

# Flight Plan

## STS-109

(STS-109 FRR Cycle Trajectory)

Mission Operations Directorate  
Operations Division

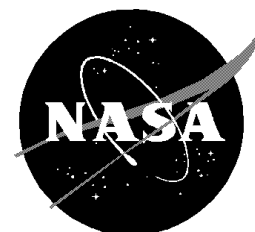
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Final  
January 29, 2002

EVENT	MET	CST		
Launch	00/00:00	Thu	02/28/02	05:48
HST Grapple	01/21:37	Sat	03/02/02	03:25
EVA 1	02/19:00	Sun	03/03/02	00:48
EVA 2	03/19:00	Mon	03/04/02	00:48
EVA 3	04/18:00	Tue	03/04/02	23:48
EVA 4	05/19:00	Wed	03/06/02	00:48
EVA 5	06/19:00	Thu	03/07/02	00:48
HST Release	07/22:27	Fri	03/08/02	04:15
Deorbit	10/19:41	Mon	03/11/02	01:29
Landing	10/20:50	Mon	03/11/02	02:38

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas



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MISSION OPERATIONS DIRECTORATE

**STS-109 FLIGHT PLAN**

FINAL  
January 29, 2002

PREPARED BY:

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Douglas Bristol  
Book Manager

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Steve Quenneville  
Timeliner

APPROVED BY:

---

Linda DeLapp  
Lead, Flight Planning  
and Pointing Group

---

Robert H. Nute  
Chief, Flight Planning Branch

---

Larry Davis  
Chief, Operations Division

---

Jon C. Harpold  
Director of Operations

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FLIGHT PLAN  
STS-109

**LIST OF EFFECTIVE PAGES**

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1-4 .....	109/FIN	3-23 .....	109/FIN
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3-63	109/FIN	3-117	109/FIN
3-64	109/FIN	3-118	109/FIN
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3-71	109/FIN	3-125	109/FIN
3-72	109/FIN	3-126	109/FIN
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3-74	109/FIN	3-128	109/FIN
3-75	109/FIN	3-129	109/FIN
3-76	109/FIN	3-130	109/FIN
3-77	109/FIN	3-131	109/FIN
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3-79	109/FIN	4-1	109/FIN
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3-82	109/FIN	4-4	109/FIN
3-83	109/FIN	4-5	109/FIN
3-84	109/FIN	4-6	109/FIN
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3-86	109/FIN	5-ii	* 109/FIN
3-87	109/FIN	5-1	* 109/FIN
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3-90	109/FIN	5-4	* 109/FIN
3-91	109/FIN	5-5	* 109/FIN
3-92	109/FIN	5-6	* 109/FIN
3-93	109/FIN	5-7	* 109/FIN
3-94	109/FIN	5-8	* 109/FIN
3-95	109/FIN	5-9	* 109/FIN
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3-97	109/FIN	6-1	* 109/FIN
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3-99	109/FIN	6-3	* 109/FIN
3-100	109/FIN	6-4	* 109/FIN
3-101	109/FIN	6-5	* 109/FIN
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3-111	109/FIN		
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## INTRODUCTION

The STS–109 Flight Plan is the Flight Data File article that contains the on–orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Rendezvous, EVA, Deorbit Prep, and Entry Checklists. The detailed rendezvous timelines and procedures are contained in the Rendezvous Checklist. The detailed EVA task timelines and procedures are in the EVA Checklist. The Detailed Timeline pages of this Flight Plan show high–level, bulleted comments for general insight during the rendezvous and EVAs. The deploy procedures required during the deploy timeframe are in the STS–109 HST Deploy Checklist. For continuity, the summary timeline includes the entire flight.

The Servicing Mission Integrated Timeline (SMIT), Launch Version, dated January 25, 2002, was used in the development of these timelines.

This on–orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive, and the requirements of the STS–109 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the STS–109 Flight Initialization Data Pack.

The STS–109 FRR Cycle Trajectory Rev C was used for the timeline trajectory. The flight profile used in this Flight Plan is for a launch date of February 28, 2002, at 11:48 GMT. Orbiter inertial attitudes are expressed relative to a mean of 1950 (M50) reference frame.

NSTS–37326, Shuttle Crew Scheduling Constraints (SCSC), Rev A, July 2000, has been used to build the timelines contained in this Flight Plan.

There have been two SCSC Exceptions written for STS–109:

- 109–1A
- 109–2A

The Flight Plan timeline pages, as well as other flight planning information, are available on the Space Shuttle Flight Planning web page at the following address:  
<http://mod.jsc.nasa.gov/do4/flightplan/fp.cfm?id=109>

OVERVIEW TIMELINE



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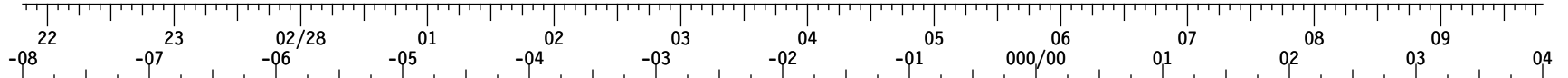
## STS-109 HST-SM3B Overview Timeline 11+2 Day Mission, 2 EVA Crews, 5 EVAs

	0/	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11
FD 1	February 28, 2002 Launch													POST INSERTION			Pre Sleep		Sleep						
Orb Att.														-ZLV +YVV		NC1 ● NC1B		-ZLV -XVV							
FD 2	Sleep		Post Sleep		RMS C/O, SSE C/O, EMU C/O, 10.2 DEPRESS, PRE-RNDZ										Pre Sleep		Sleep								
10.2/14.7																									
Orb Att.	● NC2						● NPC						-ZLV -XVV			● NH									
FD 3	Sleep		Post Sleep		HST Grapple				BRTH				SA RETRACT		Pre Sleep		Sleep								
10.2/14.7																									
Orb Att.	-ZLV -XVV			-ZLV +YVV			● NC4 RNDZ		● Ti		FREE		BATT CHG		BIAS -ZSI			-ZLV -XVV							
HST ATT	RNDZ										CAPT		BERTH		-V3 AXIS		-V2	+V2	-V3 AXIS FWD						
	*Grapple ~1/21:37																								
FD 4	Sleep		Post Sleep		Pre-EVA		EVA 1 (-V2 SA & DIODE BOX)					Post-EVA		Pre Sleep		Sleep									
10.2/14.7																									
Orb Att.	-ZLV -XVV										BATT CHG		-ZLV -XVV												
HST ATT	-V3 AXIS FWD					-V2 AXIS FWD					-V3 AXIS FWD														
FD 5	Sleep		Post Sleep		Pre-EVA		EVA 2 (+V2 SA & DIODE BOX, RWA)					Post-EVA		Dump	Pre Sleep		Sleep								
10.2/14.7																									
Orb Att.	-ZLV -XVV										BATT CHG		-ZLV -XVV												
HST ATT	-V3 AXIS FWD					+V2 AXIS FWD					-V3 AXIS FWD														
FD 6	Sleep		Post Sleep		Pre-EVA		EVA 3 (PCU)					Post-EVA		Pre Sleep		Sleep									
10.2/14.7																									
Orb Att.	-ZLV -XVV										BATT CHG		RGA F/T												
HST ATT	-V3 AXIS FWD					225°, (BAY 4 FWD)					-V3 AXIS FWD														
FD 7	Sleep		Post Sleep		Pre-EVA		EVA 4 (ACS, ESM)					Post-EVA		Dump	Pre Sleep		Sleep								
10.2/14.7																									
Orb Att.	RGA F/T					SUN PROTECT					-ZLV -XVV														
HST ATT	-V3 AXIS FWD					-V2 AXIS FWD					-V3 AXIS FWD														
FD 8	Sleep		Post Sleep		Pre-EVA		EVA 5 (NCS)					Post-EVA		Pre Sleep		Sleep									
10.2/14.7																									
Orb Att.	-ZLV -XVV			RBST		SUN PROTECT					-ZLV -XVV														
HST ATT	-V3 AXIS FWD					+V2 AXIS FWD					-V3 AXIS FWD														
FD 9	Sleep		Post Sleep		HST Release - 7/22:27				FSS STW, 14.7 RPR			Pre Sleep		Sleep											
10.2/14.7																									
Orb Att.	-ZLV -XVV			BATT CHRG			RELEAS		SEP		-ZLV -XVV														
HST ATT	-V3 AXIS FWD					RMS																			
FD 10	Slp	Post Sleep		OFF DUTY				POST EVA ENT PREP			Pre Sleep		Sleep												
Orb Att.	-ZLV -XVV																								
FD 11	Post Sleep		FCS C/O, RCS HF				CABIN STOW				Pre Sleep		Sleep												
Orb Att.	-ZLV -XVV			-ZLV -XVV			OPS3		-ZLV -XVV		ADJ	-ZLV -XVV		-ZLV -YVV											
FD 12	Post Sleep		IMU	D/O PREP			ENT	KSC LANDING																	
Orb Att.	-ZLV -YVV		IMU	-XSI	COMM		ENTRY	*LDG 10/20:50																	
	14.7						10.2																		

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SUMMARY TIMELINE

BETA = -7.6  
 CT 02/27/02  
 FD01  
 MET Day 000



CDR ALTMAN	FD01	ASCENT	POST INSERTION	OMS2A	ACFN TLR	GIRAINSTAL	HUMSEP	ACPN UFG
PLT CAREY		ASCENT	POST INSERTION		LOAD DAPC	T EN P C	PTV SETUPS (1,10,11)	
MS2/R1 CURRIE		ASCENT	POST INSERTION		ACFN TLR	SEE SETUP	F S R E T U P	ERGOM SETUP
MS1/EV1 GRUNSFELD		ASCENT	POST INSERTION		S A S C E T		C P S O T /	U O C A S /
MS3/EV2 LINNEHAN		ASCENT	POST INSERTION				PTV SETUPS (1,10,11)	
MS4/EV3 NEWMAN		ASCENT	POST INSERTION			LAN S/U & LATE UPDT	C P S O T /	U O C A S /
MS5/EV4 MASSIMINO		ASCENT	POST INSERTION		R M S	S A S C E T	GIRAINSTL	ERGOM SETUP
GND CMD					S T O C C		GYRO6 PWRUP	
DAY/NIGHT ORBIT SAA							2	3
TDRS E W Z								
TDRS								
ORB ATT								
FSS FWD AXIS								
SOLAR ARRAY								
NOTES								

L  
A  
U  
N  
C  
H

\*DSO 634 SETUP  
 @SM CHECKPOINT INIT

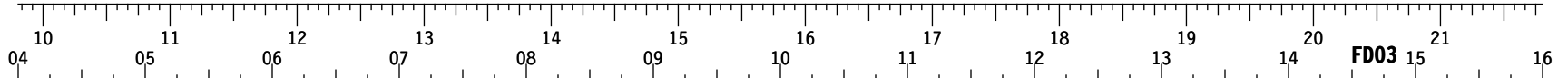
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 CT 02/28/02  
 FD01  
 MET Day 000

	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	16	
CDR ALTMAN	FD01 E L V O N RCS BURN	NC1A P S R L E E P RCS BURN	NC1B P S R L E E P OMS BURN	G P R W P R D N P M C E A / G P S R L E E P	PRE SLEEP									SLEEP					46 93 34	POST SLEEP
PLT CAREY	E L V O N RCS BURN	P S R L E E P RCS BURN	OMS BURN	- - Z X L V V	PRE SLEEP									SLEEP						POST SLEEP
MS2/R1 CURRIE	P S R L E E P RCS BURN	P S R L E E P RCS BURN	OMS BURN	G P R W P R D N	PRE SLEEP									SLEEP					4 9 3	POST SLEEP
MS1/EV1 GRUNSFELD			PRE SLEEP											SLEEP					4 9 3	POST SLEEP
MS3/EV2 LINNEHAN			PRE SLEEP											SLEEP						POST SLEEP
MS4/EV3 NEWMAN			PRE SLEEP											SLEEP					4 9 3	POST SLEEP
MS5/EV4 MASSIMINO			PRE SLEEP											SLEEP					4 9 3	POST SLEEP
GND CMD					S P C	HST ATT	CNFG SI AND NSSC1							STIS/NCS NOISE TEST						
DAY/NIGHT ORBIT SAA	3	4		5	6	7	8	9	10	11										
TDRS E W Z	[Timeline of TDRS events]																			
TDRS	[Timeline of TDRS events]																			
ORB ATT	[Timeline of ORB ATT events]																			
FSS FWD AXIS	[Timeline of FSS FWD AXIS events]																			
SOLAR ARRAY	[Timeline of SOLAR ARRAY events]																			
NOTES	*PTV SETUPS (1,10,11)																			

BETA = -5.4  
 CT 02/28/02  
 FD02  
 MET Day 000

	16	17	18	19	20	21	22	23	01/00	01	02	03	04	05	06	07	08	09	04			
CDR ALTMAN	FD02 POST SLEEP		RCS BURN	LD OAPS	PREP	10.2 DEPRESS	CONF	EXERCISE	RMS PLB SURV	MEAL	RCS BURN	MEAL	RNDZ TOOLS C/O		PLB OPS	TEST	POP	10.2 M	NPC3 OMS BURN	-ZLVV		
PLT CAREY	POST SLEEP		FUEL CELL MON OPS	RCS BURN	LD OAPS	TEST	PREP	10.2 DEPRESS	CONF	CRYO 02 SNSR	MEAL	RCS BURN	MEAL	RNDZ TOOLS C/O		EXERCISE		FILTER CLEAN	10.2 M	OMS BURN	PS REEP	
MS2/R1 CURRIE	POST SLEEP		RMT SR	EXERCISE	RP MRS UP	RMS C/O		SSE SURVEY	RMS PLB SURV		RCS BURN	RP MRS DN	MEAL	RNDZ TOOLS C/O		POP				OMS BURN	PS REEP	
MS1/EV1 GRUNSFELD	POST SLEEP		ASPRN	EXERCISE	HST PGSCA INST CNFG	SSE C/O		FSS PREP FOR BRTHG	BI AN TTT S*	MEAL		BT ATR TM*	A/L PREP	EVA TOOL UNSTOW/CNFG	BT ATR TM#	PGT C/O	TEST	POP	PTV07 SETUP			PRE SLEEP
MS3/EV2 LINNEHAN	POST SLEEP		ASPRN	HHL C/O	EXERCISE	PTV10 OPS	PTV11 OPS	PS TE VT OUP	MEAL		A/L PREP		EMU C/O #3,4	EMU SWAP	EMU C/O #1,2		REBA HW CO			PS REEP		
MS4/EV3 NEWMAN	POST SLEEP		ASPRN	MAGR UNSTOW & SETUP	HST PGSCA INST CNFG	SSE C/O		FSS PREP FOR BRTHG	BI AN TTT S*	MEAL		BT ATR TM*	A/L PREP	EVA TOOL UNSTOW/CNFG	BT ATR TM#	PGT C/O	TEST	POP	EXERCISE		PS REEP	
MS5/EV4 MASSIMINO	POST SLEEP		ASPRN	RMS C/O		SSE SURVEY	RMS PLB SURV	EXERCISE		MEAL	A/L PREP		EMU C/O #3,4	EMU SWAP	EMU C/O #1,2		REBA HW CO			PS REEP		
GND CMD															PLBK SSR							
DAY/NIGHT ORBIT SAA	11		12		13		14		15		16		17		18							
TDRS E W Z	[Timeline showing TDRS events across days 16-18]																					
TDRS	[Timeline showing TDRS events across days 16-18]																					
ORB ATT	-ZLV -XVV																					
FSS FWD AXIS	STOWED																					
SOLAR ARRAY	STOWED																					
NOTES	*MANUAL PURGE *REBA/EHIP/PGT BATT INIT *CNTLR SWAP #EHIP/PGT BATT TERM *REBA/EHIP/PGT BATT TERM EHIP/PGT BATT INIT																					

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 CT 03/01/02  
 FD02  
 MET Day 001

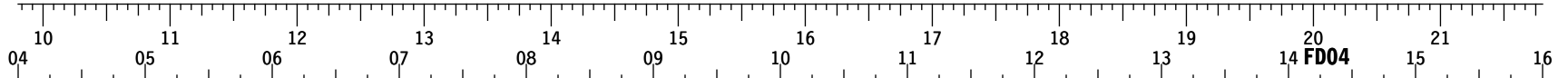


CDR ALTMAN	FD02 PRE SLEEP	PMC OCA	PRE SLEEP											SLEEP	4 6 9 3 4	POST SLEEP			
PLT CAREY	PRE SLEEP	HUM SEP	PRE SLEEP											SLEEP	P O S T S L E E P	- Z L V V	+ Y L V V	S D I U M M O P	POST SLEEP
MS2/R1 CURRIE			PRE SLEEP											SLEEP	4 9 3	POST SLEEP			
MS1/EV1 GRUNSFELD			PRE SLEEP											SLEEP	4 9 3	POST SLEEP			
MS3/EV2 LINNEHAN			PRE SLEEP											SLEEP		POST SLEEP			
MS4/EV3 NEWMAN			PRE SLEEP											SLEEP	4 9 3	POST SLEEP			
MS5/EV4 MASSIMINO			PRE SLEEP											SLEEP	4 9 3	POST SLEEP			
GND CMD	C D L O O S R E	S L A A T C H			P S L B R K	H S T L G A	L O A D S P C Z E R O S	F M H S T	S B A R K S +	P R E P H G A R T R C T	R E T R C T O F H G A S	S B A R K S -			T R A N S				
DAY/NIGHT ORBIT SAA	18	19	20	21	22	23	24	25	26										
TDRS	E W Z	Timeline showing TDRS activity with horizontal bars and vertical tick marks across the 18-26 hour period.																	
TDRS	Timeline showing TDRS activity with horizontal bars and vertical tick marks across the 18-26 hour period.																		
ORB ATT FSS FWD AXIS SOLAR ARRAY	-ZLV -XVV BERTH CONFIG (-V3) -ZLV +YVV																		
NOTES	*TO H/W CHARGE CONTROL																		





BETA = -0.8  
 CT 03/02/02  
 FD03  
 MET Day 002



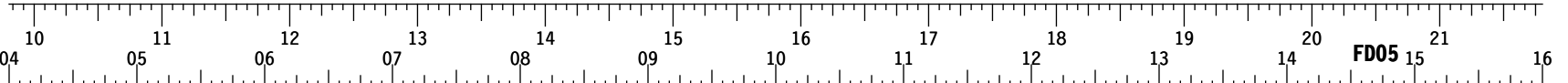
CDR ALTMAN	FD03 EVA RVW	PMC OCA	PRE SLEEP	HST SURVEY (-V3 FWD) #1							SLEEP	46 93 34	POST SLEEP
PLT CAREY	EVA RVW	P S T E V T O U I P	PRE SLEEP								SLEEP		POST SLEEP
MS2/R1 CURRIE	EVA RVW		PRE SLEEP								SLEEP	4 9 3	POST SLEEP
MS1/EV1 GRUNSFELD	EVA RVW	P B S P P A S S	PRE SLEEP								SLEEP	4 9 3 I H P S G S R S C T C *	POST SLEEP
MS3/EV2 LINNEHAN	EVA RVW		PRE SLEEP								SLEEP	B O N D	POST SLEEP
MS4/EV3 NEWMAN	EVA RVW	P B S P P A S S	PRE SLEEP								SLEEP	4 9 3 I H P S G S R S C T C *	POST SLEEP
MS5/EV4 MASSIMINO	EVA RVW		PRE SLEEP								SLEEP	4 9 3	POST SLEEP
GND CMD				KU BAND C/O	DISCHARGE BATTERIES	DISCHARGE BATTERIES	N T O E I S T E	DISCHARGE BATTERIES		STIS DATA		PGSC C/O	D FMT TEST
DAY/NIGHT ORBIT SAA													
TDRS	E W Z												
TDRS	Z												Z
ORB ATT													
FSS FWD AXIS													
SOLAR ARRAY													
NOTES	*-ZLV -XVV											*HST 4K CNFG	

BETA = 0.5  
 CT 03/02/02  
 FD04  
 MET Day 002

16 17 18 19 20 21 22 23 24 25 003/00 01 02 03 04 05 06 07 08 09 04

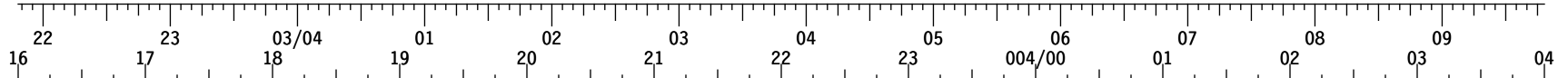
CDR ALTMAN	FD04 POST SLEEP	10-2M		ROTT**	EXERCISE	TAP	PVT*	TAP	TAP	TAP	TAP	TAP	ROTT*	TAP	10-2M	SA SLEW	BCHGT	PALCBK	PLBK OPS	10-2M	SA SLEW		
PLT CAREY	POST SLEEP	10-2M	PS TE VT 1U 1P	PS TE VT 1U 5P	P O T V S 1 1	EXERCISE	PTV15 OPS	P O T V S 1 1	PTV15 OPS EVA 1 (6:30)						P O T V S 1 1	PTV15 OPS	10-2M	P O T V S 1 4	PTV13 OPS			10-2M	P O T V S 1 4
MS2/R1 CURRIE	POST SLEEP	M C I U *		R O T T *	RMS A/L	RMS EVA SUPT	INTL EVA SETUP	-V2 SA & DIODE BOX						MFR	P601 CABLE	DAILY CLSOUT	R P M A R K					SA SLEW	
MS1/EV1 GRUNSFELD	PS O L S E T P	P M C A /G	EVA PREP	EMU PG & P/B	D E P R S	INTL EVA SETUP	-V2 SA & DIODE BOX						MFR	P601 CABLE	DAILY CLSOUT	I N G R S S	P A /L R E P	POST EVA W/H2O RECHG	EVA 2 T O O L C N F G	M B D A T K T	EVA 2 T O O L C N F G		
MS3/EV2 LINNEHAN	PS O L S E T P	P M C A /G	EVA PREP	EMU PG & P/B	D E P R S	INTL EVA SETUP	-V2 SA & DIODE BOX						MFR	P601 CABLE	DAILY CLSOUT	I N G R S S	P A /L R E P	POST EVA W/H2O RECHG	* L I O H W / B A T T	EMU SWAP			
MS4/EV3 NEWMAN	POST SLEEP		EVA PREP	EMU PG & P/B	D E P R S	EVA SUPPORT						A/L R E P	POST EVA W/H2O RECHG	EVA 2 T O O L C N F G	M B D A T K T	EVA 2 T O O L C N F G							
MS5/EV4 MASSIMINO	POST SLEEP		EVA PREP	EMU PG & P/B	D E P R S	EVA SUPPORT	P V T *	EVA SUPPORT						R O T *	EVA SUPPORT	SA SLEW	POST EVA W/H2O RECHG	* L I O H W / B A T T	EMU SWAP				
GND CMD	D FMT TEST			P R E P		W F E P C O N	S A I D E						S E C T 4	-A S L I V E	SA* SLEW	SA FUNCT			SA T O D E G				
DAY/NIGHT ORBIT SAA		41		42		43		44		45		46		47		48							
TDRS	E W Z	[Timeline of TDRS events]																					
TDRS	Z	[Timeline of Z events]																					
ORB ATT FSS FWD AXIS SOLAR ARRAY		-V3 -V2, +V2 RETRACTED -V2 -V2 INSTALL -V3 BATT CHG																					
NOTES		*HST 32K CNFG *-V2 POSN *90 DEG *DBA2 HTRS *-V3 POSN *90 DEG *USE HIGHEST CAPACITY LIOH *FILTER CK *85 DEG *TERM HST PGSCA C/O																					

BETA = 1.8  
 CT 03/03/02  
 FD04  
 MET Day 003



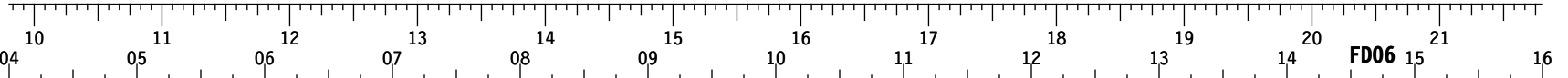
CDR ALTMAN	FD04 Z X L V V	EVA RVW	PMC OCA	PRE SLEEP	SLEEP HST SURVEY (-V3 FWD) #2				4 6 9 3 3 4	POST SLEEP
PLT CAREY		EVA RVW	P S T E V T O U I P	PRE SLEEP	SLEEP					POST SLEEP
MS2/R1 CURRIE		EVA RVW		PRE SLEEP	SLEEP				4 9 3	POST SLEEP
MS1/EV1 GRUNSFELD	B I A N T I T T *	EVA RVW	P B S P P A S S	PRE SLEEP	SLEEP				I H 4 N P 9 S G 3 R S T C	POST SLEEP
MS3/EV2 LINNEHAN	E S Q W U A I P	EVA RVW		PRE SLEEP	SLEEP					POST SLEEP
MS4/EV3 NEWMAN	B I A N T I T T *	EVA RVW	P B S P P A S S	PRE SLEEP	SLEEP				I H 4 N P 9 S G 3 R S T C	POST SLEEP
MS5/EV4 MASSIMINO	E S Q W U A I P	EVA RVW		PRE SLEEP	SLEEP				4 9 3	POST SLEEP
GND CMD	W F P C 2							DISCHARGE BATTERIES	DISCHARGE BATTERIES	
DAY/NIGHT ORBIT SAA	48	49	50	51	52	53	54	55	56	
TDRS	E W Z	[Timing diagram showing TDRS events across days 48-56]								
TDRS	Z	[Timing diagram showing Z events across days 48-56]								
ORB ATT FSS FWD AXIS SOLAR ARRAY	-ZLV -XVV -V3 -V2 AT 0									
NOTES	*EMU SWAP ⊕EMU SWAP *REBA/EHIP/PGT BATT INIT									

BETA = 2.9  
 CT 03/03/02  
 FD05  
 MET Day 003



CDR ALTMAN	FD05 POST SLEEP 10:2M				RH OSTT*	EXERCISE		T A P E		T A P E		T A P E		T A P E		T A P E		T A P E		R O T *	S A S L E W	B C A H T G T	1 0 :2 M	P A L C B T K	P O L P B S K	S L E W	
PLT CAREY	POST SLEEP	PS T E V T U 1 P		EXERCISE	P O T V S 1 1	PS T E V T U 5 P	PTV15 OPS														P O T V S 1 1	PTV14 OPS	PTV13 OPS			P T V 1 4	
MS2/R1 CURRIE	POST SLEEP 10:2M	M C I U *		RMS S/U	RMS EVA SUPT	RH OSTT*		DAILY SETUP	+V2 SA & DIODE BOX						RWA	DAILY CLSOUT	R P M A S R K		1 0 :2 M								S L E W
MS1/EV1 GRUNSFELD	POST SLEEP AS P R N	B T A E R T M *		EVA PREP	EMU PG & P/B	D E P R S	EVA SUPPORT EVA 2 (6:35)														R O T *	S A S L E W	POST EVA W/H2O RECHG	EVA 3 T O O L C N F G	M B D A T K T	EVA 3 T O O L C N F G	
MS3/EV2 LINNEHAN	POST SLEEP AS P R N	B T A E R T M *		EVA PREP	EMU PG & P/B	D E P R S	EVA SUPPORT														A/L R E P	POST EVA W/H2O RECHG	L I O H W/ B A T T	EMU S W A P			
MS4/EV3 NEWMAN	PM C S E T E P A/G	P S O L E T E P	B T A E R T M *	EVA PREP	EMU PG & P/B	D E P R S	DAILY SETUP	+V2 SA & DIODE BOX						RWA	DAILY CLSOUT	I N G R S	P R P A/L R E P	POST EVA W/H2O RECHG	EVA 3 T O O L C N F G	M B D A T K T	EVA 3 T O O L C N F G						
MS5/EV4 MASSIMINO	PM C S E T E P A/G	P S O L E T E P	B T A E R T M *	EVA PREP	EMU PG & P/B	D E P R S	DAILY SETUP	+V2 SA & DIODE BOX						RWA	DAILY CLSOUT	I N G R S	P R P A/L R E P	POST EVA W/H2O RECHG	L I O H W/ B A T T	EMU S W A P							
GND CMD	DISCHARGE BATTERIES				+ P R E P	S A I O D E				R P W R E P		S E C T 1	+ A S L A I V E	P P H C E U A T	A L I V E	RWA F U N C T T E S T	S A * S L E W	SA FUNCT TEST			S L E W *						
DAY/NIGHT ORBIT SAA	56	57	58	59	60	61	62	63																			
TDRS	[Timeline diagram showing TDRS events]																										
TDRS	[Timeline diagram showing TDRS events]																										
ORB ATT FSS FWD AXIS SOLAR ARRAY	-V3 -V2 AT 0 +V2 +V2 INSTALL -V3 90 0																										
NOTES	*FILTER CK *REBA/EHIP/PGT BATT TERM *+V2 POSN *DBA2 HTRS *-V3 POSN *-V3 POSN *90 DEG																										

BETA = 4.1  
 CT 03/04/02  
 FD05  
 MET Day 004

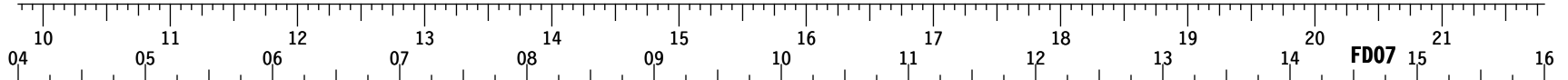


CDR ALTMAN	FD05 SLEW -ZLV +YVV	EVA RVW	PRE SLEEP	PMC OCA	-ZLV -XVV	HST SURVEY (-V3 FWD) #3					SLEEP	46 93 34	POST SLEEP	10 .2 M	RCS
PLT CAREY	P T V 1 4 M	SD U M O P	EVA RVW	PRE SLEEP	ST I M O M	PS R L E E P	SLEEP					POST SLEEP		RCS	
MS2/R1 CURRIE	SLEW 10 .2 M	EVA RVW	PRE SLEEP	SLEEP					49 3	POST SLEEP	10 .2 M	MCIU			
MS1/EV1 GRUNSFELD	B I A N T I T *	EVA RVW	PB S P A S S	PRE SLEEP	SLEEP					49 3 3	I H N P S G R S T C	POST SLEEP	PMC A/G	B T A E T M *	*
MS3/EV2 LINNEHAN	E S Q U A I P	EVA RVW	PRE SLEEP	SLEEP					B O N D	POST SLEEP	PMC A/G	EVA PREP			
MS4/EV3 NEWMAN	B I A N T I T *	EVA RVW	PB S P A S S	PRE SLEEP	SLEEP					49 3 3	I H N P S G R S T C	POST SLEEP	A S P R N	B T A E T M *	®
MS5/EV4 MASSIMINO	E S Q U A I P	EVA RVW	PRE SLEEP	SLEEP					49 3	POST SLEEP	A S P R N	EVA PREP			
GND CMD	S R 4 L N 8 E C 6 M F * G	RWA PREHEAT INIT	F T H E S T		DISCHARGE BATTERIES	P P H C E U A T	DISCHARGE BATTERIES		DISCHARGE BATTERIES	O H E T T X R E S S E P		L E I P R E S S E P	F I R E E		
DAY/NIGHT ORBIT SAA	63	64	65	66	67	68	69	70	71						
TDRS	E W Z	[Timeline of TDRS events]													
TDRS	Z	[Timeline of Z events]													
ORB ATT	-ZLV +YVV														
FSS FWD AXIS	-V3														
SOLAR ARRAY	0														
NOTES	®EVA 3 TOOL CNFG ♦EMU SWAP ♥EVA 3 TOOL CNFG ΔEMU SWAP * PAYLOAD BAY LIGHTS OFF *REBA/EHIP/PGT *OBDEG INIT														

♦EVA PREP  
 ®EVA PREP  
 \*REGULATOR  
 RECONFIG  
 \*REBA/EHIP/PGT  
 BATT TERM



BETA = 6.0  
 CT 03/05/02  
 FD06  
 MET Day 005

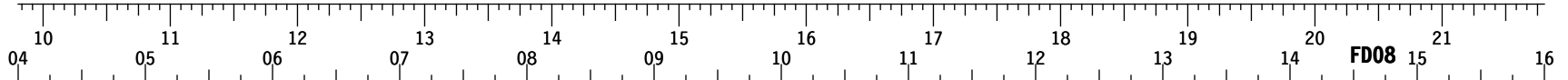


CDR ALTMAN	EVARV	10 - 2 M	PRE SLEEP	M R N G V A R *	HST SURVEY (-V3 FWD) #4										SLEEP	46 93 34	POST SLEEP		
PLT CAREY	FILTER CLEAN INSPECT	P S T E * V T O U I P	PRE SLEEP												SLEEP		POST SLEEP		
MS2/R1 CURRIE	EVARV	10 - 2 M	PRE SLEEP												SLEEP	4 9 3	POST SLEEP		
MS1/EV1 GRUNSFELD	EVARV	P B S P A S S	PRE SLEEP												SLEEP	4 9 3	I H N P S G R S T C	POST SLEEP	
MS3/EV2 LINNEHAN	EVARV		PRE SLEEP												SLEEP		POST SLEEP		
MS4/EV3 NEWMAN	EVARV	P B S P A S S	PRE SLEEP												SLEEP	4 9 3	I H N P S G R S T C	POST SLEEP	
MS5/EV4 MASSIMINO	EVARV		PRE SLEEP												SLEEP	4 9 3	POST SLEEP		
GND CMD	HRDWR PWR	L 4 O 8 A D	RWA FUNCT TEST	F H S T *	F C / S O T	R F T G U E S T	R L O A D P C S T B L S	C N F G F S W F O R P C U - R		C C D									
DAY/NIGHT ORBIT SAA																			
TDRS	E W Z																		
TDRS	Z		Z		Z		Z		Z		Z		Z		♠	Z			
ORB ATT FSS FWD AXIS SOLAR ARRAY			BATT CHG												RGA F/T				
															-V3 90				
NOTES			*WCS FILTR CK *MAINT		*Fut Load MNVR to RGA F/T *FHST PWR ON		*RGA FUNCT TEST START												



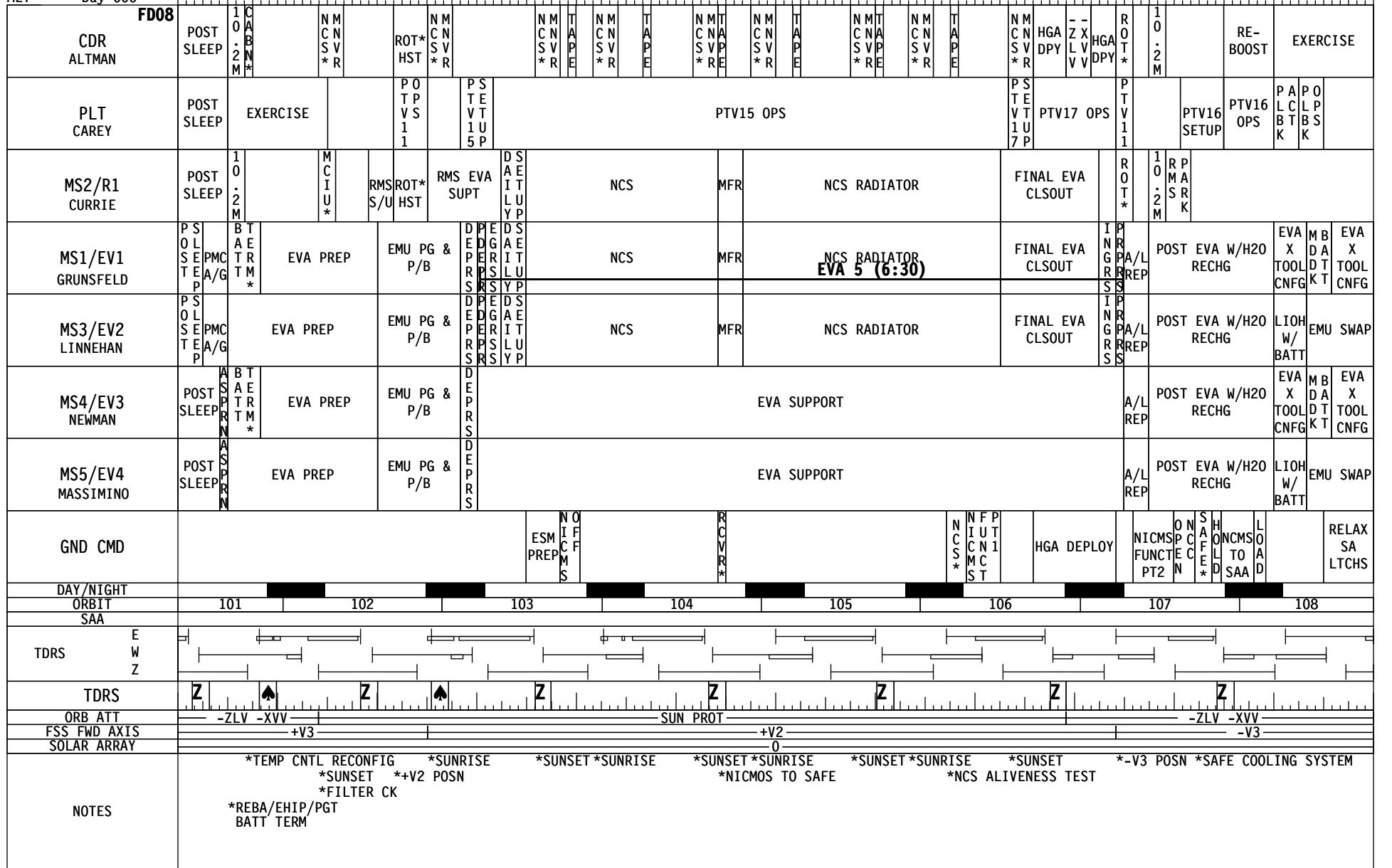


BETA = 7.6  
 CT 03/06/02  
 FD07  
 MET Day 006

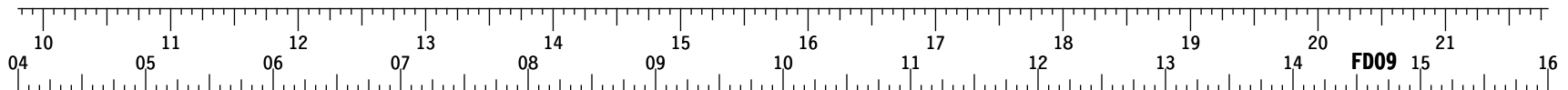


CDR ALTMAN	PMC OCA	EVA RVW	PRE SLEEP	HST SURVEY (+V3 FWD) #5						SLEEP	46 93 34	POST SLEEP	
PLT CAREY	*	EVA RVW	STE I M R L V O M	- Z X L V V	PRE SLEEP	SLEEP						GPS	POST SLEEP
MS2/R1 CURRIE		EVA RVW	PRE SLEEP	SLEEP						49 3	POST SLEEP		
MS1/EV1 GRUNSFELD	B I A N T I T T *	EVA RVW	P B S P P A S S	PRE SLEEP	SLEEP						I H N P S G R S T C	49 3 3	POST SLEEP
MS3/EV2 LINNEHAN	E S Q W A I P P	EVA RVW	PRE SLEEP	SLEEP						B O N D	49 3	POST SLEEP	
MS4/EV3 NEWMAN	B I A N T I T T *	EVA RVW	P B S P P A S S	PRE SLEEP	SLEEP						I H N P S G R S T C	49 3 3	POST SLEEP
MS5/EV4 MASSIMINO	E S Q W A I P P	EVA RVW	PRE SLEEP	SLEEP						49 3	POST SLEEP		
GND CMD													
DAY/NIGHT ORBIT SAA													
TDRS	E W Z												
TDRS	Z												
ORB ATT	-ZLV +YVV												
FSS FWD AXIS	+V3												
SOLAR ARRAY	0												
NOTES	*PTV01 SETUP ⊕EMU SWAP ♦EMU SWAP *REBA/EHIP/PGT BATT INIT												

BETA = 8.2  
CT 03/06/02  
FD08  
MET Day 006



BETA = 8.7  
 CT 03/07/02  
 FD08  
 MET Day 007



CDR ALTMAN	10 PMC 2 OCA M	PRE SLEEP	HST SURVEY (-V3 FWD) #6						SLEEP	46 93 34	POST SLEEP	
PLT CAREY	10 PS 2 M	PRE SLEEP							SLEEP		POST SLEEP	
MS2/R1 CURRIE		PRE SLEEP							SLEEP	49 3	POST SLEEP	
MS1/EV1 GRUNSFELD	B I P A N S T I P T T * S	PRE SLEEP							SLEEP	I H 4 N P 9 S G 3 R S 3 T C	POST SLEEP	
MS3/EV2 LINNEHAN	E S Q W U A I P P	PRE SLEEP							SLEEP		POST SLEEP	
MS4/EV3 NEWMAN	B I P A N S T I P T T * S	PRE SLEEP							SLEEP	I H 4 N P 9 S G 3 R S 3 T C	POST SLEEP	
MS5/EV4 MASSIMINO	E S Q W U A I P P	PRE SLEEP							SLEEP	49 3	POST SLEEP	
GND CMD			S O A F G F A									
DAY/NIGHT ORBIT SAA				108	109	110	111	112	113	114	115	116
TDRS	E W Z	[Timeline showing TDRS activity with horizontal bars]										
TDRS		[Timeline showing TDRS activity with 'Z' markers]										
ORB ATT		-ZLV -XVV										
FSS FWD AXIS		-V3										
SOLAR ARRAY		0										
NOTES	*EMU SWAP ⊕EMU SWAP *REBA/EHIP/PGT BATT INIT											

BETA = 9.2

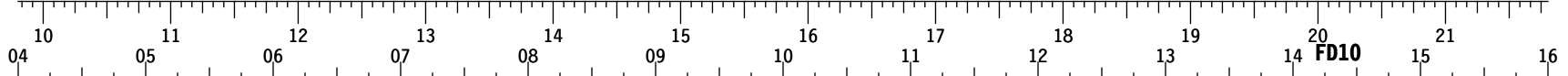
CT 03/07/02

FD09

MET Day 007

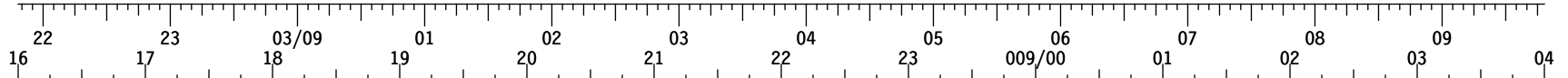
CDR ALTMAN	POST SLEEP	10.2M	SA SLEW	BATT CHG	GRP B PWUP	P S G E S T C U P		HST UMBTH MNVR	R A E T L S E	HST RELEASE PREP	REL HST	SEP2A	RELEASE OPS	MEAL	-ZLVV*	GPWRBND	P O P A P T Y	O P E S S T	14.7 RPRSS	PMC OCA	PRE SLEEP					
PLT CAREY	POST SLEEP		P O T P V S 1 4		GRP B PWUP	P S G E S T C U P	PTV17 SETUP & OPS	HST UMBTH MNVR	R A E T L S E	HST RELEASE PREP	REL HST	RELEASE OPS	MEAL	PTV11 OPS	GPWRBND	P S T E V O U Z P	P O P A P T Y	O P E S S T	14.7 RPRSS	WCS	PRE SLEEP					
MS2/R1 CURRIE	POST SLEEP	10.2M	SA SLEW	M C I U *	GRP B PWUP	P S G E S T C U P	G R P L	HST UMBTH MNVR		HST RELEASE PREP	REL HST		R P M W S R D N	MEAL	FRED STOW		P O P A P T Y				PRE SLEEP					
MS1/EV1 GRUNSFELD	POST SLEEP		SA SLEW	B T A E R T M *			EXERCISE		U M B C L	HST UMBTH MNVR		HST RELEASE PREP	REL HST	MEAL	FSS STOW	P S T S O C W A	P O P A P T Y	P A L C B T K	P O L P B S K		PRE SLEEP					
MS3/EV2 LINNEHAN	POST SLEEP						EXERCISE							MEAL	FSS STOW		P O P A P T Y				PRE SLEEP					
MS4/EV3 NEWMAN	POST SLEEP			B T A E R T M *					U M B C L	HST UMBTH MNVR		HST RELEASE PREP	REL HST	MEAL	PTV11 OPS	E M U *	P O P A P T Y				PRE SLEEP					
MS5/EV4 MASSIMINO	POST SLEEP		H L M I T *				EXERCISE		G R P L	HST UMBTH MNVR		HST RELEASE PREP	REL HST	MEAL		E M U *	P O P A P T Y				PRE SLEEP					
GND CMD		L O A D * S M A C S	P R E P B A T T * C H G		F O F T A	P S E A T E S T M O D E			O S P A N E **	V E R F O N	P W R M O S	D O P E R	E R P C M S F	P P S E A	N M O O R M E	R H C S T A	L M G V R	F M C E S	F H S T F O V C H E C K	E N A B O T A	A T T D E T & L G B U D A T A	O T A	H G M O L S	O T A		⊕
		DAY/NIGHT	ORBIT	SAA																						
TDRS	E W Z	[Timeline bars for TDRS events]																								
TDRS	Z	[Timeline bars for Z events]																								
ORB ATT	-ZLV -XVV																									
FSS FWD AXIS	-V3																									
SOLAR ARRAY	0																									
NOTES	<p>*FILTER CK *REBA/EHIP/PGT BATT TERM *LT RCHG TERM *S/A SLEW TO 90 DEG *VERIFY INITIAL CONFIG *EPHEMERIS TABLES</p> <p>*TRIM RELAYS *POWER OFF *LGAs FOR RELEASE OPS</p> <p>*FOR RELEASE</p> <p>*RELNVA *BATT RCHRG TERM</p> <p>*HST Release 7/22:27</p>																									

BETA = 9.5  
 CT 03/08/02  
 FD09  
 MET Day 008



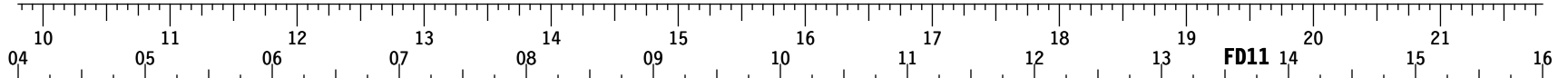
CDR ALTMAN	PRE SLEEP	SLEEP	46 93 34	POST SLEEP	P T E S T	P F C	P O S T	- Z L V	+ Y V V	POST SLEEP
PLT CAREY	PRE SLEEP	SLEEP		POST SLEEP	S D I U M O P	P O S T	P F C	P O S T	P O S T	POST SLEEP
MS2/R1 CURRIE	PRE SLEEP	SLEEP	4 9 3	POST SLEEP		P F C				POST SLEEP
MS1/EV1 GRUNSFELD	PRE SLEEP	SLEEP	4 9 3	POST SLEEP						
MS3/EV2 LINNEHAN	PRE SLEEP	SLEEP		POST SLEEP						
MS4/EV3 NEWMAN	PRE SLEEP	SLEEP	4 9 3	POST SLEEP						
MS5/EV4 MASSIMINO	PRE SLEEP	SLEEP	4 9 3	POST SLEEP						
GND CMD										
DAY/NIGHT ORBIT SAA	123	124	125	126	127	128	129	130	131	
TDRS										
TDRS										
GND SITES										
ORB ATT	-ZLV -XVV									
FSS FWD AXIS	STOWED									
SOLAR ARRAY	90									
NOTES										

BETA = 9.7  
 CT 03/08/02  
 FD10  
 MET Day 008



CDR ALTMAN	POST SLEEP		-- Z X L V V	OFF DUTY	MEAL	OFF DUTY	M I N M V U R	M H N U V D R	HUD CAL	EXERCISE	PMC OCA	OFF DUTY	P O A P O P T Y	STS ISS PAO	PRE SLEEP	
PLT CAREY	POST SLEEP		S T I E M R O M	OFF DUTY	EXERCISE	MEAL	OFF DUTY	M I N M V U R	M H N U V D R	HUD CAL	-- Z X L V V	OFF DUTY	P S T E V T O U Z P	P O A P O P T Y	PRE SLEEP	
MS2/R1 CURRIE	POST SLEEP		M C I U *	OFF DUTY	MEAL	EXERCISE	OFF DUTY					P O A P O P T Y	C O M M *	PRE SLEEP		
MS1/EV1 GRUNSFELD	POST SLEEP			OFF DUTY	MEAL	OFF DUTY	EXERCISE	OFF DUTY					P O A P O P T Y	PRE SLEEP		
MS3/EV2 LINNEHAN	POST SLEEP			OFF DUTY	MEAL	OFF DUTY					EXERCISE	P O A P O P T Y	PRE SLEEP	P F C	PRE SLEEP	
MS4/EV3 NEWMAN	POST SLEEP			OFF DUTY	MEAL	OFF DUTY	EXERCISE	OFF DUTY					P O A P O P T Y	PRE SLEEP	P F C	PRE SLEEP
MS5/EV4 MASSIMINO	POST SLEEP			OFF DUTY	MEAL	OFF DUTY			EXERCISE	OFF DUTY		P O A P O P T Y	PRE SLEEP	P F C	PRE SLEEP	
GND CMD																
DAY/NIGHT ORBIT SAA																
131 132 133 134 135 136 137 138																
TDRS E W																
TDRS																
GND SITES																
DGS MIL DGS -VAN -HTS -DGS -VAN -GTS -VTS -DGS -VAN -GTS -MIL -DGS -VAN -GTS -MIL -VTS -VTS -VTS -GTS -MIL -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -HTS -MIL -GDX -MIL																
ORB ATT FSS FWD AXIS SOLAR ARRAY																
-ZLV +YVV -ZLV -XVV STOWED HUD CAL -ZLV -XVV																
NOTES *FILTER CK *STRING 1 C/O INIT																

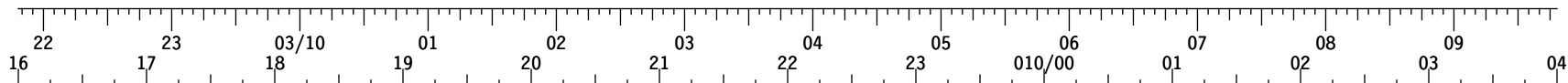
BETA = 9.8  
 CT 03/09/02  
 FD10  
 MET Day 009



CDR ALTMAN	PRE SLEEP	SLEEP	46 93 34	POST SLEEP	DSO 802					
PLT CAREY	PRE SLEEP	SLEEP		POST SLEEP	PS TE VT 0U 2P DSO 802					
MS2/R1 CURRIE	PRE SLEEP	SLEEP	4 9 3	POST SLEEP	DSO 802					
MS1/EV1 GRUNSFELD	P F C P S R L E E P	SLEEP	4 9 3	POST SLEEP	DSO 802					
MS3/EV2 LINNEHAN	PRE SLEEP	SLEEP		POST SLEEP	DSO 802					
MS4/EV3 NEWMAN	PRE SLEEP	SLEEP	4 9 3	POST SLEEP	DSO 802					
MS5/EV4 MASSIMINO	PRE SLEEP	SLEEP	4 9 3	POST SLEEP	DSO 802					
GND CMD										
DAY/NIGHT ORBIT SAA		138	139	140	141	142	143	144	145	146
TDRS E W		[TDRS Event Diagram]								
TDRS		[TDRS Event Diagram]								
GND SITES		-DGS -HTS -DGS -HTS -GTS -HTS -GTS -GTS -GTS -DGS -MIL -MIL								
ORB ATT FSS FWD AXIS SOLAR ARRAY		-ZLV -XVV -STOWED								
NOTES										

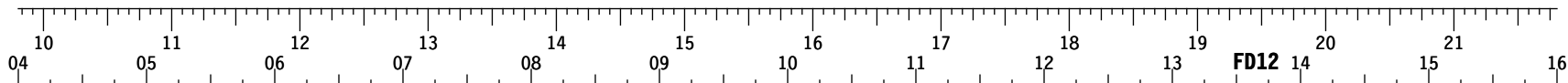


BETA = 9.7  
 CT 03/09/02  
 FD11  
 MET Day 009



CDR ALTMAN	* FD11 CABIN STOW	A P U * C A O T M	CREW PHOTO	CREW CONF	FCS C/O	RCS HOT FR	D/O PREP BRIEF	MEAL	CABIN STOW	PILOT OPS	CABIN STOW	OA BURN	EXERCISE	ET N E T M P M C R P A / G	PRE SLEEP
PLT CAREY	⊕ EXERCISE		CREW PHOTO	CREW CONF	FCS C/O	RCS HOT FR	- - Z X L V V B R I E F	MEAL	C S L C L C A T N O N O B O D M D M I W G M G M N * * *	PILOT OPS	CABIN STOW	OA BURN	- - Z X L V V	CABIN STOW	PRE SLEEP
MS2/R1 CURRIE	♦ CABIN STOW		CREW PHOTO	CREW CONF	FCS C/O	RCS HOT FR	D/O PREP BRIEF	MEAL	FILTER CLEAN	PILOT OPS	CABIN STOW		KU STOW	C O M M * *	PRE SLEEP
MS1/EV1 GRUNSFELD	⊗ CABIN STOW		CREW PHOTO	CREW CONF	POST EVA ENT PREP		D/O PREP BRIEF	MEAL	CABIN STOW	EXERCISE	CABIN STOW		PGSC STOW PT 1	ERGOM STOW	PRE SLEEP
MS3/EV2 LINNEHAN	♥ CABIN STOW		CREW PHOTO	CREW CONF	POST EVA ENT PREP		D/O PREP BRIEF	MEAL	CABIN STOW	EXERCISE	CABIN STOW	S D S E V A C T			PRE SLEEP
MS4/EV3 NEWMAN	△ CABIN STOW		CREW PHOTO	CREW CONF	POST EVA ENT PREP		D/O PREP BRIEF	MEAL	CABIN STOW		EXERCISE	CABIN STOW	KU STOW		PRE SLEEP
MS5/EV4 MASSIMINO	♠ CABIN STOW		CREW PHOTO	CREW CONF	POST EVA ENT PREP		D/O PREP BRIEF	MEAL	CABIN STOW		EXERCISE		ERGOM STOW		PRE SLEEP
GND CMD															
DAY/NIGHT ORBIT SAA															
146 147 148 149 150 151 152 153															
TDRS E W															
TDRS															
GND SITES															
-DGS -MIL -DGS -VAN -HTS -DGS -VAN -DGS -GTS -VAN -DGS -VAN -DGS -VAN -DGS -VAN															
-VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS -VTS															
-GDX -MIL -GDX -MIL -GDX -MIL -GDX -MIL -GDX -MIL -GDX -MIL -GDX -MIL -GDX -MIL															
ORB ATT -ZLV -XVV OPS 3 TEST, COMM -ZLV -XVV -OA -ZLV -XVV															
FSS FWD AXIS SOLAR ARRAY STOWED															
NOTES															
♠DSO 802 *APU HTR ACT *WEST COAST COMM C/O *STRING 1 C/O TERM															
⊕DSO 802 *EAST COAST COMM C/O															
♦DSO 802															
⊗DSO 802															
♠DSO 802															

BETA = 9.6  
 CT 03/10/02  
 FD11  
 MET Day 010



CDR ALTMAN	FD11 PSRL EELV EELV	SLEEP	46 93 34	POST SLEEP	GRPB PWUP	6S 3T 40W	D/O IMU ALIGN	DER OER PB			
PLT CAREY	PRE SLEEP	SLEEP		POST SLEEP	GRPB PWUP	HT 2A ONK	D/O IMU ALIGN	DER OER PB			
MS2/R1 CURRIE	PRE SLEEP	SLEEP	4 9 3	POST SLEEP			AST IAE RMP PC	DER OER PB			
MS1/EV1 GRUNSFELD	PRE SLEEP	SLEEP	4 9 3	POST SLEEP	PDL EACT	PGSC STOW PT 2	GSR ITNO RTR	DER OER PB			
MS3/EV2 LINNEHAN	PRE SLEEP	SLEEP		POST SLEEP			OST IAO RTR	DER OER PB			
MS4/EV3 NEWMAN	PRE SLEEP	SLEEP	4 9 3	POST SLEEP		MAGR ENTRY S/U	PTV05 SETUP	DER OER PB			
MS5/EV4 MASSIMINO	PRE SLEEP	SLEEP	4 9 3	POST SLEEP	PDL EACT			DER OER PB			
GND CMD											
DAY/NIGHT ORBIT SAA			153	154	155	156	157	158	159	160	161
TDRS E W											
TDRS											
GND SITES											
ORB ATT FSS FWD AXIS SOLAR ARRAY											
NOTES											

BETA = 9.3  
 CT 03/10/02  
 FD12  
 MET Day 010



FD12	
CDR ALTMAN	DEORB PREP
PLT CAREY	DEORB PREP
MS2/R1 CURRIE	DEORB PREP
MS1/EV1 GRUNSFELD	DEORB PREP
MS3/EV2 LINNEHAN	DEORB PREP
MS4/EV3 NEWMAN	DEORB PREP
MS5/EV4 MASSIMINO	DEORB PREP
GND CMD	
DAY/NIGHT	
ORBIT	161 162 163 164 165 166 167 168
SAA	
TDRS E	
TDRS W	
TDRS	
GND SITES	DGS MIL DGS VAN HTS DGS VAN DGS GTS VAN DGS GTS VAN DGS GTS -HTS -VTS -GDX -MIL -HTS -VTS -GDX -MIL -HTS -VTS -GDX -MIL -MIL -GDX -GDMIL -GDX
ORB ATT	-XSI COMM D/O ENTRY
FSS FWD AXIS	
SOLAR ARRAY	
NOTES	*010/19:41 *010/20:45

DETAILED TIMELINE

DETAILED  
TIMELINE

# (FD 01)

TDRS  
GND  
DND  
SWE  
SO  
AR  
AB

MET  
Day 000  
00:00

ORBIT  
ATT  
FSS  
TDRS  
HST  
S/A

CDR  
ALTMAN

PLT  
CAREY

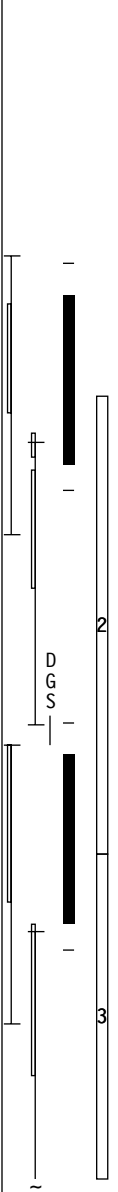
MS2/R1  
CURRIE

GND CMD

MCC

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

**FD01 EZ ACTIVITIES:**  
Perform at earliest convenience:  
LAMP TEST (ORB OPS, EPS) (5 min)  
SMK DETN CK TEST (ORB OPS, ECLS) (5 min)  
DATE/TIME SET  
(PHOTO/TV, DCS)  
PCS 1 (2) CONFIG (ORB OPS, ECLS) (5 min)  
Config Sys 1  
DO NOT OPEN 14.7 CAB REG INLET SYS 1,2  
(Cabin Will be Allowed to Leak Down  
Toward 10.2 psia.)  
CSA-CP CHECKOUT OPS (ORB OPS, CSA-CP)  
OCAC FILTER INSPECT



00:00  
01:00  
02:00  
03:00  
04:00

ASCENT  
STOWED  
-ZLV +YVV

SET UP ACTILIGHT WATCHES  
(ORS OPS, DSO 634)  
AFT CONTROLLER C/O  
(ORB OPS, GNC)  
SM CKPT INIT (ORB OPS, DPS)  
GALLEY IODINE REMOVAL  
ASSEMBLY INSTALLATION  
(ORB OPS, GIRA)  
APU STEAM VENT HTR DEACT  
OR2 BLR PWR (three) - OFF  
A12 APU HTR GG/FU PMP (three)-A AUTO

LOAD FLT SPECIFIC DAPS  
(FLT PLN, STS-109 DAP TABLES)  
IEPC (POWER ON)  
(ORB OPS, CREW SYS)  
Step A.  
P/TV01 SETUP  
(PHOTO/TV, PLB VIEWS)  
P/TV10 SETUP  
(PHOTO/TV, SSE SURVEY)  
P/TV11 SETUP  
(PHOTO/TV, FSS OPS)

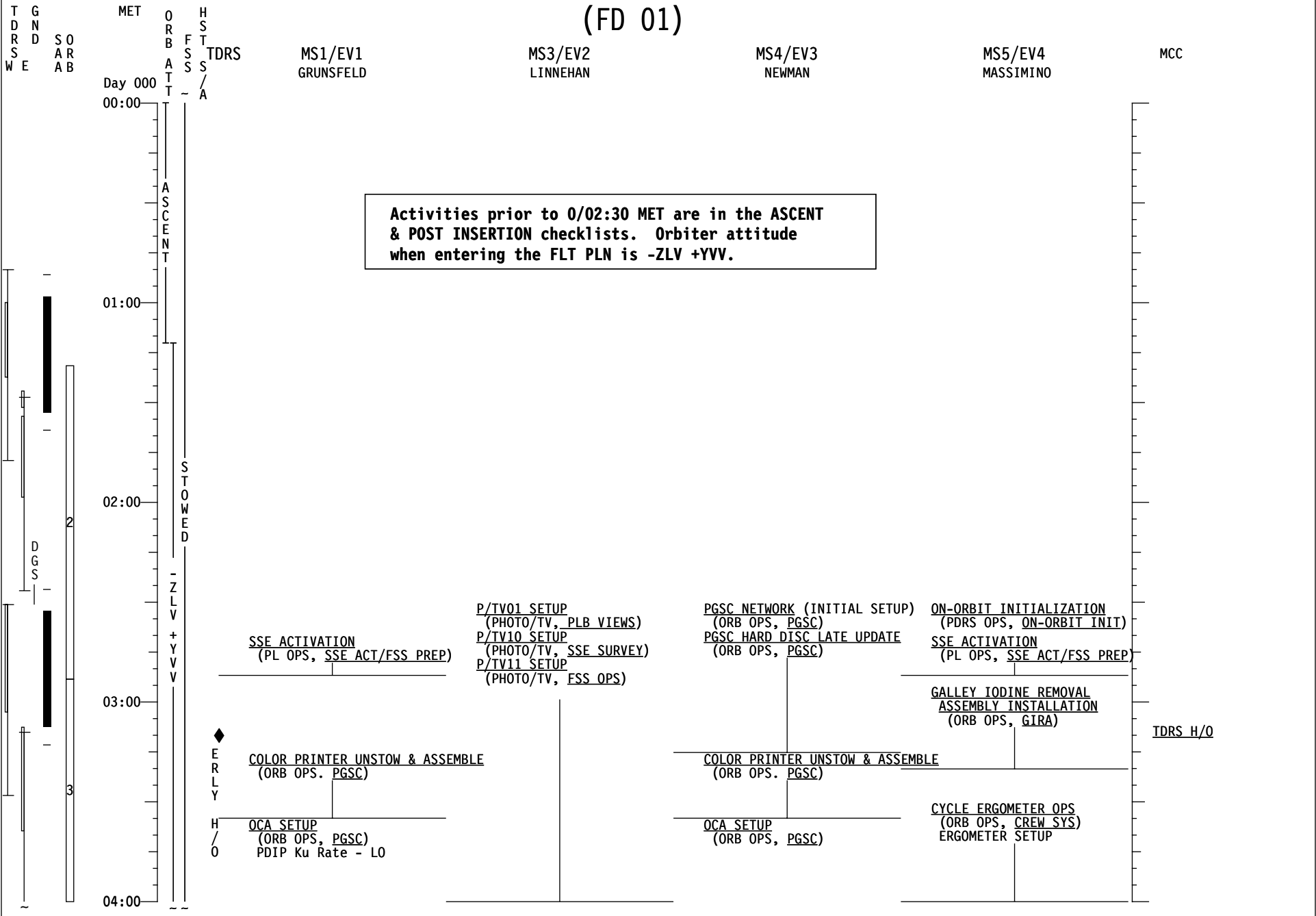
ON-ORBIT INITIALIZATION  
(PDRS OPS, ON-ORBIT INIT)  
AFT CONTROLLER C/O  
(ORB OPS, GNC)  
SHUTTLE EMERGENCY EYEWASH  
Unstow, attach on or near  
galley. Fill drink  
container(s) & attach  
near appropriate  
locations.  
FRED SETUP  
(ORB OPS, FRED)  
CYCLE ERGOMETER OPS  
(ORB OPS, CREW SYS)  
ERGOMETER SETUP

LOAD SERVICING  
MISSION SPCs  
POWER ON GYRO 6 &  
CNFG FOR SHADOW MODE

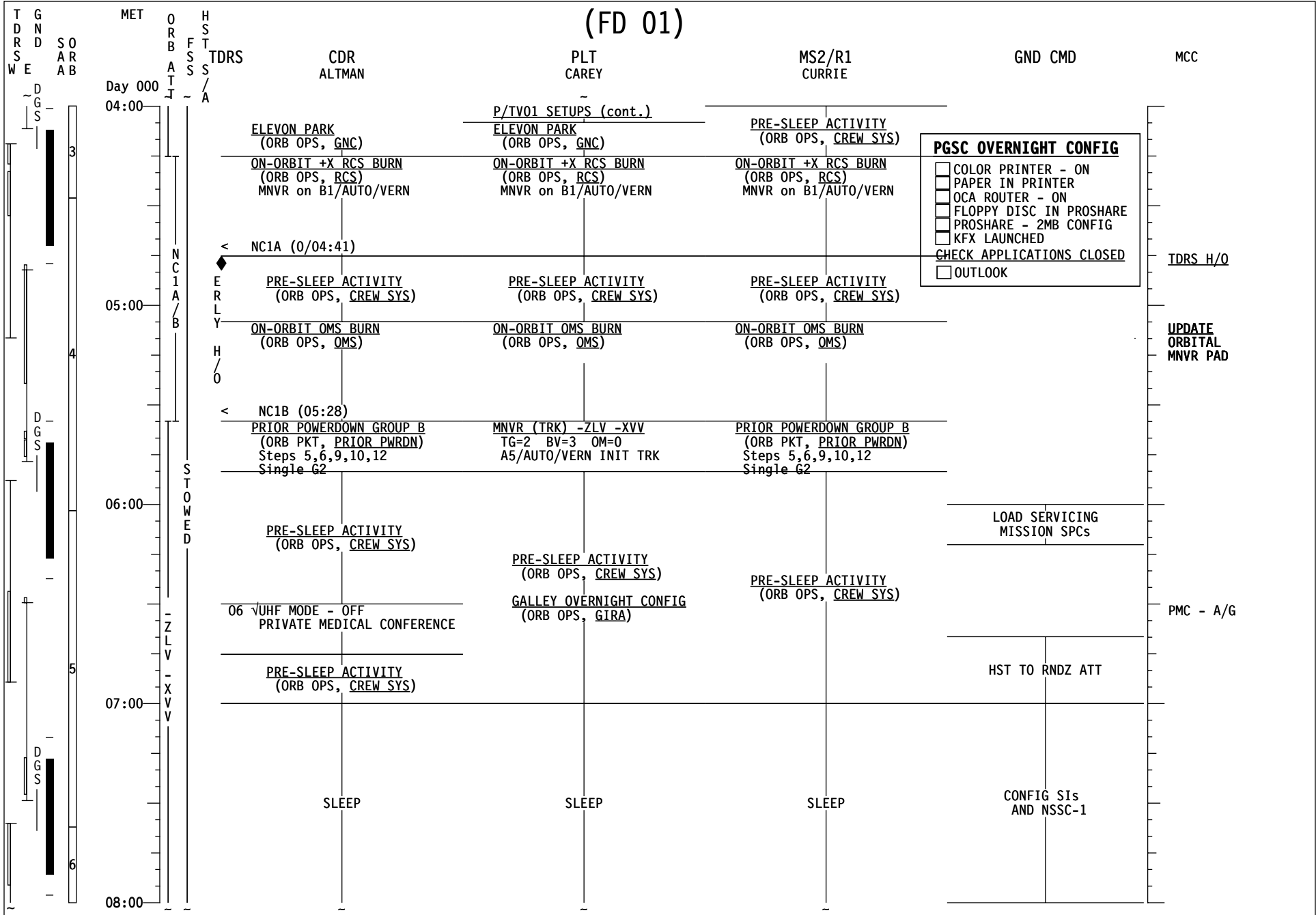
UPLINK  
β21 + MASK  
TFL  
184  
TDRS H/O

ERL  
Y

# (FD 01)



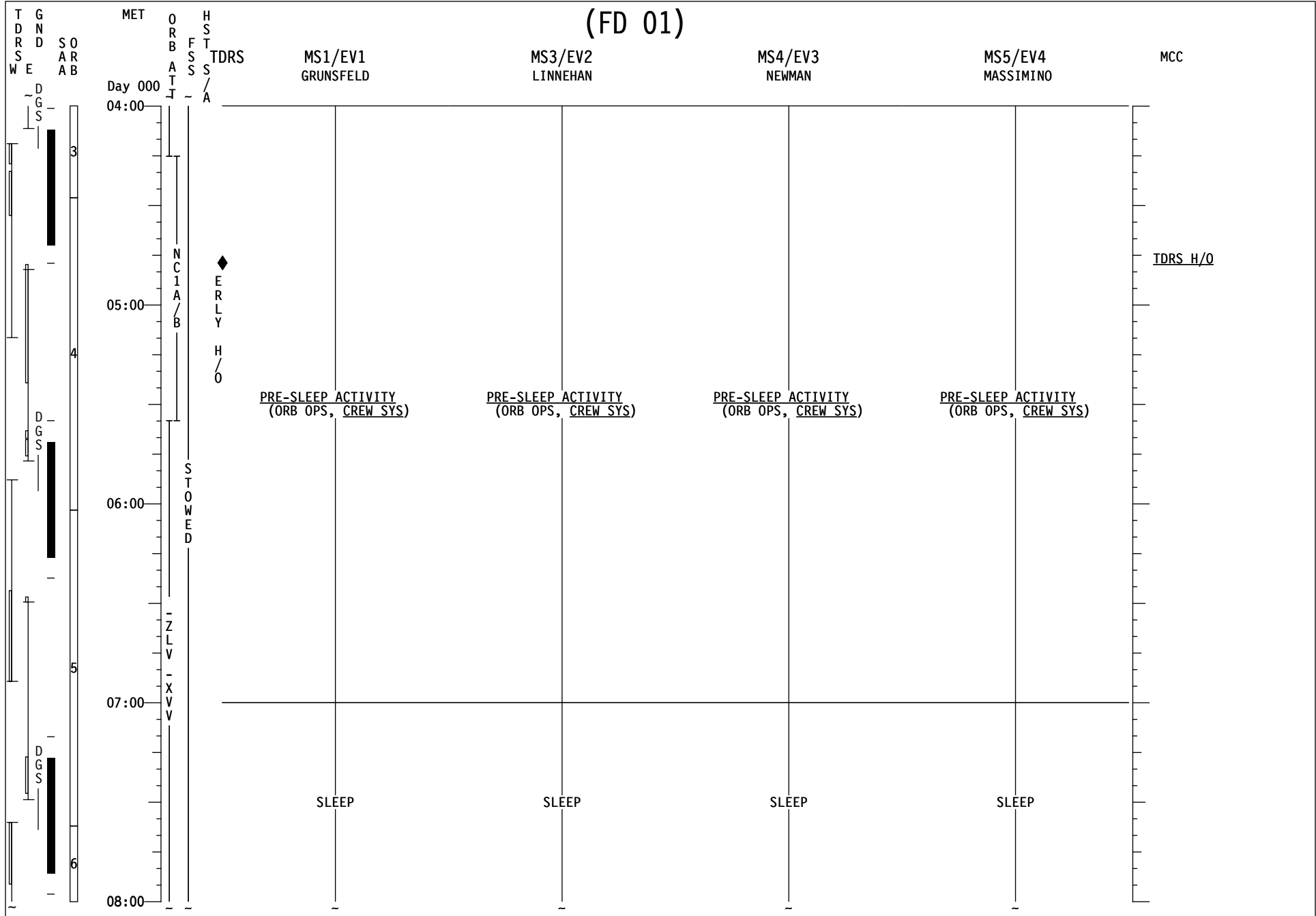
# (FD 01)



**PGSC OVERNIGHT CONFIG**

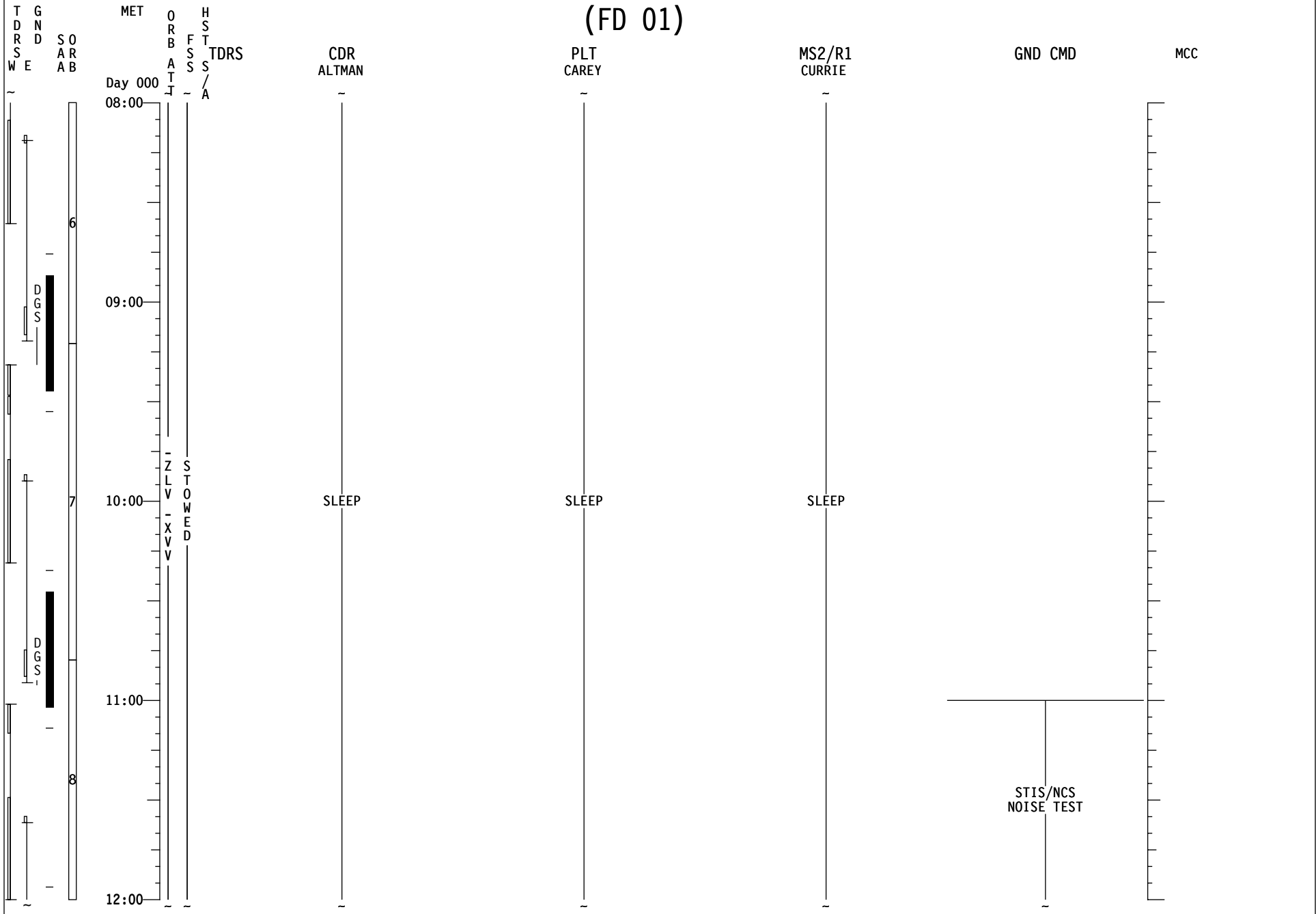
- COLOR PRINTER - ON
- PAPER IN PRINTER
- OCA ROUTER - ON
- FLOPPY DISC IN PROSHARE
- PROSHARE - 2MB CONFIG
- KFX LAUNCHED
- CHECK APPLICATIONS CLOSED
- OUTLOOK

(FD 01)

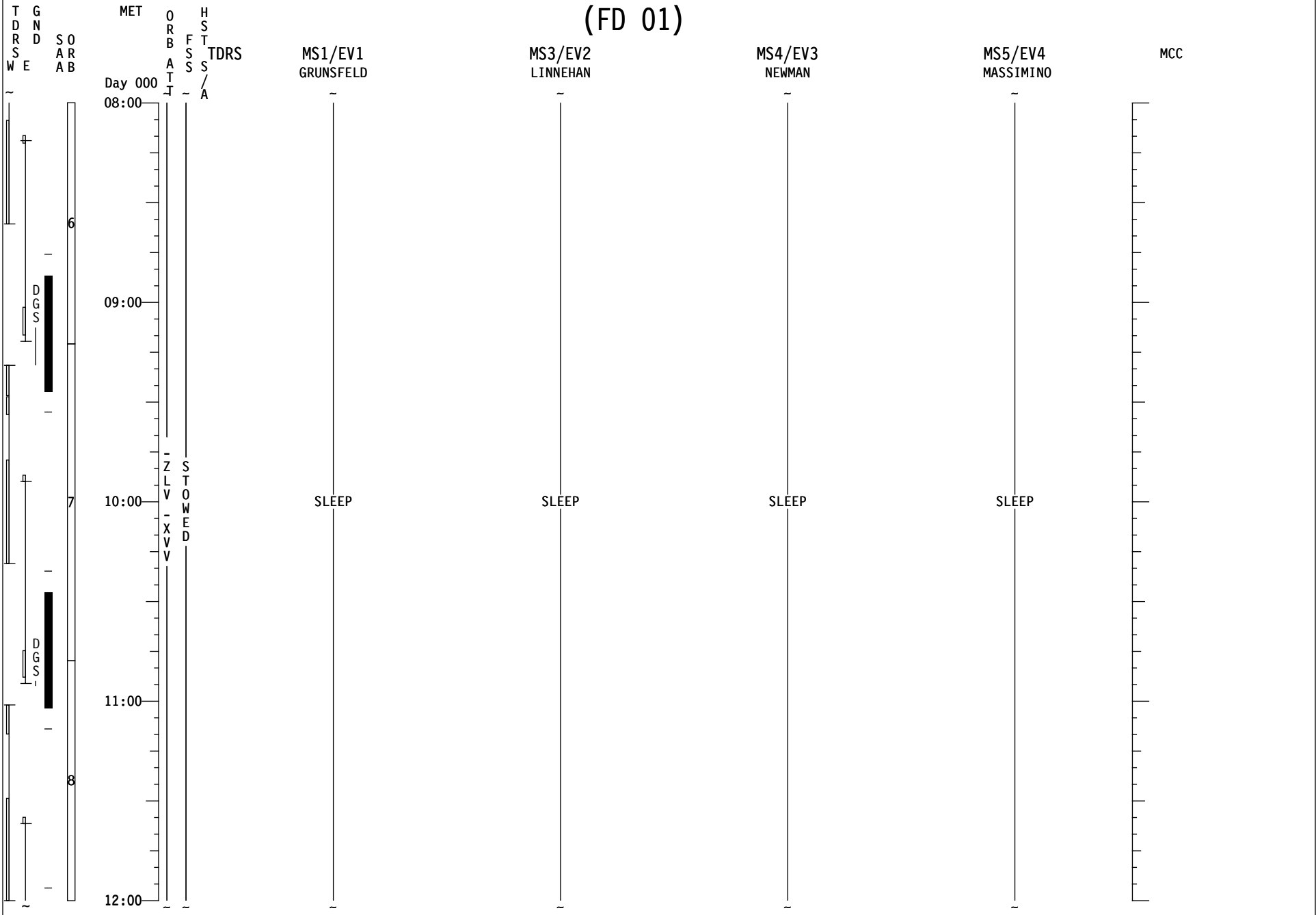




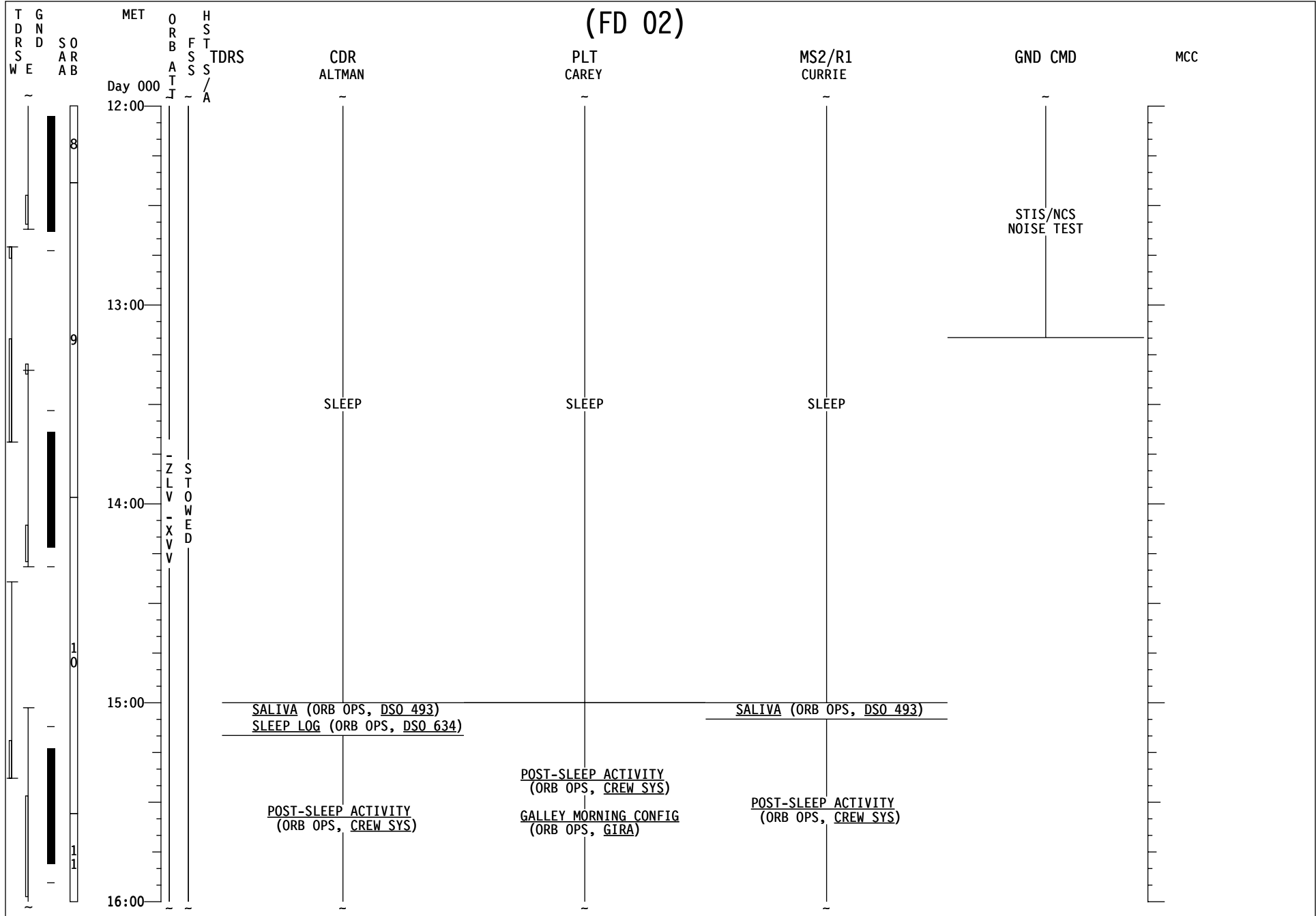
(FD 01)



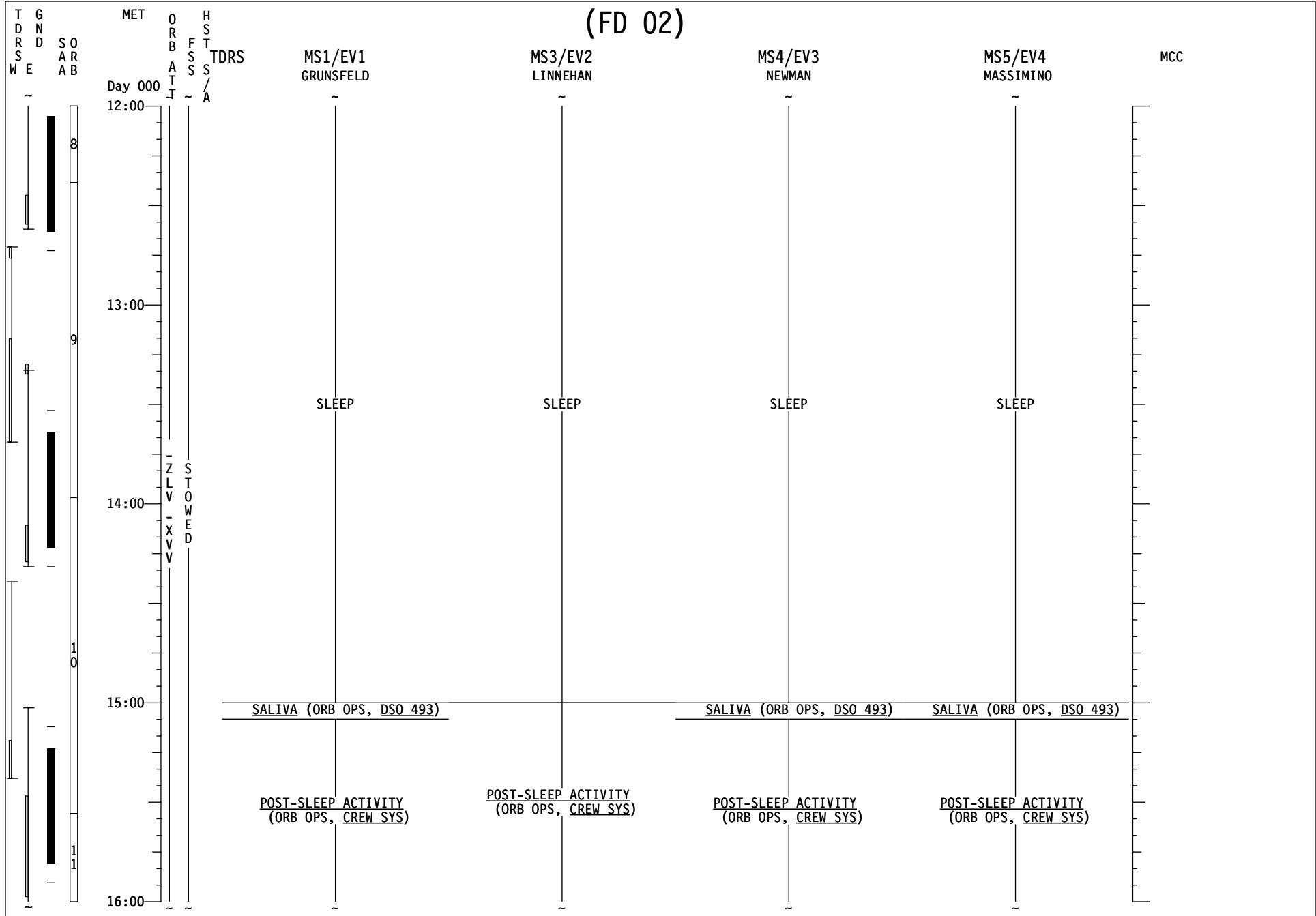
(FD 01)



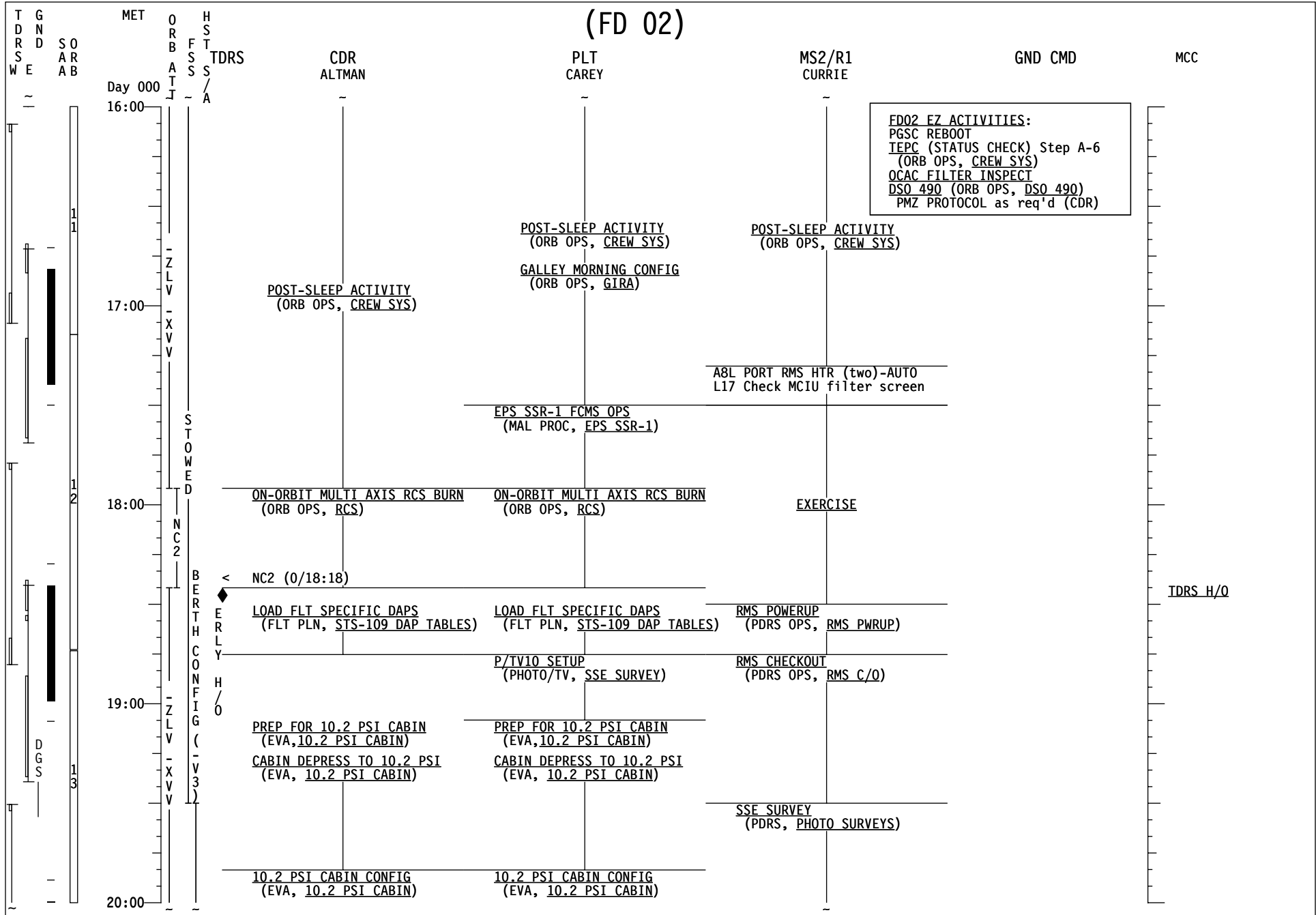
(FD 02)



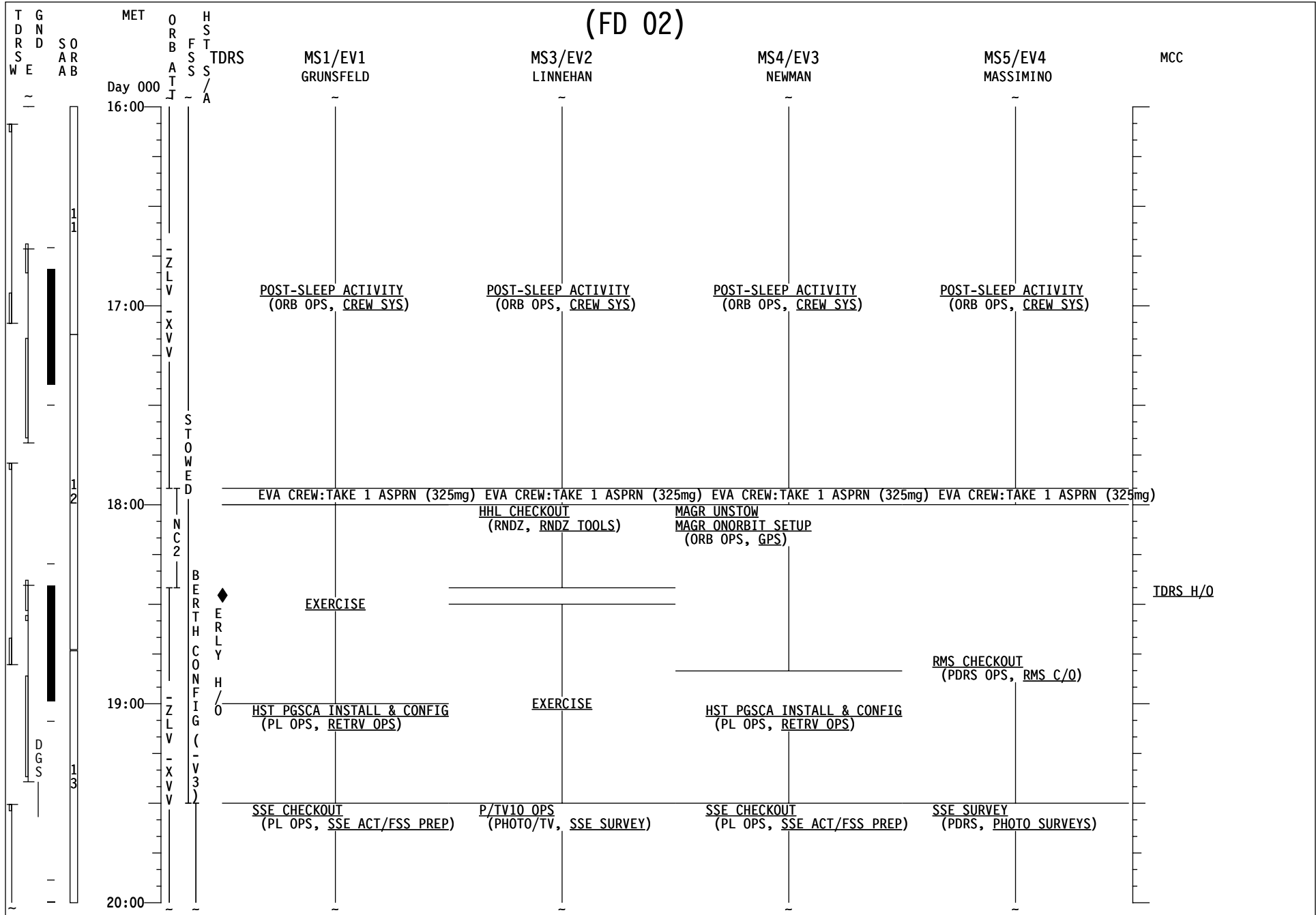
(FD 02)



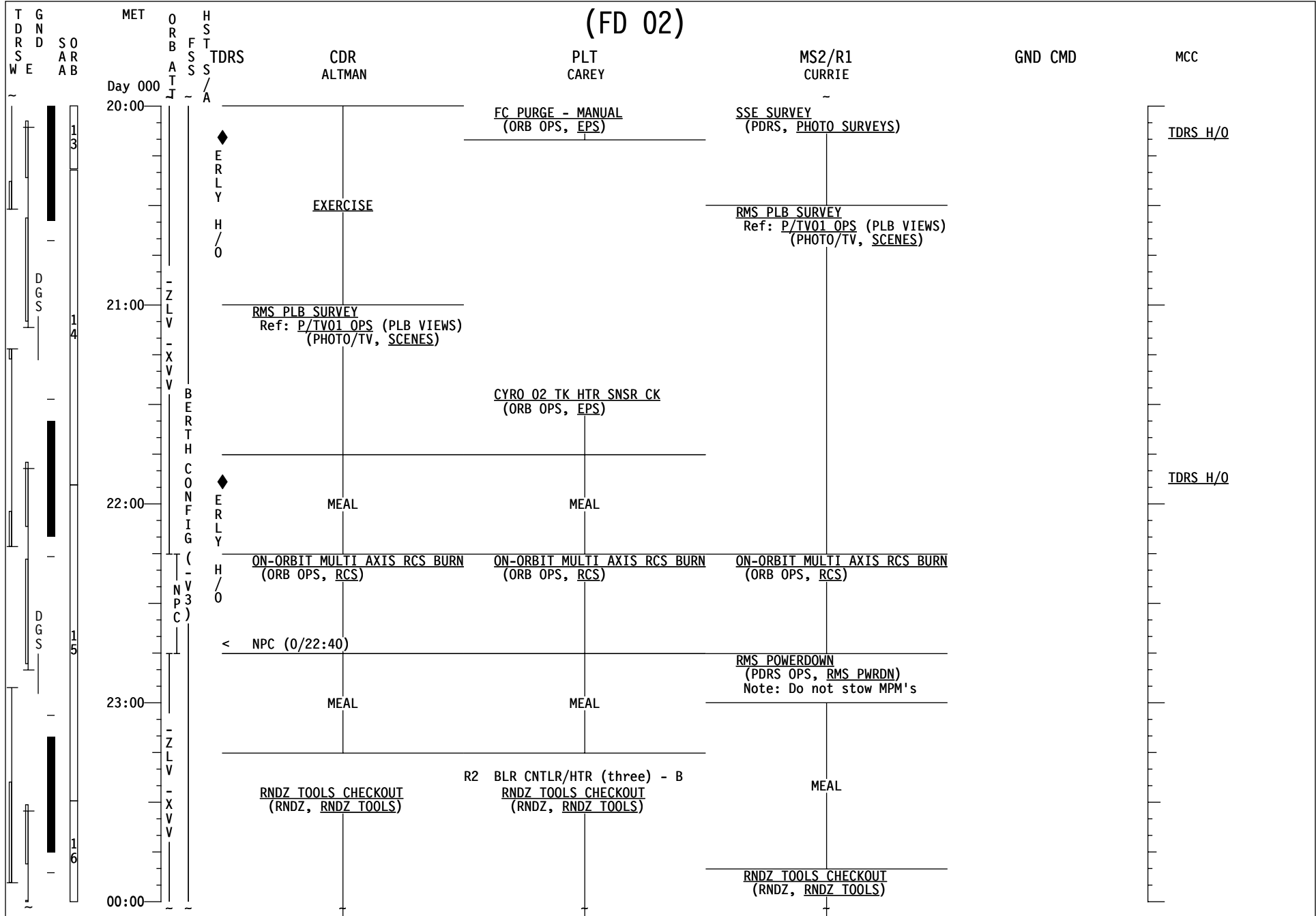
# (FD 02)



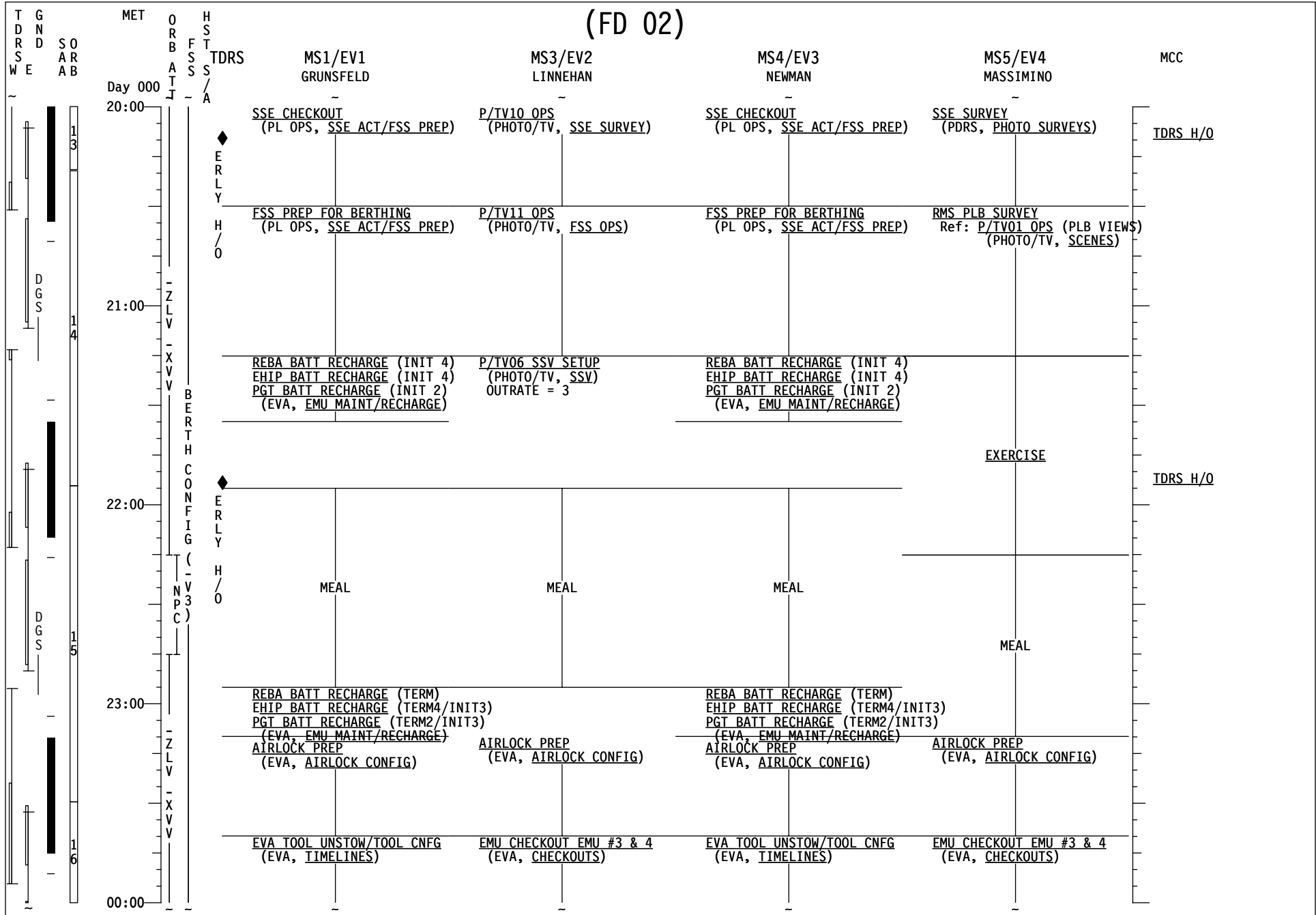
# (FD 02)



# (FD 02)

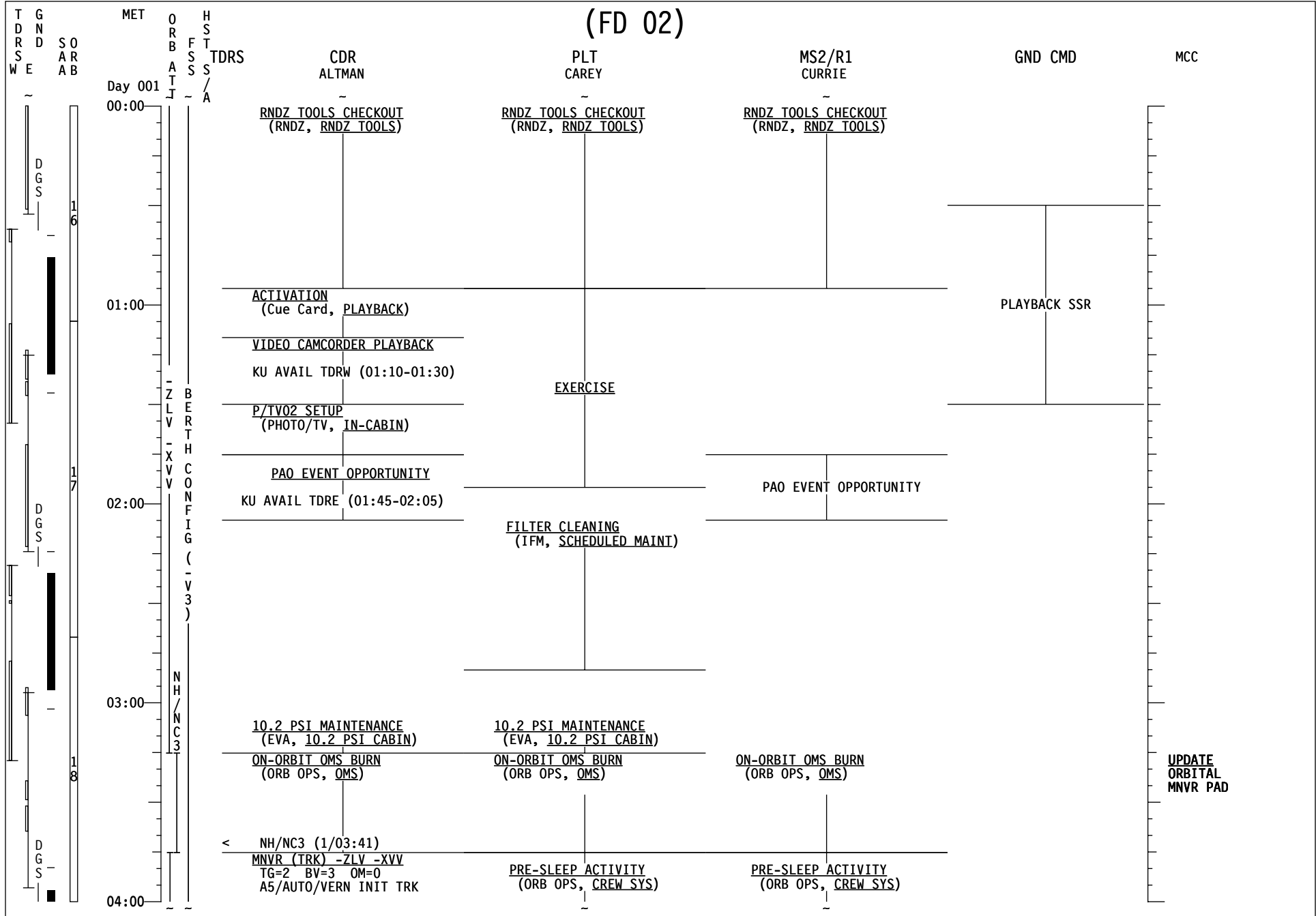


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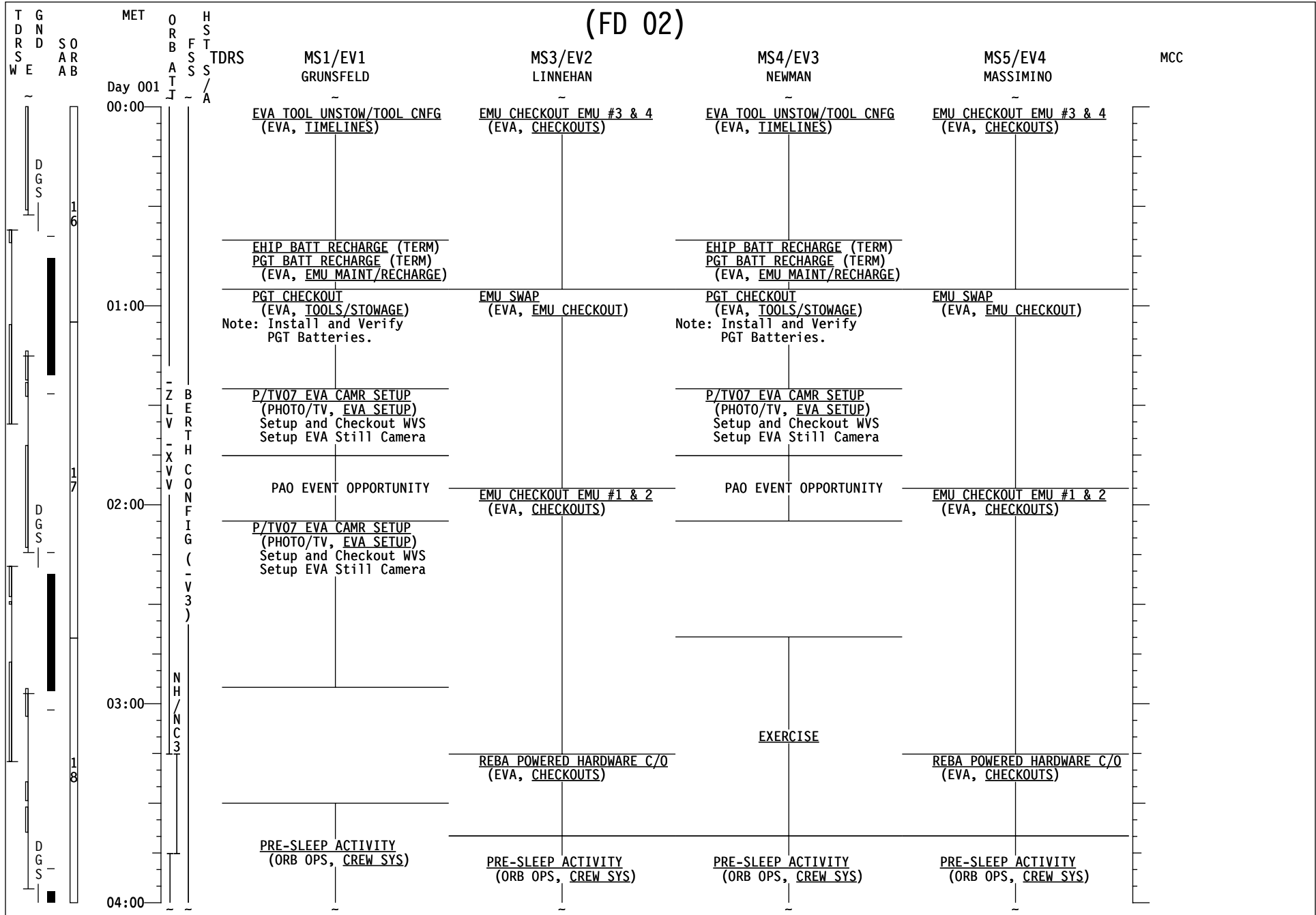




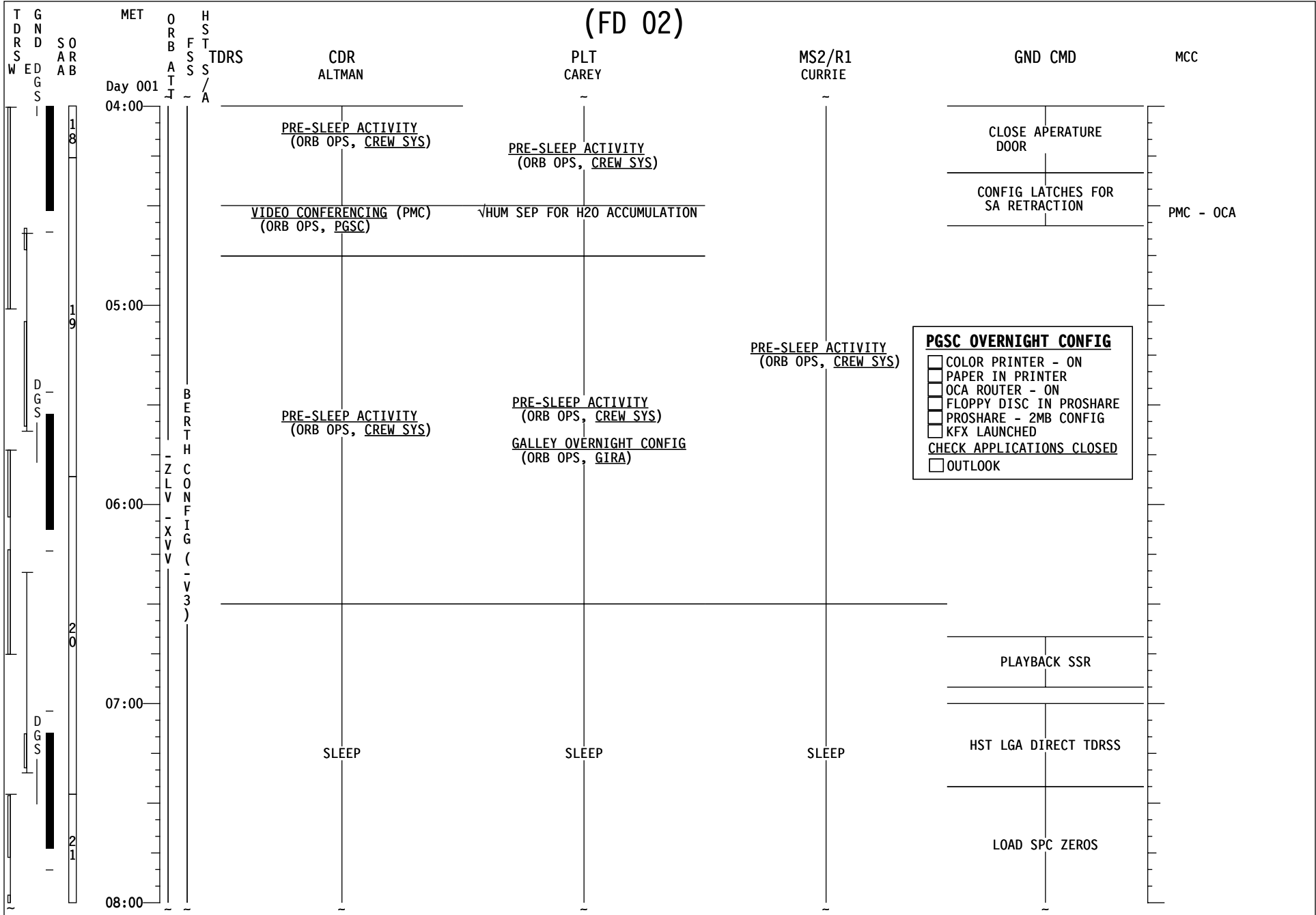
# (FD 02)



# (FD 02)



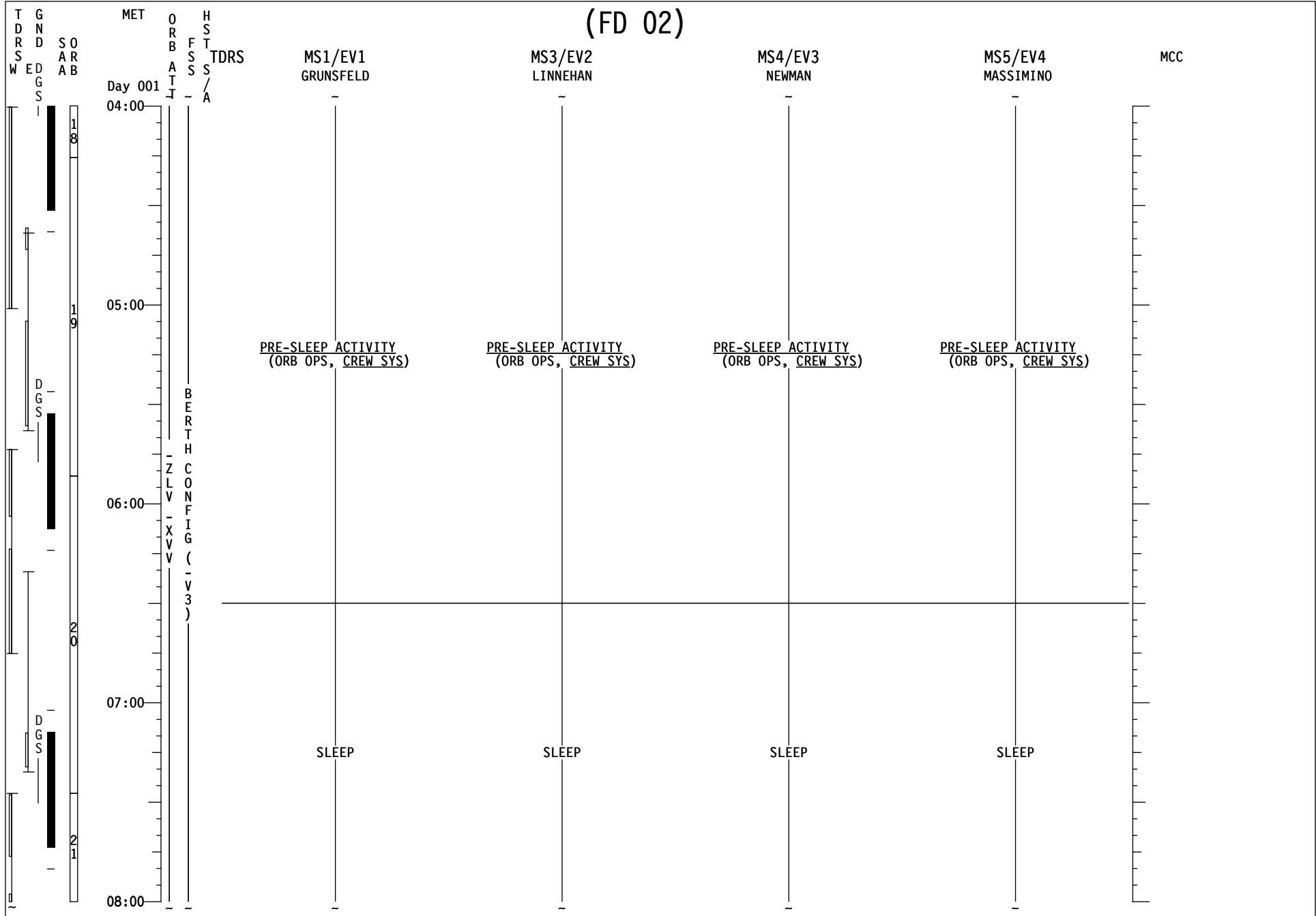
# (FD 02)



**PGSC OVERNIGHT CONFIG**

- COLOR PRINTER - ON
- PAPER IN PRINTER
- OCA ROUTER - ON
- FLOPPY DISC IN PROSHARE
- PROSHARE - 2MB CONFIG
- KFX LAUNCHED
- CHECK APPLICATIONS CLOSED
- OUTLOOK

(FD 02)



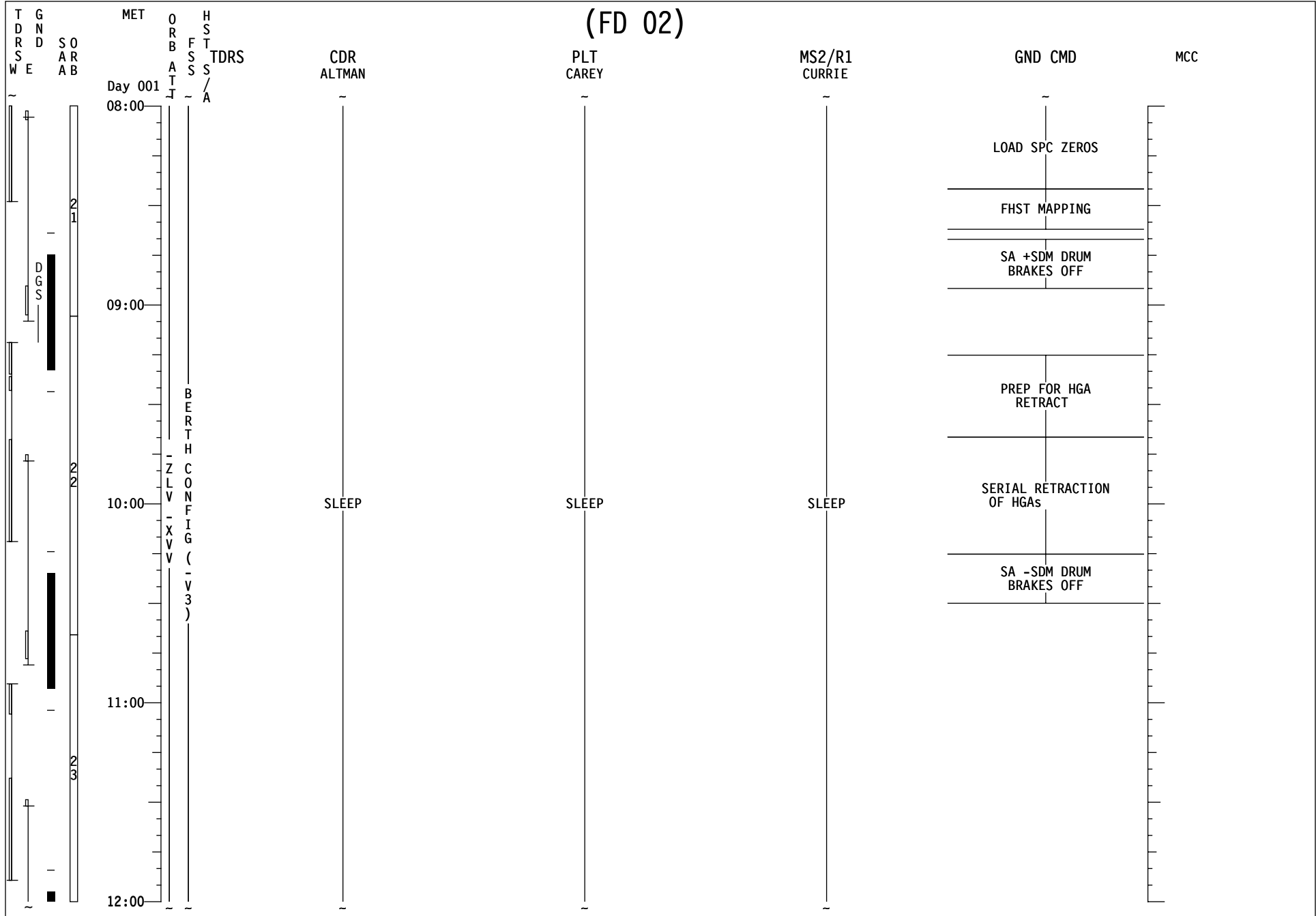
MET  
Day 001  
ORB ATT  
HST  
TDRS

TDRS  
GND  
SO  
WEDGS  
AR  
AB

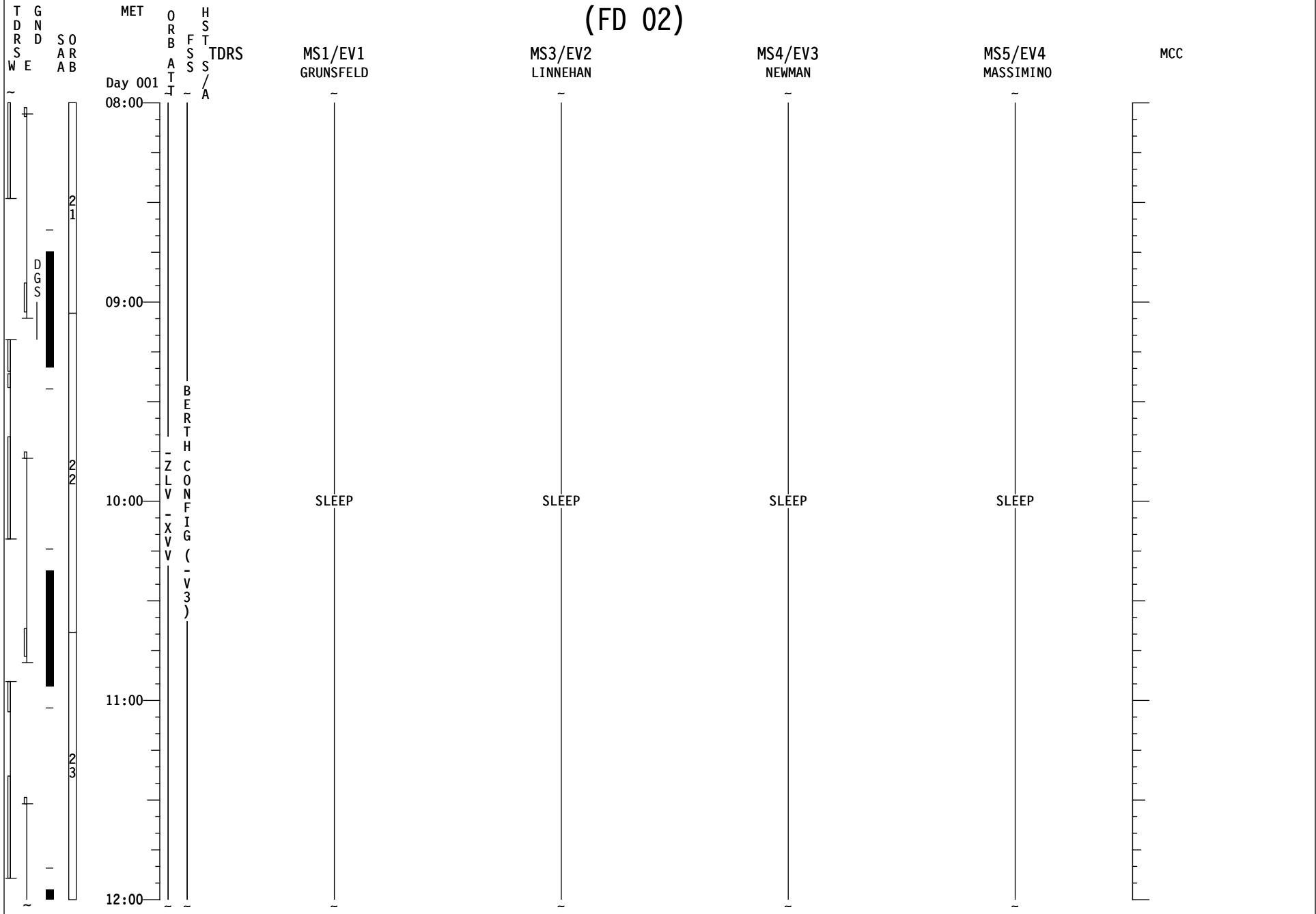
18  
19  
20  
21  
04:00  
05:00  
06:00  
07:00  
08:00

BERTH CONFIG (-V3)

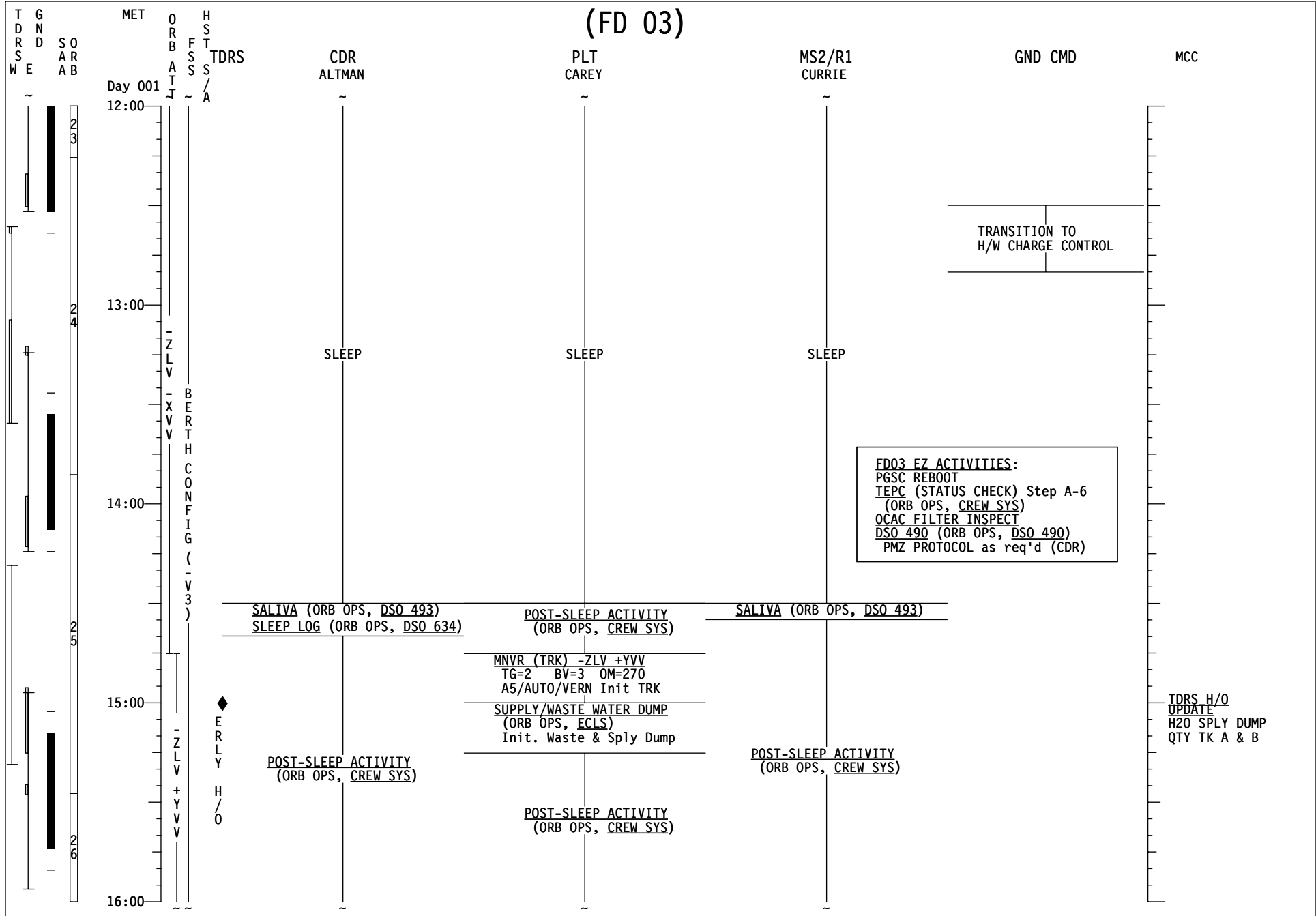
# (FD 02)



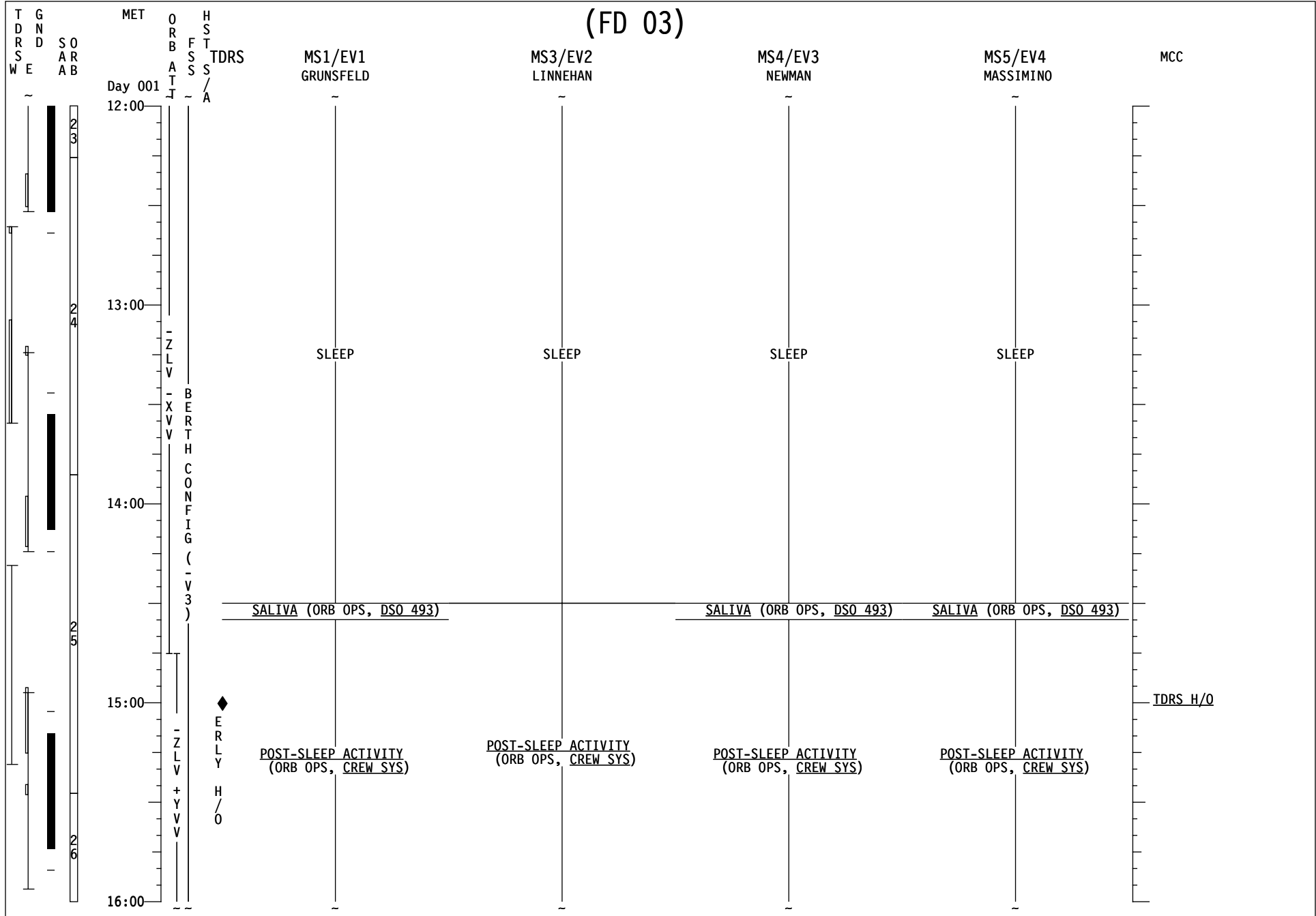
(FD 02)



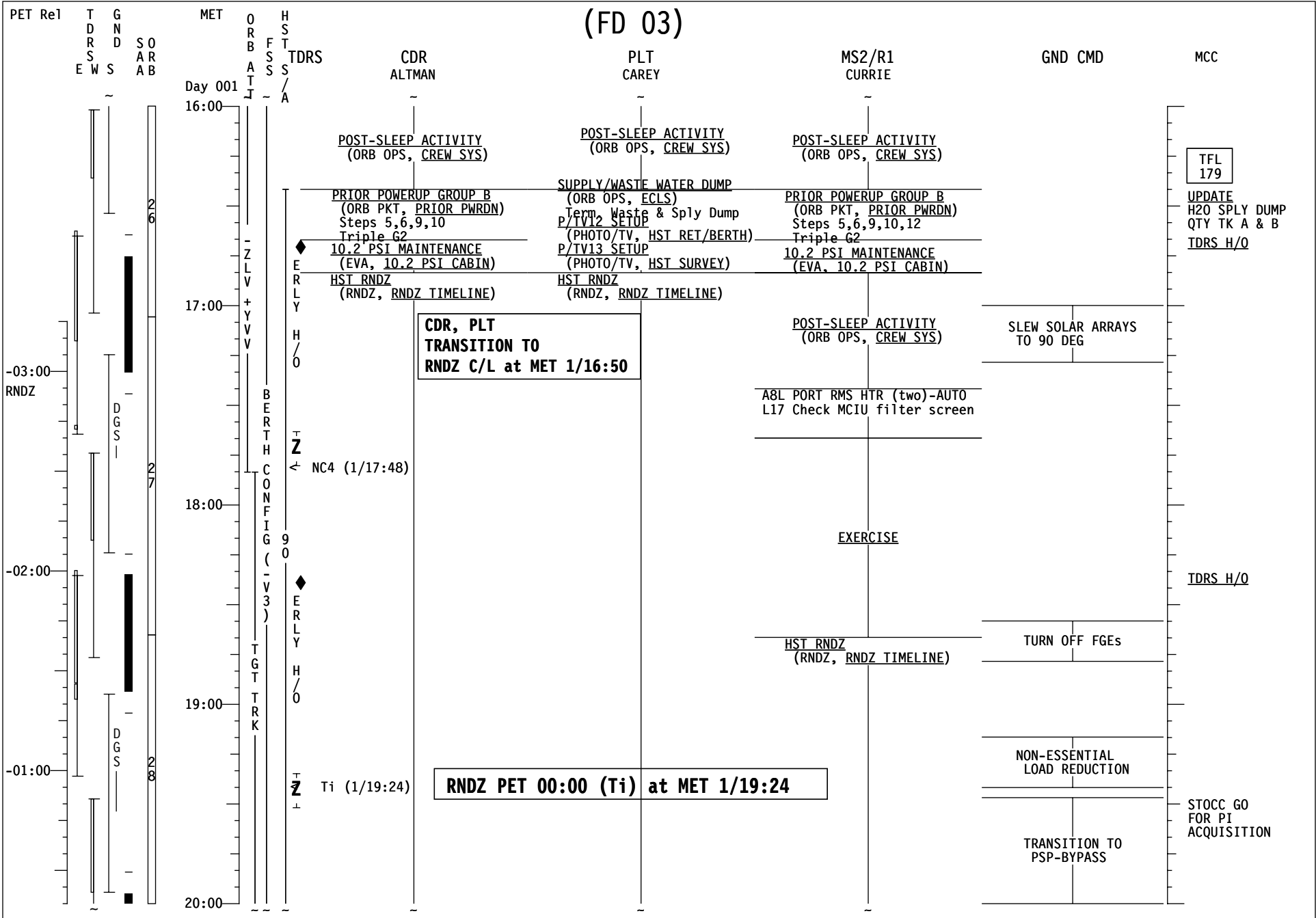
# (FD 03)



(FD 03)





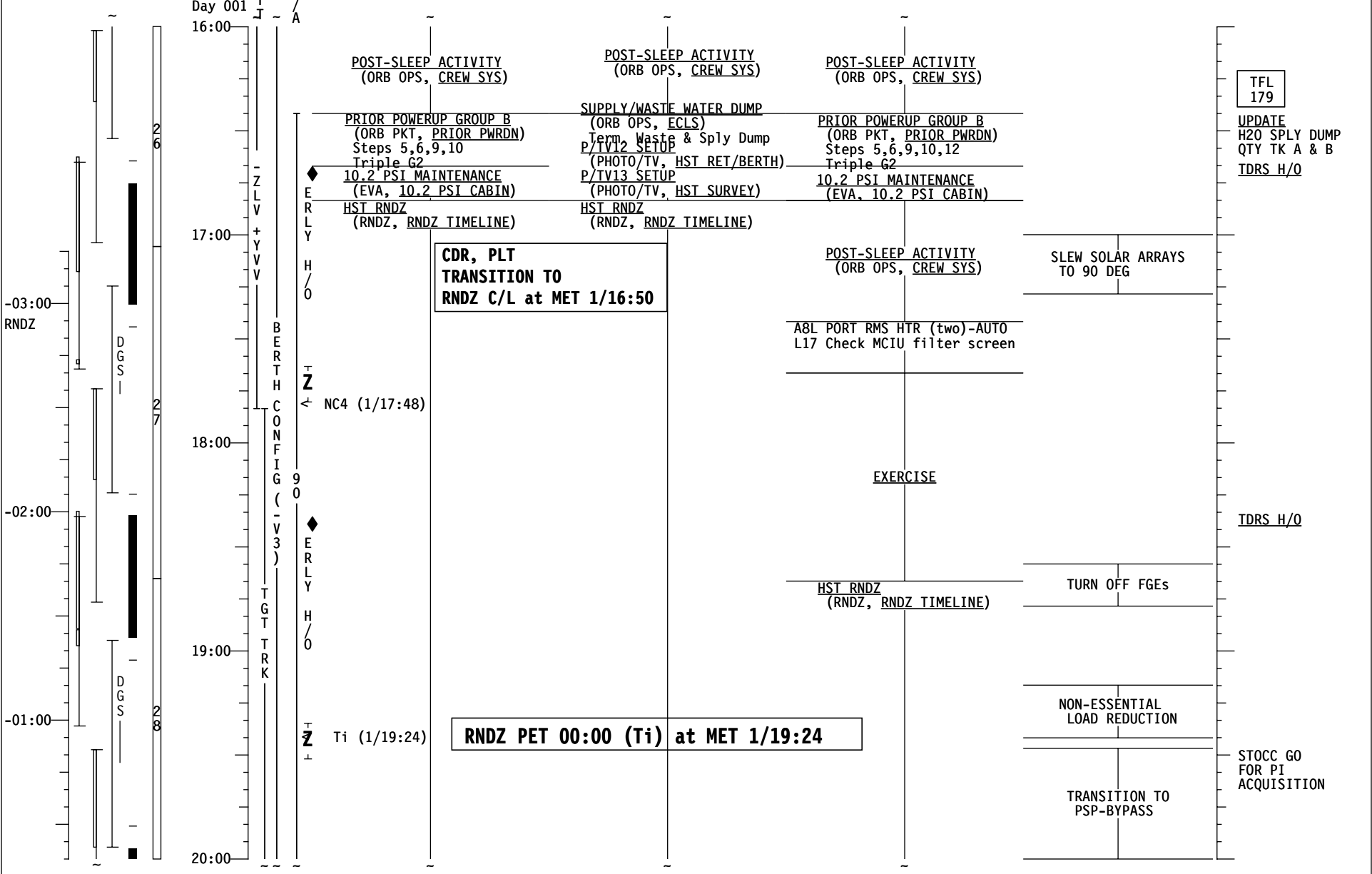


(FD 03)

PET ReI  
TDRS  
EWS  
GND  
SARS  
AB

MET  
Day 001  
ORBIT  
HSTS  
TDRS

CDR ALTMAN  
PLT CAREY  
MS2/R1 CURRIE  
GND CMD  
MCC

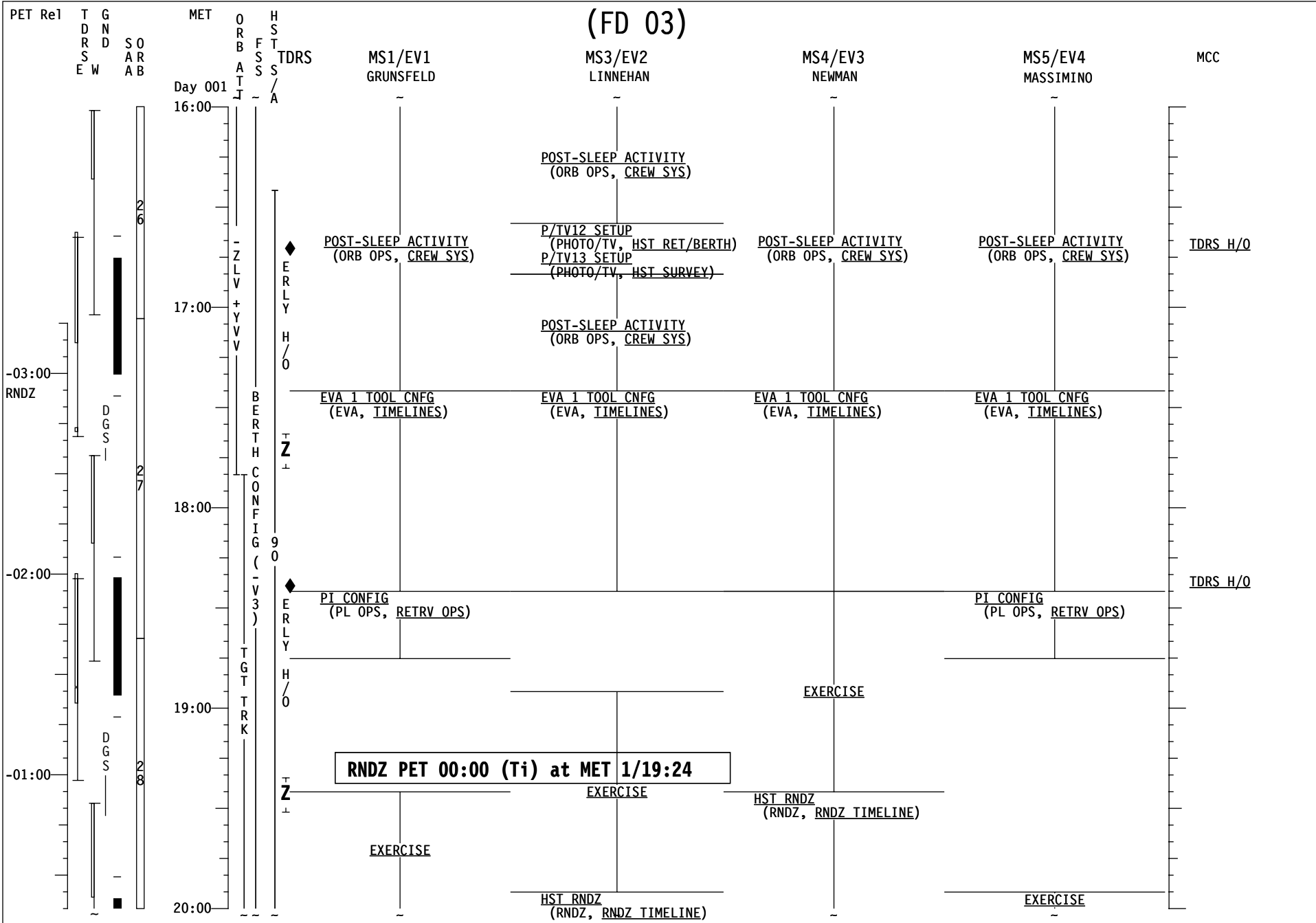


TFL  
179

UPDATE  
H2O SPLY DUMP  
QTY TK A & B  
TDRS H/O

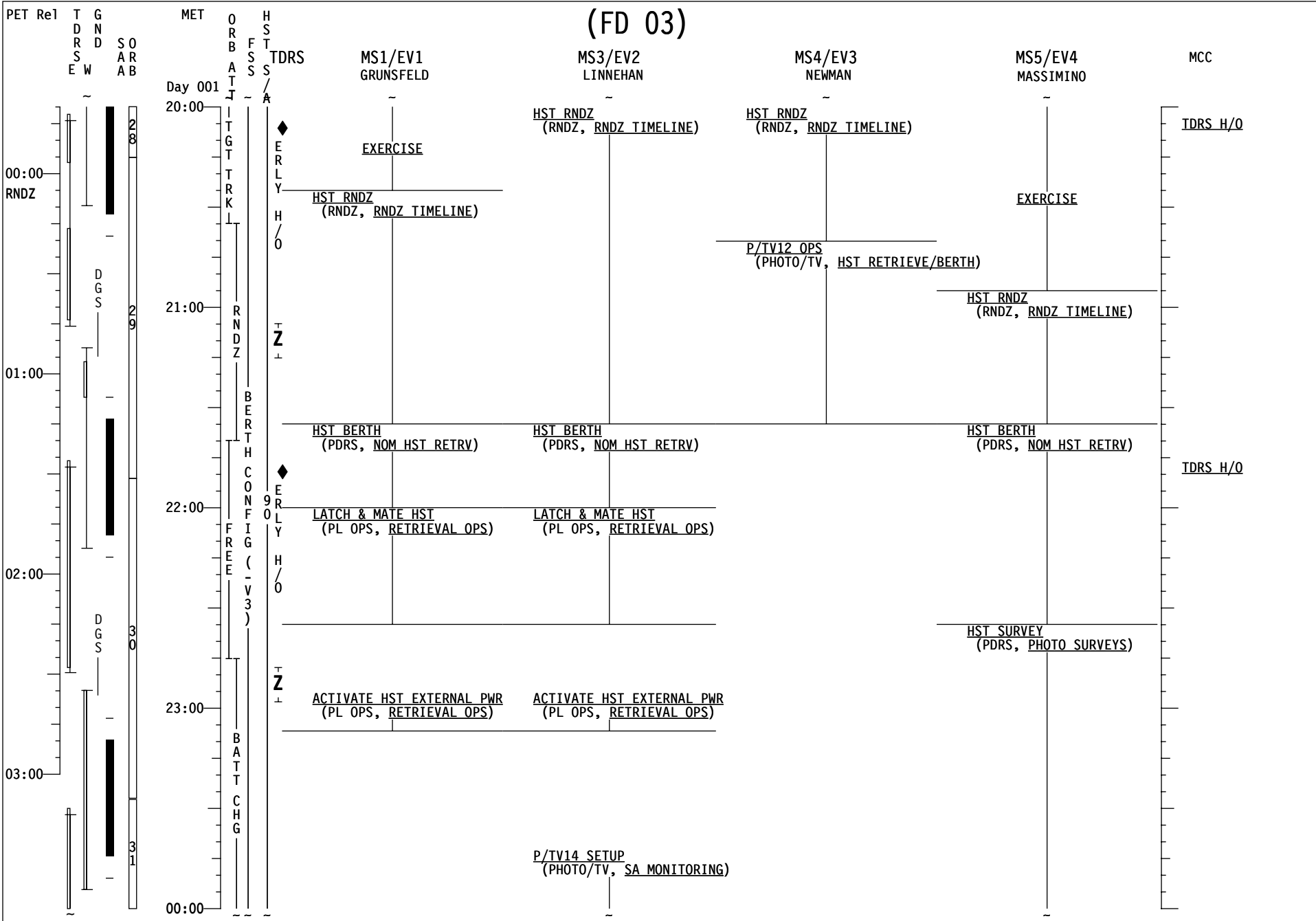
TDRS H/O

STOCC GO  
FOR PI  
ACQUISITION



# (FD 03)

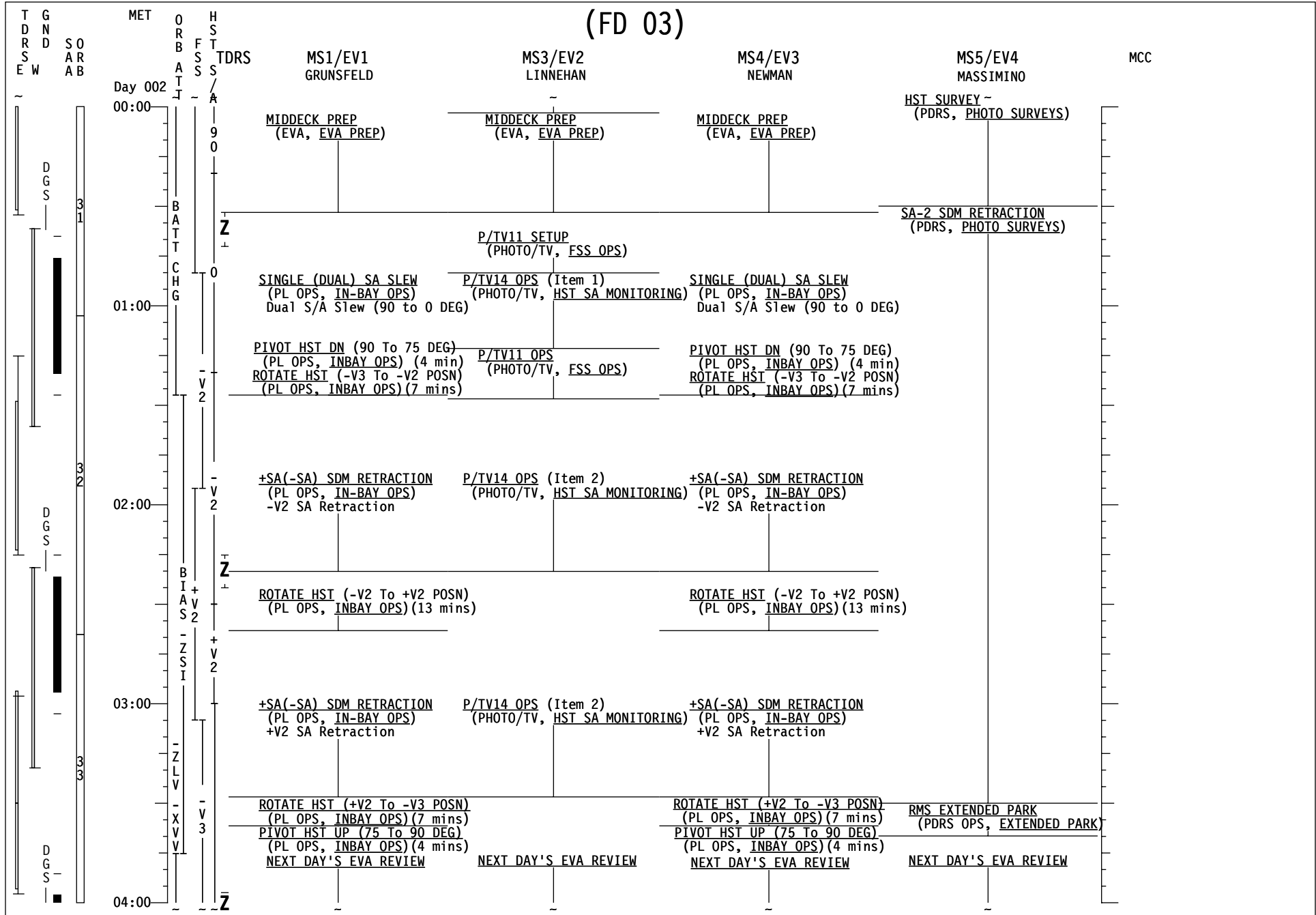
PET Re1	TDRS	GND	SO	MET	ORBIT	HST	CDR	PLT	MS2/R1	GND CMD	MCC
ERSW	SS/A	DS	AR	Day 001	STATUS	TDRS	ALTMAN	CAREY	CURRIE		
				20:00	ERTLY H/O		HST RNDZ (RNDZ, RNDZ TIMELINE)	HST RNDZ (RNDZ, RNDZ TIMELINE)	HST RNDZ (RNDZ, RNDZ TIMELINE)	HST TO CAPTURE ATT & DSBL S/M TESTS	TDRS H/O UPLINK β ONLY 0 +BOX -40<AZ<100 -89≤EL≤ 10
									POISE FOR CAPTURE (PDRS, NOM HST RETRIEVAL)	LGA SWITCH AFT TO FWD	
				21:00	Z				HST RNDZ (RNDZ, RNDZ TIMELINE)	HST TO CAPTURE ATT & DSBL S/M TESTS	
										LGA SWITCH FWD TO AFT	
				01:00	BERTH CONFIG (V3)		GRAPPLE (1/21:37) HST BERTH (PDRS, NOM HST RETRV)	P/TV12 OPS (PHOTO/TV, HST RETRIEVE/BERTH)	HST BERTH (PDRS, NOM HST RETRV)	PSEA KA MONITORING DISABLED	
										HST TO DRIFT MODE	TDRS H/O
				22:00	ERTLY H/O					SWITCH LGAs FOR PI OPS	
				02:00	Z		MNVR BATT CHG ATT R=257 P=187 Y=13 A10/AUTO/VERN INIT MNVR	P/TV13 OPERATIONS (PHOTO/TV, HST SURVEY) Item 1	HST SURVEY (PDRS, PHOTO SURVEYS)		UPLINK β ONLY 15 +BOX -65<AZ<-10 -89≤EL≤-40
				23:00	BATT CHG					ACTIVATE HST EXTERNAL POWER	
							EXERCISE				
				00:00						OTA HTR CONFIG	
										FGEs ON	
										CONFIGURE 486 FOR SA CHANGEOUT	



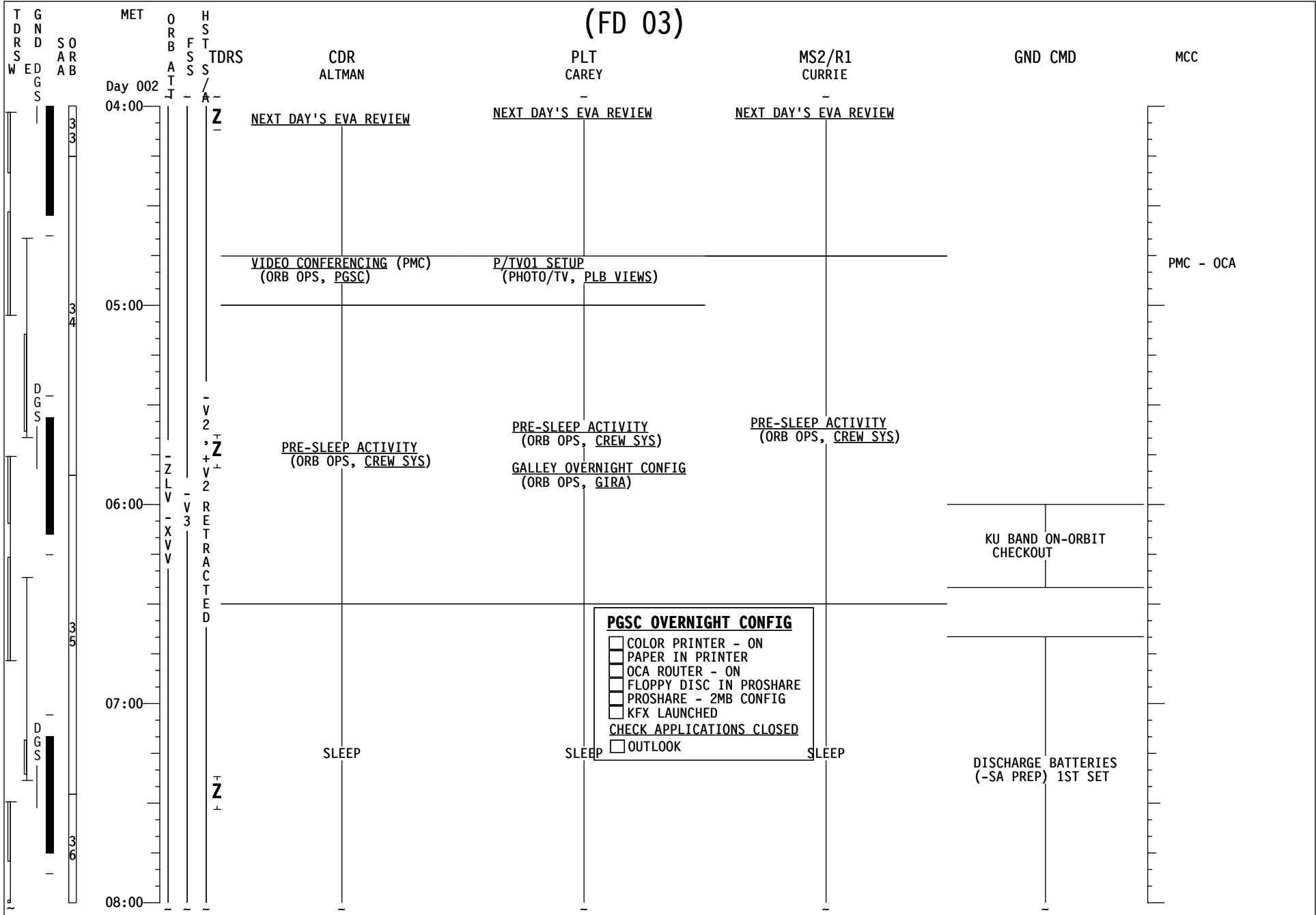
(FD 03)

TDRS	CDR ALTMAN	PLT CAREY	MS2/R1 CURRIE	GND CMD	MCC
00:00	<u>ACTIVATION</u> (Cue Card, <u>PLAYBACK</u> )  <u>VIDEO CAMCORDER PLAYBACK</u>  KU AVAIL TDRE (00:15-00:30)	<u>PRIOR POWERDOWN GROUP B</u> (ORB PKT, <u>PRIOR PWRDN</u> ) Steps 5,6,9,10,12 Single G2	<u>HST SURVEY ~</u> (PDRS, <u>PHOTO SURVEYS</u> )	<u>PWR ON AND CONFIGURE DCE</u> <u>STAGE 2 OTA HTR GROUP</u>	
01:00	During SA SLEW FREE DRIFT: <u>MNVR SA RETRACT ATT</u> TGT=4 BV=5 P=75 Y=0 OM=220 A10/FREE/VERN Init MNVR When SA Damping Complete: A10/AUTO/VERN for 1 Minute. Then A10/AUTO/FREE for PVT/ROT <u>PIVOT HST DN (90 To 75 DEG)</u> (PL OPS, <u>INBAY OPS</u> ) (4 min) <u>ROTATE HST (-V3 To -V2 POSN)</u> (PL OPS, <u>INBAY OPS</u> ) (7 mins) When ROTATE complete: A10/AUTO/VERN	<u>EXERCISE</u>	<u>SA-2 SDM RETRACTION</u> (PDRS, <u>PHOTO SURVEYS</u> )	<u>OPEN SPA TRIM RELAYS</u>  <u>SLEW SAs (90 To 0 DEG)</u>  <u>STAGE 3 OTA HTR GROUP</u>	
02:00	<u>+SA(-SA) SDM RETRACTION</u> (PL OPS, <u>IN-BAY OPS</u> ) -V2 SA Retraction	<u>P/TV13 OPERATIONS</u> (PHOTO/TV, <u>HST SURVEY</u> ) Item 3		<u>SA SDM RETRACTION</u>	
03:00	<u>ROTATE HST (-V2 To +V2 POSN)</u> (PL OPS, <u>INBAY OPS</u> ) (13 mins)	<u>P/TV11 OPS</u> (PHOTO/TV, <u>FSS OPS</u> )			
	<u>10.2 PSI MAINTENANCE</u> (EVA, <u>10.2 PSI CABIN</u> )	<u>10.2 PSI MAINTENANCE</u> (EVA, <u>10.2 PSI CABIN</u> )			
	<u>+SA(-SA) SDM RETRACTION</u> (PL OPS, <u>IN-BAY OPS</u> ) +V2 SA Retraction	<u>P/TV13 OPERATIONS Item 4</u> (PHOTO/TV, <u>HST SURVEY</u> )		<u>SA SDM RETRACTION</u>	
	<u>ROTATE HST (+V2 To -V3 POSN)</u> (PL OPS, <u>INBAY OPS</u> ) (7 mins)	<u>P/TV11 SETUP</u> (PHOTO/TV, <u>FSS OPS</u> )	<u>RMS EXTENDED PARK</u> (PDRS OPS, <u>EXTENDED PARK</u> )		<u>UPLINK</u> β ONLY 15 deg
	<u>PIVOT HST UP (75 To 90 DEG)</u> (PL OPS, <u>INBAY OPS</u> ) (4 mins) <u>MNVR (TRK) -ZLV -XVV</u> TG=2 BV=3 OM=0 A10/AUTO/VERN INIT TRK	<u>NEXT DAY'S EVA REVIEW</u>	<u>NEXT DAY'S EVA REVIEW</u>		
04:00					

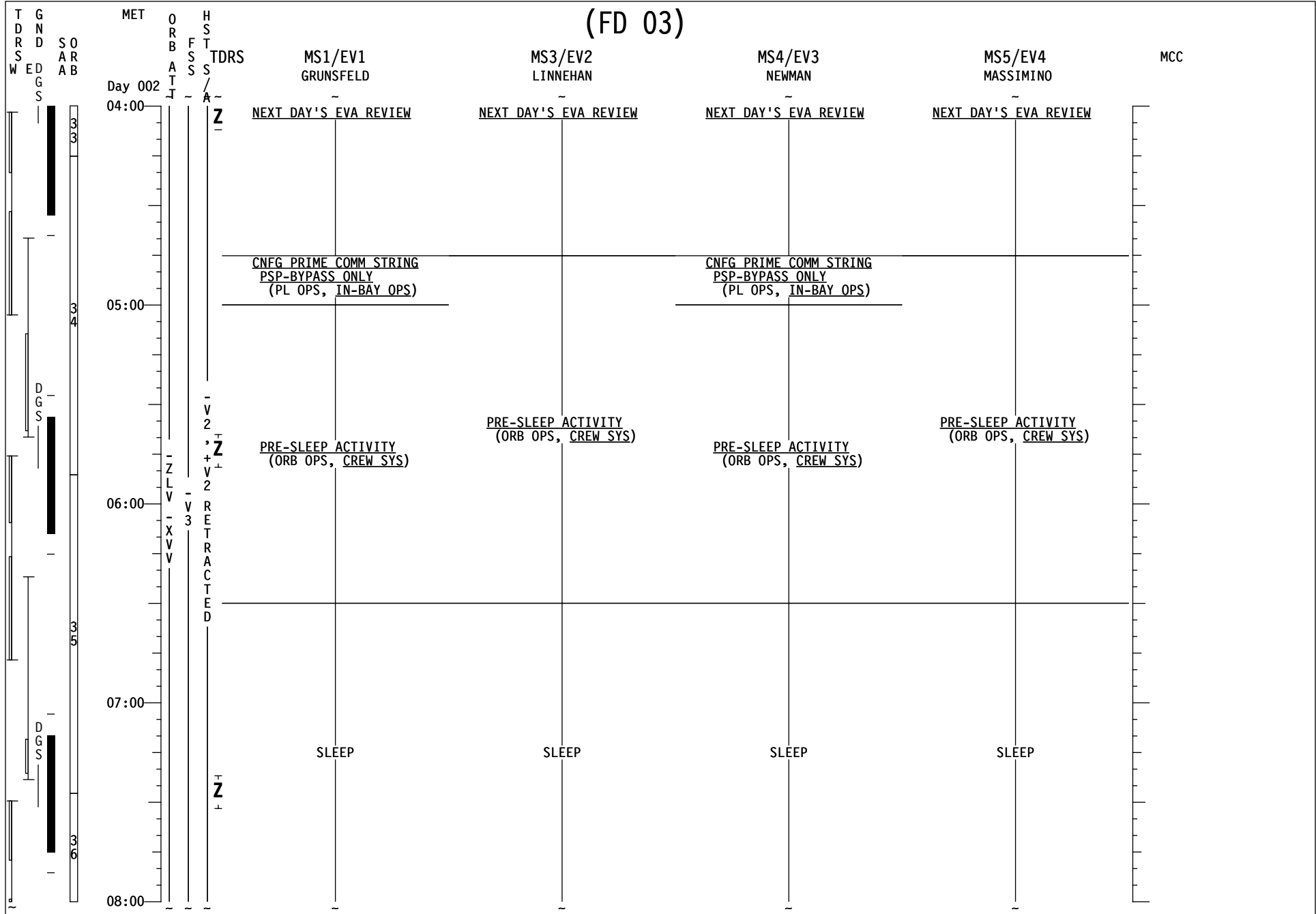
# (FD 03)



# (FD 03)

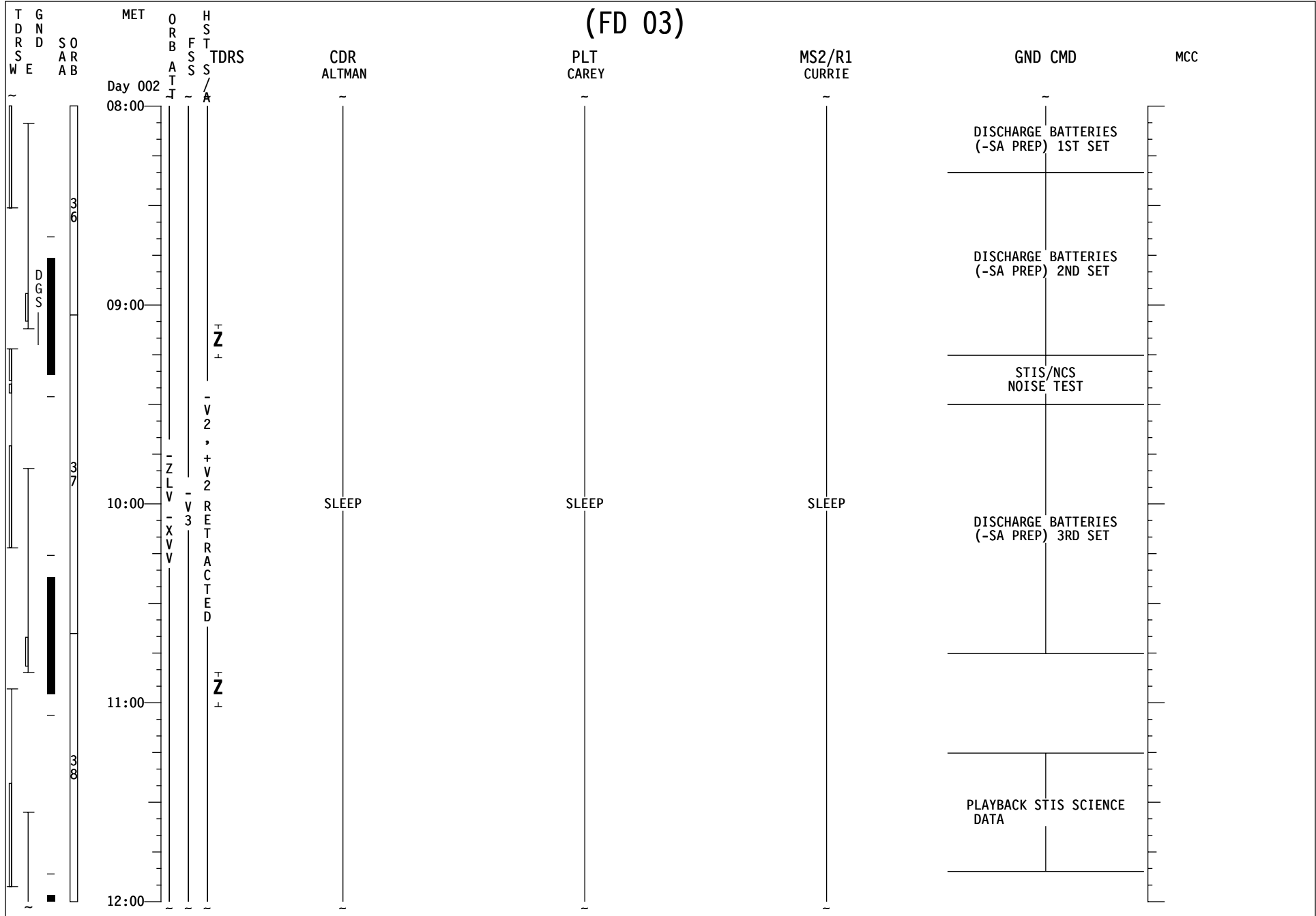


# (FD 03)

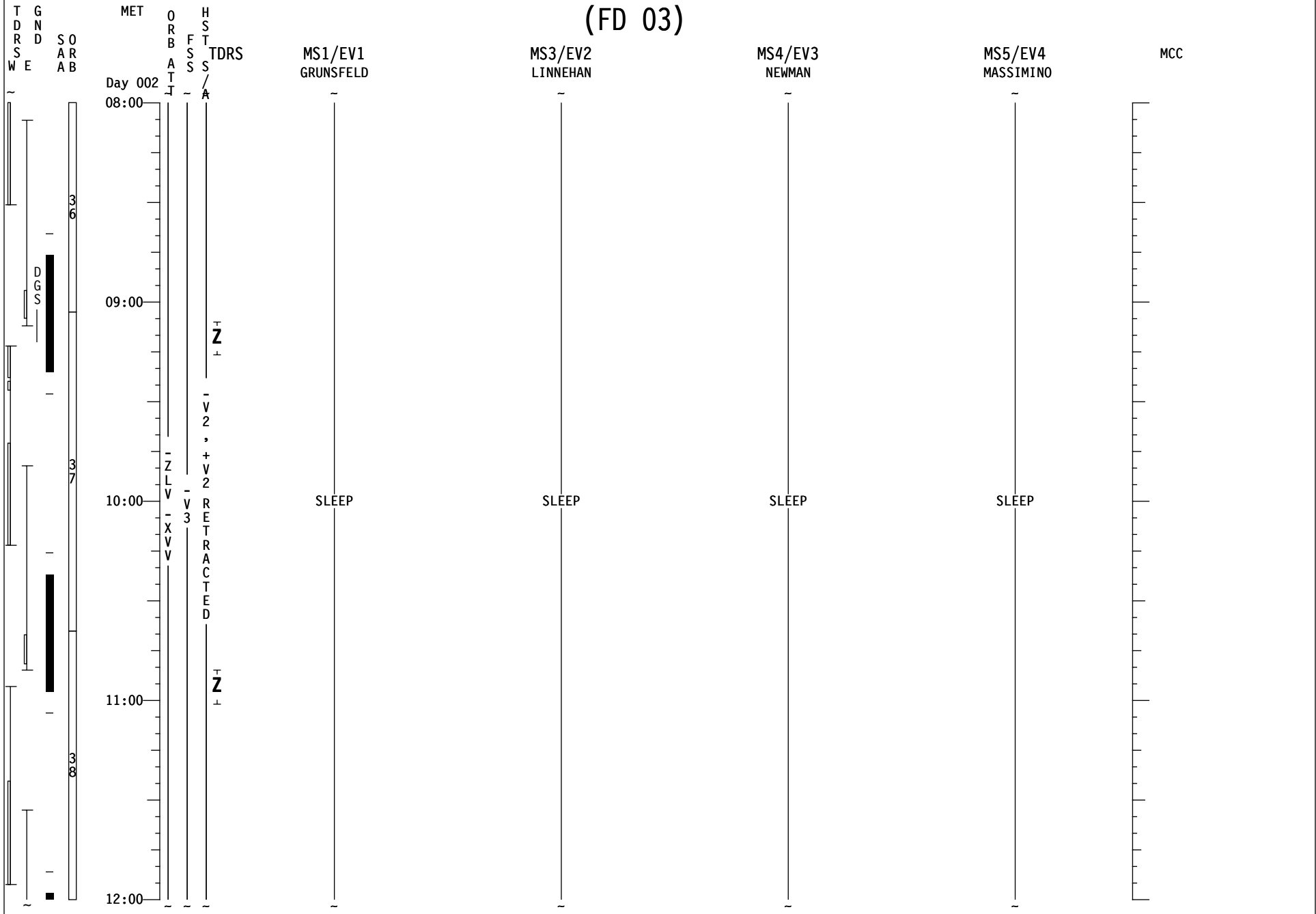




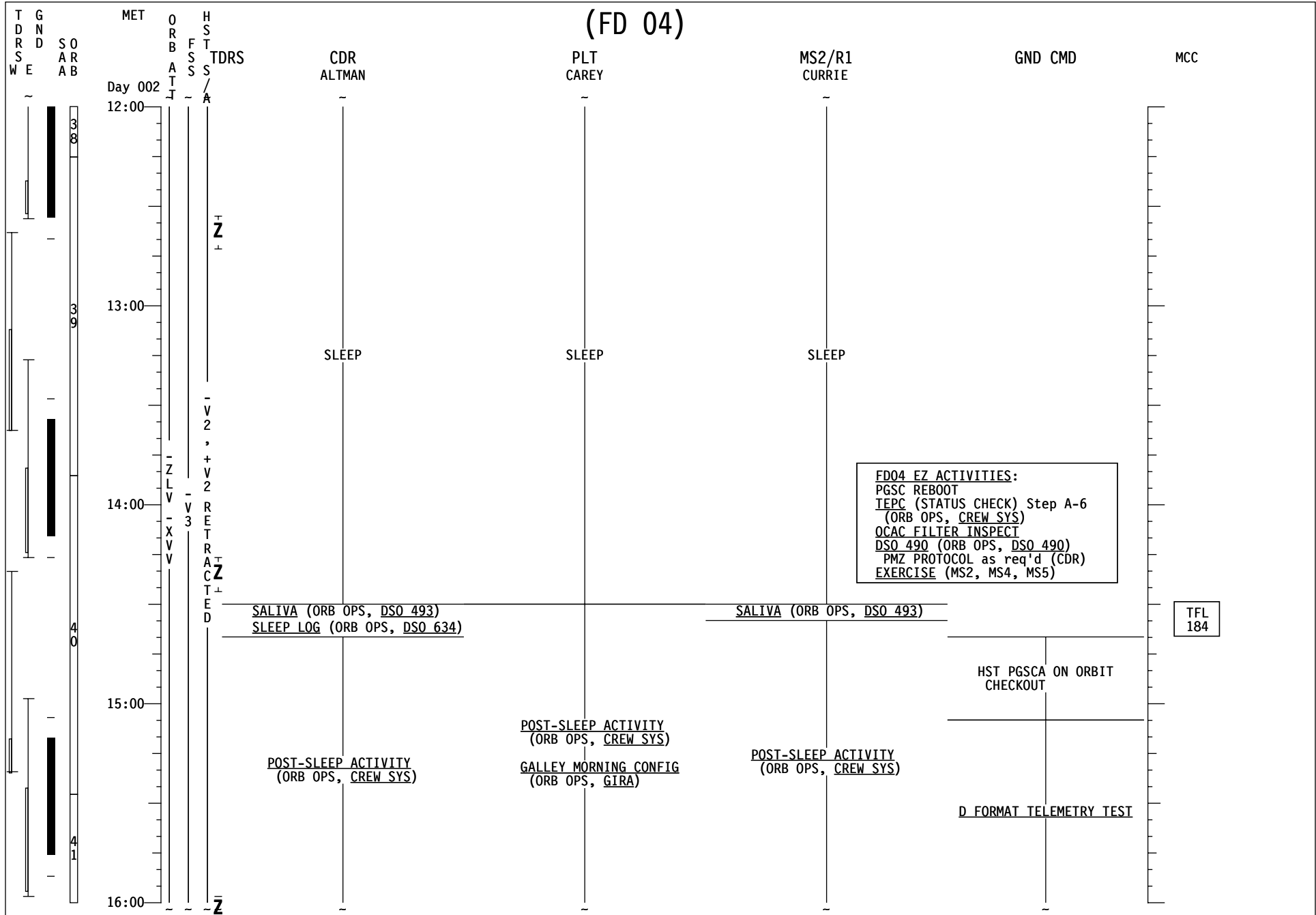
# (FD 03)



(FD 03)

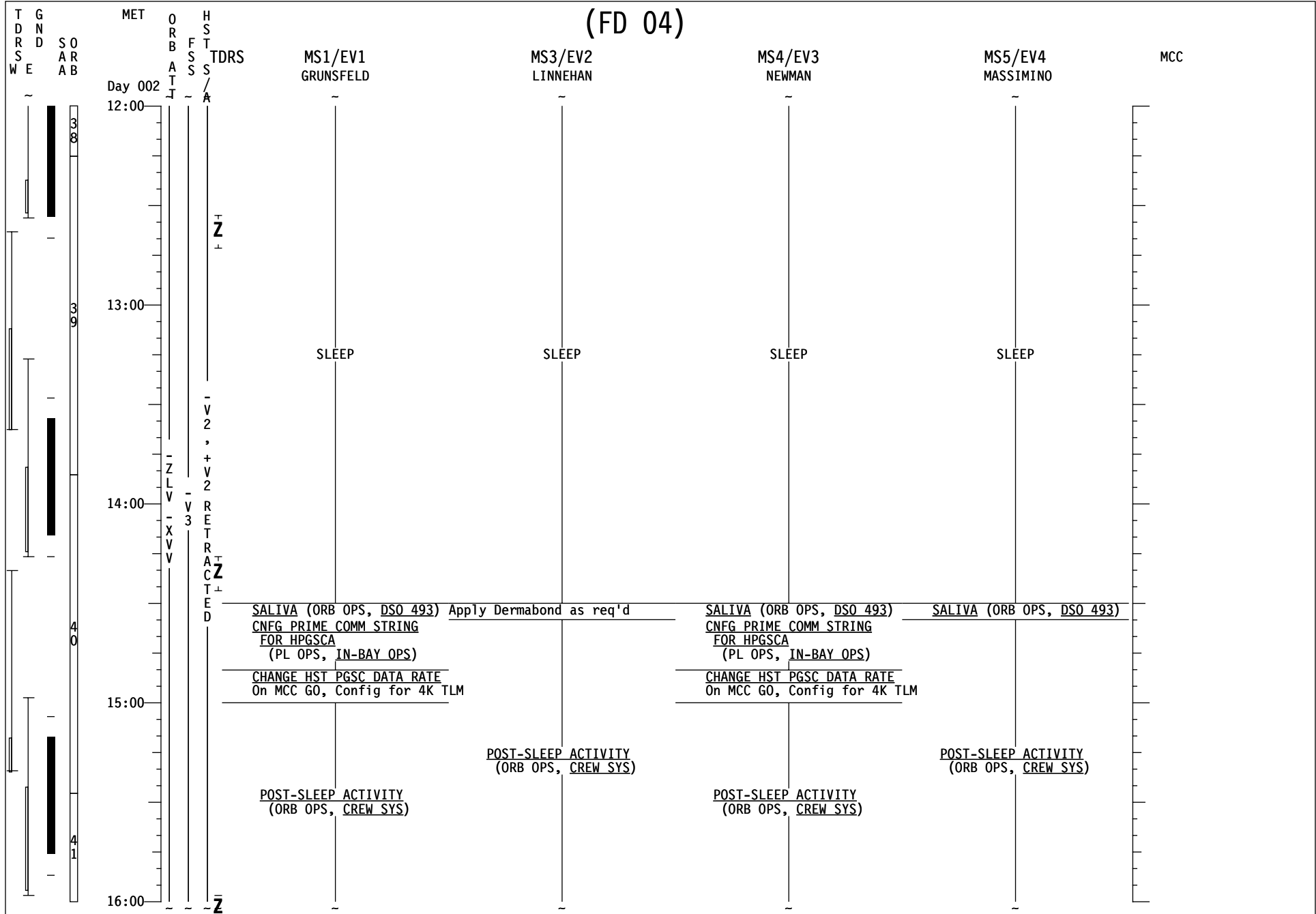


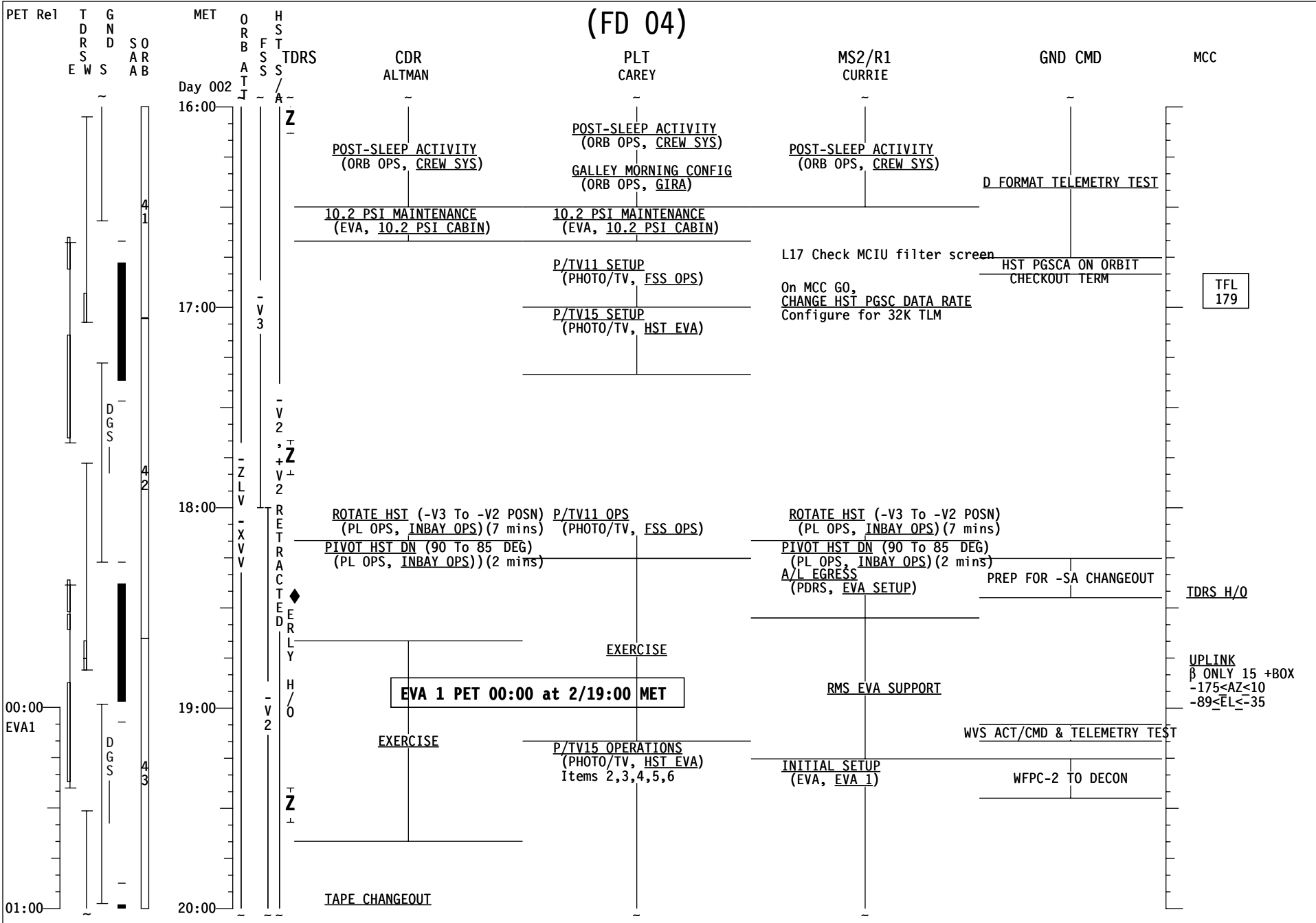
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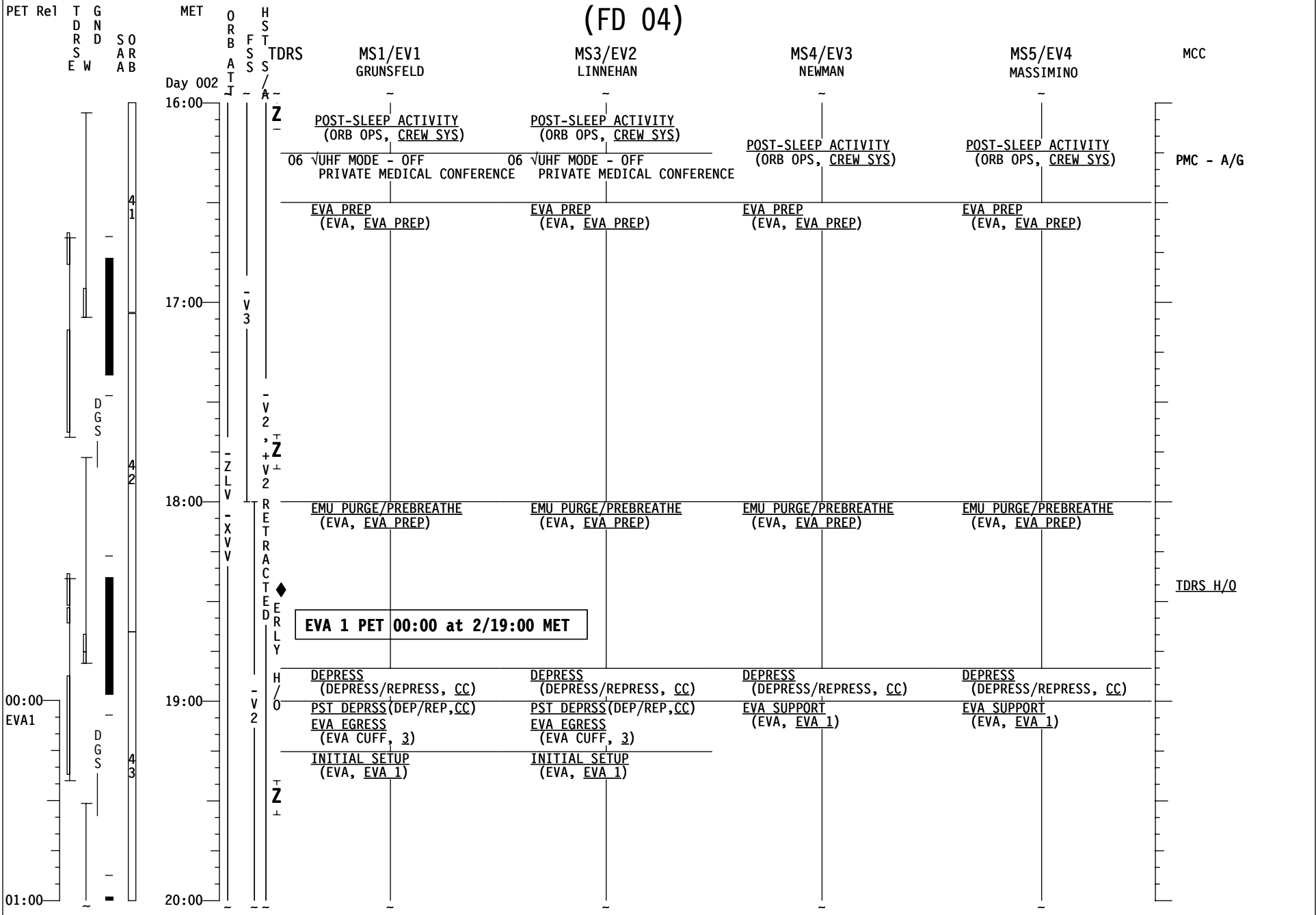


**FD04 EZ ACTIVITIES:**  
 PGSC REBOOT  
 IEPC (STATUS CHECK) Step A-6 (ORB OPS, CREW SYS)  
 QCAC FILTER INSPECT  
 DSO 490 (ORB OPS, DSO 490)  
 PMZ PROTOCOL as req'd (CDR)  
 EXERCISE (MS2, MS4, MS5)

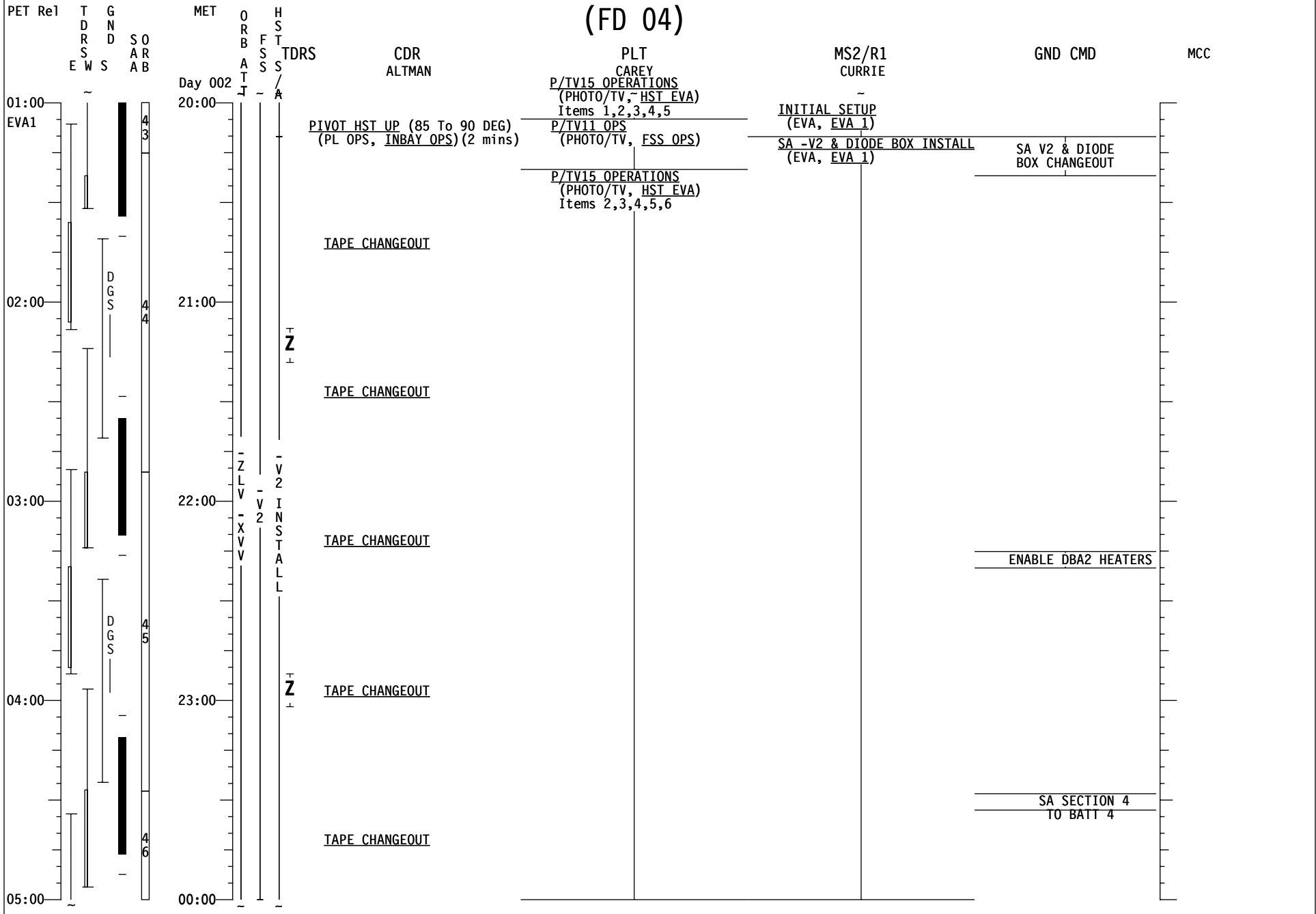
# (FD 04)

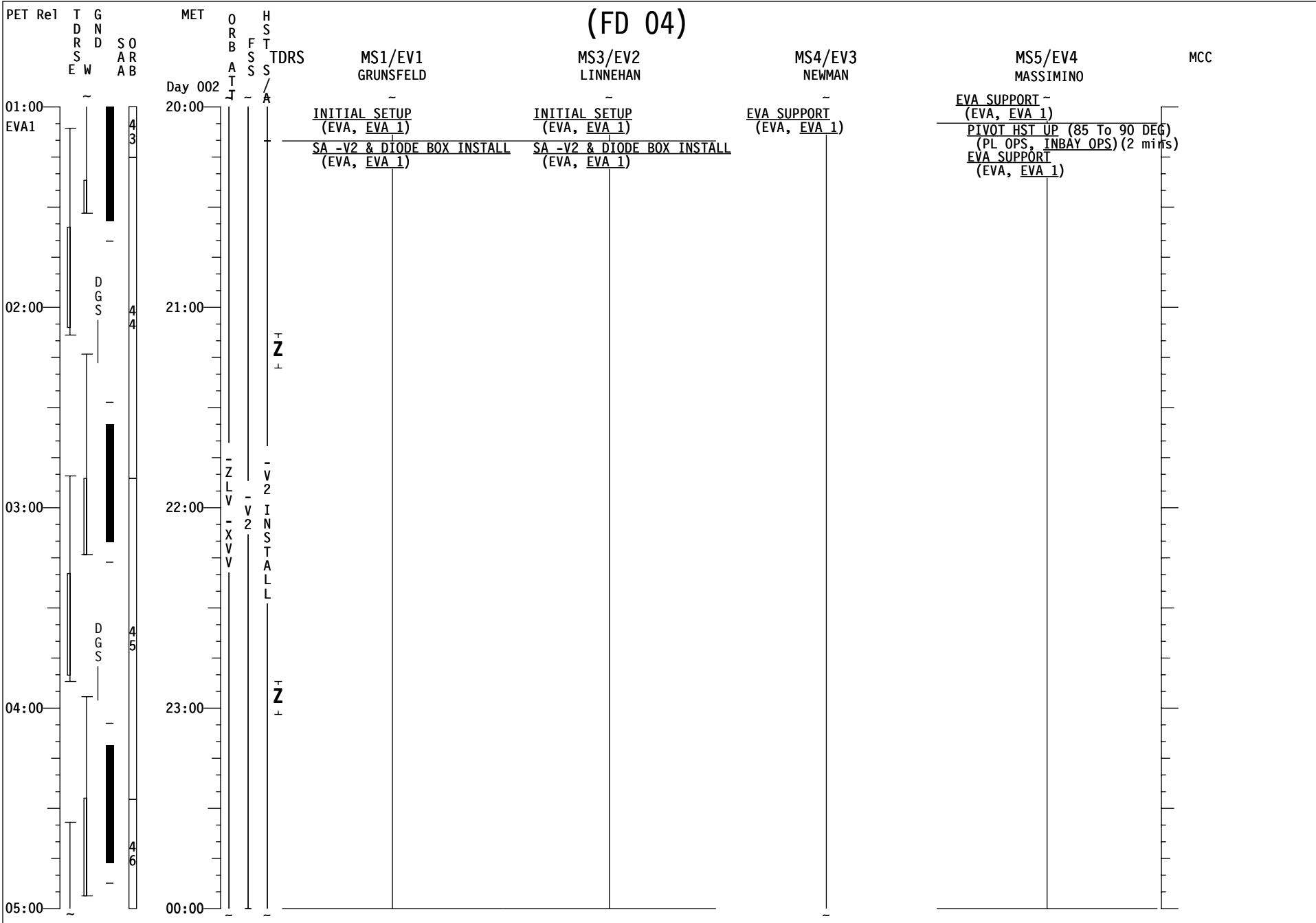




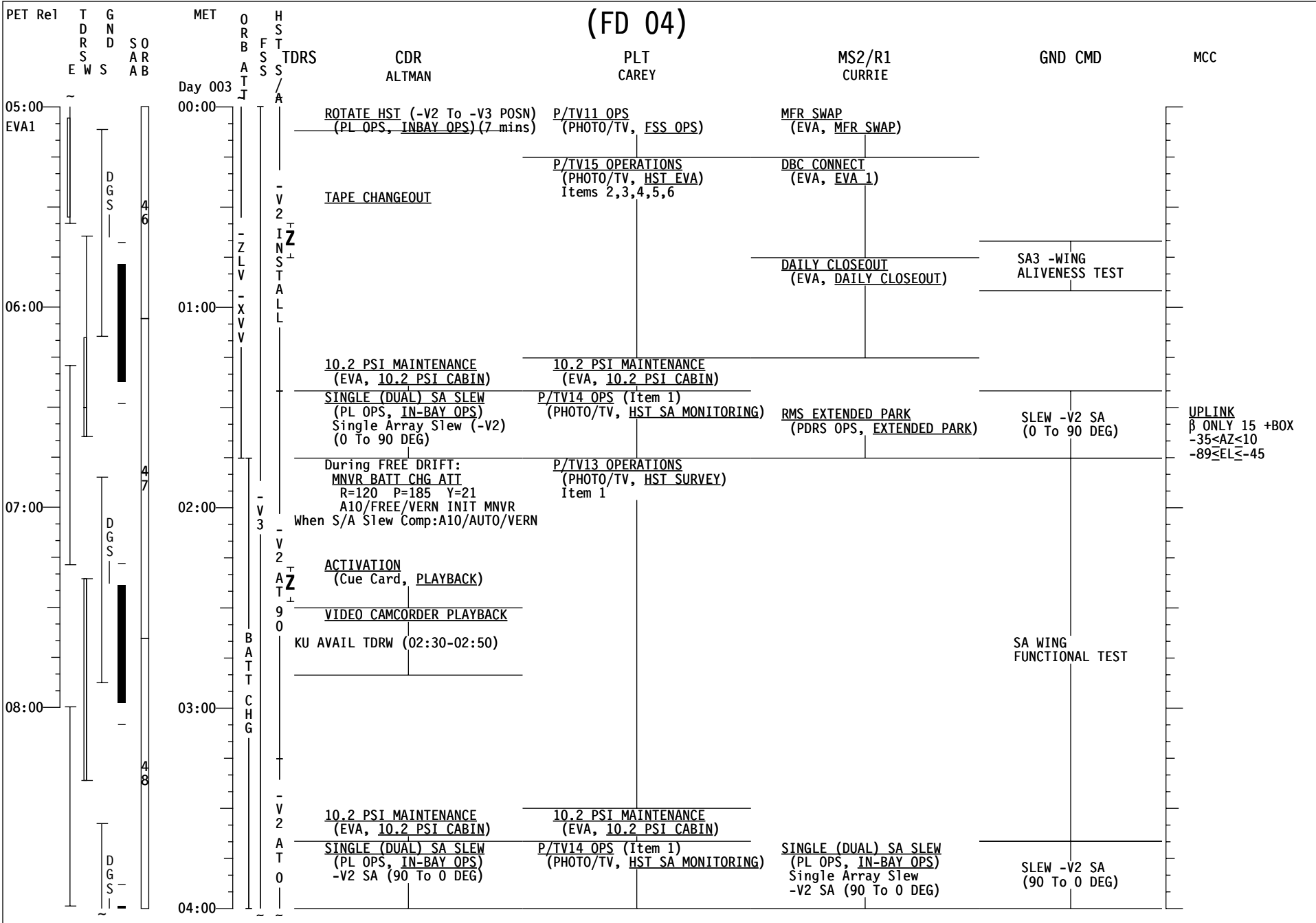


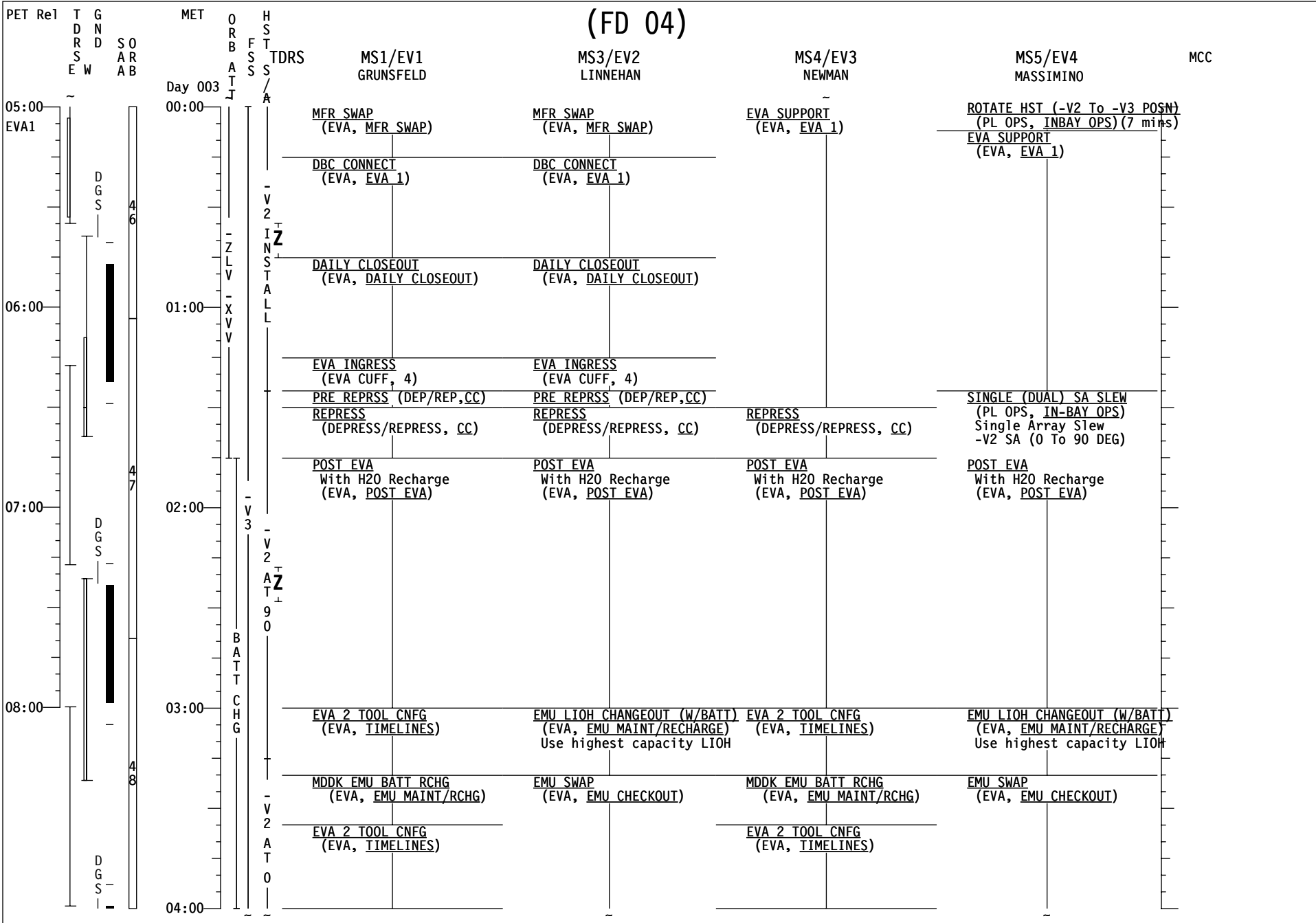
# (FD 04)



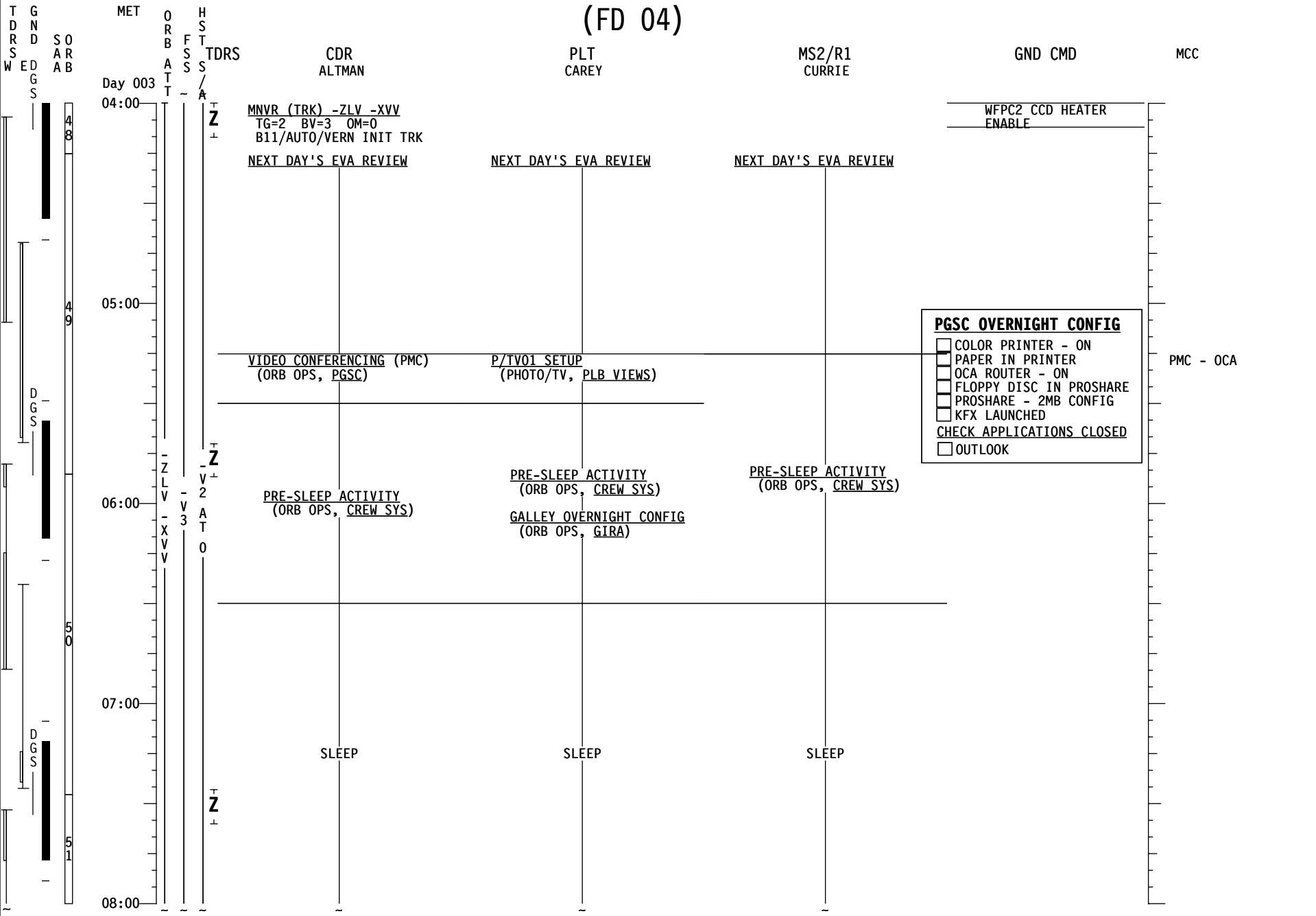




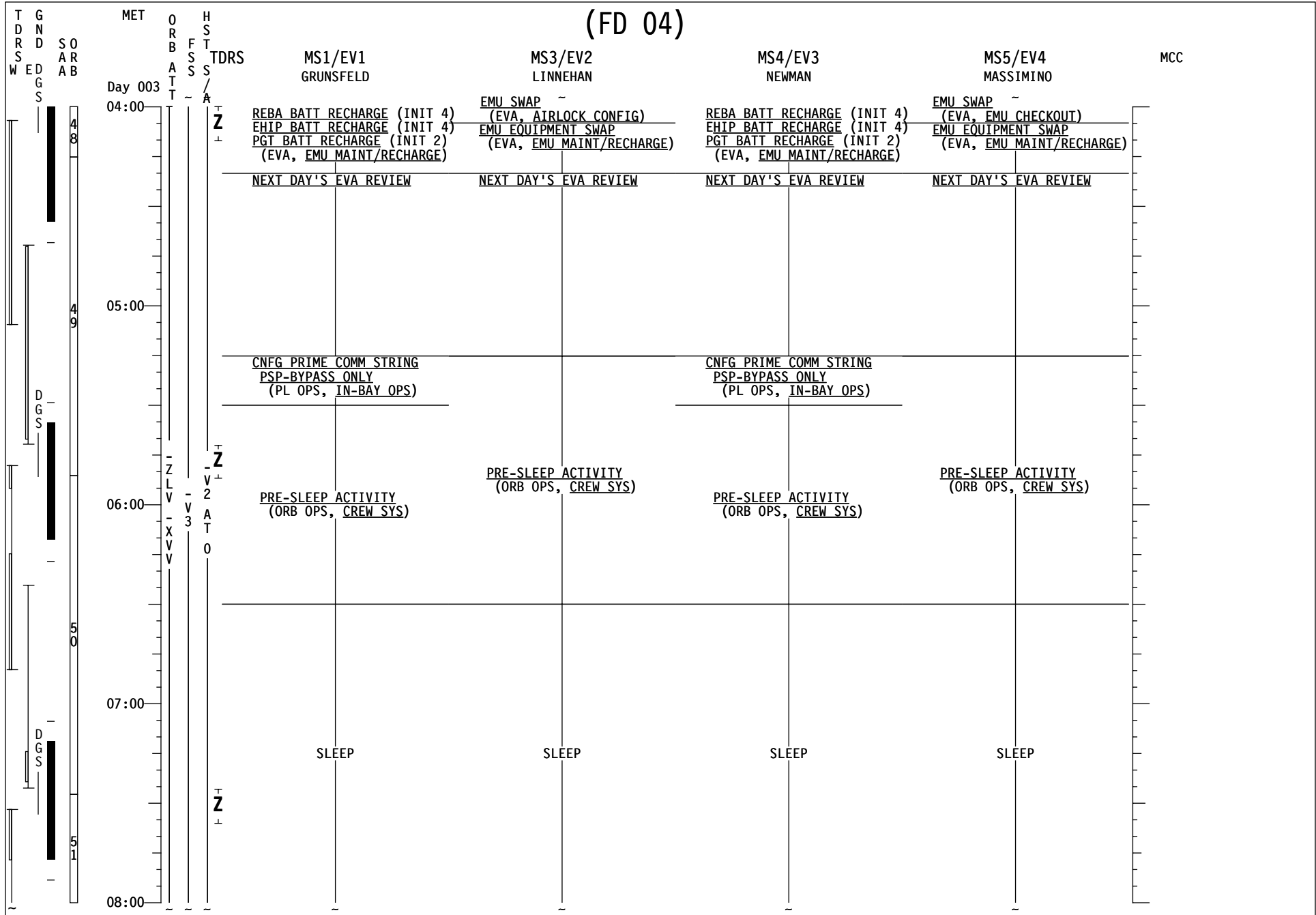




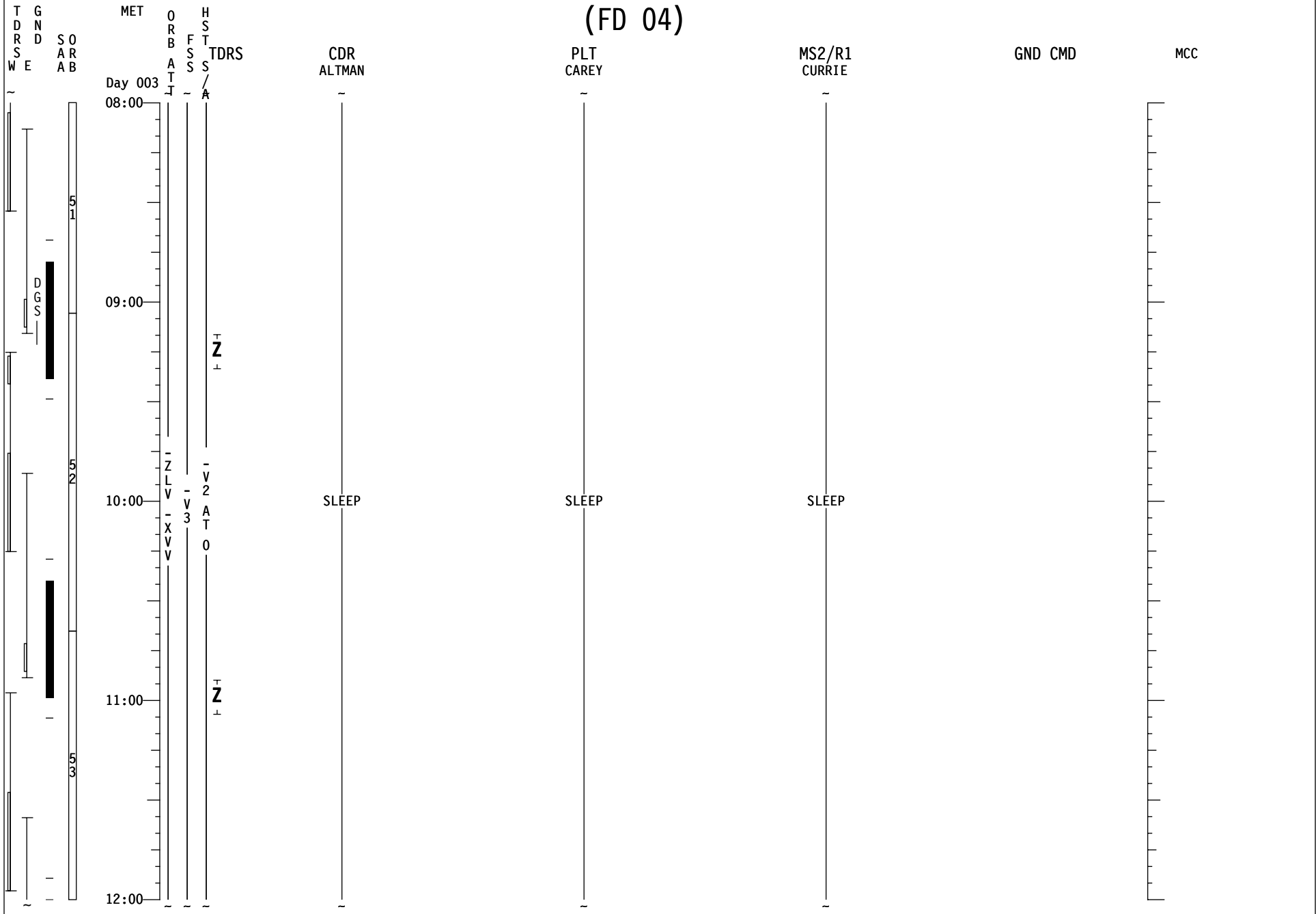
(FD 04)



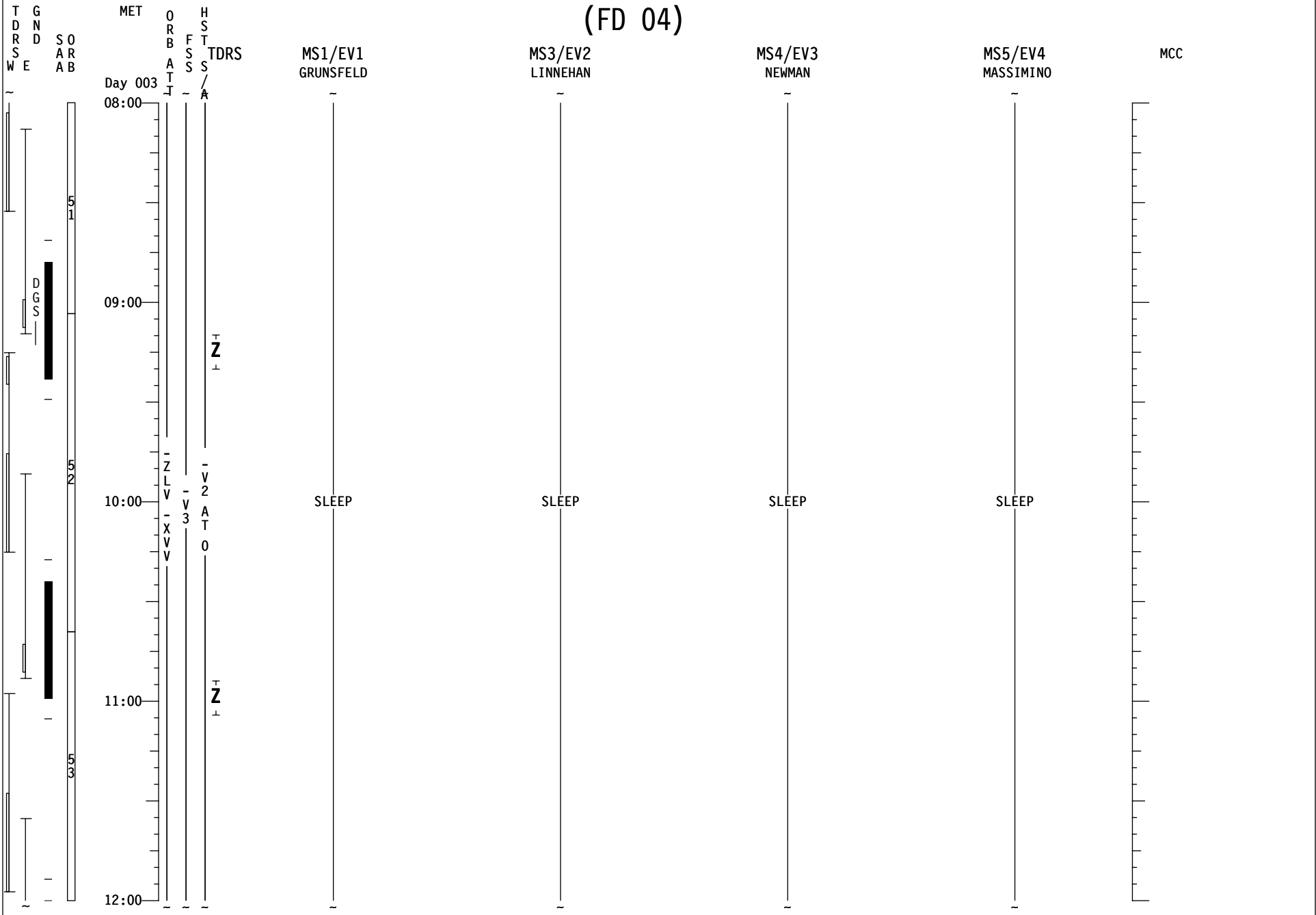
# (FD 04)



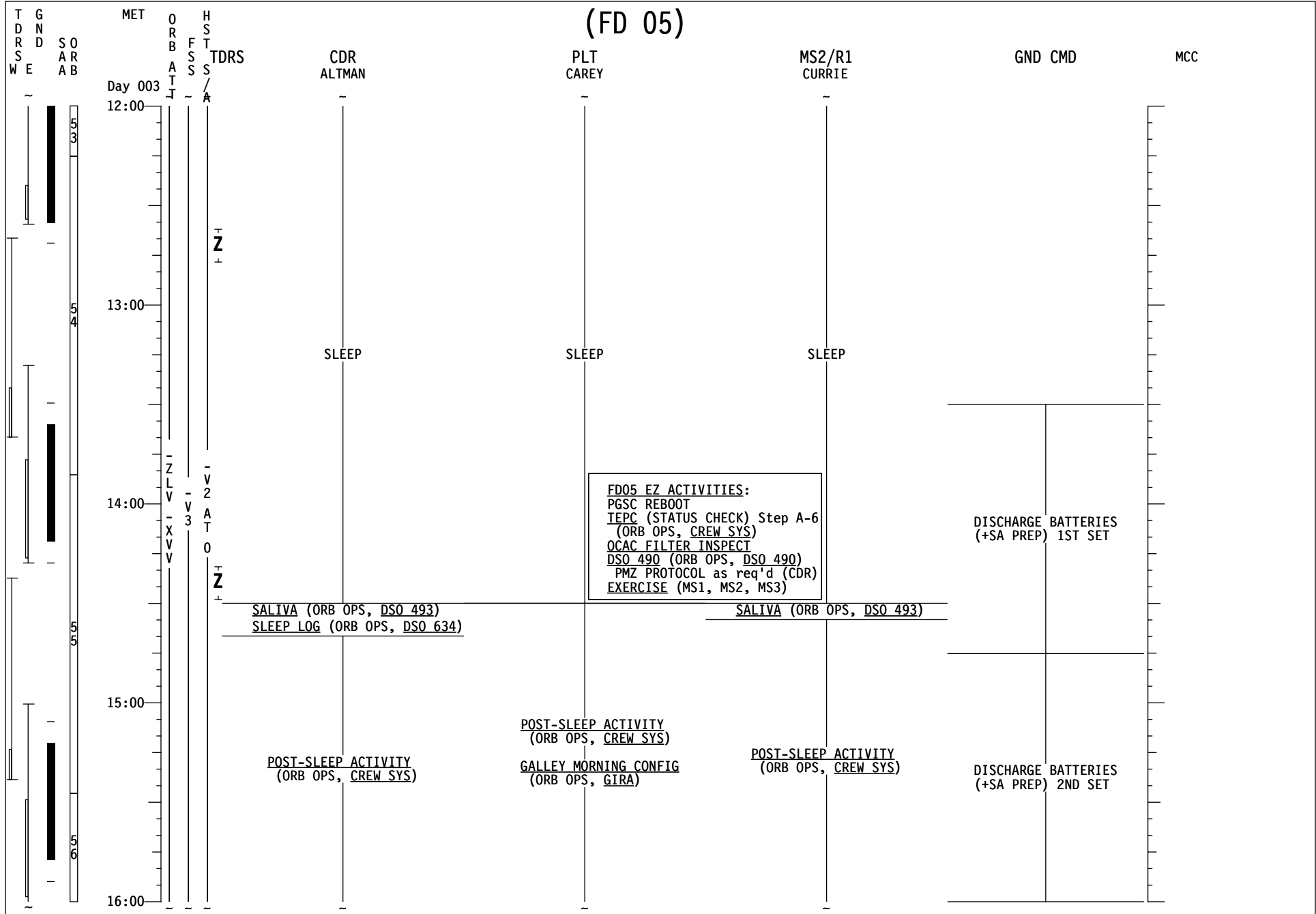
(FD 04)



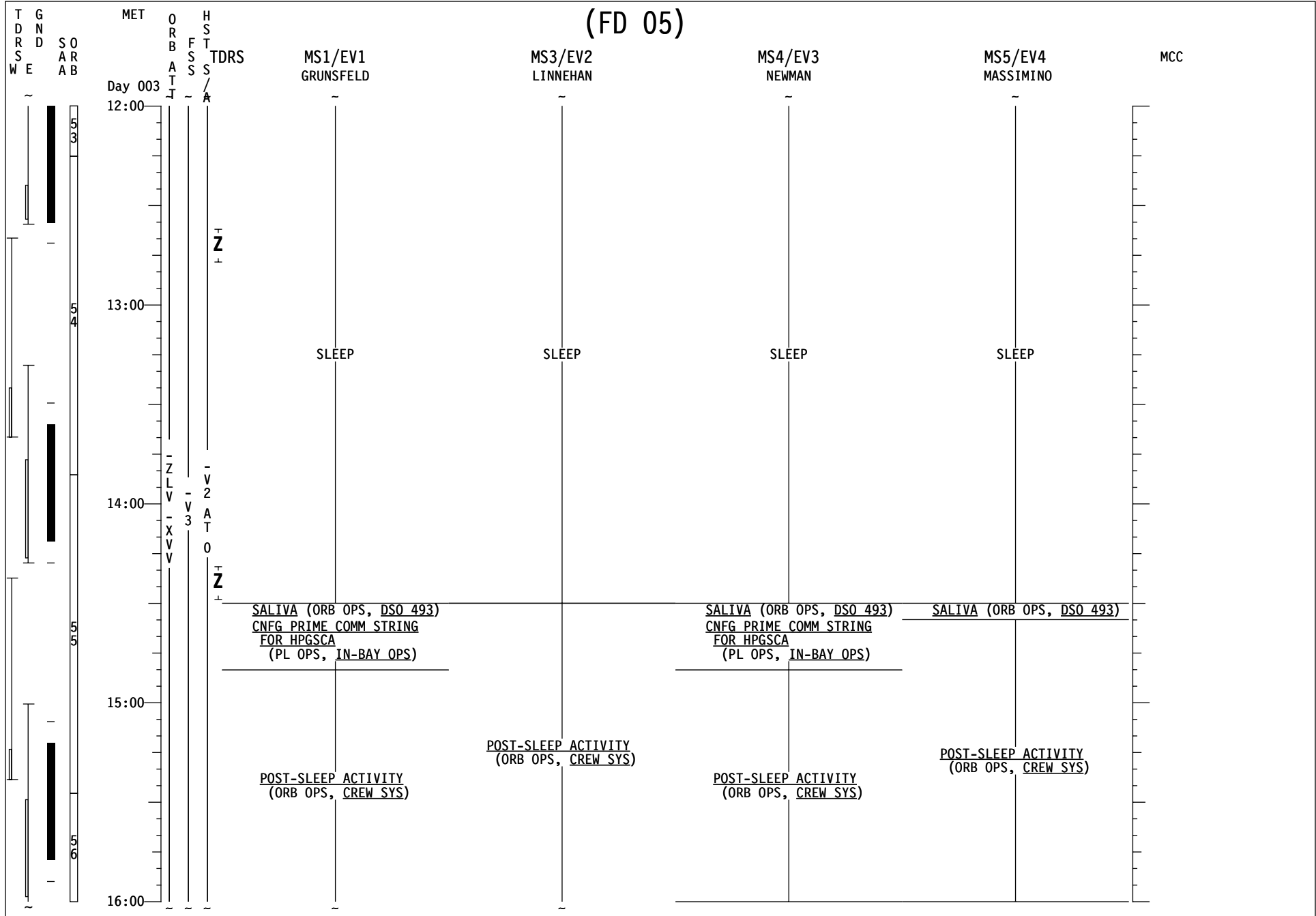
(FD 04)



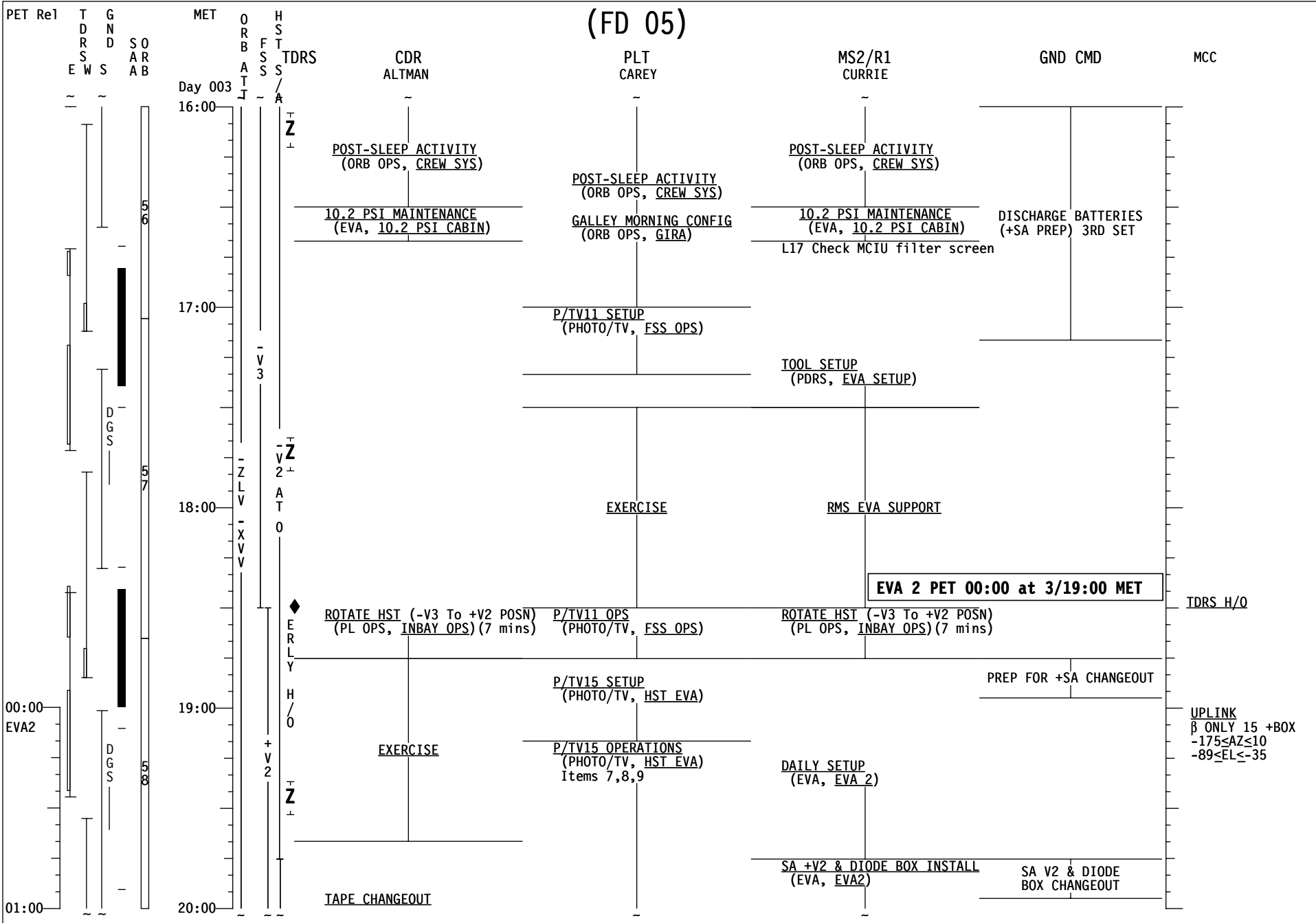
# (FD 05)

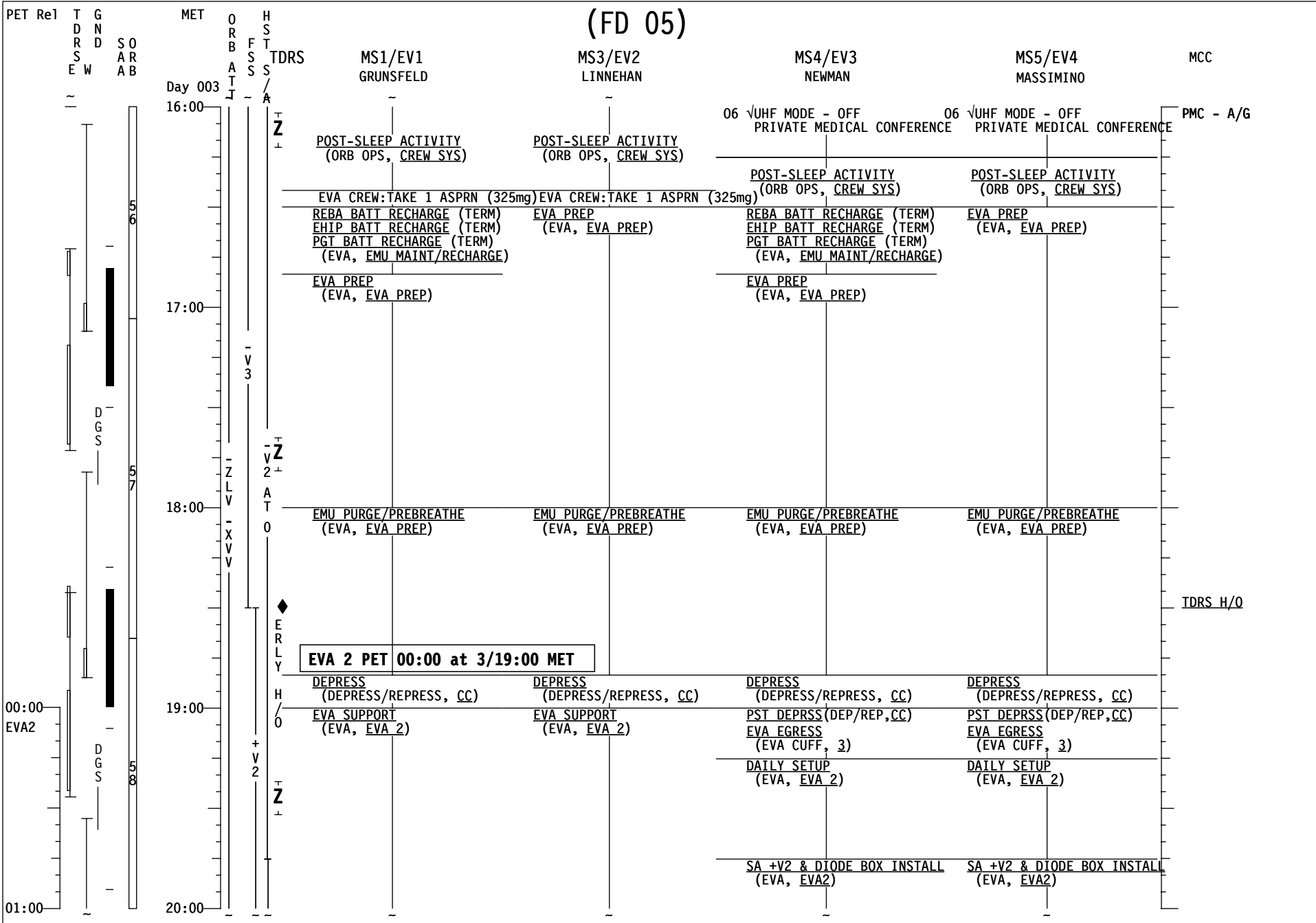


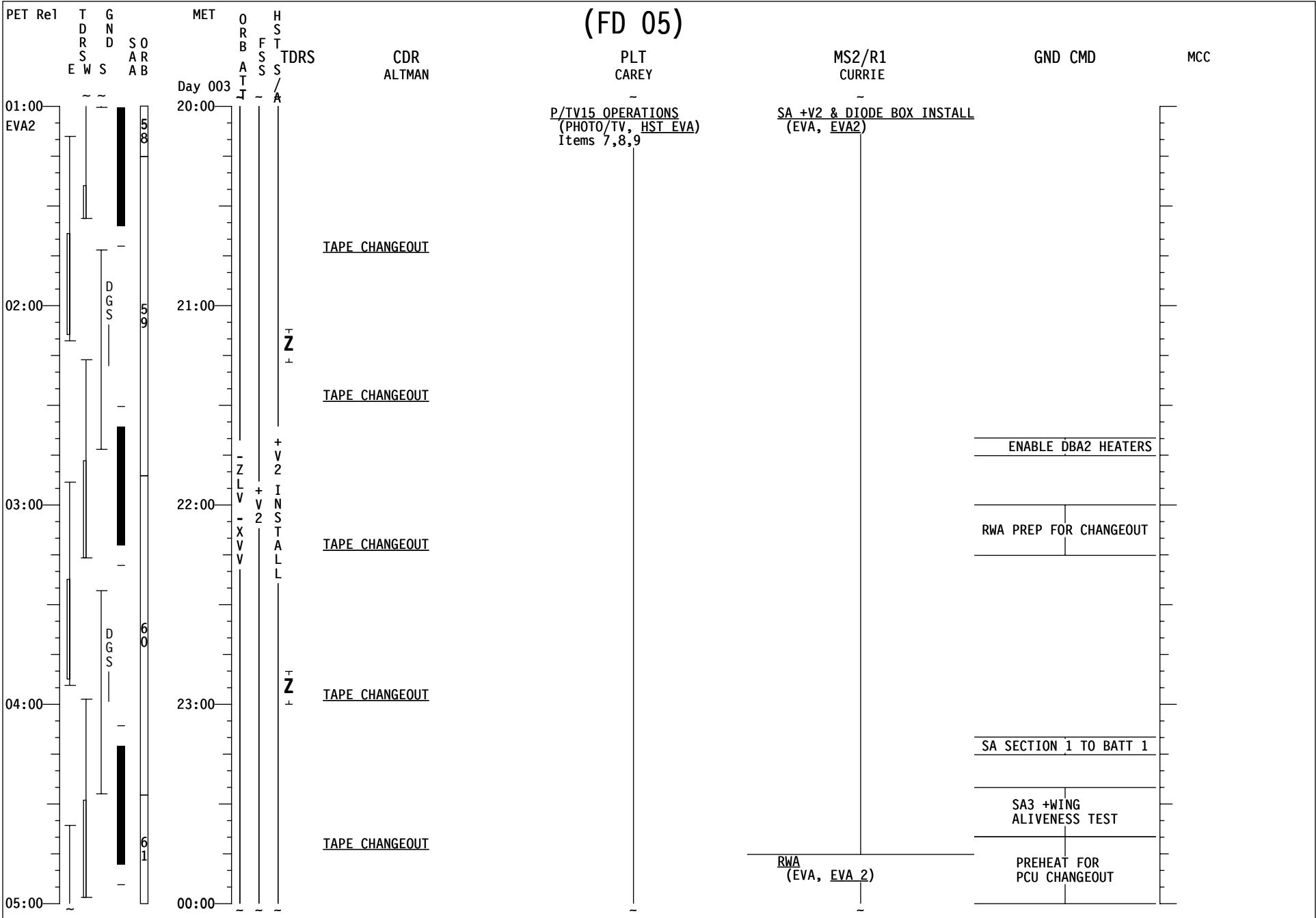
# (FD 05)

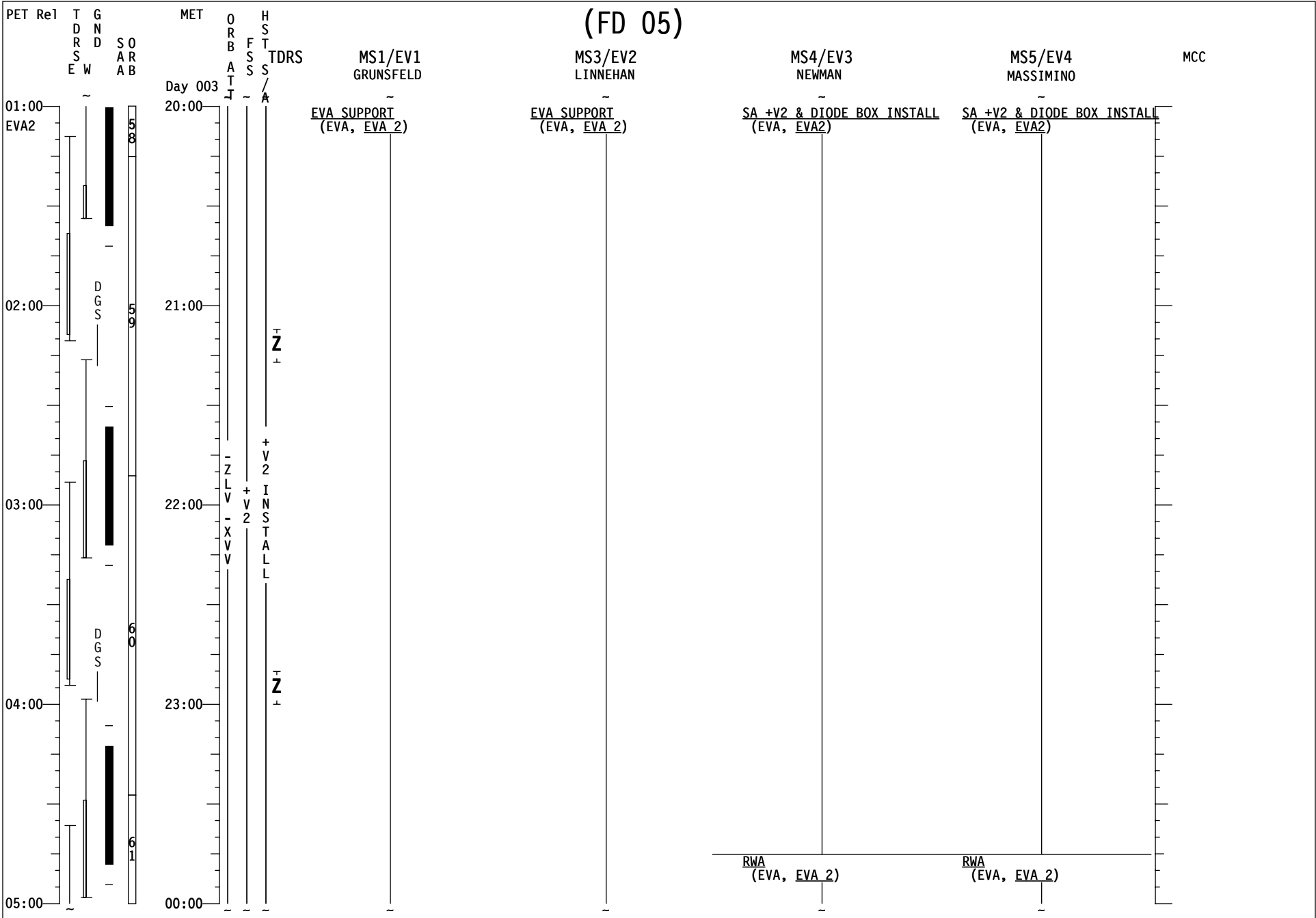


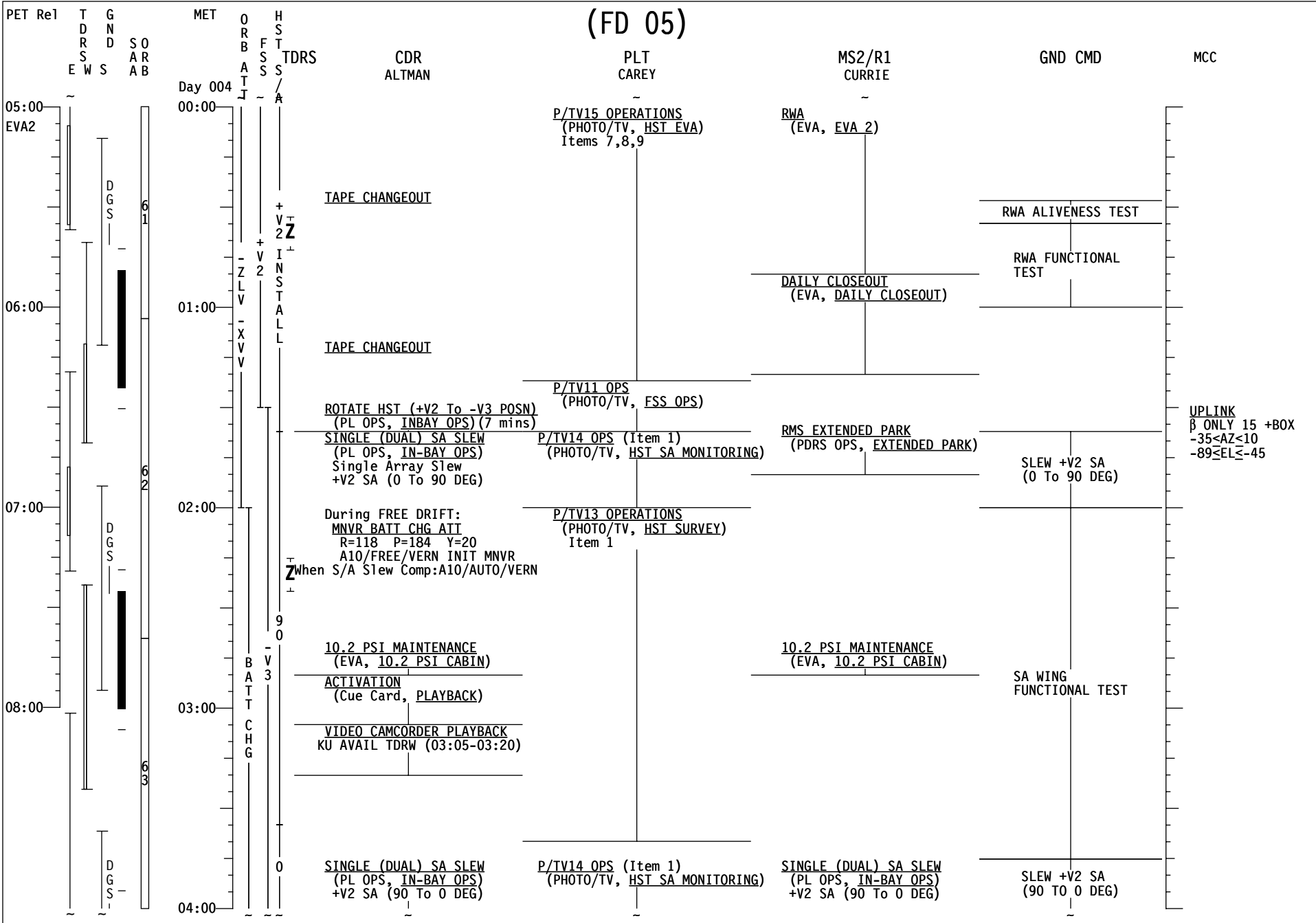


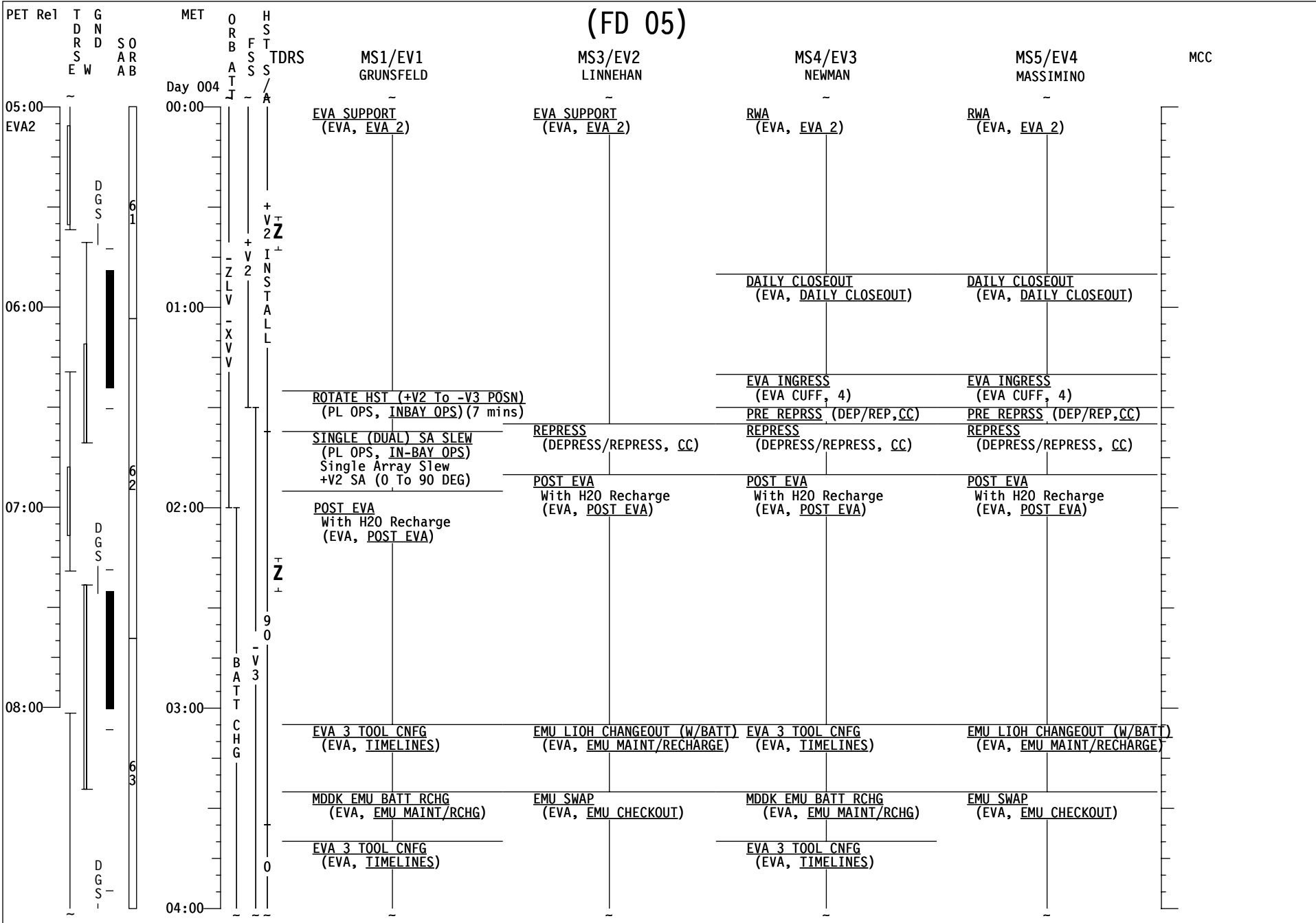








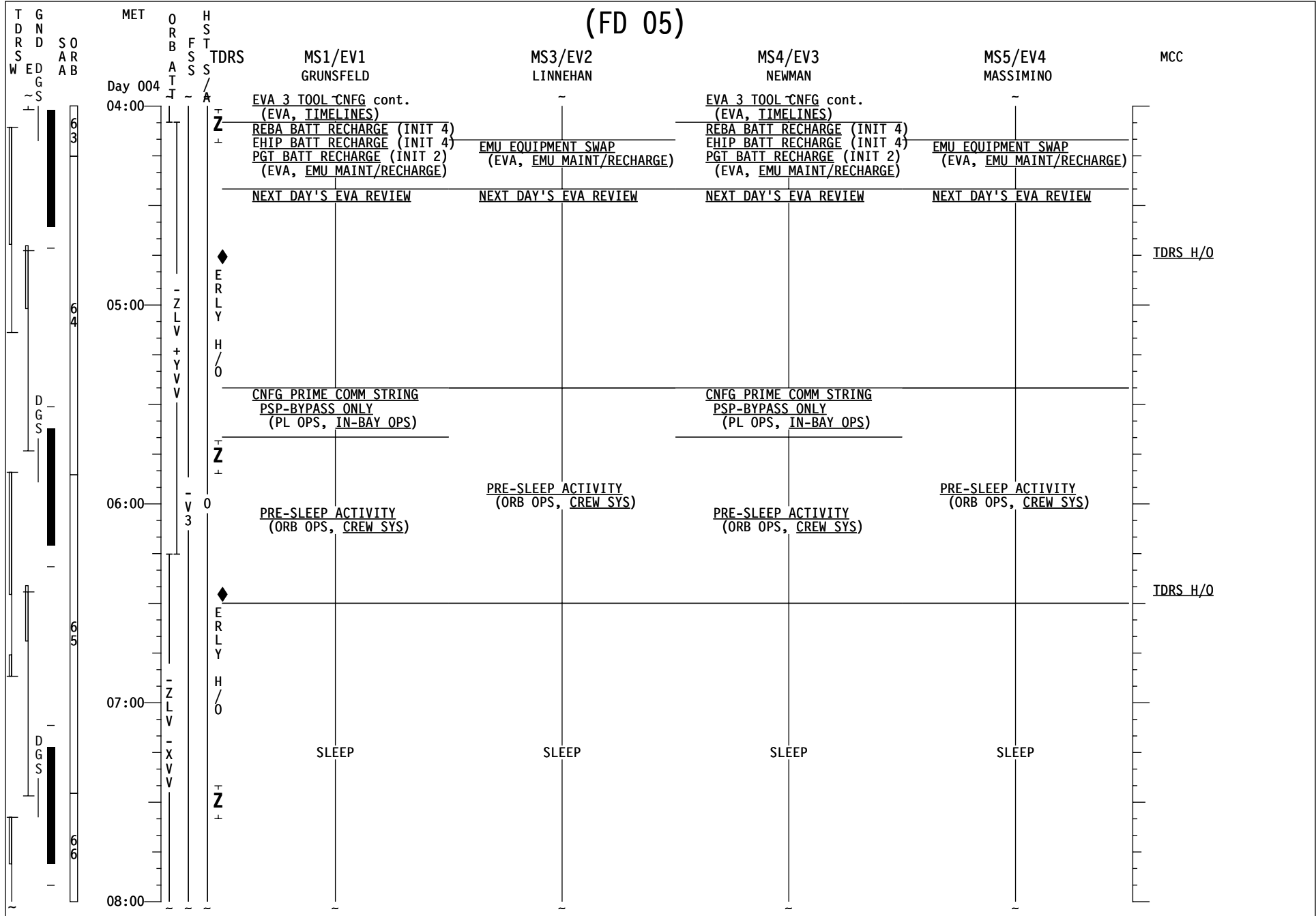




# (FD 05)

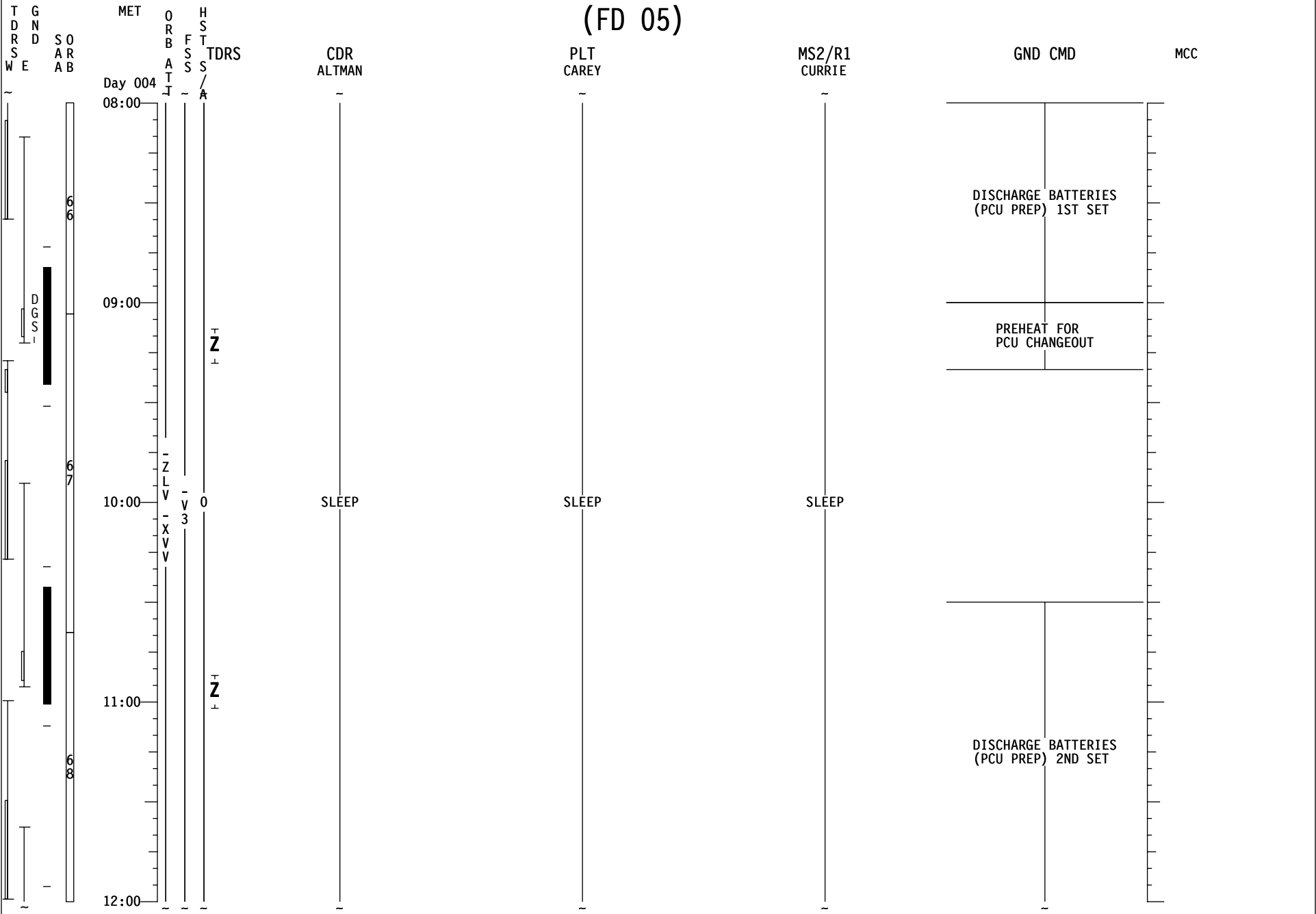
MET		TDRS	CDR ALTMAN	PLT CAREY	MS2/R1 CURRIE	GND CMD	MCC
Day 004 04:00 05:00 06:00 07:00 08:00	TDRS WEDGS SOARAB 63 64 65 66	Z SINGLE (DUAL) SA SLEW cont. During FREE DRIFT: MNVR (TRK) -ZLV +YVV TG=2 BV=3 OM=270 A10/FREE/VERN Init TRK When S/A Slew Comp: A10/AUTO/VERN VERIFY PAYLOAD BAY LIGHTS - OFF NEXT DAY'S EVA REVIEW	P/TV14 OPS cont. 10.2 PSI MAINTENANCE (EVA, 10.2 PSI CABIN) P/TV01 SETUP (PHOTO/TV, PLB VIEWS) SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) When in Att, Init Waste & Sply Dump NEXT DAY'S EVA REVIEW	SINGLE (DUAL) SA SLEW cont. 10.2 PSI MAINTENANCE (EVA, 10.2 PSI CABIN) NEXT DAY'S EVA REVIEW	SLEW +V2 SA cont. RECONFIGURE 486 AFTER SA CHANGEOUT RWA PREHEAT (4 HRS)	UPDATE H2O SPLY DUMP QTY TK A & B TDRS H/O	
		ER L Y H / O	PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS)	PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS) GALLEY OVERNIGHT CONFIG (ORB OPS, GIRA)	PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS)	PGSC OVERNIGHT CONFIG <input type="checkbox"/> COLOR PRINTER - ON <input type="checkbox"/> PAPER IN PRINTER <input type="checkbox"/> OCA ROUTER - ON <input type="checkbox"/> FLOPPY DISC IN PROSHARE <input type="checkbox"/> PROSHARE - 2MB CONFIG <input type="checkbox"/> KFX LAUNCHED <input checked="" type="checkbox"/> CHECK APPLICATIONS CLOSED <input type="checkbox"/> OUTLOOK	PMC - OCA
		Z V 3	VIDEO CONFERENCING (PMC) (ORB OPS, PGSC) MNVR (TRK) -ZLV -XVV TG=2 BV=3 OM=0 B11/AUTO/VERN INIT TRK	SUPPLY/WASTE WATER DUMP (ORB OPS, ECLS) Term. Waste & Sply Dump PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS)	UPDATE H2O SPLY DUMP QTY TK A & B TDRS H/O		
		ER L Y H / O	SLEEP	SLEEP	SLEEP	FHST-SSP SHUTTER POWER TEST	

# (FD 05)

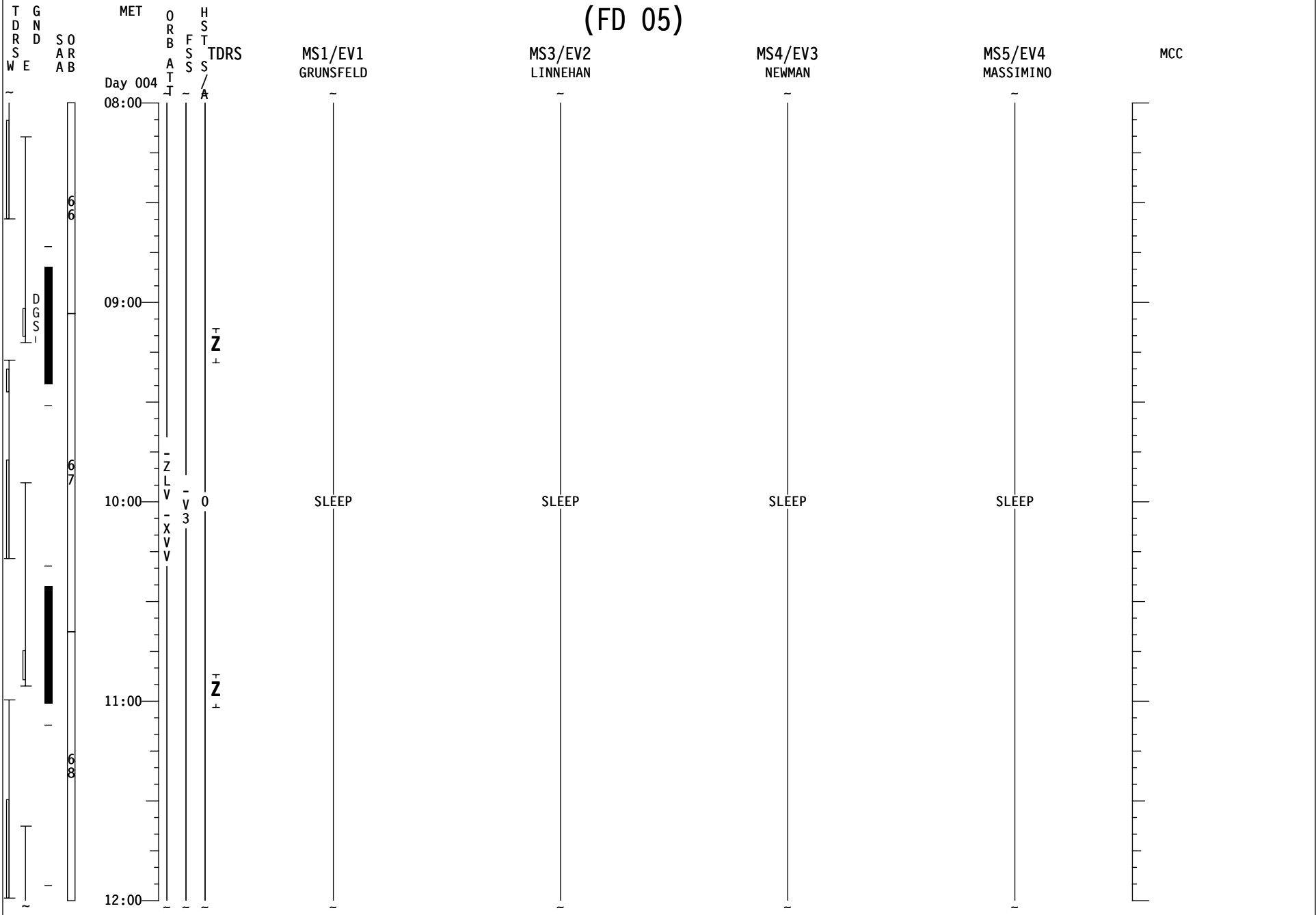




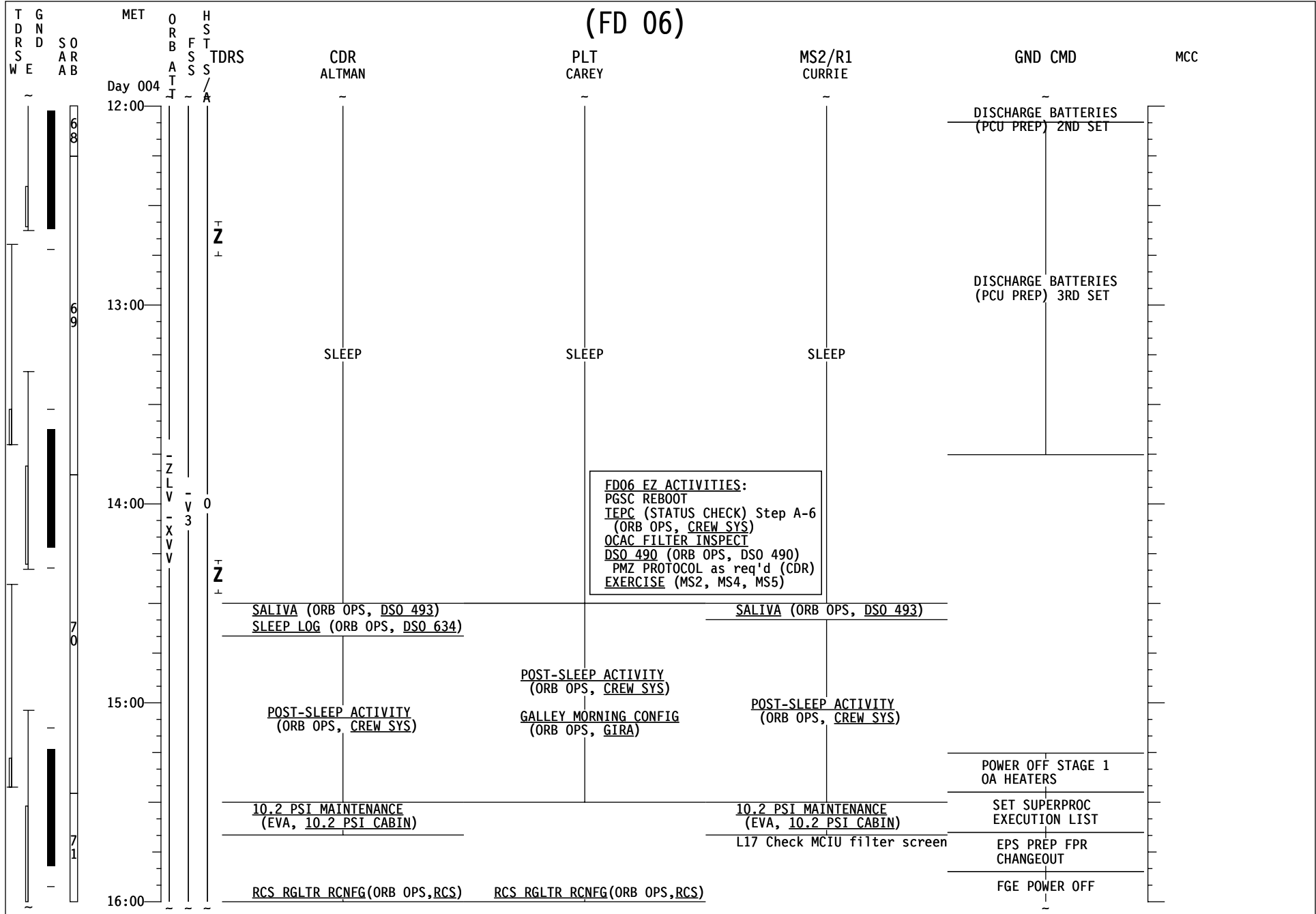
(FD 05)



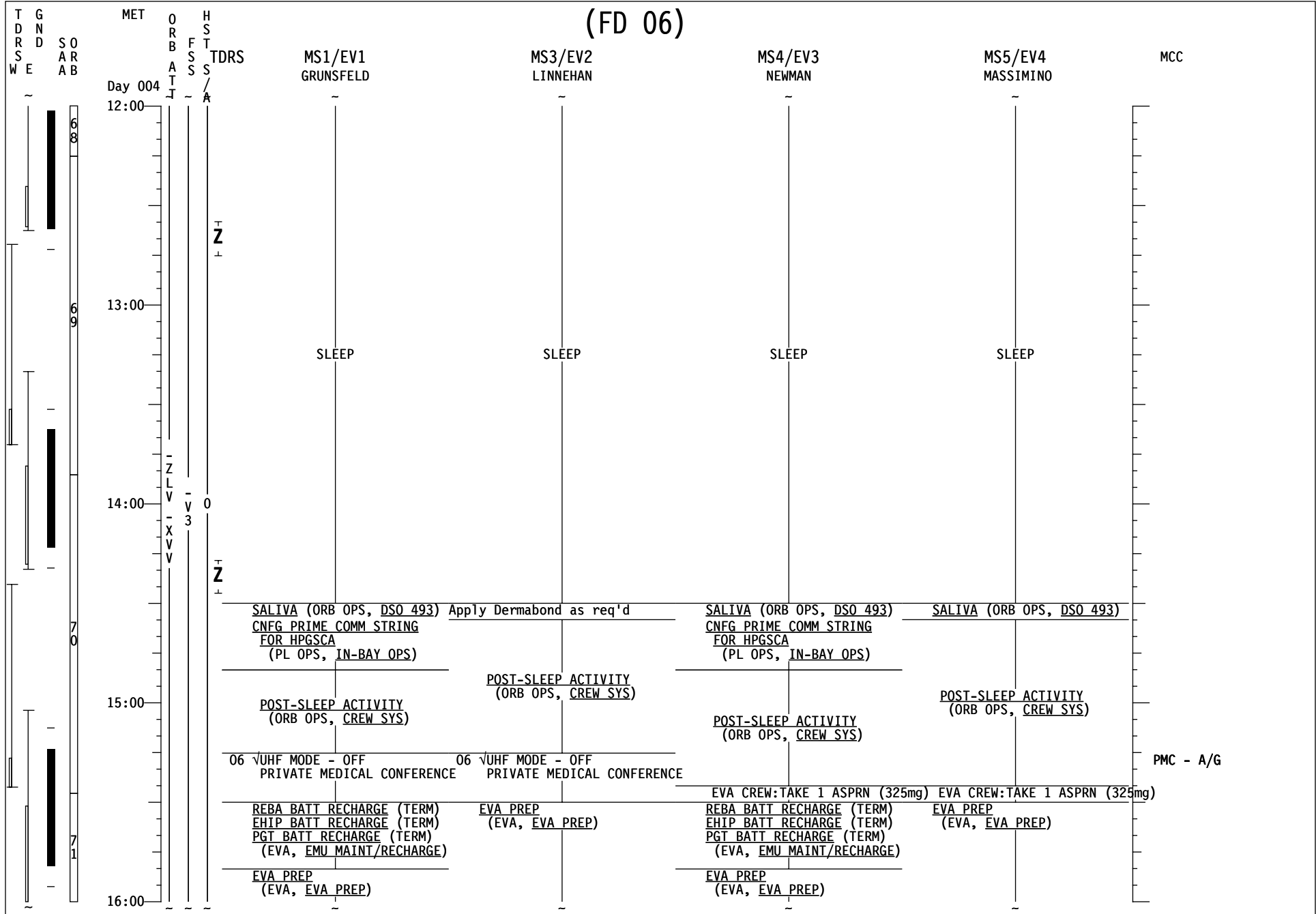
(FD 05)

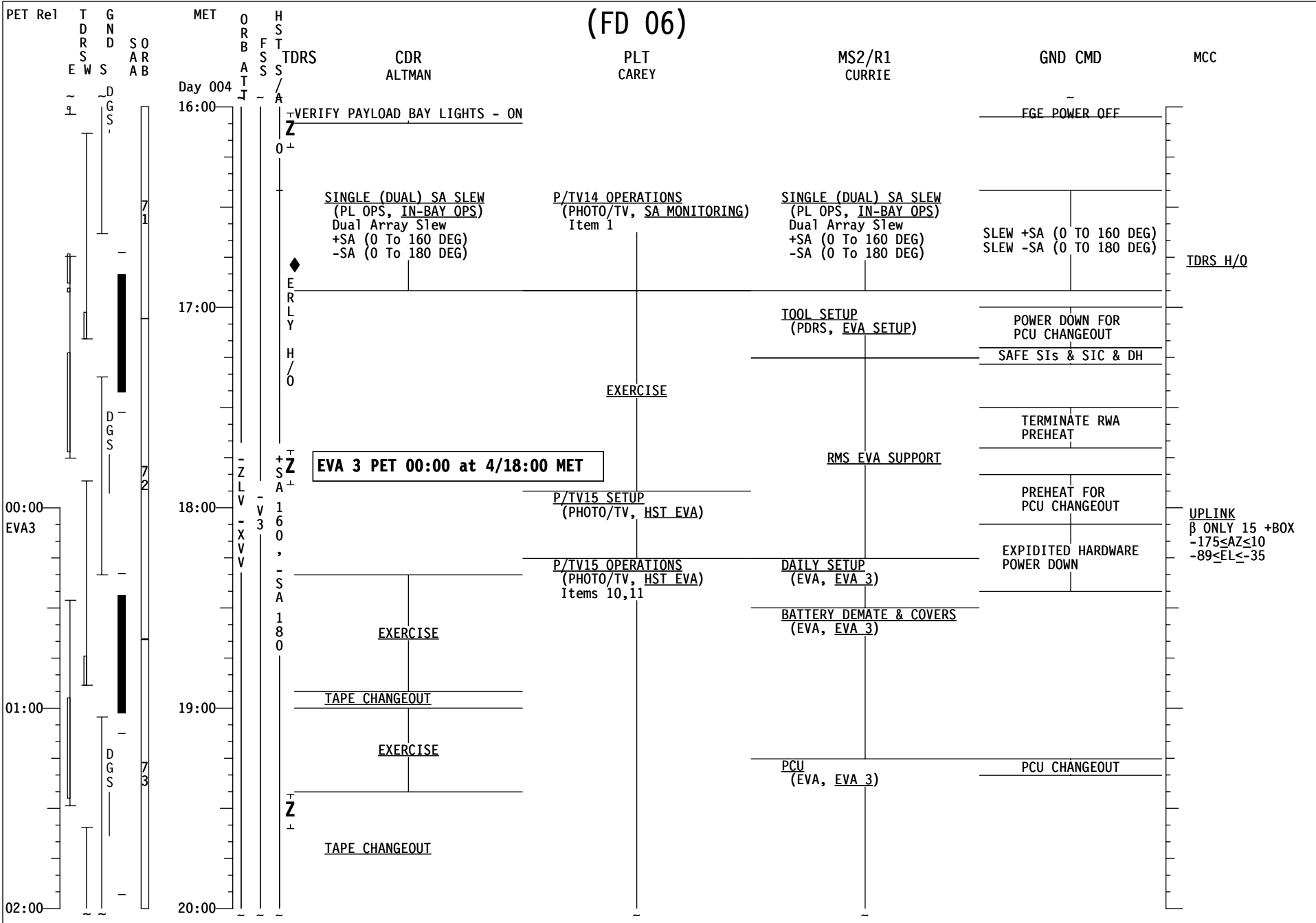


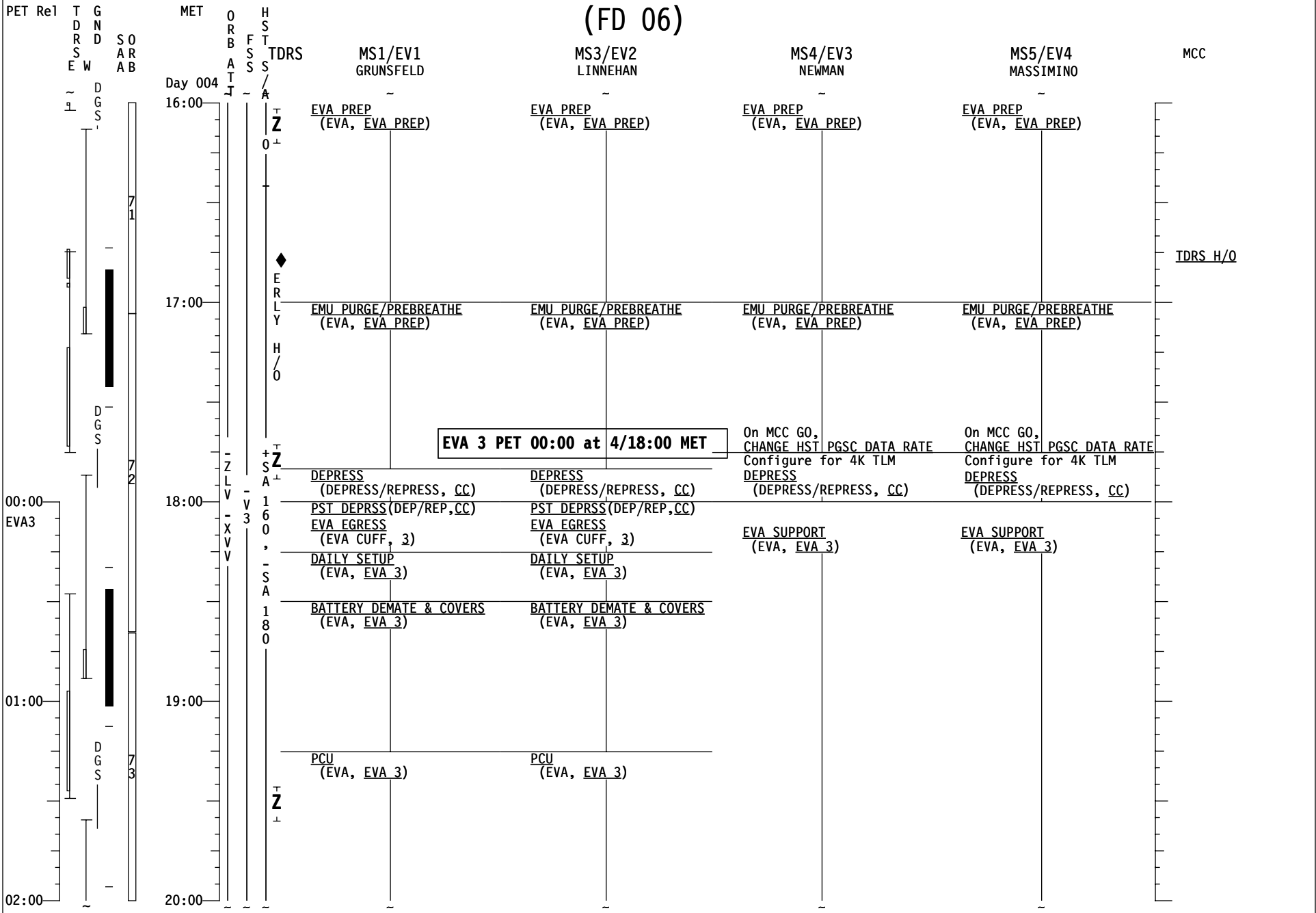
# (FD 06)

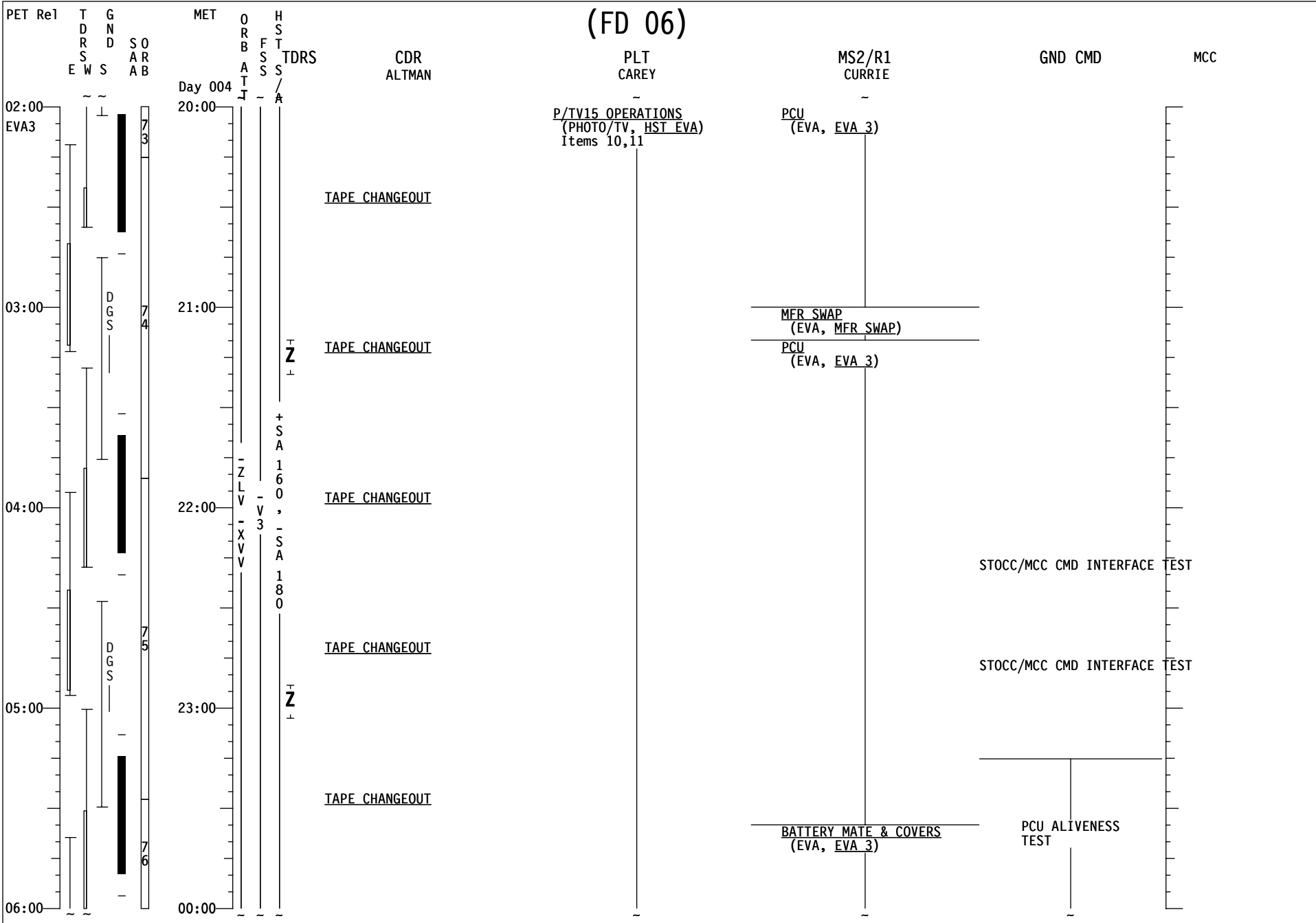


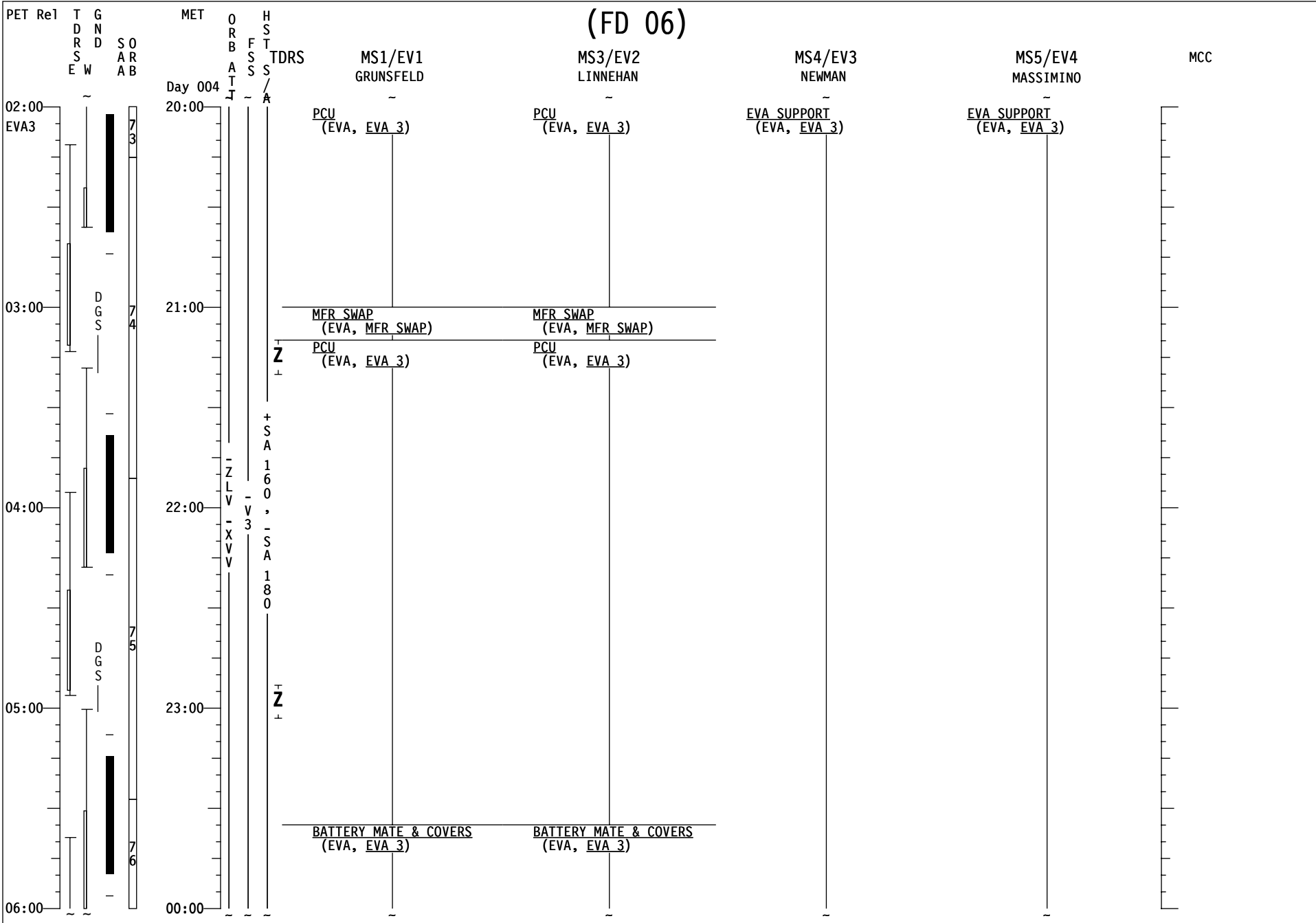
# (FD 06)



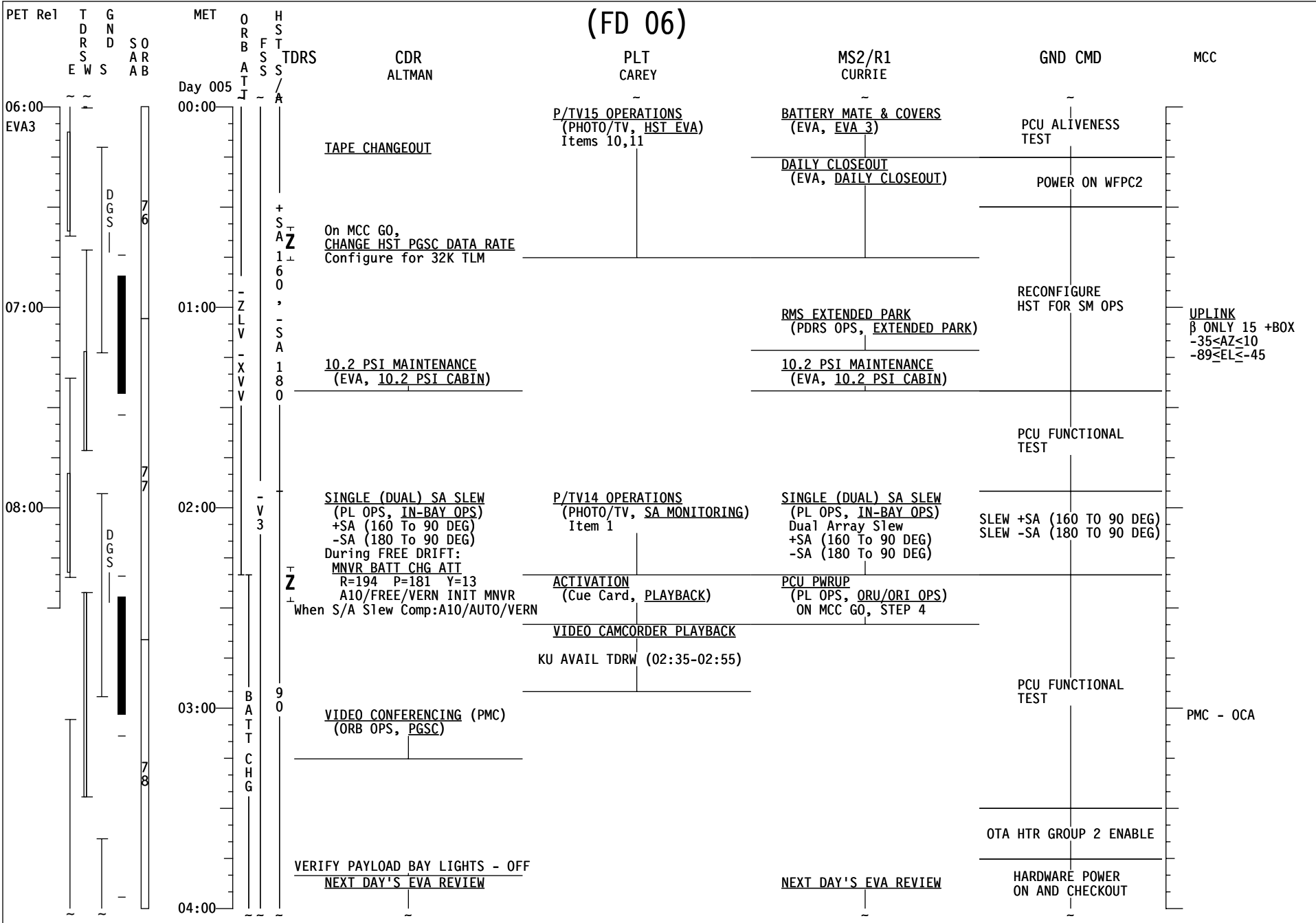


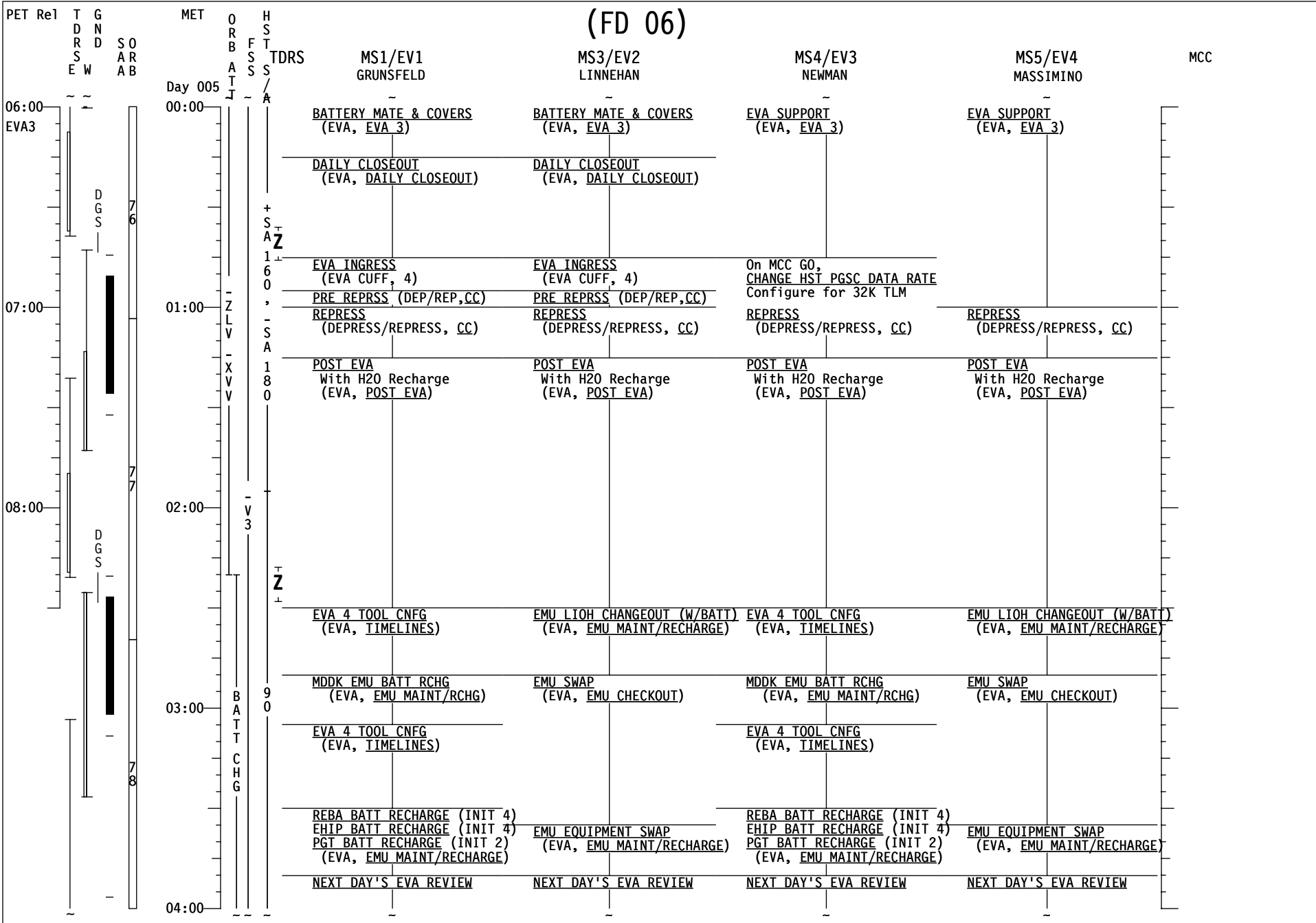




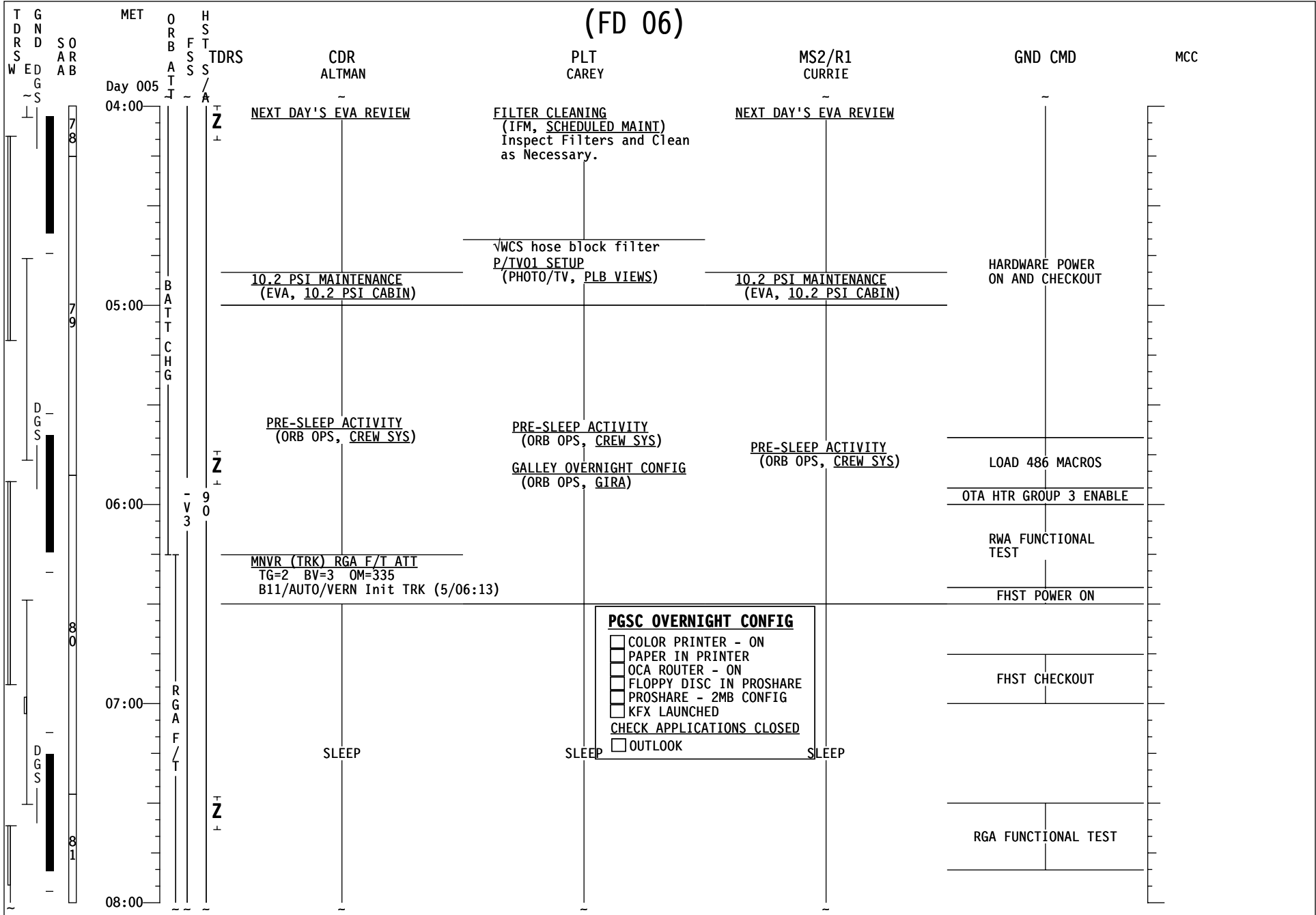




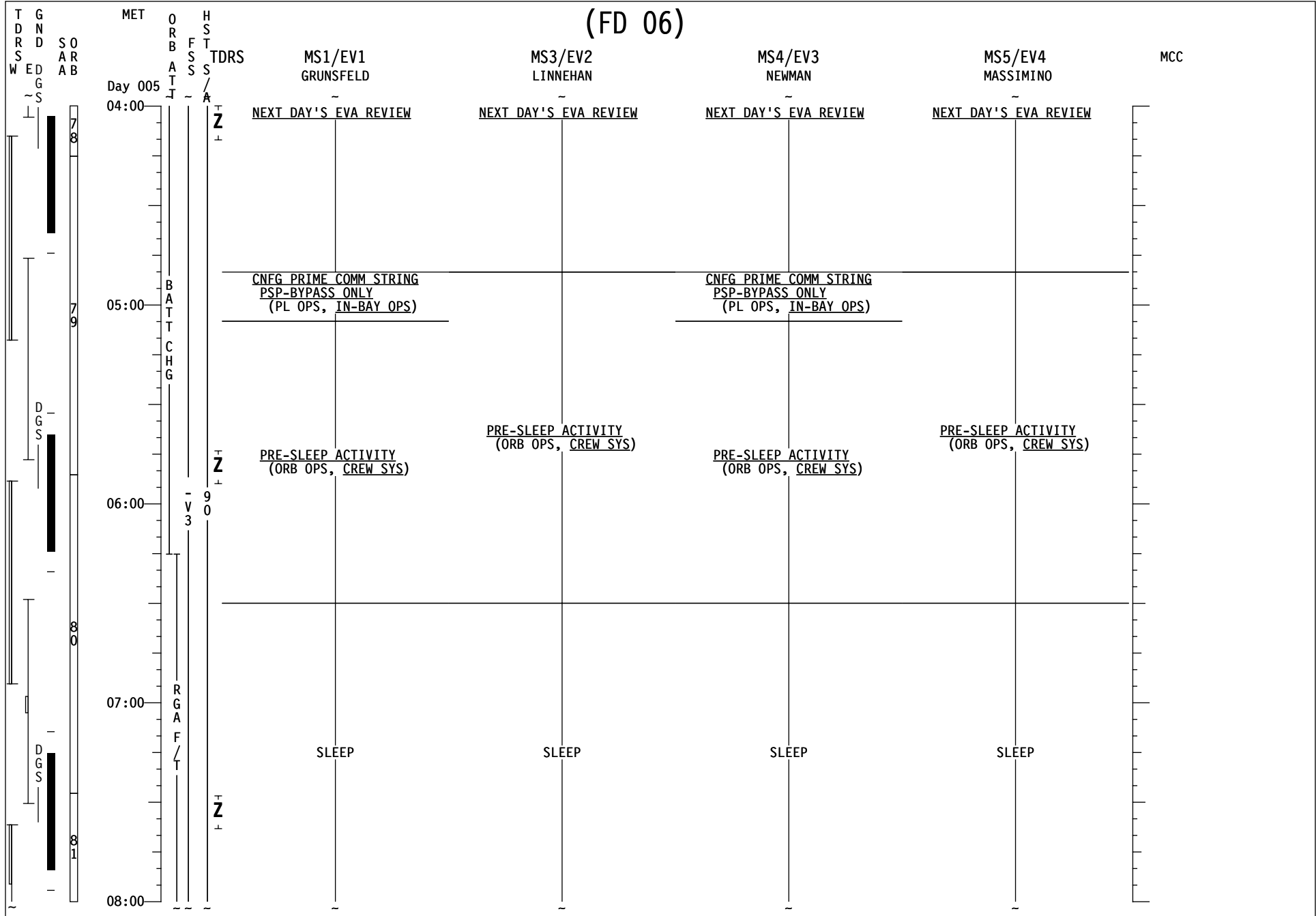




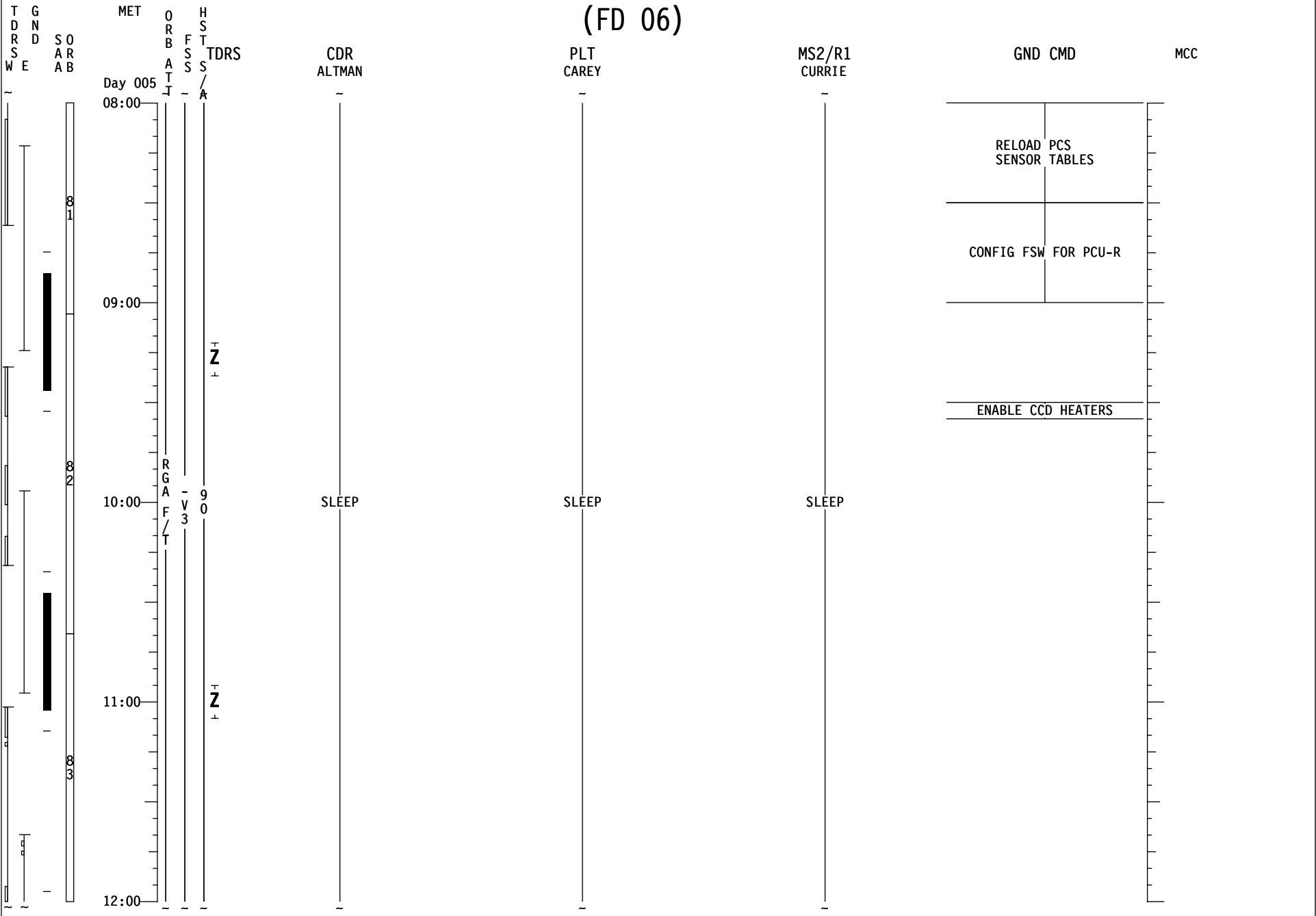
# (FD 06)



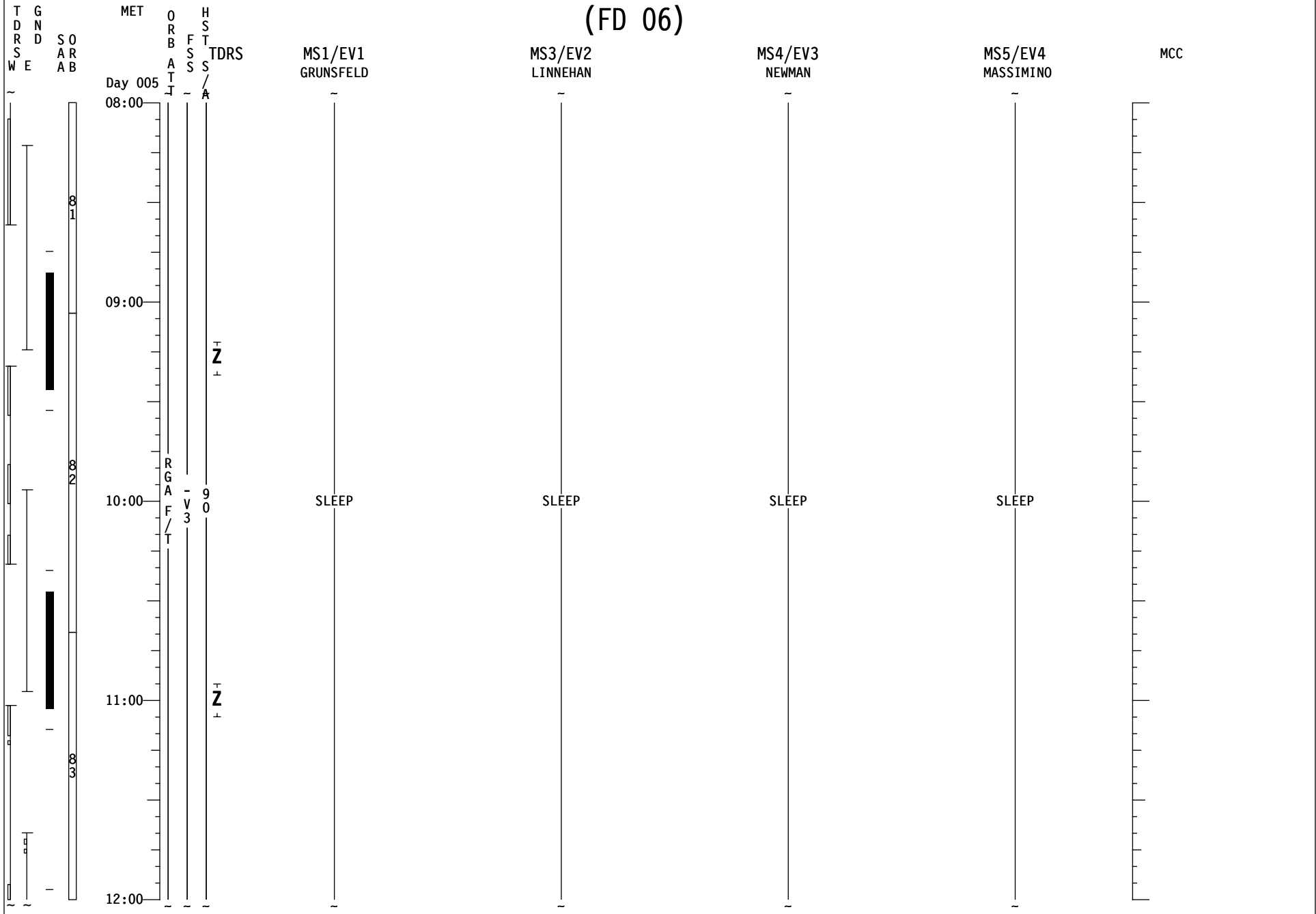
# (FD 06)



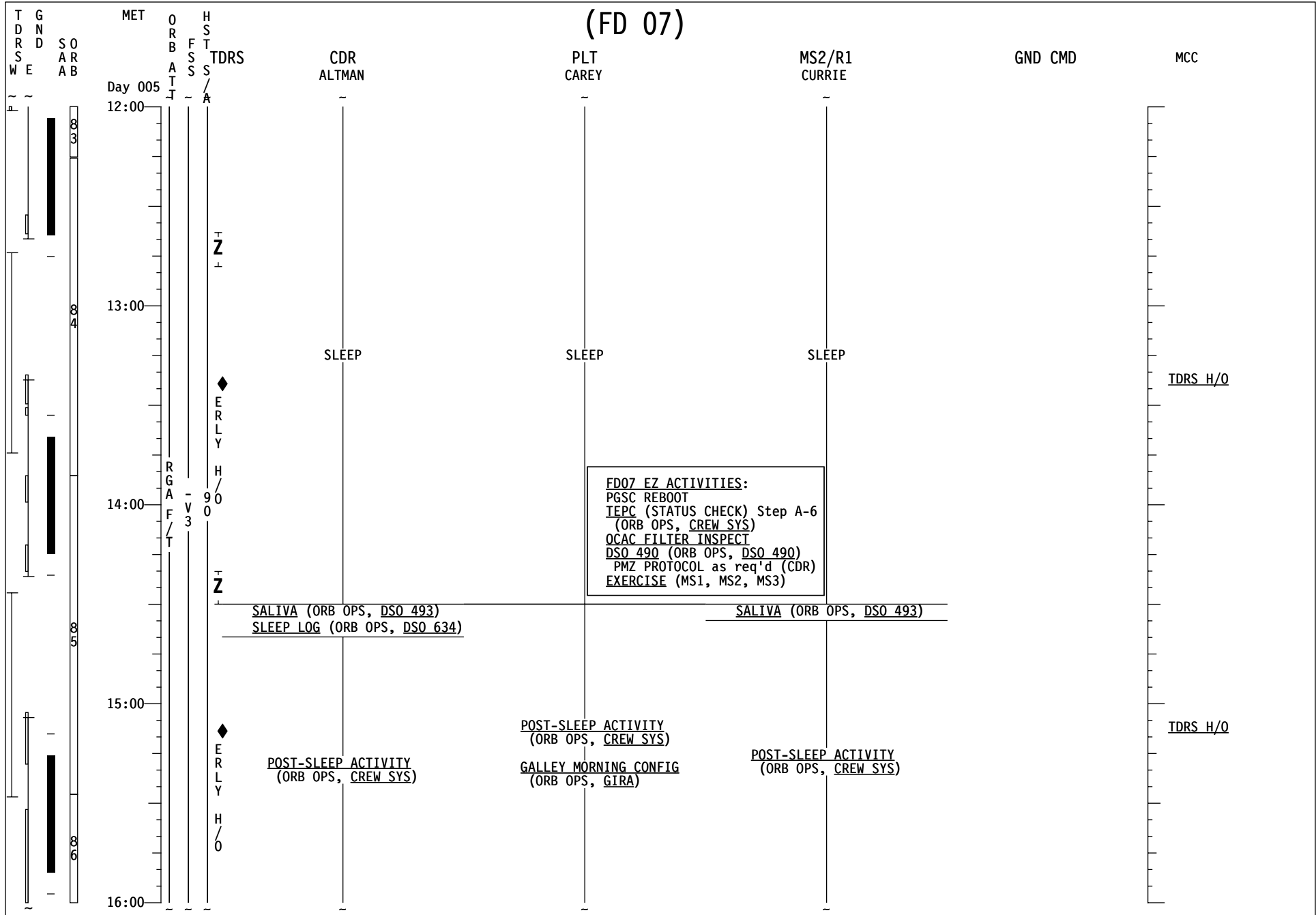
(FD 06)



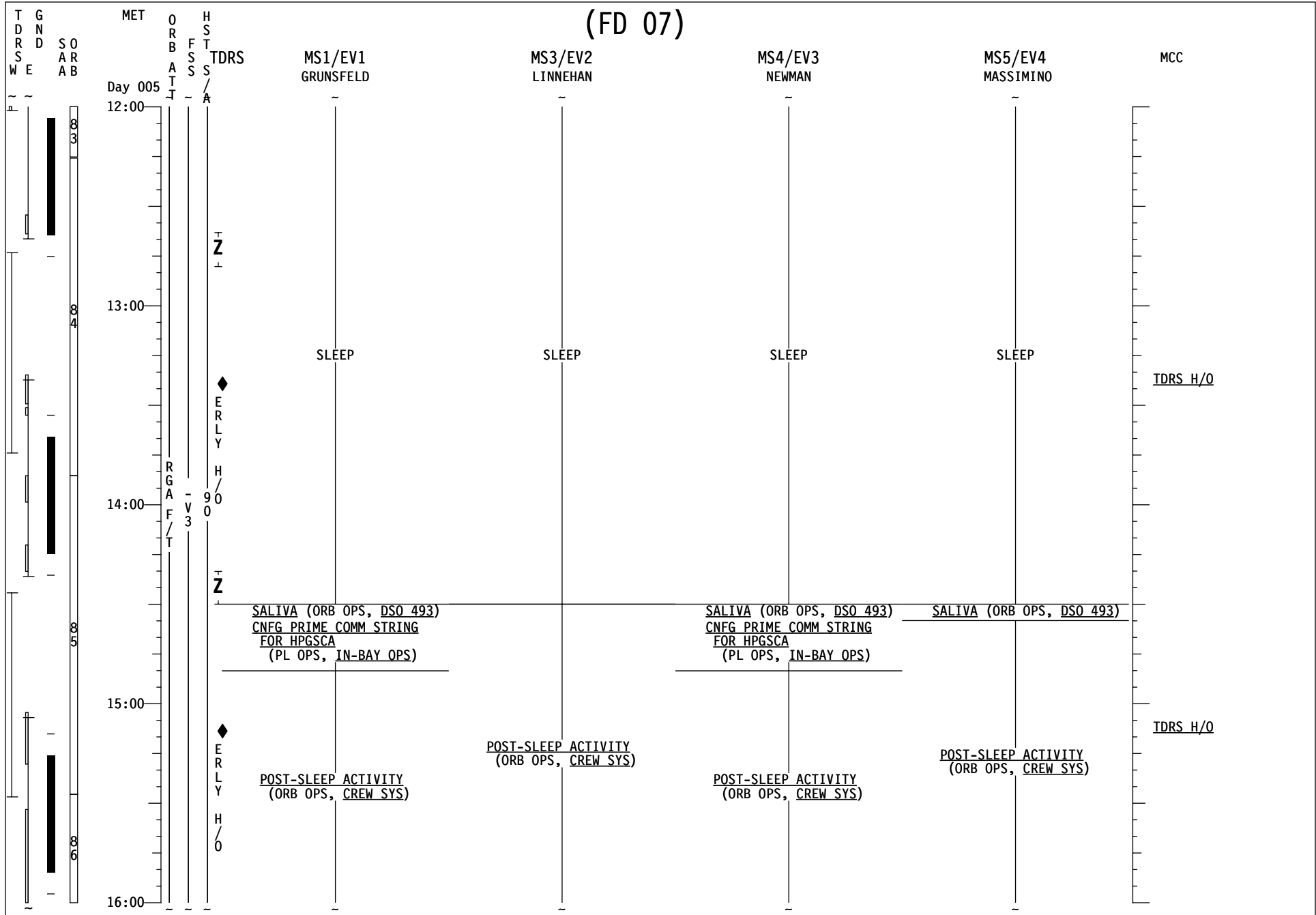
(FD 06)



# (FD 07)



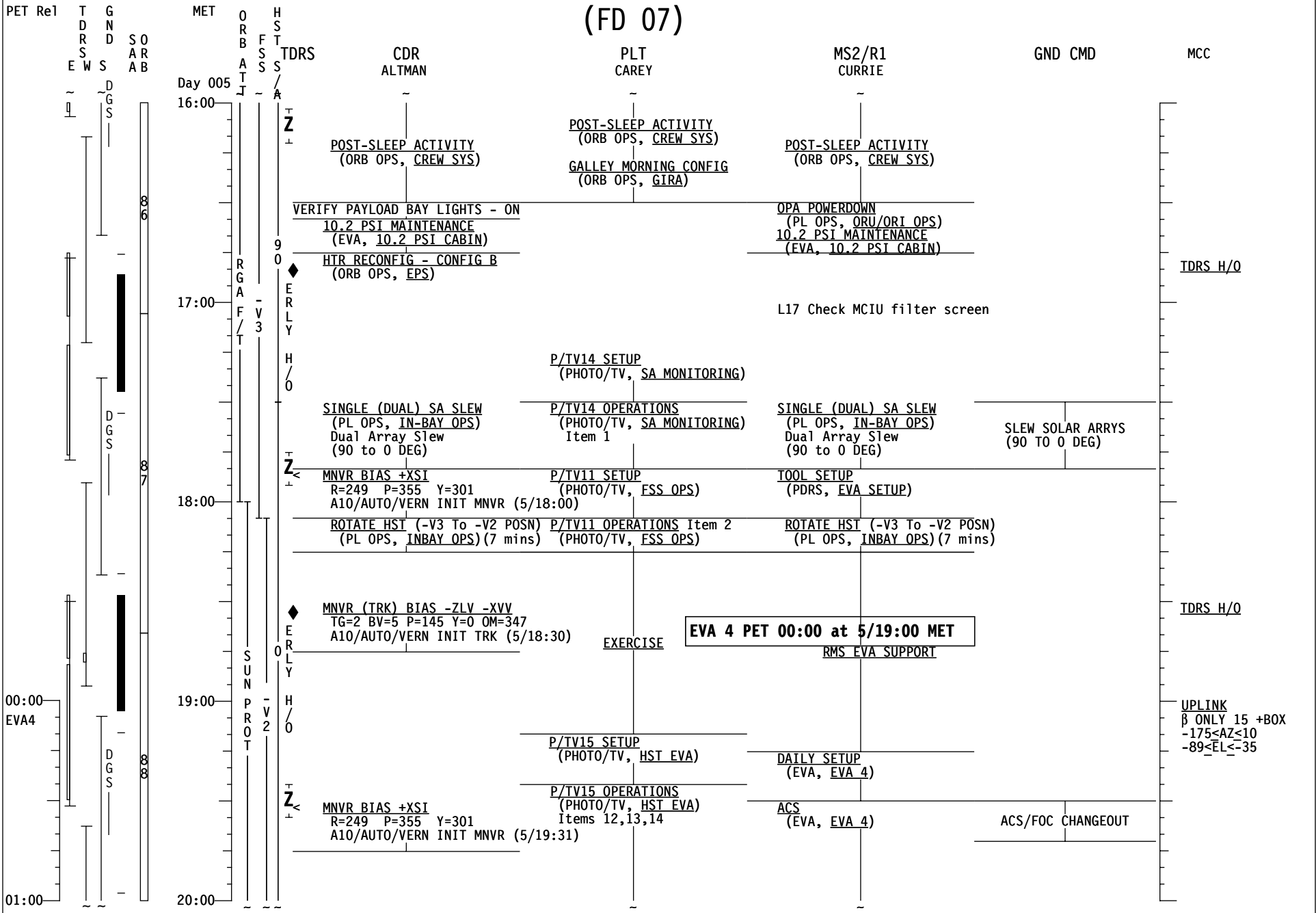
# (FD 07)

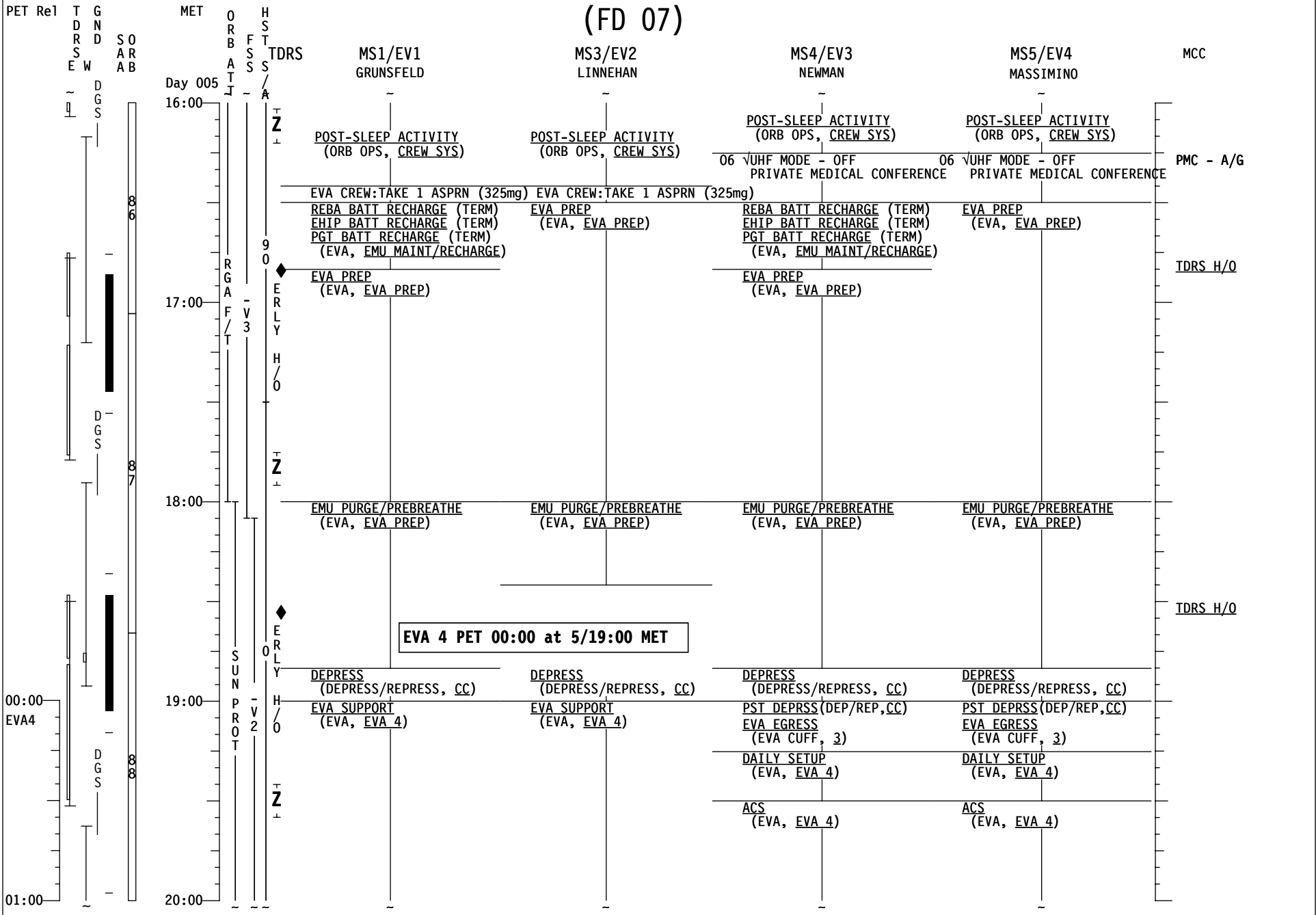




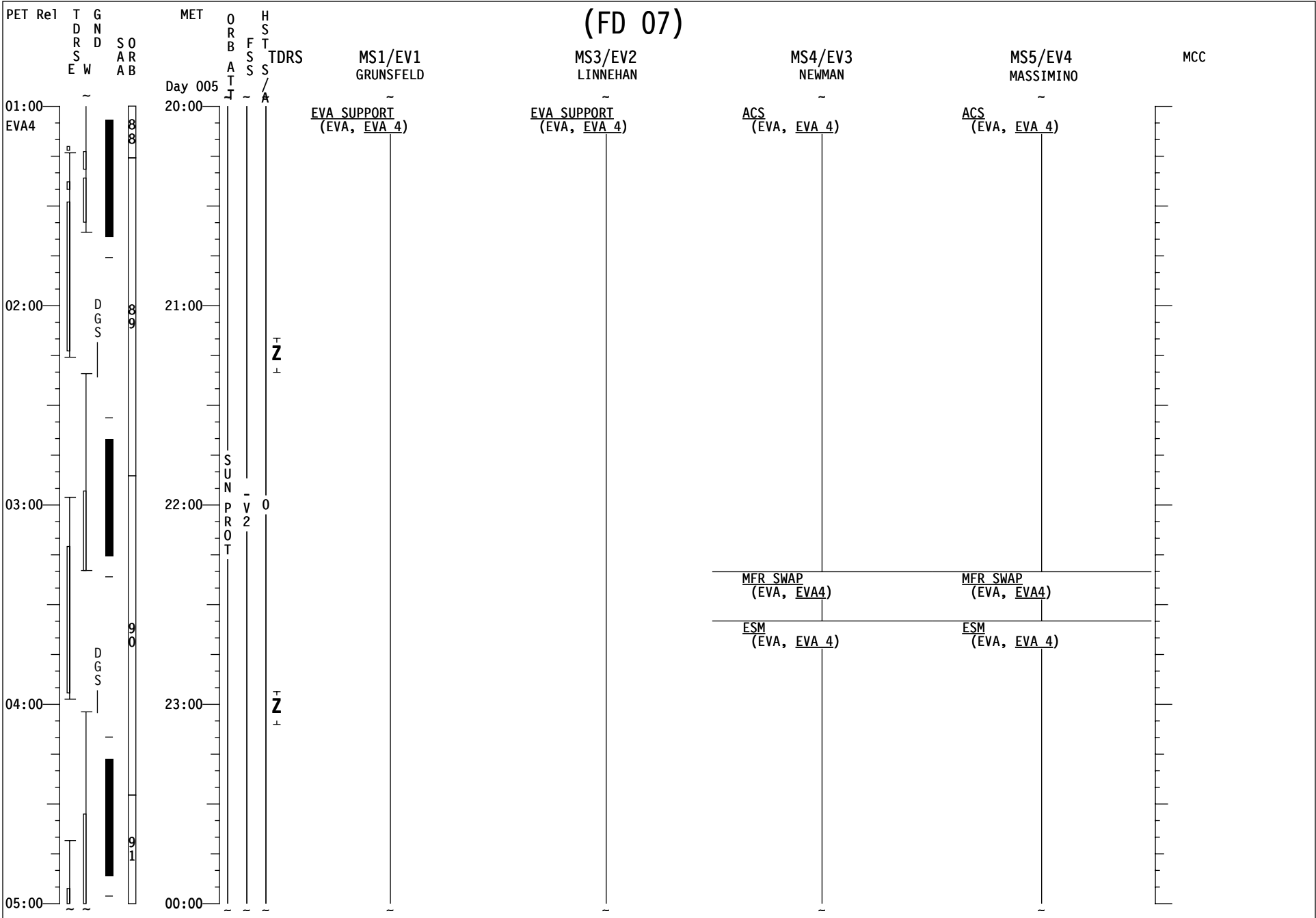
PET Re1

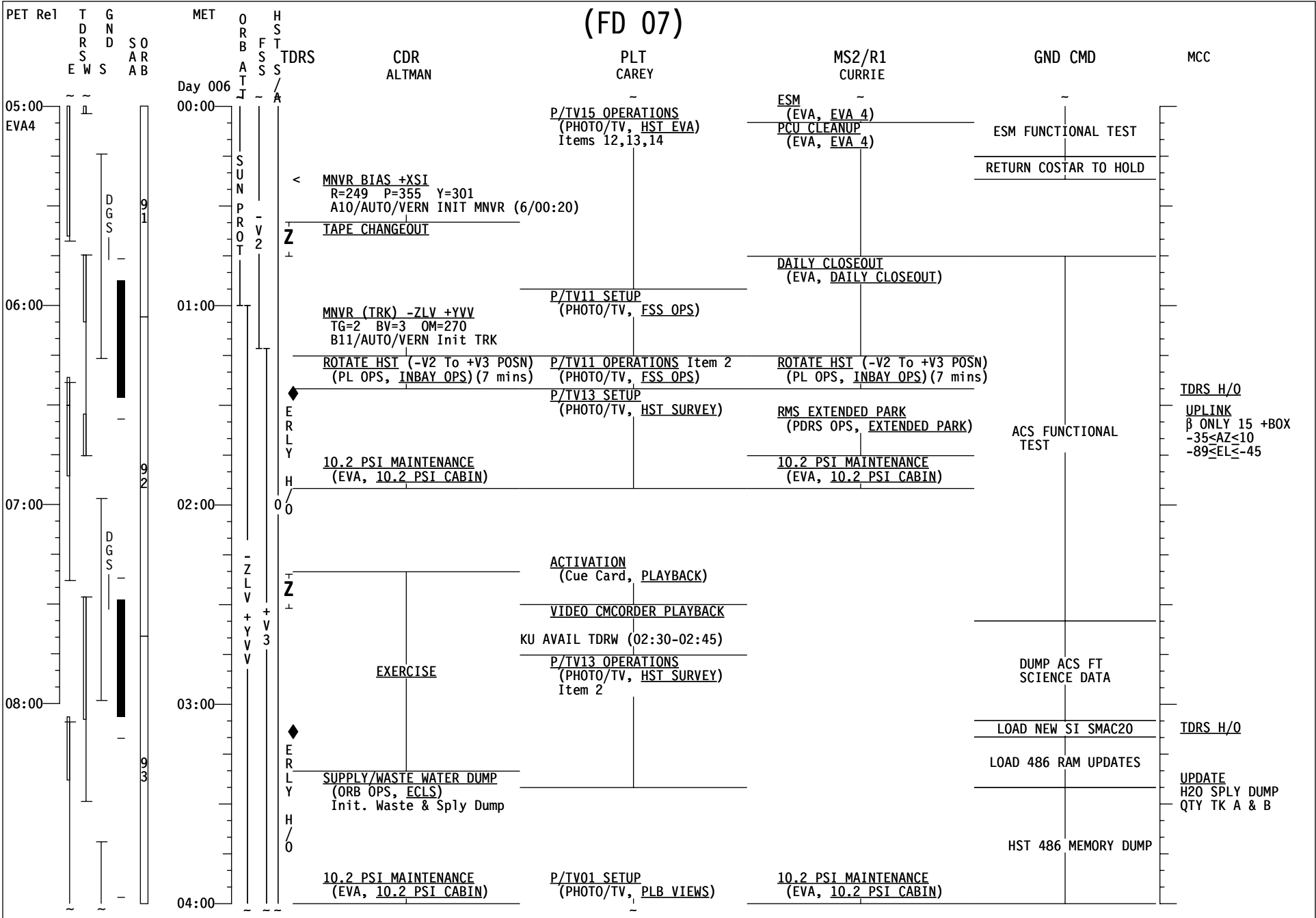
# (FD 07)





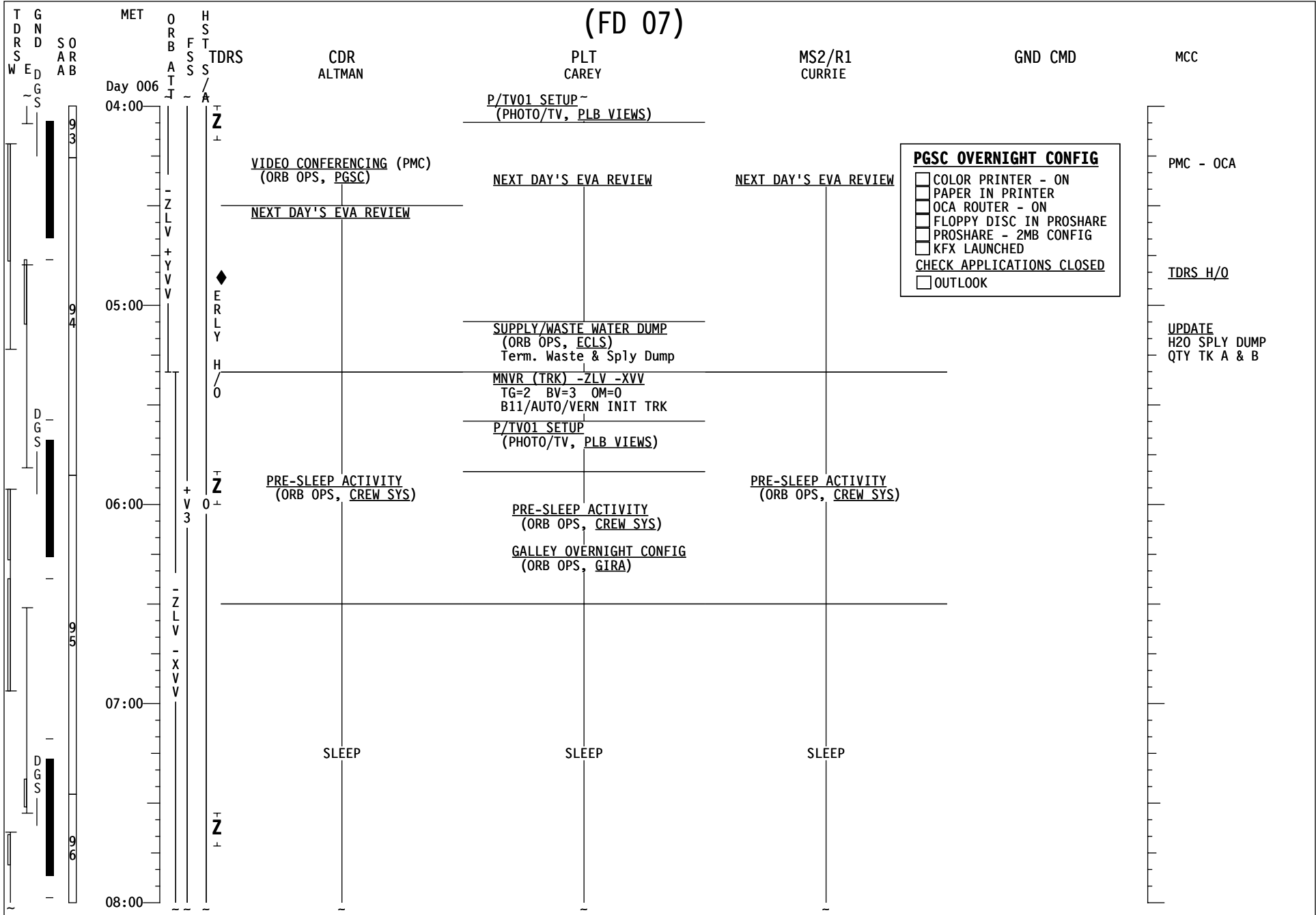








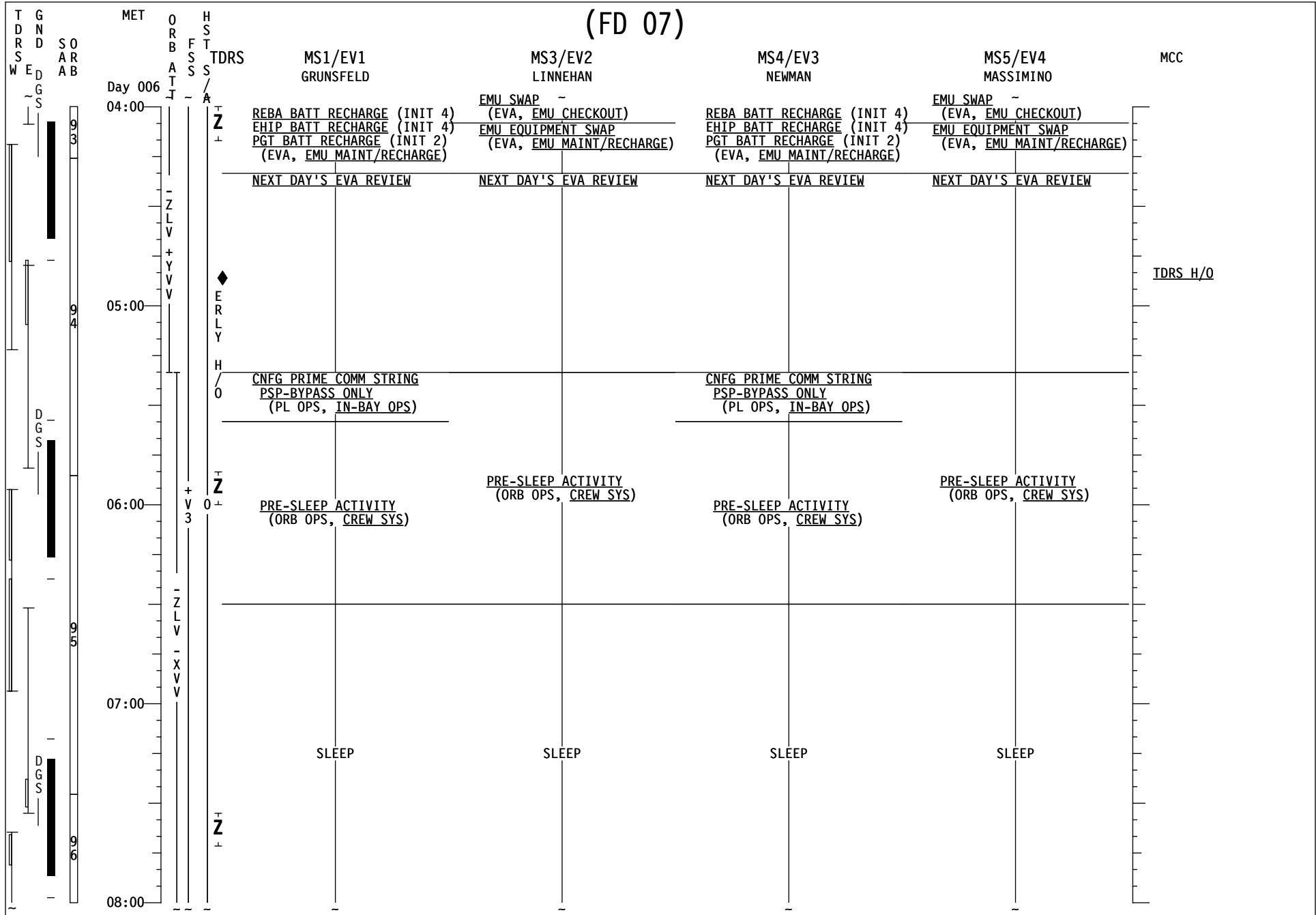
# (FD 07)



**PGSC OVERNIGHT CONFIG**

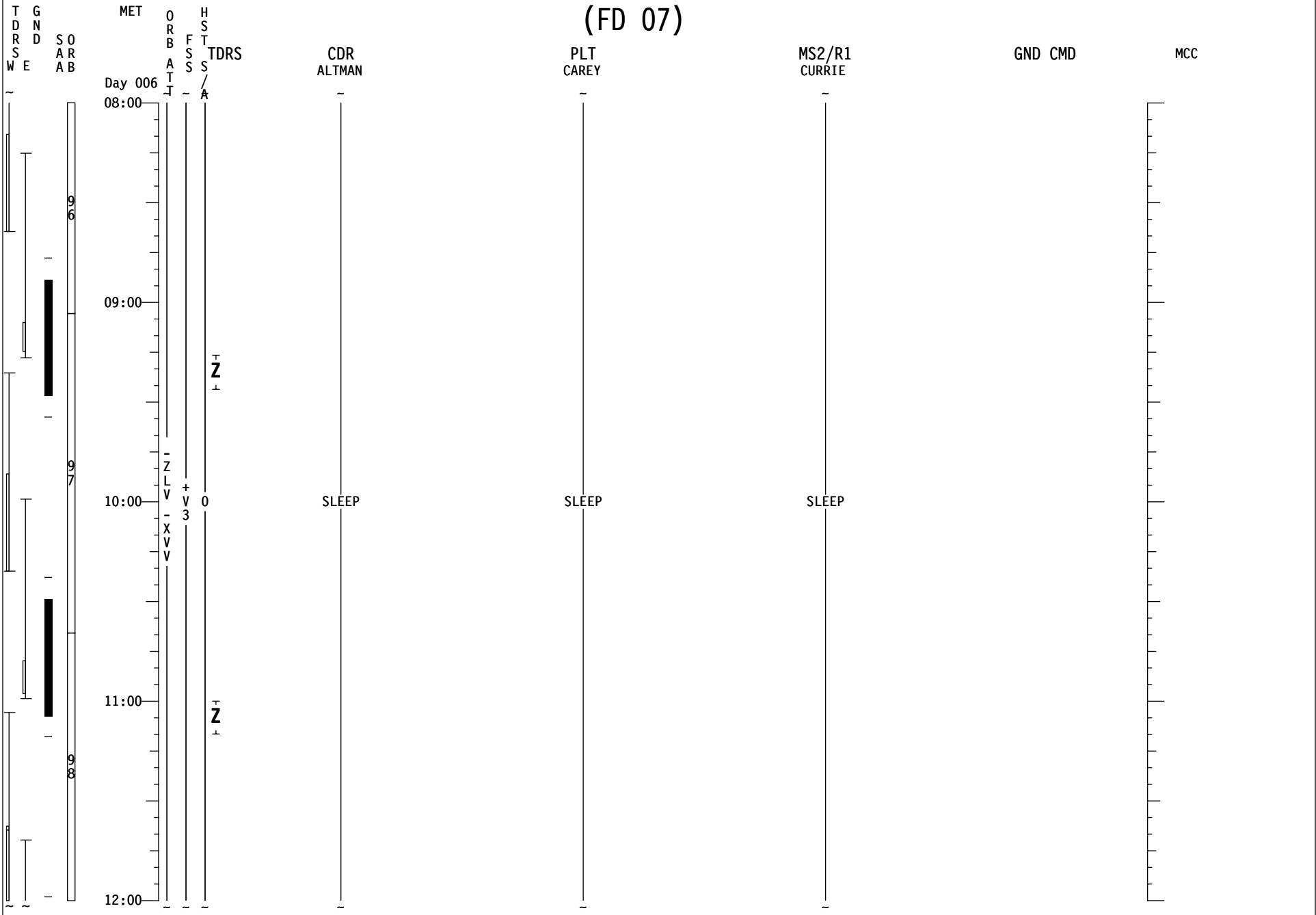
- COLOR PRINTER - ON
- PAPER IN PRINTER
- OCA ROUTER - ON
- FLOPPY DISC IN PROSHARE
- PROSHARE - 2MB CONFIG
- KFX LAUNCHED
- CHECK APPLICATIONS CLOSED
- OUTLOOK

# (FD 07)

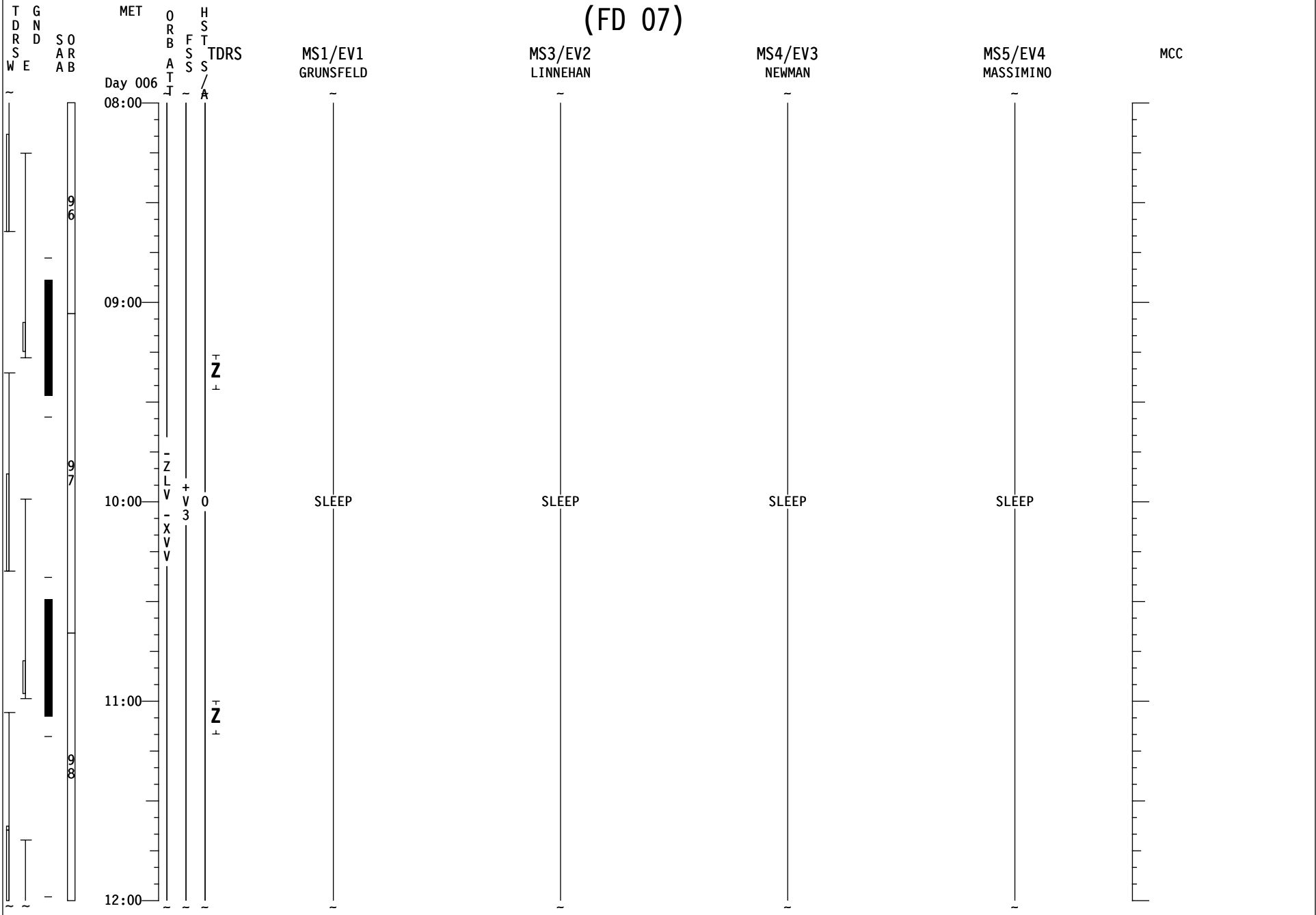




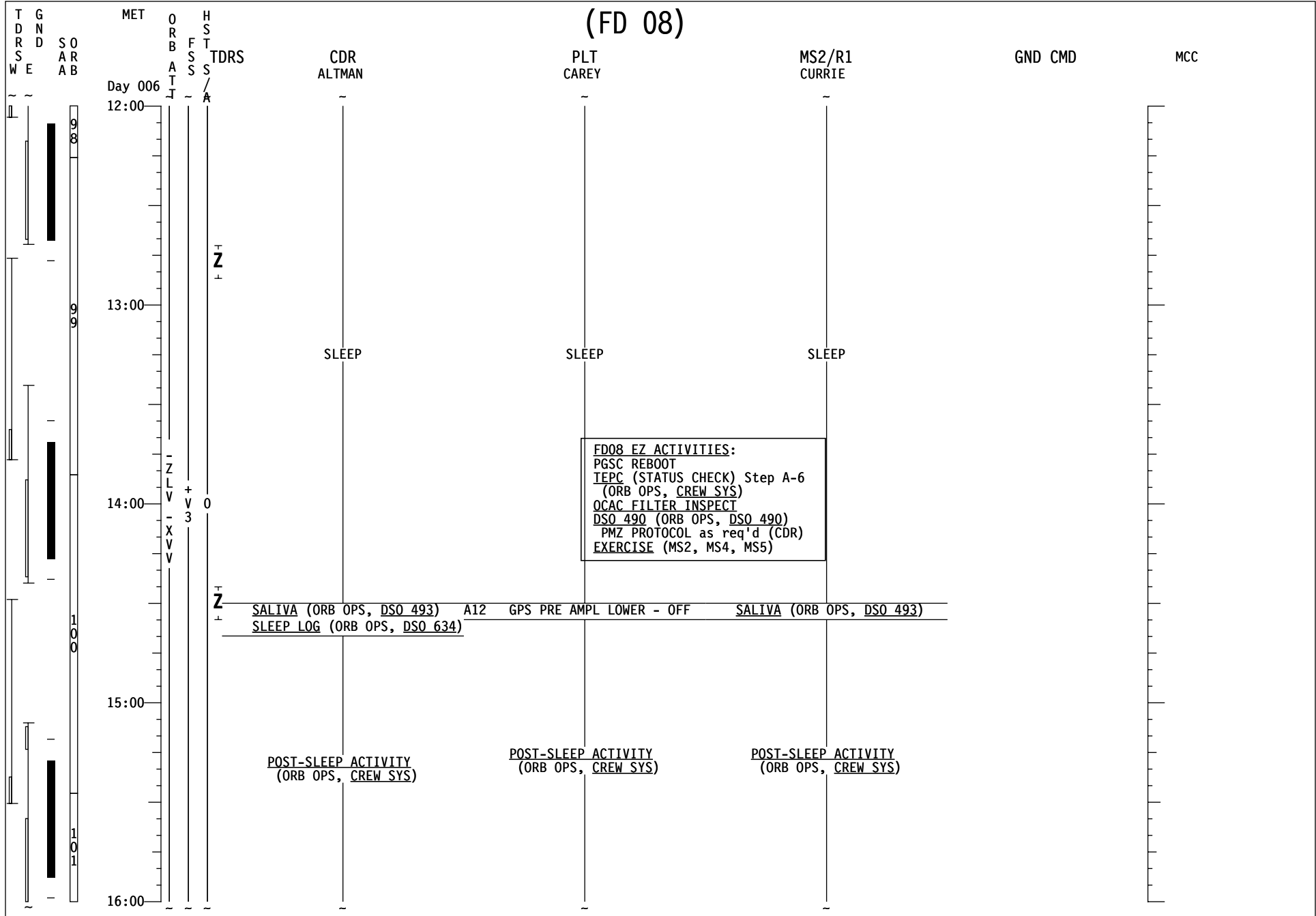
(FD 07)



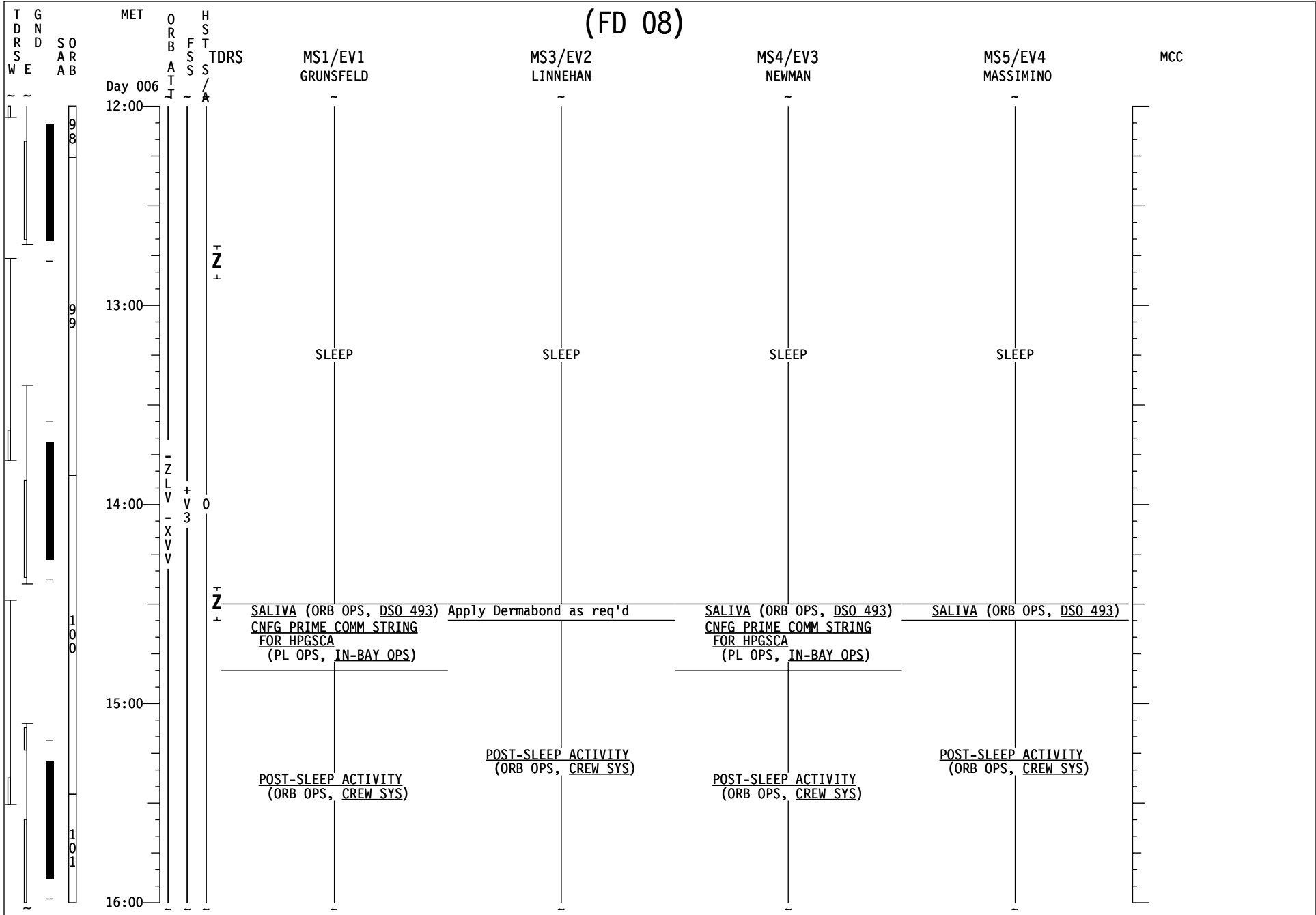
(FD 07)

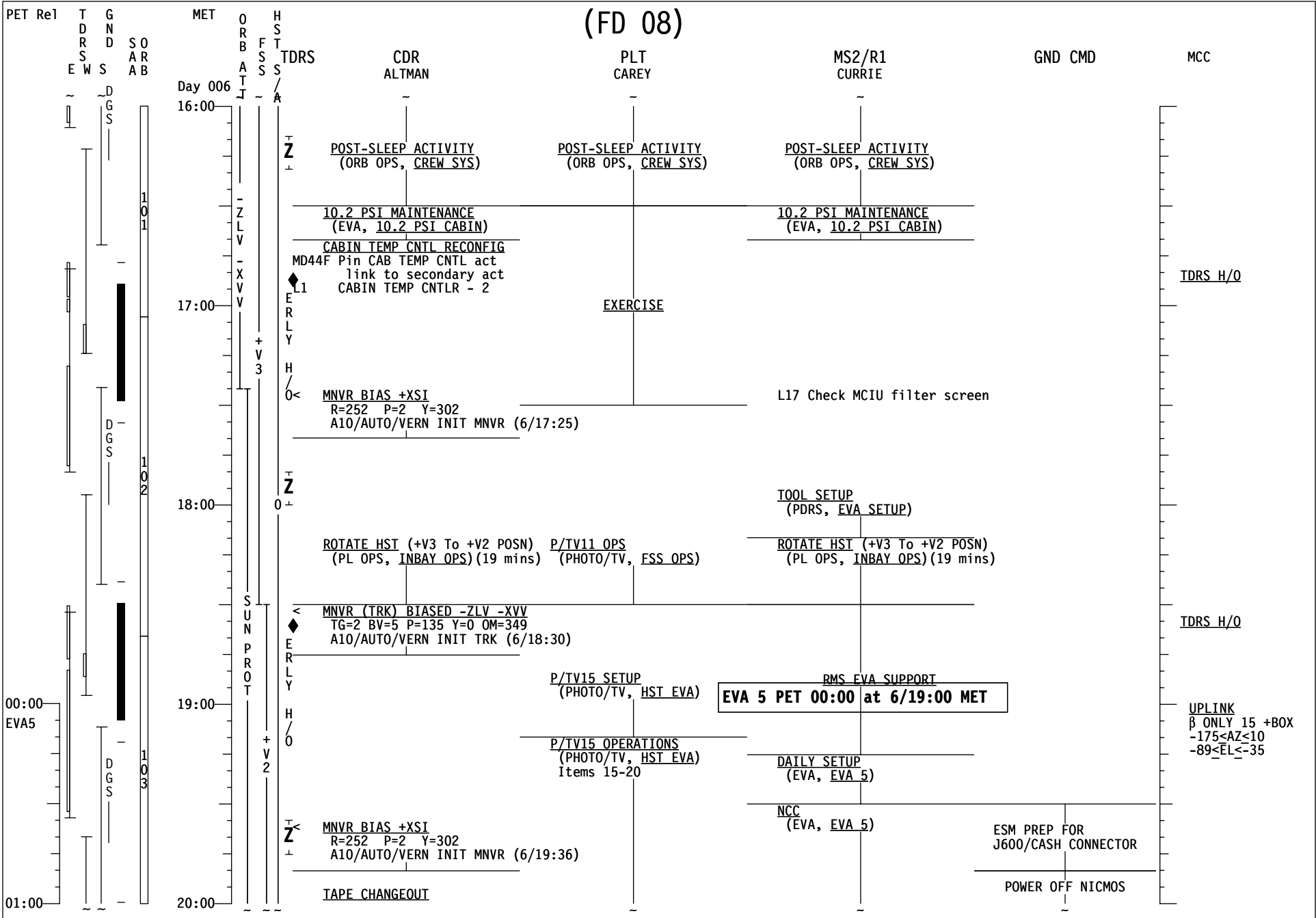


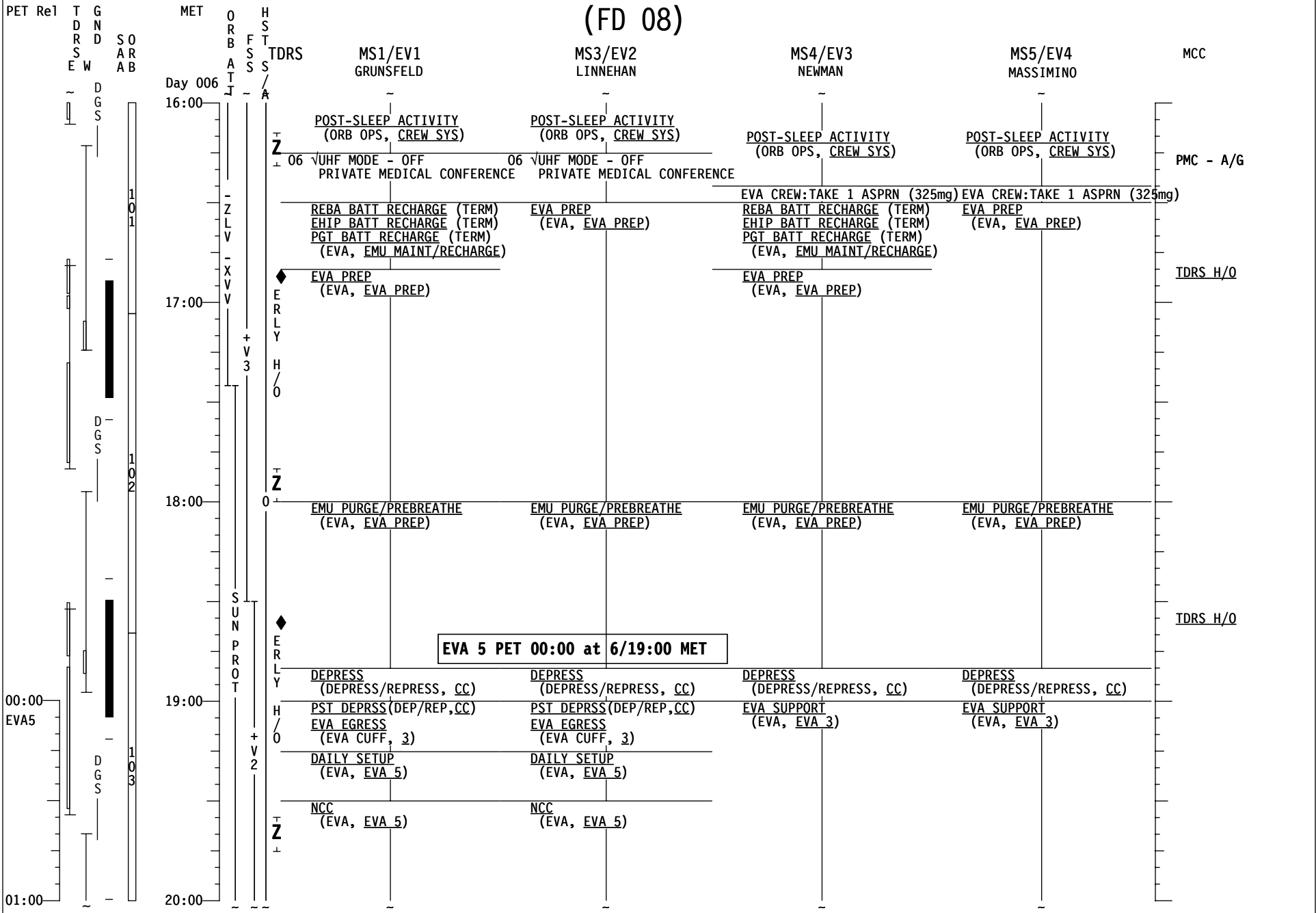
# (FD 08)

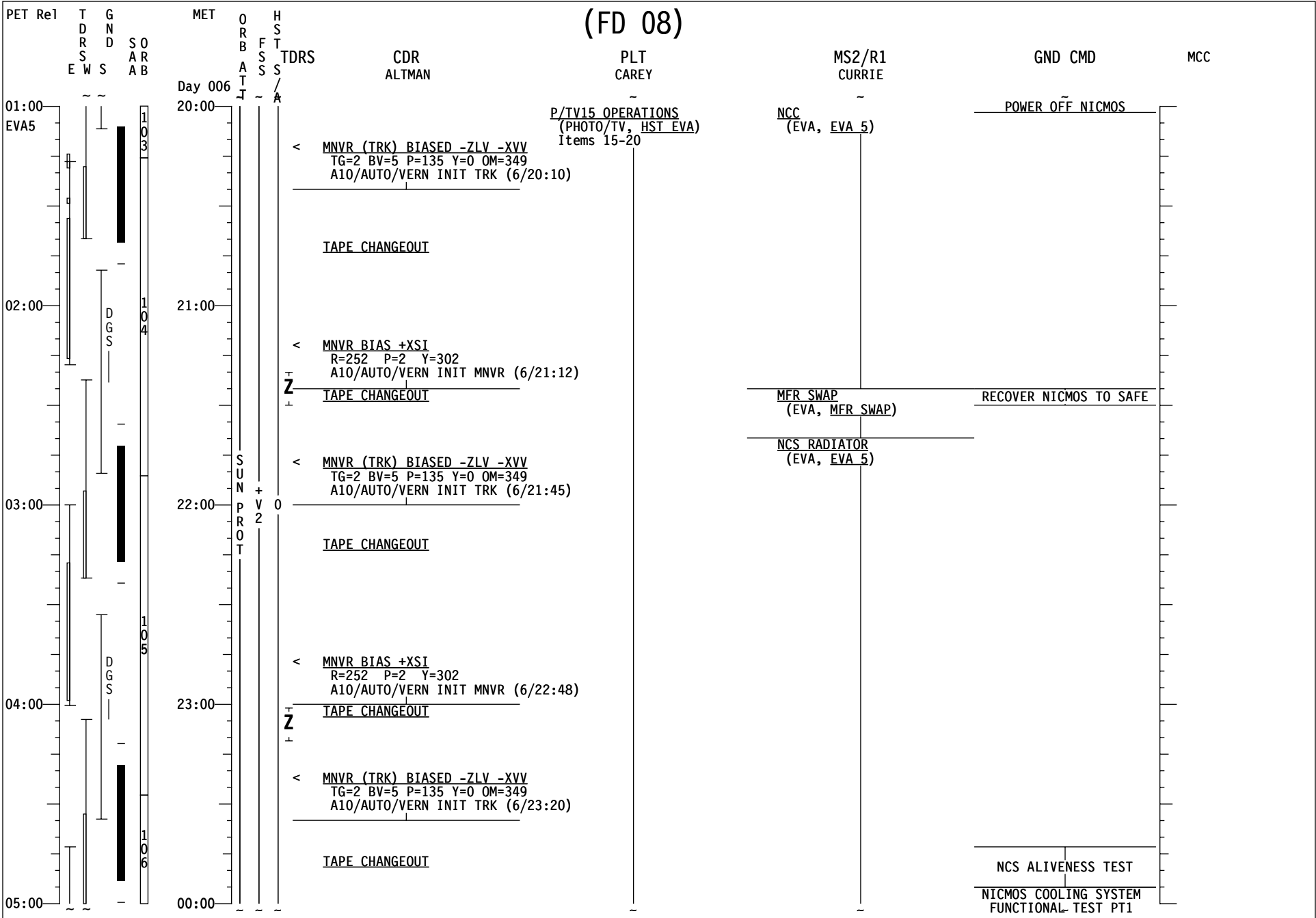


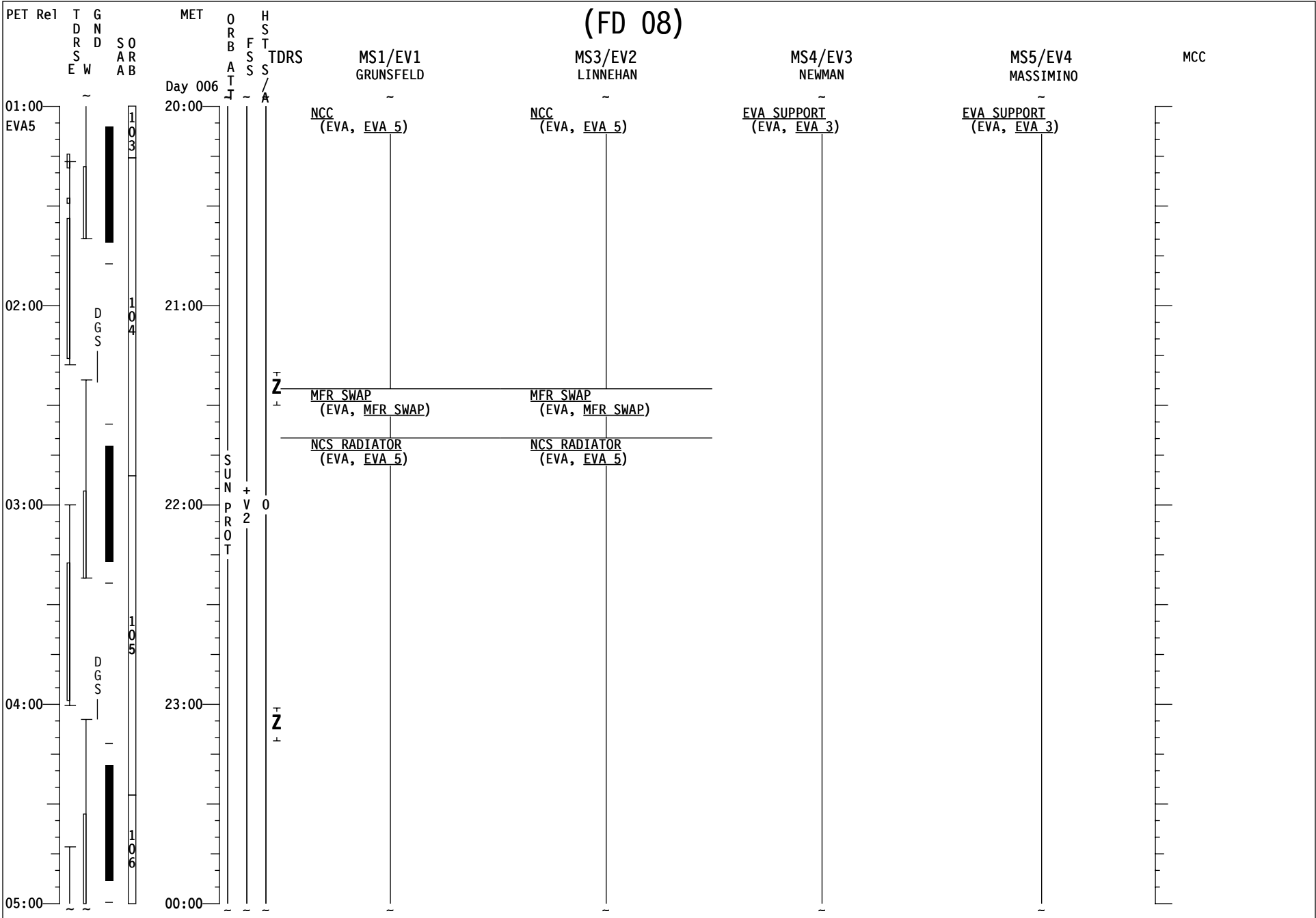
(FD 08)



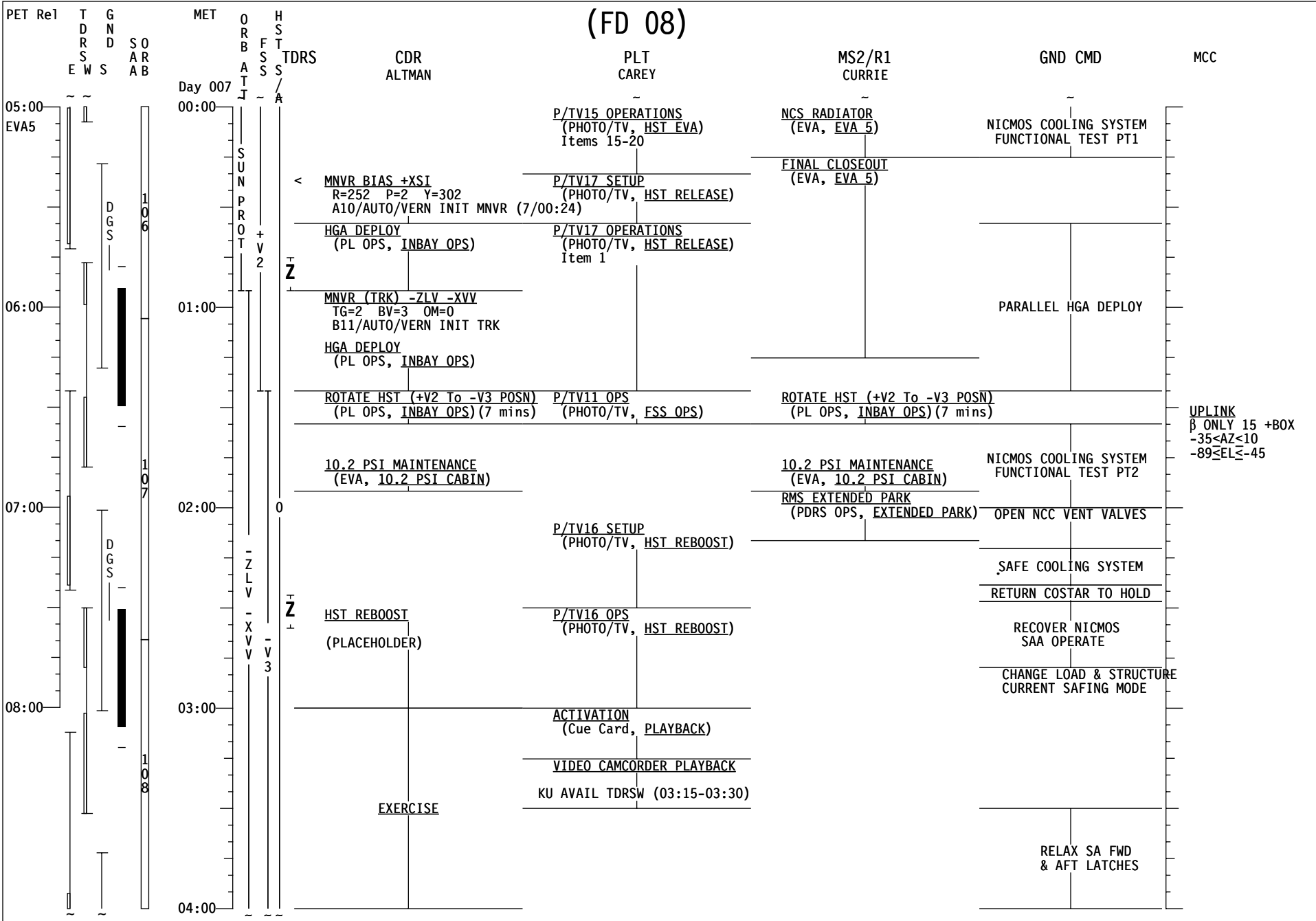


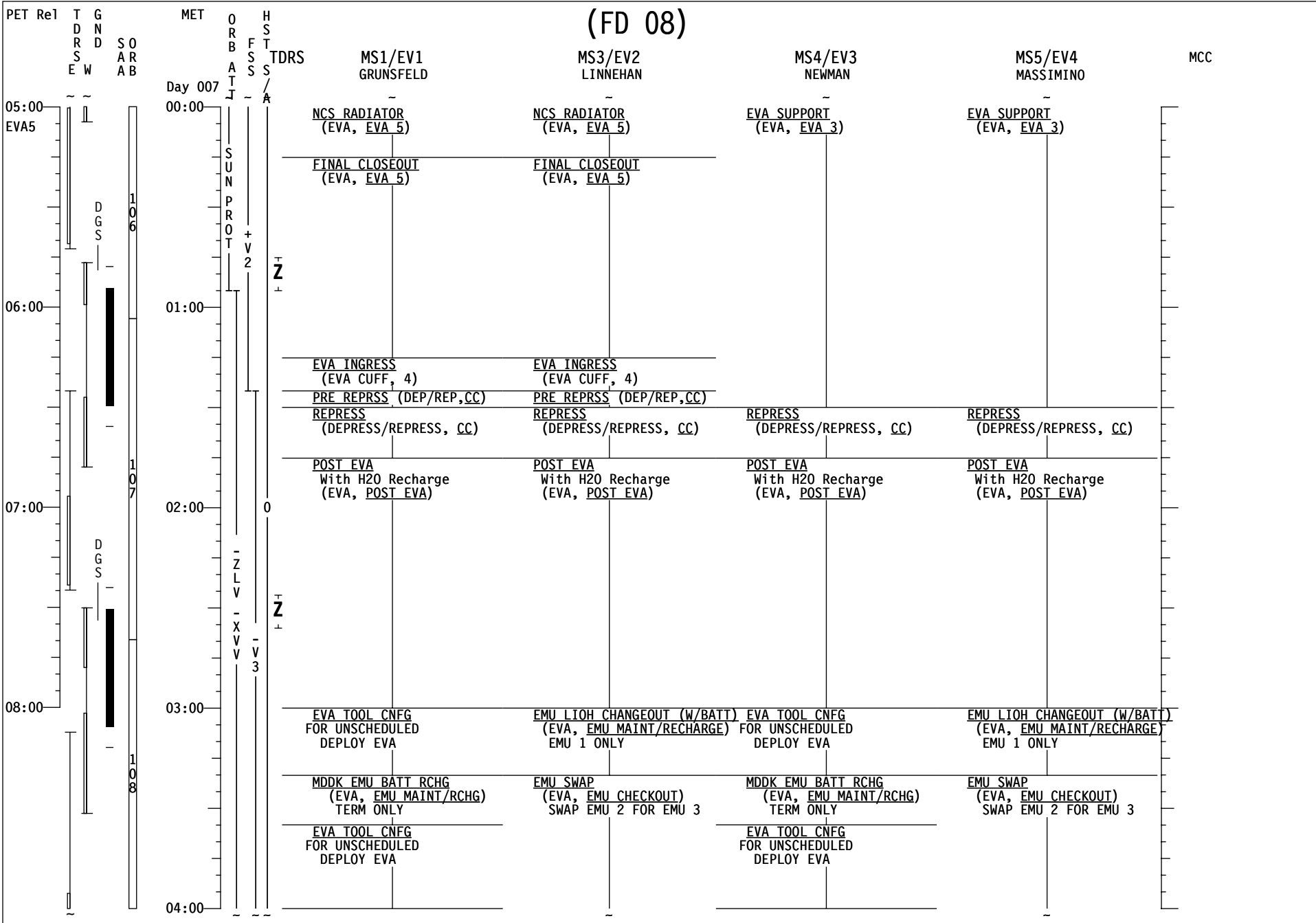




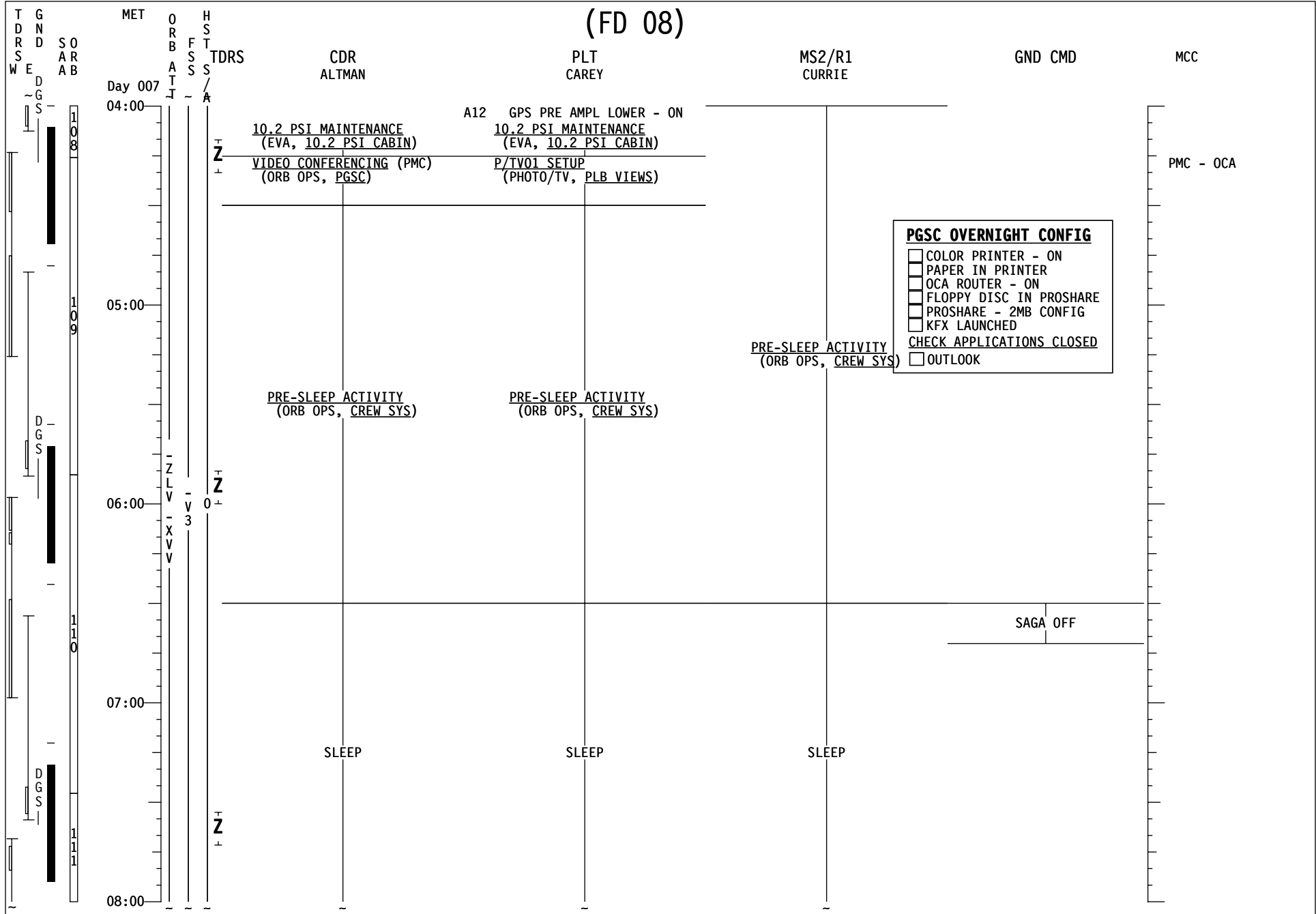








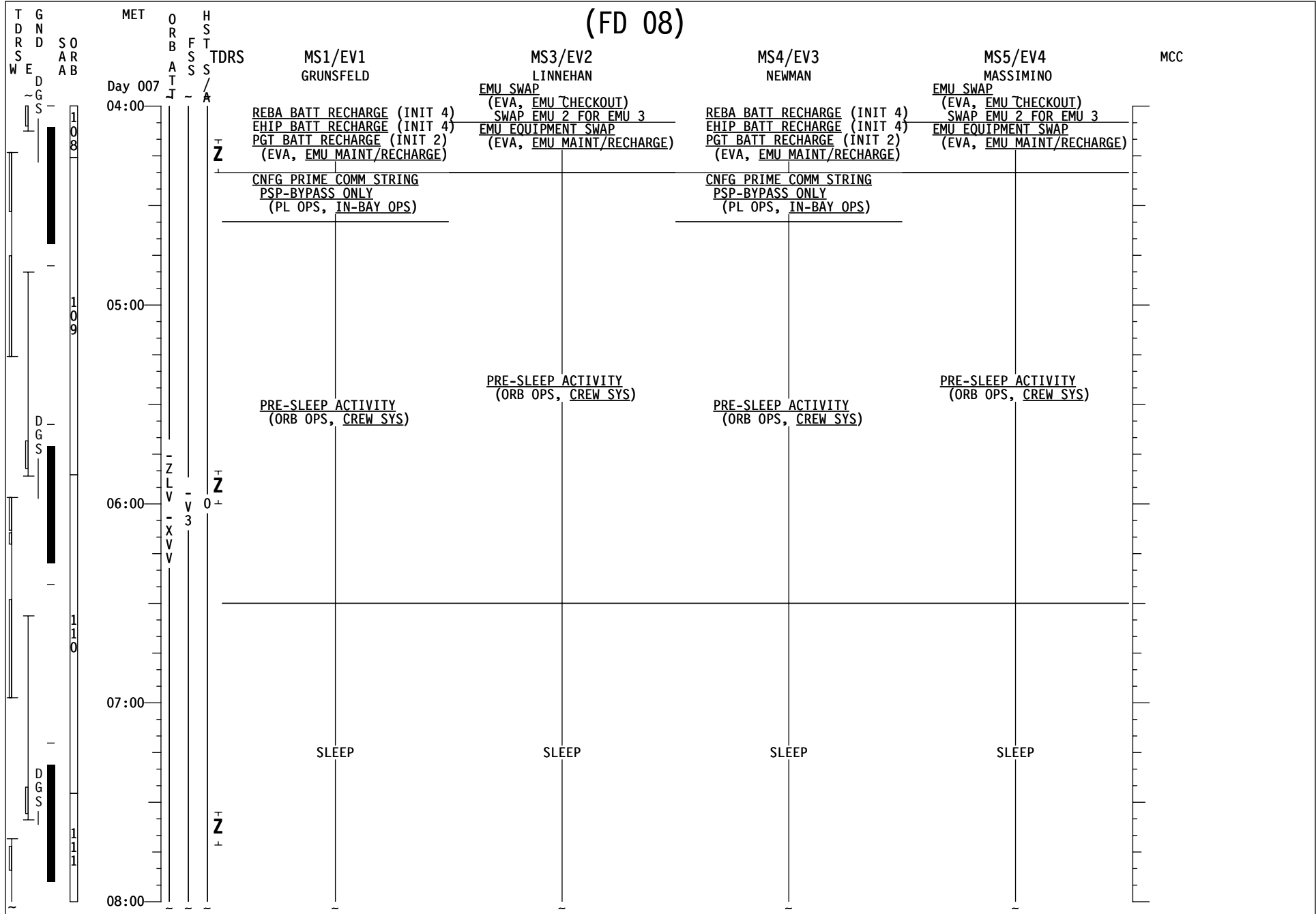
# (FD 08)



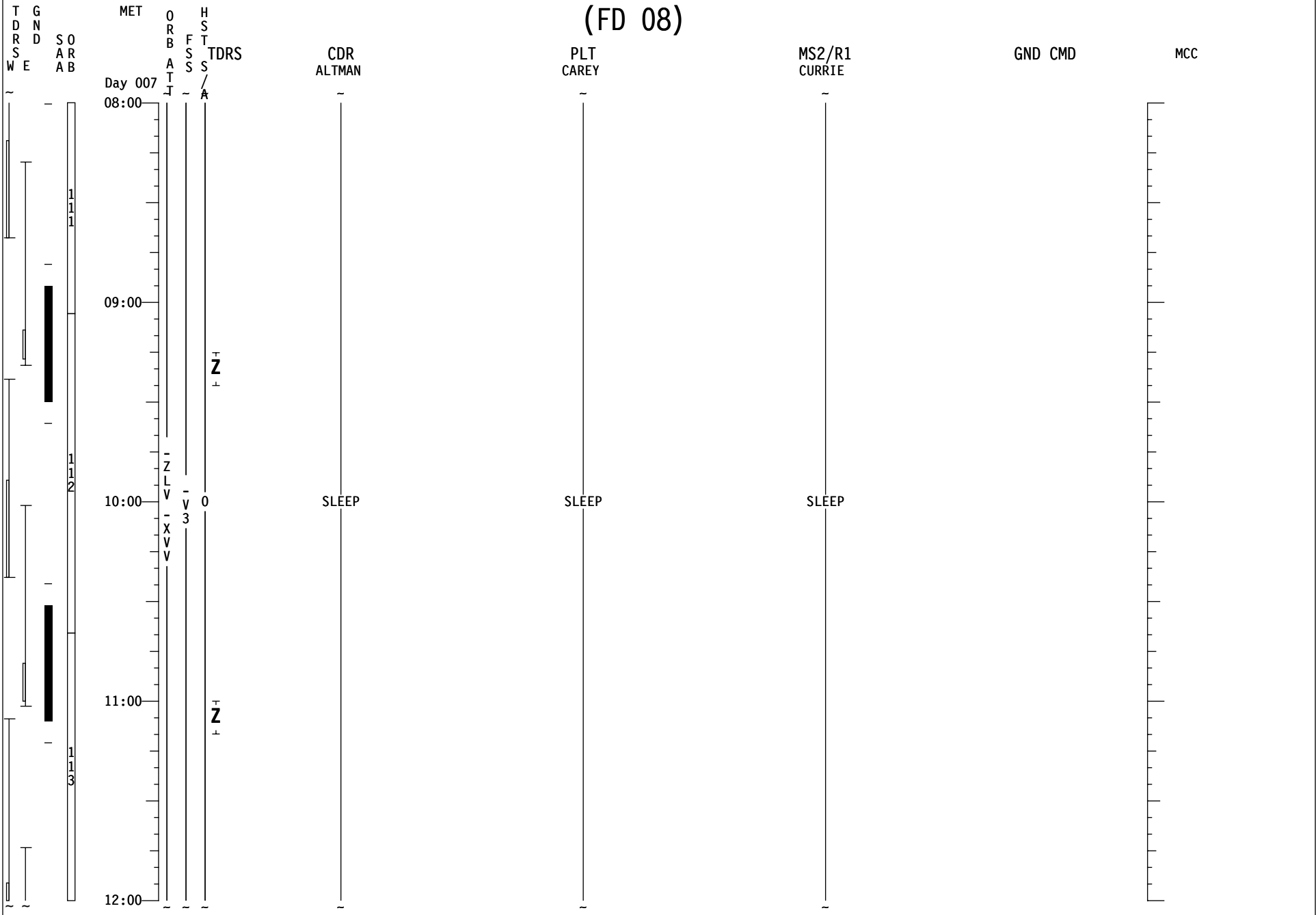
**PGSC OVERNIGHT CONFIG**

- COLOR PRINTER - ON
- PAPER IN PRINTER
- OCA ROUTER - ON
- FLOPPY DISC IN PROSHARE
- PROSHARE - 2MB CONFIG
- KFX LAUNCHED
- CHECK APPLICATIONS CLOSED
- OUTLOOK

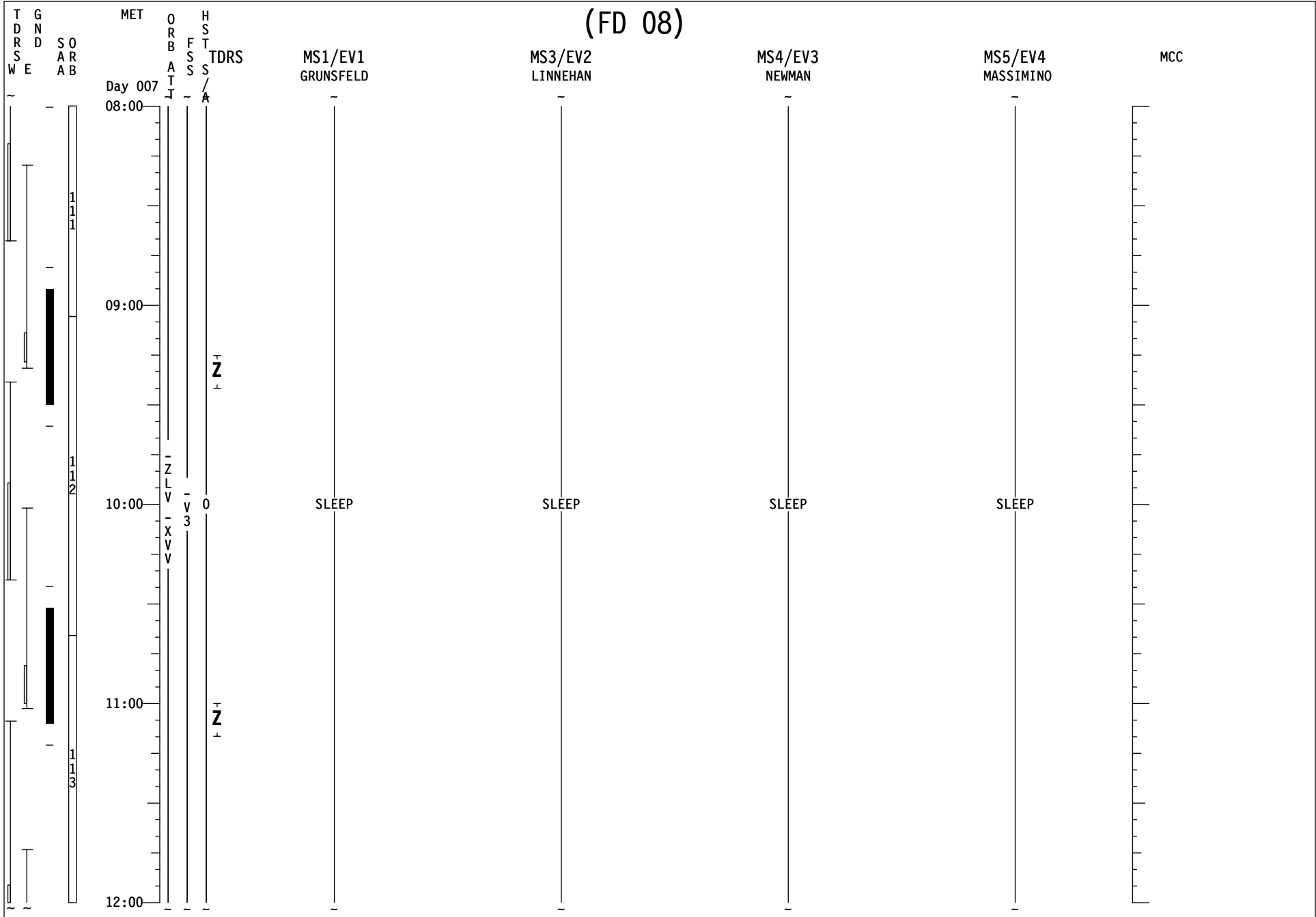
# (FD 08)



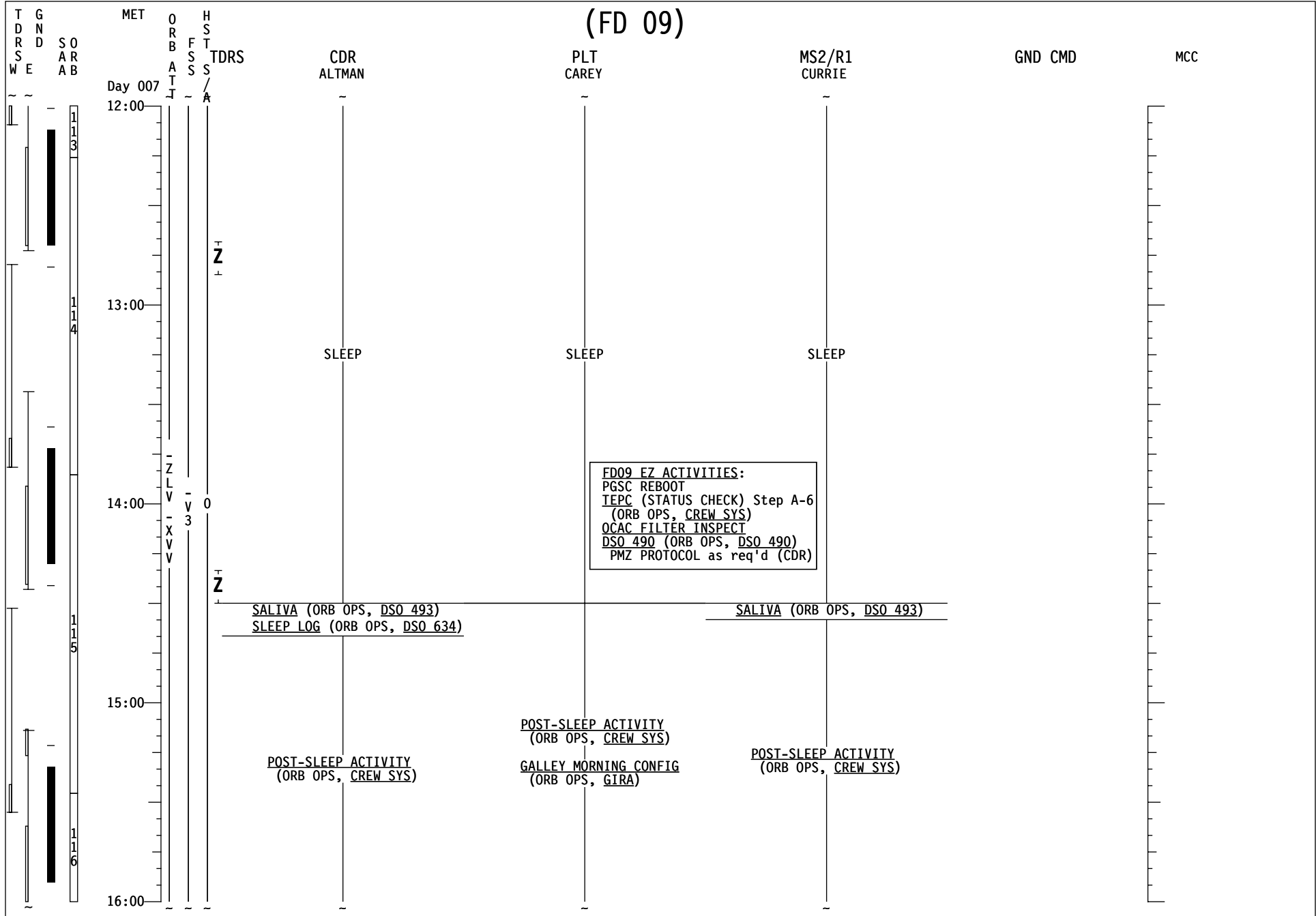
(FD 08)



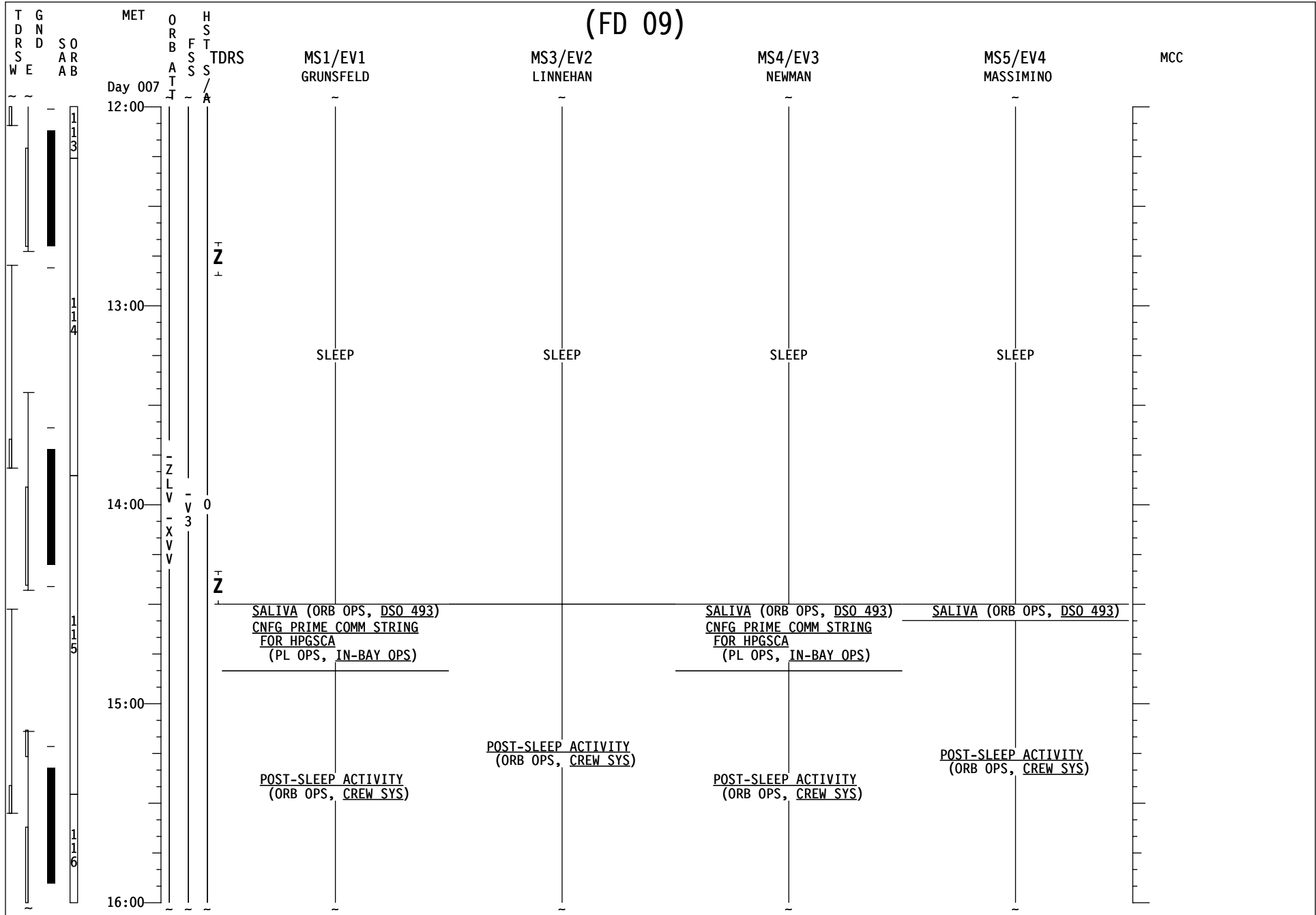
(FD 08)



# (FD 09)

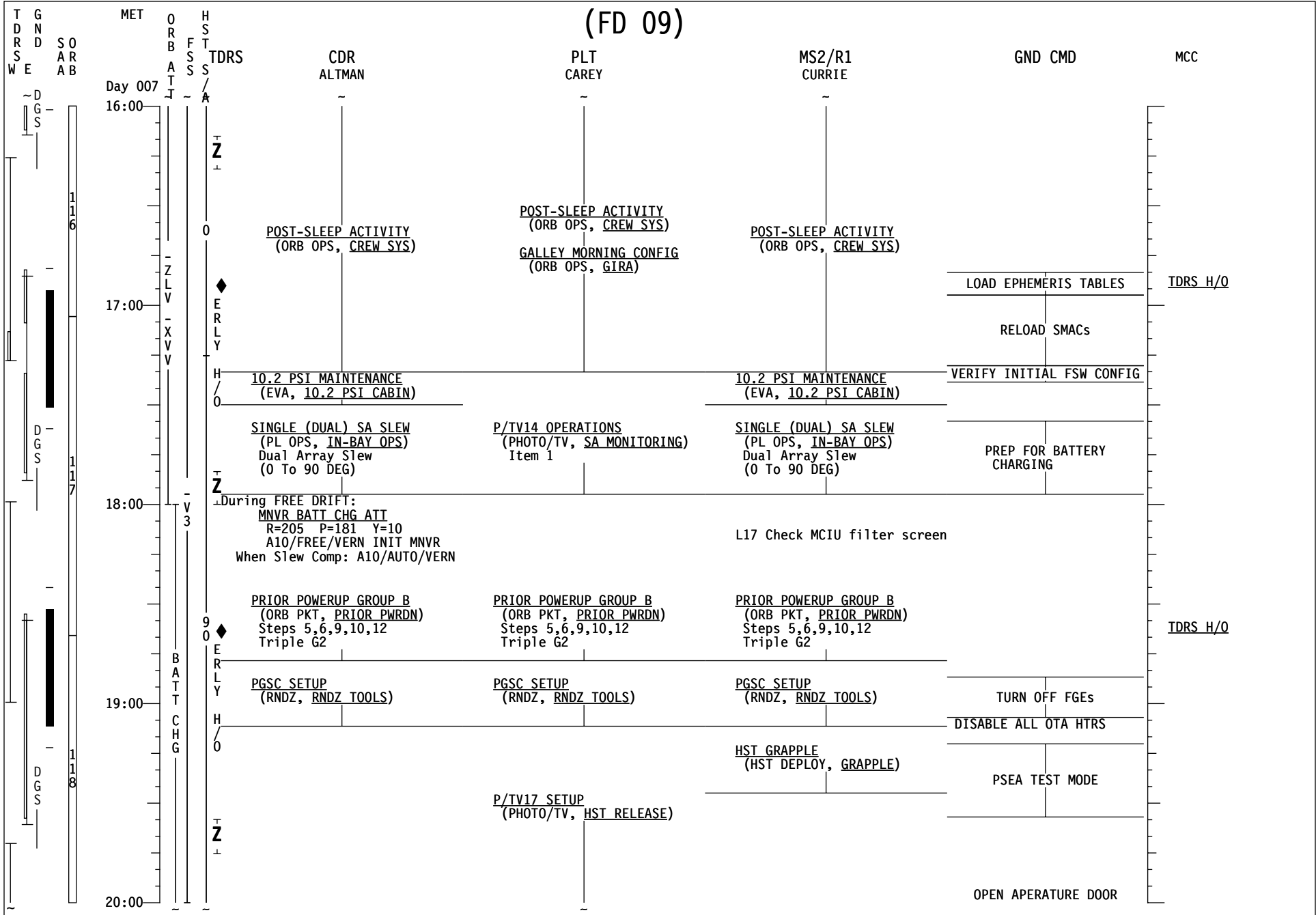


(FD 09)

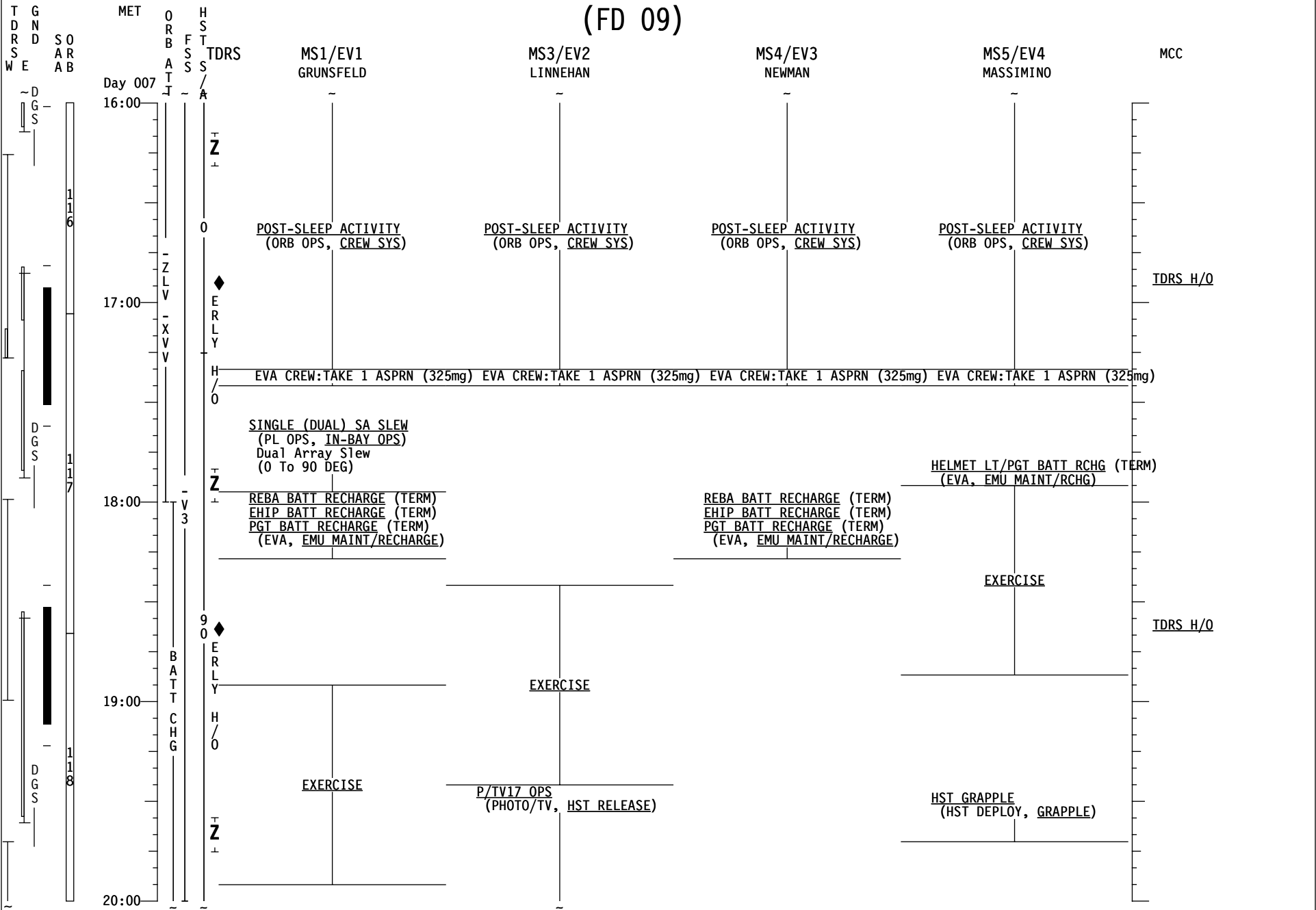


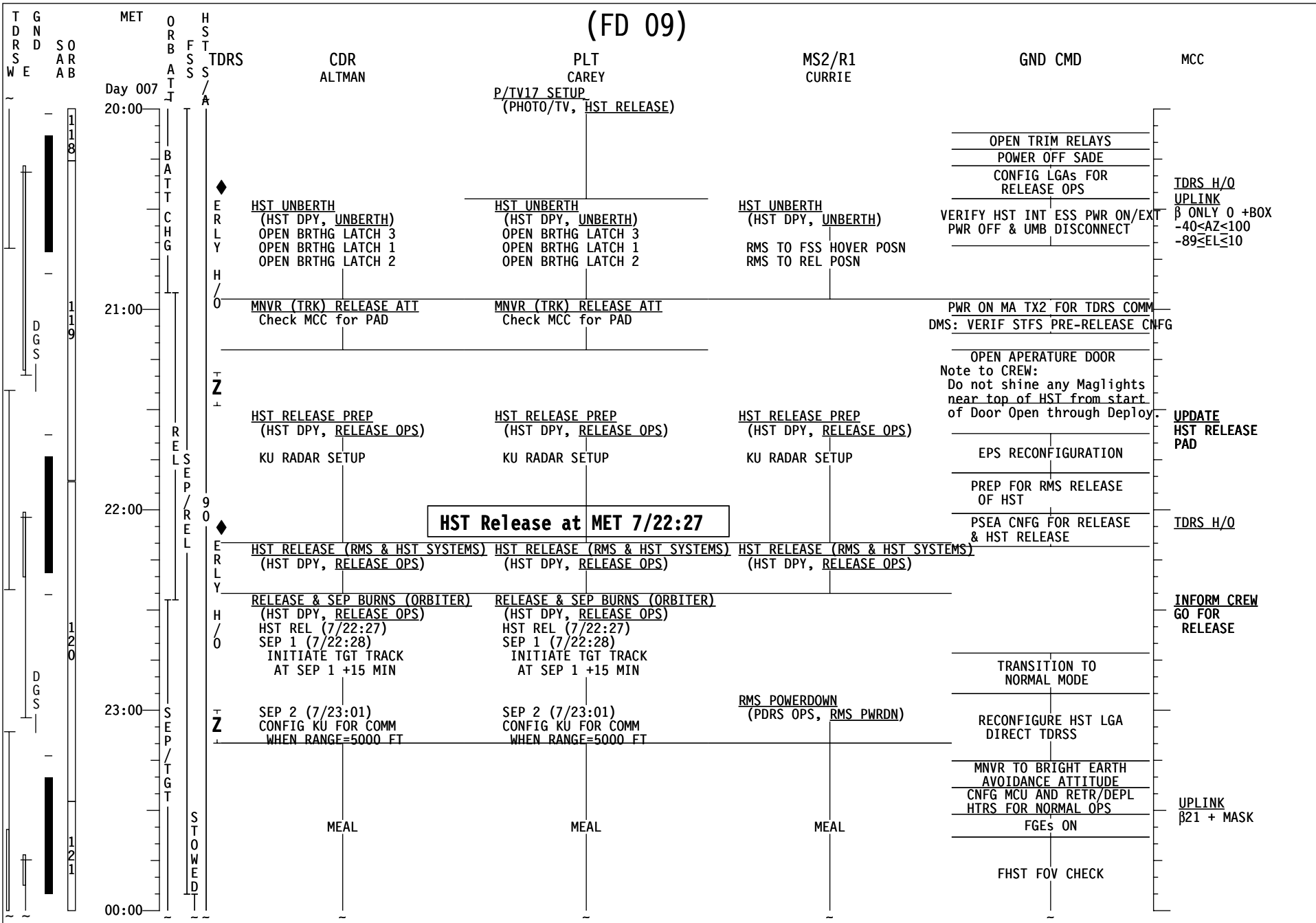


# (FD 09)

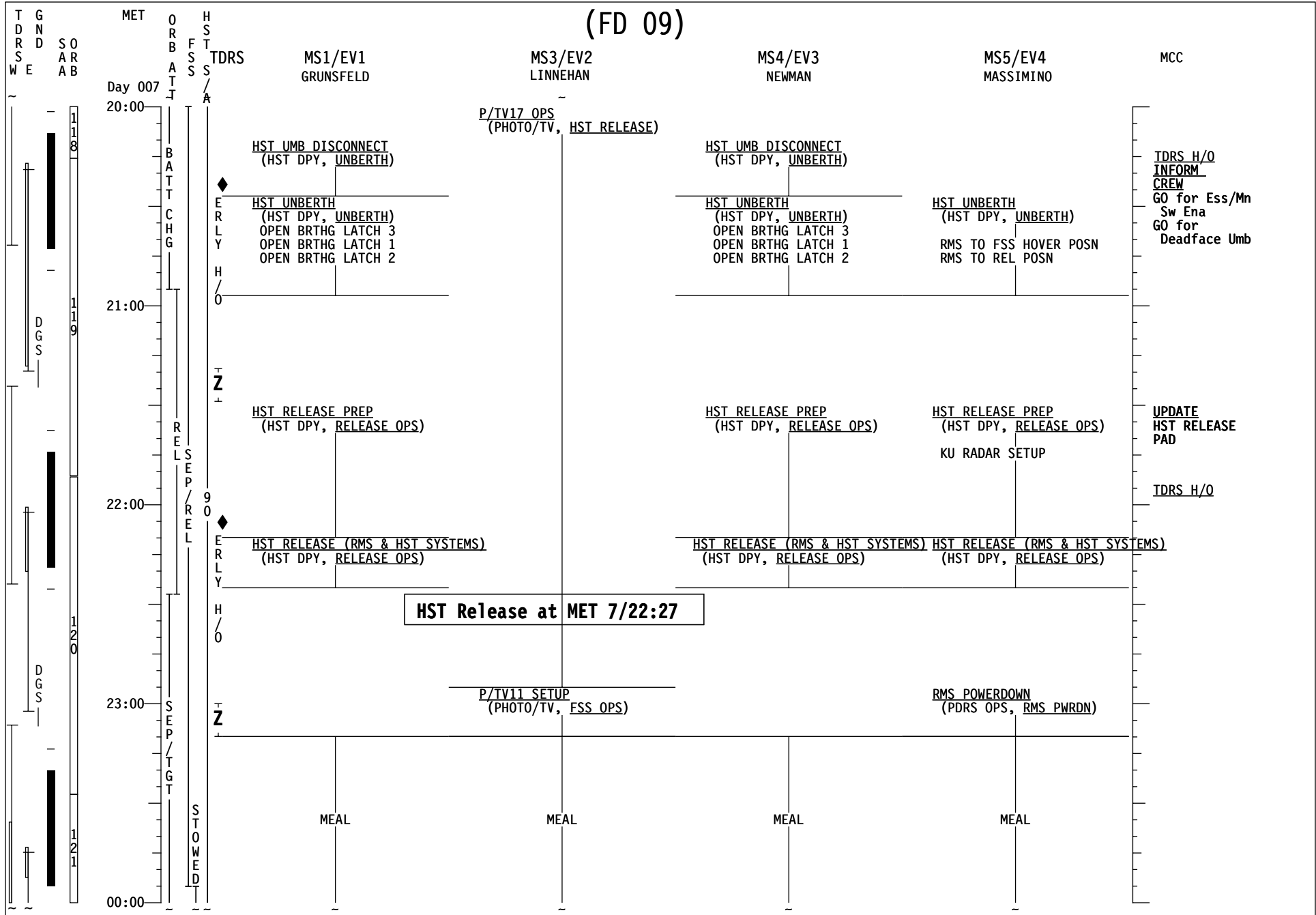


(FD 09)

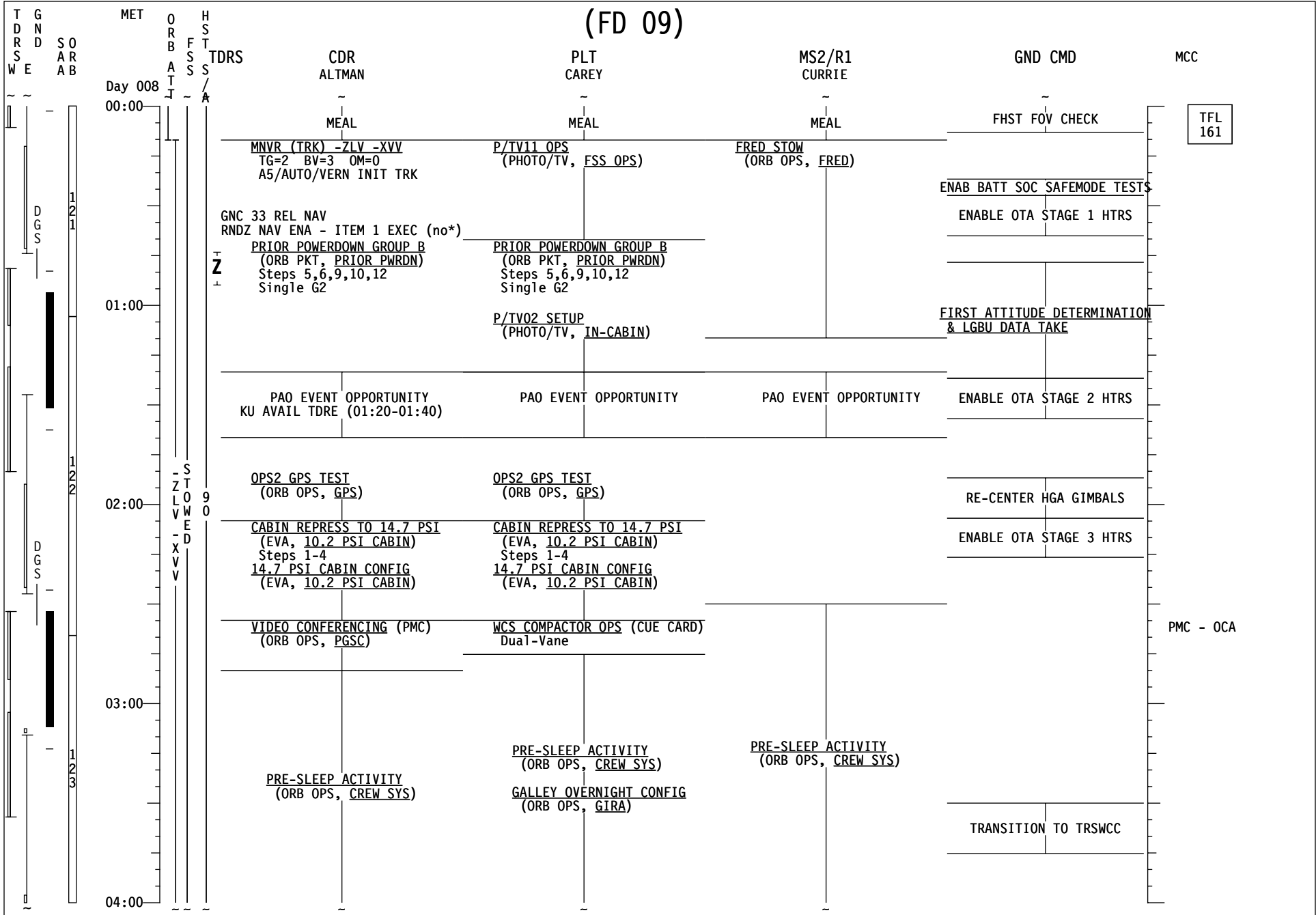




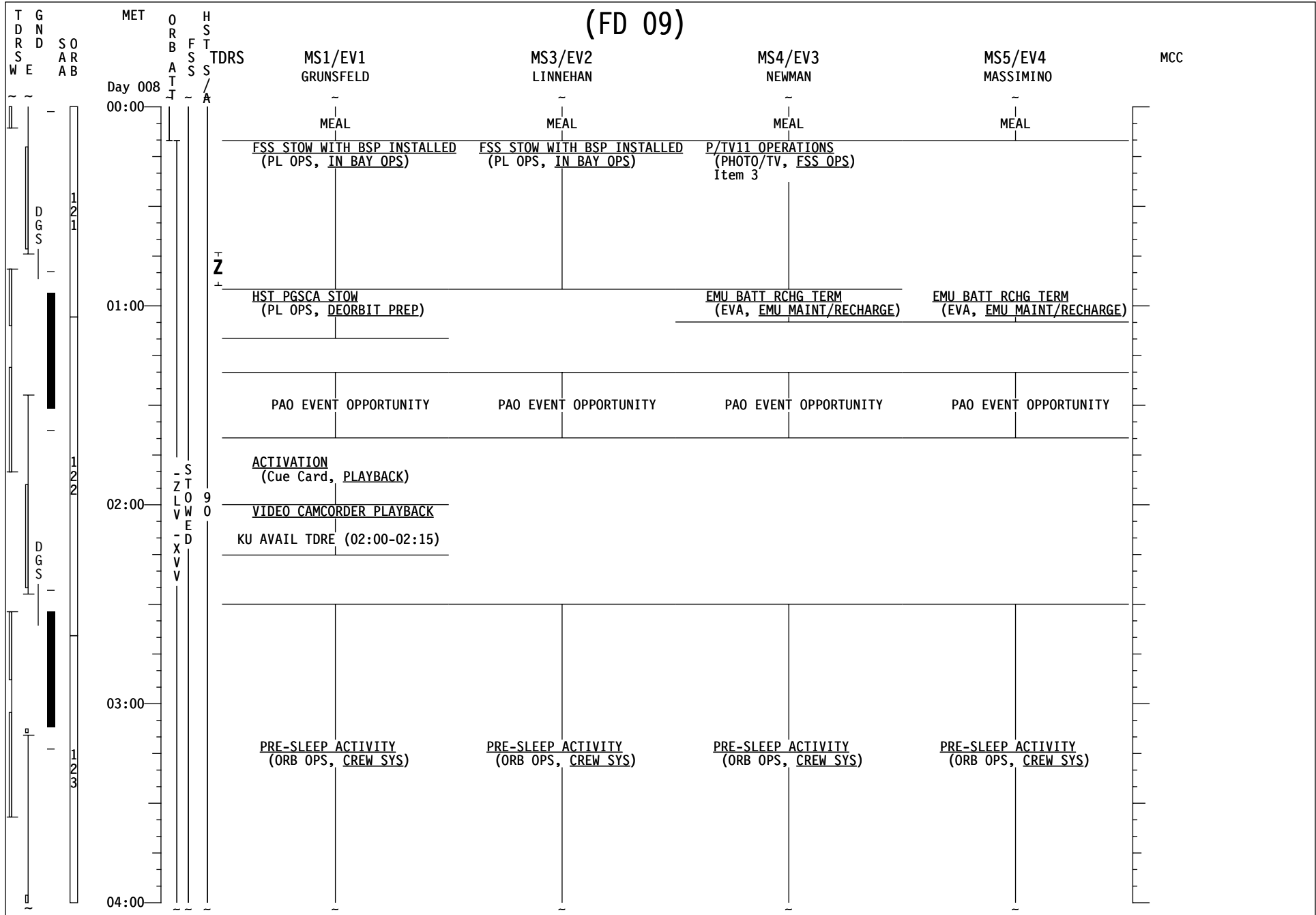
# (FD 09)



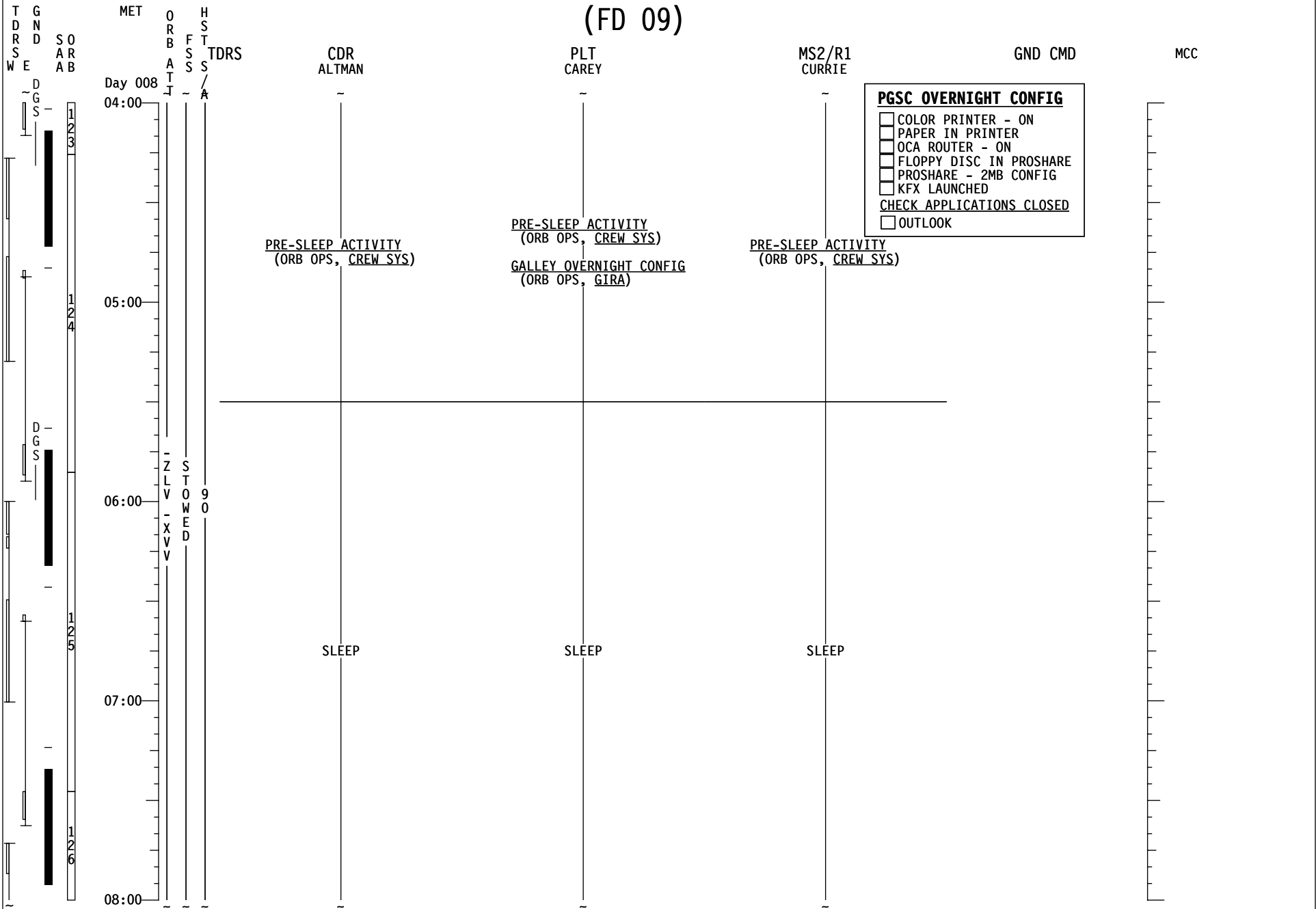
(FD 09)



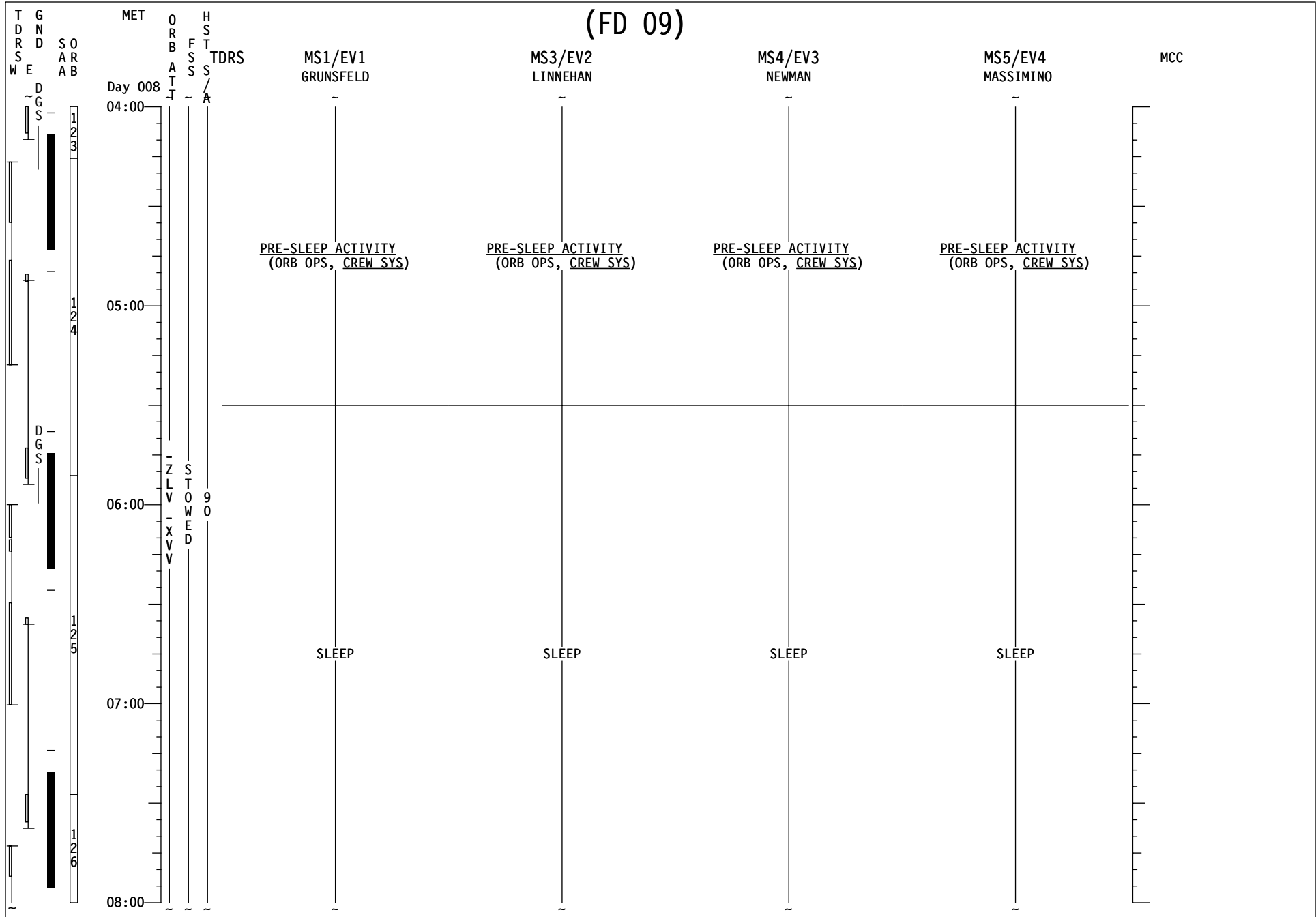
# (FD 09)



# (FD 09)

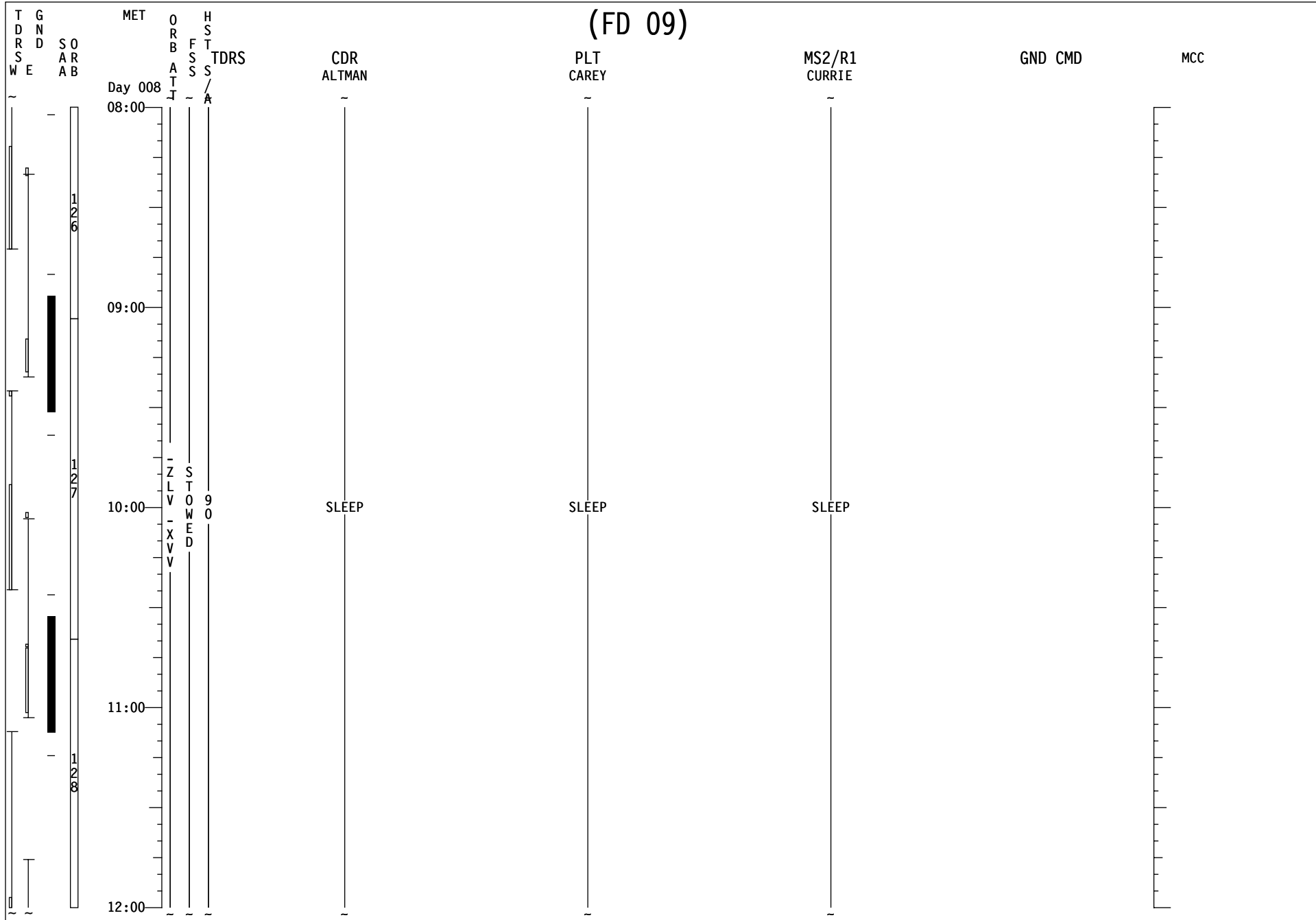


(FD 09)

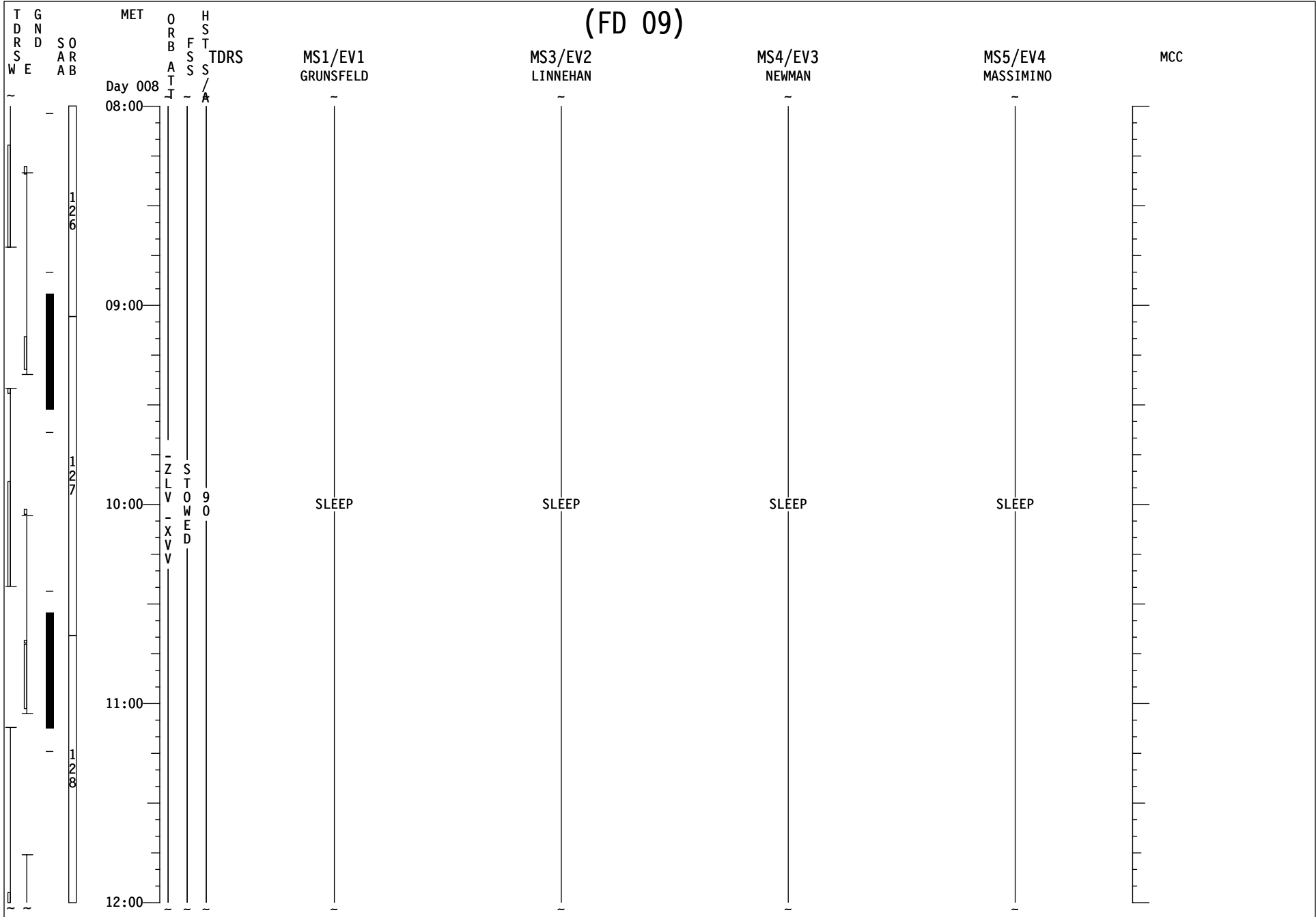




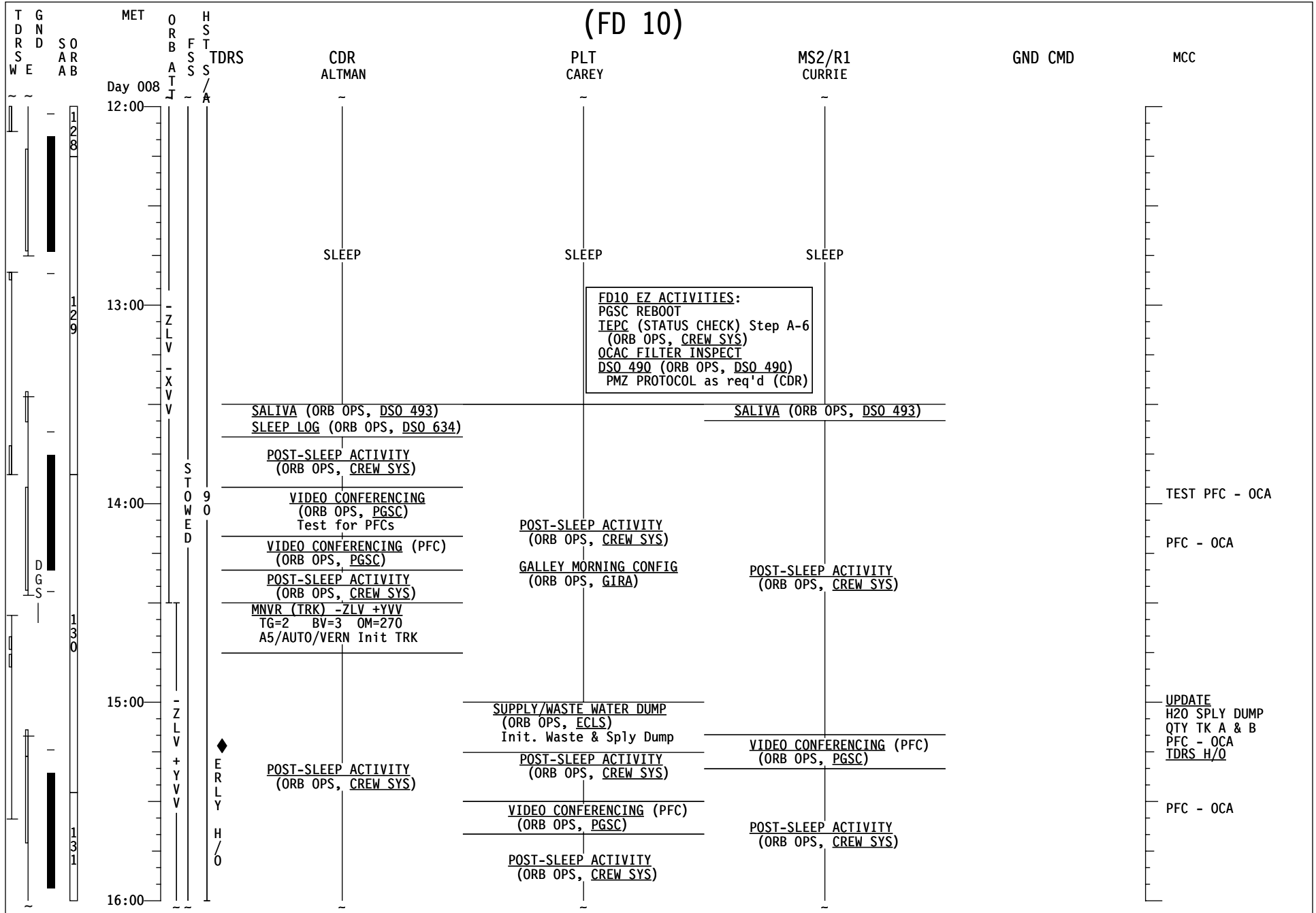
# (FD 09)



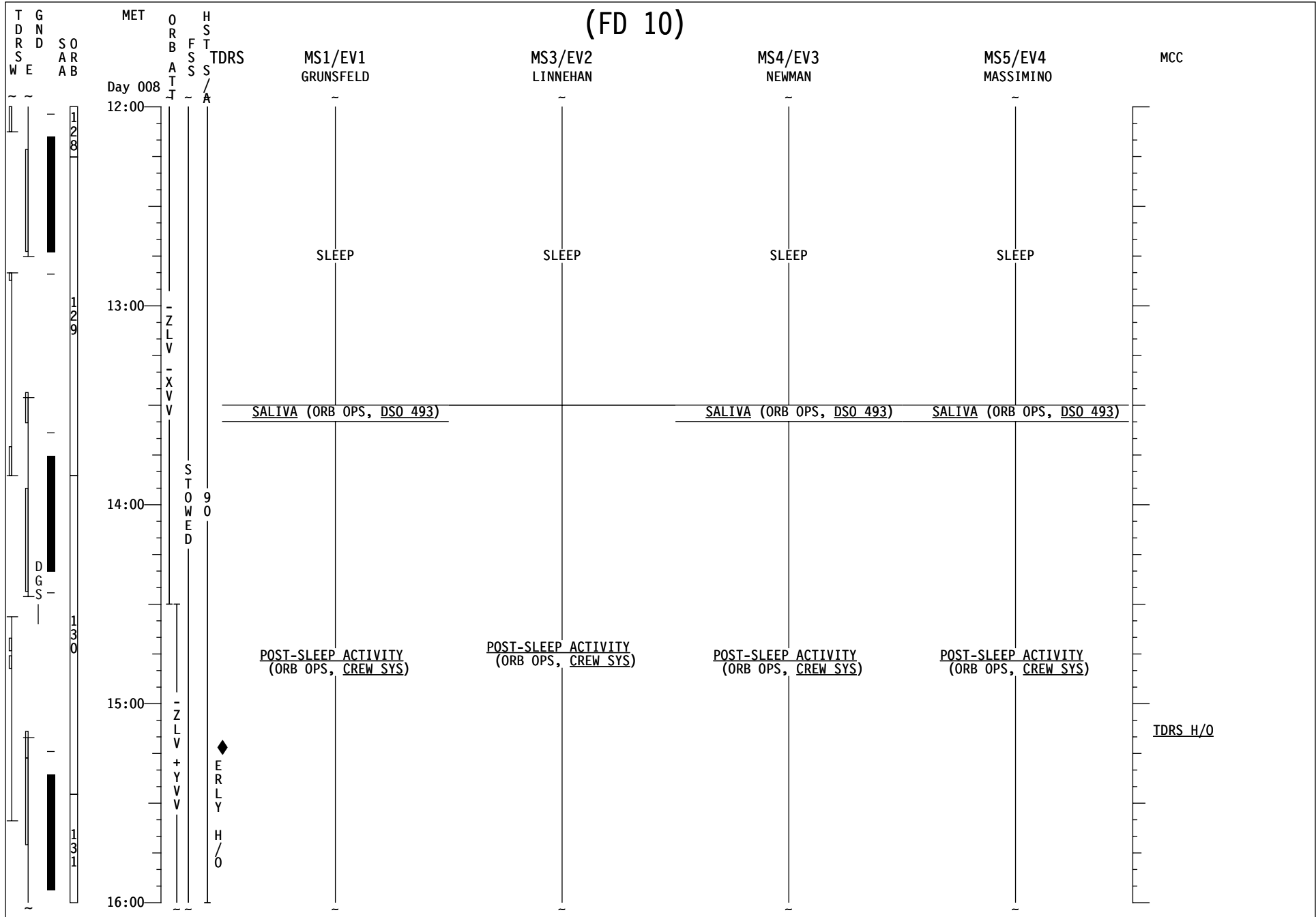
(FD 09)



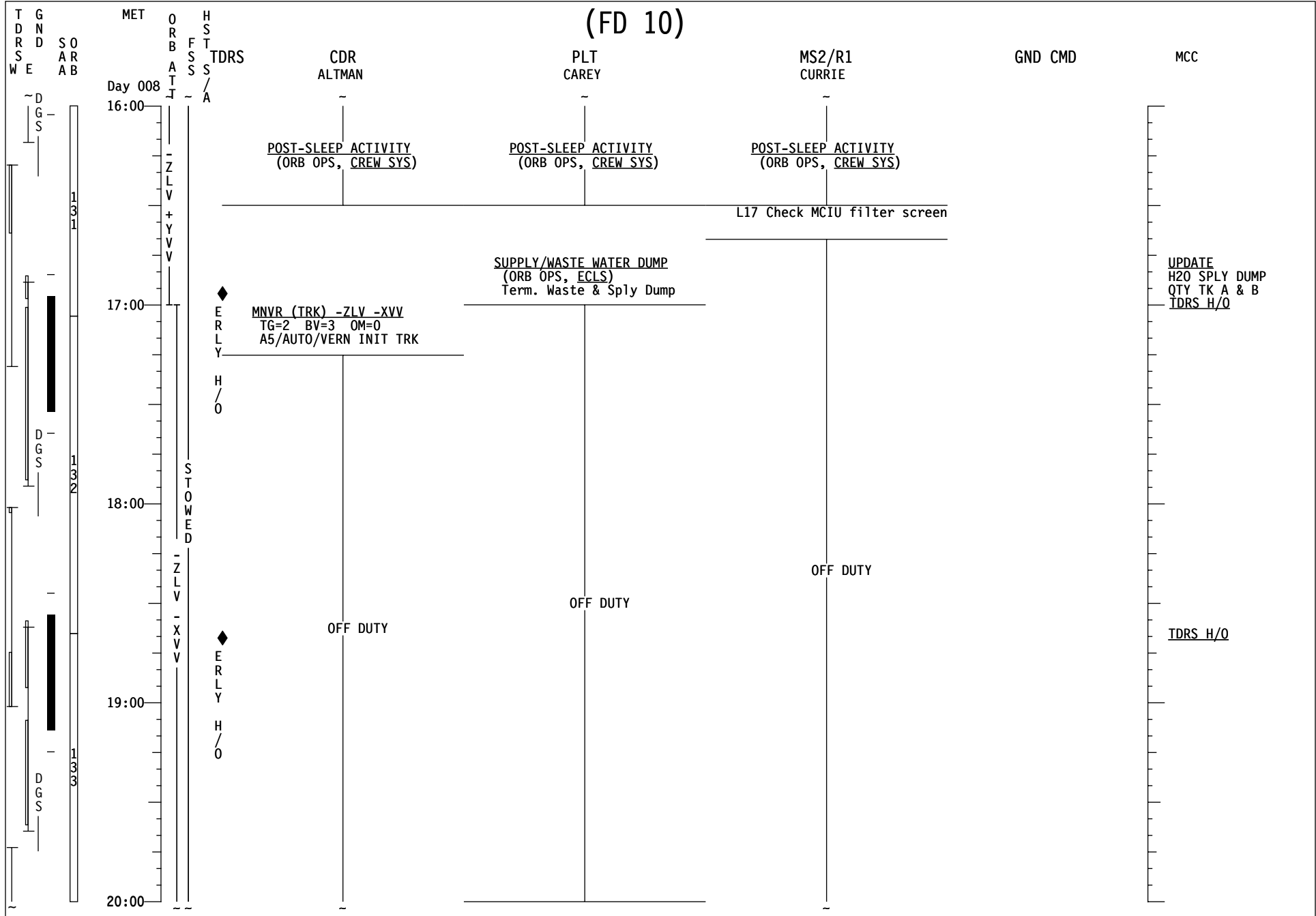
# (FD 10)



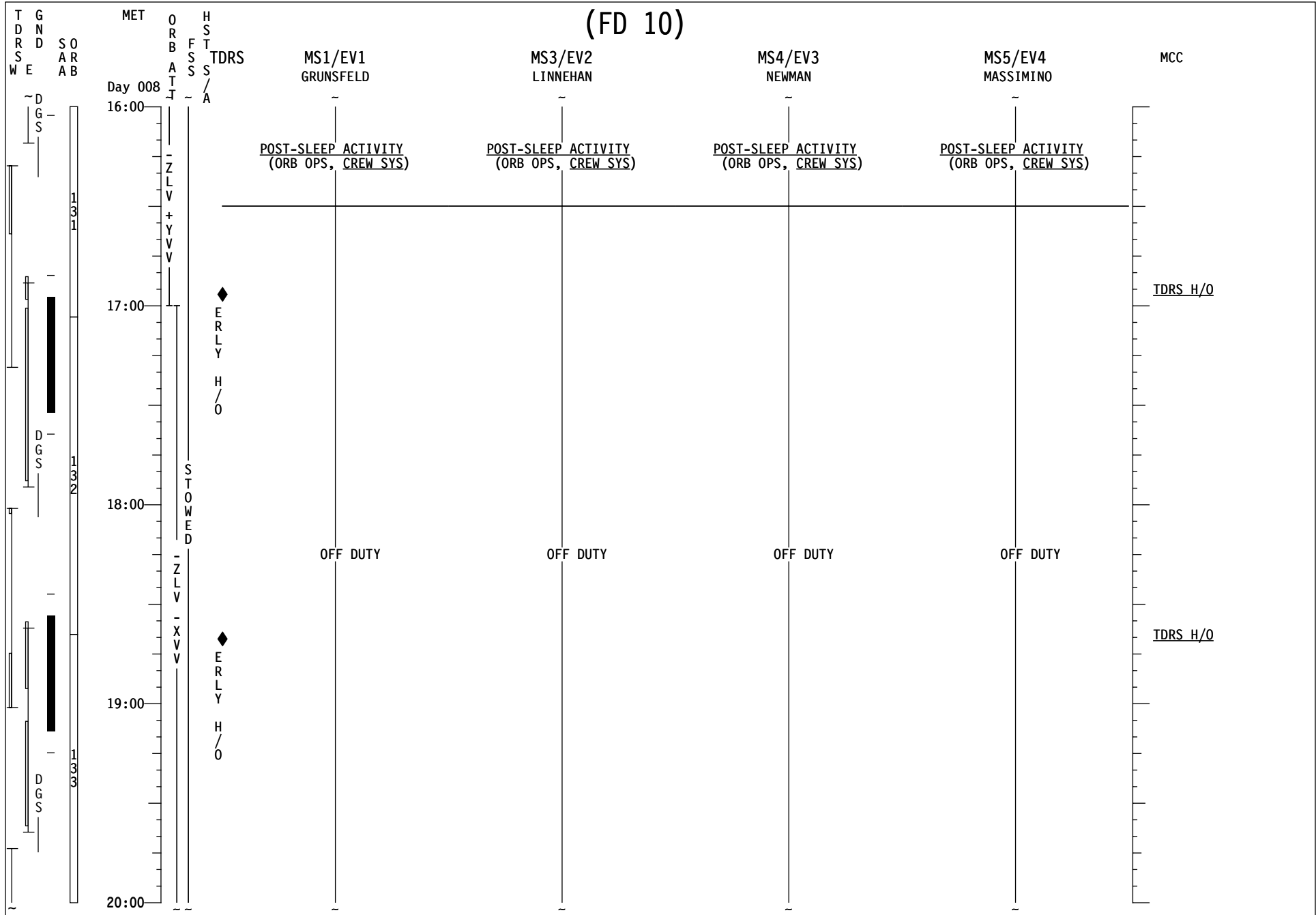
(FD 10)



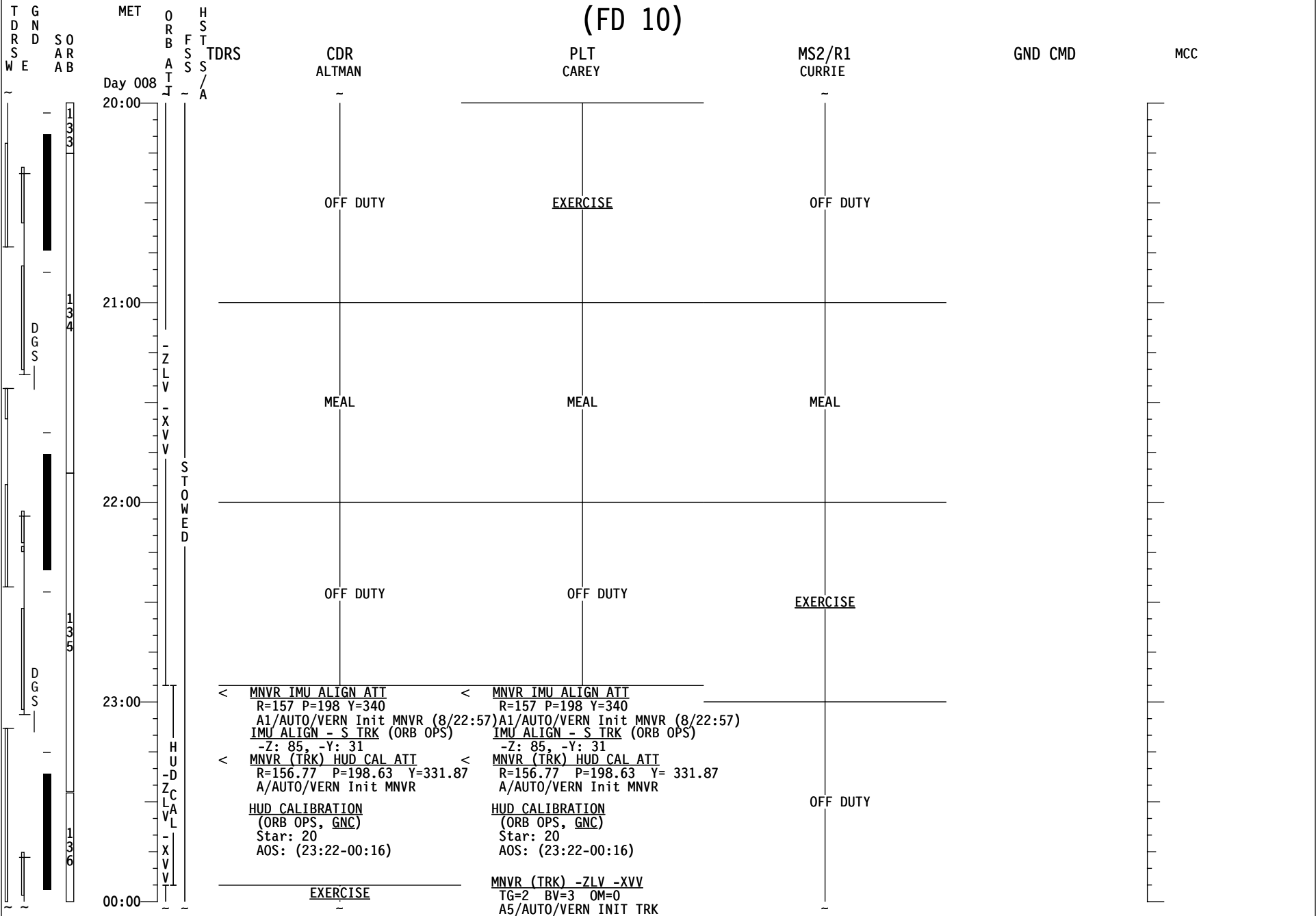
# (FD 10)



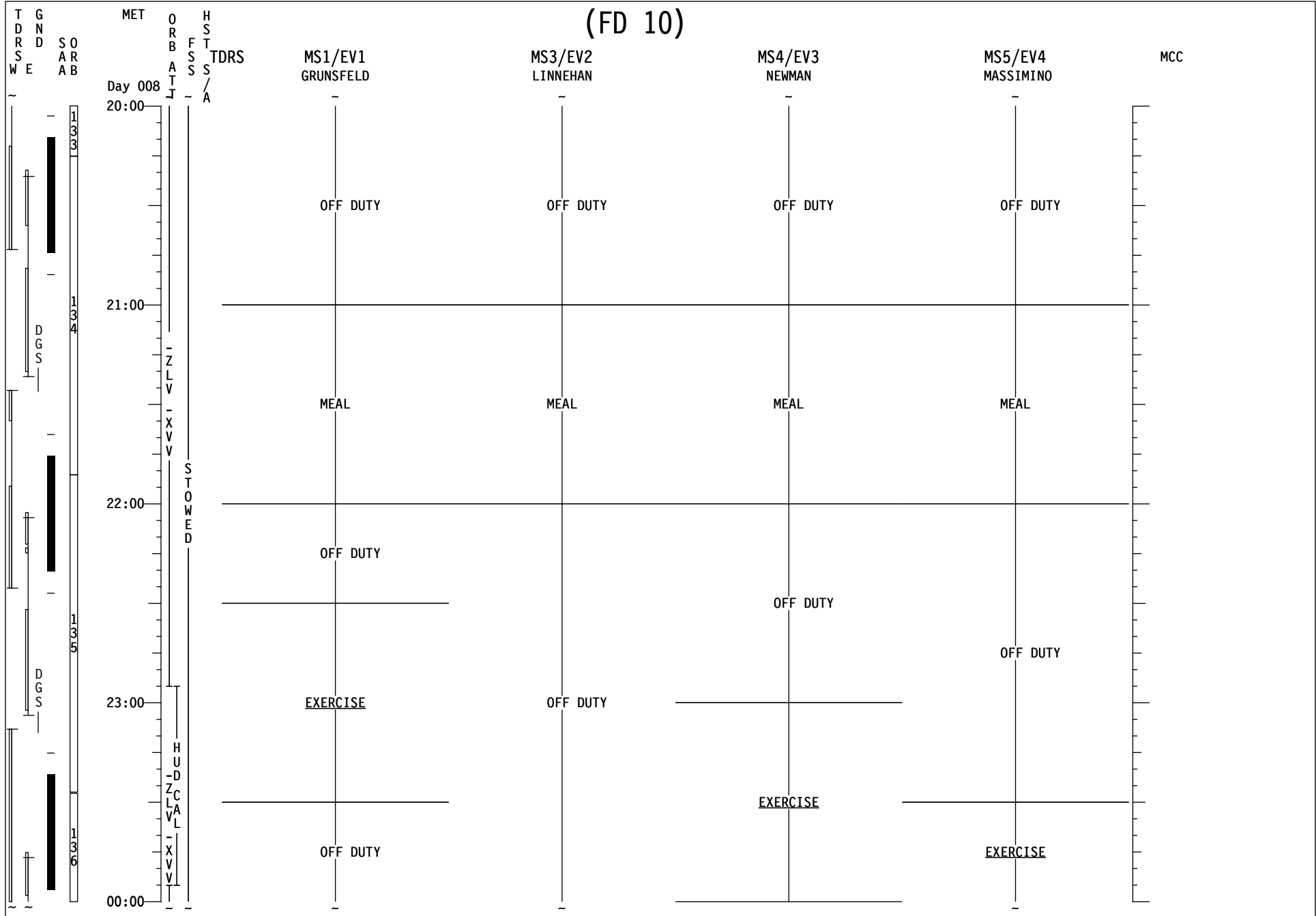
# (FD 10)



# (FD 10)

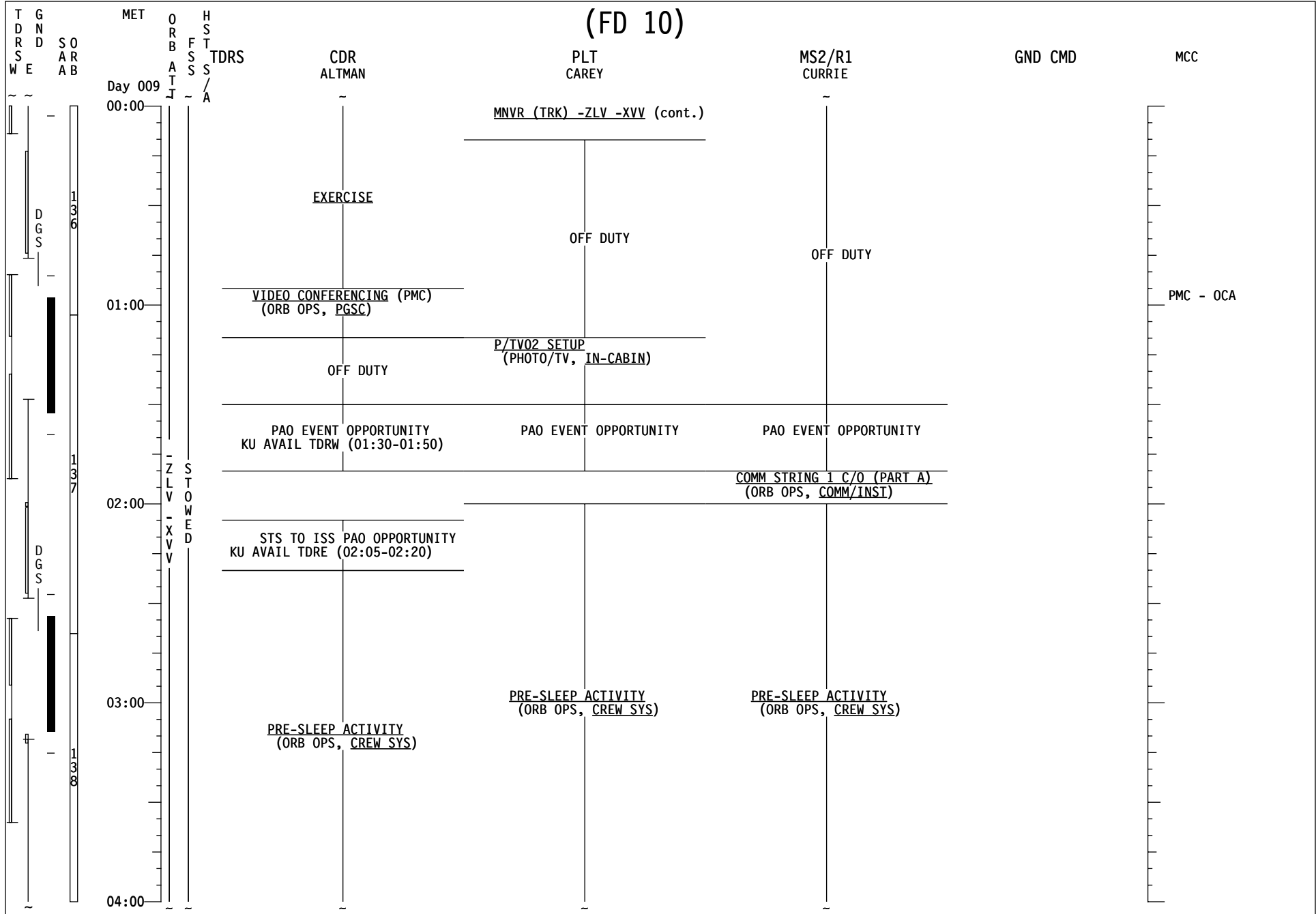


# (FD 10)

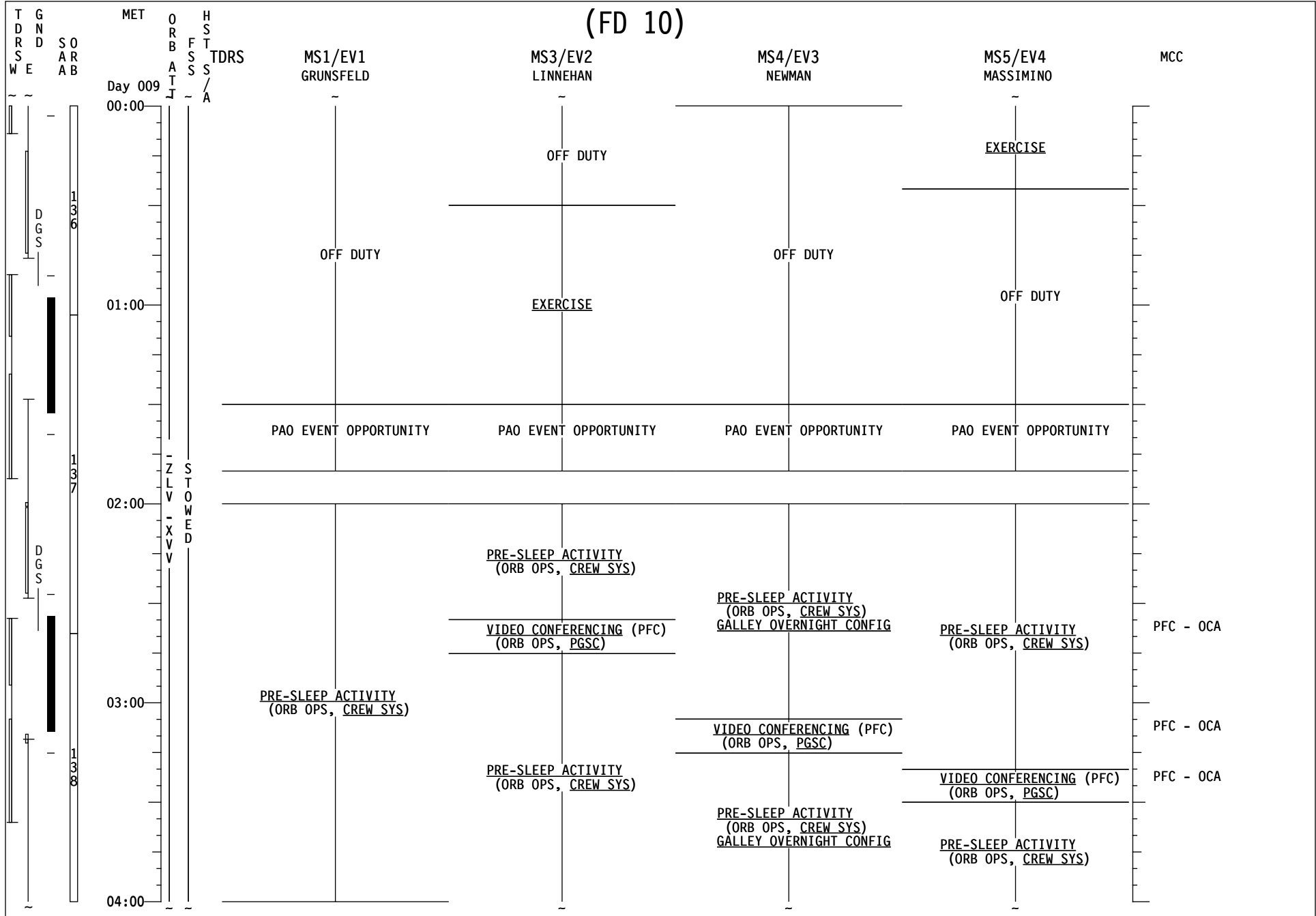




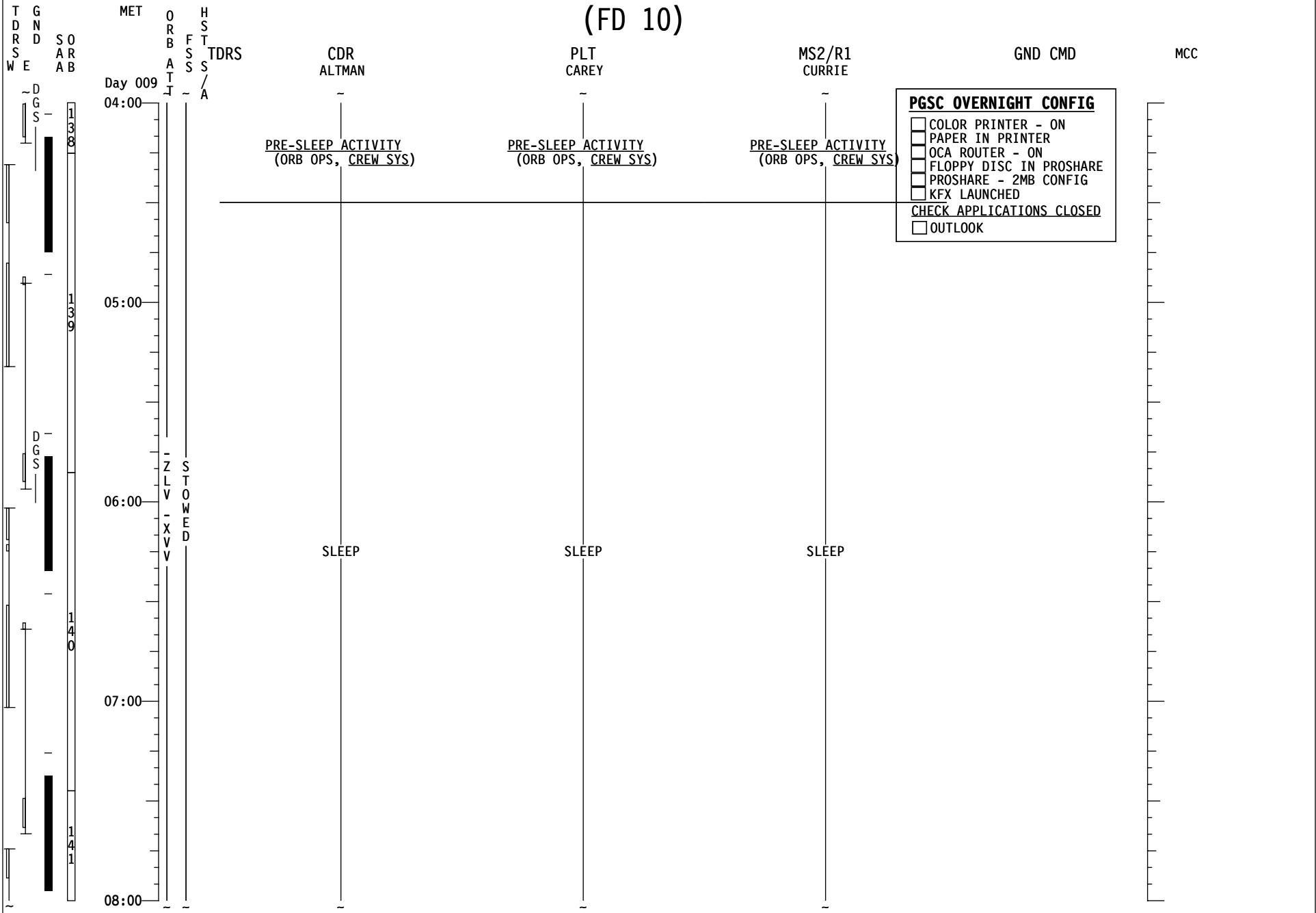
# (FD 10)



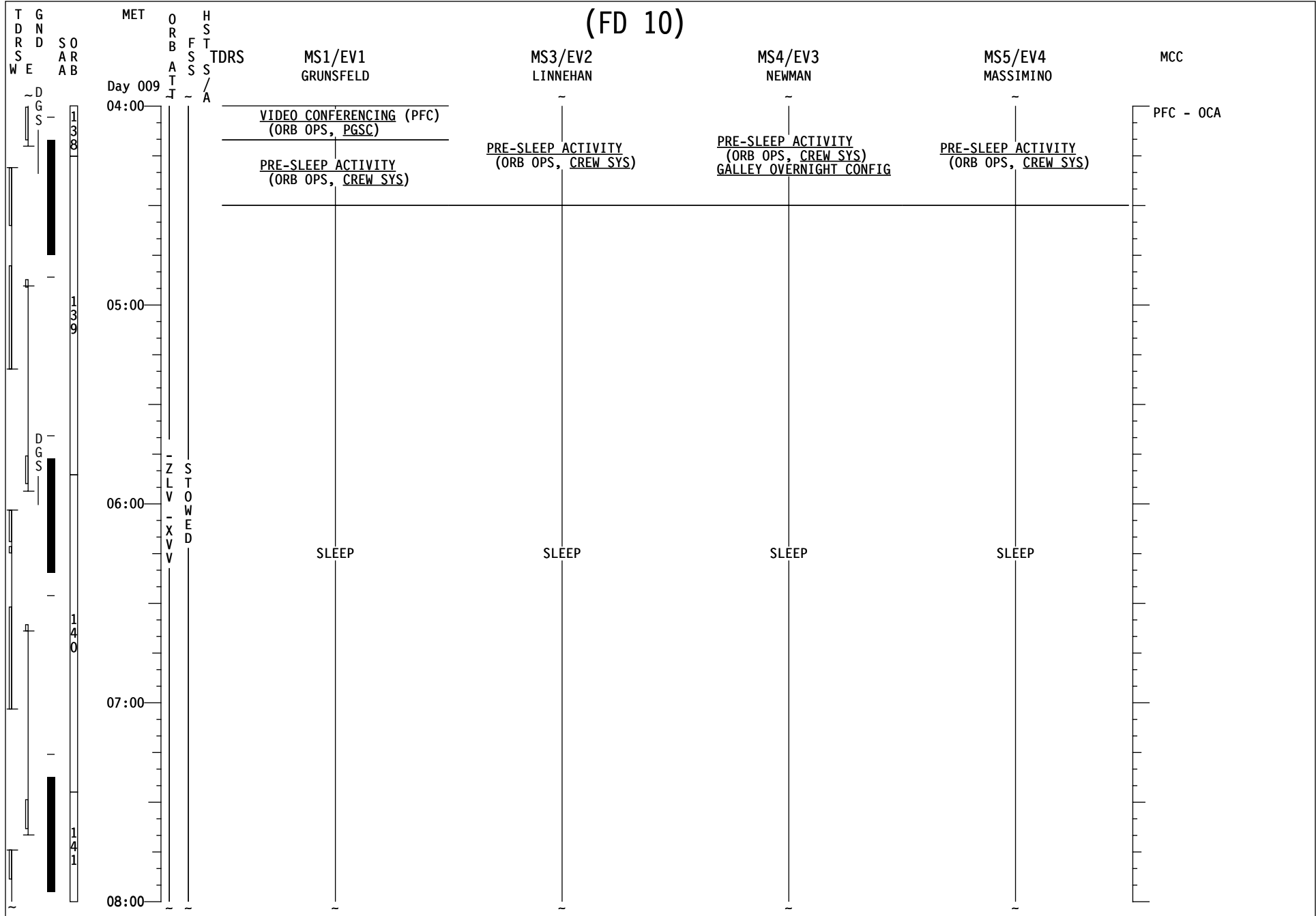
# (FD 10)



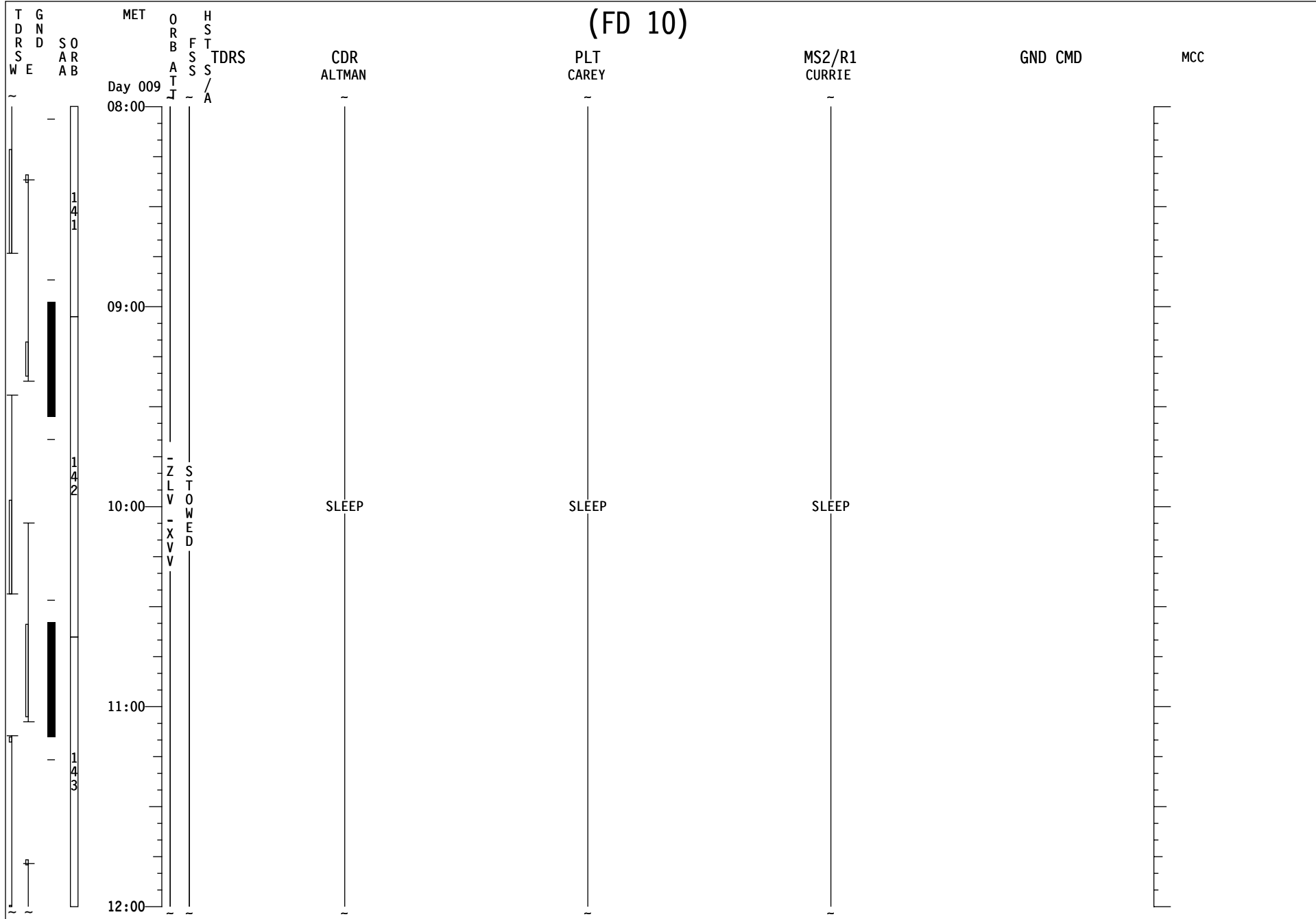
# (FD 10)



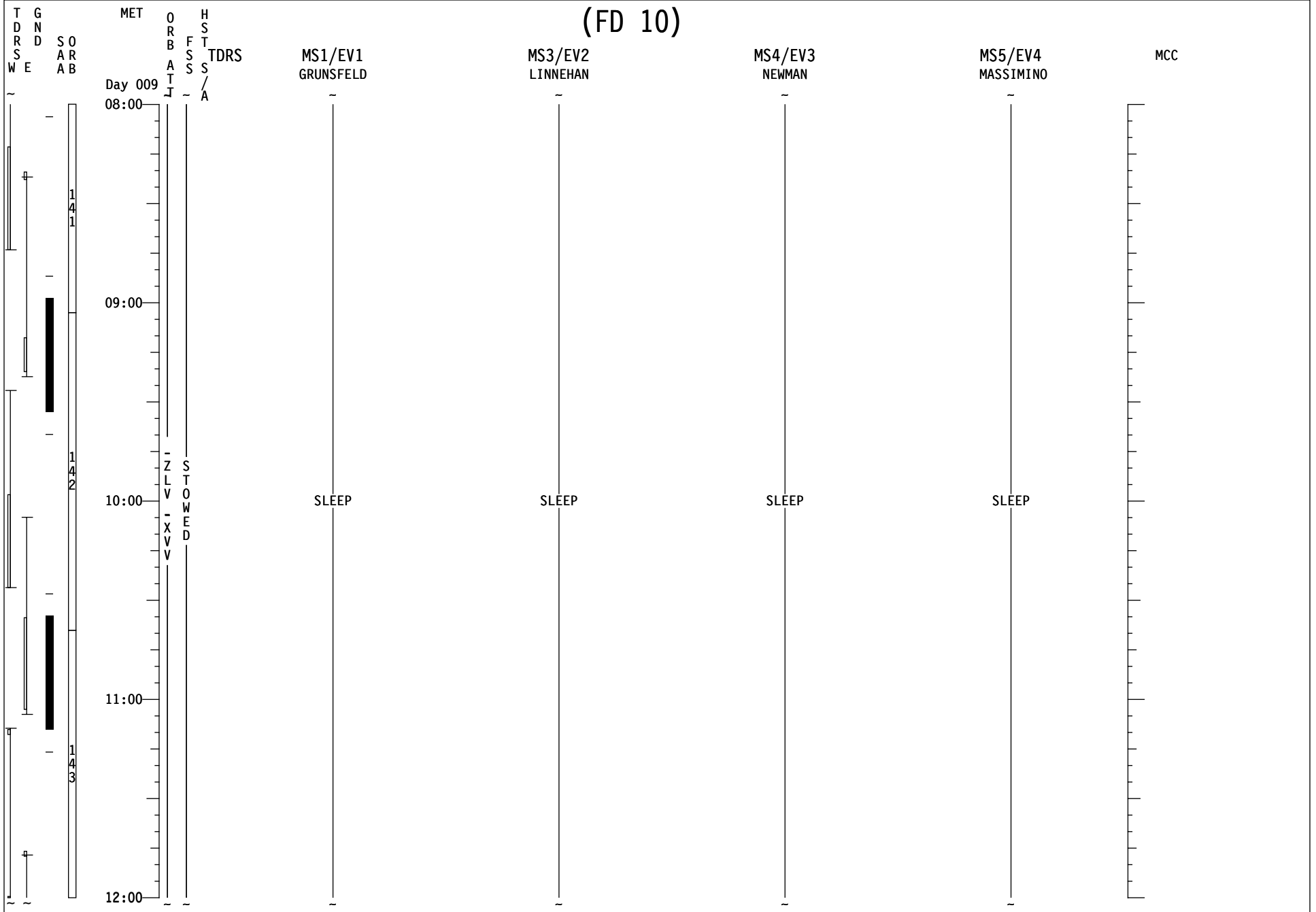
# (FD 10)



(FD 10)



(FD 10)



Day 009

08:00

09:00

10:00

11:00

12:00

MS1/EV1  
GRUNSFELD

SLEEP

MS3/EV2  
LINNEHAN

SLEEP

MS4/EV3  
NEWMAN

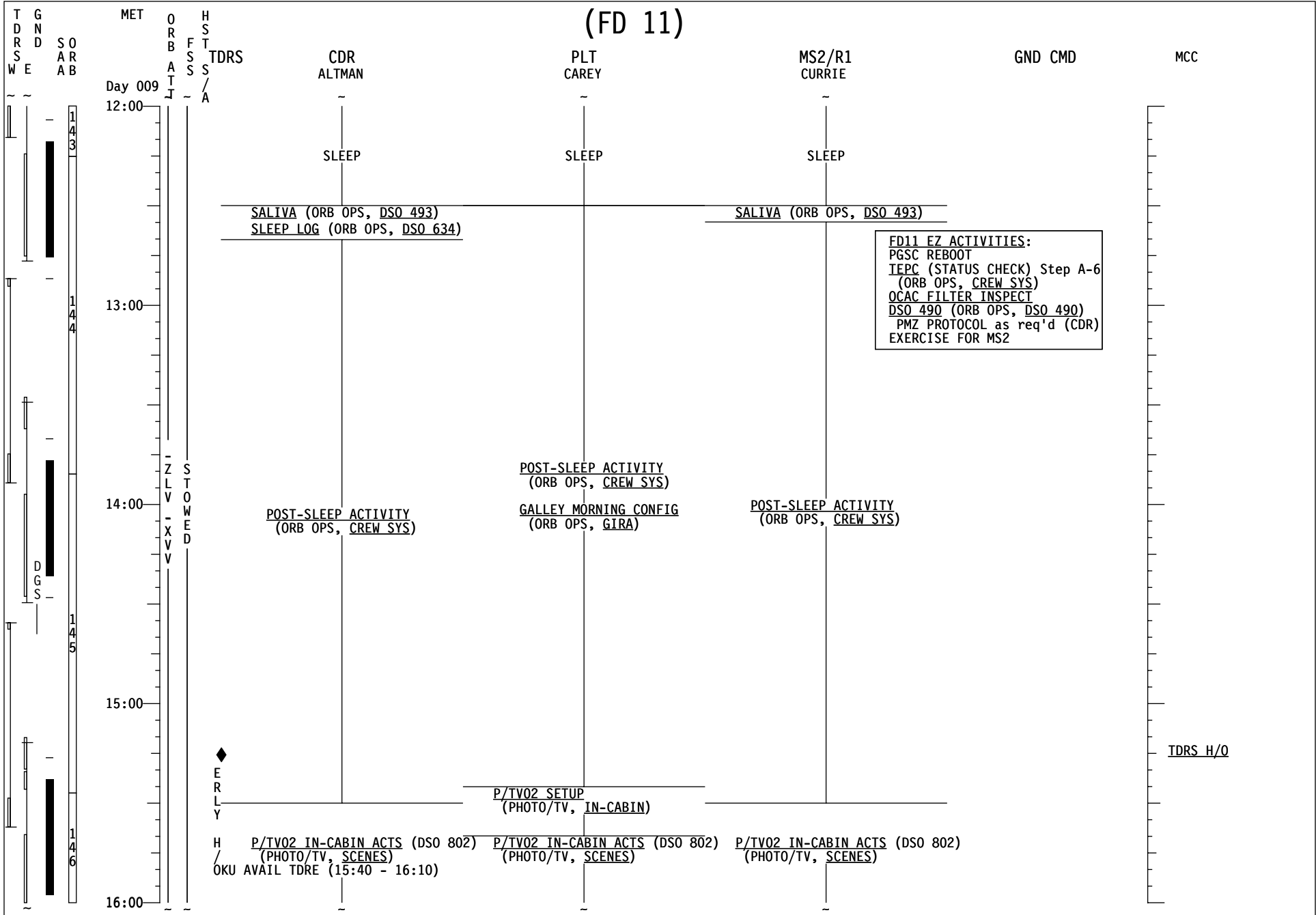
SLEEP

MS5/EV4  
MASSIMINO

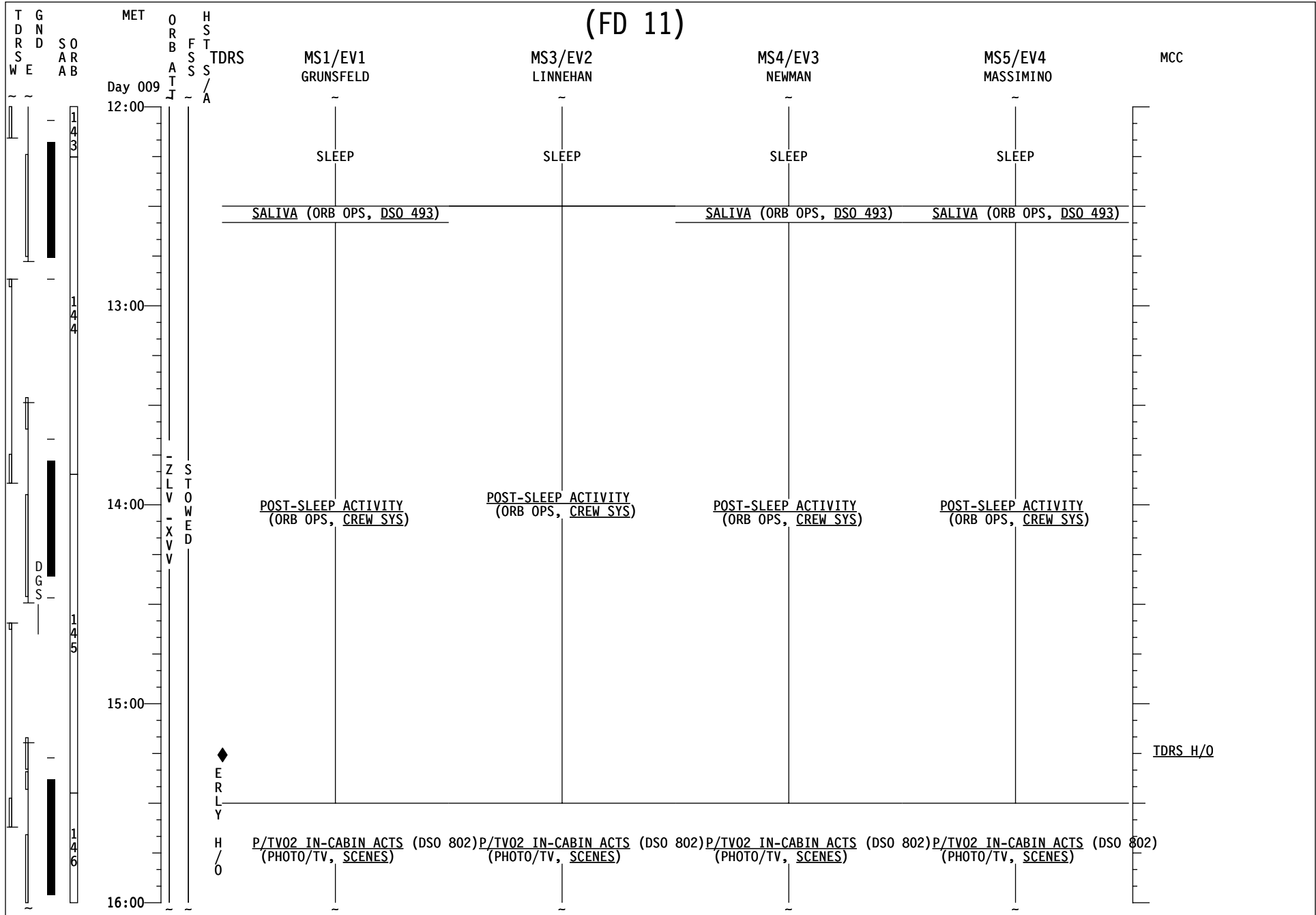
SLEEP

MCC

# (FD 11)

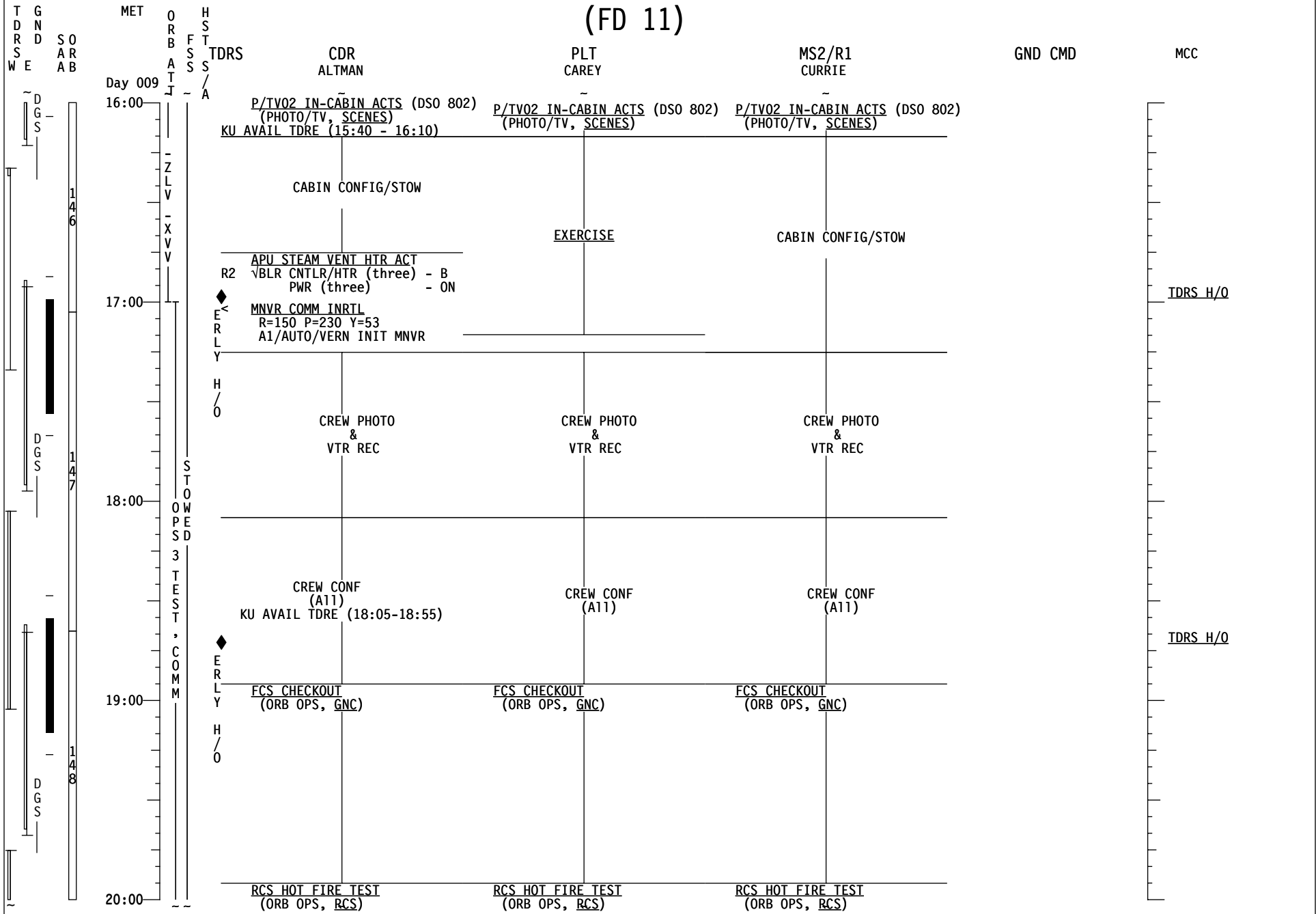


# (FD 11)

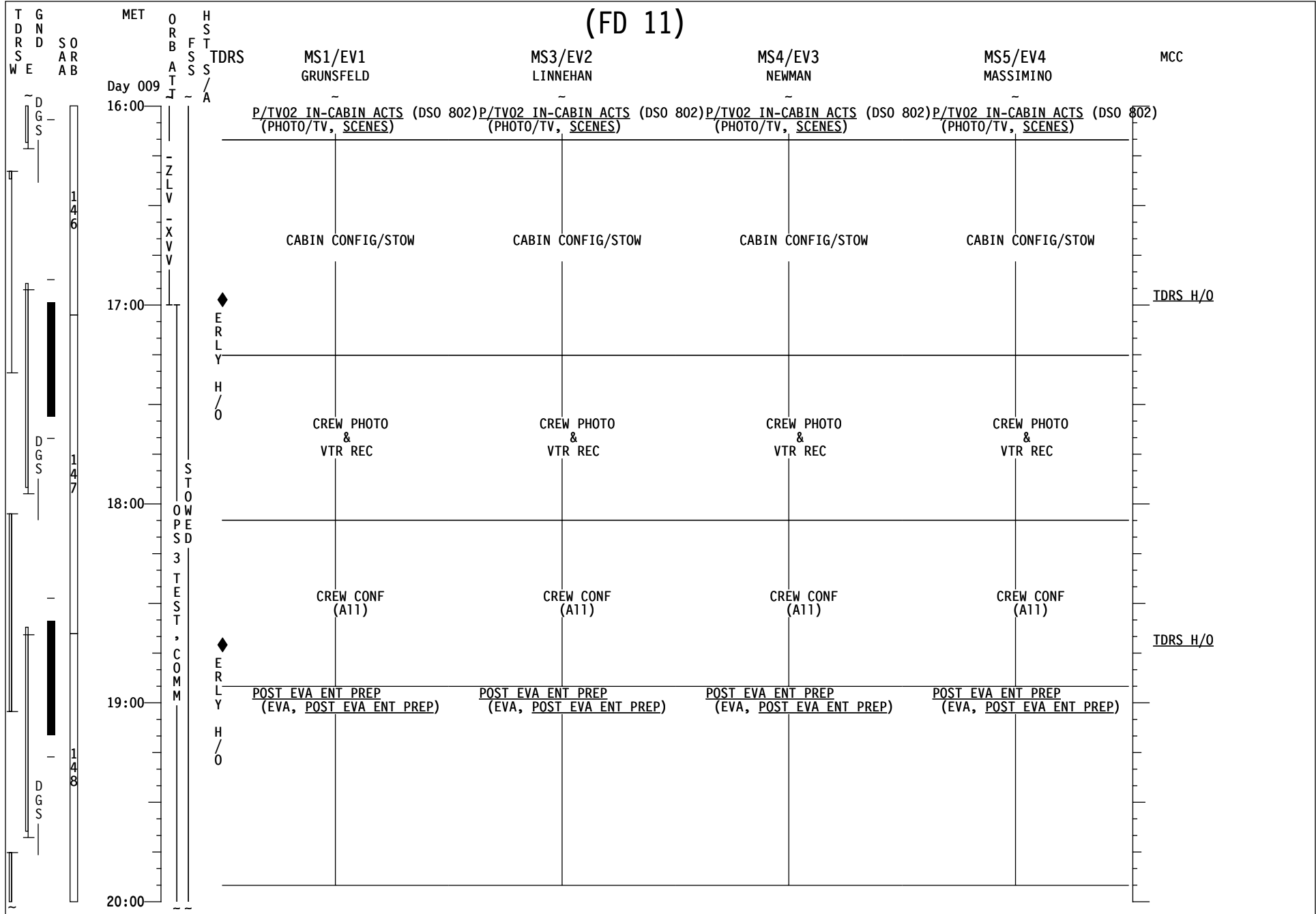




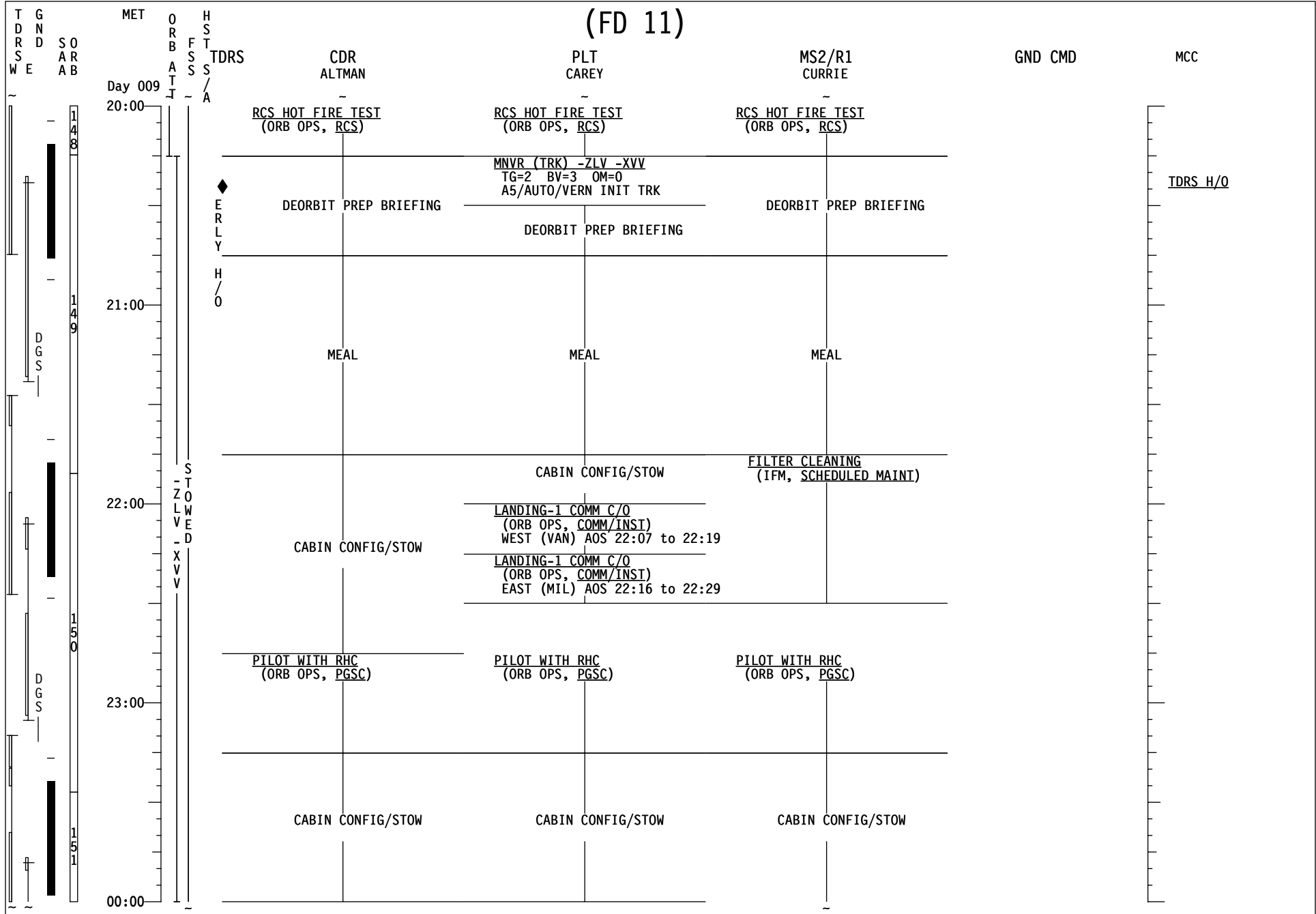
# (FD 11)



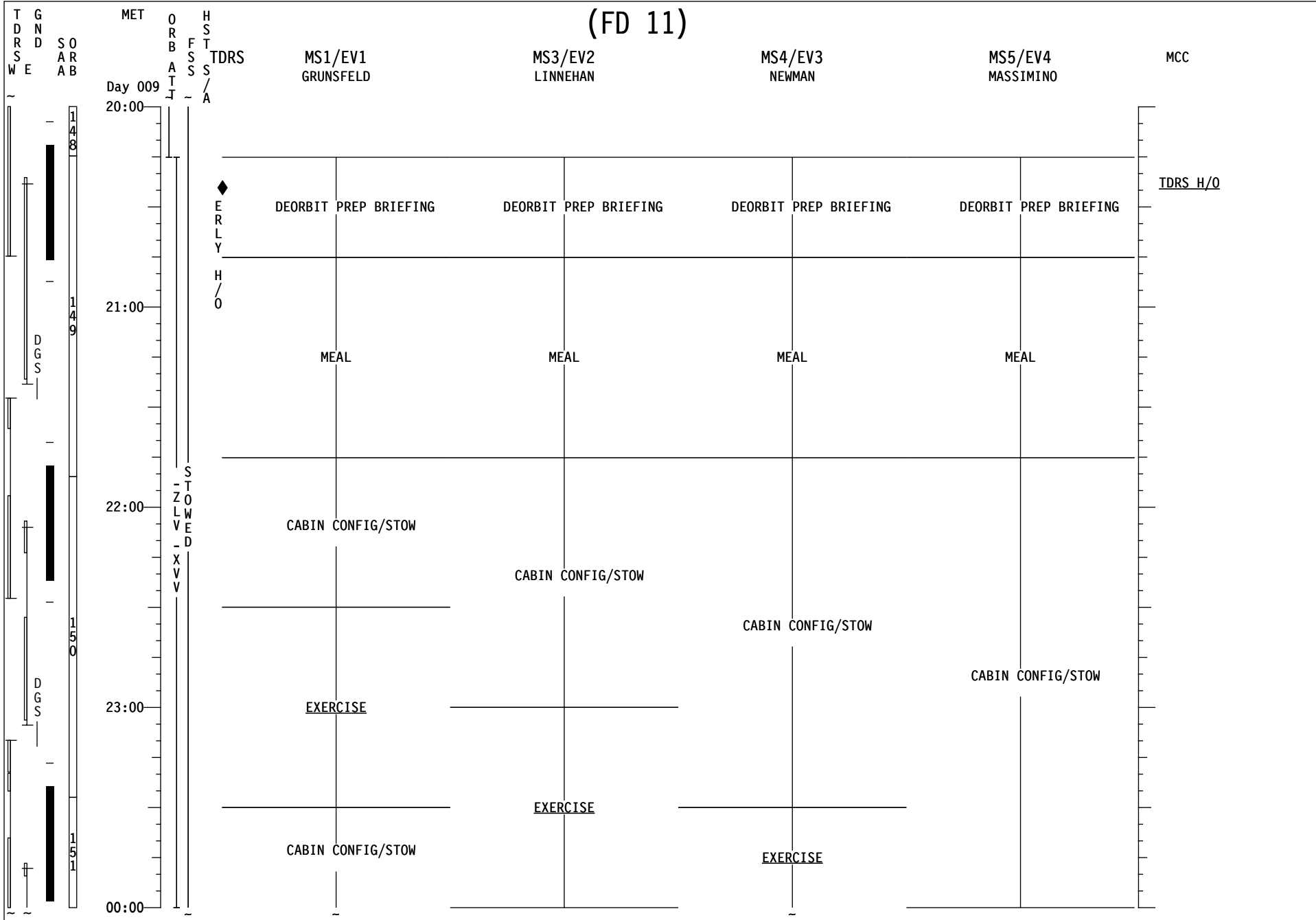
# (FD 11)



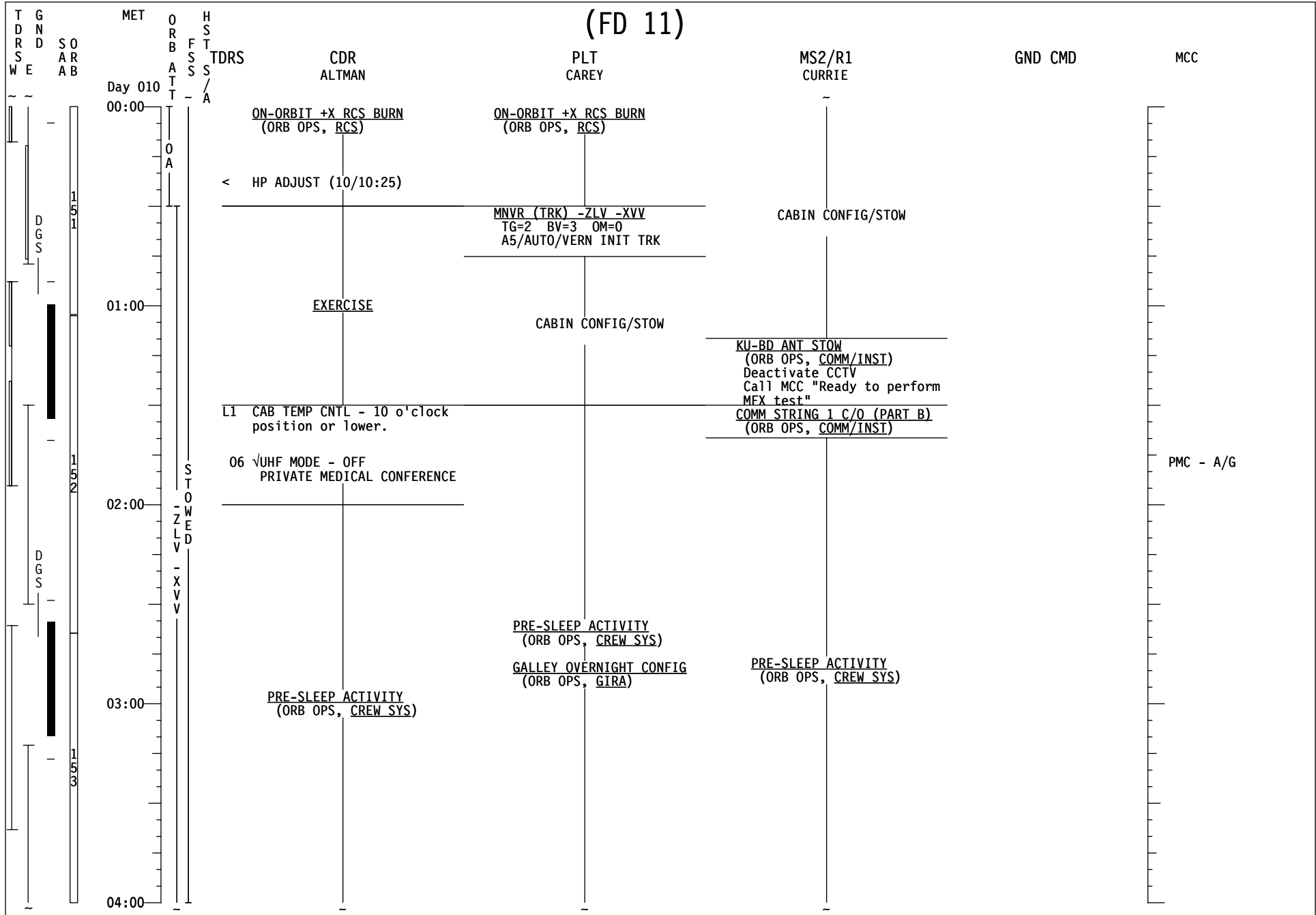
# (FD 11)



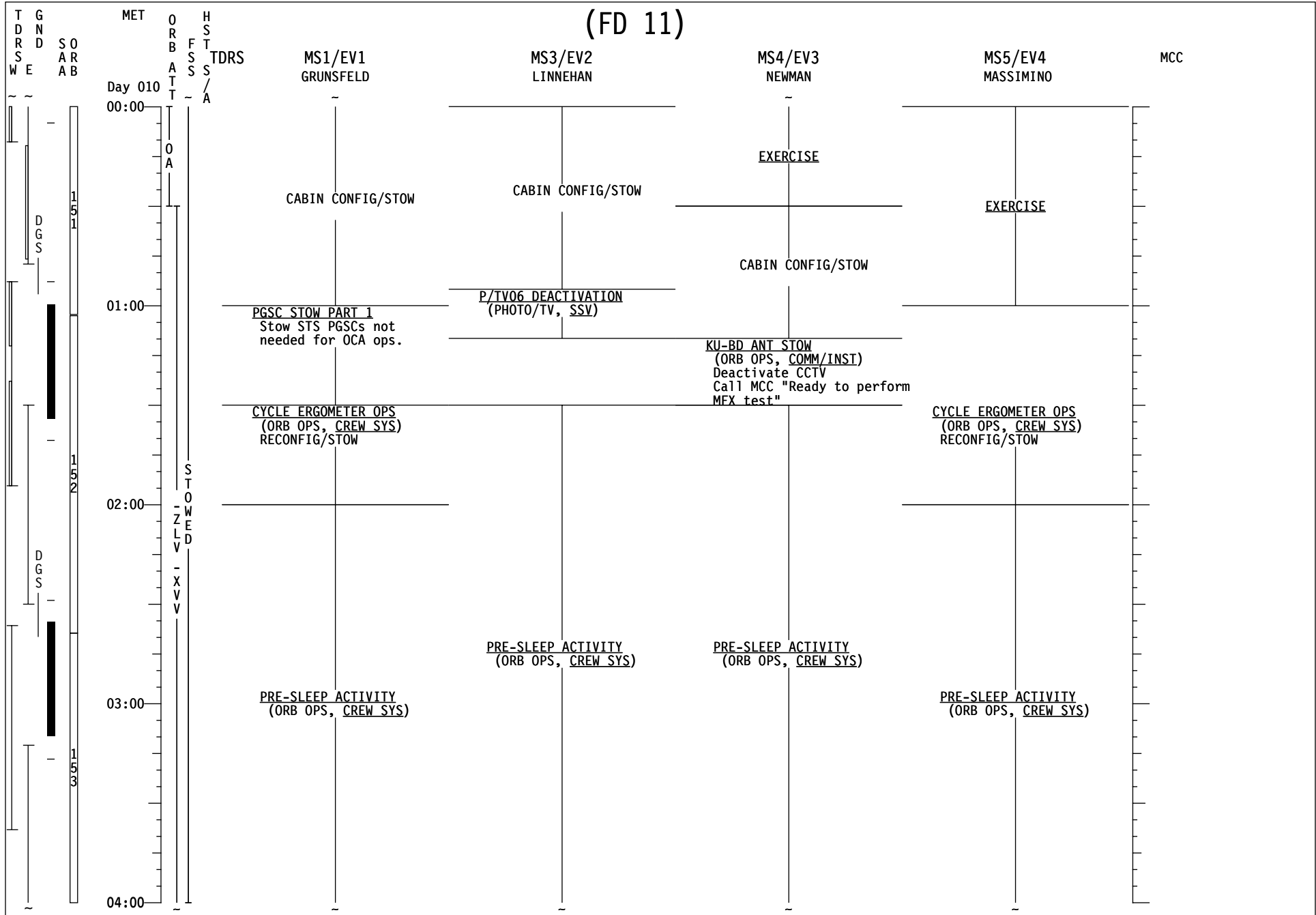
# (FD 11)



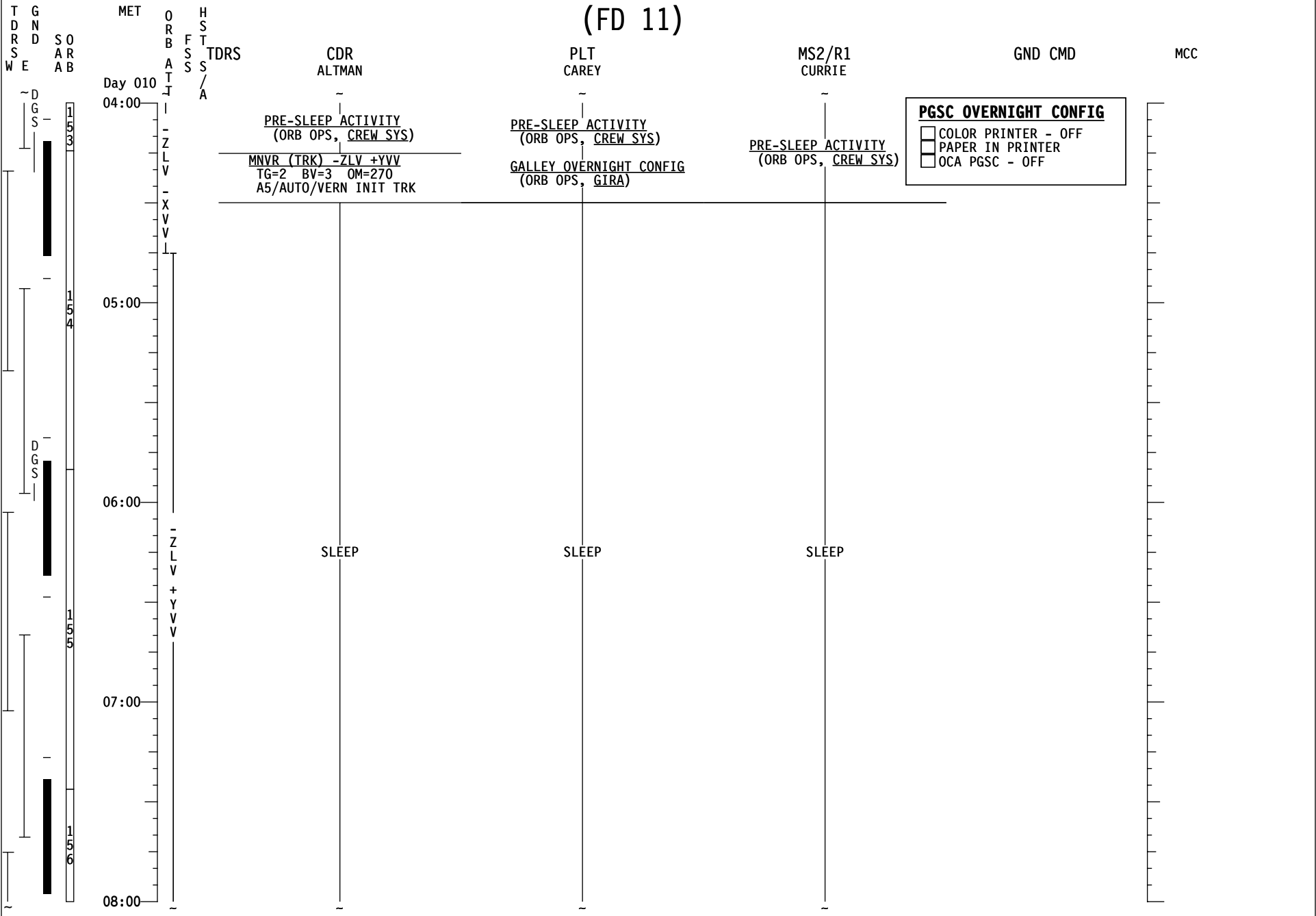
# (FD 11)



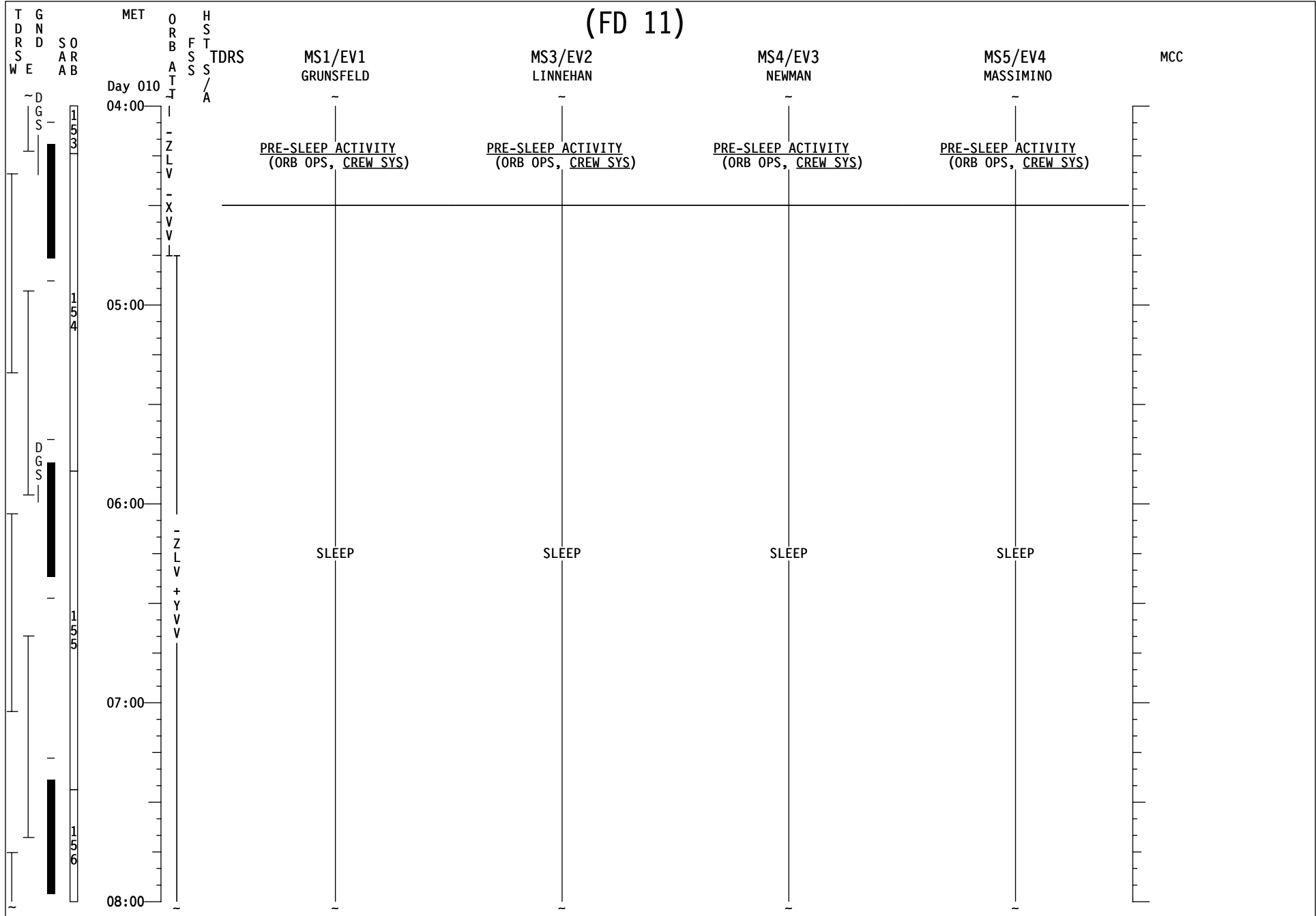
# (FD 11)



# (FD 11)

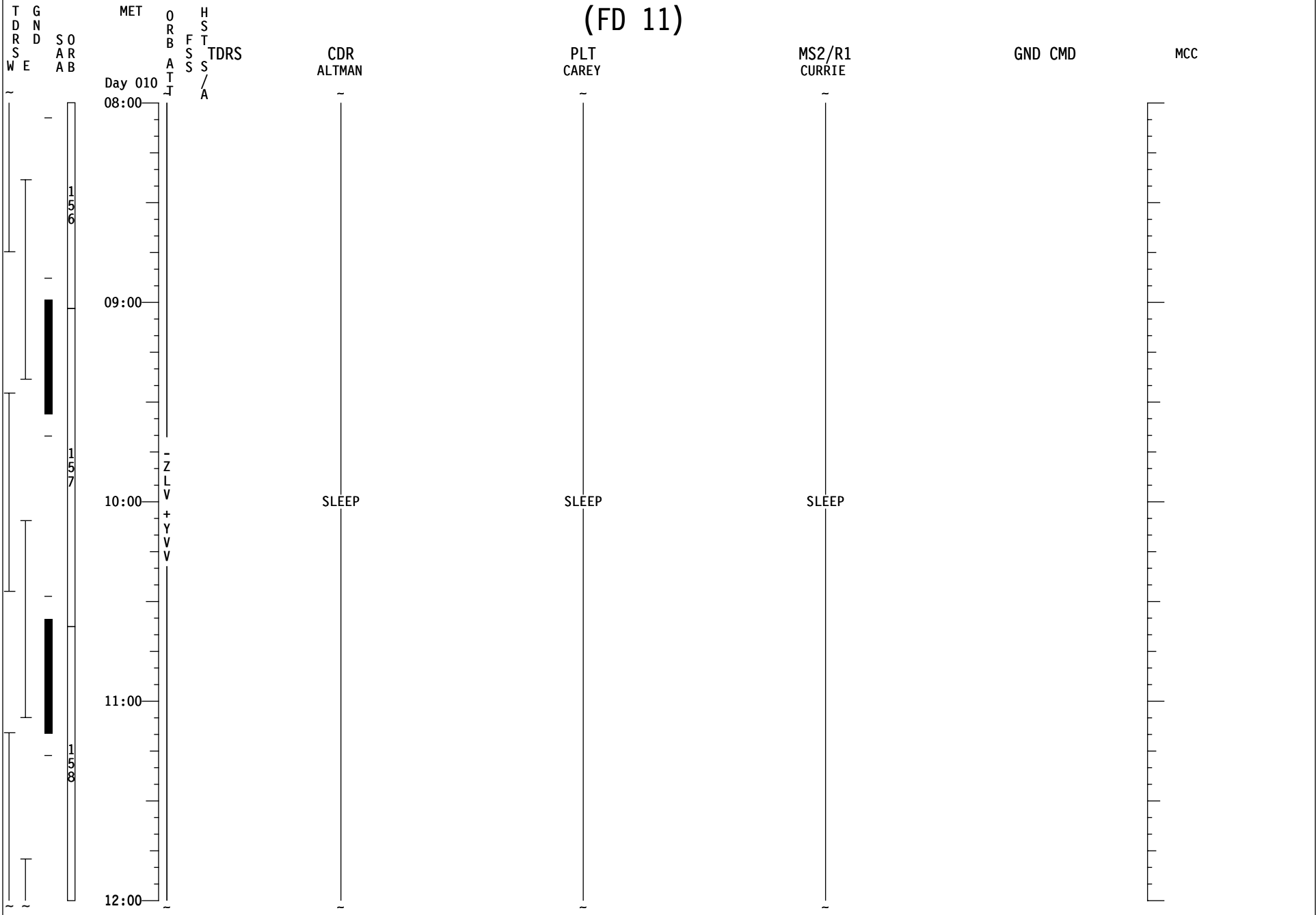


(FD 11)

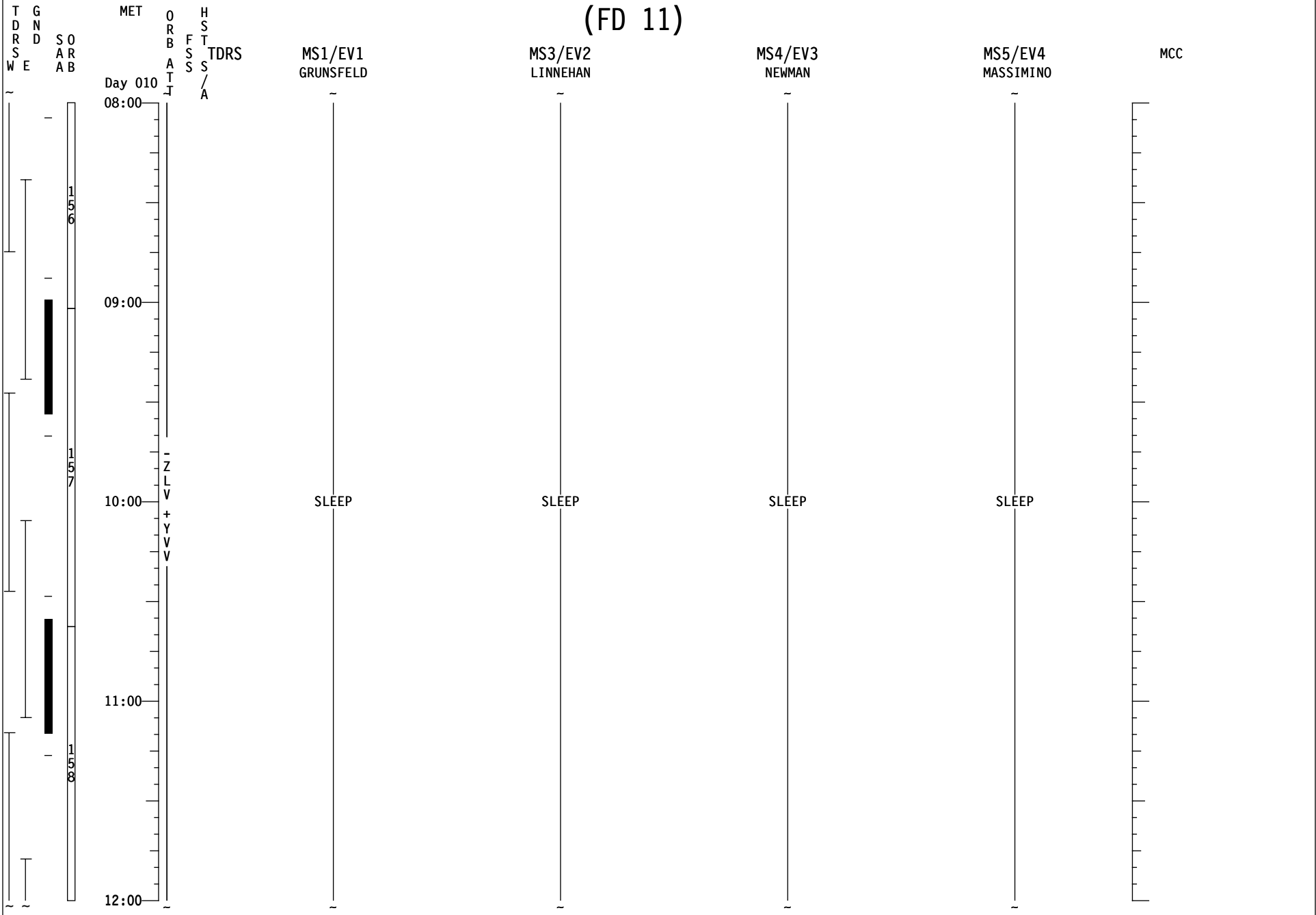




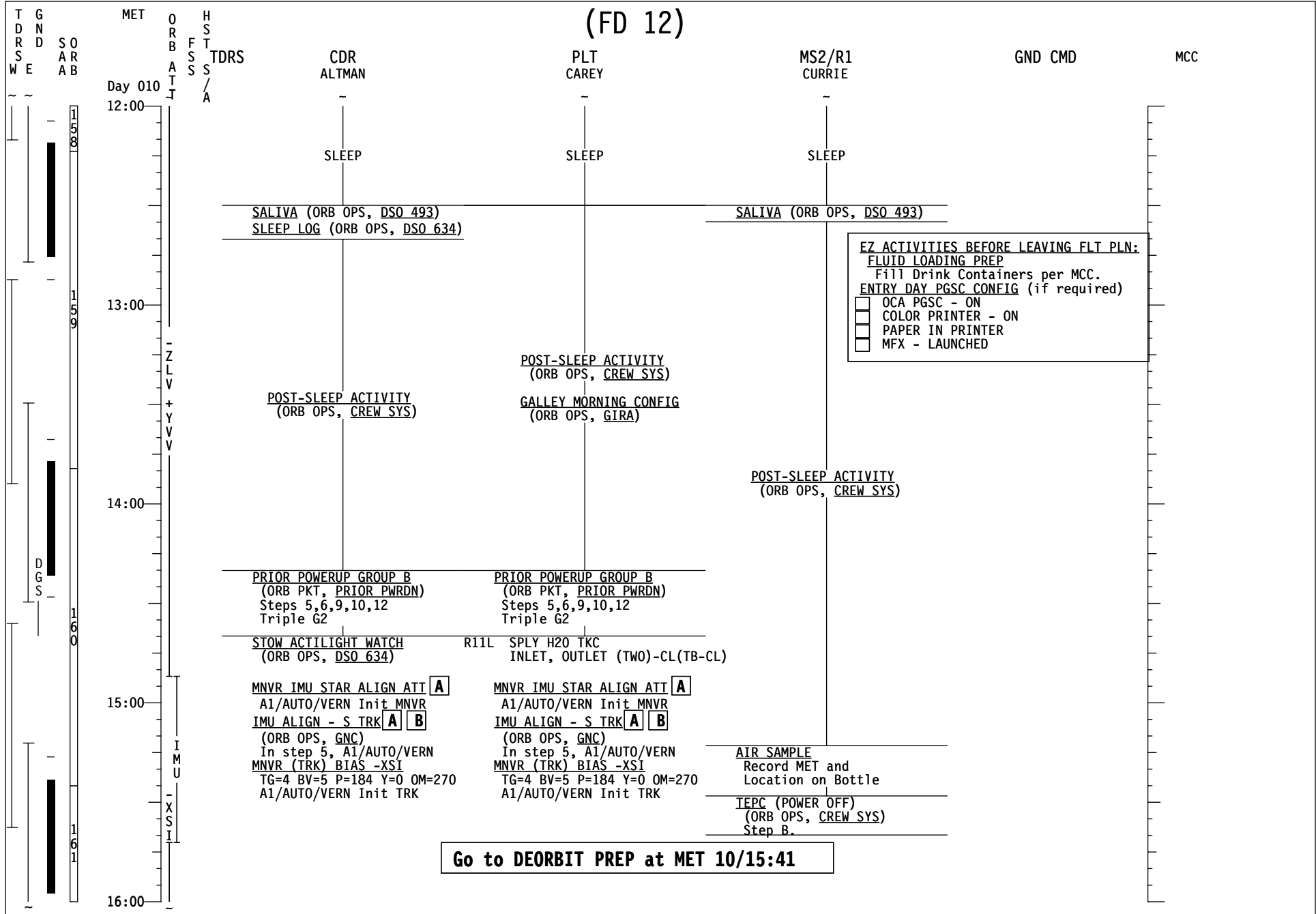
(FD 11)



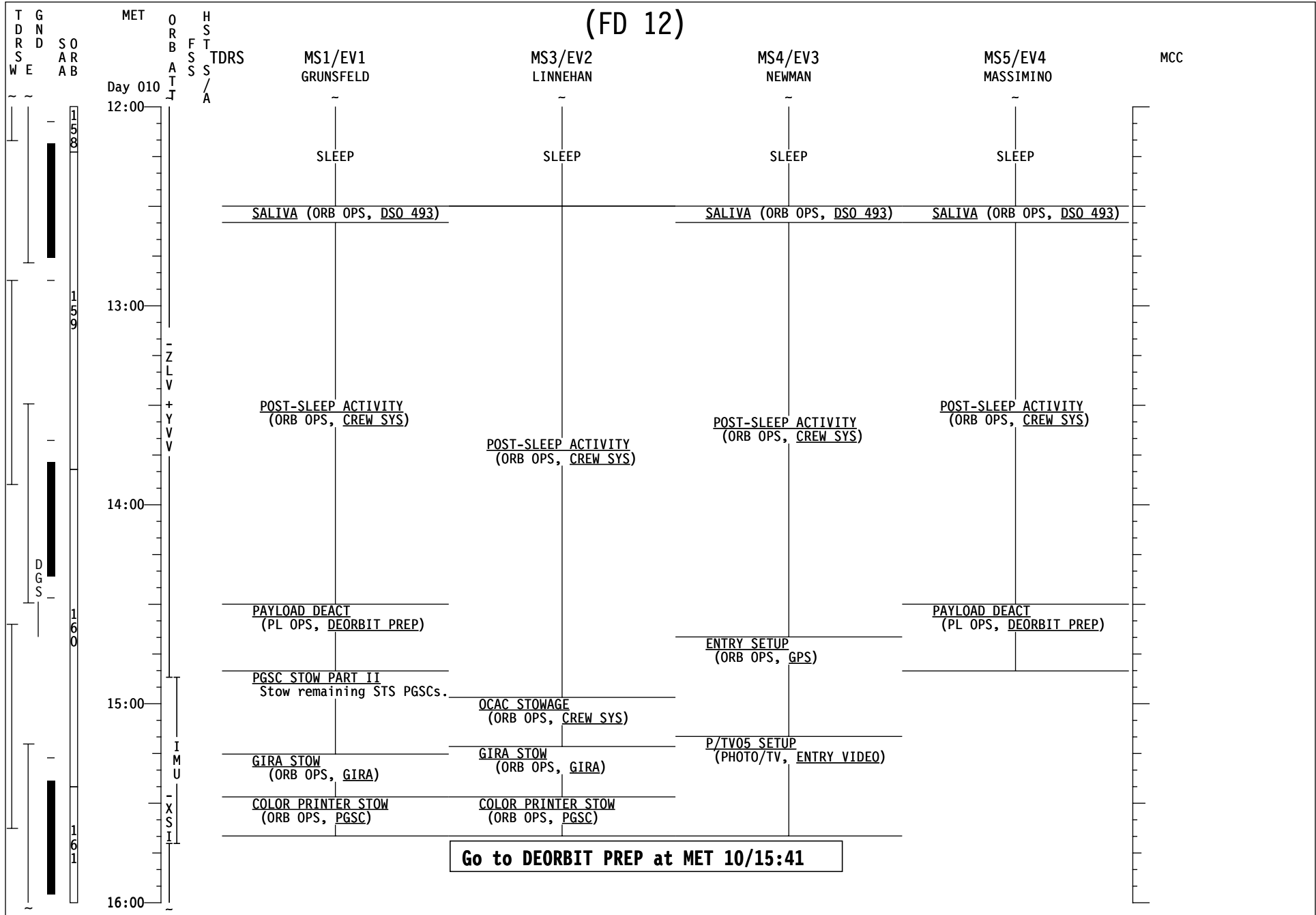
(FD 11)



# (FD 12)



# (FD 12)



# (FD 12)

TDRS  
GND  
SO  
WE AR  
AB

MET

ORBIT  
ATT

HST  
FSS  
/A

TDRS

CDR  
ALTMAN

PLT  
CAREY

MS2/R1  
CURRIE

GND CMD

MCC

Day 010

16:00

17:00

18:00

19:00

20:00

**Go to DEORBIT PREP at MET 10/15:41**

**A IMU STAR ALIGN**

ID: -Y: 40, MIRFAK  
MET 14:53 to 15:57

-Z: 57, ACAMAR  
MET 14:41 to 15:35

ANG DIFF: 90.3

DUAL S TRKR ALIGNMENT	2nd ATTITUDE (SINGLE S TRKR)	
R 127	-Z: 40	-Y: 57
P 186	38	233
Y 52	187	163
	37	49

REQD ID:  
-Y: \_\_, -Z: \_\_, ANG ERR \_\_, \_\_

ANG: 1 2 3  
 $\Delta X$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_  
 $\Delta Y$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_  
 $\Delta Z$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_

EXECUTION TIME: \_\_/\_\_:\_\_ MET

**B IMU STAR VERIFICATION**

ID: -Y: 21, PROCYON  
MET 15:02 to 15:55

-Z: 17, ACRUX  
MET 14:49 to 15:57

ANG DIFF: 86.6

DUAL S TRKR ALIGNMENT	2nd ATTITUDE (SINGLE S TRKR)	
R 185	-Z: 21	-Y: 17
P 205	103	275
Y 346	219	196
	340	13

REQD ID:  
-Y: \_\_, -Z: \_\_, ANG ERR \_\_, \_\_

ANG: 1 2 3  
 $\Delta X$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_  
 $\Delta Y$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_  
 $\Delta Z$  ( ) \_\_, \_\_ ( ) \_\_, \_\_ ( ) \_\_, \_\_

**If any  $\Delta X$ ,  $\Delta Y$ , or  $\Delta Z$  > 0.1 Check MCC**

EXECUTION TIME: \_\_/\_\_:\_\_ MET

# (FD 12)

TDRS  
W E

MET

ORBIT  
ATT

HST  
TDRS  
S/A

MS1/EV1  
GRUNSFELD

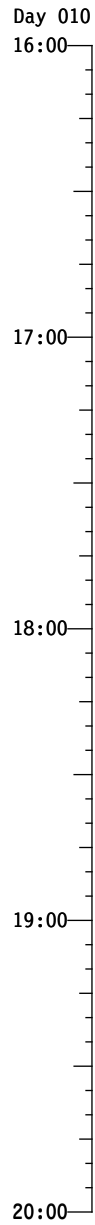
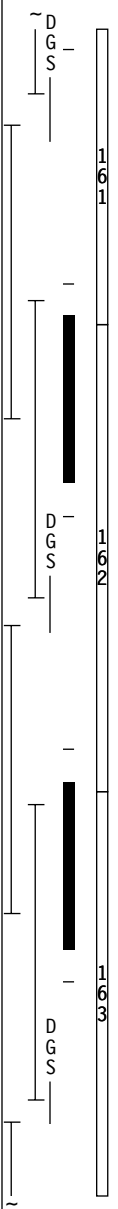
MS3/EV2  
LINNEHAN

MS4/EV3  
NEWMAN

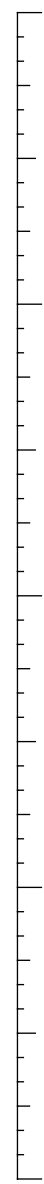
MS5/EV4  
MASSIMINO

MCC

**Go to DEORBIT PREP at MET 10/15:41**



X S I  
C O M M  
D O E N T R Y



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STS-109 DAP TABLE

STS-109  
DAP TABLE



**STS-109  
DAP TABLE**

<u>DAP</u>	<u>PURPOSE</u>
A1	- NOMINAL
A2	- PTC
A3	- GG
A4	- PRE/POST DEPLOY
A5	- AFT PROP SAVINGS (NOSE & TAIL)
A6	- LOSS OF VERN (NOSE & TAIL)
A7	- RNDZ
A8	- TERMINAL PHASE
A9	- PROX OPS
A10	- HST BERTHED
A11	- NOT USED
A12	- NOT USED
A13	- NOT USED
A14	- NOT USED
A15	- HST RMS

<u>DAP</u>	<u>PURPOSE</u>
B1	- NOM OMS & RCS BURNS
B2	- LOSS OF VERN (TAIL ONLY)
B3	- LOSS OF VERN (NOSE & TAIL)
B4	-
B5	- COAS CAL
B6	-
B7	- RNDZ
B8	- TERMINAL PHASE
B9	- FLY AROUND
B10	- NORMAL HST BERTHED
B11	- SLOW HST BERTHED
B12	- SLOW HST RMS
B13	- NOT USED
B14	- VRCS REBOOST
B15	- HST RELEASE

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 →	OM (0-359.99)
MON AXIS	= 1 +X = 2 -X

CNTL ACC = 0	NOMINAL
= 1	HST CAP/RELEASE
= 2	RMS EXT PARK
= 3	RMS HOVER
= 4	HST BERTHED AT 90°
= 5	HST BERTHED AT 85°
= 6	HST BERTHED AT 75°
= 7	HST BERTHED AT 46°

STS-109 GENERIC DAP A CONFIGURATIONS

	ITEM #	A1	A2	A3	A4	A5	A6	A7	A8	A9
<b>PRI</b>										
ROT RATE	10(50)	0.2000	0.4000	0.2000	0.5000	0.2000	0.2000	0.2000	0.0500	<b>0.2000</b>
ATT DB	11(51)	5.00	1.00	0.30	3.00	5.00	5.00	2.00	2.00	1.00
RATE DB	12(52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.10
ROT PLS	13(53)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
COMP	14(54)	.000	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	15(55)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL	TAIL
Y OPTION	16(56)	ALL	ALL	TAIL	ALL	ALL	TAIL	ALL	ALL	TAIL
TRAN PLS	17(57)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.05
<b>ALT</b>										
RATE DB	18(58)	0.200	0.200	0.070	0.200	0.070	0.070	0.100	0.100	0.100
JET OPT	19(59)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL	TAIL
# JETS	20(60)	2	2	1	2	1	1	2	2	2
ON TIME	21(61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22(62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>										
ROT RATE	23(63)	0.2000	0.4000	0.0080	0.2000	0.0500	0.0500	0.0160	0.0500	<b>0.2000</b>
ATT DB	24(64)	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000	1.000
RATE DB	25(65)	.020	.020	.010	.020	.020	.020	.020	.020	.020
ROT PLS	26(66)	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.050	0.050
COMP	27(67)	.000	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	28(68)	0	0	0	0	0	0	0	0	0
PURPOSE		NOMINAL	PTC	GG	PRE/POST DEPLOY	AFT PROP SAVINGS (NOSE & TAIL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE	PROX OPS/ FLY AROUND

Note: **BOLD-ITALIC** indicate a change from the I-load

STS-109 FLT SPECIFIC DAP A CONFIGURATIONS

	ITEM #	A10	A11	A12	A13	A14	A15
<b>PRI</b>							
ROT RATE	10(50)	<b>0.1000</b>					<b>0.1000</b>
ATT DB	11(51)	<b>3.00</b>					5.00
RATE DB	12(52)	0.20					0.20
ROT PLS	13(53)	<b>0.04</b>					<b>0.04</b>
COMP	14(54)	.000					.000
P OPTION	15(55)	ALL					<b>TAIL</b>
Y OPTION	16(56)	ALL					<b>TAIL</b>
TRAN PLS	17(57)	<b>0.05</b>					<b>0.05</b>
<b>ALT</b>							
RATE DB	18(58)	<b>0.100</b>					<b>0.100</b>
JET OPT	19(59)	<b>TAIL</b>					<b>TAIL</b>
# JETS	20(60)	2					2
ON TIME	21(61)	0.08					0.08
DELAY	22(62)	<b>12.30</b>					<b>7.50</b>
<b>VERN</b>							
ROT RATE	23(63)	<b>0.1000</b>					<b>0.1000</b>
ATT DB	24(64)	1.000					<b>2.000</b>
RATE DB	25(65)	.020					<b>.050</b>
ROT PLS	26(66)	<b>0.005</b>					<b>0.005</b>
COMP	27(67)	.000					.000
CNTL ACC	28(68)	<b>4(5,6,7)</b>					<b>1(2,3)</b>
PURPOSE		HST BERTHED					HST RMS

Note: **BOLD-ITALIC** indicate a change from the I-load

STS-109 GENERIC DAP B CONFIGURATIONS

	ITEM #	B1	B2	B3	B4	B5	B6	B7	B8	B9
<b>PRI</b>										
ROT RATE	30(50)	0.5000	0.2000	0.2000	0.2000	0.2000	0.5000	0.5000	0.0500	<b>0.2000</b>
ATT DB	31(51)	3.00	3.00	3.00	0.30	3.00	3.00	2.00	2.00	1.00
RATE DB	32(52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.10
ROT PLS	33(53)	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
COMP	34(54)	.000	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	35(55)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL	TAIL
Y OPTION	36(56)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL	TAIL
TRAN PLS	37(57)	0.10	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.01
<b>ALT</b>										
RATE DB	38(58)	0.200	0.070	0.070	0.100	0.200	0.200	0.100	0.100	0.100
JET OPT	39(59)	ALL	TAIL	ALL	ALL	ALL	ALL	ALL	ALL	TAIL
# JETS	40(60)	2	1	1	2	2	2	2	2	2
ON TIME	41(61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	42(62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>										
ROT RATE	43(63)	0.2000	0.2000	0.2000	0.0080	0.0160	0.2000	0.2000	0.0500	<b>0.2000</b>
ATT DB	44(64)	1.000	1.000	1.000	0.100	0.033	1.000	1.000	1.000	1.000
RATE DB	45(65)	.020	.020	.020	.010	.020	.020	.020	.020	.020
ROT PLS	46(66)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.020	0.020
COMP	47(67)	.000	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	48(68)	0	0	0	0	0	0	0	0	0
PURPOSE		NOM OMS & RCS BURNS	LOSS OF VERN (TAIL ONLY)	LOSS OF VERN (NOSE & TAIL)		COAS CAL		RNDZ	TERMINAL PHASE	FLYAROUND

Note: **BOLD-ITALIC** indicate a change from the I-load

STS-109 DAP B CONFIGURATIONS

	ITEM #	B10	B11	B12	B13	B14	B15
<b>PRI</b>							
ROT RATE	30(50)	<b>0.1000</b>	<b>0.0500</b>	<b>0.0500</b>		<b>0.1000</b>	<b>0.0500</b>
ATT DB	31(51)	<b>5.00</b>	<b>10.00</b>	<b>5.00</b>		<b>10.00</b>	<b>2.00</b>
RATE DB	32(52)	0.20	0.20	0.20		0.20	0.20
ROT PLS	33(53)	0.04	0.04	0.04		0.04	0.04
COMP	34(54)	.000	.000	.000		.000	.000
P OPTION	35(55)	<b>TAIL</b>	<b>TAIL</b>	<b>TAIL</b>		<b>TAIL</b>	<b>TAIL</b>
Y OPTION	36(56)	<b>TAIL</b>	<b>TAIL</b>	<b>TAIL</b>		<b>TAIL</b>	<b>TAIL</b>
TRAN PLS	37(57)	<b>0.01</b>	<b>0.05</b>	<b>0.05</b>		<b>0.01</b>	<b>0.01</b>
<b>ALT</b>							
RATE DB	38(58)	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>		<b>0.070</b>	<b>0.100</b>
JET OPT	39(59)	<b>TAIL</b>	<b>TAIL</b>	<b>TAIL</b>		<b>TAIL</b>	<b>TAIL</b>
# JETS	40(60)	2	2	2		2	2
ON TIME	41(61)	0.08	0.08	0.08		0.08	0.08
DELAY	42(62)	<b>12.30</b>	<b>12.30</b>	<b>7.50</b>		<b>12.30</b>	<b>7.50</b>
<b>VERN</b>							
ROT RATE	43(63)	0.2000	<b>0.0160</b>	<b>0.0400</b>		<b>0.1000</b>	<b>0.0240</b>
ATT DB	44(64)	<b>3.000</b>	1.000	<b>2.000</b>		<b>5.000</b>	<b>0.500</b>
RATE DB	45(65)	.020	.020	<b>.050</b>		<b>.400</b>	<b>.030</b>
ROT PLS	46(66)	<b>0.005</b>	<b>0.005</b>	<b>0.005</b>		<b>0.040</b>	<b>0.005</b>
COMP	47(67)	.000	.000	.000		.000	.000
CNTL ACC	48(68)	<b>4(5,6,7)</b>	<b>4(5,6,7)</b>	<b>1(2,3)</b>		<b>4(7)</b>	<b>1</b>
PURPOSE		NORMAL HST BERTHED	SLOW HST BERTHED	SLOW HST RMS		VRCS REBOOST/ ORBIT CONJUC	HST RELEASE

Note: **BOLD-ITALIC** indicate a change from I-load or prior flight DAP configuration

The sections following this divider page will not be included in flight copies.

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ATTITUDE TIMELINE



Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
1 000/00:45:00 M  059/12:33:14 G	INRTL R = 301.00 MNVR P = 167.00 Y = 23.00  MNVR A1/AUTO/PRI HOLD (same)	RATE 0.2000 DB AT 5.00 DB RT 0.20  SUN R 232 P 159 $\beta = -16$		OMS 2  TIG 00/00:45:00
2 000/01:12:00 M 22:00  059/13:00:14 G 10:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR A5/AUTO/ALT HOLD (same)	RATE 0.2000 DB AT 5.00 DB RT 0.070  EARTH R 0 P 90 $\beta = -16$	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YVV PLBD Open Att Stars
3 000/04:26:00 M 35:07  059/16:14:14 G 23:21	INRTL R = 59.00 MNVR P = 347.00 Y = 337.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 308 P 21 $\beta = -15$		NC-1(A)  TIG 00/04:41:00
4 000/05:13:00 M 27:56  059/17:01:14 G 16:10	INRTL R = 301.00 MNVR P = 167.00 Y = 24.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 229 P 159 $\beta = -15$		NC-1(B)  TIG 00/05:28:00
5 000/05:35:00 M 06:35:00  059/17:23:14 G 18:23:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = -15$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV Crew Sleep
6 000/18:18:00 M  060/06:06:14 G				NC-2 Multi-axis  TIG 00/18:18:00
7 000/22:40:00 M  060/10:28:14 G				NPC Multi-axis  TIG 00/22:40:00
8 001/03:26:00 M 40:59  060/15:14:14 G 29:13	INRTL R = 303.00 MNVR P = 165.00 Y = 31.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 211 P 155 $\beta = -11$		NC-3/NH  TIG 01/03:41:00
9 001/03:45:00 M 04:44:55  060/15:33:14 G 16:33:09	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = -11$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV Crew Sleep
10 001/14:45:00 M 15:15:00  061/02:33:14 G 03:03:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = -10$	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YVV H2O Dump stars

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
11 001/17:33:00 M 41:13  061/05:21:14 G 29:27	INRTL R = 133.00 MNVR P = 220.00 Y = 313.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 169 P 109 $\beta = -9$		NC-4  TIG 01/17:48:00
12 001/17:48:00 M 50:40  061/05:36:14 G 38:54	LVLH TRACK TGT = 2 P = 0.00 BV = 1 Y = 0.00 OM = 0.00  MNVR B7/AUTO/ALT HOLD (same)	RATE 0.5000 DB AT 2.00 DB RT 0.100  EARTH R 238 P 0 $\beta = -9$	LVLH R= 0.00 P=270.00 Y= 0.00	S TRK NAV PASS LVLH Equiv
13 001/18:03:00 M 17:49  061/05:51:14 G 06:06:03	LVLH TRACK TGT = 2 P = 352.00 BV = 5 Y = 0.00 OM = 0.00  MNVR B7/AUTO/ALT HOLD (same)	RATE 0.0090 DB AT 2.00 DB RT 0.100  EARTH R 180 P 8 $\beta = -9$	LVLH R= 0.00 P=278.00 Y= 0.00	S TRK NAV PASS LVLH Equiv
14 001/19:09:00 M 10:19  061/06:57:14 G 58:33	INRTL R = 205.00 MNVR P = 67.00 Y = 59.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 10 P 90 $\beta = -9$		Ti  TIG 01/19:24:00
15 001/19:25:00 M 31:59  061/07:13:14 G 20:13	LVLH TRACK TGT = 2 P = 0.00 BV = 1 Y = 0.00 OM = 0.00  MNVR A7/AUTO/ALT HOLD (same)	RATE 0.2000 DB AT 2.00 DB RT 0.100  EARTH R 128 P 0 $\beta = -9$	LVLH R= 0.00 P=270.00 Y= 0.00	LVLH Equiv
16 001/19:36:00 M 56:22  061/07:24:14 G 44:36	LVLH TRACK TGT = 2 P = 349.00 BV = 5 Y = 0.00 OM = 0.00  MNVR A7/AUTO/ALT HOLD (same)	RATE 0.0090 DB AT 2.00 DB RT 0.100  EARTH R 180 P 11 $\beta = -9$	LVLH R= 0.00 P=281.00 Y= 0.00	LVLH Equiv
17 001/19:57:00 M 20:48:35  061/07:45:14 G 08:36:49	LVLH TRACK TGT = 2 P = 284.00 BV = 5 Y = 0.00 OM = 0.00  MNVR A7/AUTO/ALT HOLD (same)	RATE 0.0210 DB AT 2.00 DB RT 0.100  EARTH R 180 P 76 $\beta = -9$	LVLH R= 0.00 P=346.00 Y= 0.00	LVLH Equiv
18 001/20:44:00 M   061/08:32:14 G				MC-4  1/20:44:00
19 001/20:48:40 M 57:19  061/08:36:54 G 45:33	LVLH TRACK TGT = 2 P = 270.00 BV = 5 Y = 0.00 OM = 0.00  MNVR A7/AUTO/ALT HOLD (same)	RATE 0.0270 DB AT 2.00 DB RT 0.100  EARTH R 180 P 90 $\beta = -9$	LVLH R= 0.00 P= 0.00 Y= 0.00	RBAR Crossing  1/20:57:00
20 001/21:33:00 M   061/09:21:14 G		RATE 0.0500 DB AT 1.000 DB RT 0.020  SUN R 158 P 155 $\beta = -8$	INRTL R=118.04 HOLD P=190.73 Y=352.45	INERTIAL for Grapple

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
21 001/21:37:00 M  061/09:25:14 G				HST GRAPPLE @ SS +3 min
22 001/22:45:00 M 23:08:15  061/10:33:14 G 56:29	INRTL R = 257.00 MNVR P = 187.00 Y = 13.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 3 P 176 $\beta$ = -8		BIAS -XSI  Battery Charge
23 002/01:25:00 M 41:46  061/13:13:14 G 30:00	TGT= 4 BV = 5 P = 75.00 Y = 0.00 OM = 220.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 0 P 75 $\beta$ = -8	INRTL R=191.98 P=105.97 Y=283.22  RA= 342.522 DEC= -7.419S	BIAS -ZSI  SA-II Retraction
24 002/03:45:00 M 04:11:39  061/15:33:14 G 59:53	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta$ = -8	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XV  Crew Sleep
25 003/01:45:00 M 56:01  062/13:33:14 G 44:15	INRTL R = 120.00 MNVR P = 185.00 Y = 21.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 356 P 175 $\beta$ = -4		BIAS -XSI  Battery Charge
26 003/04:00:00 M 06:34:35  062/15:48:14 G 18:22:49	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta$ = -4	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XV  Crew Sleep
27 004/02:00:00 M 19:20  063/13:48:14 G 14:07:34	INRTL R = 118.00 MNVR P = 184.00 Y = 20.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 4 P 175 $\beta$ = 0		BIAS -XSI  Battery Charge
28 004/04:05:00 M 29:45  063/15:53:14 G 16:17:59	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta$ = 0	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YV  H2O Dump
29 004/06:15:00 M 07:48:45  063/18:03:14 G 19:36:59	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta$ = 0	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XV  Crew Sleep
30 005/02:20:00 M 49:06  064/14:08:14 G 37:20	INRTL R = 194.00 MNVR P = 181.00 Y = 13.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 3 P 174 $\beta$ = 3		BIAS -XSI  Battery Charge

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
31 005/06:13:00 M 07:30:52  064/18:01:14 G 19:19:06	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 335.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 3$	LVLH R= 0.00 P=180.00 Y= 25.00	BIAS -ZLV -XVV RGA F/T
32 005/18:00:00 M 06:27  065/05:48:14 G 54:41	INRTL R = 249.00 MNVR P = 355.00 Y = 301.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 186 P 46 $\beta = 5$		BIAS +XSI  Sunset Protect (ACS Task)
33 005/18:30:00 M 51:55  065/06:18:14 G 40:09	LVLH TRACK TGT = 2 P = 145.00 BV = 5 Y = 0.00 OM = 347.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 145 $\beta = 5$	LVLH R= 10.71 P=124.30 Y= 7.41	BIAS -ZLV -XVV Sunrise Protect
34 005/19:31:00 M 07  065/07:19:14 G 21	INRTL R = 249.00 MNVR P = 355.00 Y = 301.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 186 P 46 $\beta = 5$		BIAS +XSI  Sunset Protect
35 005/20:05:00 M 26:13  065/07:53:14 G 08:14:27	LVLH TRACK TGT = 2 P = 145.00 BV = 5 Y = 0.00 OM = 347.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 145 $\beta = 5$	LVLH R= 10.71 P=124.30 Y= 7.41	BIAS -ZLV -XVV Sunrise Protect
36 005/21:07:00 M 07  065/08:55:14 G 21	INRTL R = 249.00 MNVR P = 355.00 Y = 301.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 186 P 46 $\beta = 6$		BIAS +XSI  Sunset Protect
37 005/21:45:00 M 22:08:39  065/09:33:14 G 56:53	LVLH TRACK TGT = 2 P = 145.00 BV = 5 Y = 0.00 OM = 347.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 145 $\beta = 6$	LVLH R= 10.71 P=124.30 Y= 7.41	BIAS -ZLV -XVV Sunrise Protect
38 005/22:44:00 M 30  065/10:32:14 G 44	INRTL R = 249.00 MNVR P = 355.00 Y = 301.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 186 P 46 $\beta = 6$		BIAS +XSI  Sunset Protect (ESM Task)
39 005/23:20:00 M 42:58  065/11:08:14 G 31:12	LVLH TRACK TGT = 2 P = 145.00 BV = 5 Y = 0.00 OM = 347.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 145 $\beta = 6$	LVLH R= 10.71 P=124.30 Y= 7.41	BIAS -ZLV -XVV Sunrise Protect
40 006/00:20:00 M 26  065/12:08:14 G 40	INRTL R = 249.00 MNVR P = 355.00 Y = 301.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 186 P 46 $\beta = 6$		BIAS +XSI  Sunset Protect

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
41 006/01:00:00 M 03:12:22  065/12:48:14 G 15:00:36	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 6$	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YVV H2O Dump
42 006/05:20:00 M 06:53:45  065/17:08:14 G 18:41:59	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 7$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV Crew Sleep
43 006/17:25:00 M 54:19  066/05:13:14 G 42:33	INRTL R = 252.00 MNVR P = 2.00 Y = 302.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 193 P 45 $\beta = 9$		BIAS +XSI  Sunset Protect (NCS Task)
44 006/18:30:00 M 48:48  066/06:18:14 G 37:02	LVLH TRACK TGT = 2 P = 135.00 BV = 5 Y = 0.00 OM = 349.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 135 $\beta = 9$	LVLH R= 7.83 P=134.47 Y= 7.75	BIAS -ZLV -XVV  Sunrise Protect
45 006/19:36:00 M 06  066/07:24:14 G 20	INRTL R = 252.00 MNVR P = 2.00 Y = 302.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 193 P 45 $\beta = 9$		BIAS +XSI  Sunset Protect
46 006/20:10:00 M 31:14  066/07:58:14 G 08:19:28	LVLH TRACK TGT = 2 P = 135.00 BV = 5 Y = 0.00 OM = 349.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 135 $\beta = 9$	LVLH R= 7.83 P=134.47 Y= 7.75	BIAS -ZLV -XVV  Sunrise Protect
47 006/21:12:00 M 08  066/09:00:14 G 22	INRTL R = 252.00 MNVR P = 2.00 Y = 302.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 193 P 45 $\beta = 9$		BIAS +XSI  Sunset Protect
48 006/21:45:00 M 22:05:32  066/09:33:14 G 53:46	LVLH TRACK TGT = 2 P = 135.00 BV = 5 Y = 0.00 OM = 349.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 135 $\beta = 9$	LVLH R= 7.83 P=134.47 Y= 7.75	BIAS -ZLV -XVV  Sunrise Protect
49 006/22:48:00 M 12  066/10:36:14 G 26	INRTL R = 252.00 MNVR P = 2.00 Y = 302.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 193 P 45 $\beta = 9$		BIAS +XSI  Sunset Protect
50 006/23:20:00 M 39:51  066/11:08:14 G 28:05	LVLH TRACK TGT = 2 P = 135.00 BV = 5 Y = 0.00 OM = 349.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 135 $\beta = 9$	LVLH R= 7.83 P=134.47 Y= 7.75	BIAS -ZLV -XVV  Sunrise Protect

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
51 007/00:24:00 M 16  066/12:12:14 G 30	INRTL R = 252.00 MNVR P = 2.00 Y = 302.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 193 P 45 $\beta = 10$		BIAS +XSI  Sunset Protect
52 007/00:55:00 M 02:08:32  066/12:43:14 G 13:56:46	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR B11/AUTO/VERN HOLD (same)	RATE 0.0160 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 10$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV Crew Sleep
53 007/18:00:00 M 21:33  067/05:48:14 G 06:09:47	INRTL R = 205.00 MNVR P = 181.00 Y = 10.00  MNVR A10/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 1.000 DB RT 0.020  SUN R 2 P 175 $\beta = 12$		BIAS -XSI Battery Charge
54 007/20:55:00 M 21:04:11  067/08:43:14 G 52:25	TGT= 4 BV = 5 P = 180.00 Y = 55.00 OM = 270.00  MNVR A15/AUTO/VERN HOLD (same)	RATE 0.1000 DB AT 2.000 DB RT 0.050  SUN R 90 P 125 $\beta = 12$	INRTL R=207.23 P=207.83 Y=321.20  RA= 347.929 DEC= -5.180S	RELEASE ATT
55 007/22:27:00 M   067/10:15:14 G				HST RELEASE @ Noon - 22 min
56 007/22:28:00 M   067/10:16:14 G				SEP 1
57 007/22:42:00 M 50:28  067/10:30:14 G 38:42	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A7/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 13$	LVLH R= 0.00 P=180.00 Y= 0.00	TGT TRACK
58 007/23:01:00 M   067/10:49:14 G				SEP2 RCS -X Retro  TIG 07/23:01:00
59 008/00:10:00 M   067/11:58:14 G	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 13$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV
60 008/14:30:00 M 15:00:00  068/02:18:14 G 48:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 15$	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YVV H2O Dump

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
61 008/17:00:00 M 30:00  068/04:48:14 G 05:18:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 15$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV
62 008/22:57:00 M 23:05:10  068/10:45:14 G 53:24	INRTL R = 157.00 MNVR P = 198.00 Y = 340.00  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 137 P 146 $\beta = 16$	Pair -Z: 85; -Y: 31 Pair AOS: 23:05 Pair LOS: 23:54	IMU ALIGN
63 008/23:25:00 M 41  068/11:13:14 G 55	INRTL R = 156.77 MNVR P = 198.63 Y = 331.87  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 134 P 139 $\beta = 16$	Star 20 AOS: 8/23:22 LOS: 9/00:16	HUD CAL
64 008/23:55:00 M 009/00:23:34  068/11:43:14 G 12:11:48	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 16$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV
65 009/17:00:00 M 11:48  069/04:48:14 G 05:00:02	INRTL R = 150.00 MNVR P = 230.00 Y = 53.00  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 242 P 124 $\beta = 18$		Crew Conference FCS Checkout RCS Hotfire
66 009/20:15:00 M 59:24  069/08:03:14 G 47:38	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 18$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV
67 010/00:10:00 M 13:40  069/11:58:14 G 12:01:54	INRTL R = 108.00 MNVR P = 219.00 Y = 313.00  MNVR B1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 200 P 115 $\beta = 18$		OA Burn
68 010/00:30:00 M 40:22  069/12:18:14 G 28:36	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 0.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 18$	LVLH R= 0.00 P=180.00 Y= 0.00	-ZLV -XVV
69 010/04:45:00 M 05:15:00  069/16:33:14 G 17:03:14	LVLH TRACK TGT = 2 P = 90.00 BV = 3 Y = 0.00 OM = 270.00  MNVR A5/AUTO/VERN HOLD (same)	RATE 0.0500 DB AT 1.000 DB RT 0.020  EARTH R 0 P 90 $\beta = 19$	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV +YVV EOM Thermal
70 010/14:43:00 M 53:51  070/02:31:14 G 42:05	INRTL R = 127.00 MNVR P = 186.00 Y = 52.00  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 320 P 137 $\beta = 20$	-Y: 40 -Z: 57	IMU Align 10/14:53-15:35

ALL ORBITER DATA IN  
MEAN OF 1950 AND PYR EULER SEQUENCE

Attitude Timeline

MET/GMT	ORBITER		REF ATT/REMARKS	EVENT
	MNVR OPTION	DAP E/S/ $\beta$		
71 010/15:10:00 M 17:38  070/02:58:14 G 03:05:52	INRTL R = 185.00 MNVR P = 205.00 Y = 346.00  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 127 P 149 $\beta$ = 20	-Y: 21 -Z: 17	IMU Verif 10/15:02-15:55
72 010/15:38:00 M 40:35  070/03:26:14 G 28:49	TGT= 4 BV = 5 P = 184.00 Y = 0.00 OM = 270.00  MNVR A1/AUTO/VERN HOLD (same)	RATE 0.2000 DB AT 1.000 DB RT 0.020  SUN R 180 P 176 $\beta$ = 20	INRTL R=193.75 P=188.09 Y= 10.45  RA= 350.496 DEC= -4.094S	-XSI Coldsoak
73 010/17:16:00 M 25:04  070/05:04:14 G 13:18	INRTL R = 94.00 MNVR P = 154.00 Y = 8.00  MNVR A1/AUTO/PRI HOLD (same)	RATE 0.2000 DB AT 5.00 DB RT 0.20  SUN R 91 P 150 $\beta$ = 20		COMM Attitude
74 010/19:30:00 M 37:56  070/07:18:14 G 26:10	INRTL R = 113.50 MNVR P = 229.00 Y = 294.00  MNVR A1/AUTO/PRI HOLD (same)	RATE 0.2000 DB AT 5.00 DB RT 0.20  SUN R 201 P 98 $\beta$ = 20		D/O Burn  TIG 010/19:41



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FLIGHT PLAN NOTES

FLIGHT PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

Orbiter: OV102/Columbia  
 Launch Window: 66 min  
 Inclination: 28.45°  
 Rendezvous Altitude: 315 nm  
 Duration: 11 + 2 days

B. MAJOR EVENTS

FLIGHT PLAN  
NOTES

<u>EVENT</u>	<u>MET</u>	<u>DATE</u>	<u>CST</u>	<u>GMT</u>
Launch	00/00:00	02/28/02	05:48	11:48
OMS2	00/00:45	02/28/02	06:33	12:33
NC1A	00/05:25	02/28/02	10:29	16:29
NC1B	00/05:28	02/28/02	11:16	17:16
NC2	00/18:18	02/28/02	00:06	06:06
NPC	00/22:40	03/01/02	04:28	10:28
NH/NC3	01/03:41	03/01/02	09:29	15:29
NC4	01/17:48	03/01/02	23:36	05:36
Ti	01/19:24	03/02/02	01:12	07:12
HST Grapple	01/21:37	03/02/02	03:25	09:25
EVA-1 Start	02/19:00	03/03/02	00:48	06:48
EVA-2 Start	03/19:00	03/04/02	00:48	06:48
EVA-3 Start	04/18:00	03/04/02	23:48	05:48
EVA-4 Start	05/19:00	03/06/02	00:48	06:48
EVA-5 Start	06/19:00	03/07/02	00:48	06:48
HST Release	07/22:27	03/08/02	04:15	10:15
HP Adjust	10/00:25	03/10/02	06:13	12:13
Deorbit	10/19:41	03/11/02	01:29	07:29
Landing	10/20:52	03/11/02	02:40	08:40

C. LANDING OPPORTUNITIES

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>CST</u>	<u>MET</u>
Nominal	Primary	163	KSC	01:29	10/19:41
	1 Rev Late	164	KSC	03:11	10/21:23
1 Day Late	Primary	178	KSC	01:28	11/19:40
	1 Rev Late	179	KSC	03:09	11/21:21

D. CREW

Cdr – Scott Altman  
 Plt – Duane Carey  
 MS1 – John Grusfeld  
 MS2 – Nancy Currie  
 MS3 – Richard Linneman  
 MS4 – James Newman  
 MS5 – Michael Massimino

## E. COMMUNICATIONS

The Summary Timeline contains several data bands for ground site and TDRS events. The TDRS band reflects the three TDRS satellites that will be used for orbiter coverage (East, West, and Z) and their longitudinal position. The data shown contain Ku-band coverage (unshaded bars) as well as the TDRS SHO schedule (solid bars). The SHO schedule depicts early handovers and Z satellite coverage.

### Shuttle

TDRS Support: East (47°), West (171°), Z (-275°)

Ground Sites (\*): MIL, WLP, and DFR

Contingency RTS: DGS, GTS, HTS, OTS, CTS, VTS, and NHS

### \*UHF Capability

Lead time for site callup: 2 hr for GSTDN; 4 hr for RTS

## F. IMU ALIGNS

Routine IMU aligns are expected to occur every 72 hr. If stars of opportunity are not available in the flown attitude, the orbiter will be required to maneuver to an IMU attitude for alignment or will use the Uplinkable Star capability for IMU alignment.

## G. PAYLOADS

Off duty periods for the crew are scheduled for Flight Day 10 (~7.0 hr).

## H. PAYLOADS

The primary objective of this flight is to perform the operations necessary to fulfill the on-orbit servicing of the Hubble Space Telescope Servicing Mission 3A (HST SM3B). The primary servicing task is to replace the Solar Array 2 (SA2) with the Solar Array 3 (SA3). Other tasks are to replace the Reaction Wheel Assembly (RWA) and Power Control Unit (PCU); remove the Faint Object Camera (FOC) and install the Advanced Camera for Surveys (ACS); install the NICMOS Cooling System (NCS); and install New Outer Blanket Insulation (NOBL) on Bays 5 through 8.

For SM3B, two unscheduled EVAs are required. The first unscheduled EVA will be used to correct any problems encountered during the scheduled EVAs and/or to complete unfinished tasks on a best-effort basis. The second unscheduled EVA will be used to correct any deployment day problems.

EVA tasks will be performed to replace or service HST hardware. HST hardware items scheduled for replacement or servicing are to be considered in a prioritized sequence. Hardware items and their priority are provided in table 6-1.

Table 6-1.- HARDWARE REPLACEMENT/SERVICING PRIORITIES

	Item	Priority	Classification
a.	Reaction Wheel Assembly (RWA)	1	Primary
b.	Advanced Camera for Surveys (ACSs)	2	Primary
c.	Power Control Unit (PCU)	3	Primary
d.	+V2 SA3/Diode Box	4	Primary
e.	-V2 SA3/Diode Box	4	Primary
f.	NCS/radiator	5	Secondary
g.	Rate Sensing Unit (RSU) (R&R)	6	Secondary
h.	NOBL (Bays 5 & 6)	7	Secondary
i.	NOBL (Bays 7 & 8)	7	Secondary

I. DETAILED TEST OBJECTIVES (DTO)

1. SINGLE STRING GLOBAL POSITIONING SYSTEM (MAGR) (DTO700-14).

The purpose of this experiment is to demonstrate the performance and operations of the GPS during orbiter ascent, on-orbit operations, entry, and landing phases utilizing a modified military GPS receiver processor and the existing orbiter GPS antennas.

2. CROSSWIND LANDING PERFORMANCE (DTO 805)

This is a DTO of opportunity.

J. DETAILED SUPPLEMENTAL OBJECTIVES (DSO)

1. SPACE FLIGHT-INDUCED REACTIVATION OF LATENT EPSTEIN-BARR VIRUS (DSO 500)

This activity is performed pre/post-flight only.

2. TEST OF MIDODRINE AS A COUNTERMEASURE AGAINST POSTFLIGHT ORTHOSTATIC HYPOTENSION (DSO 503)

This activity is performed pre/post-flight only.

3. BIOAVAILABILITY AND PERFORMANCE EFFECTS OF PROMETHAZINE DURING SPACE FLIGHT (DSO 490A)

The purpose of DSO 490 is to evaluate PMZ as the anti-motion sickness medication of choice for treating SMS during shuttle missions. Shuttle crewmembers will ingest PMZ as needed and record results.

#### 4. MONITORING LATENT VIRUS REACTIVATION AND SHEDDING IN ASTRONAUTS (DSO 493)

The purpose of DSO 493 is to determine the frequency of induced reactivation of latent viruses, latent virus shedding, and clinical disease after exposure to the physical, physiological, and psychological stressors associated with space flight.

Space flight-induced alterations in the immune response will become increasingly important on long duration missions, with one focus being the potential for reactivation and dissemination (shedding) of latent viruses. An example of a latent virus is herpes simplex type-1 (HSV-1), which infects 70 to 80 percent of all adults. Its manifestation is classically associated with the presence of cold sores, pharyngitis, and tonsillitis; and is usually acquired through contact with the saliva, skin, or mucous membranes of an infected individual. However, many recurrences are asymptomatic, resulting in shedding of the virus. Twenty subjects have been studied for Epstein-Barr Virus. Three additional viruses will be focused upon with an increase in subject allotment.

#### 5. INDIVIDUAL SUSCEPTIBILITY TO POST-SPACE FLIGHT ORTHOSTATIC INTOLERANCE (DSO 496)

This activity is performed pre/post-flight only.

#### 6. SPACE FLIGHT AND IMMUNE FUNCTION (DSO 498)

This activity is performed pre/post-flight only.

#### 7. SLEEP/WAKE ACTIGRAPHY AND LIGHT EXPOSURE DURING SPACE FLIGHT (DSO 634)

This experiment will use state-of-the-art ambulatory technology (Actilight Watches) to monitor sleep/wake activity and light exposure patterns obtained in-flight. These data should help us better understand the effects of space flight on sleep as, well as aid in the development of effective countermeasures for both short and long duration space flight.

The success and effectiveness of manned space flight depends on the ability of crewmembers to maintain a high level of cognitive performance and vigilance while operating and monitoring sophisticated instrumentation. Astronauts, however, commonly experience sleep disruption, together with misalignment of circadian phase during space flight. Both of these conditions are associated with insomnia and associated impairment of alertness and cognitive performance.

Each crewmember is allotted an Actilight Watch and personal sleep logbook for monitoring purposes. Subjects will don the Actilight Watch as soon as possible upon entering orbit and will wear it continuously throughout the mission on their non-dominant wrists. The Actilight Watch can be temporarily removed for activities such as EVAs. Subjects will also complete a short log within 15 min of final awakening every morning in-flight; subjects will wear the Actilight Watch continuously and complete the sleep log for 1 week at L-90, L-60, and L-30 days and from L-11 to L-0 days and R+0 to R+7 days.

#### 8. SPATIAL REORIENTATION FOLLOWING SPACE FLIGHT (DSO 635)

This activity is performed pre/post-flight only.

## 9. EDUCATIONAL ACTIVITIES (DSO 802)

The purpose of this DSO is to use the attraction of space flight to capture the interest of students and motivate them toward careers in science, engineering, and mathematics. The activities supported by this DSO can be separated into three distinct objectives, but only objective 2 will be performed on this flight.

### Objective 2:

The purpose of objective 2 is to support the live TV downlink of educational activities performed by the flight crew explicitly toward or involving the participation of students and teacher. On this flight we are scheduling one live downlink with available Ku (30 min continuous desired) with at least three crewmembers.

## K. MEDICAL SCIENCES DIVISION (MSD)

There are no on-orbit MSDs scheduled for this flight.



# FLIGHT PLAN

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