B9 INRT PRI	DSC 1.000 DB AT 3.00 DB RT 0.20	SUN R 201 P 123	INRTL R= 6.45 HOLD P=298.45 Y=356.11	STOP PITCH ROT
9 000/04:50:00 MET 289/20:00:00 GMT	INRTL ROTR BV=5 P=270.00 Y= 0.00	B9 AUTO PRI	DSC 1.000 DB AT 3.00 DB RT 0.20		INRTL R= 6.45 P=298.45 Y=356.11	SAMS CAL YAW ROTATION
10 000/04:53:00 MET 289/20:03:00 GMT		B9 INRT PRI	DSC 1.000 DB AT 3.00 DB RT 0.20	SUN R 159 P 57	INRTL R=173.55 HOLD P=118.45 Y= 3.89	STOP YAW ROT
11 000/05:10:00 MET 21:21 289/20:20:00 GMT 31:21	TGT=2 BV=5 P= 90.00 Y=355.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 355 P 90	LVLH R= 5.00 P=180.00 Y= 0.00	BIAS -ZLV TAIL FWD
12 000/06:45:00 MET 55:23 289/21:55:00 GMT 22:05:23	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 142 P 124	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 000/07:05:00 MET 14:49 289/22:15:00 GMT 24:49	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=355.00	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= 5.00	TPCE OPS ASP YAW BIAS BIAS -ZLV TAIL FWD
2 000/18:45:00 MET 53:29 290/09:55:00 GMT 10:03:29	INRTL R=127.00 MNVR P=186.00 Y= 52.00	A4 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 128 P 74	STAR PR A2 -Y: 40 -Z: 57	IMU ALIGN
3 000/20:00:00 MET 13:27 290/11:10:00 GMT 23:27	TGT=5 RA= 167.180 BV=3 DEC= -85.800S P= 90.00 Y= 0.00 OM=150.00	A4 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 282 P 86	INRTL R= 3.15 P= 7.11 Y=287.20	LAGEOS DEPLOY DEP: 0/20:46:55
4 000/20:53:55 MET 56:35 290/12:03:55 GMT 06:35 DEP + 00:07	INRTL R=199.00 MNVR P=197.00 Y=333.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 332 P 25		OMS SEP BURN
5 000/21:04:55 MET 08:58 290/12:14:55 GMT 18:58 DEP + 00:18	TGT=1 BV=3 P= 90.00 Y= 0.00 OM=270.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20		RNDZ NAV must be enabled	IRIS/LGS VIEW
6 000/21:23:55 MET 29:54 290/12:33:55 GMT 39:54 DEP + 00:37	TGT=1 BV=5 P=275.00 Y= 0.00 OM= 76.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20		RNDZ NAV must be enabled	WINDOW PROTECT
7 000/21:31:55 MET  290/12:41:55 GMT  DEP + 00:45		B1 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 359 P 61	INRTL R=340.37 HOLD P=109.40 Y=354.55	INRTL HOLD AT SRM IGN
8 000/21:45:00 MET 54:47 290/12:55:00 GMT 13:04:47	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
9 000/22:50:00 MET 23:05:00 290/14:00:00 GMT 15:00	TGT=2 BV=5 P= 78.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 78	LVLH R= 0.00 P=192.00 Y= 0.00	LVLH APPROX OMS 4 & 5
10 001/00:05:00 MET 20:00 290/15:15:00 GMT 30:00	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
11 001/06:35:00 MET 41:56 290/21:45:00 GMT 51:56	INRTL R=173.00 MNVR P= 53.00 Y=293.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 154 P 80	SPECIAL STAR PR -Y: 16 -Z: 37	IMU ALIGN -Z COAS CAL
12 001/07:00:00 MET 04:35 290/22:10:00 GMT 14:35	TGT=26 RA= 343.726 BV=1 DEC= -29.889S P= 0.00 Y= 0.00 OM=(blank)	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 162 P 127	INRTL R=156.87 P= 30.91 Y=345.94	+X COAS CAL +X: 26

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 001/07:20:00 MET 34:27 290/22:30:00 GMT 44:27	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
2 001/20:20:00 MET 27:12 291/11:30:00 GMT 37:12	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 142 P 123	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
3 001/20:40:00 MET 52:27 291/11:50:00 GMT 12:02:27	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
4 002/05:20:00 MET 26:51 291/20:30:00 GMT 36:51	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 142 P 123	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
5 002/05:40:00 MET 52:04 291/20:50:00 GMT 21:02:04	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
6 002/23:40:00 MET 51:18 292/14:50:00 GMT 15:01:18	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 143 P 122	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
7 003/00:00:00 MET 12:54 292/15:10:00 GMT 22:54	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
8 003/15:55:00 MET 16:01:39 293/07:05:00 GMT 11:39	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 143 P 121	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
9 003/16:15:00 MET 27:04 293/07:25:00 GMT 37:04	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
10 004/04:00:00 MET 07:24 293/19:10:00 GMT 17:24	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 143 P 121	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
11 004/04:20:00 MET 33:03 293/19:30:00 GMT 43:03	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
12 004/19:00:00 MET 06:49 294/10:10:00 GMT 16:49	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 143 P 120	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN

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



Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
004/19:20:00 MET 32:27 294/10:30:00 GMT 42:27	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
005/04:05:00 MET 16:08 294/19:15:00 GMT 26:08	TGT=2 BV=5 P=178.00 Y= 1.00 OM= 69.00	A1 AUTO VERN	DSC 0.200 DB AT 5.00 DB RT 0.02	EARTH R 27 P 178	LVLH R=291.00 P= 91.65 Y=358.49	MEPHISTO GG
005/15:20:00 MET 31:08 295/06:30:00 GMT 41:08	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS BIAS -ZLV NOSE FWD
006/04:05:00 MET 11:54 295/19:15:00 GMT 21:54	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 143 P 119	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
006/04:25:00 MET 37:44 295/19:35:00 GMT 47:44	TGT=2 BV=5 P= 87.80 Y= 0.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 88	LVLH R=180.00 P=357.80 Y= 0.00	USMP OPS MELEO EXPOSURE BIAS -ZLV NOSE FWD
006/16:05:00 MET 11:28 296/07:15:00 GMT 21:28	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 118	STAR PAIR A1 -Y: 57 -Z: 40	IMU ALIGN
006/16:25:00 MET 37:09 296/07:35:00 GMT 47:09	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=180.00	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= 0.00	MELEO EXPOSURE -ZLV NOSE FWD
006/19:00:00 MET 13:45 296/10:10:00 GMT 23:45	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 15.00	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=345.00	ASP SETUP BIAS -ZLV TAIL FWD
006/20:01:00 MET 21:00 296/11:11:00 GMT 31:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=345.00	A9 AUTO VERN	DSC 0.025 DB AT 1.00 DB RT 0.01	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 15.00	ASP YAW MNVR #1 DAY MNVR
006/20:57:00 MET 21:17:00 296/12:07:00 GMT 27:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 15.00	A9 AUTO VERN	DSC 0.025 DB AT 1.00 DB RT 0.01	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y=345.00	ASP YAW MNVR #2 NIGHT MNVR
006/21:20:00 MET 34:48 296/12:30:00 GMT 44:48	TGT=4 BV=5 P= 0.00 Y=270.00 OM=270.00 RA= 206.728 DEC= -11.0385	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 270 P 90	INRTL R= 59.11 P= 94.66 Y= 30.69	SPEAM OBS CREW CONF -YSI
007/01:25:00 MET 34:28 296/16:35:00 GMT 44:28	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=345.00	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= 15.00	ASP SETUP BIAS -ZLV TAIL FWD

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVEN	
1 007/01:50:00 MET 02:10:00 296/17:00:00 GMT 20:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 15.00	A9 AUTO VERN	DSC 0.025 DB AT 1.00 DB RT 0.01	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y=345.00	ASP YAW MNVR #3 DAY MNVR
2 007/02:57:00 MET 03:17:00 296/18:07:00 GMT 27:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=345.00	A9 AUTO VERN	DSC 0.025 DB AT 1.00 DB RT 0.01	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 15.00	ASP YAW MNVR #4 NIGHT MNVR MAINTAIN ATT FOR MODE 2 OBS
3 007/04:10:00 MET 22:34 296/19:20:00 GMT 32:34	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 118	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
4 007/04:30:00 MET 43:20 296/19:40:00 GMT 53:20	TGT=2 BV=5 P= 90.00 Y=355.00 OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 355 P 90	LVLH R=185.00 P= 0.00 Y= 0.00	MELEO EXPOSURE ASP ROLL BIAS BIAS -ZLV NOSE FWD
5 007/14:40:00 MET 46:50 297/05:50:00 GMT 56:50	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 117	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
6 007/15:00:00 MET 09:25 297/06:10:00 GMT 19:25	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 90.00	SVS TESTS +ZLV NOSE SOUTH
7 007/19:40:00 MET 54:18 297/10:50:00 GMT 11:04:18	TGT=2 BV=5 P= 78.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 78	LVLH R= 0.00 P=192.00 Y= 0.00	LVLH APPROX OMS 6 & 7
8 007/21:50:00 MET 57:33 297/13:00:00 GMT 07:33	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 360 P 90	LVLH R= 0.00 P=180.00 Y=270.00	OGLOW/VRCS -ZLV NOSE NORTH
9 007/23:05:00 MET 19:23 297/14:15:00 GMT 29:23	TGT=2 BV=5 P=270.00 Y=349.41 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 191 P 90	LVLH R=349.41 P= 0.00 Y= 0.00	OGLOW/CTA BIAS +ZLV NOSE FWD
10 008/00:45:00 MET 58:45 297/15:55:00 GMT 16:08:45	TGT=2 BV=5 P= 90.00 Y=349.44 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 349 P 90	LVLH R= 0.00 P=190.56 Y= 90.00	OGLOW/OBS BIAS -ZLV NOSE SOUTH
11 008/01:40:00 MET 53 297/16:50:00 GMT 53	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 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	WASTE H2O DUMP -ZLV NOSE SOUTH
12 008/04:05:00 MET 17:16 297/19:15:00 GMT 27:16	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 117	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 008/04:25:00 MET 38:31 297/19:35:00 GMT 48:31	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=180.00	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= 0.00	MELEO EXPOSURE -ZLV NOSE FWD
2 008/14:25:00 MET 32:14 298/05:35:00 GMT 42:14	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 116	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
3 008/14:45:00 MET 53:34 298/05:55:00 GMT 06:03:34	TGT=2 BV=2 P=180.00 Y= 0.00 OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 326 P 180	LVLH R=270.00 P= 90.00 Y= 0.00	CAMERA SETUP FOR CTA RELEASE SUN AVOIDANCE -XLV -YVV
4 008/16:43:00 MET 50:30 298/07:53:00 GMT 08:00:30	TGT=2 BV=2 P=180.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 44 P 180	LVLH R=180.00 P= 90.00 Y= 0.00	CTA RELEASE -XLV -ZVV
5 008/16:58:00 MET 17:12:48 298/08:08:00 GMT 22:48	TGT=1 BV=3 P= 90.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02		RNDZ NAV must be enabled	-Z TRACK OF CTA PERFORMED MANUALLY WITH DAP IN INRT
6 008/17:19:30 MET  298/08:29:30 GMT		B7 LVLH PRI	DSC 0.500 DB AT 2.00 DB RT 0.20	EARTH R 180 P 4	LVLH R=179.84 HOLD P=265.99 Y= 0.00	LVLH HOLD FOR SEP 3 BURN
7 008/17:30:00 MET 40:12 298/08:40:00 GMT 50:12	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	SPIE BAKEOUT WASTE H2O DUMP -ZLV NOSE SOUTH
8 009/02:10:00 MET 21:27 298/17:20:00 GMT 31:27	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 116	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
9 009/02:30:00 MET 42:27 298/17:40:00 GMT 52:27	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=180.00	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= 0.00	SPIE BAKEOUT -ZLV NOSE FWD
10 009/13:55:00 MET 14:00:19 299/05:05:00 GMT 10:19	INRTL R=142.00 MNVR P= 3.00 Y=326.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 144 P 115	STAR PR A1 -Y: 57 -Z: 40	IMU ALIGN
11 009/14:15:00 MET 22:46 299/05:25:00 GMT 32:46	TGT=4 BV=5 P=184.00 Y= 0.00 OM= 90.00 RA= 209.304 DEC= -11.9855	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 180 P 176	INRTL R=211.72 P=350.19 Y= 30.77	TAIL SUN RAD COLD SOAK
12 009/16:59:00 MET 17:04:20 299/08:09:00 GMT 14:20 TIG -02:58	INRTL R=183.00 MNVR P= 59.00 Y= 16.00	A1 AUTO PRI	DSC 0.200 DB AT 5.00 DB RT 0.20	SUN R 152 P 112	-Y: 23 -Z: 37	D-O IMU ALIGN

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	I/S	REF ATT/REMARKS	EVENT
1 009/17:15:00 MET 17:31 299/08:25:00 GMT 27:31	INRTL R=192.00 MNVR P=349.00 Y=346.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 82 P 137 -Y: 32 -Z: 49	D-O IMU VERIF
2 009/17:30:00 MET 34:20 299/08:40:00 GMT 44:20	INRTL R= 40.00 MNVR P=114.00 Y=299.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 339 P 47	D-O COMM
3 009/19:42:00 MET 46 299/10:52:00 GMT 46 TIG -00:15	INRTL R= 17.00 MNVR P=114.00 Y=299.00	TRANS AUTO PRI	DSC 0.500 DB AT 3.50 DB RT 0.50	SUN R 2 P 47	D-O BURN TIG: 9/19:57:00

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

STS-52 DAP BOOK

DAP A CONFIGURATIONS

	ITEM #	A1*	A2	A3	A4	A5	A6	A7	A8	A9
<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
<u>ROTATION</u>										
DSC RT NORM °/sec	2	0.200	0.400	0.200	0.500	0.200	0.200	0.200	0.200	0.050
VERN °/sec	3	0.200	0.400	0.008	0.200	0.200	0.200	0.200	0.200	0.025
PULSE NORM °/sec	4	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
VERN °/sec	5	0.010	0.010	0.010	0.010	0.050	0.010	0.010	0.010	0.010
COMP NORM °/sec	6	.00	.00	.00	.00	.00	.00	.00	.00	.00
VERN °/sec	7	.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	1.00
VERN (deg)	9	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000	1.000
RATE NORM °/sec	10	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	.010
<u>JET OPT</u>										
P	12	1	1	1	1	1	3	1 or 3	1	1
Y	13	1	1	3	1	1	3	1 or 3	1	1
CNTL ACCEL	14	0	0	0	0	0	0	0	0	0

\*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

	ITEM #	B1*	B2	B3	B4	B5	B6	B7	B8	B9
<u>TRANSLATION</u>										
PULSE ft/sec	15	0.02	0.02	0.02	0.02	0.02		0.05	0.01	0.02
<u>ROTATION</u>										
DSC RT NORM °/sec	16	0.500	0.200	0.200	0.200	0.200		0.500	0.200	1.000
VERN °/sec	17	0.200	0.200	0.200	0.008	0.016		0.200	0.200	0.200
PULSE NORM °/sec	18	0.04	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	0.002
COMP NORM °/sec	20	.00	.00	.00	.00	.00		.00	.00	.00
VERN °/sec	21	.000	.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	3.00
VERN (deg)	23	1.000	1.000	1.000	0.100	0.033		1.000	1.000	1.000
RATE NORM °/sec	24	0.20	0.20	0.20	0.20	0.20		0.20	0.20	0.20
VERN °/sec	25	.020	.020	.020	.010	.020		.020	.020	.020
<u>JET OPT</u>										
P	26	1	3	1	3	3		1 or 3	1	1
Y	27	1	3	1	3	3		1 or 3	1	1
CNTL ACCEL	28	0	0	0	0	0		0	0	0

\*I-LOADED OPS-2 DAP Configuration

ALT DAP CONFIGURATIONS

	ITEM #	ALT1*	ALT2
RATE DEADBAND	32	0.200	0.070
JET OPTION	33	1	3
NUMBER OF JETS	34	2	1
ON TIME	35	0.08	0.08
DELAY	36	0.00	1.00

\*I-LOADED OPS-2 DAP Configuration



<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	- ASP YAW MNVRS	B9	- SAMS ROTATIONS

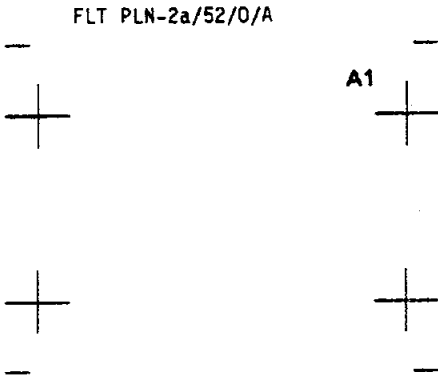
FLT PLN-1a/52/0/A

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FLT PLN-1b/52/0/A



DAP A



FLT PLN-2a/52/0/A

A1

DAP A1

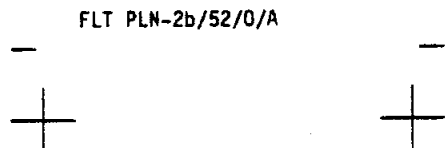
PURPOSE:

NOMINAL  
IMU ALIGN  
LOSS OF VERN  
(NOSE & TAIL)

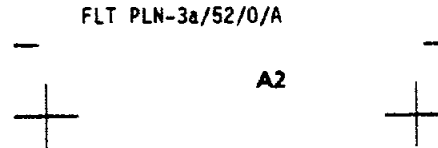


A1

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



FLT PLN-2b/52/0/A



FLT PLN-3a/52/0/A

A2



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 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/52/0/A

FLT PLN-4a/52/0/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 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
1	13		Y
0	14	CNTL ACCEL	

FLT PLN-4b/52/0/A

FLT PLN-5a/52/0/A



A4





A3



DAP A4

PURPOSE:  
PRE/POST DEPLOY

FLT PLN-5b/52/0/A



A4



DAP A5

PURPOSE:  
IMU ROTATION

FLT PLN-6b/52/0/A



A4

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

FLT PLN-6a/52/0/A

A5

A5

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

FLT PLN-7a/52/0/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	P
3	12		
3	13		Y
0	14	CNTL ACCEL	

FLT PLN-7b/52/0/A

FLT PLN-8a/52/0/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	P
1 or 3	12		
1 or 3	13		Y
0	14	CNTL ACCEL	

FLT PLN-8b/52/0/A

FLT PLN-9a/52/0/A



A8





A7



DAP A8

PURPOSE:  
PROX OPS

A8

0.0 5	1	TRANSLATION	
		PULSE	
		ROTATION	
C 2 0 0	2	DSC RT	NORM
C 2 0 0	3		VERN
0.1 0 0	4	PULSE	NORM
0.1 0 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
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/52/0/A

FLT PLN-10a/52/0/A



A9



A8

DAP A9

PURPOSE:  
ASP YAW MNVRS



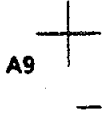
A9

0.1 0	1	TRANSLATION	
		PULSE	
		ROTATION	
0.0 5 0	2	DSC RT	NORM
0.0 2 5	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	
1.0 0	8	ATT	NORM
1.0 0 0	9		VERN
0.2 0	10	RATE	NORM
.0 1 0	11		VERN
1	12	JET OPT	P
1	13		Y
0	14	CNTL ACCEL	

FLT PLN-10b/52/0/A

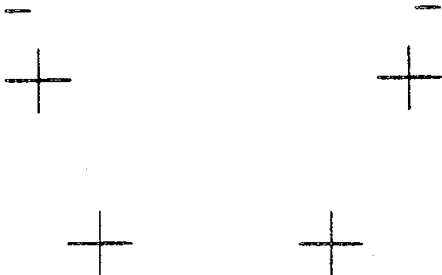
FLT PLN-11a/52/0/A



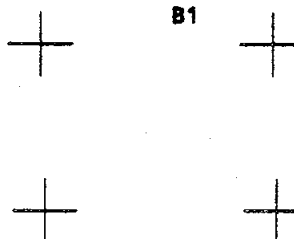


DAP B

FLT PLN-11b/52/0/A



FLT PLN-12a/52/0/A



DAP B1

PURPOSE:  
NOMINAL  
PRCS IMU ALIGN  
OMS & RCS BURNS

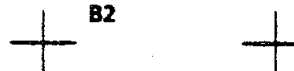
B1

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 0
23	1.0	0 0
24	0.2	0 0
25	.0	2 0
26		1
27		1
28		0

FLT PLN-12b/52/0/A



FLT PLN-13a/52/0/A





**DAP B2**

PURPOSE:  
LOSS OF VERN  
(TAIL ONLY)

FLT PLN-13b/52/0/A



**DAP B3**

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

FLT PLN-14b/52/0/A



**B2**

15	0.0	2
16	0.2	0 0
17	0.2	0 0 0
18	0.0	0 0 4
19	0.0	0 0 2
20	0.0	0 0 0
21	.0	0 0 0
22	3.0	0
23	1.0	0 0
24	0.2	0
25	.0	2 0
26		3
27		1
28		0

FLT PLN-14a/52/0/A



**B3**

15	0.0	2
16	0.2	0 0
17	0.2	0 0 0
18	0.0	0 0 4
19	0.0	0 0 2
20	0.0	0 0 0
21	.0	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-15a/52/0/A





+ B3 +

**DAP B4**

PURPOSE:  
SSUS DEPLOY

FLT PLN-15b/52/0/A

+ +

+ B4 +

**DAP B5**

PURPOSE:  
COAS CAL

FLT PLN-16b/52/0/A

+ +

+ +

**B4**

15	0.0	2
16	0.2	0 0
17	0.0	0 0 0 0
18	0.0	0 0 0 4
19	0.0	0 0 0 2
20	0.0	0 0 0 0
21	.0	0 0 0 0
22	0.3	0
23	0.1	0 0
24	0.2	0
25	0.1	0 0
26		3
27		3
28		0

FLT PLN-16a/52/0/A

+ B5 +

+ +

**B5**

15	0.0	2
16	0.2	0 0
17	0.0	0 0 0 0
18	0.0	0 0 4
19	0.0	0 0 2
20	0.0	0 0 0
21	.0	0 0 0
22	3.0	0
23	0.0	3 3
24	0.2	0
25	0.1	0 0
26		3
27		3
28		0

FLT PLN-17a/52/0/A

+ B6 +

+

**B5**

+

**DAP B6**

PURPOSE:  
(Blank)

FLT PLN-17b/52/0/A

+

+

+

**B6**

+

**DAP B7**

PURPOSE:  
RENDEZVOUS

FLT PLN-18b/52/0/A

+

+

+

**B6**

+

15    - - - -

16    - - - -

17    - - - -

18    - - - -

19    - - - -

20    - - - -

21    - - - -

22    - - - -

23    - - - -

24    - - - -

25    - - - -

26    -

27    -

28    -

FLT PLN-18a/52/0/A

+

**B7**

+

+

**B7**

+

15    0.0 5

16    0.5 0 0

17    0.2 0 0

18    0.0 0 4

19    0.0 0 2

20    .0 0 0

21    .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 2

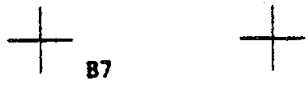
28    0

FLT PLN-19a/52/0/A

+

**B8**

+



B7



**DAP B8**

PURPOSE:

PROX OPS

**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-19b/52/0/A

FLT PLN-20a/52/0/A



B9



B8



**DAP B9**

PURPOSE:

SAMS ROTATIONS

**B9**

15	0.0	2
16	1.0	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	3.0	0
23	-1.0	0 0
24	0.2	0
25	.0	2 0
26		1
27		1
28		0

FLT PLN-20b/52/0/A

FLT PLN-21a/52/0/A



+ 89

+

+

<u>DAP</u>	<u>PURPOSE</u>
ALT1	- NOMINAL I-LOAD
ALT2	- USMP LOSS OF VERNIS

+

FLT PLN-22a/52/0/A

+

ALT1  
+

FLT PLN-21b/52/0/A

+

+

+

DAP ALT1

+

+

ALT1

+

PURPOSE:

NOMINAL  
I-LOAD

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-22b/52/0/A

FLT PLN-23a/52/0/A

+

+

+

ALT2

+

+ DAP ALT2 +

PURPOSE:

USMP LOSS OF  
VERNS

FLT PLN-23b/52/0/A

+ ALT1 +

+ +

FLT PLN-24b/52/0/A

+ ALT2 +

+ ALT2 +

RATE DB	
32	<u>0.0</u> <u>7</u> <u>0</u>
JET OPT	
33	<u>3</u>
# JETS	
34	<u>1</u>
ON TIME	
35	<u>0.0</u> <u>8</u>
DELAY	
36	<u>1.0</u> <u>0</u>

FLT PLN-24a/52/0/A

+ +

UNIV PTG	
TGT ID	= 1 Orbiting Vehicle = 2 Earth ctr = 3 Earth tgt Input LAT ( $\pm 90$ ) LON ( $\pm 180$ , + = East) ALT (-3444.0 to 20000.0 nm) = 4 Sun ctr = 5 Celestial tgt Input RA (0-359.99) DEC ( $\pm 90$ ) = 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 thru 5 not used
PRI JET OPT	= 1 Normal = 2 Nose only = 3 Tail only
ALT JET OPT	= 1 Normal = 2 Illegal entry = 3 Tail only

FLT PLN--25a/52/0/B



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FLT PLN-25b/52/0/A



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STS-52  
FLIGHT PLAN NOTES

FLT PLN NOTES

FLIGHT PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-52 (OV102) launch from KSC on October 15, 1992, (Proposed FRR Cycle) will be into a 160 x 163 nm orbit at an inclination of 28.45 degrees. The mission duration will be 10 days. Nominal landing occurs at KSC on October 25, 1992.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Local Time</u>
Nominal	Primary	159	KSC	06:56 EST
	Backup	160	KSC	08:29 EST
	Weather Alt.	161	EDW	06:54 PST
1 Day Late	Primary	175	KSC	06:29 EST
	Backup	176	KSC	08:02 EST
	Weather Alt.	177	EDW	06:27 PST
2 Days Late	Primary	191	KSC	06:01 EST
	Backup	192	KSC	07:34 EST
	Weather Alt.	193	EDW	05:58 PST

Major Events

<u>LAUNCH (KSC)</u>	October 15, 1992
MET (DD/HH:MM:SS)	00/00:00:00
Day of year	289
CDT/GMT	10:10/15:10

<u>OMS-2</u>	
MET (DD/HH:MM)	00/00:42
DV (fps)	221.0
ORBIT hp/ha (nm)	160/163

<u>IRIS/LAGEOS DEPLOY</u>	
MET (DD/HH:MM)	00/20:47
ORBIT hp/ha (nm)	160/163

<u>IRIS/LAGEOS SEPARATION</u>	
MET (DD/HH:MM)	00/21:02
DV (fps)	13.0
ORBIT hp/ha (nm)	160/169

<u>IRIS/LAGEOS INJECTION (15D)</u>	
MET (DD/HH:MM)	00/21:32
ORBIT hp/ha (nm)	***/***

<u>OMS 4</u>	
MET (DD/HH:MM)	00/23:13
DV (fps)	8.0
ORBIT hp/ha (nm)	155/169

<u>OMS 5</u>	
MET (DD/HH:MM)	00/24:00
DV (fps)	24.9
ORBIT hp/ha (nm)	155/155

FLT PLN NOTES

<u>OMS 6</u>	
MET (DD/HH:MM)	07/20:00
DV (fps)	74.9
ORBIT hp/ha (nm)	113/153
<u>OMS 7</u>	
MET (DD/HH:MM)	07/20:44
DV (fps)	71.9
ORBIT hp/ha (nm)	113/113
<u>CANEX DEPLOY</u>	
MET (DD/HH:MM)	08/16:49
ORBIT hp/ha (nm)	110/111
<u>CANEX SEP2</u>	
MET (DD/HH:MM)	08/16:57
ORBIT hp/ha (nm)	110/111
<u>CANEX SEP3</u>	
MET (DD/HH:MM)	08/17:20
ORBIT hp/ha (nm)	110/112
<u>DEORBIT BURN</u>	
MET (DD/HH:MM)	09/19:57
DV (fps)	248.0
<u>LANDING (KSC)</u>	
MET (DD/HH:MM)	09/20:48
Day of year	299
CST/GMT	05:56/11:56

## B. CREW

1. The five crewmembers flying this mission are:

CDR - James D. Wetherbee  
 PLT - Michael A. Baker  
 MS1 - Charles L. Veach  
 MS2 - William M. Shepherd  
 MS3 - Tamara E. Jernigan  
 PS1 - Steven MacLean

## 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, 174 degrees W. TDRS is the prime mode of communication coverage.
  - c. There are four GN sites available for on-orbit contingency support: MIL(MLX), BDA(BDX), DKR, and GDS(GDX). MAD(MAX) and CAN are emergency sites (2-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(GDX) and MIL(MLX) (90-minute lead time required).
- e. TDRS-E and TDRS-W are available for ascent and entry support. IOS (RTS site) is available for UHF voice in emergency (4-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 (4-hour lead time required): HTS, GTS, VTS, IOS, CTS, and DGS.

## 2. Guidance and Navigation

- a. The Orbiter state vector must be uplinked whenever downtrack error in the onboard vector becomes greater than 20 nm, but is usually uplinked when errors are greater than 5 nm. These are real-time calls. In addition, state vectors must be uplinked for specified targets when utilizing an orbiting vehicle as a TGT ID with Universal Pointing.
- b. IMU alignments occur approximately every 12 hours in the pre-sleep and post-sleep activities and prior to major events requiring low navigation uncertainty.

## 3. Environmental Control and Life Support Subsystems (ECLSS)

- a. The STS-52 vehicle, OV102, will have the Regenerative CO<sub>2</sub> Removal System installed. One CO<sub>2</sub> absorber and one charcoal canister is installed prior to launch. On orbit, the canisters are replaced by use of the RCRS. However, enough LiOH will be stowed to cover 8 days with wx extension. The crew will configure the system for on-orbit operations during Post Insertion and no further crew operation of this system is required until midflight, when alt controllers are activated. The unit is then deactivated in the deorbit prep time frame. One LiOH can will be installed for entry.
- b. There are four supply water tanks and one waste water tank which are loaded for launch with volumes sufficient to meet a launch day deorbit opportunity with payload bay doors (PLBDs) failed closed. A real-time call will be made to inform the crew to what level each dump is made. Tanks A and B will be dumped to a level that will allow the tanks to be full prior to the next daily group of deorbit opportunities. Supply water will be managed through use of the Topping FES. The waste water will be dumped when appropriate. No planned dump attitudes will be flown on this mission.
- c. The radiators will nominally be deployed after IRIS/LAGEOS deploy. The radiators will be stowed for ASP operations, and re-deploy will be considered for thermal reasons, if necessary, after ASP operations are complete.

- d. A modified Group B Powerdown will be required for all on-orbit operations, except for those times when a partial powerup is needed.

#### 4. DC Utility Power Usage

- a. Prior to completion of the CVTE experiment, the MNC Bus is limited to 185w (teleprinter unplugged). Simultaneous secondary experiment operations must be managed within this budget.

### D. TEXT UPLINK SYSTEM

1. The Text and Graphics System (TAGS) is a high-resolution facsimile system that scans text or graphics material and converts the analog SCAN data into serial digital data. This data is transmitted via a telemetry link to the cathode-ray tube hardcopier. Transmission time for an 8-1/2 by 11-inch page can vary from just over 1 minute to just over 16 minutes depending on the hardcopy resolution desired. The TAGS can only uplink images using Ku-band. This Flight Plan assumes Ku-band forward link is available for both TDRS-E and TDRS-W, and TAGS is the primary mode of text uplink. Instrumentation has the capability to uplink onboard hardcopier control commands via S-band or Ku-band for power on, advance, off, and overtemp reset.
2. The teleprinter (TPR) will provide a backup on-orbit capability to receive and reproduce text-only data from the MCC. The TPR uses S-band and is not dependent on TDRS Ku-band. TPR requires 1 to 2.5 minutes per message, depending on the number of lines. Activation will be scheduled during Post Insertion and the TPR will remain on until deactivation prior to seat ingress on entry day. The TPR will be unplugged several days while the crew is awake to provide electrical power margin for experiments. The TPR will be configured for use prior to pre-sleep every day.

### E. TELEVISION/PHOTOGRAPHY

1. The Closed Circuit Television (CCTV) systems provide two wide-angle color cameras for in-cabin coverage. The four payload bay (PLB) TV cameras will have three lens assemblies: color lens assembly; monochrome lens assembly; and wide-angle lens assembly. The Flight Requirements Document specifies the type of lens assembly for each PLB camera. The Remote Manipulator System (RMS) will have a camera on each of the wrist and elbow locations.
2. Two video tape recorders (VTRs) will be available, each with 30-minute cassettes. One VTR will be dedicated to CANEX-2.
3. The 16mm, 35mm, and 70mm camera systems will be available.
4. One TV monitor will be dedicated to CANEX-2.

## F. PAYLOADS

### 1. IRIS/LAGEOS-II

The Laser Geodynamic Satellite (LAGEOS-II) will provide ranging information through interaction with ground-based lasers. LAGEOS-II will be placed in orbit by the Italian Research Interim Stage (IRIS), a spinning solid upper stage. The LAGEOS-II is attached to the IRIS solid rocket motor and deployment system. This assembly rests inside a thermally-shielded cradle.

The crew will command the deploy activities from the Standard Switch Panel (SSP) and the Multifunction CRT Display System (MCDS). The IRIS spin and deployment system will release the LAGEOS-II and rocket motor by means of a separation spring system. At 45 minutes after deployment, the IRIS motor will fire and place the LAGEOS-II in the desired orbit. The CCTV cameras will record the deployment sequence and monitor the PKM burn using the cameras on the RMS.

### 2. United States Microgravity Payload (USMP-1)

The USMP-1 consists of three experiments mounted on Multipurpose Experiment Support Structure (MPSS-B). A Spacelab MPSS-A carrier and a Spacelab MPSS carrier, connected by a bridge, form the MPSS-B carrier.

The Lamda Point Experiment (LPE) will perform a new test measuring the heat capacity of cryogenic helium. LPE must be performed during the first 7 days in orbit to ensure a proper supply of liquid helium. The Materiel Pour L'Etude Des Phenomenes Interessant La Solidification Sur Terre et en Orbite (MEPHISTO) will study different parameters which influence crystalline growth. The Space Acceleration Measurement System (SAMS) will measure accelerations for LPE and MEPHISTO. The SAMS will also store and transmit large blocks of data.

The experiments require a minimum microgravity environment.

### 3. Attitude Sensor Package (ASP)

The ASP payload consists of three independent attitude sensors: the Modular Star Sensor (MOSS); the Yaw Earth Sensor (YESS); and the Low Altitude Conical Earth Sensor (LACES). The ASP sensors will be mounted on a single Hitchhiker mounting plate. Hitchhiker avionics, mounted on an additional small plate, will provide the interface to the space shuttle power and command systems.

The ASP sensors require at least 16 orbits of -ZLV attitude. During these orbits the sensors must have a clear field of view (FOV). The Payload Operations Control Center (POCC) will command the sensors via the Payload Signal Processor. The ASP requires Ku-band channel 2 support for sensor measurements.

### 4. Canadian Experiments (CANEX-2)

The CANEX-2 payload consists of seven sets of experiments. The Space Vision Systems (SVS), the primary CANEX-2 experiment, consists of four aft flight deck items: a Real-Time

Photogrammetry Unit, a Display and Control panel, a CCTV monitor, and a CCTV VTR. The RMS will deploy and maneuver the SVS Canadian Target Assembly (CTA). The CCTV system will track visual targets on the surface of the CTA.

The Material Exposure in Low Earth Orbit (MELEO) experiment consists of material samples on witness plates mounted to the RMS. The RMS will be periodically maneuvered to expose the plates at different positions and to permit observation of the plates by the crew. MELEO will also measure atomic oxygen flux with the Shuttle Plume Impingement Experiment (SPIE).

The Orbiter Glow (OGLOW) experiment will study the glow phenomenon generated on the Orbiter surface at certain attitudes. During Sun Photometer Earth Atmosphere Measurements (SPEAM), the crew will point a handheld sun photometer directly at the sun and moon through various Orbiter windows. The Phase Partitioning in Liquids (PARLIQ) experiment will be performed in the middeck area. The Queen's University Experiment in Liquid Metal Diffusion (QUELD) consists of a small furnace operated in the middeck area. The Space Adaptation Tests and Observations (SATO) consists of a series of medical tests performed upon the Payload Specialist (PS).

5. Commercial Protein Crystal Growth (CPCG)

The CPCG payload will supply information on the scientific methods and commercial potential for growing large, high-quality protein crystals in microgravity. The configuration on this flight, Block II, consists of a Refrigerator/Incubator Module (R/IMs) and a Protein Crystallization Facility (PCF). The CPCG payload, installed in a middeck locker, requires a nearly continuous 28V dc power.

6. Heat Pipe Performance Experiment (HPP)

The HPP payload will study the behavior of heat pipes in microgravity. The crew will perform the HPP, which involves rotating heat pipes, in the middeck area. The HPP requires TV and photographic coverage of the experiments.

7. Physiological Systems Experiment (PSE)

The PSE will study the effects of a proprietary protein molecule on animal physiological systems in microgravity. The PSE will be contained in two middeck lockers and two Animal Enclosure Modules (AEMs). The crew will monitor the PSE on a daily basis.

8. Shuttle Plume Impingement Experiment (SPIE)

The SPIE payload consists of flux/fluence sensing hardware mounted on to the End Effector of the Remote Manipulator System, an electronics unit in the aft flight deck, and a PGSC for data recording. The SPIE hardware will record the flux of atomic oxygen and measure Orbiter PRCS plume burns as a measure of contamination.

## 9. Crystals by Vapor Transport Experiment (CVTE)

The CVTE middeck payload consists of two furnaces installed inside a Middeck Accommodations Rack (MAR) that is constructed for use in place of the Orbiter galley. On orbit, the CVTE payload will process material sample cartridges during low-g phases of the mission. Two samples will be processed on STS-52. An SSP provided Payload and General Support Computer (PGSC) will be used by the crew to activate the CVTE and will be dedicated to the CVTE during processing runs. Ground commanded camcorder operations will be required during crew sleep periods to monitor MAR Water Loop temperatures.

## 10. Commercial Materials ITA Experiment (CMIX)

The CMIX consists of an experiment housed within a Refrigerator/Incubator Module (R/IM). The payload element is four material dispersion apparatus (MDA) minilabs. The CMIX occupies the space of one middeck locker, and draws 28V dc power for the R/IM. The MDA will study protein crystal growth, collagen polymerization, and several other phenomena.

## 11. Tank Pressure Control Experiment (TPCE)

TPCE will determine the effectiveness of jet mixing as a means of controlling tank pressures and equilibrating fluid temperatures. TPCE is installed in a sealed GAS canister attached to a GAS adapter beam in the PLB.

## 12. Ultraviolet Plume Instrument (UVPI)

The primary objectives of the UVPI activity are to use the orbiter during cooperative encounters of the Low-Power Atmospheric Compensation Experiment (LACE) satellite to obtain imagery and/or signature data to support the calibration of UVPI space-based sensors and to observe Orbiter events. No unique onboard hardware is associated with the UVPI tests; crew and Orbiter participation are required to establish the controlled conditions for the cooperative passes. This is a payload of opportunity on STS-52.

## G. ON-ORBIT DTOs

### 1. EDO WCS Fan Separator Evaluation (DTO 657)

The purpose of this DTO is to verify the design worthiness of the new Extended Duration Orbiter (EDO) Waste Collector Subsystem (WCS) Fan Separator under zero-g conditions for a prolonged period. This will also verify if the new design will correct past Fan Separator deficiencies.

### 2. Acoustical Noise Dosimeter Data (DTO 663)

Noise levels within the Orbiter crew compartment can be a concern from a crew operations, performance, and health standpoint. This DTO will obtain baseline data of time-averaged acoustical noise levels for the middeck area.



3. Interim Onboard Portable Printer (DTO 669)

This DTO will evaluate a portable thermal printer as an interim backup to the Text and Graphics System (TAGS) hardcopier and teleprinter. This DTO will provide a backup system for quality text and graphics, and will only be used in the event of a Ku-band or TAGS failure.

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

The purpose of this 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 using a handheld device. This DTO will assess the usefulness of the data to assist the pilot in achieving the desired trajectory conditions.

5. Plume Impingement Model Verification (DTO 828)

This DTO will impinge the CTA with one or more PRCS engines and determine its range, attitude, and induced velocity using the Space Vision System (SVS) and/or the Orbiter radar. Flight data will be used to support test validation of the Orbiter Reaction Control System (RCS) plume impingement math model.

6. Advanced Portable Computer Evaluation (DTO 1209)

This DTO will evaluate advanced portable computer technology to develop the portable computer requirements needed to support the Space Station Freedom crews.

H. ON-ORBIT DSOs

1. Intraocular Pressure (DSO 472)

The deleterious effects of sustained deviations in intraocular pressure (IOP) are difficult to predict since no statistically valid in-flight data exists. Baseline data is needed to define normal intraocular pressure ranges in microgravity and to determine the magnitude of pressure rises to be expected in crewmembers. A tonopen is used to measure IOP among the crewmembers.

2. Retinal Photography (DSO 474)

Retinal photographs taken on-orbit will show evidence (dilation of retinal veins or optic disc elevation) of increased intracranial pressure (ICP). Evidence of increased ICP and the development of Space Adaptation Syndrome (SAS) will be attempted to be correlated. Photo-analysis will be used to determine if microgravity induced fluid shifts elevate intracranial pressure.

3. In-Flight Lower Body Negative Pressure (LBNP) (DSO 478)

Fluid loading via ingestion of salt tablets and water in association with lower body negative pressure (LBNP) treatment will protect tolerance to orthostasis (simulated in-flight by LBNP). The objective of this study is to evaluate the effectiveness of fluid loading during LBNP in improving tolerance of a LBNP stress protocol.

4. Orthostatic Function During Entry, Landing, and Egress  
(DSO 603B Protocol)

The purpose is to document the orthostatic function of crewmembers during the actual stresses of entry, landing, and egress from the seat and from the cabin as mission duration increases. This data will be used to determine whether precautions and countermeasures are needed to protect crewmembers in the event of an emergency egress. It will also be used to determine the effectiveness of proposed in-flight countermeasures. Crewmembers will don equipment prior to donning the LES during deorbit preparation. The crewmember wears the equipment and records verbal comments through entry.

5. Visual-Vestibular Integration as a Function of Adaption  
(DSO 604 Investigation OI-1)

The objective 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. DSO procedure OI-1 will be performed on STS-52.

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

The objectives of this investigation are to determine the physiological effect of long duration space flight on skeletal muscle strength, endurance, and power. Specific objectives are to evaluate the concentric and eccentric functional changes pre- and postflight for the trunk, upper, and lower limbs; and to determine the etiology of neuromuscular dysfunction as measured by EMG.

7. Effects of Intense Exercise During Space Flight on Aerobic Capacity and Orthostatic Function (DSO 618)

This investigation will evaluate the effects of intense in-flight cycle ergometry exercise on postflight orthostatic function, and aerobic responses to maximal cycle exercise tests performed immediately postflight.

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

This DSO will evaluate the efficacy of Florinef on postflight orthostatic tolerance using heart rate, blood pressure, stroke volume, and other cardiovascular responses to orthostatic stress.

9. In-Flight LBNP Test of Countermeasures and EOM Countermeasure Trial (DSO 623)

The primary objective is to assess lower body negative pressure (LBNP) (soak) countermeasure effectiveness at the end of Shuttle flights. A secondary objective of this study is to evaluate the effectiveness of fluid loading during in-flight LBNP in improving tolerance to an LBNP stress protocol.

10. Documentary Television (DSO 901)

This DSO requires live television transmission or VTR dumps of crew activities, payload activities, and spacecraft functions.

11. Documentary Motion Picture Photography (DSO 902)

This DSO requires documentary and public affairs motion picture photography of significant activities which best depict the capabilities of the space shuttle. This DSO includes IRIS/LAGEOS deploy and burn, middeck activities, and crew photography.

12. Documentary Still Photography (DSO 903)

This DSO requires still photography of crew activities in the Orbiter, spacecraft accommodations, and mission-related scenes of general interest. The CANEX-2 OGLW-2 payload requires still photography in the 35mm format. The CANEX-2 MELEO payload requires still photography in the 70mm format.

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