

Shuttle

FLIGHT DATA FILE

Flight Plan

STS-46

(FRR Trajectory)

Mission Operations Directorate
Operations Division

Final *PCN*
June 1, 1992

EVENT	CDT		
Launch	08:45	Thur	July 16
Eureca Release	02:40	Fri	July 17
TSS Deploy	13:33	Sun	July 19
TSS Retrieve	19:07	Mon	July 20
KSC Landing	06:54	Thur	July 23



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



STS-46 FLIGHT PLAN

FINAL (June 1, 1992)

PCN-1 (July 1, 1992) Sheet 1 of 1

List of Implemented Change Requests (482s):

FLT PLN-1338 MULTI-666
FLT PLN-1359
FLT PLN-1361
FLT PLN-1365
FLT PLN-1366A

Incorporate the following:

1. Replace iii thru vi
2. Replace 2-1 & 2-2
3. Replace 3-1 thru 3-4, 3-21 & 3-22
4. Replace Section 4 (14 pgs)
5. Replace 7-1 thru 7-4, 7-11 & 7-12

LL

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Encl: 32 pages



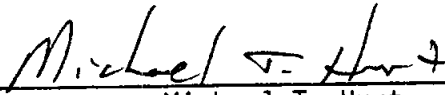
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MISSION OPERATIONS DIRECTORATE

STS-46 FLIGHT PLAN


FINAL
June 1, 1992

PREPARED BY:

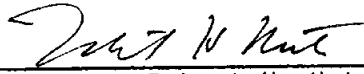


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Book Manager


APPROVED BY:



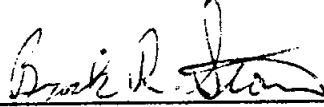
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482#:	FLT PLN-1285	FLT PLN-1324	FLT PLN-1337A
	FLT PLN-1286	FLT PLN-1325	
	FLT PLN-1303	FLT PLN-1326	FLT PLN-1339
	FLT PLN-1304	FLT PLN-1327A	FLT PLN-1340
	FLT PLN-1305	FLT PLN-1328	MULTI-636 A
	FLT PLN-1306	FLT PLN-1329	MULTI-646A
	FLT PLN-1307	FLT PLN-1331	MULTI-647A
	FLT PLN-1308	FLT PLN-1332	MULTI-657
	FLT PLN-1312A	FLT PLN-1333	MULTI-661
	FLT PLN-1320	FLT PLN-1334	
	FLT PLN-1322A	FLT PLN-1335	Exemption 1403:
	FLT PLN-1323	FLT PLN-1336	31, 32, 34, 35
	FLT PLN-1321		

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Book Manager	DH4/M. T. Hurt	483-4375
Nominal Timelines	DH4/C. T. Kingsford	483-4374
EURECA	DH4/J. M. Curry	483-5482
Contingency Timelines	DH4/J. D. Tolle	483-4480
Pointing	DH4/K. A. Amidon	483-4451

STS-46 FLIGHT PLAN

LIST OF EFFECTIVE PAGES

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PCN-1 07/01/92

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iv.....*	46/FIN 1	3-35.....	46/FIN
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viii.....	46/FIN	3-39.....	46/FIN
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(*) - Omit from flight book

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INTRODUCTION

The STS-46 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, Deorbit Prep, and Entry Checklists. The timeline for the first part of TSS-1 deployment phase and the last part of retrieval phase are in the TSS-1 Dynamics Checklist. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-46 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the Flight Cycle (12/4/91) version of the STS-46 Flight Initialization Data Pack.

The flight profile used for this Flight Plan is for a launch date of July 16, 1992, at 08:45 CDT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

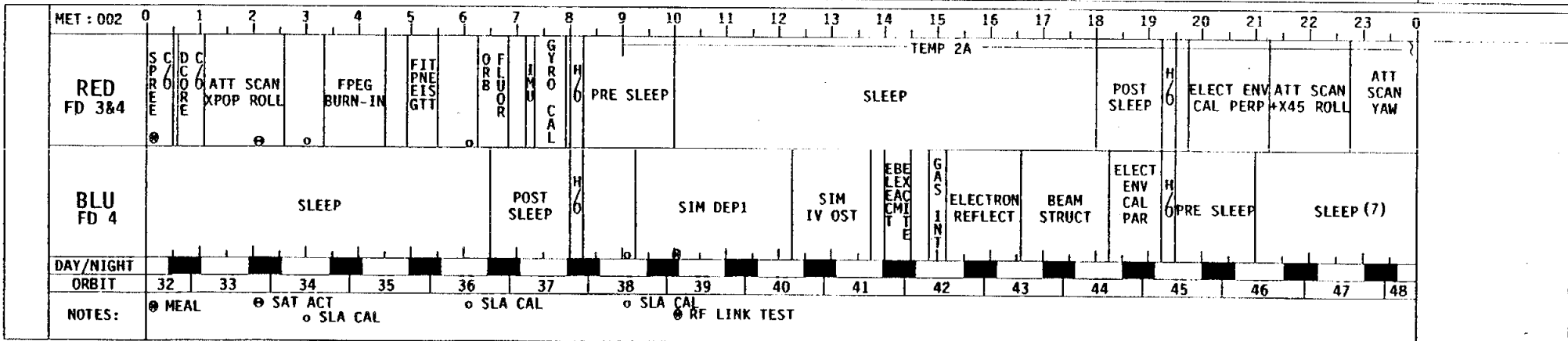
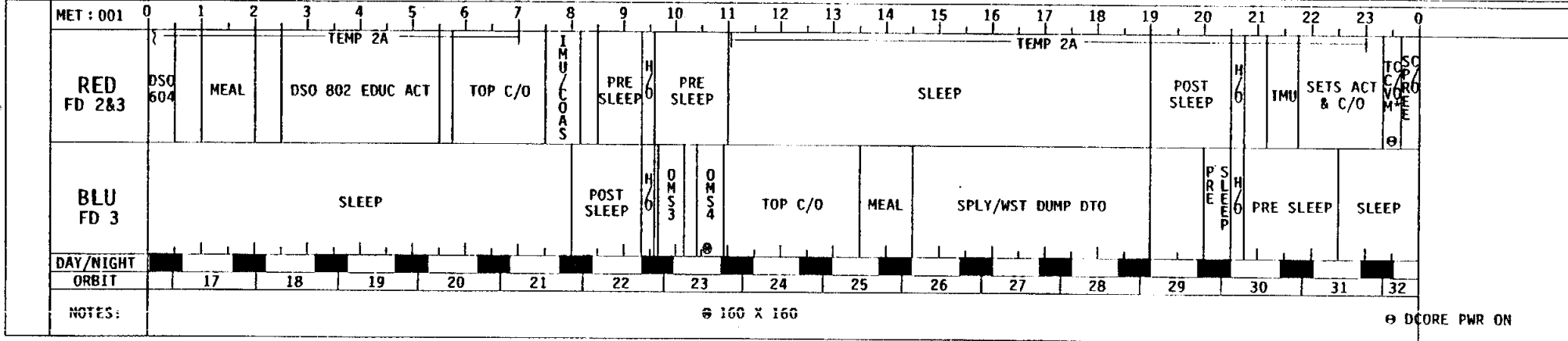
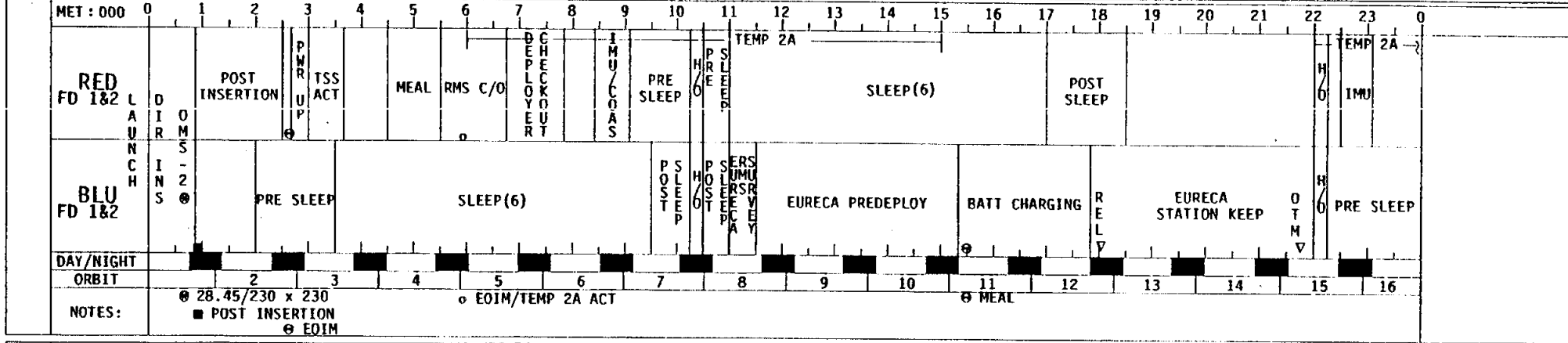
JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, Rev A, January 1990, has been used to build the timelines contained in this Flight Plan. Exemption 1403 #31 and 32 authorize the Flight Day 2 unscheduled EVA timelines for EURECA in section 4. Exemption 1403 #34 and 35 authorize the TSS EVA timelines in section 4.

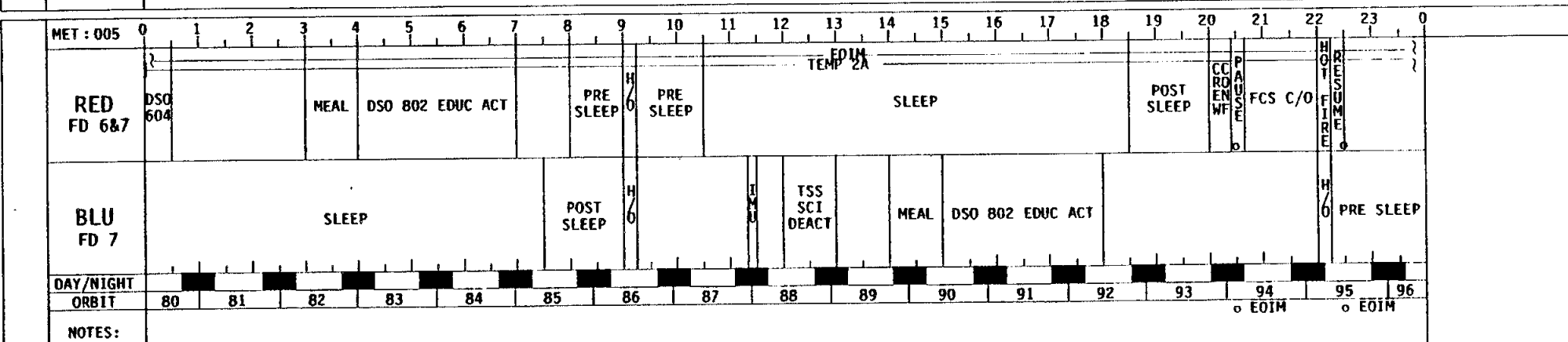
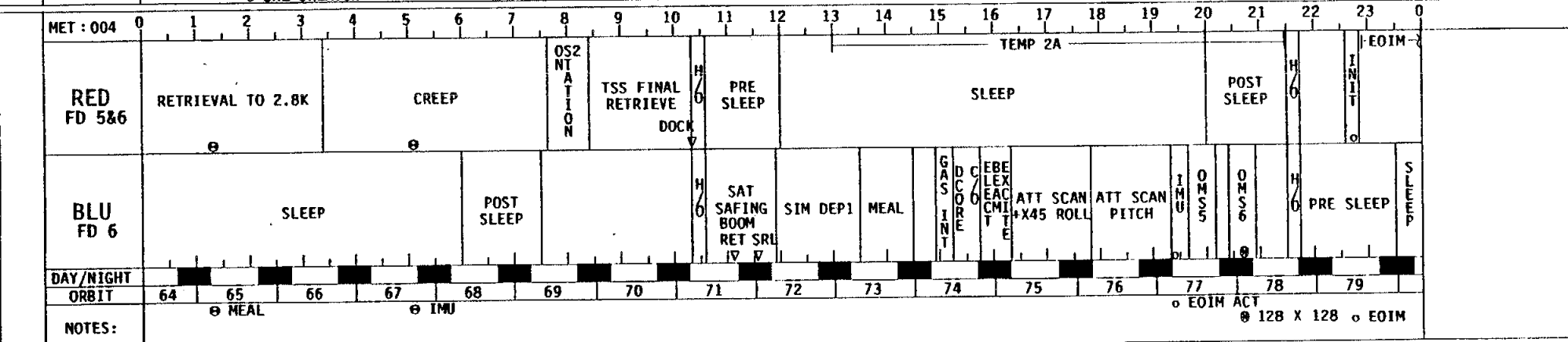
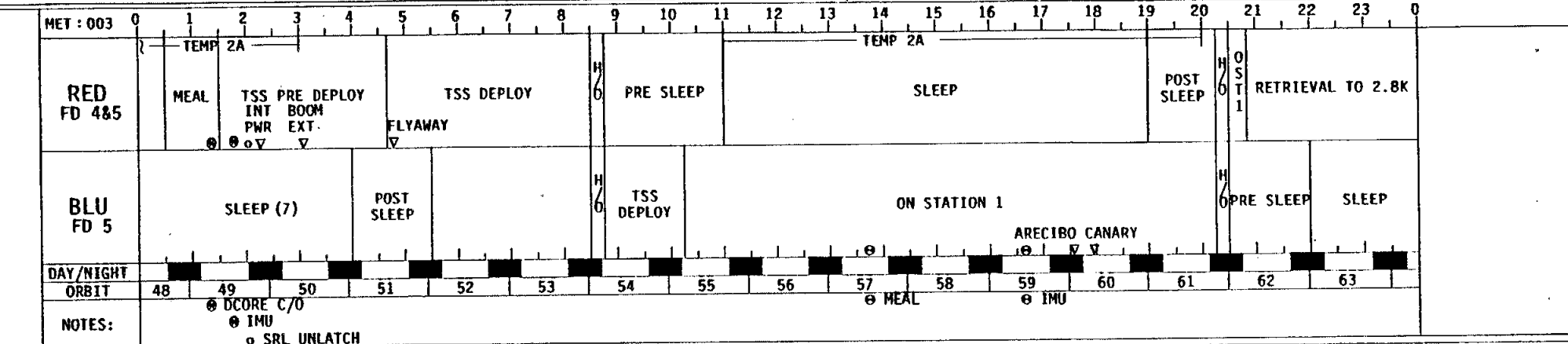
The timeline formats used in this Flight Plan are based on JSC-19933, Timeline Format Definitions and Standard Notes, Rev C, May 1990.

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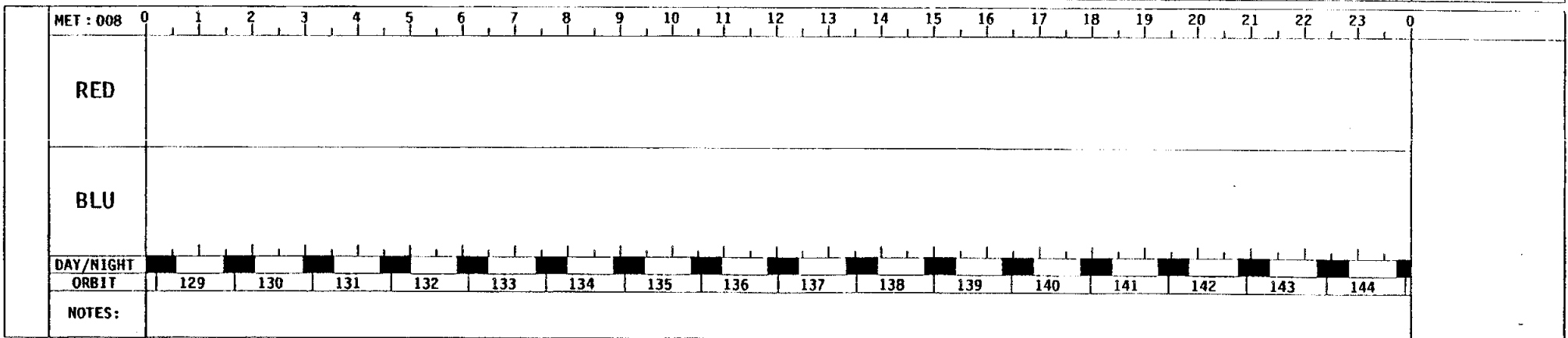
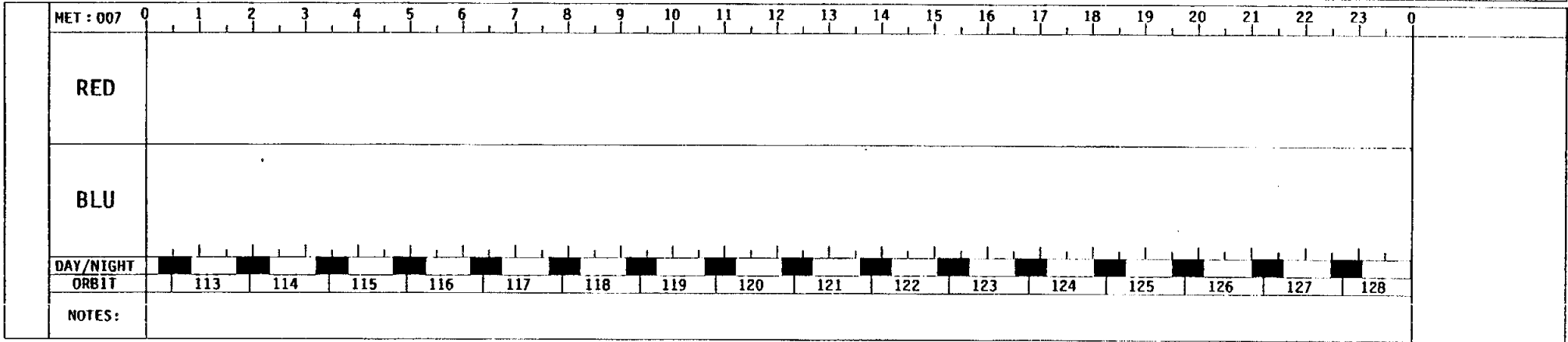
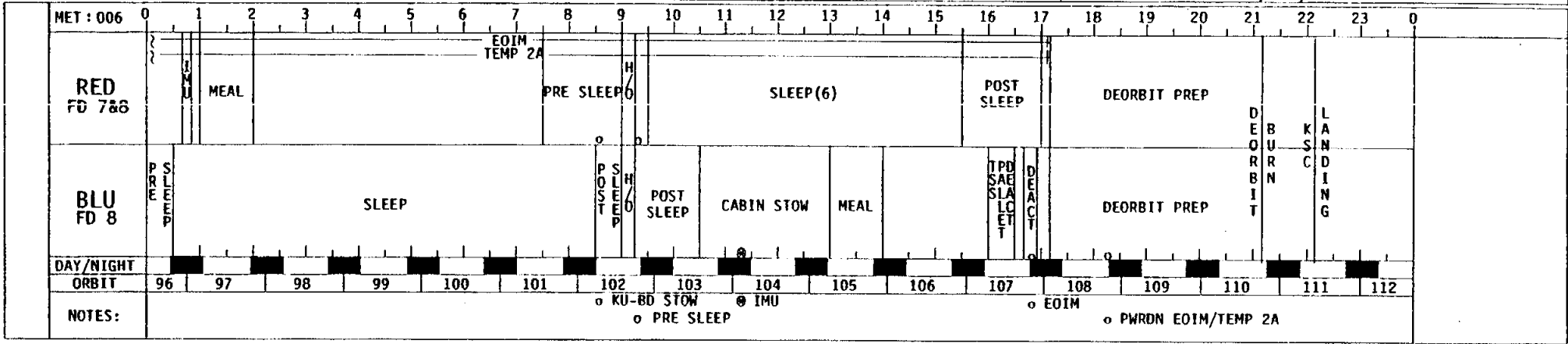
STS-46 OVERVIEW

FLIGHT: STS-46 EDITION: FINAL PUB. DATE: 06/01/92





FLIGHT: STS-46 EDITION: FINAL PUB. DATE: 06/01/92



STS-46 SUMMARY TIMELINE

SUMMARY

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
198:13:45 / 199:01:45	000:00:00 / 000:12:00	198:08:45 / 198:20:45	/198 CDT	3.2	☉	JULY 16, 1992	STS-46	FINAL	07/01/92
CDT :198 FD :001 MET :000									
STS									
LD AIR NECHT									
OMS									
INSERTION									
PL									
DAY/NIGHT									
ORBIT									
EARTH TRACE									
CONTINGENCY COVERAGE									
TDRS									
ATTITUDE									
RED SLEEP									
BLU SLEEP									
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
199:01:45/ 199:13:45	000:12:00/ 001:00:00	198:20:45/ 199:08:45	/198 CDT	4.5	☉	JULY 16, 1992	STS-46	FINAL	06/01/92
CDT :198 BLU FD :002 MET :000									
STS									
	EURECA DEPLOY OPS								
PL									
DAY/NIGHT									
ORBIT									
EARTH TRACE									
CONTINGENCY COVERAGE									
TDRS									
ATTITUDE									
RED SLEEP									
BLU SLEEP									
NOTES:	<ul style="list-style-type: none"> o CSS2 C/O MNVR o CSS3 C/O MNVR o REL/CSS1 MNVR o LACES 1 C/O * o POM 1 ACT * o H/O BLUE TO RED o DTO 656 PGSC SEU MONITORING o -ZLV, +YVV 								

* GROUND COMMANDED ACTIVITY

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
199:13:45 / 200:01:45	001:00:00 / 001:12:00	199:08:45 / 199:20:45	/199 CDT	5.9	☉	JULY 17, 1992	STS-46	FINAL	06/01/92
CDT :199 RED FD: :002 MET :001							9 BLU FD:03 10		
STS	VIS VESTIB INTEGR	MEAL							
	ASCE OTUSP DOS								
PL									
DAY/NIGHT ORBIT									
EARTH TRACE									
CONTINGENCY COVERAGE									
TDRS									
ATTITUDE									
RED SLEEP									
BLU SLEEP									
NOTES:	<p> @DSO 604 VISUAL VESTIBULAR INTEGRATION @DTO 663 ACOUSTIC NOISE DOSIMETER @DTO 656 PGSC SEU MONITORING @DSO 802 EDUCATIONAL ACTIVITIES @H/O RED TO BLUE @-ZLV, +YVV @CONCAP-III @DTO 656 PGSC SEU MONITORING @FWD STATION @-ZLV, +YVV @DTO 663 ACOUSTIC NOISE DOSIMETER </p>								

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE														
200:01:45/ 200:13:45	001:12:00/ 002:00:00	199:20:45/ 200:08:45	/199 CDT	7.5		JULY 17, 1992	STS-46	FINAL	06/01/92														
CDT :199 BLU FD :003 MET :001	12	21	22	23	0	CDT:200	1	2	3	4	20	RED FD:03	21	6	7	22	23	8	0	MET:002			
STS		RMS HTR ACT MEAL		RMS PWRUP SPLY/WST DUMP DTO		RMS PWRDN PGRRP DB DOWN		H/O		LOAD ON PT PCMMU		RN LADM LOAD ON PT PCMMU		IMU MNR ZLV MNR				TRK MNR					
				PADM SETUP SEU MONIT		PADM INIT STOW		P/TV04 SETUP EXER		P/TV04 ACT		PRE RAD ID ON IG C		P/TV10 SETUP		P/TV10 ACT		P/TV11 SETUP		P/TV11 ACT		P/TV10 SETUP	
						FLUID LOAD							EXERCISE (MS1) INTENSE (PLT) DSO 618	H/O		EXERCISE (MS4, CDR) DSO 618		DOMS & PWR/O		DCORE PWR		S & VERIF C/O	
PL	TOP CHECKOUT					FLUID LOAD						SPCB ACT				SETS ACT & C/O						TCVM C/O	
DAY/NIGHT ORBIT																							
EARTH TRACE																							
CONTINGENCY COVERAGE		-DKR	-GTS			-DKR				-MIL	-DKR	-MIL	-DKR	-IOS		-CTS	-MIL	-DKR	-IOS		-HTS	-VTS	-DKR
TDRS																							
ATTITUDE						-ZLV +YVV						IMU				-ZLV +YVV							
RED SLEEP						SLEEP						POST SLEEP											
BLU SLEEP												PSA				PRE SLEEP							
FES INH																							
NOTES:		®RMS HTR ACT		®DTO 656 PGSC SEU MONITORING		®DTO 325 WASTE/SUPPLY WATER DUMPS		®DSO 618 INTENSE CYCLE EXERCISE		®H/O BLUE TO RED		®-YVV thru +XVV		®DTO 663 ACOUSTIC NOISE DOSIMETER		®SPREE FO-1		®-ZLV, +YVV		®DCORE SE		®56FO-3B	
								®DTO 656 PGSC SEU MONITORING								®SETS							

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
201:01:45/ 201:13:45	002:12:00/ 003:00:00	200:20:45/ 201:08:45	/200 CDT	10.9		JULY 18, 1992	STS-46	FINAL	06/01/92						
CDT :200 BLU FD :004 MET :002	21	22	23	0	CDT:201	1	2	3	4	5	6	7	8	0	MET:003
STS	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT	ORBITER ROT
	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT
	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL	MEAL
PL	3PDC9	2PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10	3PDC10
DAY/NIGHT															
ORBIT	40	41	42	43	44	45	46	47	48						
EARTH TRACE															
CONTINGENCY COVERAGE	GTS	-DKR	-GTS	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS	E	W	E	W	E	W	E	W	E	W	E	W	E	W	E
ATTITUDE	360 ORB ROT	+ZLV +XVV	+X PAR	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG	BM PAR MAG
RED SLEEP			SLEEP				POST SLEEP								
BLU SLEEP								PRE SLEEP							SLEEP 7
FES INH															
NOTES:	<p>* GROUND COMMANDED ACTIVITY</p> <p> @TEA @SETS FO-11 @SETS FO-3A @SETS FO-18 @H/O BLUE TO RED @LATEST TIME @+ZLV, +XVV @SETS FO-3A @SETS FO-18 @SETS FO-3A @SETS FO-19B @SETS FO-3A @SETS FO-3A @SETS FO-3A @SETS FO-9A @SETS FO-8 @SETS FO-3A @SETS FO-19A @SETS FO-3A @SETS FO-8 @SETS FO-19A @SETS FO-6B </p>														

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
201:13:45/ 202:01:45	003:00:00/ 003:12:00	201:08:45/ 201:20:45	/201 CDT	12.7	☉	JULY 19, 1992	STS-46	FINAL	06/01/92
CDT RED FD :201 MET :004-									
							8 BLU FD:05		
STS	MEAL		TSS FLY AWAY			SAT DEPLOY		OST-1	
		P/TV10 ACT SRL'S & BOOM		P/TV10 ACT SAT DPY	P/TV11 ACT		P/TV11 ACT	P/TV11 ACT	P/TV11 ACT
							EXERCISE (MS2)	EXERCISE (PLT)	
PL									
DAY/NIGHT									
ORBIT	48	49	50	51	52	53	54	55	56
EARTH TRACE									
CONTINGENCY COVERAGE	-DKR	-GTS -MIL -HTS -VTS	-VTS -CIS -MIL -HTS	-HTS -VTS	-HTS	-IOS	-IOS -GTS -HTS	-IOS -GTS -HTS	-DKR
TDRS									
ATTITUDE	-ZLV +YVV					BIAS +ZLV -XVV			
RED SLEEP								PRE SLEEP	SLEEP
BLU SLEEP		SLEEP 7		POST SLEEP					
FES INH									HD
NOTES:	@SETS FO-6D @LOS @SETS FO-3A @LOS @DFO-13 @LOS @TEA @H/O RED TO BLUE @-ZLV, +YVV o RAD OUT NRM/NO FES @DFO-12 @DFO-10 @TEA @SETS FO-3A @CONCAP-III @DFO-11 @LOS o RAD OUT NRM/NO FES @DCORE FO-17 @DFO-4 * GROUND COMMANDED ACTIVITY								

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE									
202:01:45/ 202:13:45		003:12:00/ 004:00:00		201:20:45/ 202:08:45		/201 CDT	14.5		JULY 19, 1992	STS-46	FINAL	06/01/92									
CDT :021	21	22	23	0	CDT:202	1	2	3	4	5	6	7	8	0	MET:004						
BLU FD :005	12	13	14	15	16	17	18	19	20	RED FD:05 21	22	23	24								
MET :003																					
STS	ORBITER ROT	MEAL			ORBITER ROT			ORBITER ROT			EXERCISE (MS4, CDR)										
	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT			P/TV11 ACT	P/TV11 ACT									
PL	2OST12	1OST13	3OST13	1OST14	2OST14	3OST14	1OST15	3OST15	1OST16	2OST16	3OST16	1OST17	3OST17	1RET11	2RET11	3RET11	1RET12	2RET12	3RET12	1RET13	
DAY/NIGHT	Night		Day		Night		Day		Night		Day		Night		Day		Night		Day		
ORBIT	56	57	58	59	60	61	62	63	64												
EARTH TRACE																					
CONTINGENCY COVERAGE	-GTS	-DKR	-GTS	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	-MIL	-DKR	
TDRS	E W																				
ATTITUDE	+360 ORB ROT, BIAS +ZLV -XVV, +360 ORB ROT, BIAS +ZLV -XVV, +360 ORB ROT, BIAS +ZLV -XVV, +360 ORB ROT, BIAS +ZLV -XVV																				
RED SLEEP	SLEEP																				
BLU SLEEP	SLEEP																				
FES INH	HD																				
NOTES:	@CABIN TEMP CNTL RECONFIG @CONCAP-III ■ RAD OUT NRM/NO FES @DFO-3 @DFO-3 @SETS FO-14 @DFO-5 @TEA @TEA @DTO 663 ACOUSTIC NOISE DOSIMETER @DFO-6 * GROUND COMMANDED ACTIVITY																				

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
202:13:45/ 203:01:45	004:00:00/ 004:12:00	202:08:45/ 202:20:45	/202 CDT	16.4		JULY 20, 1992	STS-46	FINAL	06/01/92						
CDT :202 RED FD :005 MET :004								BLU FD:06 11							
STS	ROLL RESONANCE	TRK MNRV RNAR ON TJRK MNRV DAMP INPLANE LIBR	TRK MNRV DAMP SKIPROPE	DAMP POOP LIBRATION MNRV MNRV		EXERCISE (MS1, PLT, MS2)	PERSONANCE	H/O TRK MNRV DAMP POOP	CONTRIF MED						
	P/TV11 ACT	RETRIEVE-1 P/TV11 ACT	P/TV11 ACT	CREEP P/TV11 ACT		OST-2	RETRIEVE-2	SIM DEPI							
		PHCF MEAL	MOCAL SERV					DOCK PPRS REPT H/O	SECURE SAT SAT PWR RET DOWN BOOM V						
PL	2RET13	1RET14	1RET15	10ST21	20ST21 30ST21	10ST22	20ST22 30ST22	10ST23	20ST23	30ST23 10ST24	1RET21	1PRS1	1PRS2	2PRS2	
DAY/NIGHT	[Day/Night bar]														
ORBIT	64	65	66	67	68	69	70	71	72						
EARTH TRACE															
CONTINGENCY COVERAGE	MIL -DKR	-VTS -CTS -MIL -HTS MIL	-GTS -HTS -VTS	-GTS -HTS	-GTS -HTS	-HTS	--IOS -GTS	-GTS -HTS	-GTS	-GTS					
TDRS	E W	[TDRS bar]													
ATTITUDE	BIAS +ZLV -XVV														
RED SLEEP															
BLU SLEEP	SLEEP														
FES INH	POST SLEEP														
NOTES:	TEA	LOS	DFD-10 LOS	+ZLV, +XVV						LOS LOS LOS	H/O RED TO BLUE LOS CONCAP-III				
* GROUND COMMANDED ACTIVITY															

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE.															
203:01:45/ 203:13:45	004:12:00/ 005:00:00	202:20:45/ 203:08:45	/202 CDT	18.3		JULY 20, 1992	STS-46	FINAL	06/01/92															
CDT :202 BLU FD :006 MET :004	21	22	23	0	CDT:203	1	2	3	4	5	6	7	8	0	MET:005									
STS	VTR SETUP VTR PLAY BACK	TRK MNRV TRK MNRV TRK MNRV	TRK MNRV	TRK MNRV	INTERACT GAS MNRV	MAG MNRV ELECT BEAM MAG MNRV ELECT BEAM	TRK MNRV	ATT SCAN +X45 ROLL	TRK MNRV	YPOP PITCH ROT	IMU ALIGN MNRV	OMS 5 BURN	OMS 6 BURN	ZLV MNRV WASTE DUMP INIT	H/O	MPM STOW	MDA MNRV TERM	TRK MNRV RAD OUT HIT	FILTER CLEANING					
	P/TV10 ACT	P/TV11 ACT	SIM DEPI ACT	MEAL	PADM SETUP	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT	PADM STOW	P/TV11 ACT	P/TV11 ACT	P/TV11 ACT						EXERCISE (MS3,MS4,CDR)					
	SS EACT UR SRUF LATR	CP DRN FO IRGS				DC CHECK OUT					E OIM MS ON								P/TV06 SETUP	P/TV06 ACT LDCE & CONCAR				
PL	2PRS2	3PRS2	1PRS3	2PRS3	E OIM MS ON	INTERACT GAS MNRV	EM OS MNRV	ELECT BEAM	ELECT BEAM	ELECT BEAM	ATT SCAN +X45 ROLL	ATT SCAN PITCH		EXP ACT		EM OS MNRV			H/O	E OIM MS ON	E OIM MS ON	LDCE ACT	C2 ON NAC ATP	
DAY/NIGHT																								
ORBIT	72	73	74	75	76	77	78	79	80															
EARTH TRACE																								
CONTINGENCY COVERAGE	-GTS	-DKR		-DKR		-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS	E	W																						
ATTITUDE	BIAS +ZLV -XVV		+ZLV -XVV		+X PAR MAG		X45 ROLL		YPOP PITCH		IMU		BURN		-ZLV +YVV		-YLV -ZVV							
RED SLEEP	SLEEP													POST SLEEP				PRE SLEEP		ISLEEP				
BLU SLEEP																								
FES INH																								
NOTES:	@LOS		@LOS		@TEA		@RAD OUT NRM/NO FES		@+ZLV +XVV		@SETS FO-3A		@SETS FO-3A		@SETS FO-3A		@SETS FO-3A		@SETS FO-3A		@SETS FO-3A		@SETS FO-3A	
							@DCORE FO-17		@SETS FO-11		@SETS FO-6B		@SETS FO-6C		@E OIM		@H/O BLUE TO RED		@-ZLV, +YVV		@-YLV, -ZVV		@DTO 663 ACOUSTIC NOISE DOSIMETER	
	* GROUND COMMANDED ACTIVITY																							

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
203:13:45/ 204:01:45	005:00:00/ 005:12:00	203:08:45/ 203:20:45	/203 CDT	20.2		JULY 21, 1992	STS-46	FINAL	06/01/92
CDT :203 RED FD :006 MET :005							9 BLU FD:07 10		
STS	VIS VESTIB INTEGR	PADM SETUP	MEAL		PADM STOP	SEU INIT	H/O	CSM MED	IMM ALIGN
		P/TV04 SETUP PHCF	P/TV04 ACT			EXERCISE (MS2)		EXERCISE (MS1)	
							H/O		
PL		PHCF MANIP				P/TV07 ED ACTS			
DAY/NIGHT									
ORBIT	80	81	82	83	84	85	86	87	88
EARTH TRACE									
CONTINGENCY COVERAGE	MIL	-GTS -MIL	-VTS	-IOS	-GTS -HTS	-IOS	-GTS -HTS	-GTS	DKR
TDRS									
ATTITUDE									
RED SLEEP									
BLU SLEEP									
NOTES:	DSO 604 VISUAL VESTIBULAR INTEGRATION CONCAP-II			DSO 802 EDUCATIONAL ACTIVITIES			H/O RED TO BLUE OTO 656 PGSC SEU MONITORING		

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE.					
204:01:45/ 204:13:45	005:12:00/ 006:00:00	203:20:45/ 204:08:45	/203 CDT	22.2		JULY 21, 1992	STS-46	FINAL	06/01/92					
CDT :203 BLU FD :007 MET :005	12	13	14	15	16	17	18	19	20	21	22	23	0	MET:006
STS		MEAL								FCS C/O	HOT FIRE			
										EXERCISE (MS2,MS3)	H/O		EXERCISE INTENSE (PLT, CDR, MS4) DSO 618	
PL														
DAY/NIGHT ORBIT	88	89	90	91	92	93	94	95	96					
EARTH TRACE														
CONTINGENCY COVERAGE	-GTS	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS														
ATTITUDE														
RED SLEEP														
BLU SLEEP														
NOTES:	<p> @DCORE FO-13 @DTO 656 PGSC SEU MONITORING @DTO 656 PGSC SEU MONITORING @DSO 618 INTENSE CYCLE @DCORE FO-18 @DSO 802 EDUCATIONAL ACTIVITIES @DTO 663 ACOUSTIC NOISE DOSIMETER @APU HTR RECONFIG @CONCAP-II @APU HTR ACT @DTO 663 ACOUSTIC NOISE DOS </p> <p>*GROUND COMMANDED ACTIVITY</p>													

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
204:13:45/ 205:01:45	006:00:00/ 006:12:00	204:08:45/ 204:20:45	/204 CDT	24.2		JULY 22, 1992	STS-46	FINAL	06/01/92					
CDT :204 RED FD :007 MET :006	0	9	10	11	12	13	14	15	16	17	18	19	20	12
STS	ERGM STOW	MEAL	SR MA MI ON DG E	SUM TERM	PADM SETUP	LASER STOW	PC CONF H/O						PADM SETUP	
	EXERCISE					PADM STOW							CABIN STOW	
											H/O			
PL			PHCF MANIP			AD COS US STOW								
DAY/NIGHT														
ORBIT	96	97	98	99	100	101	102	103	104					
EARTH TRACE														
CONTINGENCY COVERAGE	-GTS	-HTS	-VTS	-HTS	-VTS	-HTS	-IOS	-IOS	-IOS	-GTS			-DKR	-GTS
TDRS	E	W	-GTS	-GTS	-GTS	-GTS	-HTS	-GTS	-GTS	-GTS			-GTS	
ATTITUDE														
RED SLEEP														
BLU SLEEP														
NOTES:	@DTO 663 ACOUSTIC NOISE DOSIMETER @DTO 656 PGSC SEU MONITORING @H/O RED TO BLUE @DTO 663 ACOUSTIC NOISE DOSIMETER @DTO 700-2 LASER RANGE DEVICE													

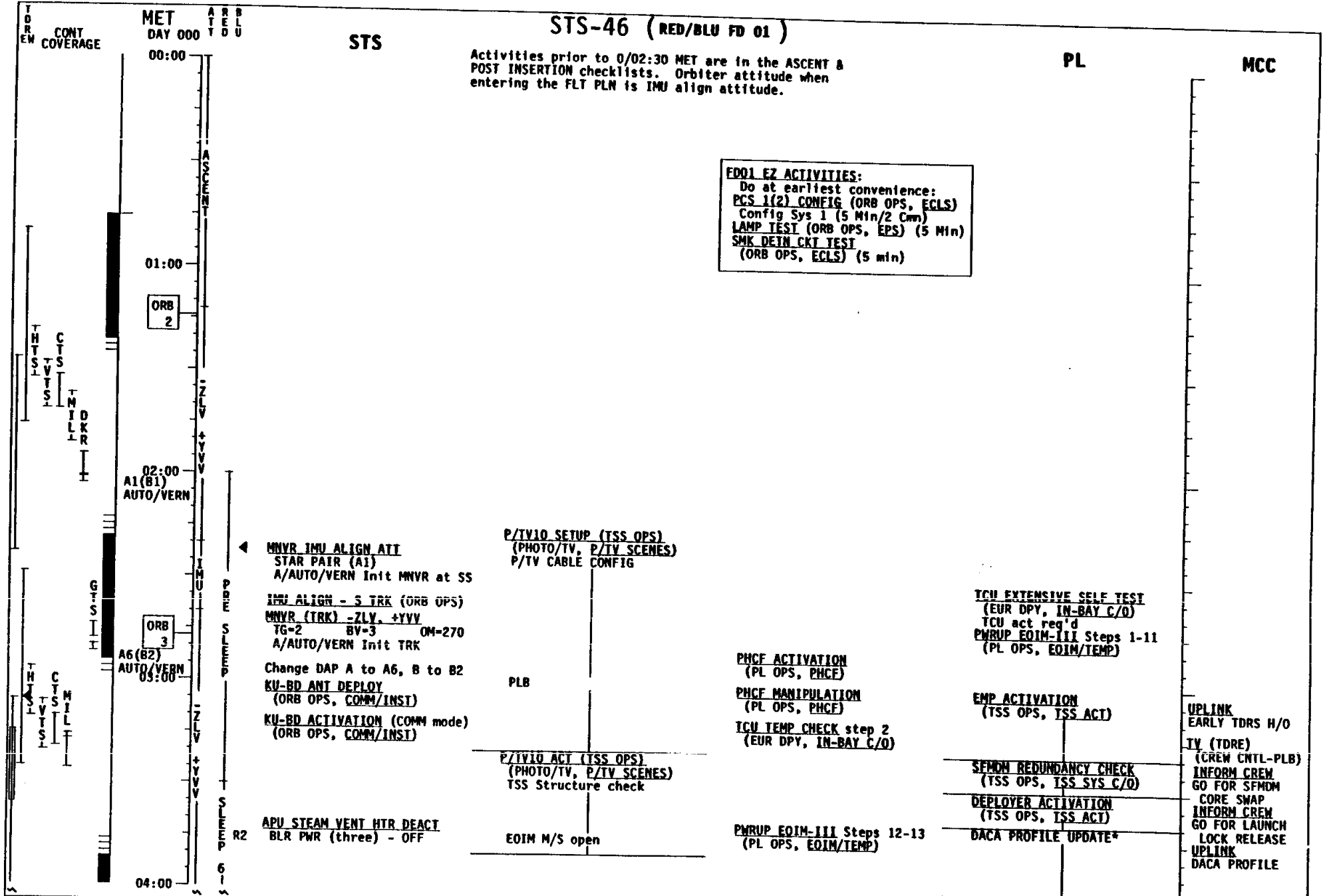
GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
205:01:45 / 205:13:45	006:12:00 / 007:00:00	204:20:45 / 205:08:45	/204 CDT	26.2		JULY 22, 1992	STS-46	FINAL	06/01/92						
CDT :204 BLU FD :008 MET :006	21	22	23	0	CDT:205	1	2	3	4	5	6	7	8	0	MET:007
STS		MEAL	PADM STOW		CONTRIF MED	XSI MNR			IMU MNR	IMU ALIGN	PLBD OPS	BURN MNR			
	CABIN STOW				DSO 603 ENT PREP	DESN OT 603 PREP				DEORBIT PREP			DEORBIT BURN*	KSC LANDING*	
					EMP DEACT										
PL					PHCF MANIP	PHCF DEACT	LDCE DEACT	GAPC STOW		EPDR MDN					
DAY/NIGHT															
ORBIT	104	105	106	107	108	109	110	111	112						
EARTH TRACE															
CONTINGENCY COVERAGE	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS															
ATTITUDE		-YLV -ZVV			IMU/VERIF					DEORBIT		ENTRY			
RED SLEEP		SLEEP 6		POST SLEEP											
BLU SLEEP															
NOTES:	@TSS @DSO 603B ORTHOSTATIC FUNCTION @EOIM @DSO 604 VISUAL VESTIBULAR INTEGRATION										* DEORBIT BURN 6/21:09	* KSC LANDING 6/22:09			

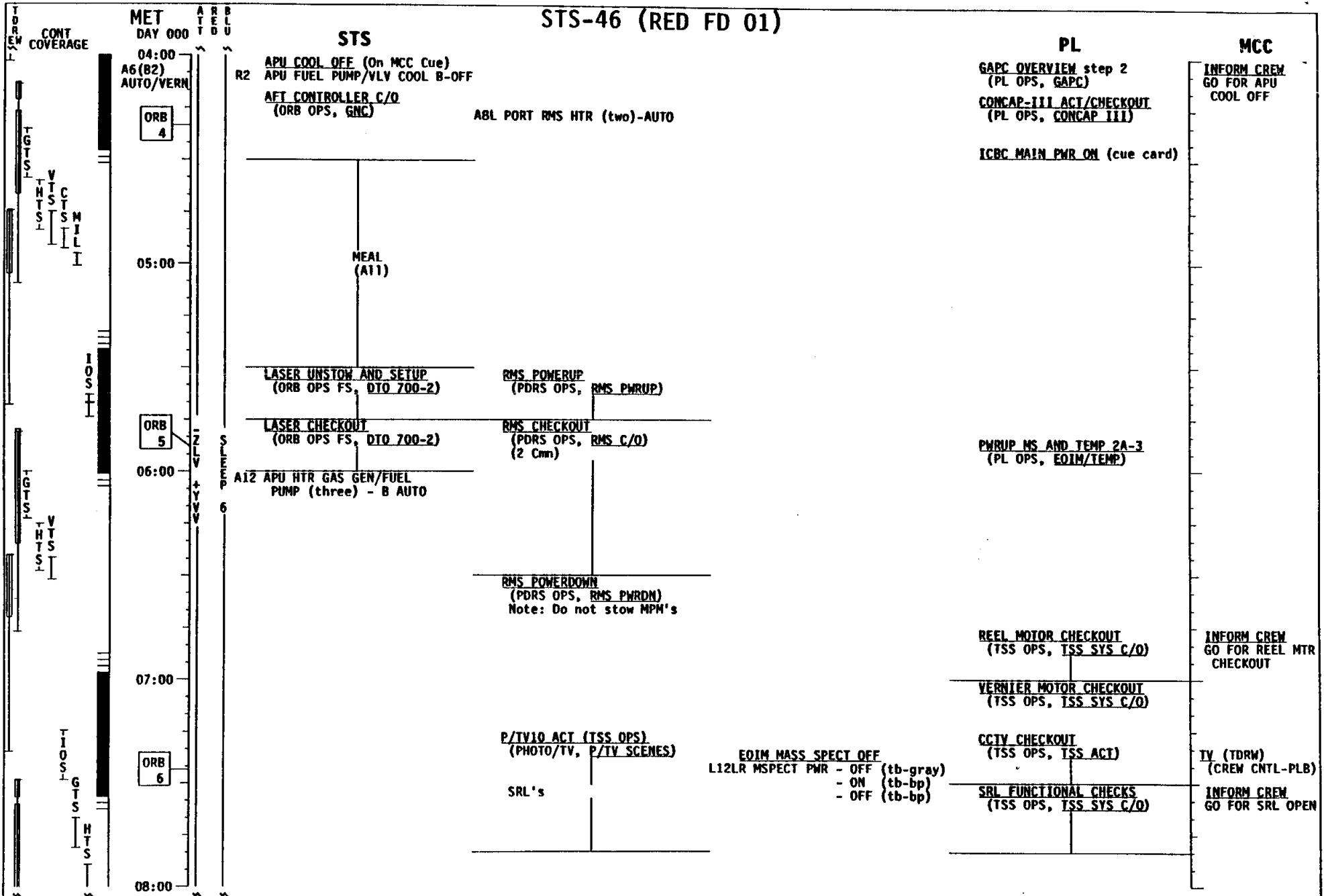
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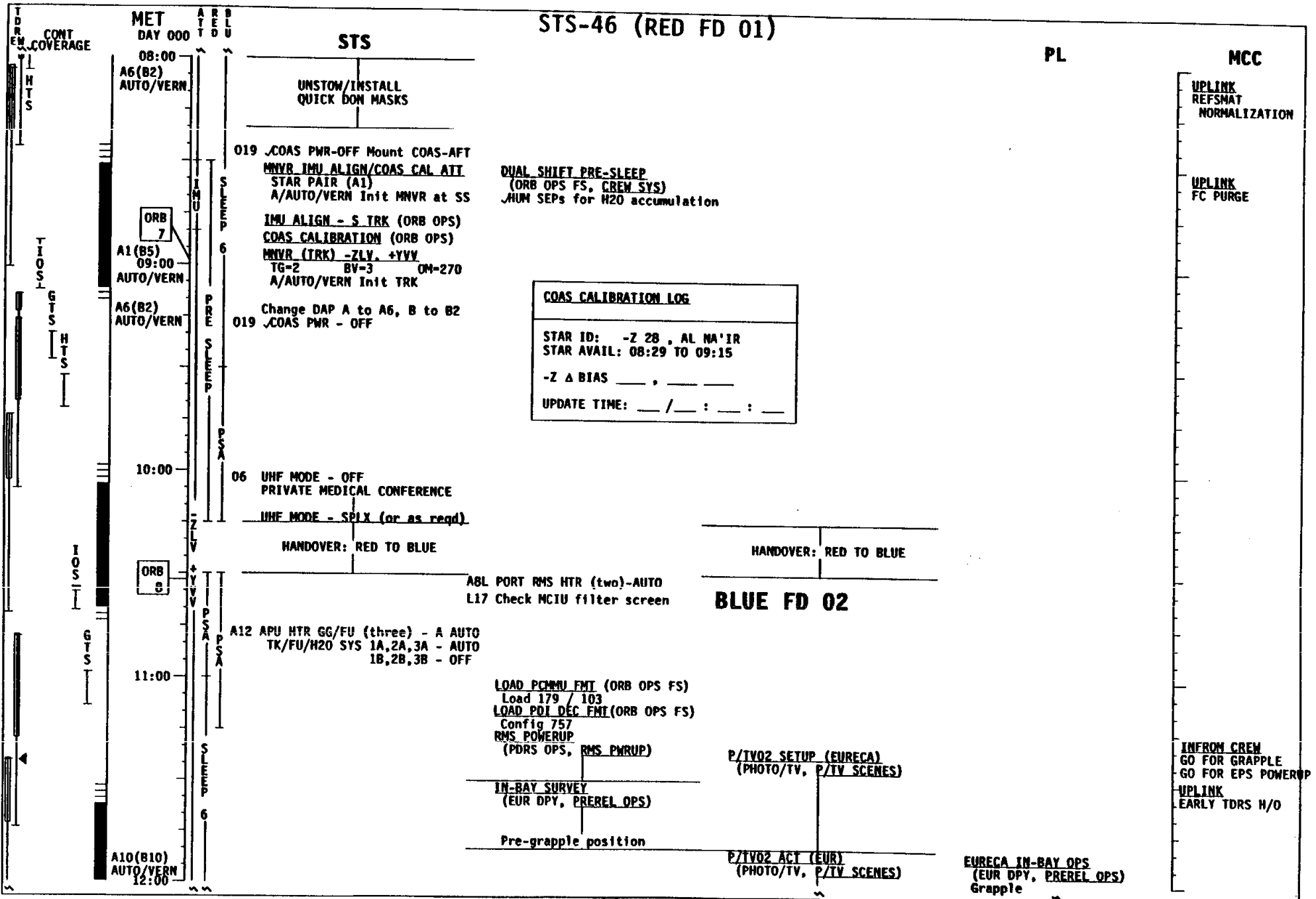
DETAILED TIMELINE

DETAILED
TIMELINE

DETAILED TIMELINE







STS-46 (RED FD 01)

COAS CALIBRATION LOG

STAR ID: -Z 28 , AL NA'IR
STAR AVAIL: 08:29 TO 09:15

-Z Δ BIAS _____

UPDATE TIME: ____ / ____ : ____ : ____

HANDOVER: RED TO BLUE

BLUE FD 02

P/TV02 SETUP (EURECA)
(PHOTO/TV, P/TV SCENES)

P/TV02 ACT (EUR)
(PHOTO/TV, P/TV SCENES)

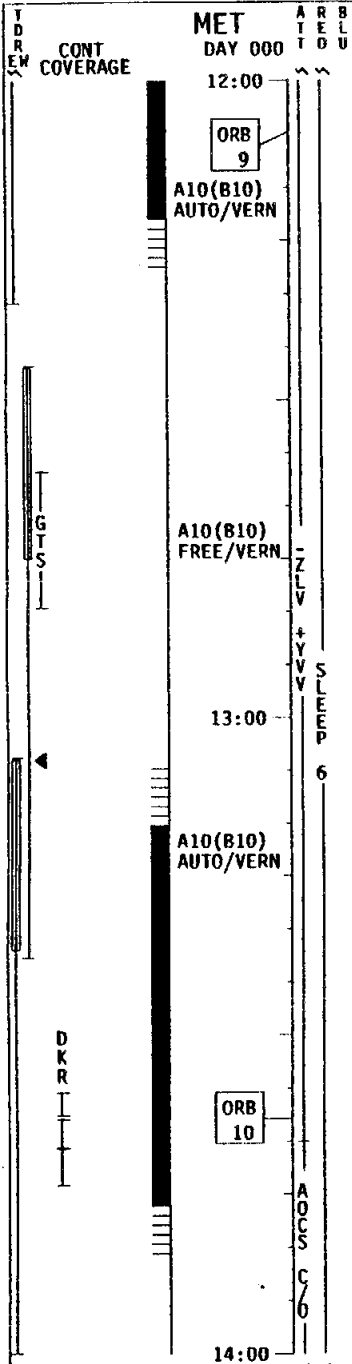
EURECA IN-BAY OPS
(EUR DPY, PREREL OPS)
Grapple

STS-46 (BLU FD 02)

STS

PL

MCC



P/TV02 ACT (EUR) (cont'd)
(PHOTO/TV, P/TV SCENES)

EURECA IN-BAY OPS (cont'd)

TCU Deact
EPS Powerup
PI Lock

ROEU Demate

TCU to RMS Mode, if req'd

EURECA UNBERIH
(EUR DPY, PREREL OPS)

PRLA/AKA Release

Low Hover Position

PI Lock, if Req'd

AOCSS CHECKOUT
(EUR DPY, PREREL OPS)

Intermediate Position

CSS 2/3 C/O Position

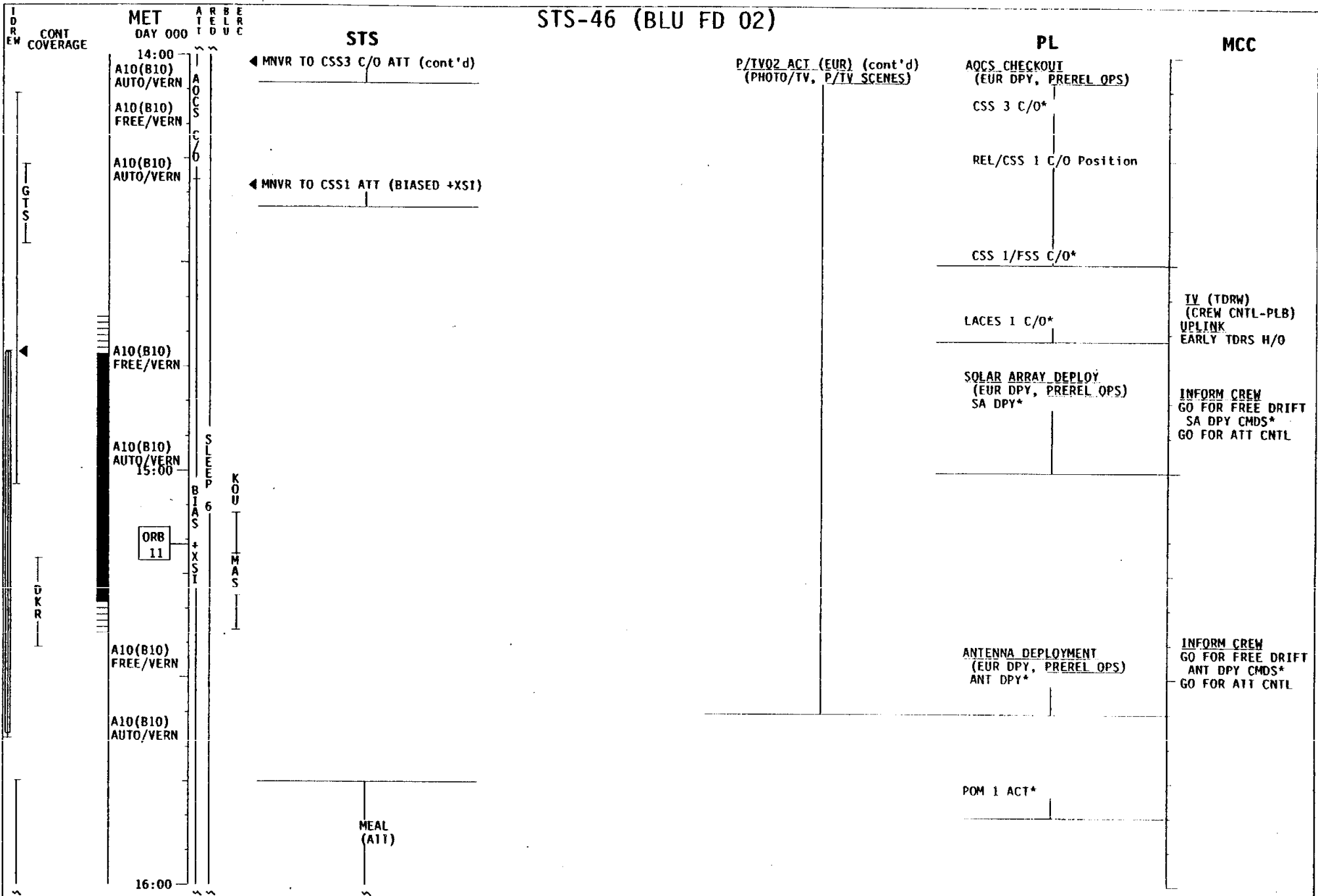
UPLINK
β only 15°

UPLINK
EARLY TDRS H/O

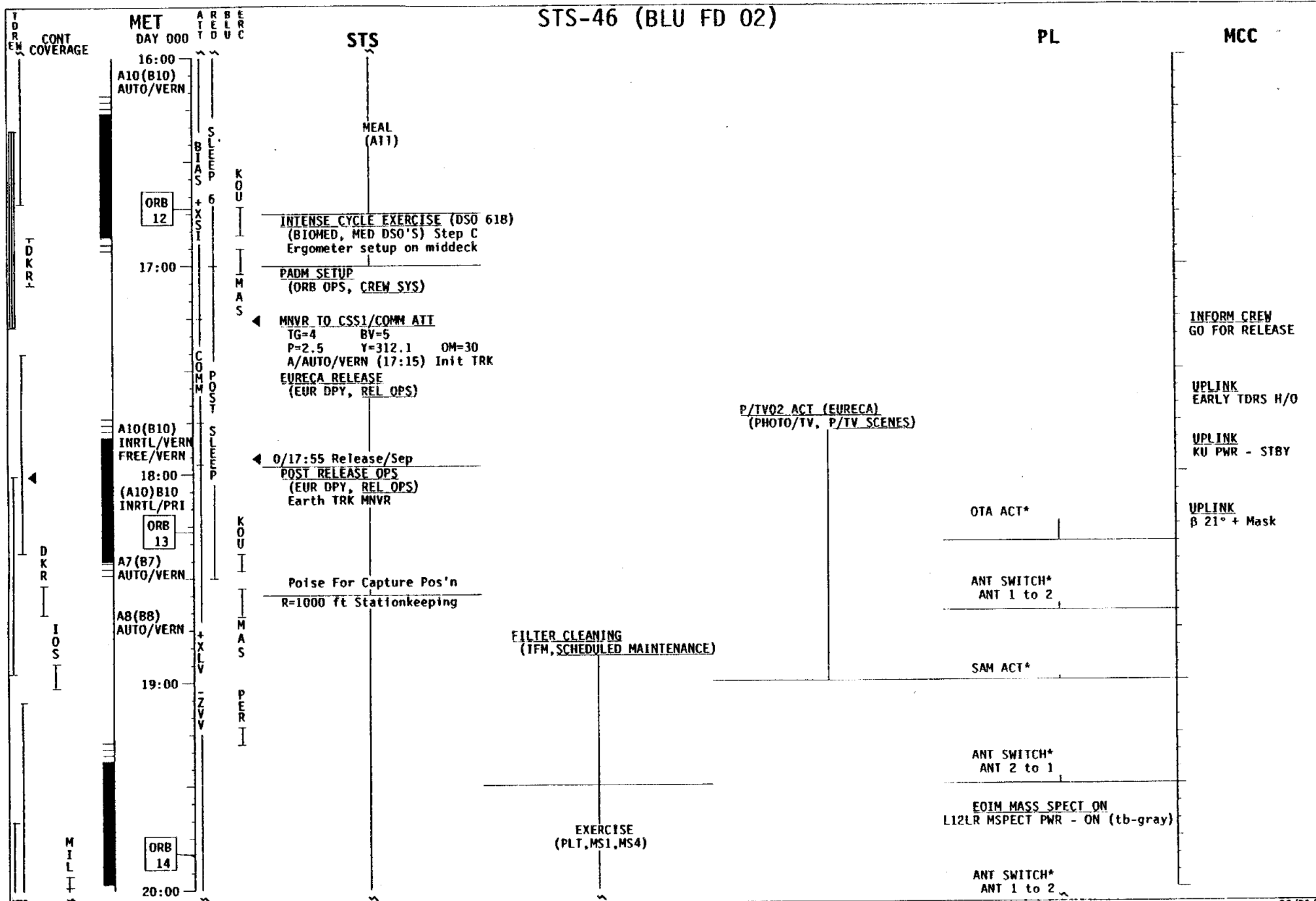
← MNVR TO CSS2 C/O ATT (BIASED -ZSI)

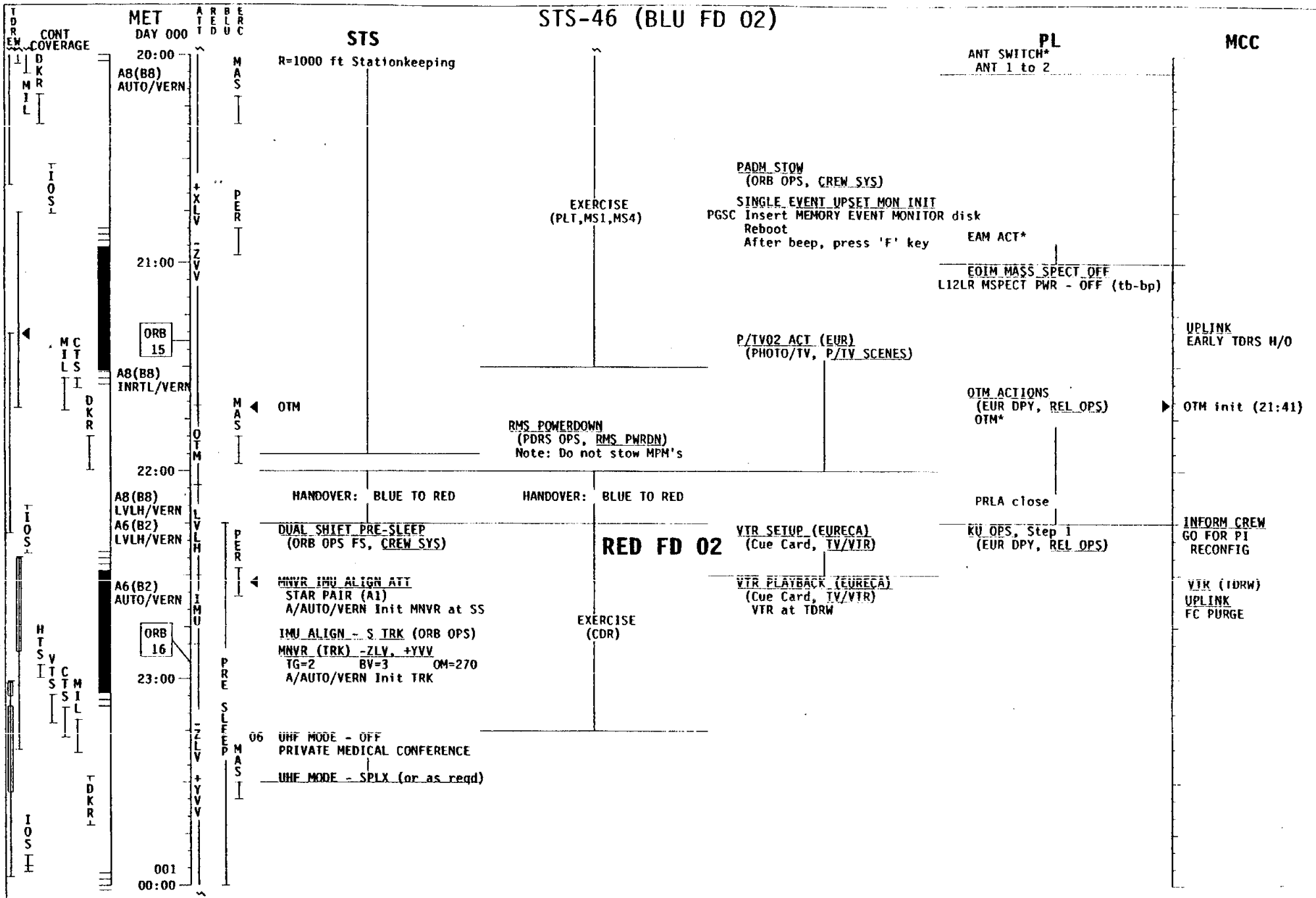
← MNVR TO CSS3 C/O ATT (BIASED +XSI)

CSS 2 C/O*



STS-46 (BLU FD 02)

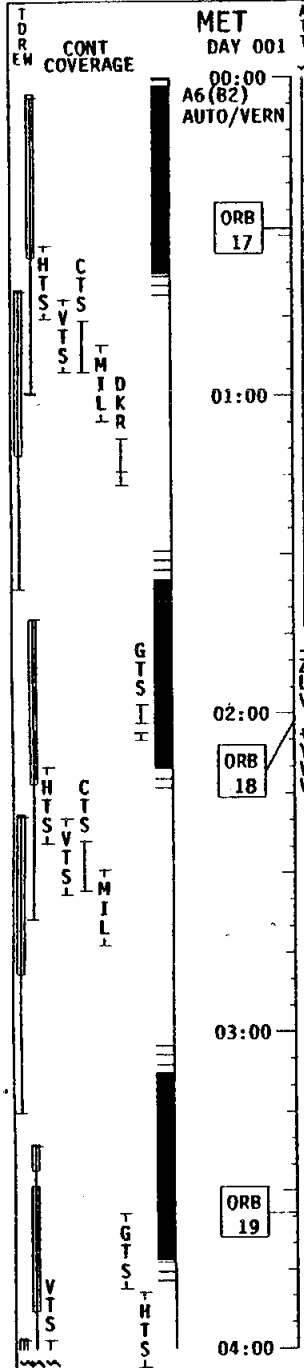




STS-46 (RED FD 02)

PL

MCC

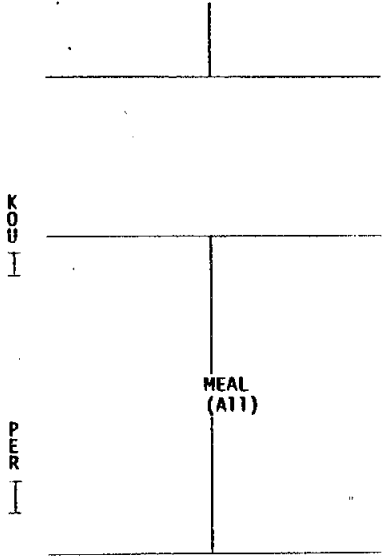


MET DAY 001
 A6 (82)
 AUTO/VERN
 00:00
 01:00
 02:00
 03:00
 04:00

STS

VISUAL VESTIBULAR INTEGRATION
 (BIOMED, MED DSO'S)
 (MS3)
 DSO 604

ACOUSTIC DOSIMETER OPS
 (ORB OPS FS, DIO 663)
 Step 1 and 3b

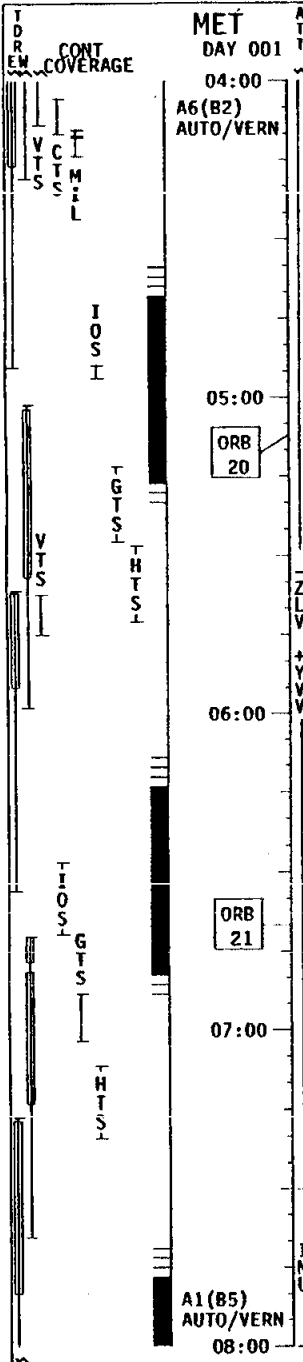


SINGLE EVENT UPSET MON TERM
 PGSC Exit MEMORY EVENT MONITOR
 (follow instructions on screen)

PADM SETUP
 (ORB OPS, CREW SYS)

PHCF MANIPULATION
 (PL OPS, PHCF)

P/TV07 (EDUCATIONAL ACTS)
 (PHOTO/TV, P/TV SCENES)
 DSO 802 (TSS-1)



ARRIVED
KOUT
ZLV
+YV
SLEW
IMU

STS

COAS CALIBRATION LOG

STAR ID: +X 29 , ALKAID
STAR AVAIL: 07:10 TO 08:13

+X Δ BIAS _____ , _____

UPDATE TIME: ___ / ___ : ___ : ___

- PADM STOW
(ORB OPS, CREW SYS)
- SINGLE EVENT UPSET MON INIT
PGSC Insert MEMORY EVENT MONITOR disk
Reboot
After beep, press 'F' key
- 01 .COAS - OFF Mount COAS - FWD
◀ MNVR IMU ALIGN/COAS CAL ATT
R=295 P=225 Y=345
A/AUTO/VERN (07:30) Init MNVR
- IMU ALIGN - S TRK (ORB OPS)
COAS CALIBRATION (ORB OPS)

EXERCISE
(MS2,MS3)

STS-46 (RED FD 02)

PL

P/TV07 (ED ACTS) (cont'd)
(PHOTO/TV, P/TV SCENES)
DSO 802 (TSS-1)

TOP CHECKOUT
(PHOTO/TV, TOP CONFIG)

MCC

STS-46 (RED FD 02)

MET
DAY 001

STS

PL

MCC

08:00

ORB
22

A1(B1)
AUTO/VERN

01

MNVR (TRK) -ZLY, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK
Change DAP B to B1
.COAS-OFF Stow COAS

ACOUSTIC DOSIMETER, Step 3a
(ORB OPS FS, DIO 663)

TOP CHECKOUT (cont'd)
(PHOTO/TV, TOP CONFIG)

DUAL SHIFT PRE-SLEEP
(ORB OPS FS, CREW SYS)
.HUM SEPs for H2O accumulation

EXERCISE
(MS2,MS3)

UPLINK
FC PURGE

09:00

06

UHF MODE - OFF
PRIVATE MEDICAL CONFERENCE

UHF MODE - SPLX (or as reqd)

HANDOVER: RED TO BLUE

HANDOVER: RED TO BLUE

UPDATE
ORB MNVR PAD
OMS3

(A1)B1
AUTO/VERN

ORB
23

INRTL/VERN
10:00

◀

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

OMS3 (10:00)

BLUE FD 03

EOIM MASS SPECT ON
L12LR MSPECT PWR - ON (tb-gray)

UPDATE
ORB MNVR PAD
OMS4

LVLH/VERN

DAP: B/LVLH/VERN

(A1)B1
AUTO/VERN

INRTL/VERN
11:00

◀

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

OMS4 (10:46)

EOIM MASS SPECT OFF
L12LR MSPECT PWR - OFF (tb-bp)

TOP CHECKOUT
(PHOTO/TV, TOP CONFIG)

A6(B2)
AUTO/VERN

11:00

ORB
24

Change DAP A to A6, B to B2
MNVR (TRK) -ZLY, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

EES 1 ACTIVATION
(PL OPS, CONCAP-III)

12:00

STS-46 (BLU FD 03)

STS

PL

MCC

MET DAY 001

12:00
A6 (B2)
AUTO/VERN

ORB
25

13:00

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

14:00

MEAL
(A11)

ORB
26

RMS POWERUP
(PDRS OPS, RMS PWRUP)

SINGLE EVENT UPSET MON TERM
PGSC Exit MEMORY EVENT MONITOR
(follow instructions on screen)

VENTED SPLY/WST H2O DUMP
(ORB OPS FS, DTO 325)

PADM SETUP
(ORB OPS, CREW SYS)

15:00

ORB
27

16:00

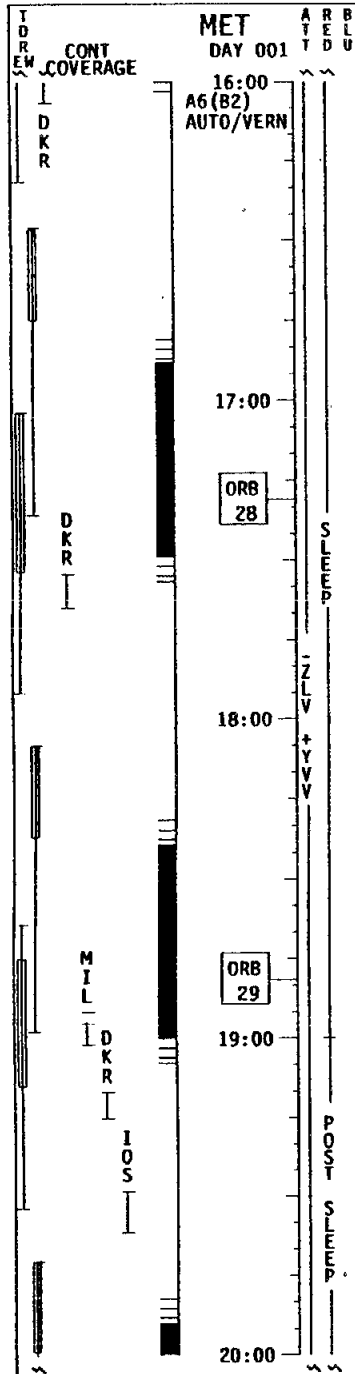
TOP CHECKOUT (cont'd)
(PHOTO/TV, TOP CONFIG)

UPDATE
H2O SUPPLY
DUMP QTY
H2O WASTE
DUMP QTY

STS-46 (BLU FD 03)

PL

MCC



MET
DAY 001

16:00
A6 (B2)
AUTO/VERN

STS

VENIED SPLY/WST H2O DUMP (cont'd)
(ORB OPS FS, DTG 325)

INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S) Steps A and B
(PLT)

INFORM CREW
GO FOR WASTE
DUMP

17:00

ORB
28

18:00

PADM STOW
(ORB OPS, CREW SYS)
SINGLE EVENT UPSET MON INIT
PGSC Insert MEMORY EVENT MONITOR disk
Reboot
After beep, press 'F' key

INFORM CREW
GO FOR RMS
RECONFIG

ORB
29

RMS POWERDOWN
(PDRS OPS, RMS PWRDN)
Note: Do not stow MPM's

P/TV04 SETUP (DSO 618)
(PHOTO/TV, P/TV SCENES)

19:00

PRIORITY PWRDN GROUP B
(ORB PKT, PRIOR PWRDN)
Perform all except steps
3,12,13

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

INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S)
(PLT)

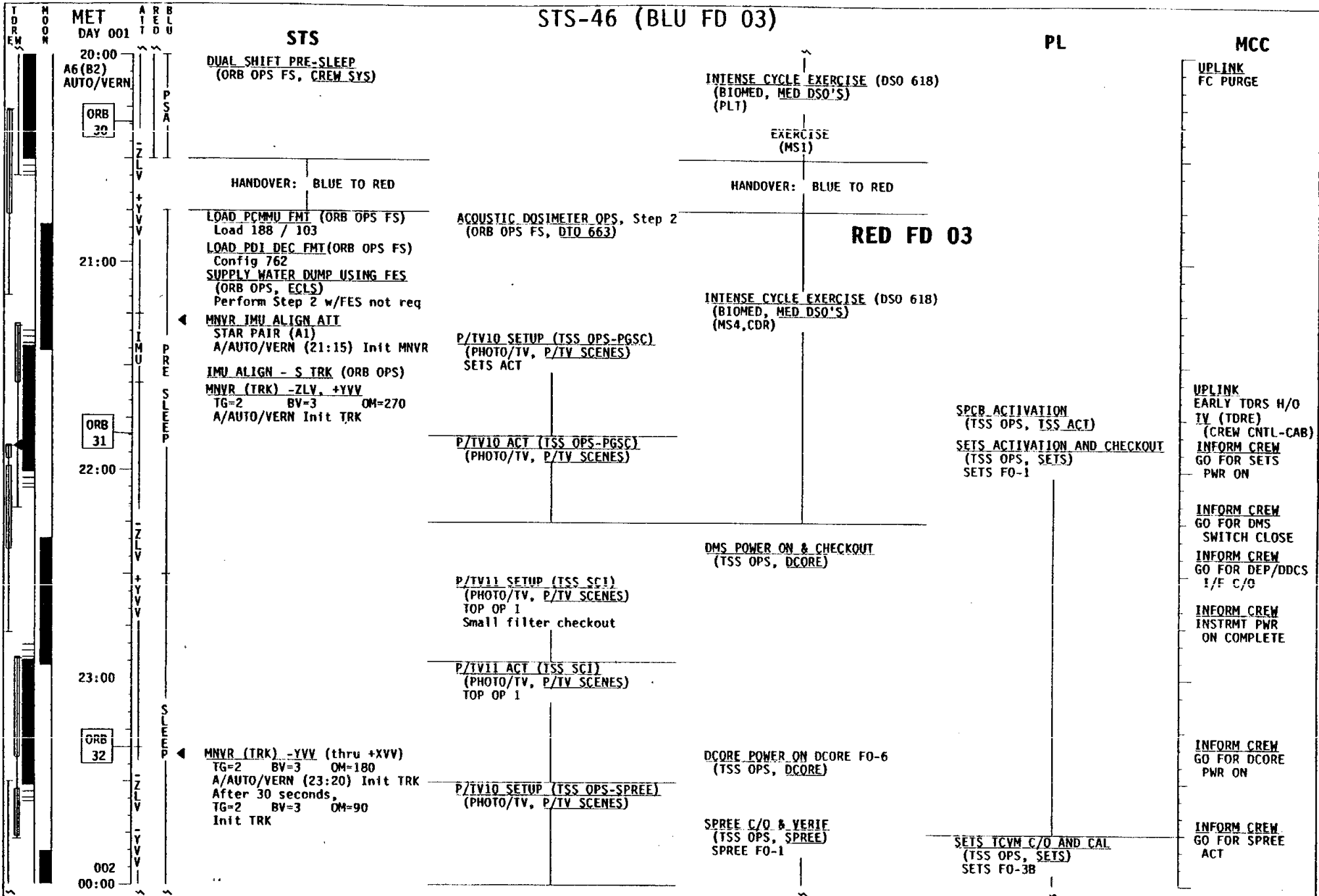
INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S)
Steps A and B
(CDR,MS4)

20:00

EXERCISE
(MS1)

TSS-1 PDC
PHASE

STS-46 (BLU FD 03)



STS-46 (RED FD 03)

STS

PL

MCC

MET DAY 002
 00:00
 A6(B2) AUTO/VERN
 ORB 33
 01:00
 A6'(B2) AUTO/PRI AUTO/VERN
 ORB 34
 (A6')B2 AUTO/PRI
 03:00
 A6(B2) AUTO/VERN
 ORB 35
 04:00

ZLV
 YVV
 XPOP
 ROLL
 IMU
 ZLV
 YVV

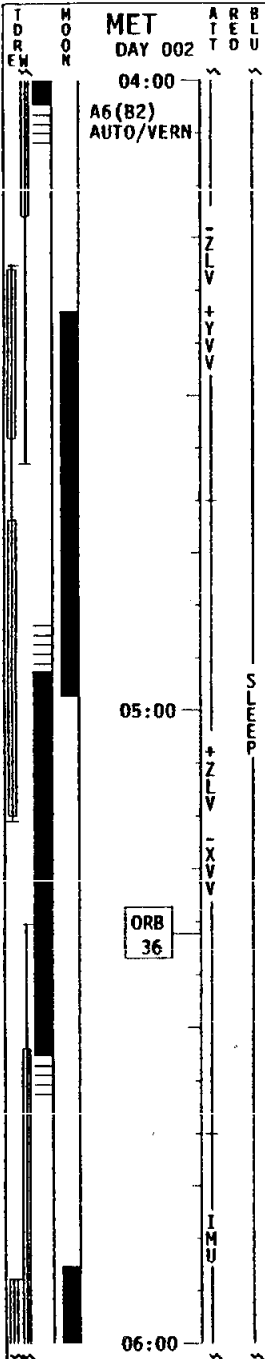
MEAL (A11)
 XPOP ROLL A
 MNVR IMU ALIGN ATT
 R=90 P=252 Y=12
 B/AUTO/PRI (02:40) Init MNVR
 Change DAP A to A6
 When in attitude,
 DAP: A/AUTO/VERN
 When SLA CAL complete,
 MNVR (TRK) -ZLV, +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN Init TRK

P/TV10 ACT (TSS OPS)
 (PHOTO/TV, P/TV SCENES)
 P/TV11 SETUP (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 2
 Spectroscopy checkout
 P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 2
 SINGLE EVENT UPSET MON TERM
 PGSC Exit MEMORY EVENT MONITOR
 (follow instructions on screen)
 PADM SETUP
 (ORB OPS, CREW SYS)
 P/TV11 SETUP (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 6
 Tail
 P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 6
 P/TV11 SETUP (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 4
 FPEG burn-in
 P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 4

SPREE C/O & VERIF
 (TSS OPS, SPREE)
 SPREE FO-1
 SETS SHORT CAL SETS FO-3A
 (TSS OPS, SETS)
 ATT SCAN - XPOP ROLL
 (TSS OPS, SETS)
 SETS FO-6A
 XPOP ROLL A
 GNC 20 DAP CONFIG
 DISC RATE NORM - ITEM 2 + 0.4 EXEC
 VERN - ITEM 3 + 0.4 EXEC
 GNC UNIV PTG
 BODY VECT - ITEM 14 + 1 EXEC
 DAP: A/AUTO/PRI
 ROT - ITEM 20 EXEC
 When ROT RATE -0.4°/sec,
 DAP: A/AUTO/VERN

SETS TCVM C/O AND CAL (cont'd)
 EOIM MASS SPECT ON
 L12LR MSPECT PWR - ON (tb-gray)
 DCORE CHECKOUT
 (TSS OPS, DCORE)
 DCORE FO-17
 EOIM MASS SPECT OFF
 L12LR MSPECT PWR - OFF (tb-bp)
 DACA PWR CYCLE
 (TSS OPS, PREDPLY OPS)
 PHCF MANIPULATION
 (PL OPS, PHCF)
 SATELLITE ACTIVATION
 (TSS OPS, TSS ACT)
 SLA CAL*
 Minimize crew motion
 SETS SHORT CAL SETS FO-3A
 (TSS OPS, SETS)
 FPEG FILAMENT BURN-IN
 (TSS OPS, SETS)
 SETS FO-4A

INFORM CREW
 TCVM Completed
 INFORM CREW
 GO FOR DCORE
 CHECKOUT
 INFORM CREW
 GO FOR SAT ACT
 INFORM CREW
 SLA CAL COMPLETE
 INFORM CREW
 TEMAG ACT
 COMPLETE



STS-46 (RED FD 03)

STS

PL

MCC

RETE & ROPE C/O*

FPEG FILAMENT BURN-IN
(TSS OPS, SETS)
SETS FO-4A

P/TV11 SETUP (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 5
FPEG Init emission

SETS SHORT CAL SETS FO-3A
(TSS OPS, SETS)

← MNVR (MAG) FPEG PAR
TGT=2 BV=5
P=270 Y=343 OM=196
A/AUTO/VERN (04:40) Init MNVR

P/TV11 ACT (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 5

FPEG INITIAL EMISSION TEST
(TSS OPS, SETS)
SETS FO-4B
Night

05:00

ORB
36

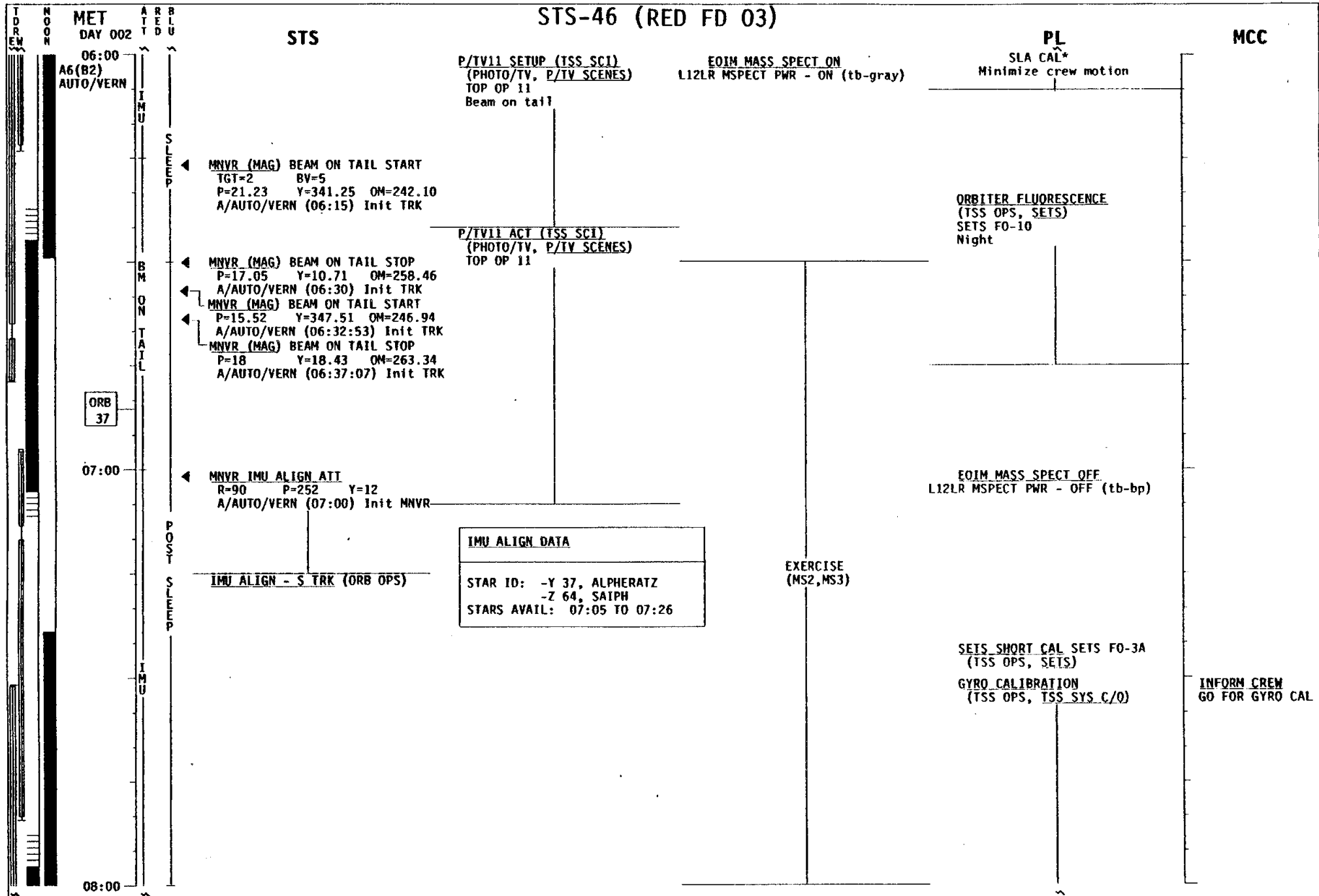
PADM STOW
(ORB OPS, CREW SYS)

← MNVR IMU ALIGN ATT
R=90 P=252 Y=12
A/AUTO/VERN (05:40) Init MNVR

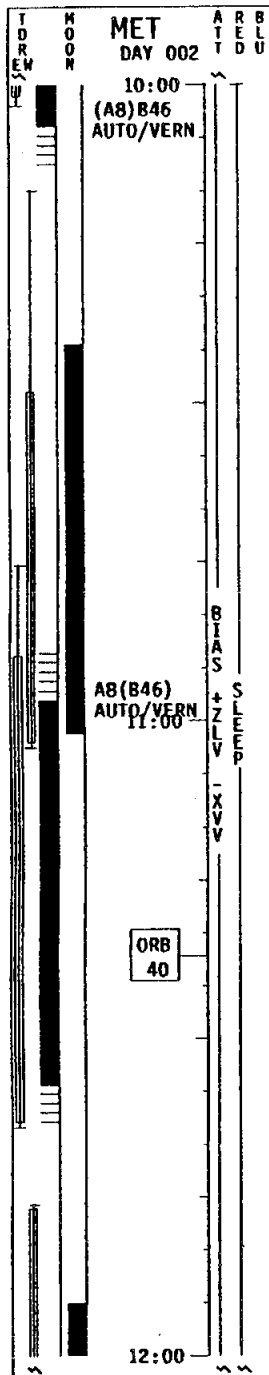
SETS SHORT CAL SETS FO-3A
(TSS OPS, SETS)

SLA CAL*
Minimize crew motion

06:00



MET DAY 002		STS		PL		MCC	
08:00	A6(B2) AUTO/VERN	HANDOVER: RED TO BLUE		HANDOVER: RED TO BLUE		GYRO CALIBRATION (TSS OPS, TSS SYS C/O)	
(A8)B48 AUTO/VERN	ORB 38	STOWED NOISE BASELINE DFO-2 (TSS OPS, DPLYD OPS) PRCS FIRING FORCE FES (2.5 MIN) PRCS FIRING		DUAL SHIFT PRE-SLEEP (ORB OPS FS, CREW SYS)		INFORM CREW GO FOR GYRO CAL TERM	
A8(B48) LVLH/VERN				BLUE FD 04		UPLINK FC PURGE	
A6(B2) AUTO/VERN		HUM SEPs for H2O accumulation, then HUMIDITY SEP RECONFIG L1 HUMIDITY SEP B - OFF A - ON 06 UHF MODE - OFF PRIVATE MEDICAL CONFERENCE					
09:00		UHF MODE - SPLX (or as reqd)		P/TV11 SETUP (ISS SCI) (PHOTO/TV, P/TV SCENES) TOP OP 7 FPEG		SLA CAL* Minimize crew motion	
		When SLA CAL complete, MNVR (TRK) FLYAWAY ATT TG=2 BV=5 P=300 Y=0 OM=180 A/AUTO/VERN Init TRK				INFORM CREW SLA CAL COMPLETE	
		Change DAP A to A8, B to B46 MNVR (TRK) DEPLOY ATT TG=2 BV=5 P=310 Y=0 OM=180 B/AUTO/VERN (09:23) Init TRK		P/TV11 ACT (ISS SCI) (PHOTO/TV, P/TV SCENES) TOP OP 7		MTL: IPDC7 (2/09:00:00) STL: SETS3A (/ : : : :) PASS SETSPASS SETS20 SIM DEP1 DEP1 DEP1	
				EXERCISE (PLT)		MTL: 1PDC8 (2/09:28:20) STL: DEP1 (/ : : : :) DEP1 DEP1 DEP1	
						MTL: 2PDC8 (2/09:55:00) STL: DEP1 (/ : : : :)	
10:00	ORB 39						



STS-46 (RED FD 03)

STS

PL

MCC

EXERCISE

RF LINK TEST
(TSS OPS, TSS SYS C/O)

APS CHECKOUT

P/TV11 SETUP (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 8
FPEG/Airglow

P/TV11 ACT (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 8

L17 Check MCIU filter screen

- ◀ MNVR (TRK) ORB ATT STEP 1
TG=2 BV=5
P=300 Y=0 OM=180
A/AUTO/VERN (10:57) Init TRK
- ◀ MNVR (TRK) ORB ATT STEP 2
TG=2 BV=5
P=285 Y=0 OM=180
A/AUTO/VERN (11:08) Init TRK
- ◀ MNVR (TRK) ORB ATT STEP 3
TG=2 BV=5
P=275.5 Y=0 OM=180
A/AUTO/VERN (11:18) Init TRK
- ◀ MNVR (TRK) MNVR TO TEA
TG=2 BV=5
P=248 Y=0 OM=180
A/AUTO/VERN (11:35) Init TRK

DEP1

DEP1

MTL: 3PDC8 (2/10:15:00)
STL: DEP1 (/ : :)

DEP1

DEP1

DEP1

SETS3A
PASS

SETSPASS

MTL: 1PDC9 (2/10:55:00)
STL: IVP24 (/ : :)

MTL: 2PDC9 (2/11:19:00)
STL: DCP (/ : :)

ACP

PASS
SETSPASS

INFORM CREW
RF TLM FOR D/L

INFORM CREW
GO FOR IN-LINE
THRUSTER TEST

TDR
MOON
MET
DAY 002
12:00
AB(B46)
AUTO/VERN
AB(B49)
AUTO/VERN
(AB)B49
AUTO/VERN
ORB
41
13:00
AB(B49)
AUTO/VERN
A6(B2)
AUTO/VERN
14:00

RELU
360
ORBIT
PAR

STS

STS-46 (BLU FD 04)

Change DAP B to B49
 MNVR (TRK) OST1 TFA
 TGT=2 BV=5
 P=244.5 Y=0 OM=180
 A/AUTO/VERN (12:12) Init TRK

ORBITER ROTATION
 TGT=2 BV=5
 P=244.5 Y=0 OM=300
 B/AUTO/VERN (12:27) Init TRK

ADI When horizon line LVLH yaw < 295
 OM=60
 Init TRK (-12:41)

ADI When horizon line LVLH yaw > 5
 OM=180
 Init TRK (-13:04)

When in att,
 DAP: A/AUTO/VERN
 IMU ALIGN-S TRK (ORB OPS)
 Perform Steps 2 through 6
 SUPPLY WATER DUMP USING FES
 (ORB OPS, ECLS)
 Perform Step 2 w/FES not req

Change DAP A to A6, B to B2
 MNVR (MAG) +X PAR
 TGT=2 BV=5
 P=120 Y=0 OM=118
 A/AUTO/VERN (13:45) Init TRK

BEAM EXCITATION SETS FO-11
 (TSS OPS, SETS)
 Night

P/TV11 SETUP (TSS SCI) (cont'd)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 9
 IVP12/FPEG

P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 9

PADM SETUP
 (ORB OPS, CREW SYS)

P/TV11 SETUP (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 10
 FPEG/Airglow

P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 10

PL

MCC

MTL: 3PDC9 (2/12:00:00)
 STL: SETS3A (/ : :)
 PASS

SIM/IV OST
 SETSPASS
 IVP12

IVP12

MTL: 1PDC10 (2/12:34:00)
 STL: IVP12 (/ : :)

IVP12

MTL: 2PDC10 (2/12:58:00)
 STL: IVP12 (/ : :)

IVP12

IVP12

MTL: 3PDC10 (2/13:34:00)
 STL: IVP12 (/ : :)

SETS3A

BEAM EXCITATION SETS FO-11
 (TSS OPS, SETS)
 Night

MEAL (A11)

STS-46 (BLU FD 04)

MET
DAY 002

14:00

A6(B2)
FREE/PRI
AUTO/PRI
FREE/PRI
AUTO/PRI
FREE/PRI
AUTO/PRI
FREE/PRI
AUTO/PRI
FREE/PRI
AUTO/VERN

ORB
42

15:00

ORB
43

16:00

TDR
NOON
A
R
E
L
U
P
A
R
M
A
G

STS

BEAM EXCITATION (cont'd)
 PRCS FIRINGS
 FORCE FES
 PRCS FIRINGS

◀ **MNVR (MAG) +X PAR**
 TGT=2 BV=5
 P=84 Y=0 OM=103
 A/AUTO/VERN (14:07) Init TRK
BEAM EXCITATION SETS FO-11
 (TSS OPS, SETS) Steps 3-6
 PRCS FIRINGS
 FORCE FES
 PRCS FIRINGS

P/TV11 ACT (TSS SCI) (cont'd)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 10

PL

BEAM EXCITATION (cont'd)
 (TSS OPS, SETS)

BEAM EXCITATION SETS FO-11
 (TSS OPS, SETS) Steps 3-6

MCC

◀ **MNVR (TRK) +ZLV,+XVY**
 TGT=2 BV=5
 P=270 Y=0 OM=0
 A/AUTO/VERN (14:35) Init TRK

GAS INTERACTIONS SETS FO-9A
 (TSS OPS, SETS)

FORCE FES (5 min)

P/TV11 SETUP (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 12
 FPEG

EOIM MASS SPECT ON
 L12LR MSPECT PMR - ON (tb-gray)

SETS SHORT CAL SETS FO-3A
 (TSS OPS, SETS)
GAS INTERACTIONS SETS FO-9A
 (TSS OPS, SETS)

◀ **MNVR (MAG) FPEG PAR**
 TGT=2 BV=5
 P=185 Y=316 OM=173
 A/AUTO/VERN (15:10) Init TRK

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

P/TV11 ACT (TSS SCI)
 (PHOTO/TV, P/TV SCENES)
 TOP OP 12

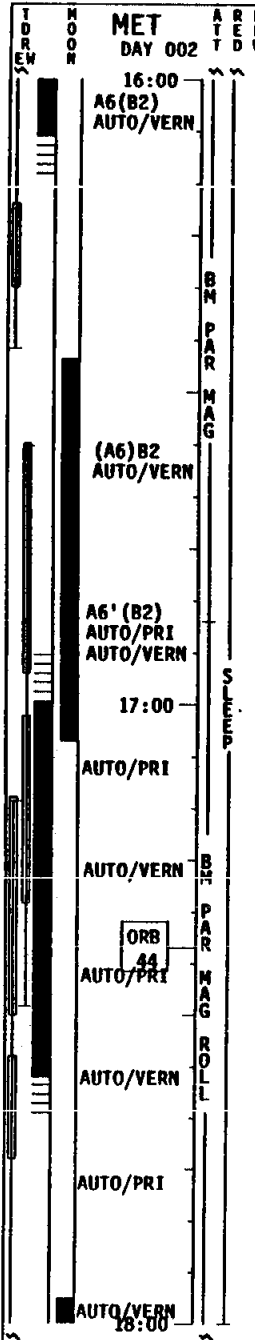
ELECTRON REFLECT SETS FO-8
 (TSS OPS, SETS)

◀ **MNVR (MAG) FPEG PAR**
 TGT=2 BV=5
 P=181 Y=5 OM=188
 A/AUTO/VERN (15:43) Init TRK

◀ **MNVR (MAG) FPEG PAR**
 TGT=2 BV=5
 P=170 Y=28 OM=160
 A/AUTO/VERN (15:53) Init TRK

ELECTRON REFLECT SETS FO-8
 (TSS OPS, SETS)
 Step 4

ELECTRON REFLECT SETS FO-8
 (TSS OPS, SETS)
 Step 4



STS

STS-46 (BLU FD 04)

PL

MCC

PADM STOW
(ORB OPS, CREW SYS)

P/TV11 ACT (ISS SCI) (cont'd)
(PHOTO/TV, P/TV SCENES)
TOP OP 12

ELECTRON REFLECT (cont'd)
(TSS OPS, SETS)
Step 4

ELECTRON REFLECT SETS FO-8
(TSS OPS, SETS)
Step 4

◀ **MNVR (MAG) FPEG PAR**
TGT=2 BV=5
P=172 Y=6 OM=128
A/AUTO/VERN (16:27) Init TRK

P/TV11 SETUP (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 13
FPEG

ELECTRON REFLECT SETS FO-8
(TSS OPS, SETS)
Step 4

◀ **MNVR (MAG) FPEG PAR**
P=90 Y=283 OM=171
A/AUTO/VERN (16:35) Init TRK

EOIM MASS SPECT OFF
L12LR MSPECT PWR - OFF (tb-gray)
- ON (tb-bp)
- OFF (tb-bp)

SETS SHORT CAL SETS FO-3A
(TSS OPS, SETS)

BEAM STRUCTURE SETS FO-18
(TSS OPS, SETS)

CONFIG ROT [B]

CONFIG ROT [B]
FLT CNTLR PWR - ON
F6/F8 ADI ATT - LVLH
RATE - MED

◀ **INIT MAN ROT [C] (16:52)**

P/TV11 ACT (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 13

BEAM STRUCTURE SETS FO-18
(TSS OPS, SETS)
Step 3

◀ **MNVR (MAG) FPEG PAR - EQU**
P=90 Y=306 OM=214
A/AUTO/PRI (17:07) Init TRK

◀ **INIT MAN ROT [C] (17:12)**

INIT MAN ROT [C]
DAP: A/LVLH/PRI
DAP ROT: PULSE/DISC/DISC
◀ **RHC: +ROLL Target for 0.4 °/sec**
When ROT RATE = 0.4°/sec,
DAP: A/LVLH/VERN
Maintain ROLL RATE = 0.4 ± .05°/sec

◀ **MNVR (MAG) FPEG PAR**
P=90 Y=20 OM=18
A/AUTO/PRI (17:27) Init TRK

◀ **INIT MAN ROT [C] (17:34)**

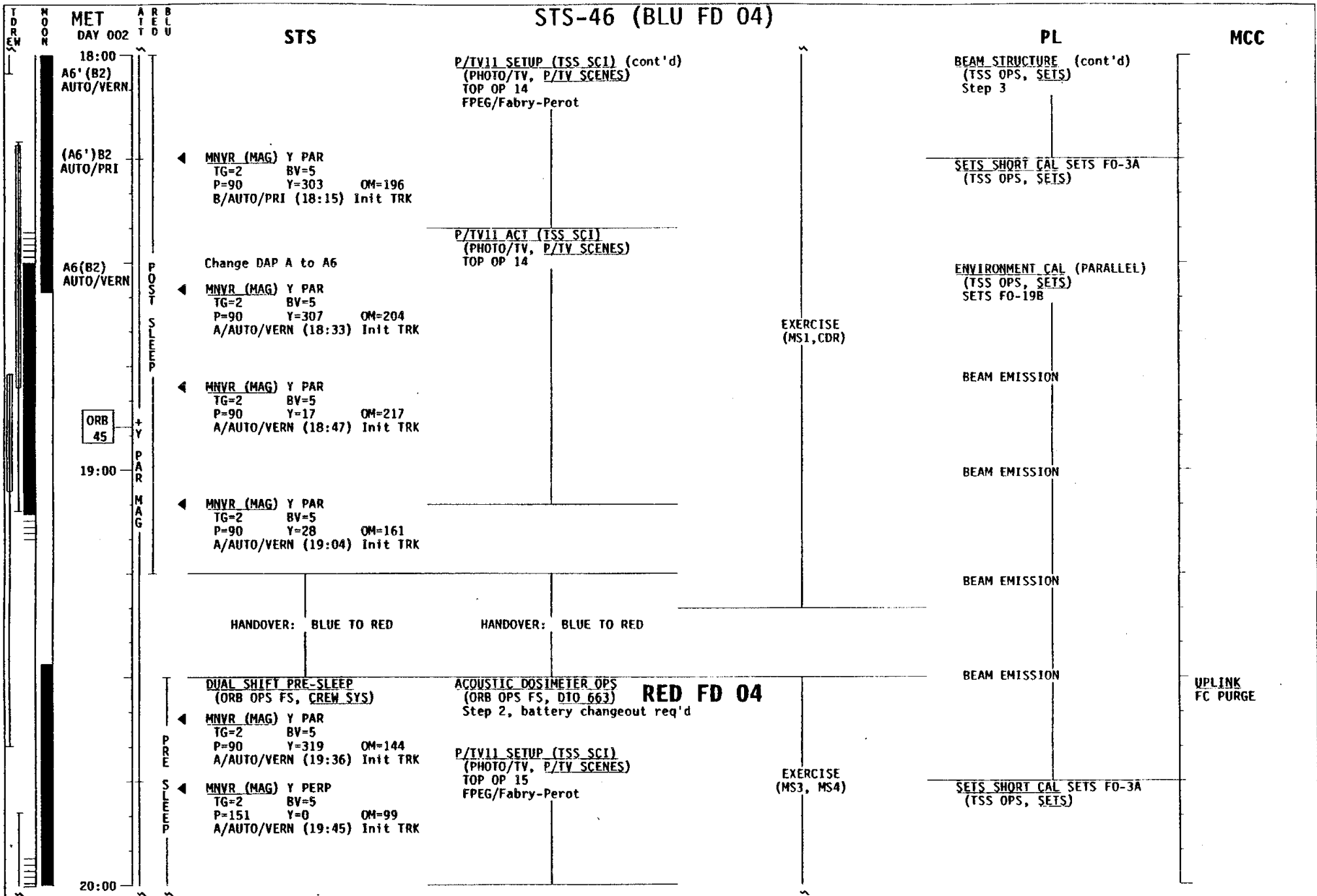
BEAM STRUCTURE SETS FO-18
(TSS OPS, SETS)
Step 3

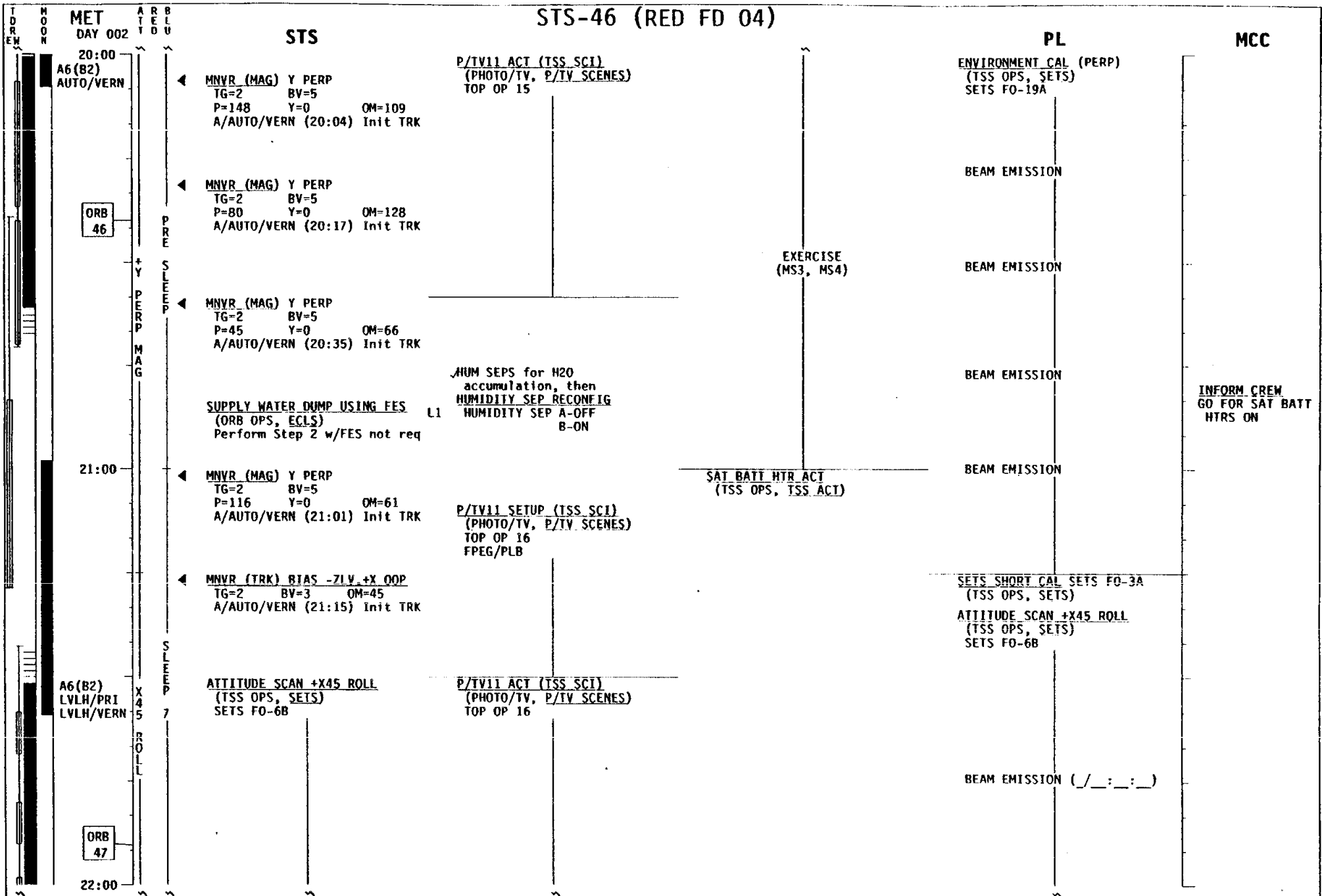
◀ **MNVR (MAG) FPEG PAR - EQU**
P=90 Y=3 OM=161
A/AUTO/PRI (17:49) Init TRK

◀ **INIT MAN ROT [C] (17:57)**

EXERCISE
(MS1, CDR)

BEAM STRUCTURE SETS FO-18
(TSS OPS, SETS)
Step 3





STS-46 (RED FD 04)

MET
DAY 002

22:00
A6(B2)
LVLH/VERN

A6(B2)
LVLH/PRI
A6(B2)
AUTO/VERN

23:00
A6(B2)
LVLH/PRI
LVLH/VERN

003
00:00

ORB
48

DR EN
MOON
ATT
RELU
X45
ROLL
SLEEP
+ZLV
YAW

STS

ATTITUDE SCAN +X45 ROLL (cont'd) (TSS OPS, SETS)
SETS FO-6B

P/TV11 ACT (TSS SCI) (cont'd)
TOP OP 16

PADM SETUP
(ORB OPS, CREW SYS)

P/TV11 SETUP (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 17
PLB/FPEG

MNVR (TRK) +ZLV +XVY
TGT=2 BV=5
P=270 Y=0 OM=0
A/AUTO/VERN (22:45) Init TRK

ATTITUDE SCAN +ZLV YAW (TSS OPS, SETS)
SETS FO-6D

P/TV11 ACT (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 17

FORCE FES (5 MIN)

PADM STOW
(ORB OPS, CREW SYS)

PL

ATTITUDE SCAN +X45 ROLL (cont'd) (TSS OPS, SETS)
SETS FO-6B
BEAM EMISSION (/ : :)

BEAM EMISSION (/ : :)

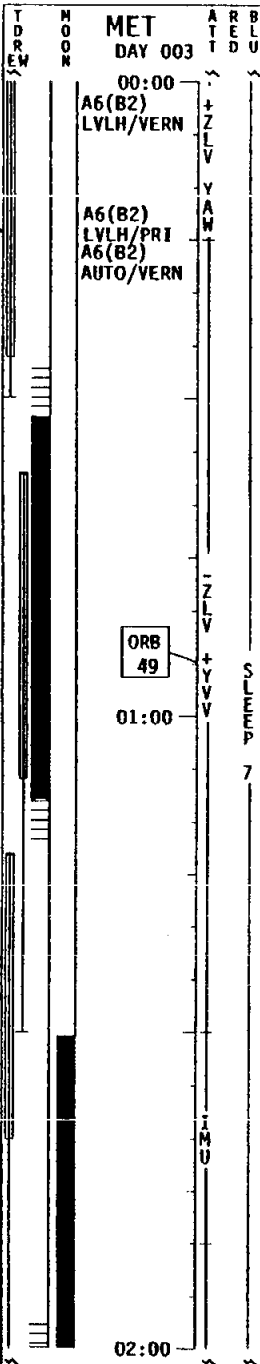
SETS SHORT CAL SETS FO-3A (TSS OPS, SETS)
ATTITUDE SCAN +ZLV YAW (TSS OPS, SETS)
SETS FO-6D

GAS INTERACTIONS (/ : :)

BEAM EMISSION (/ : :)

BEAM EMISSION (/ : :)

MCC



STS-46 (RED FD 04)

STS

ATTITUDE SCAN +ZLV YAW (cont'd)
 (TSS OPS, SETS)
 SETS FO-6D

← MNVR (TRK) -ZLV, +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN (00:15) Init TRK

MEAL (A11)

← MNVR IMU ALIGN ATT
 STAR PAIR (C1)
 A/AUTO/VERN (01:30) Init MNVR

IMU ALIGN - S TRK (ORB OPS)

← MNVR (TRK) FLYAWAY ATT
 TG=2 BV=5
 P=300 Y=0 OM=180
 A/AUTO/VERN (01:50) Init TRK

PRIORITY PWRUP GROUP B
 (ORB PKT, PRIOR PWRDN)

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

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

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

P/TV10 ACT (TSS OPS)
 (PHOTO/TV, P/TV SCENES)

P/TV10 SETUP (TSS)
 (PHOTO/TV, P/TV SCENES)

REEL MOTOR CHECKOUT
 (TSS OPS, ISS SYS C/O)

VERNIER MOTOR CHECKOUT
 (TSS OPS, ISS SYS C/O)

PREDEPLOY PREP
 (TSS OPS, PREDEPLY OPS)

Sat ext pwr off
 UNLATCH SATELLITE
 (TSS OPS, PREDEPLY OPS)
 Open SRL's

PL

ATTITUDE SCAN +ZLV YAW (cont'd)
 (TSS OPS, SETS)
 SETS FO-6D

SETS SHORT CAL SETS FO-3A
 (TSS OPS, SETS)

PHCF MANIPULATION
 (PL OPS, PHCF)

DCORE CHECKOUT
 (TSS OPS, DCORE)
 DCORE FO-17

MCC

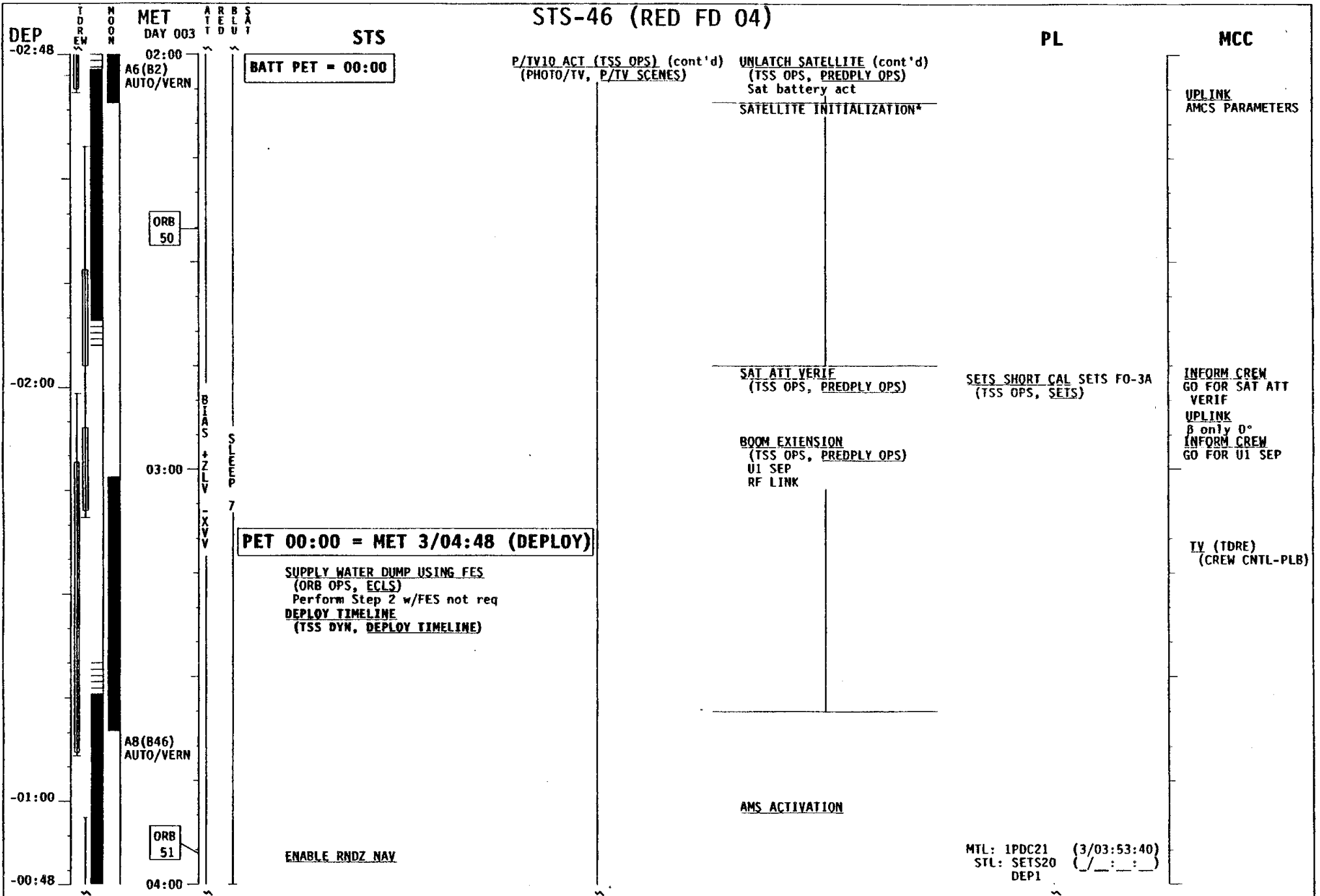
UPDATE
 H2O WASTE
 DUMP QTY

INFORM CREW
 GO FOR DCORE
 CHECKOUT

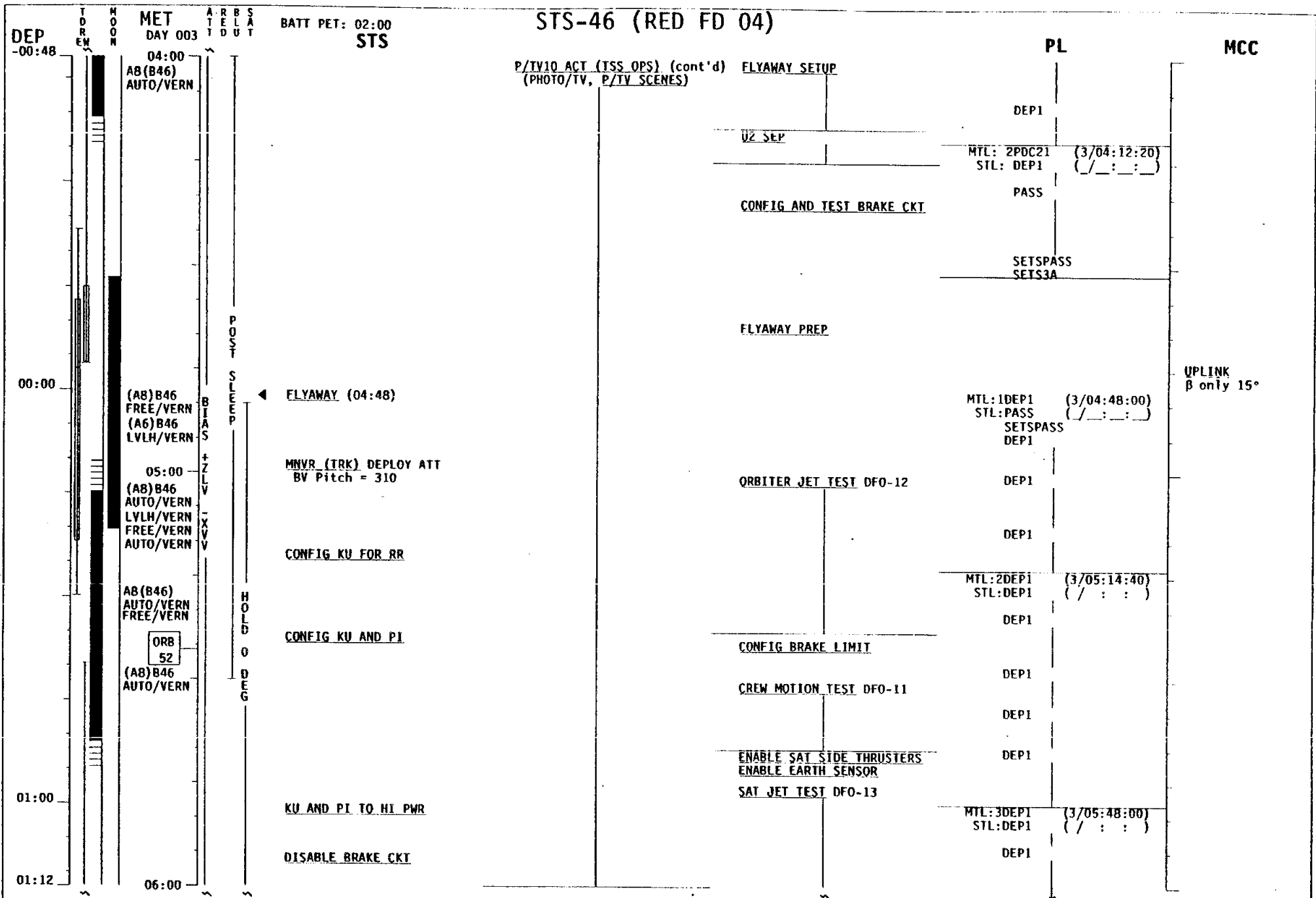
INFORM CREW
 GO FOR REEL MTR
 CHECKOUT

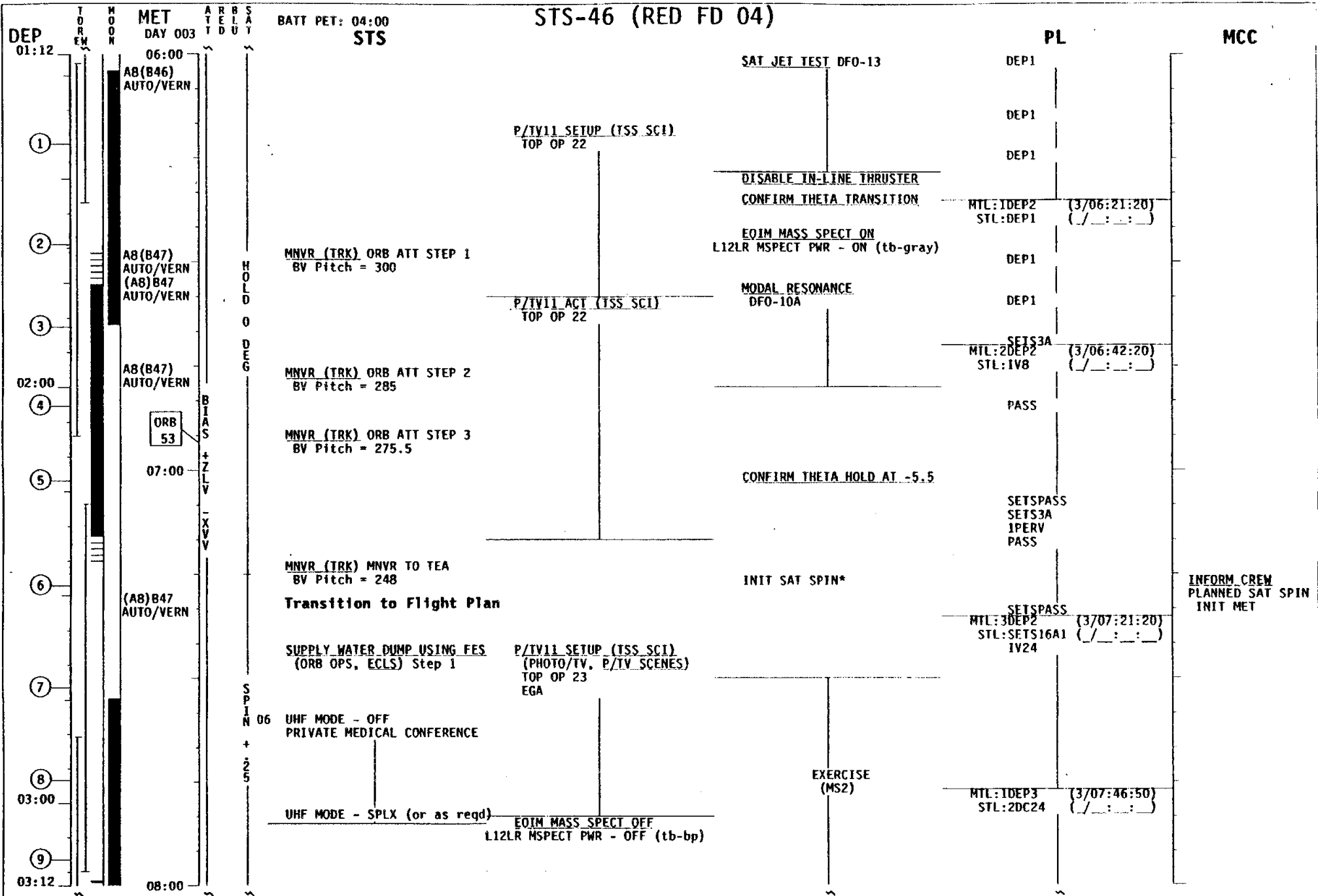
INFORM CREW
 GO FOR EXT PWR
 OFF

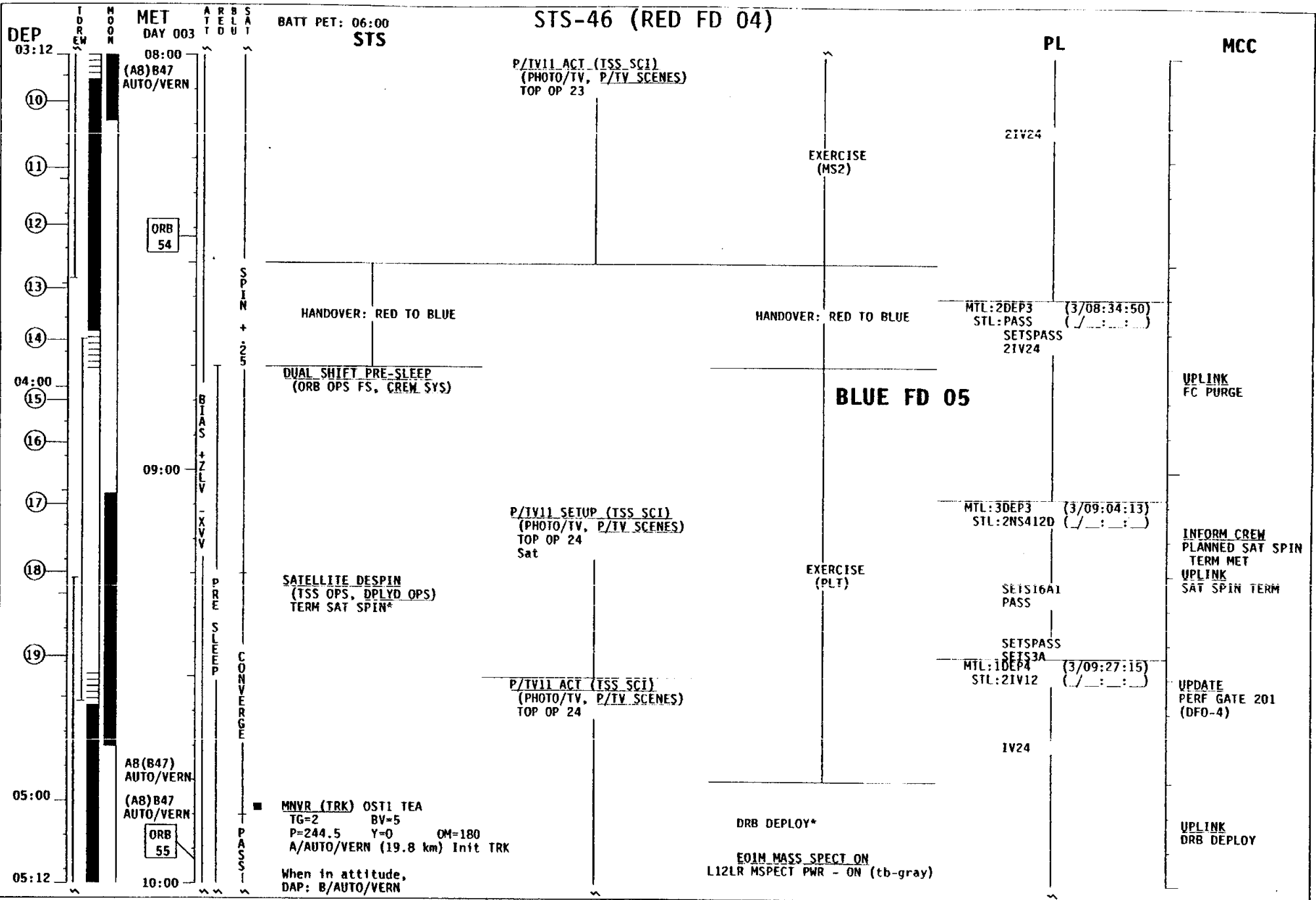
TV (TDRE)
 (CREW CNTL-PLB)
 INFORM CREW
 GO FOR SRL OPEN

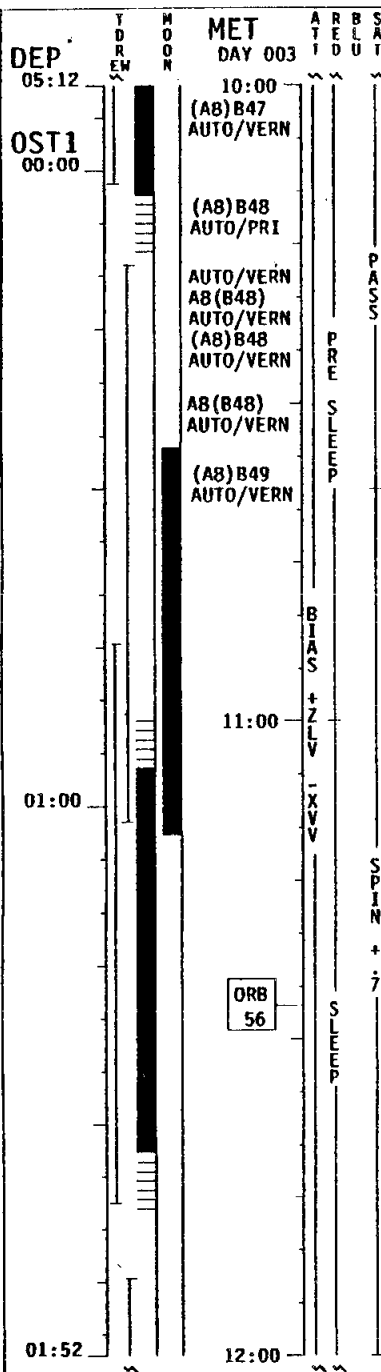


TSS-1 DEPLOYED PHASE









STS-46 (BLU FD 05)

BATT PET: 08:00
STS

SUPPLY WATER DUMP USING FES
(ORB OPS, ECLS)
Perform Step 2 w/FES not req

INLINE IMPULSE DFO-4
(TSS OPS, DPLYD OPS)
PRCS FIRING

ECLSS REDUND COMPONENT C/O
(ORB OPS, ECLS)

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

P/TV11 ACT (ISS SCI) (cont'd)
(PHOTO/TV, P/TV SCENES)
TOP OP 24

P/TV11 SETUP (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 25
Telescope at sat

P/TV11 ACT (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 25

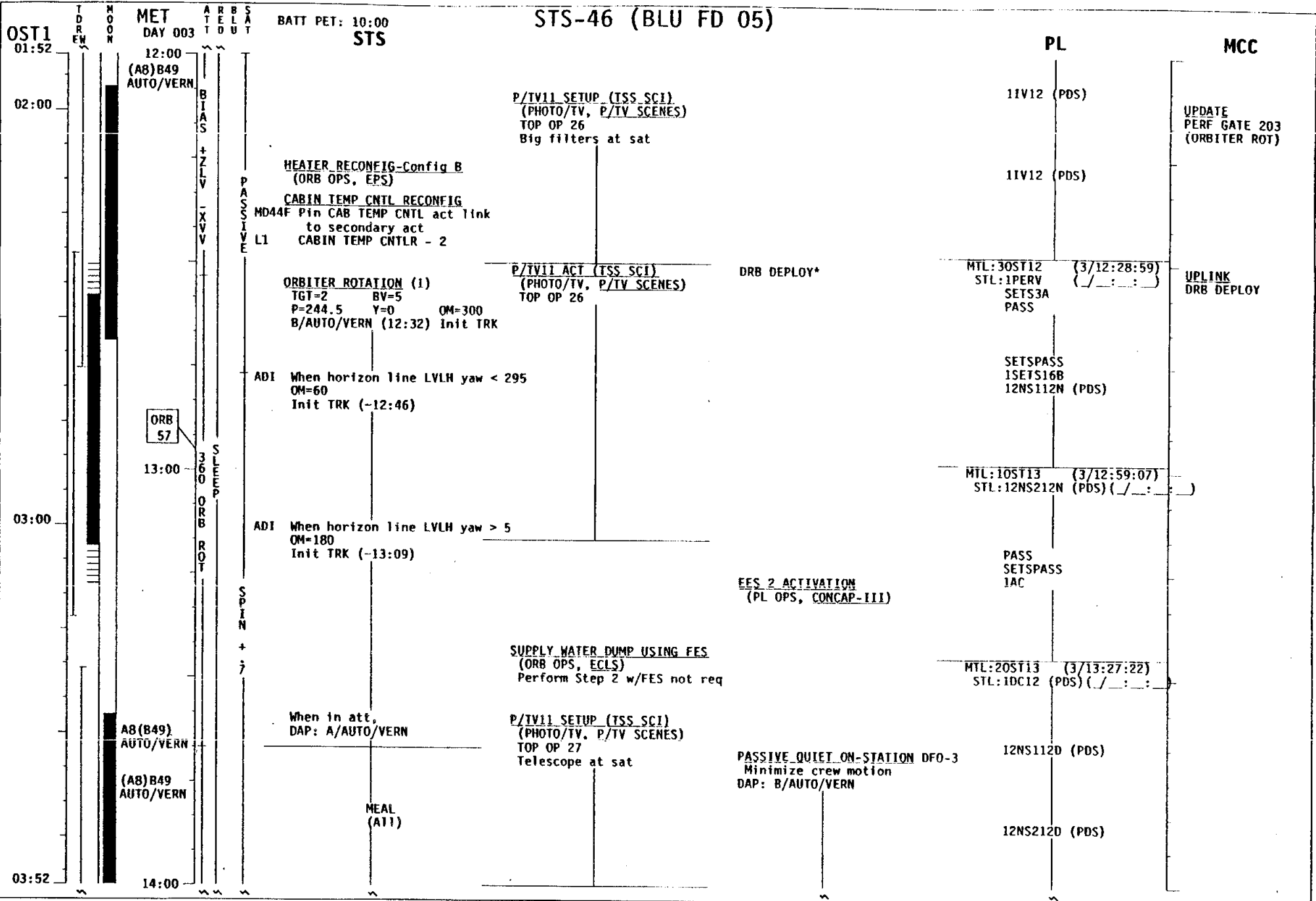
CONFIG FOR ONSTATION 1
(TSS OPS, DPLYD OPS)

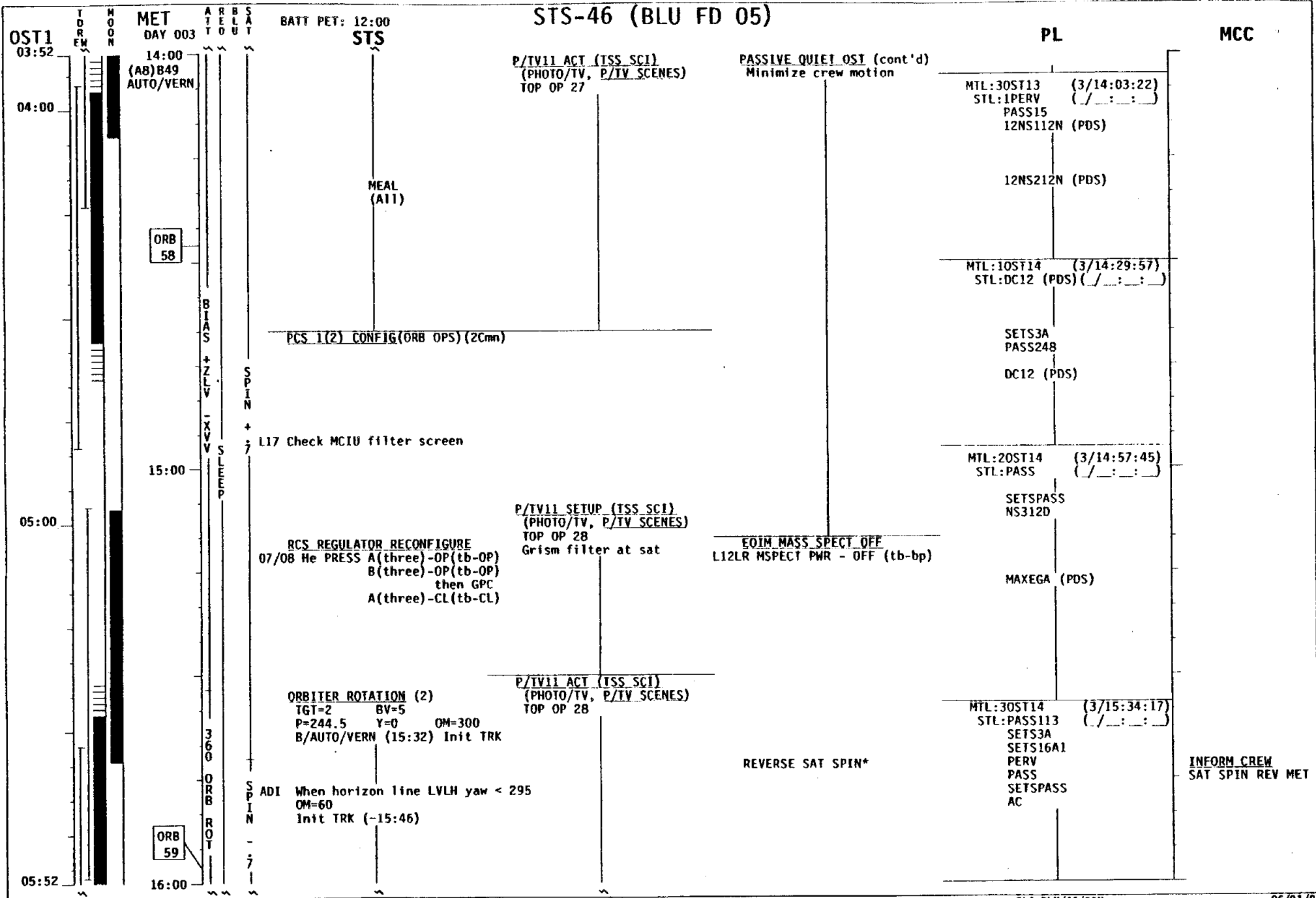
PL	
1PERV	
MTL:10ST11	(3/10:05:35)
STL:SETS3A	(/ : :)
PASS125	
21V12	
PASS	
SETSPASS	
MTL:20ST11	(3/10:37:15)
STL:SETS16B	(/ : :)
PASS15	
12NS112D	(PDS)
12NS212D	(PDS)
PASS159	
MTL:30ST11	(3/11:04:59)
STL:1DC12	(PDS) (/ : :)
11V12	(PDS)
MTL:10ST12	(3/11:28:59)
STL:11V12	(PDS) (/ : :)
1DC12	
MTL:20ST12	(3/11:52:59)
STL:1DC12	(/ : :)

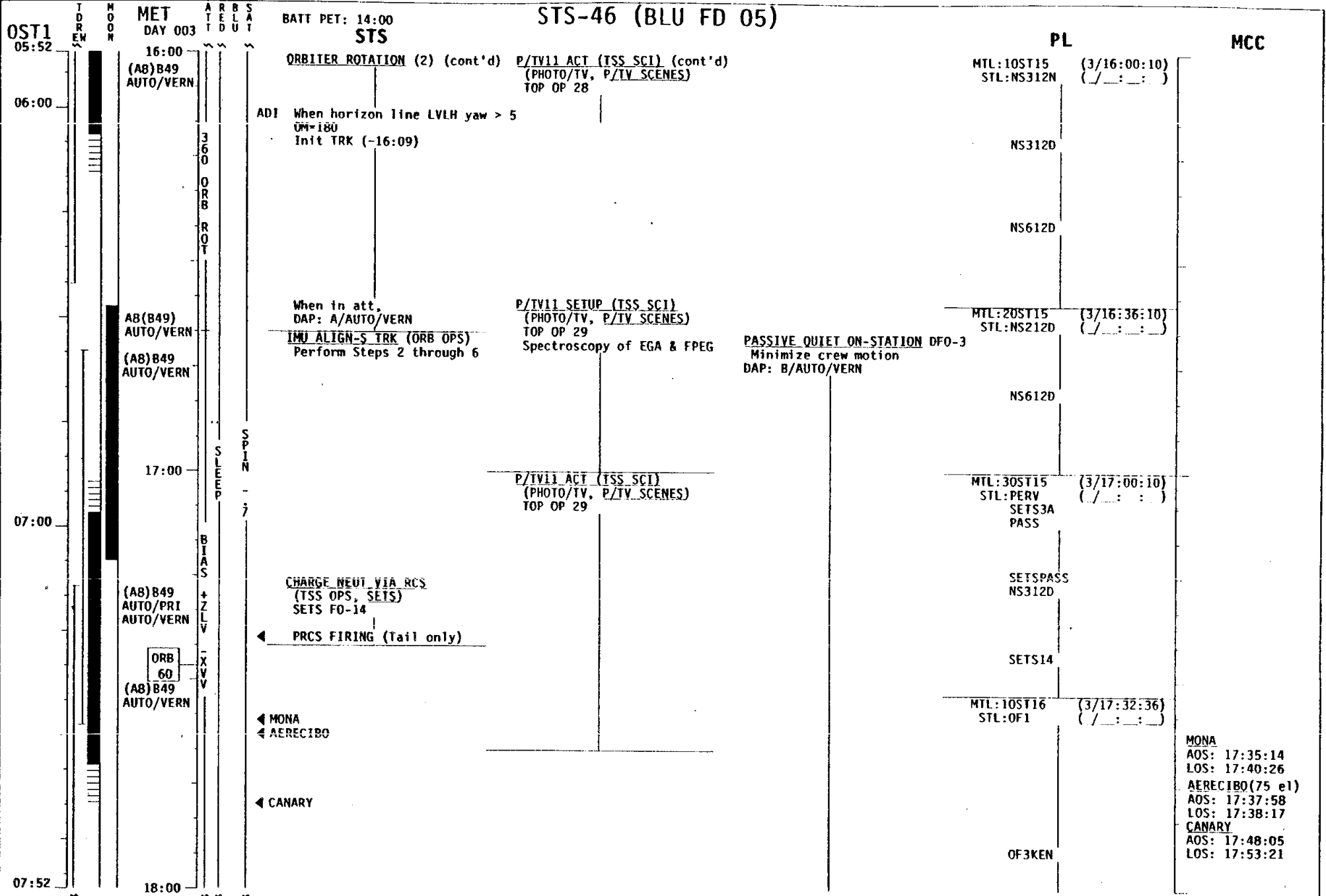
MCC

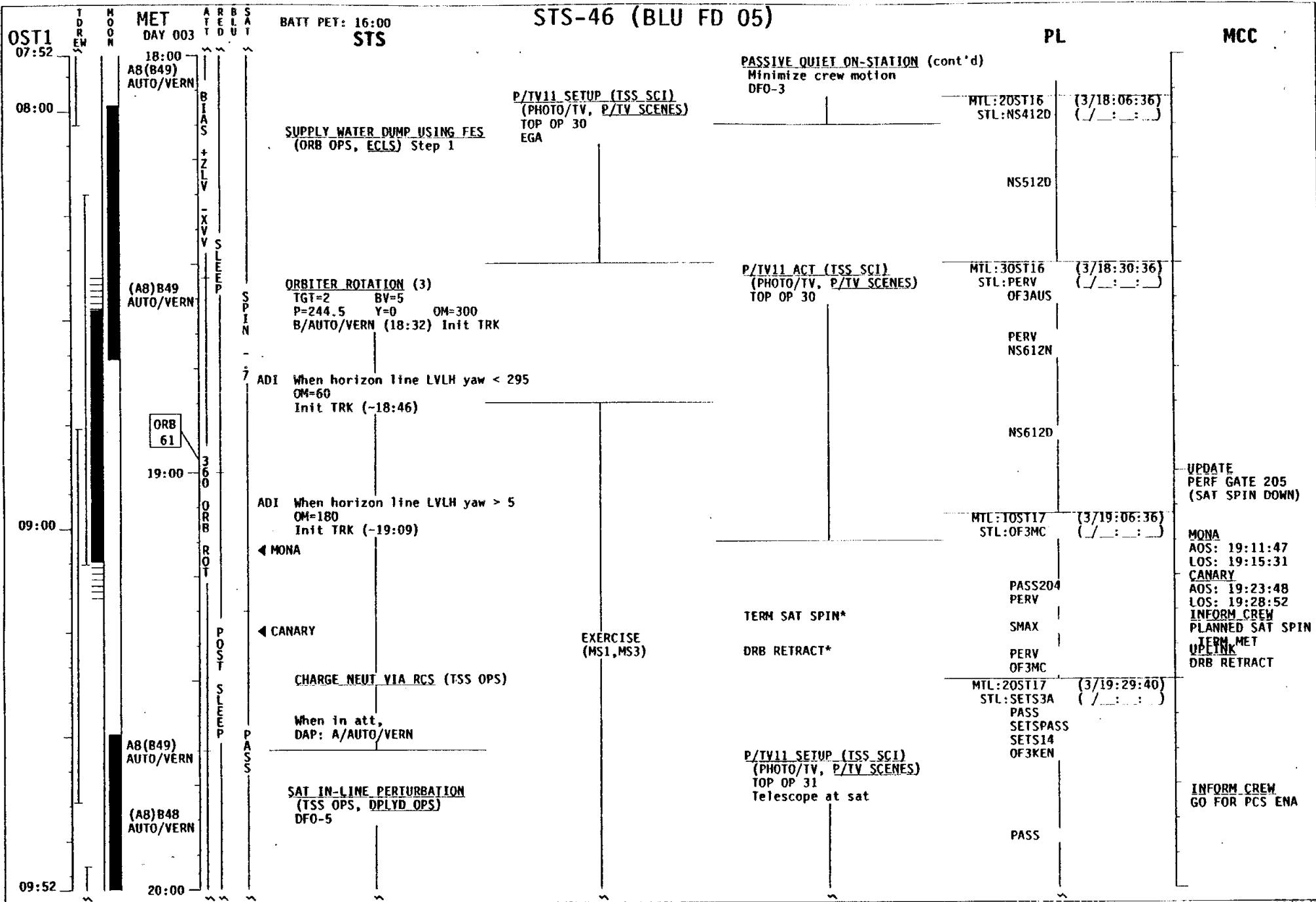
UPDATE
PERF GATE 202
(SAT SPIN)

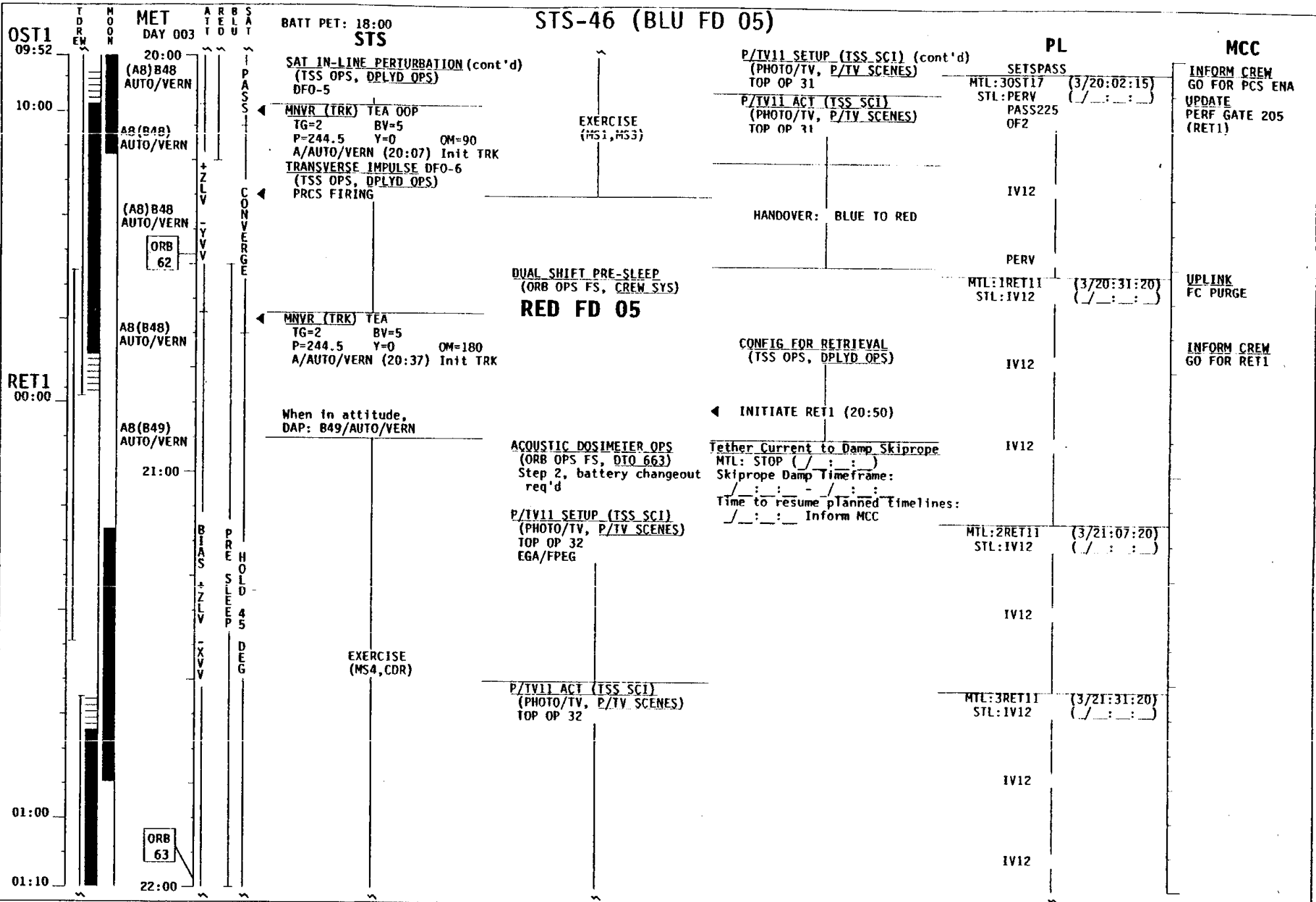
INFORM CREW
PLANNED SAT SPIN
INIT MET

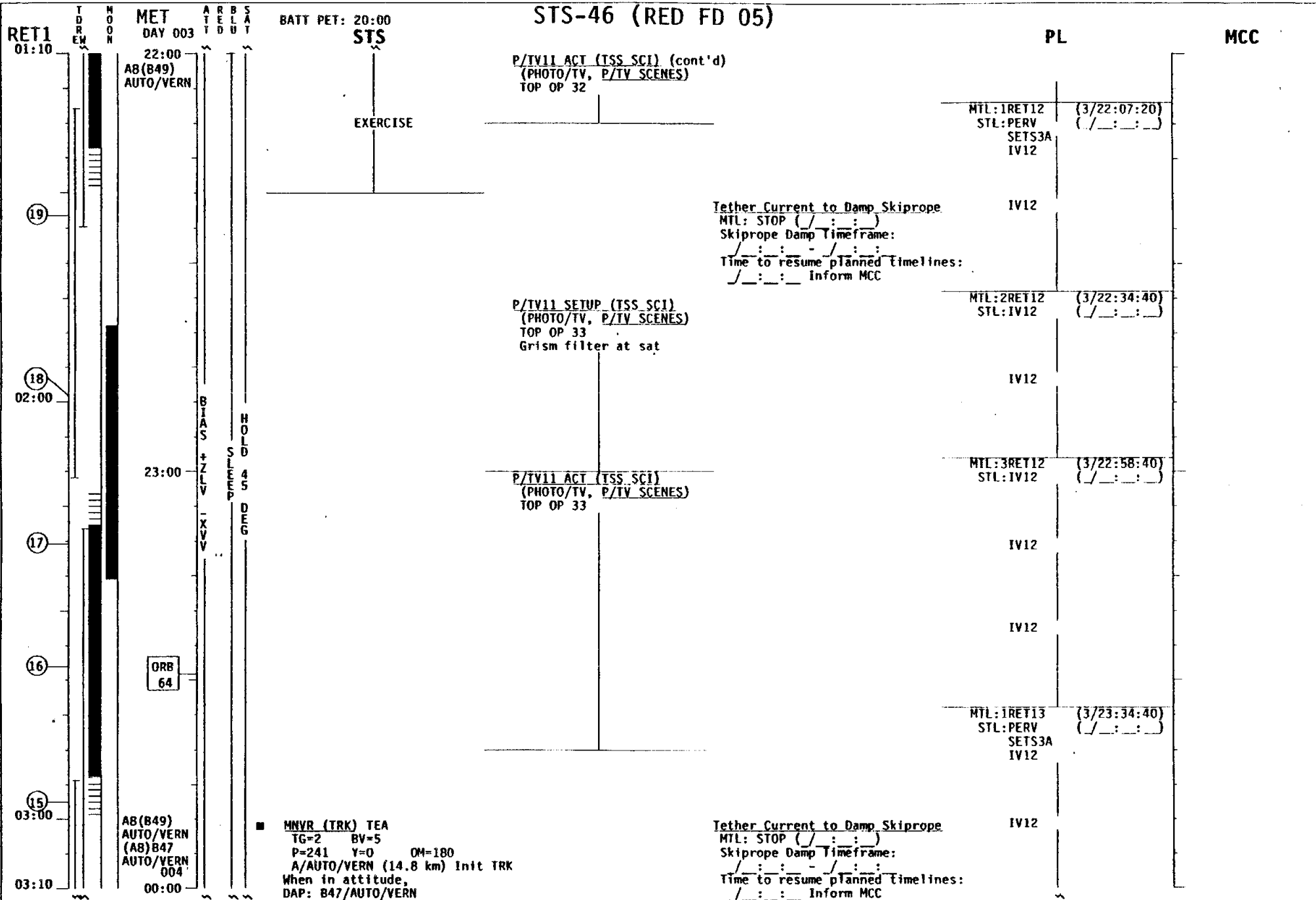












STS-46 (RED FD 05)

BATT PET: 22:00
STS

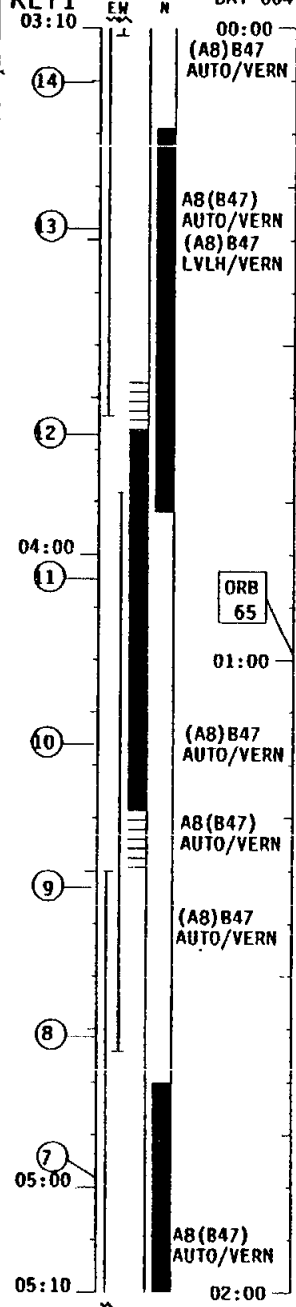
PL

MCC

RET1
03:10

MET
DAY 004

ARRIVAL
DEPART



CONFIRM THETA TRANS FROM 2 TO 4
(TSS OPS, DPLYD OPS)

P/TV11 SETUP (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 34
Sat

ROLL RESONANCE FD (13 km)
(TSS OPS, DPLYD OPS)

P/TV11 ACT (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 34

MTL: 2RET13 (4/00:02:00)
STL: IV12 (/ : :)

UPDATE
PERF GATE 301
(11K QUIESCENT)

IV12

PERV
SETS3A
PASS

04:00

ORB
65

01:00

(A8)B47
AUTO/VERN

CONFIRM THETA TRANS FROM 4 TO 6
(TSS OPS, DPLYD OPS)

PHCF MANIPULATION
(PL OPS, PHCF)

(A8)B47
AUTO/VERN

■ MNVR (TRK) TEA
TG=2 BV=5
P=237 Y=0 OM=180
A/AUTO/VERN (10 km) Init TRK

When in attitude,
DAP: B/AUTO/VERN

PET 00:00 = 3/20:50 (RET1 INIT)

SUPPLY WATER DUMP USING FES
(ORB OPS, ECLS)

Perform Step 2 w/FES not req

P/TV11 SETUP (TSS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 35
Big filters at sat

MTL: 1RET14 (4/01:28:20)
STL: SETSPASS (/ : :)

PERV
SETS3A
PASS

05:00

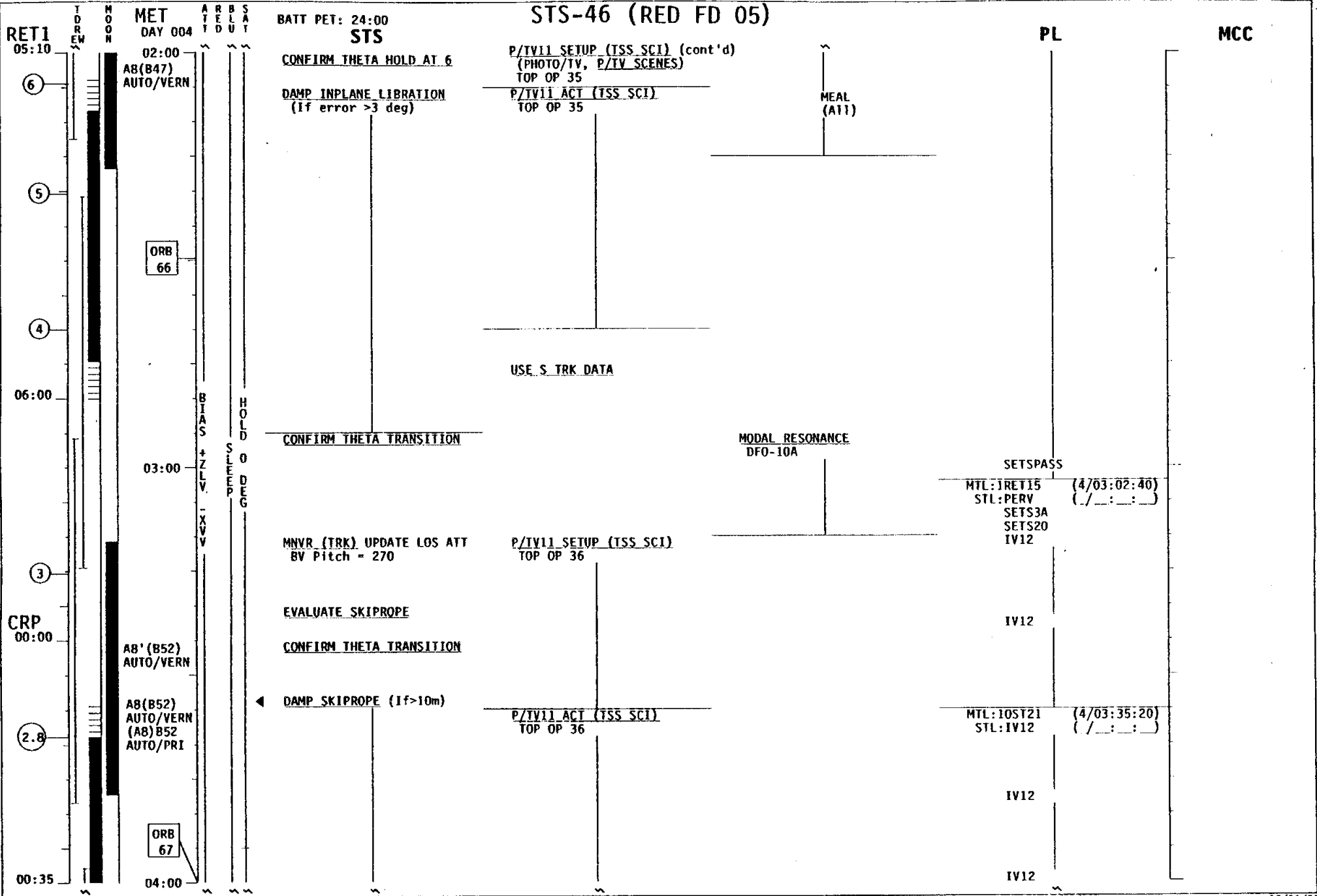
(A8)B47
AUTO/VERN

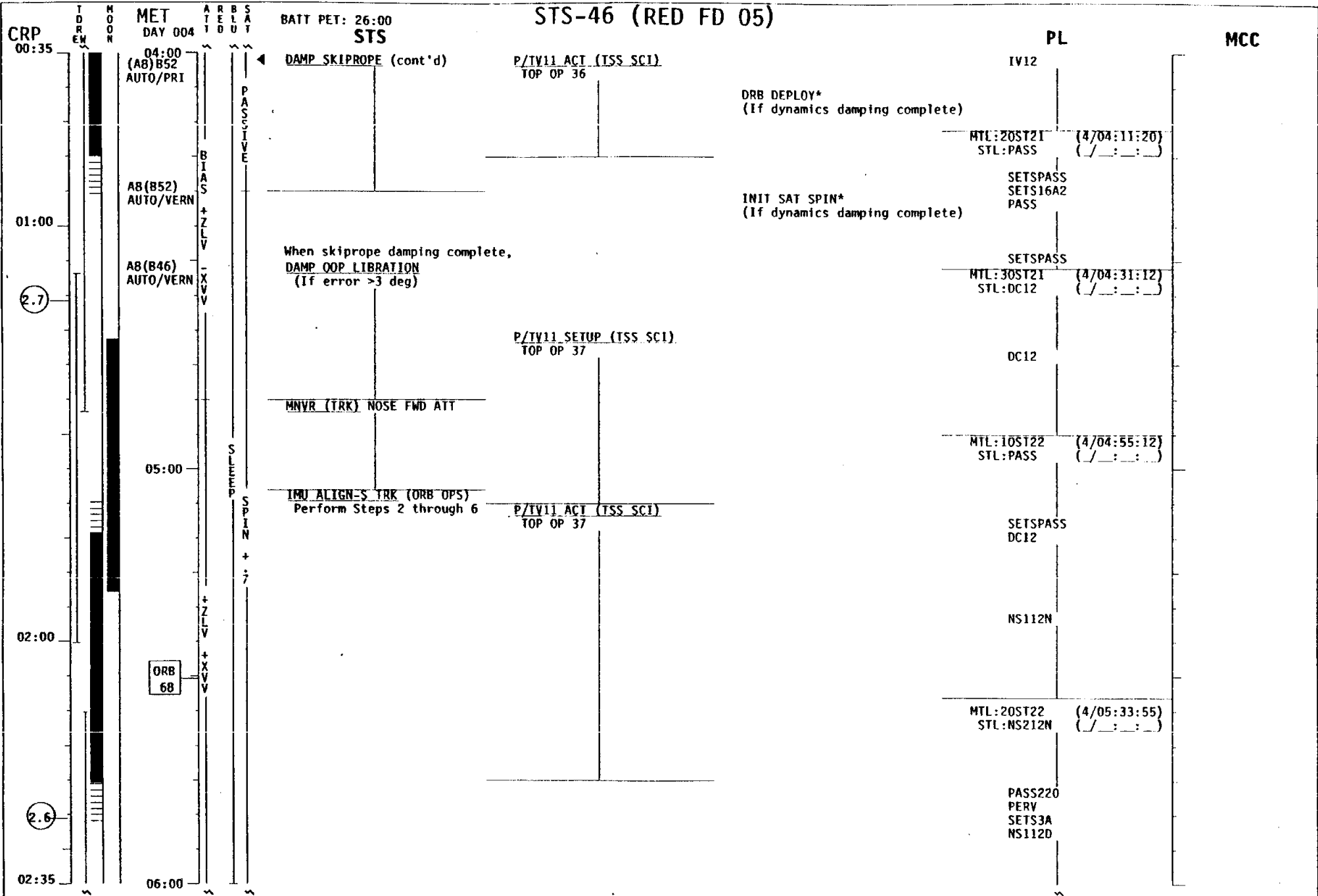
CREEP AND OST2 TIMELINE
(TSS DYN, CRP & OST2 T/L)
MNVR (TRK) LOS ATT
BV Pitch = 263

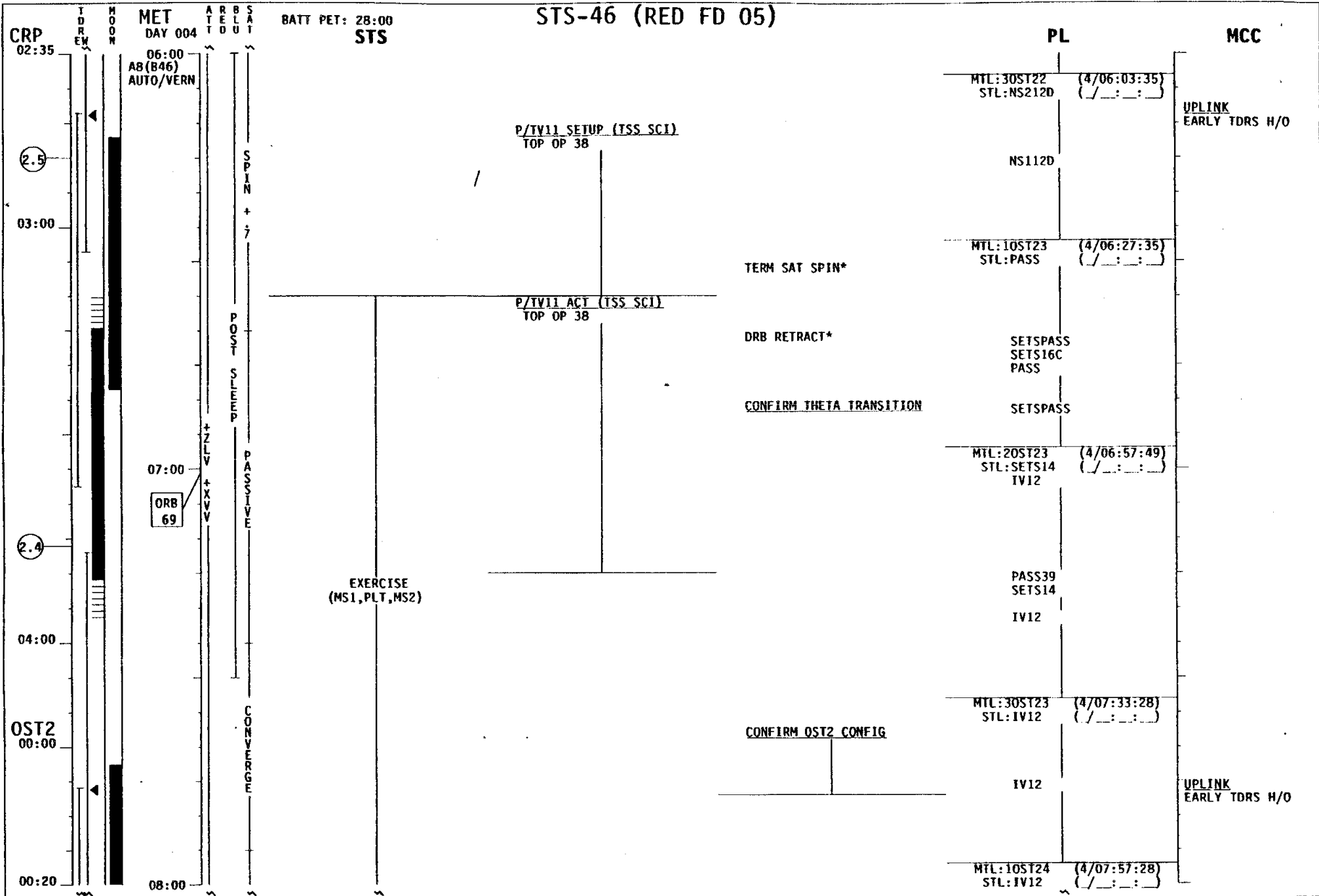
MEAL
(Aii)

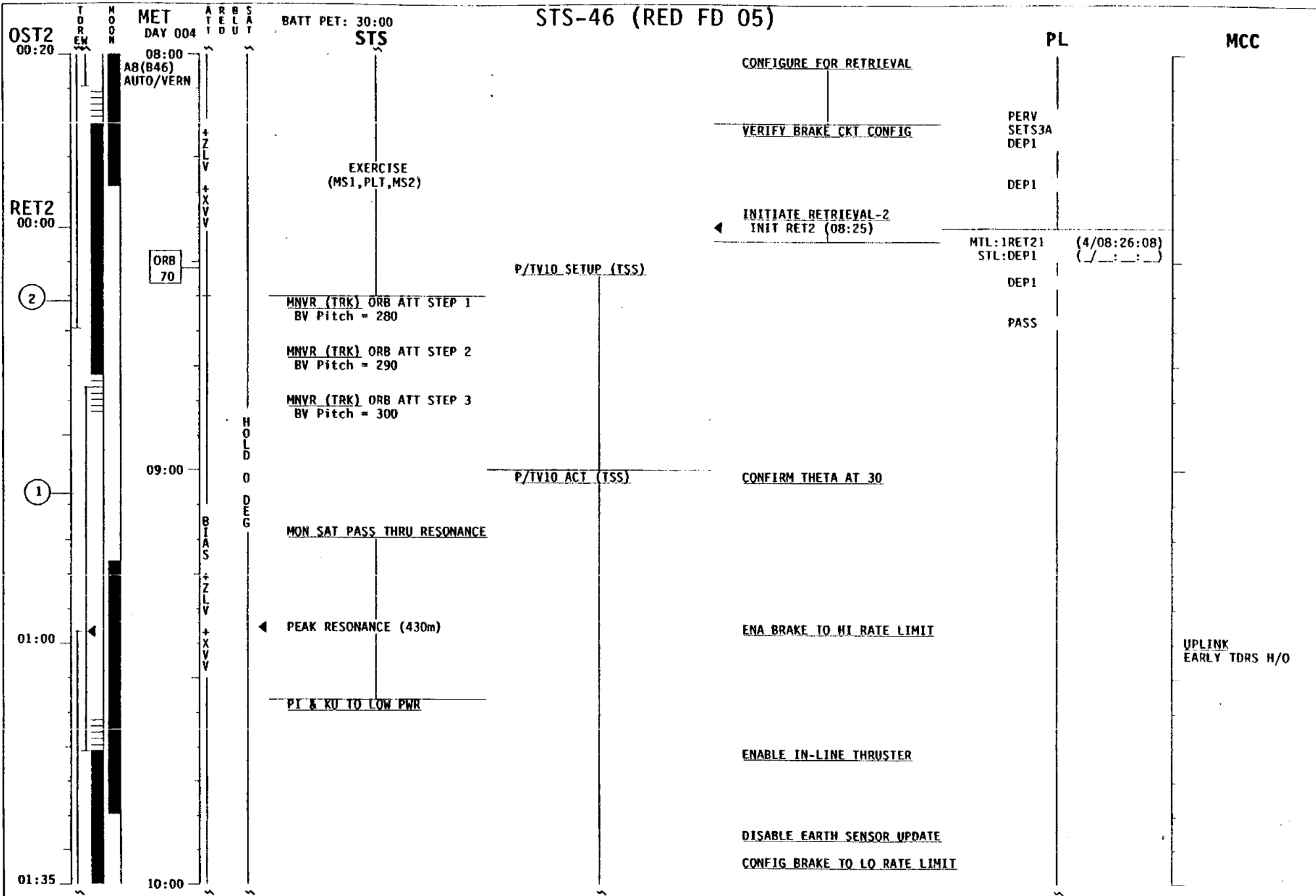
05:10

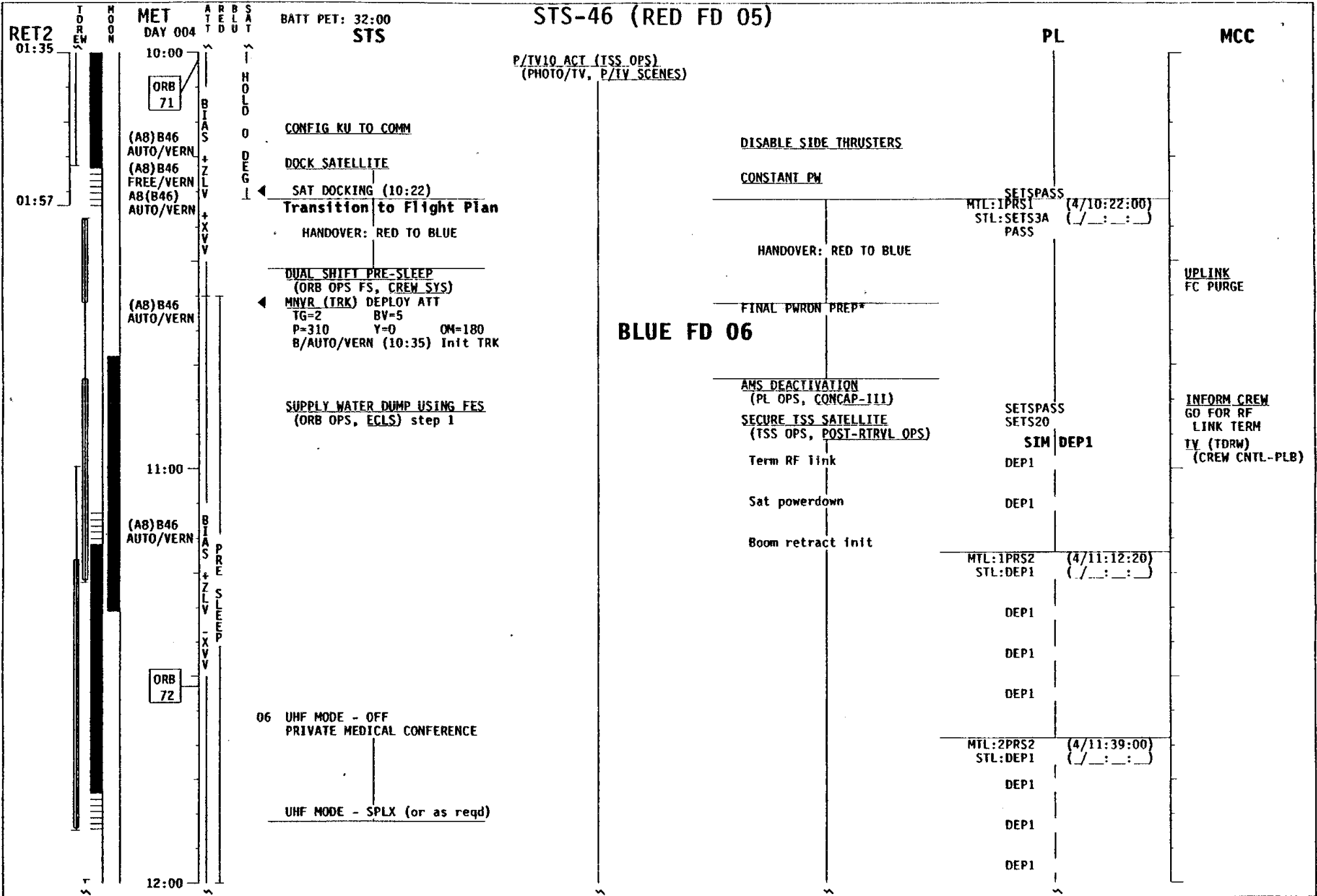
02:00

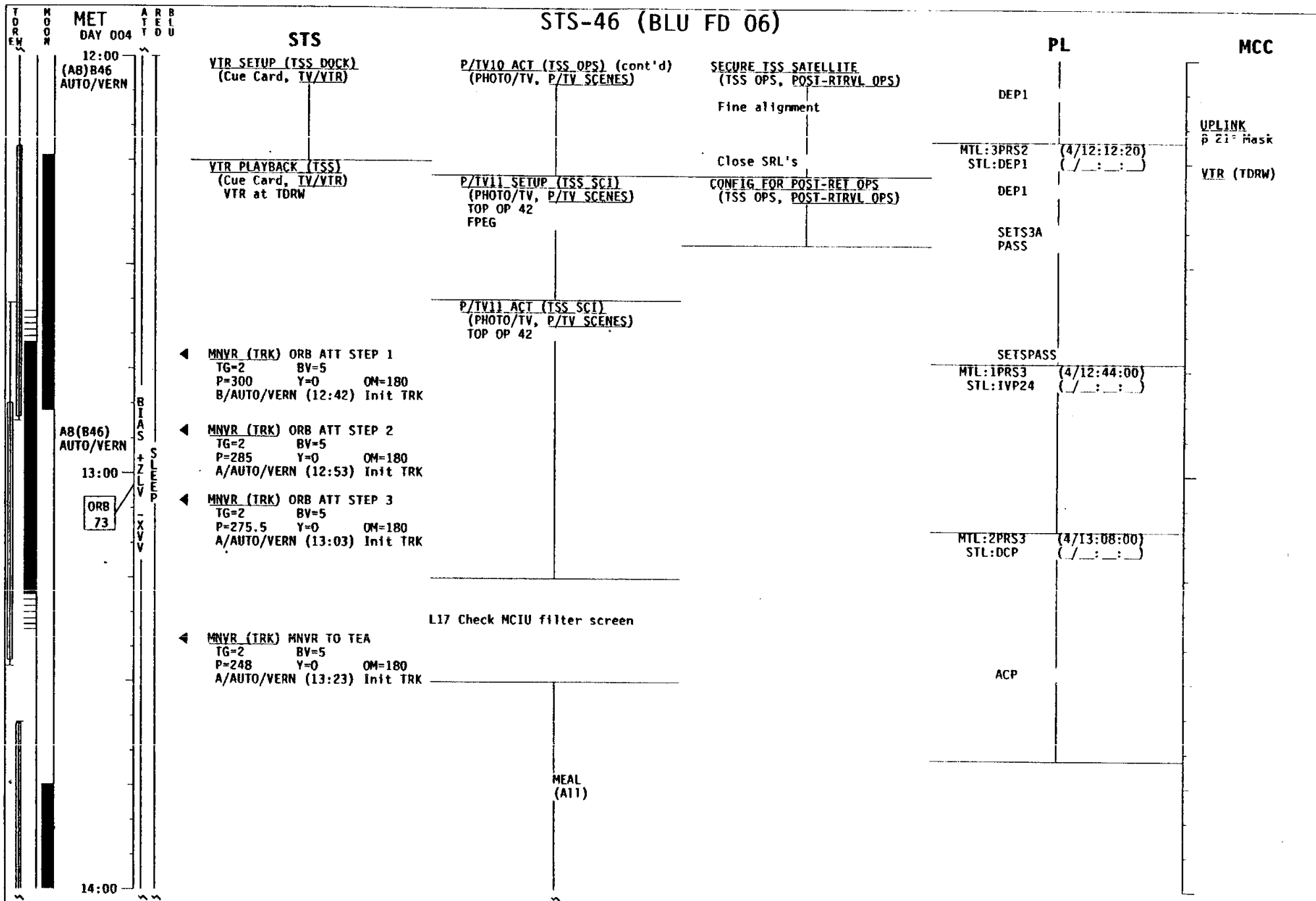


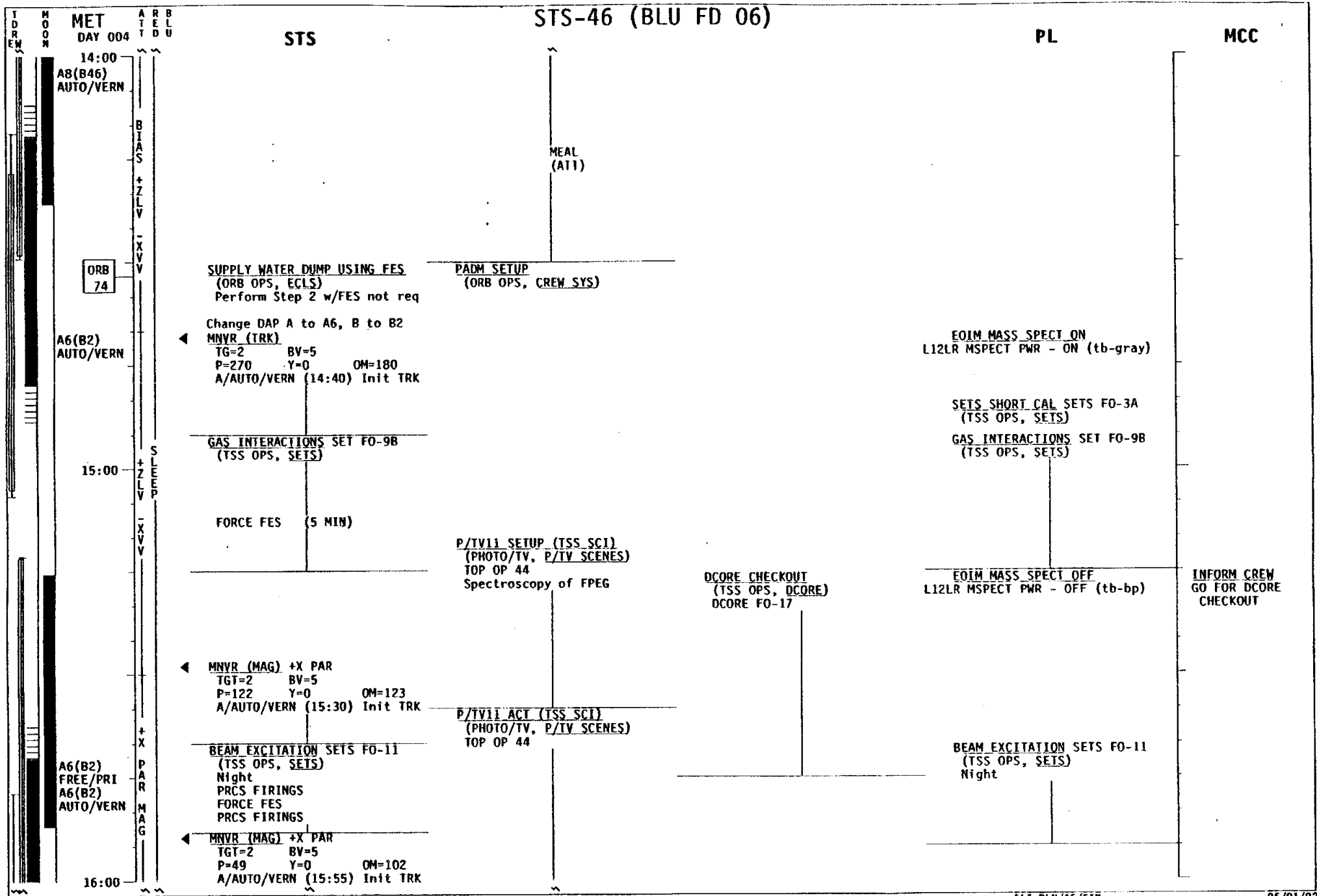


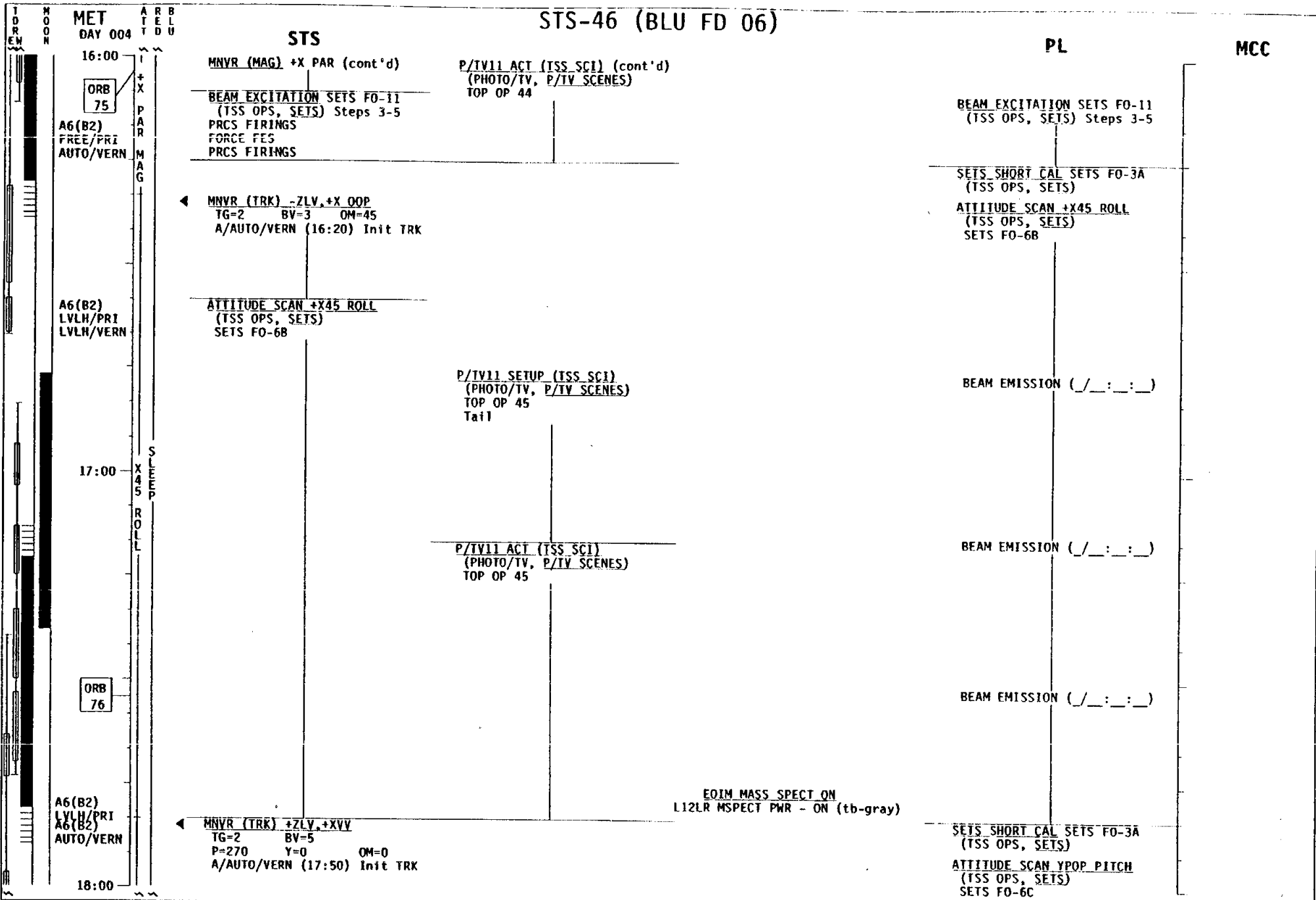


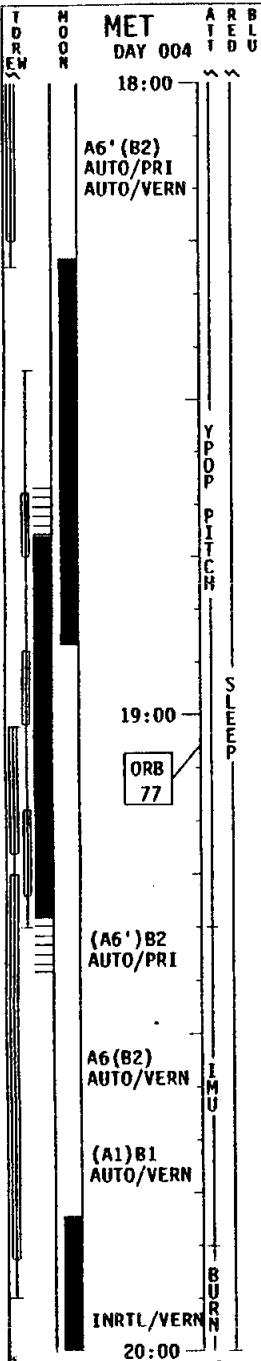












STS-46 (BLU FD 06)

STS

YPOP PITCH C

PADM STOW
(ORB OPS, CREW SYS)

P/TV11 SETUP (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 46
Tail

P/TV11 ACT (ISS SCI)
(PHOTO/TV, P/TV SCENES)
TOP OP 46

FORCE FES (5 MIN)

YPOP PITCH C

When in attitude,

GNC 20 DAP CONFIG

DISC RATE NORM - ITEM 2 + 0.4 EXEC
VERN - ITEM 3 + 0.4 EXEC

GNC UNIV PTG

BODY VECT - ITEM 14 + 5 EXEC
P - ITEM 15 + 0 EXEC
Y - ITEM 16 + 90 EXEC
DAP: A/AUTO/PRI
ROT - ITEM 20 EXEC (4/18:05)
When ROT RATE -0.4°/sec,
DAP: A/AUTO/VERN

← MNVR IMU ALIGN ATT
STAR PAIR (B1)
B/AUTO/PRI (19:20) Init MNVR
Change DAP A to A6

When in attitude,
DAP: A/AUTO/VERN
IMU ALIGN - S TRK (ORB OPS)

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

LOAD PCMMU FMI (ORB OPS FS)
Load 184 / 103

LOAD PDI DEC FMI (ORB OPS FS)
Config 760

PL

ATTITUDE SCAN YPOP PITCH
(TSS OPS, SETS)
SETS FO-6C

BEAM EMISSION (/ / : :)

BEAM EMISSION (/ / : :)

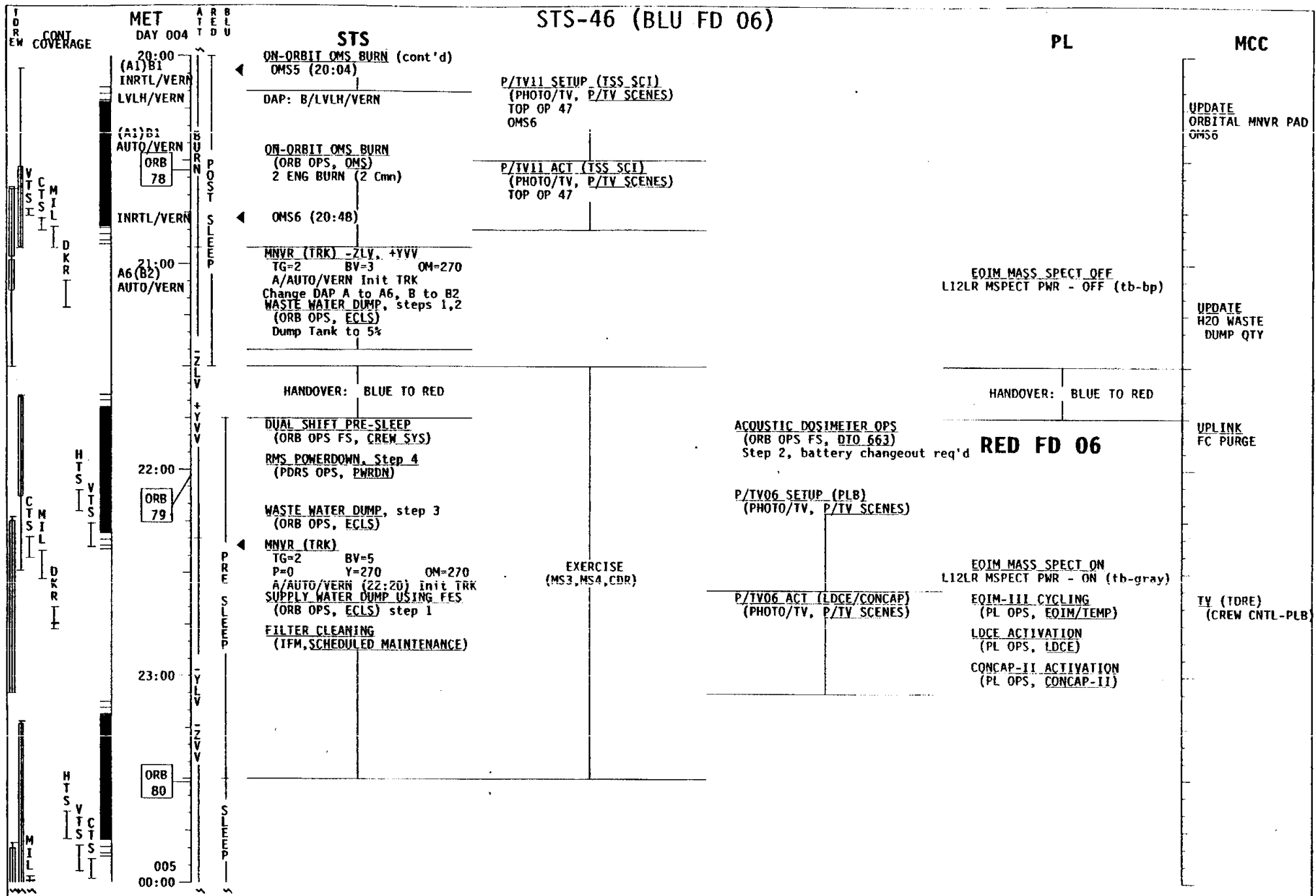
GAS INTERACTIONS (/ / : :)

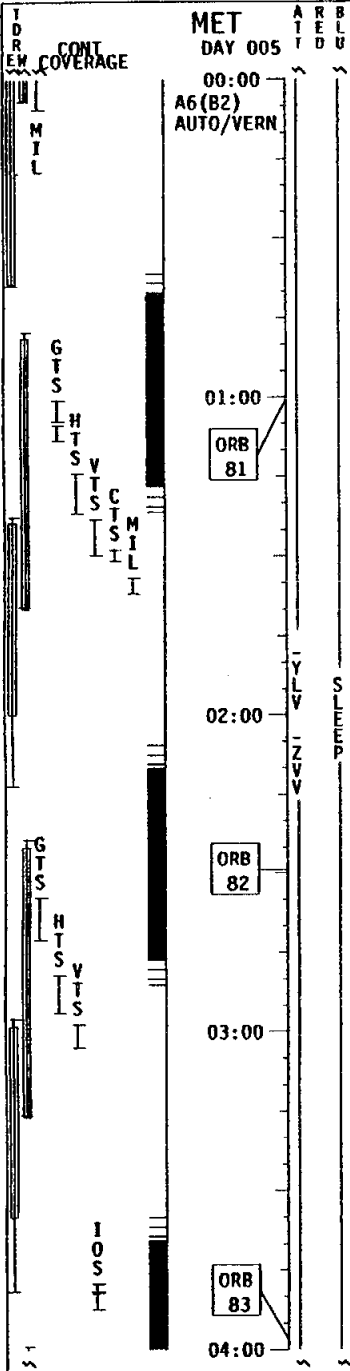
BEAM EMISSION (/ / : :)

EOIM-III CYCLE PREP
(PL OPS, EOIM/TEMP)

MCC

UPDATE
ORBITAL MNVR PAD
OMSS





STS-46 (RED FD 06)

STS

VISUAL VESTIBULAR INTEGRATION
 (BIOMED, MED DSO'S)
 (MS3)
 DSO 604

PADM SETUP
 (ORB OPS, CREW SYS)

P/TV04 SETUP (PHCF)
 (PHOTO/TV, P/IV SCENES)

P/TV04 ACT. (PHCF)
 (PHOTO/TV, P/IV SCENES)

MEAL
 (ATT)

PL

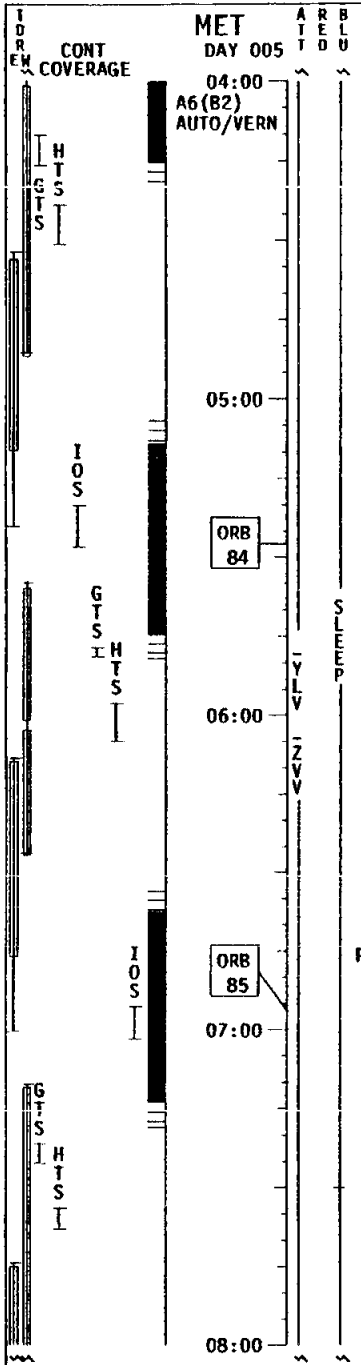
MCC

HOT PLATE ACTIVATION
 (PL OPS, CONCAP-11)

PHCF MANIPULATION
 (PL OPS, PHCF)

TV (TDRW)
 (CREW CNTL-CAB)

STS-46 (RED FD 06)



STS

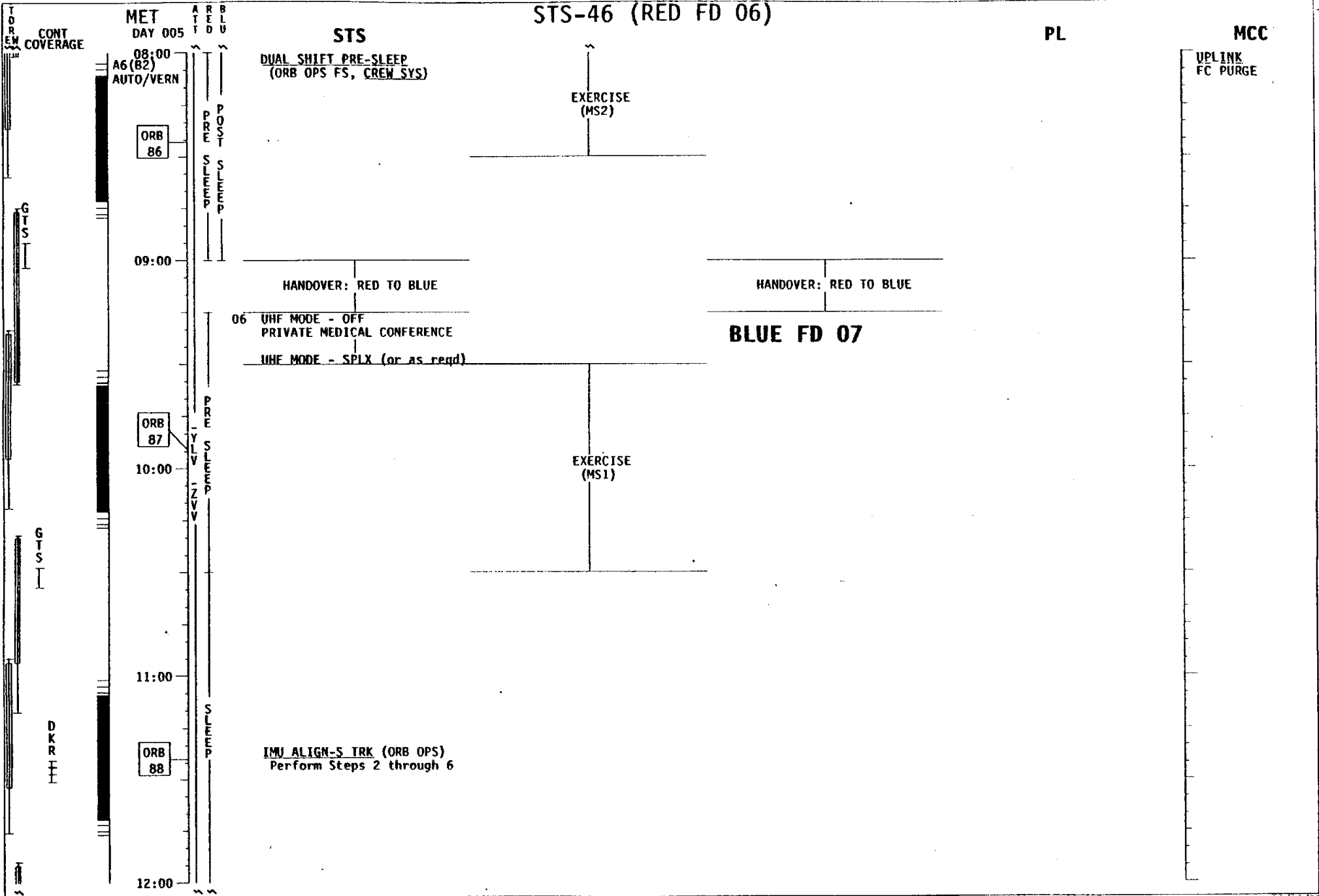
PL

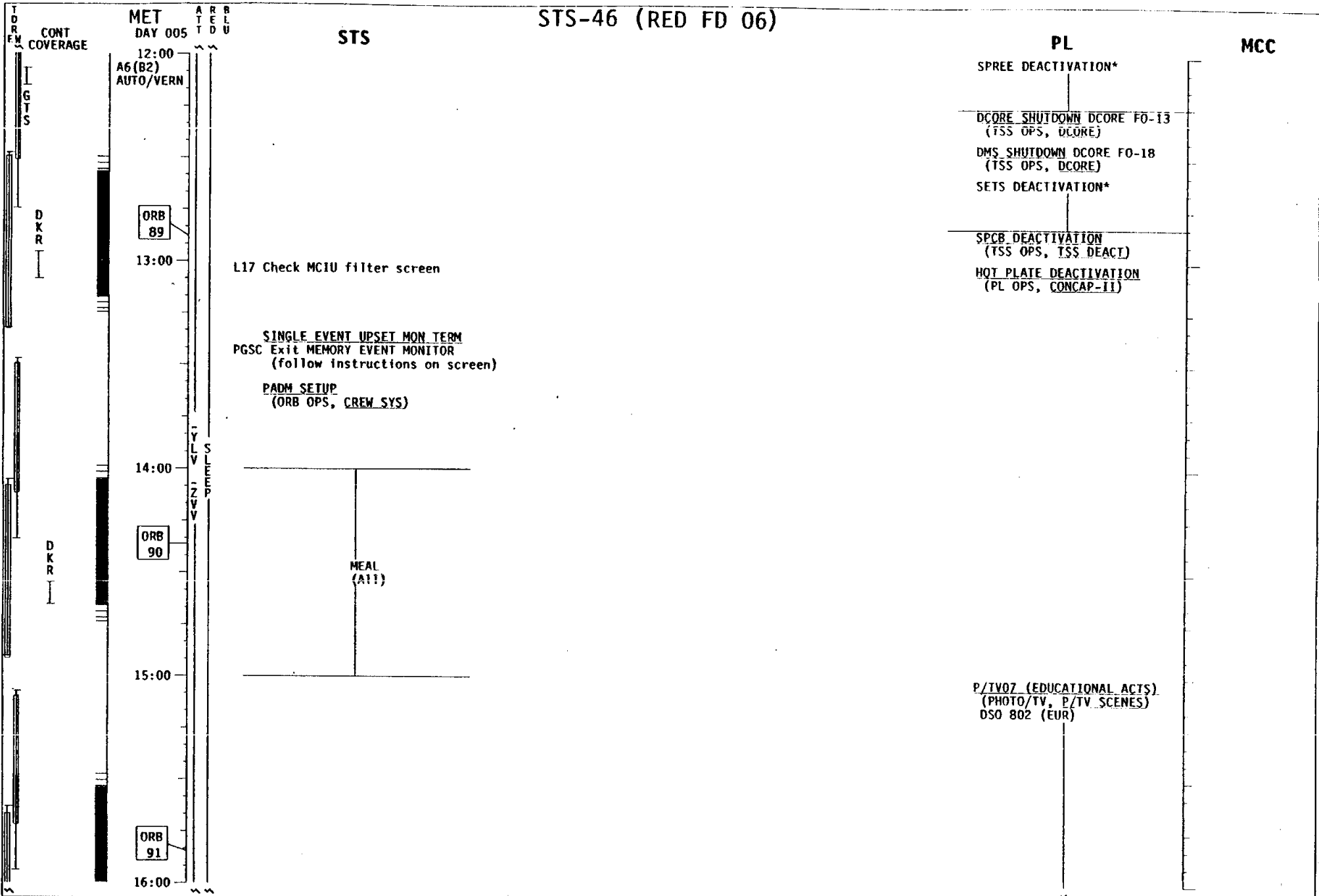
MCC

P/TV07 (EDUCATIONAL ACTS)
 (PHOTO/TV, P/TV SCENES)
 DSO 802 (TSS-1)

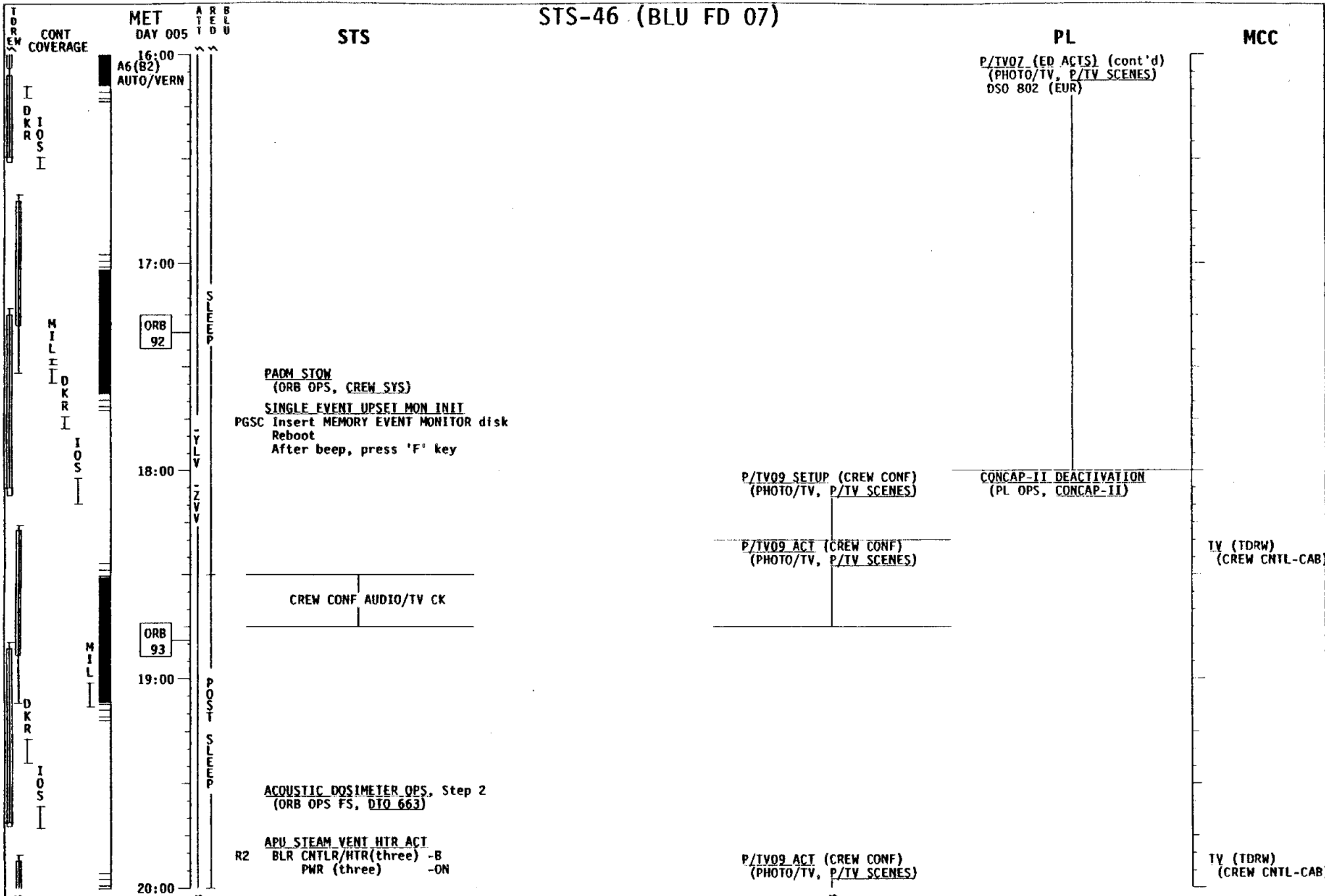
PADM STOW
 (ORB OPS, CREW SYS)
 SINGLE EVENT UPSET MON INIT
 PGSC Insert MEMORY EVENT MONITOR disk
 Reboot
 After beep, press 'F' key

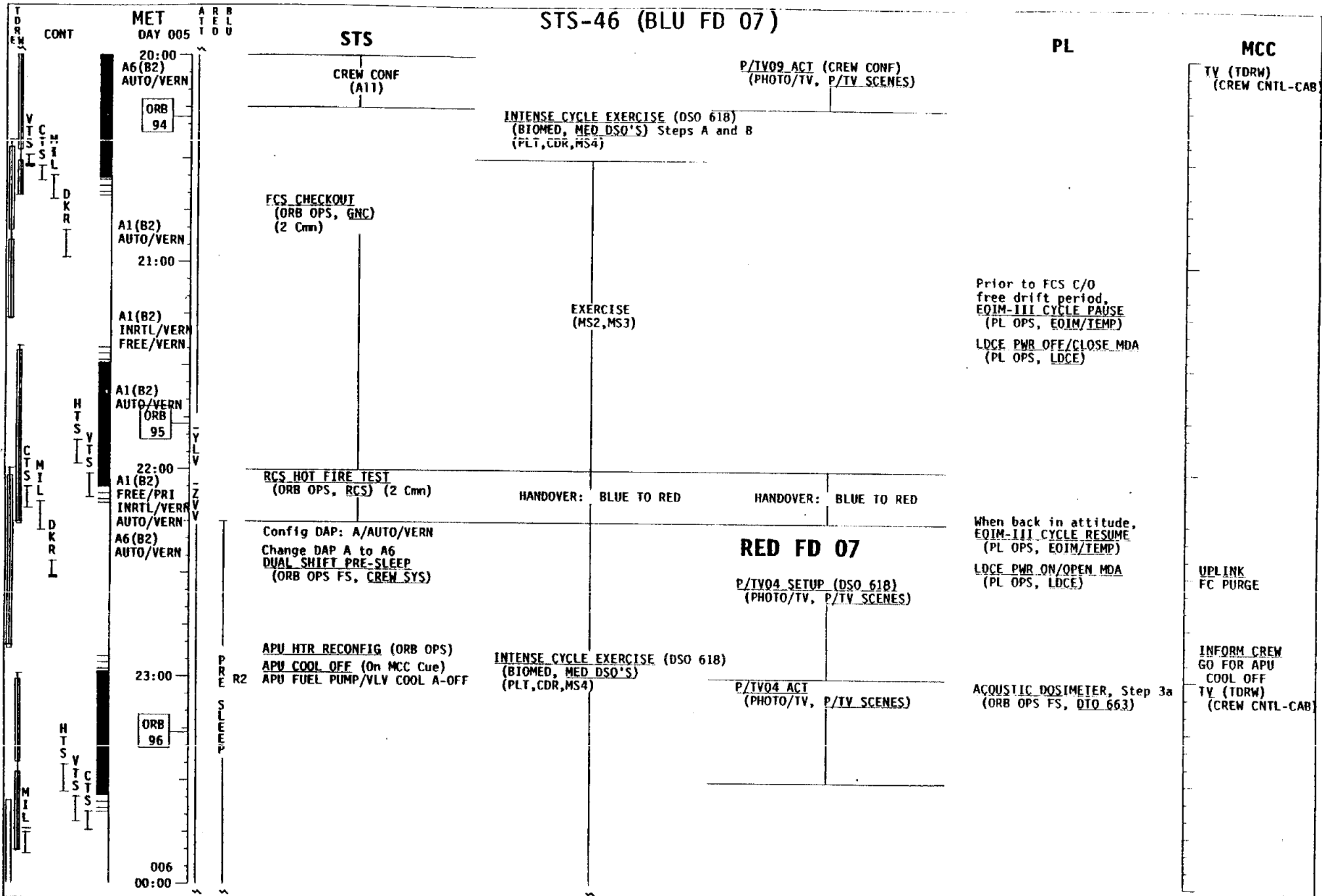
EXERCISE
 (MS2)





STS-46 (BLU FD 07)





STS-46 (BLU FD 07)

MET DAY 005

STS

PL

MCC

CREW CONF (A11)

P/TVO9 ACT (CREW CONF)
(PHOTO/TV, P/TV SCENES)

INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S) Steps A and B
(PLT, CDR, MS4)

FCS CHECKOUT
(ORB OPS, GNC)
(2 Cmn)

EXERCISE
(MS2, MS3)

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

HANDOVER: BLUE TO RED

HANDOVER: BLUE TO RED

Config DAP: A/AUTO/VERN
Change DAP A to A6
DUAL SHIFT PRE-SLEEP
(ORB OPS FS, CREW SYS)

RED FD 07

P/TVO4 SETUP (DSO 618)
(PHOTO/TV, P/TV SCENES)

APU HTR RECONFIG (ORB OPS)
APU COOL OFF (On MCC Cue)
APU FUEL PUMP/VLV COOL A-OFF

INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S)
(PLT, CDR, MS4)

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

Prior to FCS C/O
free drift period,
EQIM-III CYCLE PAUSE
(PL OPS, EOIM/TEMP)
LDCE PWR OFF/CLOSE MDA
(PL OPS, LDCE)

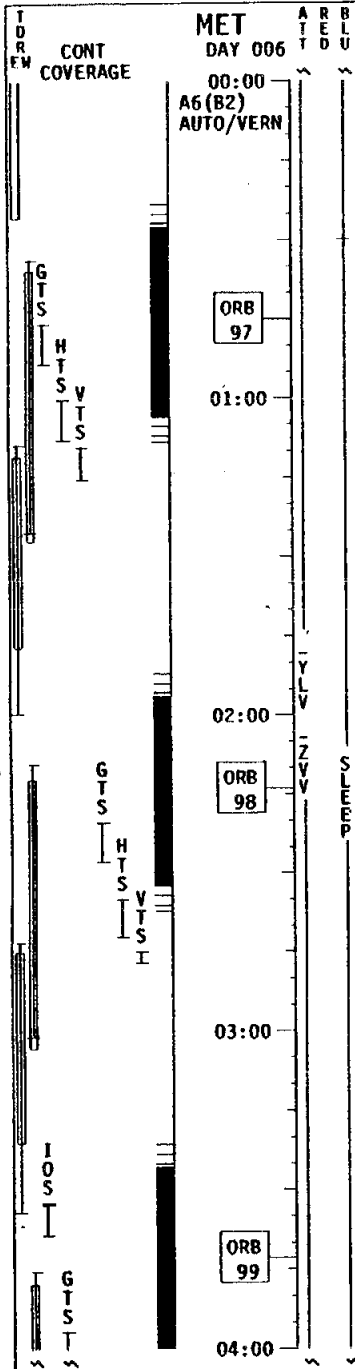
When back in attitude,
EQIM-III CYCLE RESUME
(PL OPS, EOIM/TEMP)
LDCE PWR ON/OPEN MDA
(PL OPS, LDCE)

TV (TDRW)
(CREW CNTL-CAB)

UPLINK
FC PURGE

INFORM CREW
GO FOR APU
COOL OFF
TV (TDRW)
(CREW CNTL-CAB)

ACOUSTIC DOSIMETER, Step 3a
(ORB OPS FS, DTO 663)



STS-46 (RED FD 07)

STS

PL

MCC

INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S)
(PLT, CDR, MS4)

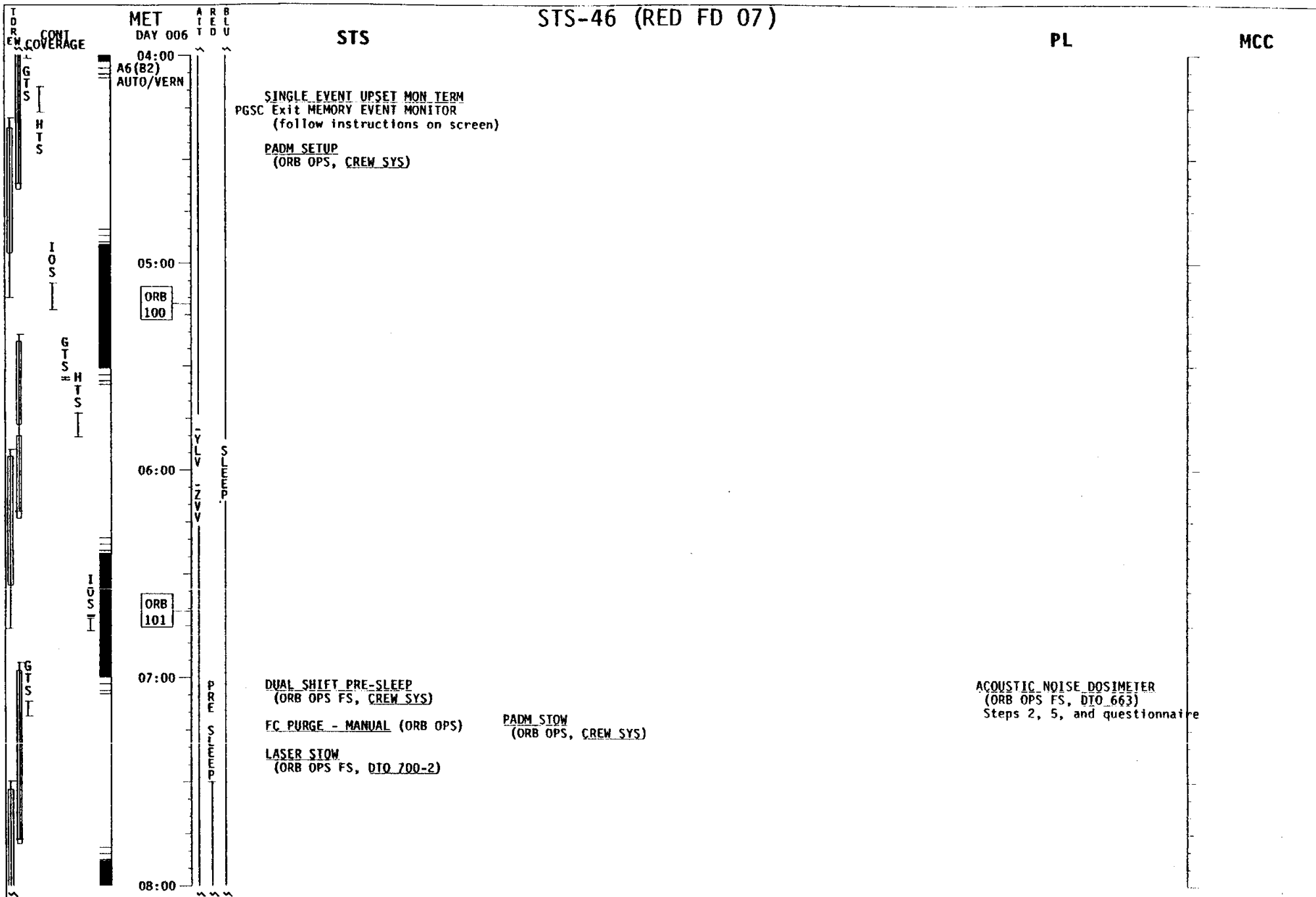
INTENSE CYCLE EXERCISE (DSO 618)
(BIOMED, MED DSO'S) Step 1
Ergometer stow

IMU ALIGN-S TRK (ORB OPS)
Perform Steps 2 through 6

MEAL
(A11)

ACOUSTIC DOSIMETER OPS, Step 3b
(ORB OPS FS, DIO 663)

PHCF MANIPULATION
(PL OPS, PHCF)



STS-46 (RED FD 07)

PL

MCC

STS

MET DAY 006

08:00

ORB 102

A6 (B2) AUTO/VERN

KU-BD ANT STOW
(ORB OPS, COMM/INST)

06 UHF MODE - OFF
PRIVATE MEDICAL CONFERENCE

09:00

UHF MODE - SPLX (or as reqd)

HANDOVER: RED TO BLUE

HANDOVER: RED TO BLUE

BLUE FD 08

10:00

ORB 103

11:00

ORB 104

IMU ALIGN-S TRK (ORB OPS)
Perform Steps 2 through 6

CABIN CONFIG/STOW
(A11)

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

PADM SETUP
(ORB OPS, CREW SYS)

A PRE-DEORBIT PREP ACTIVITIES

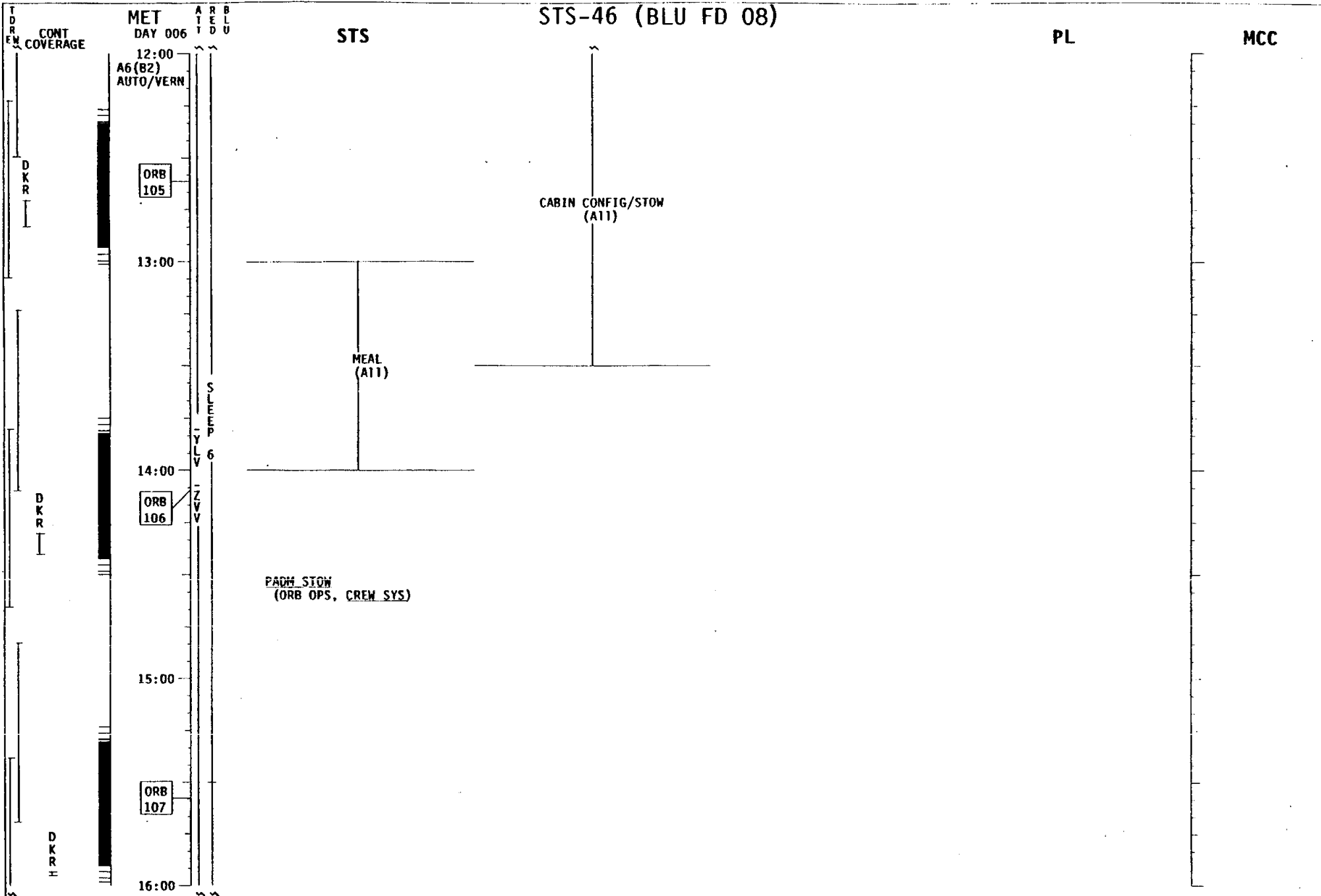
STOW QUICK DON MASKS

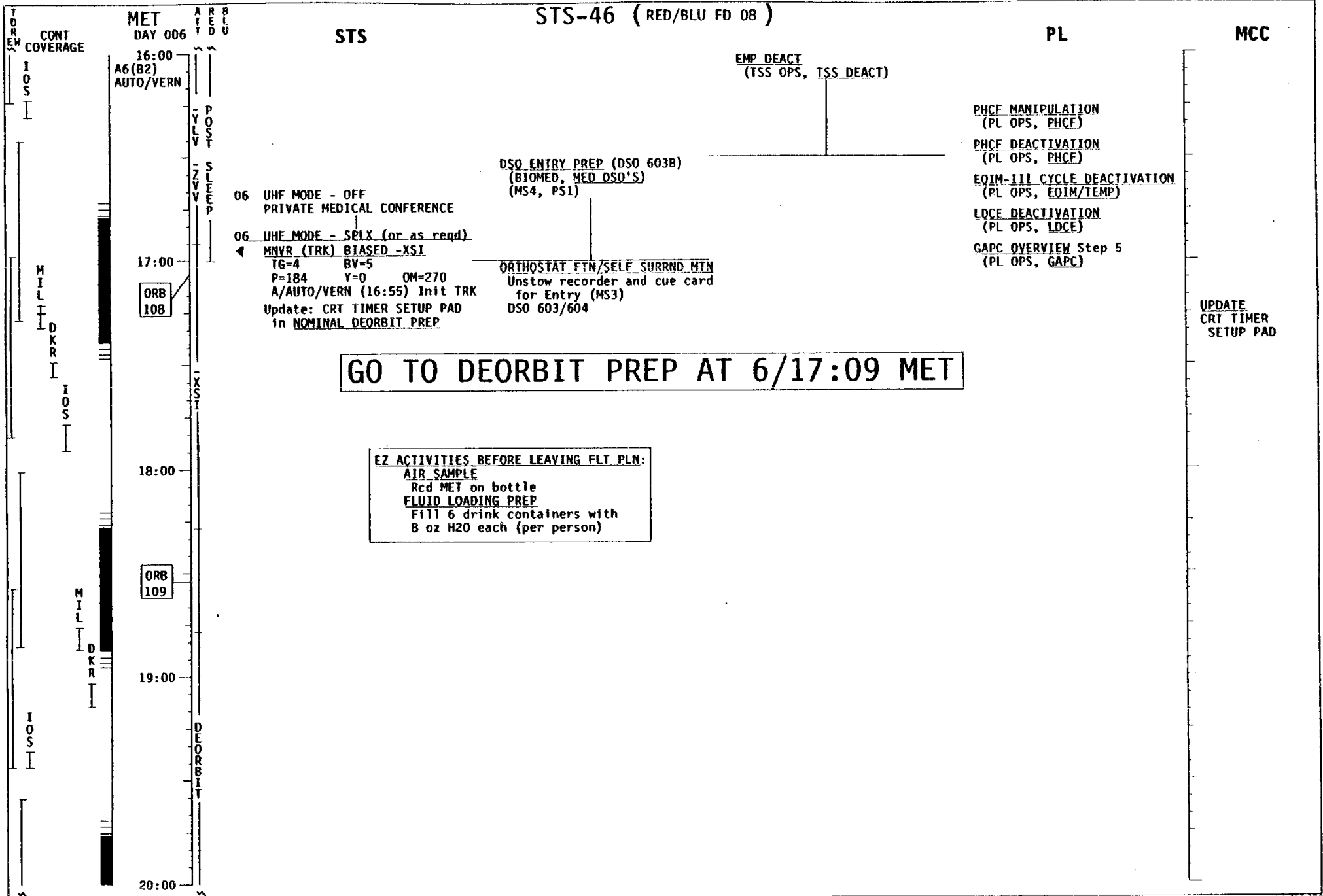
AIRLOCK CLOSEOUT

Remove loose items stored in Airlock
Perform AIRLOCK ENT & SW VERIF
(DEORBIT PREP, ENT SW LIST/VERIF), p. 3-27 & 3-28

SEAT INSTALLATION

12:00





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TSS-1
MASTER TIMELINES

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
1PDC7.TLM	SETS3A.TLS	2/09:00:00	00:00
	PASS.TLS	2/09:01:00	01:00
	SETSPASS.TLS	2/09:08:40	08:40
	SETS20.TLS	2/09:09:40	09:40
	DEP1.TLS	2/09:15:00	15:00
	DEP1.TLS	2/09:21:40	21:40
1PDC8.TLM	DEP1.TLS	2/09:28:20	00:00
	DEP1.TLS	2/09:35:00	06:40
	DEP1.TLS	2/09:41:40	13:20
	DEP1.TLS	2/09:48:20	20:00
2PDC8.TLM	DEP1.TLS	2/09:55:00	00:00
	DEP1.TLS	2/10:01:40	06:40
	DEP1.TLS	2/10:08:20	13:20
3PDC8.TLM	DEP1.TLS	2/10:15:00	00:00
	DEP1.TLS	2/10:21:40	06:40
	DEP1.TLS	2/10:28:20	13:20
	DEP1.TLS	2/10:35:00	20:00
	SETS3A.TLS	2/10:41:40	26:40
	PASS.TLS	2/10:42:40	27:40
	SETSPASS.TLS	2/10:54:00	39:00
1PDC9.TLM	IVP24.TLS	2/10:55:00	00:00
2PDC9.TLM	DCP.TLS	2/11:19:00	00:00
	ACP.TLS	2/11:43:00	24:00
	PASS.TLS	2/11:55:00	36:00
	SETSPASS.TLS	2/11:59:00	40:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
3PDC9.TLM	SETS3A.TLS	2/12:00:00	00:00
	PASS.TLS	2/12:01:00	01:00
	SETSPASS.TLS	2/12:09:00	09:00
	IVP12.TLS	2/12:10:00	10:00
	IVP12.TLS	2/12:22:00	22:00
1PDC10.TLM	IVP12.TLS	2/12:34:00	00:00
	IVP12.TLS	2/12:46:00	12:00
2PDC10.TLM	IVP12.TLS	2/12:58:00	00:00
	IVP12.TLS	2/13:10:00	12:00
	IVP12.TLS	2/13:22:00	24:00
3PDC10.TLM	IVP12.TLS	2/13:34:00	00:00
	SETS3A.TLS	2/13:46:00	12:00
1PDC21.TLM	SETS20.TLS	3/03:53:40	00:00
	DEP1.TLS	3/03:59:00	05:20
	DEP1.TLS	3/04:05:40	12:00
2PDC21.TLM	DEP1.TLS	3/04:12:20	00:00
	PASS.TLS	3/04:19:00	06:40
	SETSPASS.TLS	3/04:29:00	16:40
	SETS3A.TLS	3/04:30:00	17:40
1DEP1.TLM	PASS.TLS	3/04:48:00	00:00
	SETSPASS.TLS	3/04:53:40	05:40
	DEP1.TLS	3/04:54:40	06:40
	DEP1.TLS	3/05:01:20	13:20
	DEP1.TLS	3/05:08:00	20:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2DEP1.TLM	DEP1.TLS	3/05:14:40	00:00
	DEP1.TLS	3/05:21:20	06:40
	DEP1.TLS	3/05:28:00	13:20
	DEP1.TLS	3/05:34:40	20:00
	DEP1.TLS	3/05:41:20	26:40
3DEP1.TLM	DEP1.TLS	3/05:48:00	00:00
	DEP1.TLS	3/05:54:40	06:40
	DEP1.TLS	3/06:01:20	13:20
	DEP1.TLS	3/06:08:00	20:00
	DEP1.TLS	3/06:14:40	26:40
1DEP2.TLM	DEP1.TLS	3/06:21:20	00:00
	DEP1.TLS	3/06:28:00	06:40
	DEP1.TLS	3/06:34:40	13:20
	SETS3A.TLS	3/06:41:20	20:00
2DEP2.TLM	IV8.TLS	3/06:42:20	00:00
	PASS.TLS	3/06:50:20	08:00
	SETSPASS.TLS	3/07:05:46	23:26
	SETS3A.TLS	3/07:06:46	24:26
	PASS.TLS	3/07:07:46	25:26
	SETSPASS.TLS	3/07:20:20	38:00
3DEP2.TLM	SET16A1.TLS	3/07:21:20	00:00
	IV24.TLS	3/07:22:50	01:30
1DEP3.TLM	2DC24.TLS	3/07:46:50	00:00
	2IV24.TLS	3/08:10:50	24:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2DEP3.TLM	PASS.TLS	3/08:34:50	00:00
	SETSPASS.TLS	3/08:39:13	04:23
	2IV24.TLS	3/08:40:13	05:23
3DEP3.TLM	12NS412D.TLS	3/09:04:13	00:00
	SET16A1.TLS	3/09:16:13	12:00
	PASS.TLS	3/09:17:43	13:30
	SETSPASS.TLS	3/09:25:15	21:02
	SETS3A.TLS	3/09:26:15	22:02
1DEP4.TLM	2IV12.TLS	3/09:27:15	00:00
	IV24.TLS	3/09:39:15	12:00
	1PERV.TLS	3/10:03:15	36:00
1OST11.TLM	SETS3A.TLS	3/10:05:35	00:00
	PASS125.TLS	3/10:06:35	01:00
	2IV12.TLS	3/10:08:00	02:25
	PASS.TLS	3/10:20:00	14:25
	SETSPASS.TLS	3/10:36:15	30:40
2OST11.TLM	SETS16B.TLS	3/10:37:15	00:00
	12NS112D.TLS	3/10:39:00	01:45
	12NS212D.TLS	3/10:51:00	13:45
3OST11.TLM	1DC12.TLS	3/11:04:59	00:00
	1IV12.TLS	3/11:16:59	12:00
1OST12.TLM	1IV12.TLS	3/11:28:59	00:00
	1DC12.TLS	3/11:41:29	12:30

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2OST12.TLM	1DC12.TLS	3/11:53:29	00:00
	1IV12.TLS	3/12:06:29	13:00
	1IV12.TLS	3/12:18:29	25:00
3OST12.TLM	1PERV.TLS	3/12:30:29	00:00
	SETS3A.TLS	3/12:32:49	02:20
	PASS.TLS	3/12:33:49	03:20
	SETSPASS.TLS	3/12:44:37	14:08
	SETS16B.TLS	3/12:45:37	15:08
	12NS112N.TLS	3/12:47:07	16:38
1OST13.TLM	12NS212N.TLS	3/12:59:07	00:00
	PASS.TLS	3/13:11:07	12:00
	SETSPASS.TLS	3/13:14:22	15:15
	1AC.TLS	3/13:15:22	16:15
2OST13.TLM	1DC12.TLS	3/13:27:22	00:00
	12NS112D.TLS	3/13:40:07	12:45
	12NS212D.TLS	3/13:52:07	24:45
3OST13.TLM	12NS112N.TLS	3/14:05:57	00:00
	12NS212N.TLS	3/14:17:57	12:00
1OST14.TLM	1DC12.TLS	3/14:29:57	00:00
	SETS3A.TLS	3/14:41:57	12:00
	DC12.TLS	3/14:45:45	15:48

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2OST14.TLM	PASS.TLS	3/14:57:45	00:00
	SETSPASS.TLS	3/15:04:57	07:12
	12NS312D.TLS	3/15:05:57	08:12
	MAXEGA.TLS	3/15:17:57	20:12
3OST14.TLM	SETS3A.TLS	3/15:35:30	00:00
	SET16A1.TLS	3/15:36:30	01:00
	PERV.TLS	3/15:38:00	02:30
	PASS.TLS	3/15:40:20	04:50
	SETSPASS.TLS	3/15:47:10	11:40
	AC.TLS	3/15:48:10	12:40
1OST15.TLM	NS312N.TLS	3/16:00:10	00:00
	NS312D.TLS	3/16:12:40	12:30
	NS612D.TLS	3/16:24:40	24:30
2OST15.TLM	NS212D.TLS	3/16:37:10	00:00
	NS612D.TLS	3/16:49:10	12:00
3OST15.TLM	PERV.TLS	3/17:01:10	00:00
	SETS3A.TLS	3/17:03:30	02:20
	PASS.TLS	3/17:04:30	03:20
	SETSPASS.TLS	3/17:14:06	12:56
	NS312N.TLS	3/17:15:06	13:56
	SETS14.TLS	3/17:27:06	25:56
1OST16.TLM	OF1.TLS	3/17:32:36	00:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2OST16.TLM	NS412D.TLS	3/18:07:36	00:00
	NS512D.TLS	3/18:19:36	12:00
3OST16.TLM	OF3AUS.TLS	3/18:31:36	00:00
	PERV.TLS	3/18:38:56	07:20
	NS612N.TLS	3/18:42:36	11:00
	NS612N.TLS	3/18:54:36	23:00
1OST17.TLM	OF3MC.TLS	3/19:06:36	00:00
	PERV.TLS	3/19:14:40	08:04
	SMAX.TLS	3/19:17:00	10:24
	PERV.TLS	3/19:21:20	14:44
	OF3MC.TLS	3/19:23:40	17:04
2OST17.TLM	SETS3A.TLS	3/19:29:40	00:00
	PASS.TLS	3/19:30:40	01:00
	SETSPASS.TLS	3/19:33:45	04:05
	SETS14.TLS	3/19:34:45	05:05
	OF3KEN.TLS	3/19:40:15	10:35
	PASS.TLS	3/19:52:15	22:35
	SETSPASS.TLS	3/20:01:15	31:35
3OST17.TLM	PERV.TLS	3/20:02:15	00:00
	OF2.TLS	3/20:07:00	04:45
	IV12.TLS	3/20:17:00	14:45
	PERV.TLS	3/20:29:00	26:45

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
1RET11.TLM	IV12.TLS	3/20:31:20	00:00
	IV12.TLS	3/20:43:20	12:00
	IV12.TLS	3/20:55:20	24:00
2RET11.TLM	IV12.TLS	3/21:07:20	00:00
	IV12.TLS	3/21:19:20	12:00
3RET11.TLM	IV12.TLS	3/21:31:20	00:00
	IV12.TLS	3/21:43:20	12:00
	IV12.TLS	3/21:55:20	24:00
1RET12.TLM	PERV.TLS	3/22:07:20	00:00
	SETS3A.TLS	3/22:09:40	02:20
	IV12.TLS	3/22:10:40	03:20
	IV12.TLS	3/22:22:40	15:20
2RET12.TLM	IV12.TLS	3/22:34:40	00:00
	IV12.TLS	3/22:46:40	12:00
3RET12.TLM	IV12.TLS	3/22:58:40	00:00
	IV12.TLS	3/23:10:40	12:00
	IV12.TLS	3/23:22:40	24:00
1RET13.TLM	PERV.TLS	3/23:34:40	00:00
	SETS3A.TLS	3/23:37:00	02:20
	IV12.TLS	3/23:38:00	03:20
	IV12.TLS	3/23:50:00	15:20
2RET13.TLM	IV12.TLS	4/00:02:00	00:00
	IV12.TLS	4/00:14:00	12:00
	PERV.TLS	4/00:26:00	24:00
	SETS3A.TLS	4/00:28:20	26:20
	PASS.TLS	4/00:29:20	27:20
	SETSPASS.TLS	4/01:28:20	86:20

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
1RET14.TLM	PERV.TLS	4/01:29:20	00:00
	SETS3A.TLS	4/01:31:40	02:20
	PASS.TLS	4/01:32:40	03:20
	SETSPASS.TLS	4/03:01:40	92:20
1RET15.TLM	PERV.TLS	4/03:02:40	00:00
	SETS3A.TLS	4/03:05:00	02:20
	SETS20.TLS	4/03:06:00	03:20
	IV12.TLS	4/03:11:20	08:40
	IV12.TLS	4/03:23:20	20:40
1OST21.TLM	IV12.TLS	4/03:35:20	00:00
	IV12.TLS	4/03:47:20	12:00
	IV12.TLS	4/03:59:20	24:00
2OST21.TLM	PASS.TLS	4/04:11:20	00:00
	SETSPASS.TLS	4/04:18:30	7:10
	SETS16A2.TLS	4/04:19:30	08:10
	PASS.TLS	4/04:21:00	09:40
	SETSPASS.TLS	4/04:30:12	18:52
3OST21.TLM	DC12.TLS	4/04:31:12	00:00
	DC12.TLS	4/04:43:12	12:00
1OST22.TLM	PASS.TLS	4/04:55:12	00:00
	SETSPASS.TLS	4/05:08:55	13:43
	DC12.TLS	4/05:09:55	14:43
	NS112N.TLS	4/05:21:55	26:43

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2OST22.TLM	NS212N.TLS	4/05:33:55	00:00
	PERV.TLS	4/05:48:15	14:20
	SETS3A.TLS	4/05:50:35	16:40
	NS112D.TLS	4/05:51:35	17:40
3OST22.TLM	NS212D.TLS	4/06:03:35	00:00
	NS112D.TLS	4/06:15:35	12:00
1OST23.TLM	PASS.TLS	4/06:27:35	00:00
	SETSPASS.TLS	4/06:41:00	13:25
	SETS16C.TLS	4/06:42:00	14:25
	PASS.TLS	4/06:43:30	15:55
	SETSPASS.TLS	4/06:56:49	29:14
2OST23.TLM	SETS14.TLS	4/06:57:49	00:00
	IV12.TLS	4/07:03:19	05:30
	SETS14.TLS	4/07:15:58	18:09
	IV12.TLS	4/07:21:28	23:39
3OST23.TLM	IV12.TLS	4/07:33:28	00:00
	IV12.TLS	4/07:45:28	12:00
1OST24.TLM	IV12.TLS	4/07:57:28	00:00
	PERV.TLS	4/08:09:28	12:00
	SETS3A.TLS	4/08:11:48	14:20
	DEP1.TLS	4/08:12:48	15:20
	DEP1.TLS	4/08:19:28	22:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MEF	PET (MM:SS)
1RET21.TLM	DEP1.TLS	4/08:26:08	00:00
	DEP1.TLS	4/08:32:48	06:40
	PASS.TLS	4/08:39:28	13:20
	SETSPASS.TLS	4/10:21:00	114:52
1PRS1.TLM	SETS3A.TLS	4/10:22:00	00:00
	PASS.TLS	4/10:23:00	01:00
	SETSPASS.TLS	4/10:52:40	30:40
	SETS20.TLS	4/10:53:40	31:40
	DEP1.TLS	4/10:59:00	37:00
	DEP1.TLS	4/11:05:40	43:40
1PRS2.TLM	DEP1.TLS	4/11:12:20	00:00
	DEP1.TLS	4/11:19:00	06:40
	DEP1.TLS	4/11:25:40	13:20
	DEP1.TLS	4/11:32:20	20:00
2PRS2.TLM	DEP1.TLS	4/11:39:00	00:00
	DEP1.TLS	4/11:45:40	06:40
	DEP1.TLS	4/11:52:20	13:20
	DEP1.TLS	4/11:59:00	20:00
	DEP1.TLS	4/12:05:40	26:40
3PRS2.TLM	DEP1.TLS	4/12:12:20	00:00
	DEP1.TLS	4/12:19:00	06:40
	SETS3A.TLS	4/12:25:40	13:20
	PASS.TLS	4/12:26:40	14:20
	SETSPASS.TLS	4/12:43:00	30:40
1PRS3.TLM	IVP24.TLS	4/12:44:00	00:00

MASTER TIMELINE	SUBORDINATE TIMELINE	MET	PET (MM:SS)
2PRS3.TLM	DCP.TLS	4/13:08:00	00:00
	ACP.TLS	4/13:32:00	24:00
3PRS3.TLM	IVP12.TLS	4/13:44:00	00:00
	IVP12.TLS	4/13:56:00	12:00
	IVP12.TLS	4/14:08:00	24:00
1PRS4.TLM	IVP12.TLS	4/14:20:00	00:00
	IVP12.TLS	4/14:32:00	12:00

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CONTINGENCY TIMELINES

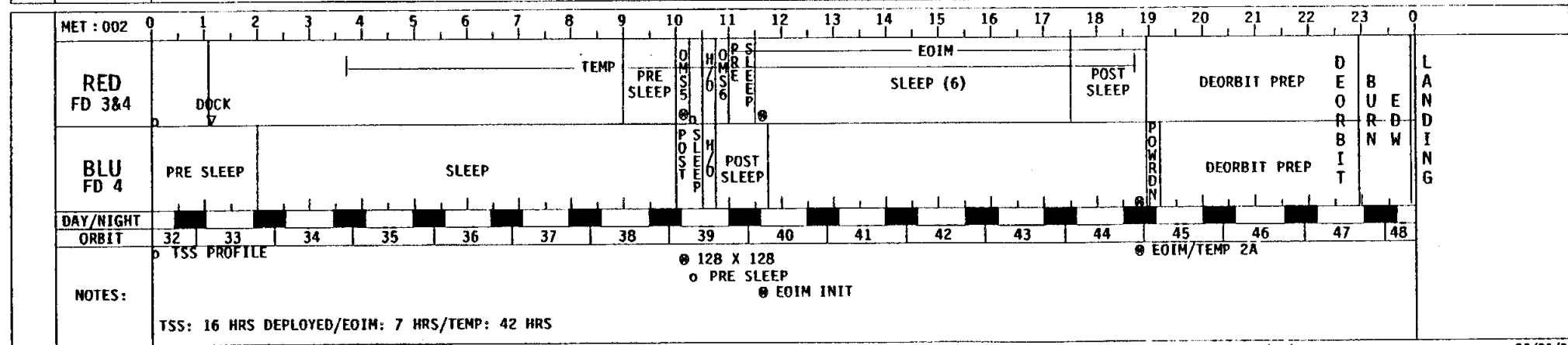
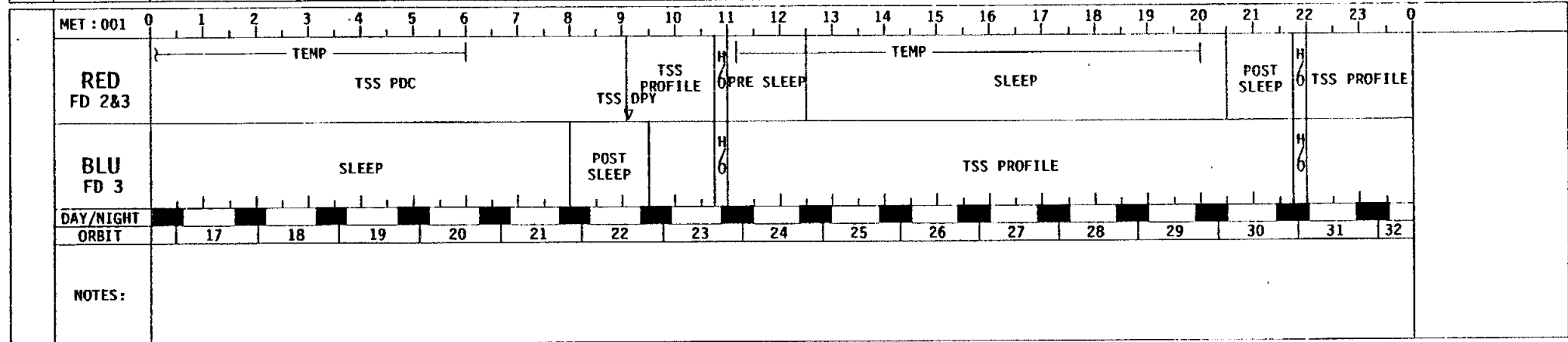
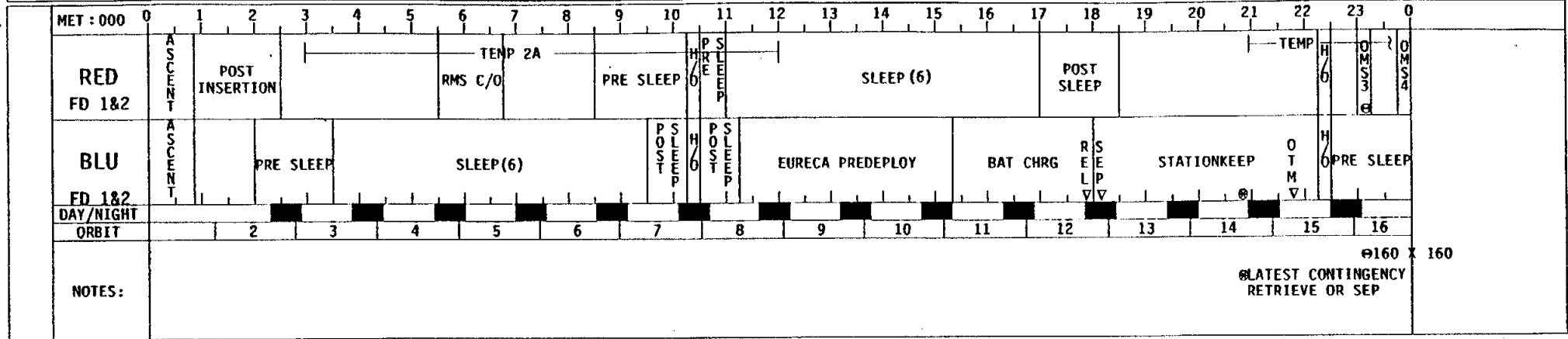
MINIMUM DURATION FLIGHT (MDF) TIMELINE.....	5-2
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CONTINGENCY
TIMELINES

CONTINGENCY
TIMELINES

MINIMUM DURATION FLIGHT (MDF) TIMELINE

The MDF timeline assumes that a failure occurred during or shortly after ascent which places the orbiter in an MDF posture. The timeline assumes a mission of approximately 72-hour duration designed to achieve the highest priority mission objectives. The nominal trajectory was used for this publication.

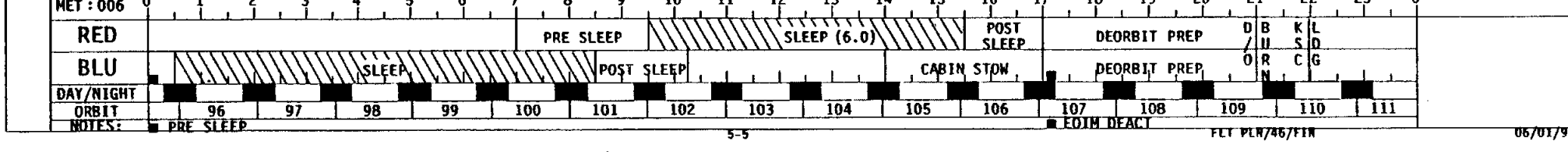
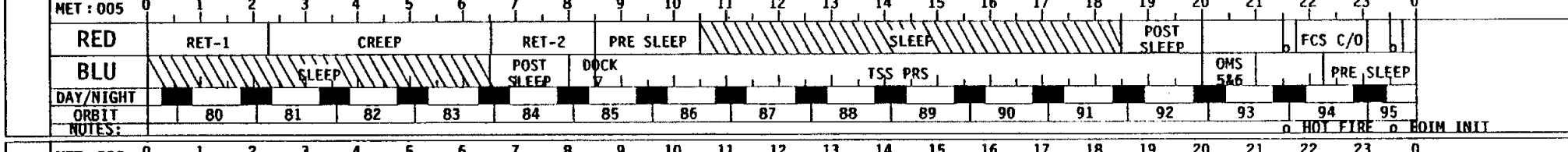
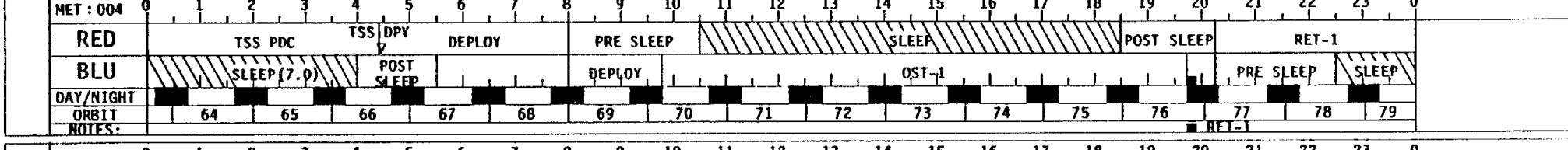
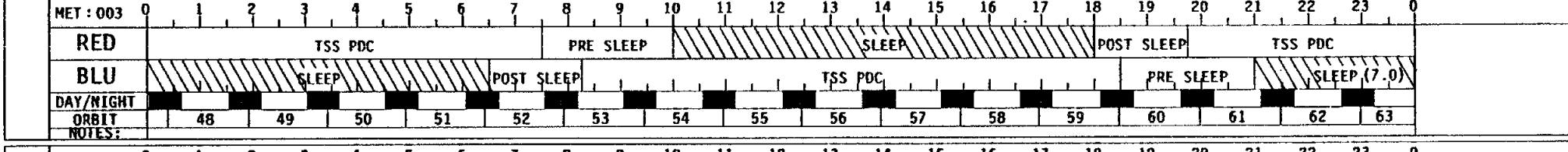
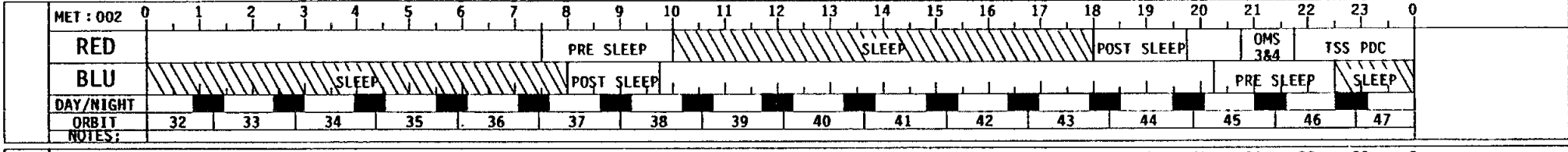
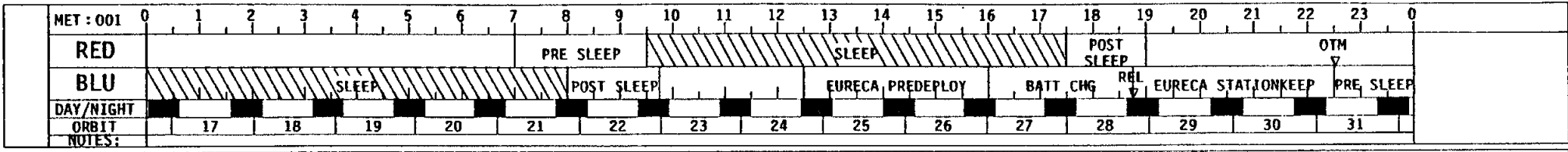
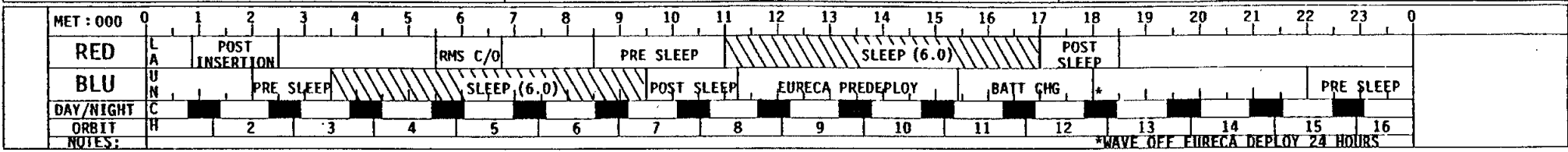


EURECA AND TSS 1-DAY LATE TIMELINE

The EURECA/TSS 1-day late timeline was designed to accommodate delaying EURECA deploy 24 hours due to a spacecraft anomaly. The following apply:

- It is assumed that the problem can be solved in order to support a EURECA deploy on orbit 28.
- All subsequent activities are assumed to proceed as planned - only 1 day late.
- It is assumed the mission cannot be extended a day. Therefore, the TSS deployed mission is shortened one rev and EOIM gets approximately 21 hours of operation.

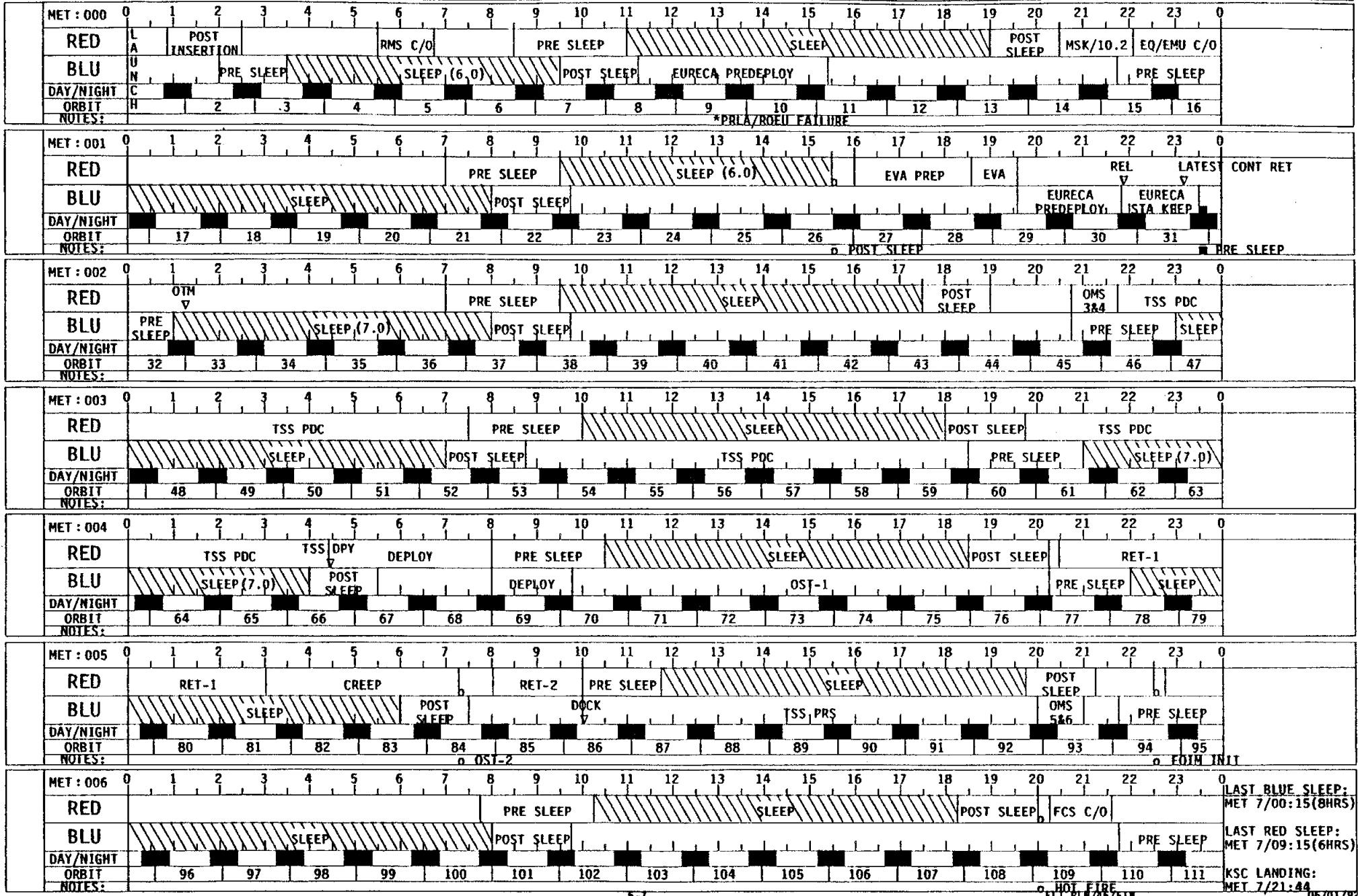
FLIGHT: EURECA AND TSS ONE DAY LATE TIMELINE EDITION: FINAL PUB. DATE: 06/01/92



EURECA PRLA/ROEU EVA TIMELINE

The PRLA/ROEU EVA timeline is designed to accommodate an EVA to manually unlatch a PRLA or demate the ROEU to deploy EURECA. The following guidelines apply:

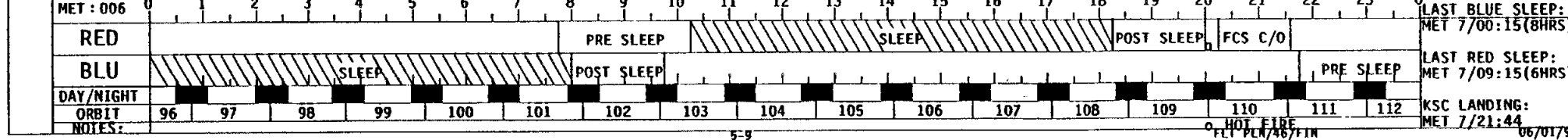
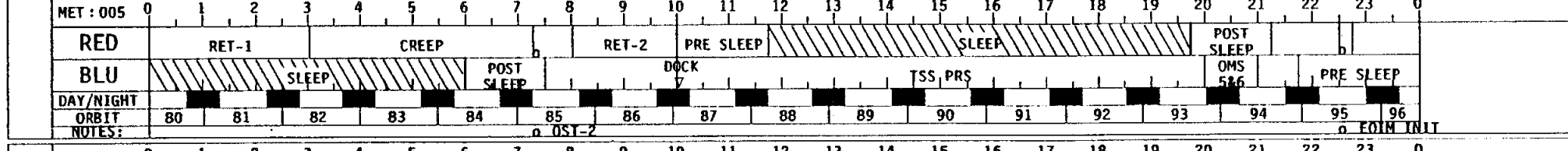
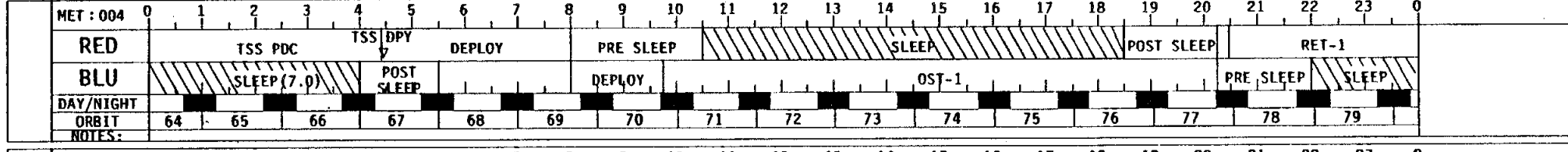
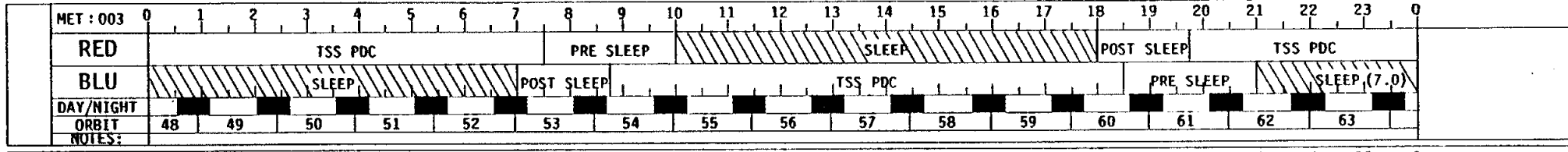
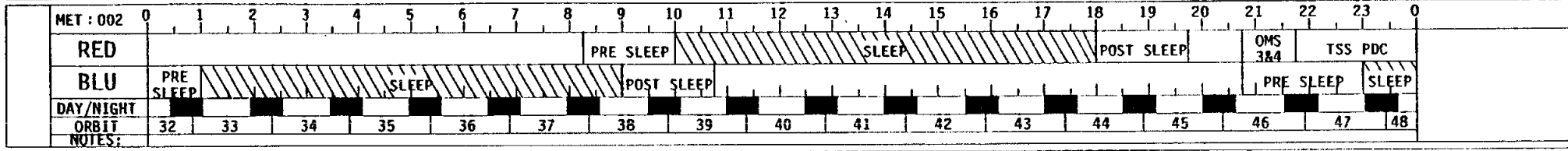
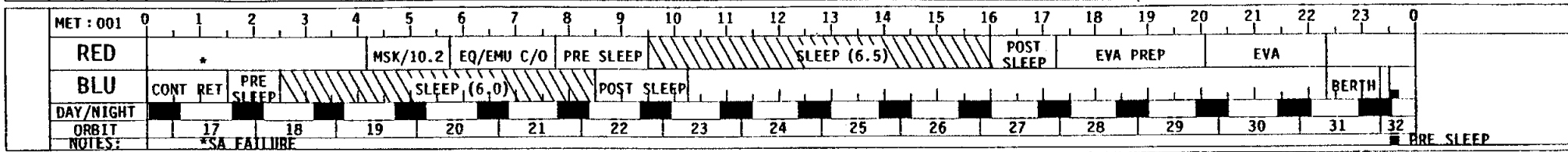
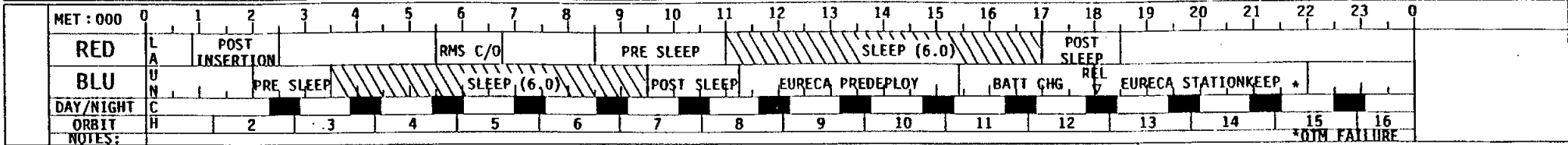
- The failure is assumed to occur during the EURECA pre-deploy activities such that the Red team can sleep 2 extra hours on FD2.
- The EVA is performed by the Red team on FD3 (MET 1/19:00) with the deploy on orbit 30.
- The EVA time required for either task is 1 hour (airlock egress to ingress).
- The EVA crewmembers will remain in the airlock until release to protect for an RMS EE failure.
- The decision time from deploy until contingency retrieve is reduced to 1:22.
- All subsequent activities are assumed to proceed as planned - only 1 day late.
- The mission duration is extended to 8 days to preserve the full TSS-1 mission and 40 hours of EOIM operations.
- Appendix K exemption request #31 covers this timeline.



EURECA CONTINGENCY RETRIEVE/SA STOW EVA TIMELINE

This timeline was designed to accommodate a contingency retrieve of the EURECA spacecraft and an EVA to stow one of the solar arrays so the spacecraft may be reberthed for return. The following guidelines apply:

- Time from orbiter initiation of contingency retrieval to final berthing is assumed to be approximately 90 minutes.
- Orbiter initiation of contingency retrieve must start no later than MET 0/23:57 (5 min prior to orbital sunset).
- The latest time to call a GO FOR EVA PREP is 1/04:10. This provides roughly 3 hours of decision making time from the point of solar array failure.
- The EVA is performed by the Red team on FD3 (MET 1/20:00).
- The EVA time required for a solar array stow is 2 hours (airlock egress to solar array latch).
- The EVA crewmembers will remain in the airlock until berth is complete to protect for RMS EE failure.
- All subsequent activities are assumed to proceed as planned - only 1 day late.
- To preserve the full TSS-1 mission and 40 hours of EOIM operations, the mission duration must be extended to 8 days.
- Appendix K exemption request #32 covers this timeline.

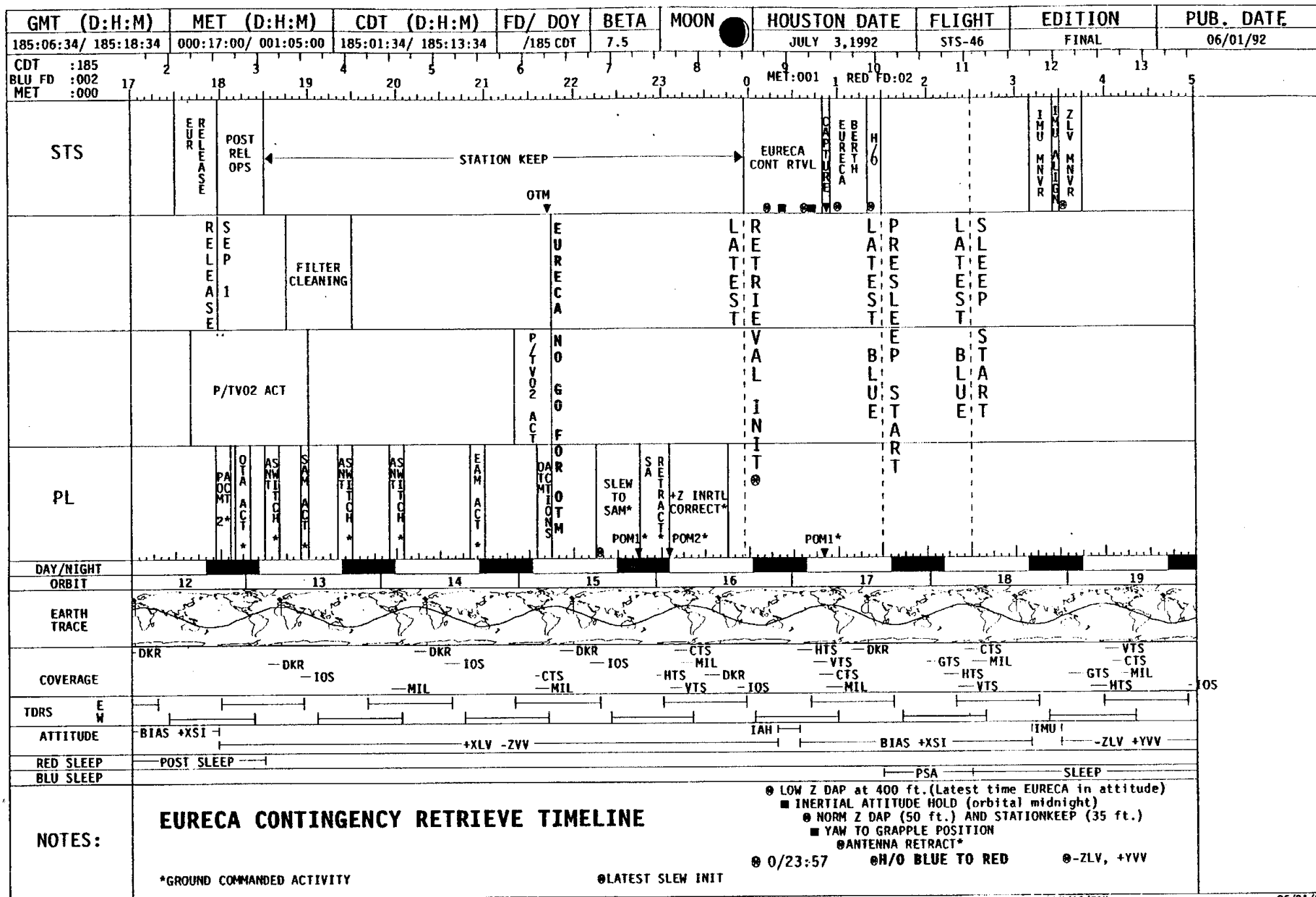


LAST BLUE SLEEP:
MET 7/00:15(8HRS)
LAST RED SLEEP:
MET 7/09:15(6HRS)
KSC LANDING:
MET 7/21:44
06/01/92

EURECA CONTINGENCY RETRIEVE SUMMARY TIMELINE

The contingency retrieve timeline is designed to accommodate the approach, grapple, and berthing of EURECA, following a failed OTM burn or some other failure requiring EURECA retrieval. The following guidelines apply:

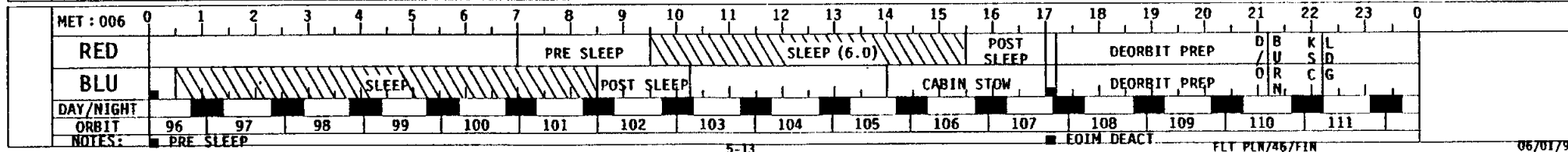
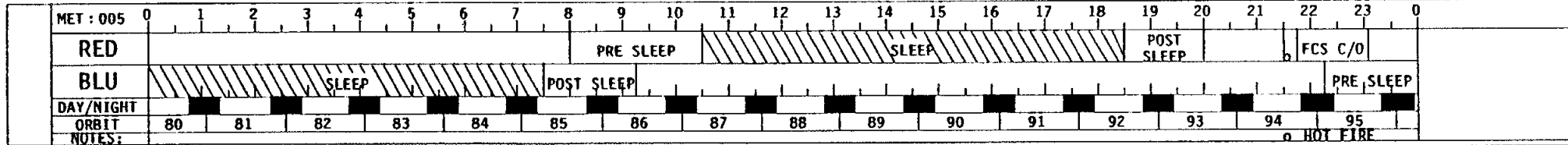
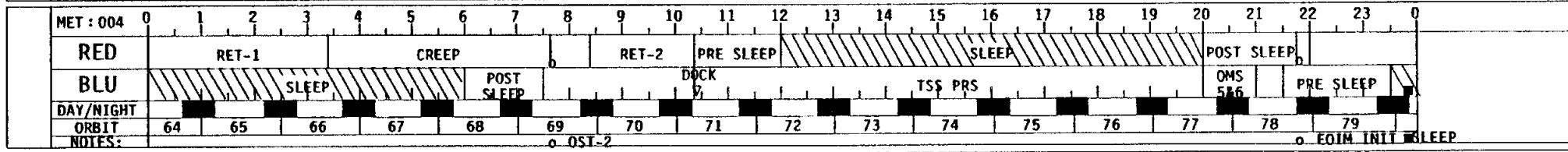
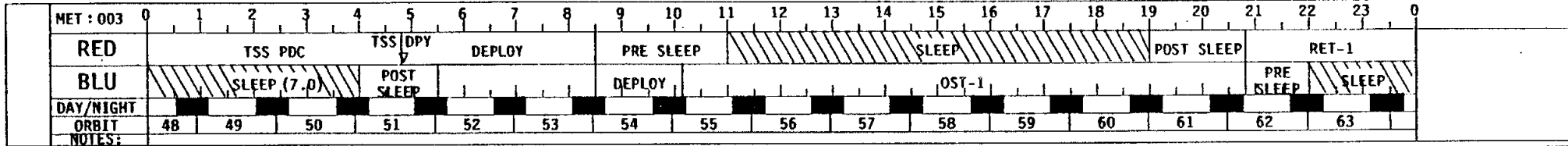
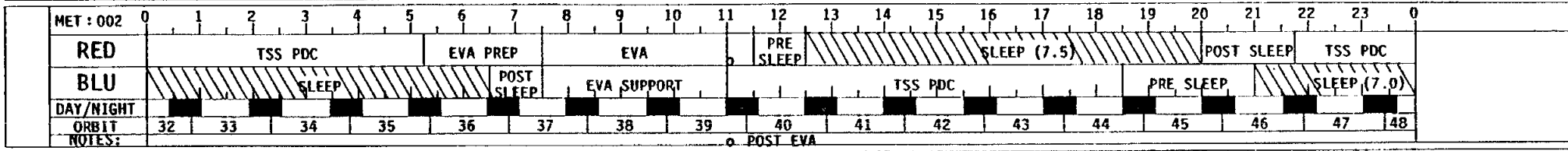
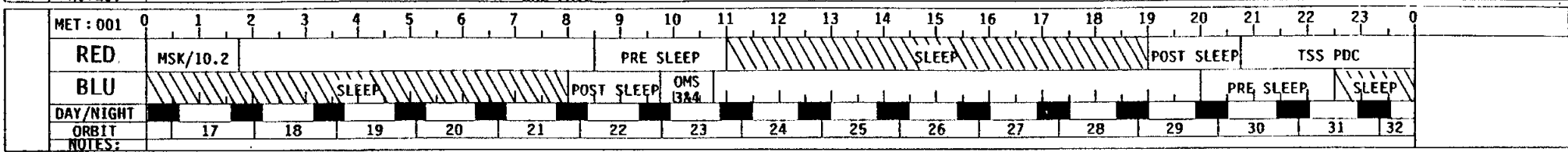
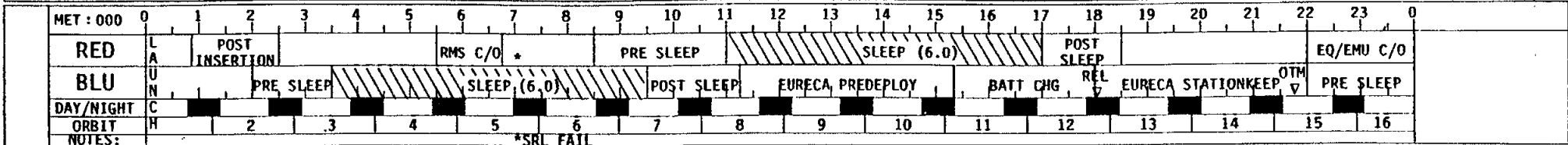
- The failure driving the retrieval is assumed to occur at the nominally scheduled OTM burn time.
- Time from orbiter initiation of contingency retrieval to final berthing is approximately 90 minutes.
- Assumes SA retraction is performed successfully.
- Following SA retraction, "+Z INRTL CORRECT" is performed to recover EURECA attitude and assumes worst case attitude correction needed (EURECA drifted 180 degrees out of attitude).
- Orbiter initiation of EURECA Contingency Retrieval begins at approximately 0/23:57 (5 min prior to orbital sunset) so that grapple fixture and end effector will be aligned at time of grapple.
- EURECA is in correct grapple attitude by the time the orbiter is within 400 feet of EURECA (retrieval initiation plus 17 minutes).
- Appendix K exemption request #32 covers this timeline.



TSS LAUNCH LOCK REL/SRL EVA TIMELINE

This timeline is designed to accommodate an EVA early in the mission to release the Launch Lock or a Satellite Retention Latch (SRL) so that TSS-1 can be deployed at the nominal time. The following guidelines apply:

- The failure (either Launch Lock Release or SRL) is discovered on Red FD1.
- A nominal EURECA deploy and a successful OTM are performed on time.
- The EVA is performed by the Red team on FD3 (MET 2/07:30).
- The excursion will not exceed 03:30 minutes.
- The nominal timeline is resumed at 3/00:00.



TSS U1/U2 EVA TIMELINE

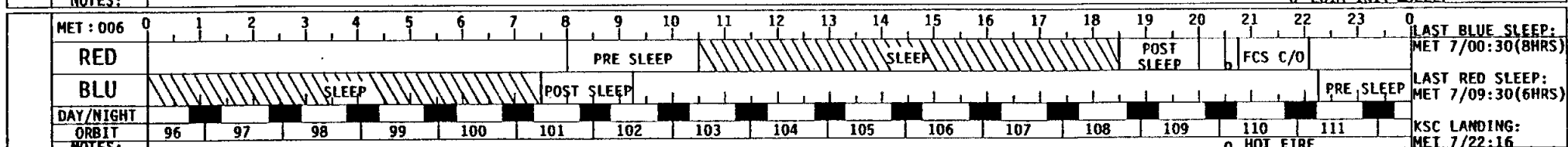
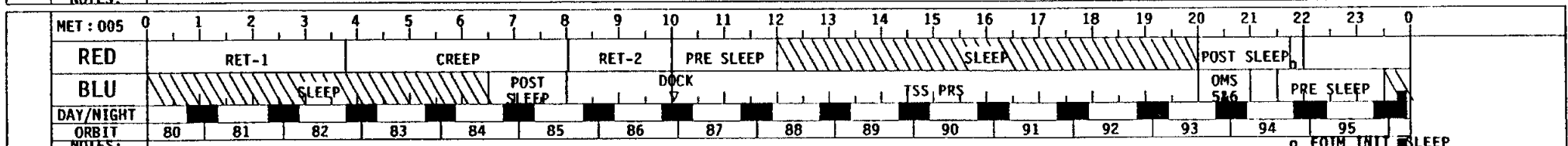
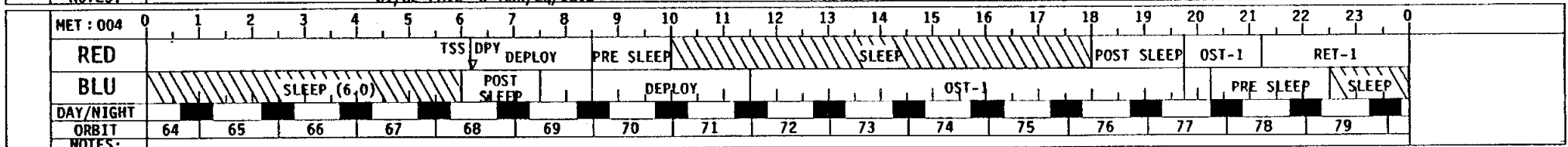
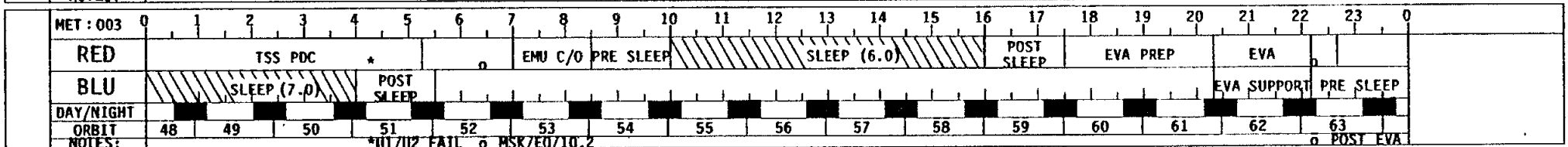
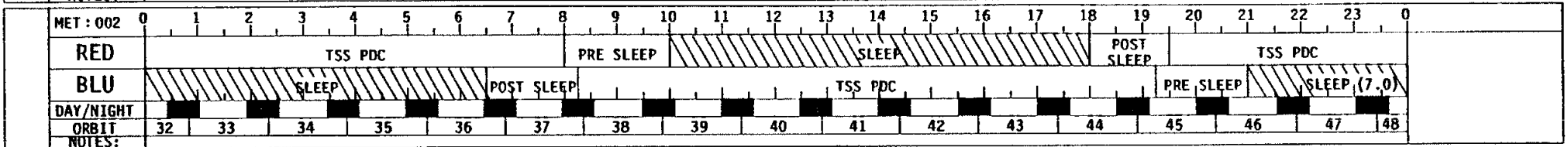
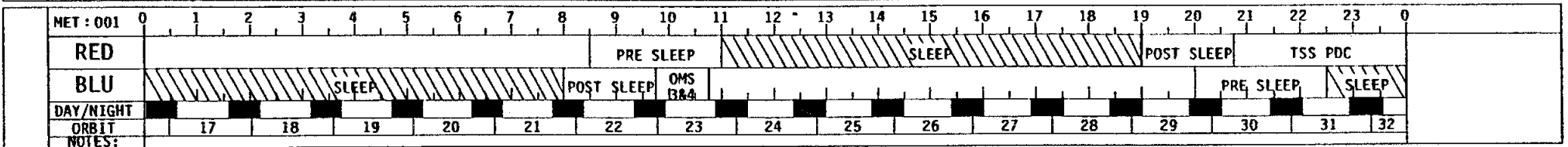
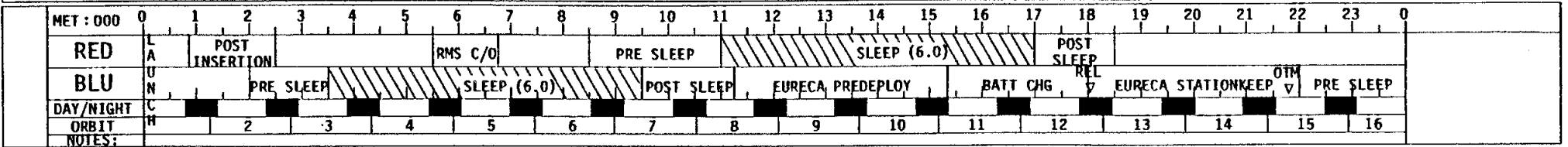
This timeline was designed to accommodate an EVA to manually disconnect the U1 or U2 to deploy TSS-1. The following guidelines apply:

- The nominal timeline has been executed up until the failure.
- The failure occurs during the planned pre-deploy prep just before flyaway.
- The GO FOR EVA must be given by MET 3/05:10.
- The EVA is performed by the Red team on FD5 (MET 3/20:30).
- The EVA time required for U2 Sep is 1:50 (airlock egress to ingress). U1 requires 1:15.
- If the failure is U2, a satellite powerdown will be performed to conserve energy for TSS-1 deployed operations.
- Consideration will be given to adjusting the orbit to 136 x 136 with burns at 3/07:00 to improve the crossrange of the overflights (the trajectory has incorporated these burns).
- The TSS-1 deployed mission must be shortened 1 rev to avoid a sleep period less than 6 hours for the Blue team prior to TSS flyaway.
- Because the TSS-1 activities are delayed a day, the mission must be extended 1 day to accommodate 40 hours of EOIM.
- Appendix K exemption request #34 covers this timeline.

FLIGHT: TSS U1/U2 EVA TIMELINE

EDITION: FINAL

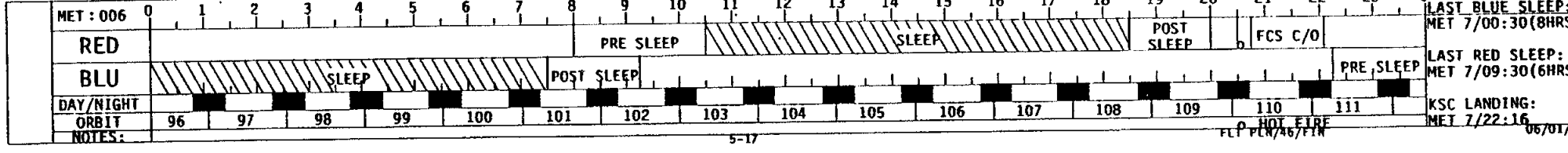
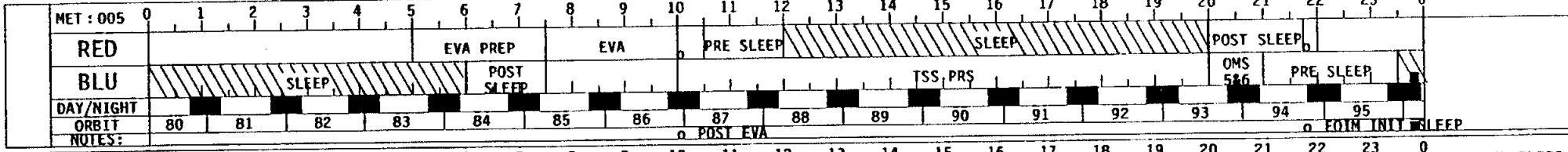
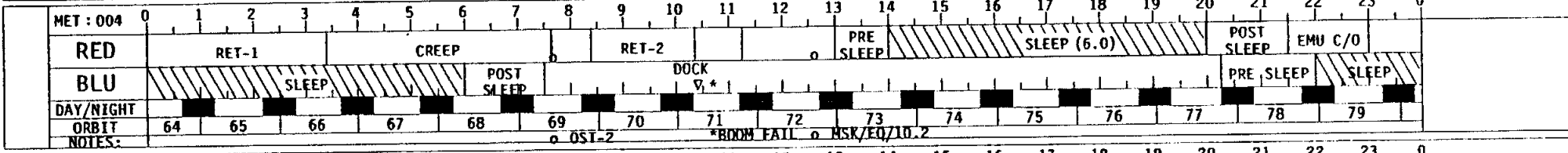
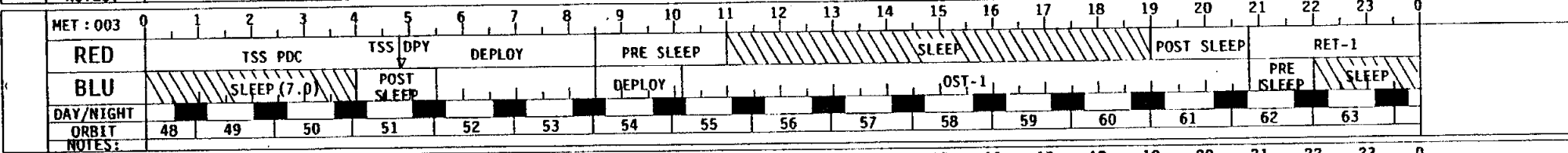
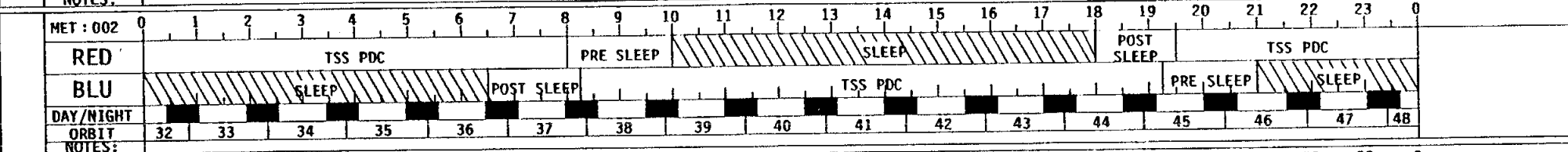
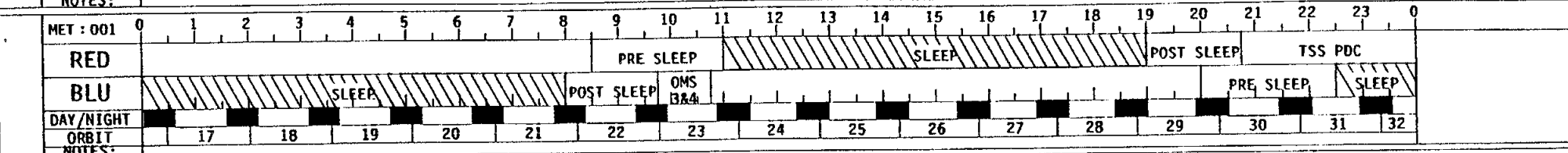
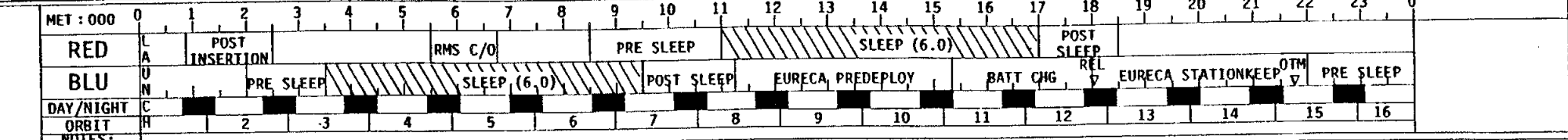
PUB. DATE: 06/01/92



TSS MANUAL FINE ALIGNMENT EVA TIMELINE

This timeline was designed to accommodate an EVA to manually fine align the satellite on the docking ring post retrieve. The following guidelines apply:

- The nominal timeline has been executed up until the failure.
- The failure occurs during the planned post-retrieval safing after dock.
- The GO FOR EVA must be given by 4/11:15.
- The EVA is performed by the Red team on FD6 (MET 5/07:30).
- The EVA time required for manual fine alignment is 1:40 (airlock egress to ingress). Boom jettison requires 2:30.
- Because TSS-1 boom retraction is delayed a day, the mission must be extended 1 day to accommodate 40 hours of EOIM.
- Appendix K exemption request #35 covers this timeline.



LAST BLUE SLEEP:
MET 7/00:30(8HRS)

LAST RED SLEEP:
MET 7/09:30(6HRS)

KSC LANDING:
MET 7/22:16

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

ATTITUDE TIMELINE

ATTITUDE
TIMELINE

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 000/01:12:00 MET 198/14:57:00 GMT	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO PRI	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	plbd opening
2 000/02:20:00 MET 34:59 198/16:05:00 GMT 19:59	INRTL R=344.00 MNVR P=321.00 Y=352.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 139 P 102	star pair A1 -Y: 43 -Z: 28	imu align
3 000/02:40:00 MET 51:45 198/16:25:00 GMT 36:45	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
4 000/08:30:00 MET 44:41 198/22:15:00 GMT 29:41	INRTL R=344.00 MNVR P=321.00 Y=352.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 139 P 102	star pair A1 -Y: 43 -Z: 28	imu align -z coas cal
5 000/08:50:00 MET 09:02:00 198/22:35:00 GMT 47:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
6 000/13:40:00 MET 47:52 199/03:25:00 GMT 32:52	TGT=4 RA= 116.107 BV=5 DEC= 21.277N P=111.20 Y= 7.40 OM= 9.00	A10 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.04	SUN R 8 P 111	INRTL R= 48.41 P=150.64 Y=323.12	eureca css 2 checkout css2-solar
7 000/13:55:00 MET 14:04:00 199/03:40:00 GMT 49:00	TGT=4 RA= 116.118 BV=5 DEC= 21.275N P= 3.00 Y= 0.70 OM=358.00	A10 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.04	SUN R 13 P 3	INRTL R= 31.14 P=217.46 Y= 54.71	eureca css 3 checkout css3-solar
8 000/14:18:00 MET 22:03 199/04:03:00 GMT 07:03	TGT=4 RA= 116.134 BV=5 DEC= 21.272N P= 2.50 Y=312.10 OM=358.30	A10 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.04	SUN R 272 P 48	INRTL R=134.90 P=108.64 Y= 65.15	eureca css 1 checkout css1-solar
9 000/17:15:00 MET 17:38 199/07:00:00 GMT 02:38	TGT=4 RA= 116.258 BV=5 DEC= 21.252N P= 2.50 Y=312.10 OM= 30.00	A10 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.04	SUN R 272 P 48	INRTL R=130.59 P=138.76 Y= 48.12	eureca css 1/comm css1-solar
10 000/17:45:00 MET 47:38 199/07:30:00 GMT 32:38 release-10 min	TGT=4 RA= 116.279 BV=5 DEC= 21.248N P= 2.50 Y=312.10 OM=358.30	A10 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.04	SUN R 272 P 48	INRTL R=134.74 P=108.53 Y= 65.23	eureca release css1-solar Z ORB in-plane +X ERC north
11 000/17:57:00 MET 18:01:54 199/07:42:00 GMT 46:54	TGT=2 BV=1 P= 0.00 Y= 0.00 OM= 0.00	B10 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 40 P 0	LVLH R= 0.00 P=270.00 Y= 0.00	eureca station keep
12 000/21:41:00 MET 199/11:26:00 GMT		A8 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 354 P 107	INRTL R= 62.57 HOLD P=148.41 Y=329.02	otm init

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT
000/22:04:00 MET 199/11:49:00 GMT		A8 LVLH VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 89	LVLH R=359.94 HOLD P=358.97 Y=359.96	adi P = 0
000/22:30:00 MET 36:35 199/12:15:00 GMT 21:35	INRTL R=344.00 MNVR P=321.00 Y=352.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 140 P 102	star pair A1 -Y: 43 -Z: 28	imu align
000/22:50:00 MET 23:01:29 199/12:35:00 GMT 46:29	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
001/07:30:00 MET 43:53 199/21:15:00 GMT 28:53	INRTL R=295.00 MNVR P=225.00 Y=345.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 158 P 71	triad -Y: 53 -Z: 22 +X: 29	imu align +X coas cal
001/08:00:00 MET 13:59 199/21:45:00 GMT 58:59	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
001/09:50:00 MET 57:33 199/23:35:00 GMT 42:33	TGT=2 BV=5 P= 78.00 Y= 0.00 OM= 0.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 78	LVLH R= 0.00 P=192.00 Y= 0.00	LVLH approx OMS-3 OMS-4
001/10:55:00 MET 11:02:33 200/00:40:00 GMT 47:33	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
001/21:15:00 MET 28:16 200/11:00:00 GMT 13:16	INRTL R=344.00 MNVR P=321.00 Y=352.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 140 P 103	star pair A1 -Y: 43 -Z: 28	imu align
001/21:35:00 MET 48:02 200/11:20:00 GMT 33:02	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
001/23:20:00 MET 200/13:05:00 GMT	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=180.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R=180.00 P= 0.00 Y= 0.00	-zlv nose fwd transit to -zlv nose north
001/23:20:30 MET 35:01 200/13:05:30 GMT 20:01	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00	A6 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y=270.00	-zlv nose north att scan XPOP roll start att
002/01:10:00 MET 200/14:55:00 GMT	INRTL BV=1 ROTR P= 0.00 Y= 0.00	A6 AUTO PRI DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R=213.21 P=250.19 Y=339.38	att scan XPOP roll rotr

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 002/02:40:00 MET 50:29 200/16:25:00 GMT 35:29	INRTL R= 90.00 MNVR P=252.00 Y= 12.00	B2 AUTO PRI	DSC 0.200 DB AT 3.00 DB RT 0.20	SUN R 23 P 50	sla cal star pr -Y: 37 -Z: 64	(imu align) sla cal
2 002/03:05:00 MET 17:32 200/16:50:00 GMT 17:02:32	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
3 002/04:40:00 MET 54:09 200/18:25:00 GMT 39:09	TGT=2 BV=5 P=270.00 Y=343.00 OM=196.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 197 P 90	LVLH R=163.00 P=180.00 Y=344.00	fpeg init emission
4 002/05:40:00 MET 49:32 200/19:25:00 GMT 34:32	INRTL R= 90.00 MNVR P=252.00 Y= 12.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 23 P 50	sla cal star pr -Y: 37 -Z: 64	(imu align) sla cal
5 002/06:15:00 MET 25:35 200/20:00:00 GMT 10:35	TGT=2 BV=5 P= 21.23 Y=341.25 OM=242.10	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 317 P 28	LVLH R=243.23 P=296.20 Y= 10.36	orbiter fluorescence start att #1
6 002/06:30:00 MET 32:49 200/20:15:00 GMT 17:49	TGT=2 BV=5 P= 17.05 Y= 10.71 OM=258.46	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 33 P 20	LVLH R=258.01 P=263.00 Y= 18.83	orbiter fluorescence att #2
7 002/06:32:53 MET 35:03 200/20:17:53 GMT 20:03	TGT=2 BV=5 P= 15.52 Y=347.51 OM=246.94	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 320 P 20	LVLH R=247.19 P=287.50 Y= 9.47	orbiter fluorescence att #3
8 002/06:37:07 MET 40:02 200/20:22:07 GMT 25:02	TGT=2 BV=5 P= 18.00 Y= 18.43 OM=263.34	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 47 P 26	LVLH R=263.28 P=253.76 Y= 19.99	orbiter fluorescence att #4
9 002/07:00:00 MET 13:08 200/20:45:00 GMT 58:08	INRTL R= 90.00 MNVR P=252.00 Y= 12.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 23 P 50	sla cal star pr -Y: 37 -Z: 64	imu align gyro cal
10 002/09:05:00 MET 12:33 200/22:50:00 GMT 57:33	TGT=2 BV=5 P=300.00 Y= 0.00 OM=180.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R=180.00 P=210.00 Y= 0.00	sim dep1 orb1 att #1
11 002/09:23:00 MET 26:20 200/23:08:00 GMT 11:20	TGT=2 BV=5 P=310.00 Y= 0.00 OM=180.00	B46 AUTO VERN	DSC 0.050 DB AT 1.00 DB RT 0.02	EARTH R 180 P 50	LVLH R=180.00 P=220.00 Y= 0.00	sim dep1 orb1 att #2
12 002/10:57:00 MET 50 201/00:42:00 GMT 50	TGT=2 BV=5 P=300.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R=180.00 P=210.00 Y= 0.00	sim dep1 orb2 att #1

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 002/11:08:00 MET 09:15 201/00:53:00 GMT 54:15	TGT=2 BV=5 P=285.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 75	LVLH R=180.00 P=195.00 Y= 0.00	sim dep1 orb2 att #2
2 002/11:18:00 MET 48 201/01:03:00 GMT 48	TGT=2 BV=5 P=275.50 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 85	LVLH R=180.00 P=185.50 Y= 0.00	sim dep1 orb2 att #3
3 002/11:35:00 MET 37:18 201/01:20:00 GMT 22:18	TGT=2 BV=5 P=248.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 112	LVLH R=180.00 P=158.00 Y= 0.00	sim dep1 orb2 att #4
4 002/12:12:00 MET 18 201/01:57:00 GMT 18	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 115	LVLH R=180.00 P=154.50 Y= 0.00	sim IV ost rotr start att
5 002/12:27:00 MET 201/02:12:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM=300.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R= 36.71 P= 43.65 Y=308.59	sim IV ost rotr
6 002/12:41:00 MET 201/02:28:00 GMT approx met	TGT=2 BV=5 P=244.50 Y= 0.00 OM= 60.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=323.29 P= 43.65 Y= 51.41	sim IV ost rotr
7 002/13:04:00 MET 35:14 201/02:49:00 GMT 03:20:14 approx met	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=180.00 P=154.50 Y= 0.00	sim IV ost rotr stop
8 002/13:45:00 MET 56:05 201/03:30:00 GMT 41:05	TGT=2 BV=5 P=120.00 Y= 0.00 OM=118.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 120	LVLH R=223.24 P= 50.88 Y=310.12	electron beam excit att #1 +x parallel
9 002/14:07:00 MET 10:15 201/03:52:00 GMT 55:15	TGT=2 BV=5 P= 84.00 Y= 0.00 OM=103.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 84	LVLH -R=155.64 P=334.96 Y=284.30	electron beam excit att #2 +x parallel
10 002/14:35:00 MET 49:41 201/04:20:00 GMT 34:41	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 0.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 0.00	gas interact +zlv +xvv
11 002/15:10:00 MET 22:09 201/04:55:00 GMT 05:07:09	TGT=2 BV=5 P=185.00 Y=316.00 OM=173.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 265 P 136	LVLH R=184.91 P= 90.17 Y= 44.23	elec reflection att #1
12 002/15:43:00 MET 47:14 201/05:28:00 GMT 32:14	TGT=2 BV=5 P=181.00 Y= 5.00 OM=188.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 101 P 175	LVLH R=172.06 P= 90.30 Y=354.91	elec reflection att #2

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 002/15:53:00 MET 55:56 201/05:38:00 GMT 40:56	TGT=2 BV=5 P=170.00 Y= 28.00 OM=160.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 72 P 150	LVLH R=197.41 P= 89.67 Y=330.41	elec reflection att #3
2 002/16:27:00 MET 30:16 201/06:12:00 GMT 15:16	TGT=2 BV=5 P=172.00 Y= 6.00 OM=128.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 37 P 170	LVLH R=231.56 P= 89.76 Y=350.01	elec reflection att #4
3 002/16:35:00 MET 48:31 201/06:20:00 GMT 33:31	INRTL R=237.00 MNVR P= 47.00 Y=281.00 norm disc=.4	B2 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 44 P 156		beam structure start att
4 002/16:52:00 MET 201/06:37:00 GMT	INRTL BV=1 ROTR P= 0.00 Y= 0.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R=237.00 P= 47.00 Y=281.00	beam structure rotr about +x
5 002/17:07:00 MET 10:58 201/06:52:00 GMT 55:58	INRTL R=163.00 MNVR P= 12.00 Y= 5.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	SUN R 304 P 116		beam struct 2 start att
6 002/17:12:00 MET 201/06:57:00 GMT	INRTL BV=1 ROTR P= 0.00 Y= 0.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R=163.00 P= 12.00 Y= 5.00	rotr about +x
7 002/17:27:00 MET 32:21 201/07:12:00 GMT 17:21	INRTL R=111.00 MNVR P=300.00 Y= 74.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	SUN R 55 P 35		beam struct 3 start att
8 002/17:33:00 MET 201/07:18:00 GMT	INRTL BV=1 ROTR P= 0.00 Y= 0.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R=111.00 P=300.00 Y= 74.00	rotr about +x
9 002/17:48:00 MET 52:14 201/07:33:00 GMT 37:14	INRTL R=247.00 MNVR P=179.00 Y= 0.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	SUN R 179 P 64		beam struct 4 start att
10 002/17:57:00 MET 201/07:42:00 GMT	INRTL BV=1 ROTR P= 0.00 Y= 0.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R=247.00 P=179.00 Y= 0.00	rotr about +x
11 002/18:15:00 MET 18:18 201/08:00:00 GMT 03:18	TGT=2 BV=5 P= 90.00 Y=303.00 OM=196.00	A6 AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	EARTH R 303 P 90	LVLH R=237.00 P= 0.00 Y= 16.00	elec environ cal parallel att #1
12 002/18:33:00 MET 45 201/08:18:00 GMT 45	TGT=2 BV=5 P= 90.00 Y=307.00 OM=204.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 307 P 90	LVLH R=233.00 P= 0.00 Y= 24.00	elec environ cal parallel att #2

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
002/18:47:00 MET 52:55 201/08:32:00 GMT 37:55	TGT=2 BV=5 P= 90.00 Y= 17.00 OM=217.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 17 P 90	LVLH R=163.00 P= 0.00 Y= 37.00	elec environ cal parallel att #3
002/19:04:00 MET 08:45 201/08:49:00 GMT 53:45	TGT=2 BV=5 P= 90.00 Y= 28.00 OM=161.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 28 P 90	LVLH R=152.00 P= 0.00 Y=341.00	elec environ cal parallel att #4
002/19:36:00 MET 41:54 201/09:21:00 GMT 26:54	TGT=2 BV=5 P= 90.00 Y=319.00 OM=144.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 319 P 90	LVLH R=221.00 P= 0.00 Y=324.00	elec environ cal parallel att #5
002/19:45:00 MET 50:55 201/09:30:00 GMT 35:55	TGT=2 BV=5 P=151.00 Y= 0.00 OM= 99.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 151	LVLH R=259.74 P= 85.04 Y=331.39	elec environ cal perp att #1
002/20:04:00 MET 52 201/09:49:00 GMT 52	TGT=2 BV=5 P=148.00 Y= 0.00 OM=109.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 148	LVLH R=247.90 P= 78.50 Y=329.93	elec environ cal perp att #2
002/20:17:00 MET 22:51 201/10:02:00 GMT 07:51	TGT=2 BV=5 P= 80.00 Y= 0.00 OM=128.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 80	LVLH R=167.47 P=344.02 Y=309.10	elec environ cal perp att #3
002/20:35:00 MET 40:52 201/10:20:00 GMT 25:52	TGT=2 BV=5 P= 45.00 Y= 0.00 OM= 66.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 45	LVLH R= 57.80 P=247.87 Y=319.76	elec environ cal perp att #4
002/21:01:00 MET 06:56 201/10:46:00 GMT 51:56	TGT=2 BV=5 P=116.00 Y= 0.00 OM= 61.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 116	LVLH R=321.66 P=134.83 Y=308.18	elec environ cal perp att #5
002/21:15:00 MET 17:32 201/11:00:00 GMT 02:32	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 45.00 norm disc=.4	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y=315.00	att scan +X45 roll start att
002/21:30:00 MET 201/11:15:00 GMT	LVLH ROTR FREE ROTATION ABOUT +X AXIS RATE=0.400	A6* LVLH PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	LVLH R= 0.00 P=180.00 Y=315.00	att scan +X45 roll +x rotr	
002/22:45:00 MET 23:00:00 201/12:30:00 GMT 45:00	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 0.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 0.00	att scan +ZLV yaw start att
002/23:00:00 MET 201/12:45:00 GMT	LVLH ROTR FREE ROTATION ABOUT +Z AXIS RATE=0.400	A6* LVLH PRI	DSC 0.400 DB AT 5.00 DB RT 0.20	LVLH R= 0.00 P= 0.00 Y= 0.00	att scan +ZLV yaw +z rotr	

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 003/00:15:00 MET 30:00 201/14:00:00 GMT 15:00	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-zlv nose south
2 003/01:30:00 MET 44:17 201/15:15:00 GMT 29:17	INRTL R=132.00 MNVR P=147.00 Y=291.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 269 P 134	star pair C1 -Y: 41 -Z: 34	imu align
3 003/01:50:00 MET 02:04:59 201/15:35:00 GMT 49:59	TGT=2 BV=5 P=300.00 Y= 0.00 OM=180.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R=180.00 P=210.00 Y= 0.00	pre-deploy att sat flyaway
4 003/04:58:00 MET 05:01:20 201/18:43:00 GMT 46:20	TGT=2 BV=5 P=310.00 Y= 0.00 OM=180.00	B46 AUTO VERN	DSC 0.050 DB AT 1.00 DB RT 0.02	EARTH R 180 P 50	LVLH R=180.00 P=220.00 Y= 0.00	pitch = 310 sat flyaway
5 003/06:27:00 MET 50 201/20:12:00 GMT 50	TGT=2 BV=5 P=300.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R=180.00 P=210.00 Y= 0.00	pitch = 300
6 003/06:45:00 MET 46:15 201/20:30:00 GMT 31:15	TGT=2 BV=5 P=285.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 75	LVLH R=180.00 P=195.00 Y= 0.00	pitch = 285
7 003/06:54:00 MET 48 201/20:39:00 GMT 48	TGT=2 BV=5 P=275.50 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 85	LVLH R=180.00 P=185.50 Y= 0.00	pitch = 275.5
8 003/07:13:00 MET 15:18 201/20:58:00 GMT 21:00:18	TGT=2 BV=5 P=248.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 112	LVLH R=180.00 P=158.00 Y= 0.00	torque equilib att
9 003/09:48:00 MET 18 201/23:33:00 GMT 18	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	A46 AUTO VERN	DSC 0.200 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=180.00 P=154.50 Y= 0.00	TEA change
10 003/12:32:00 MET 202/02:17:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM=300.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R= 36.71 P= 43.65 Y=308.59	begin 360 deg yaw rotr
11 003/12:46:00 MET 202/02:31:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM= 60.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R=323.29 P= 43.65 Y= 51.41	360 deg rotr
12 003/13:09:00 MET 40:14 202/02:56:00 GMT 25:14	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	B49 AUTO VERN	DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R=180.00 P=154.50 Y= 0.00	360 deg rotr

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT
1 003/15:32:00 MET 202/05:17:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM=300.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R= 36.71 P= 43.65 Y=308.59	begin 360 deg rotr #2
2 003/15:46:00 MET 202/05:31:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM= 60.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=323.29 P= 43.65 Y= 51.41	360 deg rotr
3 003/16:09:00 MET 40:14 202/05:56:00 GMT 25:14	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=180.00 P=154.50 Y= 0.00	360 deg rotr
4 003/18:32:00 MET 202/08:17:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM=300.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R= 36.71 P= 43.65 Y=308.59	begin 360 deg rotr #3
5 003/18:46:00 MET 202/08:31:00 GMT	TGT=2 BV=5 P=244.50 Y= 0.00 OM= 60.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 115	LVLH R=323.29 P= 43.65 Y= 51.41	360 deg rotr
6 003/19:09:00 MET 40:14 202/08:56:00 GMT 25:14	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	B49 AUTO VERN DSC 0.088 DB AT 5.00 DB RT 0.07	EARTH R 180 P 116	LVLH R=180.00 P=154.50 Y= 0.00	360 deg rotr DFO#5
7 003/20:07:00 MET 14:30 202/09:52:00 GMT 59:30	TGT=2 BV=5 P=244.50 Y= 0.00 OM= 90.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 116	LVLH R=270.00 P= 90.00 Y= 64.50	TEA change setup for DFO#6
8 003/20:37:00 MET 44:30 202/10:22:00 GMT 29:30	TGT=2 BV=5 P=244.50 Y= 0.00 OM=180.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 116	LVLH R=180.00 P=154.50 Y= 0.00	return to tail fwd for RET 1
9 003/23:48:00 MET 18 202/13:33:00 GMT 18	TGT=2 BV=5 P=241.00 Y= 0.00 OM=180.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 119	LVLH R=180.00 P=151.00 Y= 0.00	ret-1 TEA change
10 004/01:14:00 MET 20 202/14:59:00 GMT 20	TGT=2 BV=5 P=237.00 Y= 0.00 OM=180.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 123	LVLH R=180.00 P=147.00 Y= 0.00	ret-1 TEA change
11 004/01:55:00 MET 57:10 202/15:40:00 GMT 42:10	TGT=2 BV=5 P=263.00 Y= 0.00 OM=180.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 97	LVLH R=180.00 P=173.00 Y= 0.00	Line-of-sight att
12 004/03:10:00 MET 35 202/16:55:00 GMT 35	TGT=2 BV=5 P=270.00 Y= 0.00 OM=180.00	A8 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R=180.00 P=180.00 Y= 0.00	LOS att RET-1

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 004/03:34:00 MET 202/17:19:00 GMT	TGT=2 BV=5 P=270.00 Y= 0.00 OM=180.01	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R=180.00 P=180.00 Y=359.99	begin creep skip rope damp (yaw mnvrs)
2 004/04:50:00 MET 05:05:00 202/18:35:00 GMT 50:00	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 0.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 0.00	end creep begin OST-2 +zlv nose fwd
3 004/08:25:00 MET 202/22:10:00 GMT	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 0.01	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 0.01	begin RET-2
4 004/08:35:00 MET 50 202/22:20:00 GMT 50	TGT=2 BV=5 P=280.00 Y= 0.00 OM= 0.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 80	LVLH R= 0.00 P=350.00 Y= 0.00	begin stepping sequence pitch = -10
5 004/08:42:00 MET 50 202/22:27:00 GMT 50	TGT=2 BV=5 P=290.00 Y= 0.00 OM= 0.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 70	LVLH R= 0.00 P=340.00 Y= 0.00	stepping mnvr pitch = -20
6 004/08:49:00 MET 50 202/22:34:00 GMT 50	TGT=2 BV=5 P=300.00 Y= 0.00 OM= 0.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R= 0.00 P=330.00 Y= 0.00	stepping mnvr pitch = -30
7 004/10:18:00 MET 203/00:03:00 GMT	TGT=2 BV=5 P=300.00 Y= 0.00 OM= 0.01	B46 AUTO VERN	DSC 0.050 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R= 0.01 P=330.00 Y= 0.01	final dock
8 004/10:35:00 MET 11:35:00 203/00:20:00 GMT 01:20:00	TGT=2 BV=5 P=310.00 Y= 0.00 OM=180.00	B46 AUTO VERN	DSC 0.050 DB AT 1.00 DB RT 0.02	EARTH R 180 P 50	LVLH R=180.00 P=220.00 Y= 0.00	sim dep1 orb1 att #2
9 004/12:42:00 MET 45:20 203/02:27:00 GMT 30:20	TGT=2 BV=5 P=300.00 Y= 0.00 OM=180.00	B46 AUTO VERN	DSC 0.050 DB AT 1.00 DB RT 0.02	EARTH R 180 P 60	LVLH R=180.00 P=210.00 Y= 0.00	sim dep1 orb2 att #1
10 004/12:53:00 MET 54:15 203/02:38:00 GMT 39:15	TGT=2 BV=5 P=285.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 75	LVLH R=180.00 P=195.00 Y= 0.00	sim dep1 orb2 att #2
11 004/13:03:00 MET 48 203/02:48:00 GMT 48	TGT=2 BV=5 P=275.50 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 85	LVLH R=180.00 P=185.50 Y= 0.00	sim dep1 orb2 att #3
12 004/13:23:00 MET 25:18 203/03:08:00 GMT 10:18	TGT=2 BV=5 P=248.00 Y= 0.00 OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 112	LVLH R=180.00 P=158.00 Y= 0.00	sim dep1 orb2 att #4

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
004/14:40:00 MET 41:50 203/04:25:00 GMT 26:50	TGT=2 BV=5 P=270.00 Y= 0.00 OM=180.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R=180.00 P=180.00 Y= 0.00	gas interact +zlv -xvv
004/15:30:00 MET 42:40 203/05:15:00 GMT 27:40	TGT=2 BV=5 P=122.00 Y= 0.00 OM=123.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 122	LVLH R=219.21 P= 48.92 Y=314.66	electron beam excit att #1 +x parallel
004/15:55:00 MET 16:01:18 203/05:40:00 GMT 46:18	TGT=2 BV=5 P= 49.00 Y= 0.00 OM=102.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 49	LVLH R=107.95 P=283.45 Y=312.42	electron beam excit att #2 +x parallel
004/16:20:00 MET 25:46 203/06:05:00 GMT 10:46	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 45.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y=315.00	att scan +X45 roll start att
004/16:35:00 MET 203/06:20:00 GMT	LVLH ROTR FREE ROTATION ABOUT +X AXIS RATE=0.400	A6* LVLH PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		LVLH R= 0.00 P=180.00 Y=315.00	att scan +X45 roll +x rotr
004/17:50:00 MET 18:05:00 203/07:35:00 GMT 50:00	TGT=2 BV=5 P=270.00 Y= 0.00 OM= 0.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 180 P 90	LVLH R= 0.00 P= 0.00 Y= 0.00	att scan YPOP pitch start att
004/18:05:00 MET 203/07:50:00 GMT	INRTL ROTR BV=5 P= 0.00 Y= 90.00	A6* AUTO PRI	DSC 0.400 DB AT 5.00 DB RT 0.20		INRTL R= 75.99 P=160.58 Y= 25.11	att scan YPOP pitch +y rotr
004/19:20:00 MET 34:02 203/09:05:00 GMT 19:02	INRTL MNVR R=142.00 P= 3.00 Y=326.00	B2 AUTO PRI	DSC 0.200 DB AT 3.00 DB RT 0.20	SUN R 347 P 149	star pair B1 -Y: 57 -Z: 40	imu align
004/19:50:00 MET 20:02:35 203/09:35:00 GMT 47:35	TGT=2 BV=5 P= 75.00 Y= 0.00 OM= 0.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 75	LVLH R= 0.00 P=195.00 Y= 0.00	LVLH approx OMS-5 OMS-6
004/20:55:00 MET 21:02:35 203/10:40:00 GMT 47:35	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	water dump -zlv +yv
004/22:20:00 MET 27:30 203/12:05:00 GMT 12:30	TGT=2 BV=5 P= 0.00 Y=270.00 OM=270.00	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 270 P 90	LVLH R= 0.00 P=270.00 Y= 90.00	-ylv bay fwd EOIM
006/16:55:00 MET 17:07:03 205/06:40:00 GMT 52:03	TGT=4 BV=5 P=184.00 Y= 0.00 OM=270.00 RA= 122.248 DEC= 20.141N	A6 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 180 P 176	INRTL R= 55.57 P= 30.78 Y=304.08	tail sun

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT
1 006/18:17:00 MET 30:26 205/08:02:00 GMT 15:26	INRTL R=345.00 MNVR P=152.00 Y= 21.00	A1 AUTO VERN DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 65 P 57	-Y: 30 -Z: 29	deorbit imu align
2 006/18:37:00 MET 44:12 205/08:22:00 GMT 29:12	INRTL R=282.00 MNVR P=119.00 Y=320.00	B1 AUTO NORM DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 121 P 124	-Y: 26 -Z: 14	verif align
3 006/18:47:00 MET 51:55 205/08:32:00 GMT 36:55	INRTL R= 33.60 MNVR P=211.90 Y= 42.00	B1 AUTO PRI DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 48 P 11	tig 6/21:14:45	deorbit burn

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

STS-46 DAP BOOK

DAP A CONFIGURATIONS

	ITEM #	A1*	A2	A3	A4	A5	A6	A7	A8	A9	A10
<u>TRANSLATION</u>											
PULSE ft/sec	1	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.05	0.25	0.10
<u>ROTATION</u>											
DSC RT NORM °/sec	2	0.200	0.400	0.200	0.500	0.200	0.200	0.200	0.200	0.200	0.100
VERN °/sec	3	0.200	0.400	0.008	0.200	0.200	0.200	0.200	0.200	0.200	0.200
PULSE NORM °/sec	4	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.05	0.04
VERN °/sec	5	0.010	0.010	0.010	0.010	0.050	0.010	0.010	0.010	0.010	0.010
COMP NORM °/sec	6	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
VERN °/sec	7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>											
ATT NORM (deg)	8	5.00	1.00	1.00	3.00	5.00	5.00	2.00	2.00	1.00	3.00
VERN (deg)	9	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000	1.000	2.000
RATE NORM °/sec	10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN °/sec	11	.020	.020	.010	.020	.020	.020	.020	.020	0.010	0.040
<u>JET OPT</u>											
P	12	1	1	1	1	3	1 or 3	1 or 3	1	1 or 3	1 or 3
Y	13	1	1	3	1	1	3	1 or 3	1 or 3	1	1 or 3
<u>CNTL ACCEL</u>											
	14	0	0	0	0	0	0	0	0, 5	0	0 - 4

*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

	ITEM #	B1*	B2	B3	B4	B5	B6	B7	B8	B9	B10	B46	B47	B48	B49	B52
TRANSLATION																
PULSE ft/sec	15	0.02	0.02	0.02	0.02	0.02		0.05	0.01		0.10	.02	.05	.05	.05	.05
ROTATION																
DSC RT NORM °/sec	16	0.500	0.500	0.200	0.200	0.200		0.500	0.200		0.200	.100	.200	.200	.088	2.000
VERN °/sec	17	0.200	0.200	0.200	0.008	0.016		0.200	0.200		0.200	.050	.200	.200	.088	.200
PULSE NORM °/sec	18	0.04	0.04	0.04	0.04	0.04		0.04	0.04		0.04	.04	.10	.10	.10	.10
VERN °/sec	19	0.002	0.002	0.002	0.002	0.002		0.002	0.002		0.010	.004	0.050	.010	.010	.010
COMP NORM °/sec	20	.00	.00	.00	.00	.00		.00	.00		.00	.00	.00	.00	.00	.00
VERN °/sec	21	.000	.000	.000	.000	.000		.000	.000		.000	.000	.000	.000	.000	.000
DEADBAND																
ATT NORM (deg)	22	3.00	3.00	3.00	0.30	3.00		2.00	2.00		2.00	2.00	5.00	15.00	5.00	5.00
VERN (deg)	23	1.000	1.000	1.000	0.100	0.033		1.000	1.000		1.000	1.000	5.000	15.000	5.000	1.000
RATE NORM °/sec	24	0.20	0.20	0.20	0.20	0.20		0.20	0.20		0.20	.20	.20	.50	.20	.20
VERN °/sec	25	.020	.020	.020	.010	.020		.020	.020		.020	.020	.040	.050	.070	.020
JET OPT																
P	26	1	3	1	3	3		1 or 3	1		1	1 or 3	1 or 3	1 or 3	3	3
Y	27	1	3	1	3	3		1 or 3	1		1	1 or 3	1 or 3	1 or 3	3	3
CNTL ACCEL	28	0	0	0	0	0		0	0		0	0	0	0	0	0

*I-LOADED OPS-2 DAP Configuration

ALT DAP CONFIGURATIONS

	ITEM #	ALT1*	ALT2	ALT3
RATE DEADBAND	32	0.200	0.100	0.100
JET OPTION	33	1	3	3
NUMBER OF JETS	34	2	2	2
ON TIME	35	0.08	0.08	0.08
DELAY	36	0.00	10.50	8.00

*I-LOADED OPS-2 DAP Configuration

<u>DAP</u>	<u>PURPOSE</u>	<u>DAP</u>	<u>PURPOSE</u>
A1	- NOMINAL IMU ALIGN LOSS OF VERN (NOSE & TAIL)	B1	- NOMINAL PRCS IMU ALIGN OMS & RCS BURNS
A2	- PTC	B2	- LOSS OF VERN (TAIL ONLY)
A3	- GG	B3	- LOSS OF VERN (NOSE & TAIL) GG MNVR
A4	- PRE/POST DEPLOY	B4	- SSUS DEPLOY
A5	- IMU ROTATION	B5	- COAS CAL
A6	- LOSS OF VERN (TAIL ONLY)	B6	- (Blank)
A7	- RENDEZVOUS	B7	- RENDEZVOUS
A8	- PROX OPS	B8	- PROX OPS
A9	- IUS DEPLOY	B9	- (Blank)
A10	- EURECA	B10	- EURECA
		B46	- TSS PROX OPS
		B47	- DPLY RET1
		B48	- DFOG, 4
		B49	- OST1
		B52	- YAW MAN

FLT PLN-1a/46/0/C

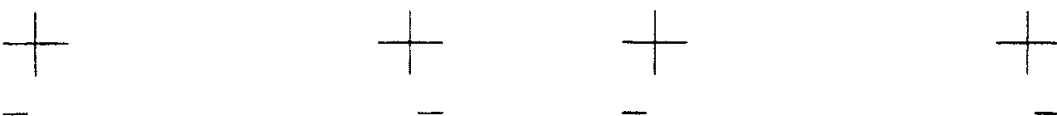
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FLT PLN-1b/46/0/A



DAP A

FLT PLN-2a/46/0/A



DAP A1

PURPOSE:

NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)

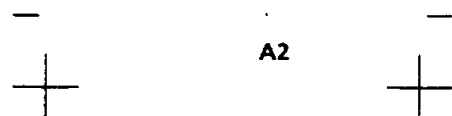
A1

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

FLT PLN-2b/46/0/A



FLT PLN-3a/46/0/A





A1



DAP A2

PURPOSE:
PTC

A2

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

FLT PLN-3b/46/0/A

FLT PLN-4a/46/0/A



A3



A2



DAP A3

PURPOSE:
GG

A3

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

FLT PLN-4b/46/0/A

FLT PLN-5a/46/0/A



A4





A3



DAP A4

PURPOSE:
PRE/POST DEPLOY

A4

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

FLT PLN-5b/46/0/A

FLT PLN-6a/46/0/A



A5



A4



DAP A5

PURPOSE:
IMU ROTATION

A5

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

FLT PLN-6b/46/0/A

FLT PLN-7a/46/0/A



A6



A5

DAP A6

PURPOSE:

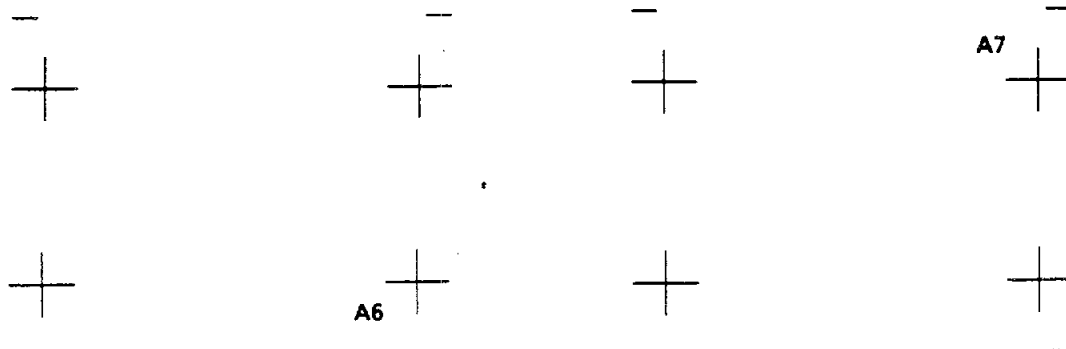
LOSS OF VERN
(TAIL ONLY)

A6

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

FLT PLN-7b/46/0/A

FLT PLN-8a/46/0/A



A7

A6

DAP A7

PURPOSE:

RENDEZVOUS

A7

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

FLT PLN-8b/46/0/A

FLT PLN-9a/46/0/A



A8



A7



DAP A8

PURPOSE:
PROX OPS

A8

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

FLT PLN-9b/46/0/A

FLT PLN-10a/46/0/B



A9



A8



DAP A9

PURPOSE:
IUS DEPLOY

A9

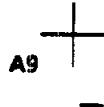
0.2 5	1	TRANSLATION	
		PULSE	
ROTATION			
0.2 0 0	2	DSC RT	NORM
0.2 0 0	3		VERN
0.0 5	4	PULSE	NORM
0.0 1 0	5		VERN
.0 0 0	6	COMP	NORM
.0 0 0	7		VERN
DEADBAND			
1.0 0	8	ATT	NORM
1.0 0 0	9		VERN
0.2 0	10	RATE	NORM
0.0 1 0	11		VERN
1	12	JET OPT	P
1	13		Y
0	14	CNTL ACCEL	

FLT PLN-10b/46/0/A

FLT PLN-11a/46/0/A



A10



DAP A10

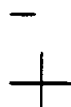
PURPOSE:
EURECA

A10

- 0.1 0 1 TRANSLATION PULSE
- 0.1 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.0 4 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 0 6 COMP NORM
- .0 0 0 7 VERN
- 3.0 0 8 DEADBAND ATT NORM
- 2.0 0 0 9 VERN
- 0.2 0 10 RATE NORM
- 0.0 4 0 11 VERN
- 1 or 3 12 JET OPT P
- 1 or 3 13 Y
- 0 = 4 14 CNTL ACCEL

FLT PLN-11b/46/0/A

FLT PLN-12a/46/0/B



A10



DAP B

FLT PLN-12b/46/0/B

FLT PLN-13a/46/0/B



B1





DAP B1

B1

PURPOSE:

NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

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

FLT PLN-13b/46/0/B

FLT PLN-14a/46/0/B



B1

B2

DAP B2

B2

PURPOSE:

LOSS OF VERN
(TAIL ONLY)

15	0.0	2
16	0.5	0 0
17	0.2	0 0 0
18	0.0	0 4
19	0.0	0 2
20	0.0	0 0
21	.0	0 0
22	3.0	0 0
23	- 1.0	0 0
24	0.2	0
25	.0	2 0
26		3
27		3
28		0

FLT PLN-14b/46/0/B

FLT PLN-15a/46/0/C



B3



B2

DAP B3

PURPOSE:

LOSS OF VERN
(NOSE & TAIL)
GG MNVR

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

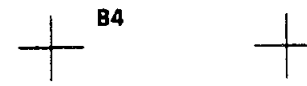
22	3.0	0
23	1.0	0 0
24	0.2	0
25	0.2	0

26	1
27	1

28 0

FLT PLN-15b/46/0/B

FLT PLN-16a/46/0/B



B4



B3

DAP B4

PURPOSE:

SSUS DÉPLOY

15	0.0	2
16	0.2	0 0
17	0.0	0 8
18	0.0	4
19	0.0	0 2
20	0.0	0 0
21	0.0	0 0

22	0.3	0
23	0.1	0 0

24	0.2	0
25	0.1	0

26	3
27	3

28 0

FLT PLN-16b/46/0/B

FLT PLN-17a/46/0/B



B5



B4

DAP B5

PURPOSE:
COAS CAL

FLT PLN-17b/46/0/B



B5

DAP B6

PURPOSE:
(Blank)

FLT PLN-18b/46/0/B



B5

15	0.0 2
16	0.2 0 0
17	0.0 1 6
18	0.0 0 4
19	0.0 0 2
20	.0 0 0
21	.0 0 0
22	3.0 0
23	0.0 3 3
24	0.2 0
25	.0 2 0
26	3
27	3
28	0

FLT PLN-18a/46/0/B



B6



B6

15	-. -
16	-. -
17	-. -
18	-. -
19	-. -
20	-. -
21	-. -
22	-. -
23	-. -
24	-. -
25	-. -
26	-
27	-
28	-

FLT PLN-19a/46/0/B



B7

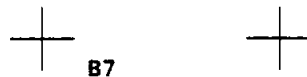


B6

DAP B7

PURPOSE:
RENDEZVOUS

FLT PLN-19b/46/0/B



B7

DAP B8

PURPOSE:
PROX OPS

FLT PLN-20b/46/0/B



B7

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

FLT PLN-20a/46/0/B



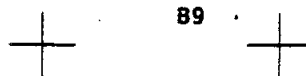
B8



B8

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

FLT PLN-21a/46/0/B



B9

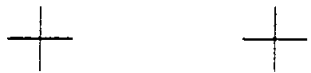


88

DAP B9

PURPOSE:
(Blank)

FLT PLN-21b/46/0/B



B9

DAP B10

PURPOSE:
EURECA

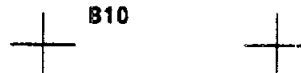
FLT PLN-22b/46/0/B



B9

15	---
16	---
17	---
18	---
19	---
20	---
21	---
22	---
23	---
24	---
25	---
26	---
27	---
28	---

FLT PLN-22a/46/0/B



B10



B10

15	0.1 0
16	0.2 0 0
17	0.2 0 0
18	0.0 0 4
19	0.0 1 0
20	0.0 0 0
21	0.0 0 0
22	2.0 0
23	1.0 0 0
24	0.2 0
25	0.2 0
26	1
27	1
28	0

FLT PLN-23a/46/0/B



B46

+ +
B10

DAP B46

PURPOSE:
TSS PROX OPS

FLT PLN-23b/46/0/B

+ +

+ +
B46

DAP B47

PURPOSE:
DPLY RET1

FLT PLN-24b/46/0/B

+ +

+ +

B46

15 -.0 2

16 -.1 0 0
17 -.0 5 0
18 -.0 4
19 -.0 4
20 .0 0 0
21 .0 0 0

22 .2 0 0
23 -1.0 0 0

24 .2 0
25 .0 2 0

26 1 or 3
27 1 or 3

28 0

FLT PLN-24a/46/0/B

+ +
B47

+ +

B47

15 -.0 5

16 -.2 0 0
17 -.2 0 0
18 -.1 0 0
19 0.0 5 0 0
20 .0 0 0
21 .0 0 0

22 .5 0 0
23 -5.0 0 0

24 .2 0
25 .0 4 0

26 1 or 3
27 1 or 3

28 0

FLT PLN-25a/46/0/B

+ +
B48



B47

DAP B48

PURPOSE:

DF06, 4

FLT PLN-25b/46/0/B



B48

DAP B49

PURPOSE:

OST1

FLT PLN-26b/46/0/B



(reduced copy)



B48

15 .0 5

16 .2 0 0

17 .2 0 0

18 .1 0 0

19 .0 1 0

20 .0 0 0

21 .0 0 0

22 1 5.0 0

23 1 5.0 0 0

24 .5 0

25 .0 5 0

26 1 or 3

27 1 or 3

28 0

FLT PLN-26a/46/0/B



B49



B49

15 .0 5

16 .0 8 8

17 .0 8 8

18 .1 0 0

19 .0 1 0

20 .0 0 0

21 .0 0 0

22 5.0 0

23 5.0 0 0

24 .2 0

25 .0 7 0

26 3

27 3

28 0

FLT PLN-27a/46/0/B



B52

FLT PLN/46/FIN

+ +

B49

+ +

DAP B52

B52

PURPOSE:
YAW MAN

15	-.0	5
16	2.0	0 0
17	-.2	0 0
18	-.1	0 0
19	-.0	1 0 0
20	-.0	0 0 0
21	.0	0 0 0
22	5.0	0 0
23	-1.0	0 0
24	-.2	0 0
25	.0	2 0
26		3
27		3
28		0

FLT PLN-27b/46/0/B

FLT PLN-28a/46/0/B

+ +

+ +

+ +
B52

+ +

DAP	PURPOSE
ALT1	- NOMINAL I-LOAD
ALT2	- EURECA, LOSS OF VERNS
ALT3	- TSS LOSS OF VERNS

FLT PLN-29a/46/0/B

+ +
ALT1

FLT PLN-28b/46/0/B

+ +

+
+
+
+

DAP ALT1

PURPOSE:
NOMINAL I-LOAD

FLT PLN-29b/46/0/B

ALT1

RATE DB	
32	<u>0.2 0 0</u>
JET OPT	
33	<u>1</u>
# JETS	
34	<u>2</u>
ON TIME	
35	<u>0.0 8</u>
DELAY	
36	<u>0.0 0</u>

FLT PLN-30a/46/0/B

+
+
+
+

ALT2

+
+
+
+

DAP ALT2

PURPOSE:
EURECA
LOSS OF
VERNS

FLT PLN-30b/46/0/B

ALT2

RATE DB	
32	<u>0.1 0 0</u>
JET OPT	
33	<u>3</u>
# JETS	
34	<u>2</u>
ON TIME	
35	<u>0 0.0 8</u>
DELAY	
36	<u>1 0.5 0</u>

FLT PLN-31a/46/0/B

+
+
+
+

ALT1

ALT3

+	+	+	+
	DAP ALT3		ALT3

PURPOSE:

TSS ON THE BOOM
LOSS OF
VERNS

RATE DB	
32	0.1 0 0
JET OPT	
33	3
# JETS	
34	2
ON TIME	
35	0 0.0 8
DELAY	
36	8.0 0

FLT PLN-31b/46/0/A

FLT PLN-32a/46/0/A

+	ALT2	+	+
	+		+

+	+
---	---

FLT PLN-32b/46/0/B

ALT3	+
+	

UNIV PTG	
TGT ID	= 1 Orbiting Vehicle = 2 Earth ctr = 3 Earth tgt Input LAT (± 90) LON (± 180 , + = East) ALT (-3444.0 to 20000.0 nm) = 4 Sun ctr = 5 Celestial tgt Input RA (0-359.99) DEC (± 90) = 11-110 Nav Stars
BODY VECT	= 1 +X* = 2 -X* = 3 -Z* = 4 -Y Star Tracker* = 5 Optional input P (0-359.99) Y (270-359.99,0-90) * input OM \rightarrow OM (0-359.99)
MON AXIS	= 1 +X = 2 -X
CNTL ACCEL	= 0 Orbiter Alone = 1 thru 5 not used
PRI JET OPT	= 1 Normal = 2 Nose only = 3 Tail only
ALT JET OPT	= 1 Normal = 2 Illegal entry = 3 Tail only

FLT PLN-33a/46/0/B



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FLT PLN-33b/46/0/B



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STS-46
FLIGHT PLAN NOTES

FLT PLAN NOTES

FLIGHT PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-46 (OV104) launch from KSC on July 16, 1992, is into a 230 nm orbit at an inclination of 28.45 degrees. The mission duration will be 7 days. Nominal landing occurs at KSC on July 23, 1992.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Local Time</u>
Nominal	Primary	111	KSC	07:54 EDT
	Weather Alt.	112	EDW	06:20 PDT
1 Day Late	Primary	127	KSC	07:38 EDT
	Weather Alt.	128	EDW	06:04 PDT
2 Days Late	Primary	143	KSC	07:22 EDT
	Weather Alt.	144	EDW	05:47 PDT

MAJOR EVENTS

LAUNCH (KSC)
 MET (DD/HH:MM) July 16, 1992
 Day of year 198
 CDT/GMT 08:45/13:45

OMS-2
 MET (DD/HH:MM) 00/00:45
 DV (fps) 349
 ORBIT ha/hp (nm) 230/230

EURECA RMS RELEASE
 MET (DD/HH:MM) 0/17:55
 ORBIT ha/hp (nm) 231/229

SEP 1 TIG
 MET (DD/HH:MM) 0/17:56
 DV (fps) 0.7
 ORBIT ha/hp (nm) 231/229

EURECA OTM
 MET (DD/HH:MM) 0/21:40
 ORBIT ha/hp (nm) 231/229

OMS-3 TIG
 MET (DD/HH:MM) 01/10:00
 DV (fps) 121
 ORBIT ha/hp (nm) 230/160

OMS-4 TIG
 MET (DD/HH:MM) 01/10:46
 DV (fps) 121
 ORBIT ha/hp (nm) 160/160

FLT PLAN NOTES

<u>TSS DEPLOY</u>	
MET (DD/HH:MM)	03/04:48
ORBIT ha/hp (nm)	161/159
<u>TSS OVERFLIGHT</u>	
MET (DD/HH:MM)	03/17:38
ORBIT ha/hp (nm)	161/159
<u>TSS RETRIEVE</u>	
MET (DD/HH:MM)	04/10:22
ORBIT ha/hp (nm)	161/158
<u>OMS-5 TIG</u>	
MET (DD/HH:MM)	04:20:04
DV (fps)	54
ORBIT ha/hp (nm)	160/128
<u>OMS-6 TIG</u>	
MET (DD/HH:MM)	04/20:48
DV (fps)	58
ORBIT ha/hp (nm)	128/128
<u>DEORBIT BURN</u>	
MET (DD/HH:MM)	06/21:09
DV (fps)	239
<u>LANDING</u>	
MET (DD/HH:MM)	06/22:09
Day of year	205
CST/GMT	06:54/11:54

B. CREW

1. There are seven crewmembers (six NASA astronauts and one payload specialist) onboard divided into teams as follows:

RED team - MS2, MS3, MS4
 BLUE team - MS1, PLT, PS1

The CDR is not assigned to a team and is free to adjust his hours real-time as necessary. Each team works approximately 12 hours followed by 12 hours off duty. This allows continuous 24-hour-per-day payload operations.

2. The seven crewmembers assigned to this mission are:

CDR - Loren Shriver
 PLT - Andrew Allen
 MS1 - Claude Nicollier
 MS2 - Marsha Ivins
 MS3 - Jeff Hoffman
 MS4 - Franklin Chang-Diaz
 PS1 - Franco Malerba

3. In the event an EVA becomes necessary, MS3 will be EV1, MS4 will be EV2, and MS2 will be IV1.

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system is nominally managed from the ground through uplink of real-time commands (RTCs) coordinated with the crew.
- b. TDRS coverage is assumed to be supported by TDRS-E (41 degrees W) and TDRS-W (171 degrees W) and is the prime mode of communication coverage.
- c. GN sites are available on an on-orbit contingency support basis (4 hours call-up): MIL (MLX), BDA, DKR, GDS (GDX), and DFR. NOTE: The DFR site is not indicated in this version of the Flight Plan. RID and CAN are available on an emergency support basis only.
- d. RTS sites are available for contingency support or when scheduled in advance (2-hour lead time required): HTS, GTS, VTS, IOS, CTS, and OTS.
- e. The ground stations shown in the contingency coverage band on the timeline pages are a combination of certain GN and RTS sites that are representative of the ground station coverage available.
- f. TDRS Ku-band is the prime mode of real-time TV; however, there are also two GN sites available as backups (90-minute lead time required): GDS (GDX) and MIL (MLX).
- g. TDRS-E and TDRS-W are assumed available to support Ku-band uplink except during TSS deployed operations.
- h. HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.

D. TELEVISION/PHOTOGRAPHY

1. The orbiter CCTV system provides views from one in-cabin wide-angle lens assembly (WLA) camera and nine cameras in the PLB. The cameras in the PLB are as follows:
 - a. Camera A (port forward), WLA
 - b. Camera B (port aft), Monochrome Lens Assembly (MLA)
 - c. Camera C (starboard aft), MLA
 - d. Camera D (starboard forward), MLA
 - e. Keel camera, MLA
 - f. TSS cradle camera 1, MLA
 - g. TSS cradle camera 2, MLA

- h. RMS wrist camera, MLA
 - i. RMS elbow camera, MLA
2. There is one OAST video tape recorder available with 30-minute cassettes, as well as two camcorders with 2-hour cassettes.
 3. Three still camera systems are available: 16mm, 35mm, and 70mm.

E. PAYLOADS

1. European Retrievable Carrier (EURECA)

EURECA is a European Space Agency (ESA) sponsored reusable free-flying platform carrying microgravity processing and space science experiments. The EURECA platform contains an attitude control system, an Orbital Transfer Assembly (OTA) which permits orbital height and phasing adjustment, and solar panels to provide power.

EURECA is deployed on STS-46 and transferred to a high altitude orbit where it will remain for approximately 6 months. During a later shuttle mission, EURECA will rendezvous with the orbiter, be captured with the RMS, and be brought back to Earth for experiment evaluation and refurbishment.

Deployment mission operations begin with initial systems checkouts in-bay followed by deployment on the RMS to permit Sun and Earth attitude sensor checkouts, antenna/solar panel deployment, and battery charging. After the systems checkouts are complete, EURECA is released from the RMS. The orbiter maintains station-keeping distance while EURECA is remotely commanded from the ESA Remote POCC (RPOCC) via the orbiter PI link. At the end of the stationkeeping phase, ESA commands the initiation of the EURECA Orbital Transfer Maneuver (OTM) burn which boosts EURECA to a higher orbit for the operational phase of the platform's mission.

2. Tethered Satellite System - 1 (TSS-1)

TSS-1 is an orbital flight facility for a wide variety of scientific experiments and technological investigations in near-Earth orbit. TSS-1 is used to deploy, maintain on-station, and retrieve scientific payloads mounted on the satellite above or below an orbiting space shuttle. TSS-1 has tethered system dynamics and scientific objectives.

a. Dynamics Objective

During the TSS-1 mission a primary objective is deploying the satellite to a distance of 20 km above the orbiter (away from Earth), maintaining on-station, and retrieving the satellite back into the payload bay with the orbiter operating in a 160 nm, near-circular orbit. Figure 8-1 shows the TSS-1 operations profile. The mission is divided logically into nine major phases of activity.

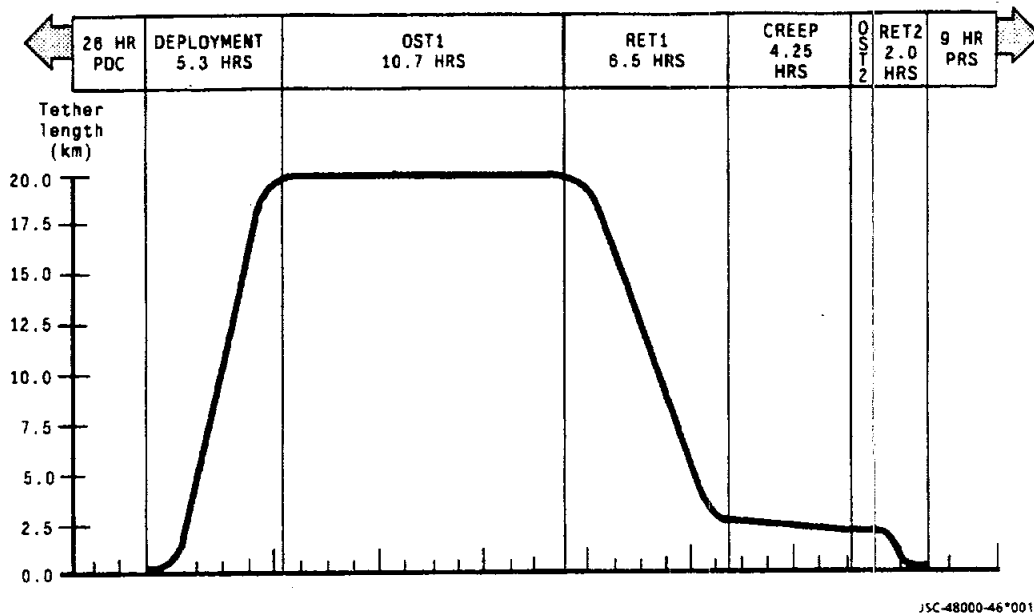


Figure 8-1.- TSS-1 operations profile.

- (1) Pre-deployment Quiescent (PDQ) - The objective of this phase is to activate and verify the operation of the Enhanced MDM Pallet. The deployer is also powered on at the beginning of this phase.
- (2) Pre-deployment Checkout (PDC) - This phase marks the actual beginning of the TSS-1 mission. The initial activities in PDC involve the activation and checkout of the satellite and science equipment. The rest of this phase is dedicated to the performance of various science objectives.
- (3) Deployment (DEP) - The satellite is deployed to a distance of 20 km. Satellite deployment occurs in an orbiter-tail-forward attitude. Tether reelout is automatically controlled by the deployer system.
- (4) On-station 1 (OST1) - This phase of the TSS-1 mission will demonstrate electrical power generation and characterize system current-voltage response. Other objectives for this phase are to characterize satellite sheath, current collection, and current closure.
- (5) Retrieval (RET1) - The satellite is retrieved to a tether length of 2.8 km.
- (6) Creep (CRP) - The creep portion of the TSS-1 profile begins at a tether length of 2.8 km. The tether is slowly reeled in to a length of 2.4 km for 4 hours and 15 minutes. Tether creep provides a retrieval plateau with an active reel to aid tether dynamics control activities which may be required.

- (7) On-station 2 (OST2) - OST2 begins at a tether length of 2.4 km. The purpose of OST2 is to provide an on-station period to set up final retrieval phasing.
- (8) Retrieval 2 (RET2) - The satellite is retrieved back on the docking ring during this phase. Maneuvering the orbiter to achieve proper satellite-to-docking ring alignment may be required.
- (9) Post Retrieval Safing (PRS) - The first part of this phase involves the powering down of the satellite and deployer. The balance of the PRS phase is used for science objectives.
- (10) Post Retrieval Quiescent (PRQ) - The PRQ phase is begun after the science equipment is deactivated and continues until the EMP is deactivated just prior to deorbit prep.

b. Science Objectives

Another TSS-1 mission objective is to investigate the electrodynamic characteristics of satellite-tether-orbiter systems. Physical dynamics of the system will also be studied. The TSS-1 electrodynamic science equipment supports investigations of the system in its plasma environment by providing the capability to manipulate and observe current flow in the conductive tether.

(1) Cargo Bay Science

The TSS-1 cargo bay science instrumentation is mounted on the TSS-1 MPESS. The bulk of the cargo bay science equipment is controlled by a series of master timelines (MTL). MTLs are a collection of science equipment commands executed by the Display and Control System (DDCS), which resides in a PGSC.

- (a) Deployer Core Equipment (DCORE) - As part of the total tether current control system, DCORE allows variation of the TSS-1 satellite electrical potential. This is done by controlling the current that flows between the satellite and the orbiter through the tether as a result of the electro-magnetic force generated by motion of the tether through the geomagnetic field. DCORE has two electron gun assemblies (EGAs) which are used to manage current flow in the tether when the satellite is deployed.
- (b) Shuttle Electrodynamic Tether System (SETS) - SETS provides measurements of tether voltage and current, plasma environment of the orbiter, perturbations of the tether current, orbiter environment, and electrons extracted from the orbiter structure. The SETS fast pulse electron gun (FPEG) is used to generate an electron beam in support of science investigations while the satellite is deployed, as well as during the PDC and PRS phases.

- (c) Shuttle Potential and Return Electron Experiment (SPREE) - SPREE measures the full ion and electron distribution functions in the energy range from 10eV to 10keV for all unobstructed directions out of the shuttle bay. From this data, SPREE determines orbiter potential with respect to the ambient plasma, return currents to the orbiter that result from electron gun ops, and ion and electron heating. The SPREE DPU performs onboard processing of this spectral data to determine the orbiter's negative potential which is made available to the crew on the aft flight deck and to ground personnel. SPREE also directly studies Wave Particle Interactions (WPI) resulting from both the electrodynamic properties of the TSS-1 and FPEG and EGA operations.

(2) Satellite Science

Other science investigation equipment is mounted on the satellite. The operation of this equipment is transparent to the crew.

- (a) Satellite Core Equipment (SCORE) - SCORE provides support to investigations on both the satellite and the deployer.
- (b) Research on Orbital Plasma Electrodynamics (ROPE) - The experimental objectives of ROPE are to study the interaction that occurs when a large conducting body moves through a collisionless space plasma at supersonic sub-Alfvenic speeds.
- (c) Research on Electrodynamic Tether Effects (RETE) - The RETE experiment is an investigation of the physical processes in the space charge region surrounding the satellite which determine particle collection and, hence, current in the tether.
- (d) Magnetic Field Experiment for TSS-1 Emissions (TEMAG) - The objective of this experiment is to investigate the magnetic signature of the tether current and its closure through the structure of the sheath surrounding the satellite. It also measures the magnetic signature of the ionosphere currents including distributed and concentrated, anomalies of the Earth's magnetic field in order to determine the core and the crustal contributions, and dynamic behavior of the satellite.

(3) Theoretical Science Investigations

Theoretical science investigations own no onboard hardware but perform studies based on data acquired during the TSS-1 mission.

- (a) Investigation of Electromagnetic (EM) Emissions by the Electrodynamic Tether (EMET) - The objective of the EMET is to establish by analytical and observational methods the detectability of Ultra

Low Frequency (ULF) and Extremely Low Frequency (ELF) electromagnetic emissions.

- (b) Theoretical and Experimental Investigation on TSS Dynamic Noise (TEID) - This experimental objective is to characterize the dynamic noise of the TSS caused by events such as elastic vibration modes, satellite librations, and possible causes of external excitation.
 - (c) Investigation and Measurement of Dynamic Noise (IMDN) - In conjunction with TEID, IMDN attempts to characterize the dynamic noise environment of the TSS-1.
 - (d) Theory and Modeling in Support of Tether (TMST) - The objective of the TMST experiment is to characterize the electrodynamic coupling between a moving conductor (TSS-1) and the ionosphere.
 - (e) Observations at the Earth's Surface of EM Emissions by TSS-1 (OESEE) - The objective of the OESEE experiment, in cooperation with EMET, is to characterize the reception of the Earth's surface of electromagnetic VLF/ULF/ELF signals from an electrically conducting tether in low-Earth orbit.
3. Evaluation of Oxygen Interaction with Materials III and Thermal Energy Management (EOIM and TEMP 2A)

The EOIM-III and TEMP 2A-3 are independent experiments that reside on the same MPSS. The EOIM-III payload is designed to study and quantitatively measure the interaction of spacecraft materials with atomic oxygen, the principal constituent within the low-Earth orbit environment. This information provides accurate reaction rate measurements and helps to determine suitable materials for long duration space structures.

The EOIM-III payload consists of the following five main components: carousel system, mass spectrometer system, passive pallet, active pallet, and power and avionics subsystems. Several subexperiments are included in this payload. Those which require activation and deactivation by the crew include the Heated Plate Experiment (HPE), the Solar Ultraviolet Experiment (SUV), the Environment Monitor Package Experiment (EMP), the Atomic Oxygen Monitor (AOM), and the Variable Exposure Tray (VET).

TEMP 2A-3 experiment tests a small mechanically-pumped two-phase thermal control system in both the one-g and zero-g environments. The TEMP 2A-3 is a phase thermal control system which utilizes the latent heat of vaporization of its ammonia working fluid to transport large amounts of heat over large distances and yet maintain a nearly constant temperature.

The TEMP 2A-3 experiment consists of two-phase Mounting Plates (TPMPs), a reservoir, mechanical pumps, flow meter, boiling and pressure drop experiments, a radiator, valves, and instrumentation.

4. Consortium for Materials Development in Space Complex Autonomous Payload - II (CONCAP-II)

The Objective of the CONCAP-II experiment is to expose different passive samples of High Temperature Superconducting (HTSC) thin films to the electron volt atomic oxygen flux to achieve improved properties. A subset of the HTSC materials samples will be mounted on a plate of which the temperature during exposure can be raised to 300/320° C so that the absorption of oxygen as a function of temperature can be studied.

An additional objective of the CONCAP-II is the Materials Preparation and Longevity in Hyperthermal Oxygen experiment which will expose the surface of different passive samples of materials to the oxygen flow.

5. Consortium for Material Development in Space Complex Autonomous Payload - III (CONCAP-III)

The objective of the CONCAP-III payload is to determine if a low gravity threshold exists for the observed phenomenon of gravity-induced structural alteration. Whether this threshold, if it exists, is as small as the change in gravity levels resulting from the TSS-1 deployment, will be determined.

6. Limited Duration Space Environment Candidate Materials Exposure (LDCE)

The primary objective of the LDCE is to introduce developmental composite materials to a flux of atomic oxygen atoms in low-Earth orbit. The candidate materials, polymeric, coated polymeric, and light metallic composite, will have undergone extensive ground-based material performance testing prior to being attached to reusable test fixtures designed for multimission space shuttle use.

7. Microgravity Induced Effects on Pituitary Growth Cell Function (PHCF)

The PHCF experiment was designed to determine if the exposure of cultured rat pituitary cells to microgravity effects the capacity to produce biologically or immunologically active growth hormone. It will also permit exploration of these effects as a possible mechanism for muscle atrophy in manned spaceflight.

8. Air Force Maui Optical Site (AMOS)

The primary objective of AMOS is to use the orbiter during cooperative overflights of Maui to obtain imagery and/or signature data to support the calibration of the AMOS ground-based sensors and to observe orbiter plume phenomenology. No unique onboard hardware is associated with the AMOS test. No orbiter cooperative activities are scheduled for AMOS overflights during STS-46.

9. Ultraviolet Plume Instrument (UVPI)

The UVPI is an instrument located on the Low-Power-Atmospheric Compensation Experiment (LACE) satellite in orbit at 43 degrees inclination and approximately 260 nm. The primary objectives of

the UVPI activity are to use the orbiter during cooperative encounters of the LACE satellite to obtain imagery and/or signature data for UVPI sensor calibration and to observe orbiter events. No orbiter cooperative activities are scheduled for STS-46 encounters.

10. IMAX Cargo Bay Camera (ICBC)

The ICBC is a 65mm color motion picture camera system, consisting of a camera, a 30mm lens, and a film magazine containing approximately 3850 feet of film, for 10.5 minutes of filming. The camera is housed in an insulated pressurized enclosure with a movable lens window cover. This container is mounted on the starboard side of the forward payload bay on an extended adaptive payload carrier. The payload is controlled from the aft flight deck with the Autonomous Payload Controller (APC). Scene opportunities shall be provided to the crew both in pre-flight and real-time, and shall include EURECA deployment, the TSS-1 deploy and retrieval, and Earth viewing.

F. DTOs

1. Waste/Supply Water Dumps (DTO 325)

The objective of this DTO is to perform inflight verification of new water dump nozzle performance.

2. PGSC Single Event Upset Monitoring (DTO 656)

The objective of this DTO is to determine PGSC RAM susceptibility to single event upset (SEU) caused by cosmic radiation. This data could lead to procedure changes and software or hardware changes that would reduce the affects of cosmic radiation on PGSC operations.

3. Acoustical Noise Dosimeter Data (DTO 663)

The acoustical noise dosimeter data will provide a baseline of time-averaged acoustical noise levels within the orbiter crew cabin. Noise levels are a concern from a crew operations, performance, and health standpoint. Data is sought on middeck payloads, equipment/avionics, voice communications, within sleep stations, the new RCRS, and the WCS.

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

The purpose of this DTO is to demonstrate the capability to provide the orbiter flight crew with range and range rate data for rendezvous, proximity operations, and deploy operations using a hand-held device. This DTO will assess the usefulness of the data to assist the pilot in achieving the desired trajectory conditions.

G. DSOs

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

The purpose of this DSO is to document the orthostatic function of crewmembers during the actual stresses of entry, landing, and

egress from the seat and from the the cabin as mission duration increases. This data will be used to determine whether precautions and countermeasures are needed to protect crewmembers in the event of an emergency egress. It will also be used to determine the effectiveness of proposed inflight countermeasures. Crewmembers will don equipment prior to donning the LES during deorbit preparation. Crewmembers wear the equipment and record verbal comments through entry.

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

The objective of this DSO is to investigate visual vestibular and perceptual adaptive responses as a function of longer missions and to determine the operational impact on performance of entry, landing, and egress procedures. DSO procedure OI-1 will be performed on STS-46.

3. Effects of Intense Exercise During Spaceflight on Aerobic Capacity and Orthostatic Function (DSO 618)

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

4. Inflight Use of Florinef to Improve Orthostatic Intolerance Post Flight (DSO 621)

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

5. Educational Activities (DSO 802)

The purpose of this DSO is to produce an educational video product with scenes recorded on-orbit and on the ground. The crew will film several scenes on-orbit using the camcorder. On STS-46 the crew will perform demonstrations of space physics (tether dynamics, electrodynamics, forces, etc.) and tethered satellite properties. They will also discuss the TSS-1 mission objectives and the EURECA mission.

6. Documentary Television (DSO 901)

This DSO is for live television transmissions or VTR dumps of crew activities and spacecraft functions (especially those associated with payload deployment and functions).

7. Documentary Motion Picture Photography (DSO 902)

The purpose of this DSO is to provide documentary and public affairs motion picture photography of significant activity which best depicts the basic capabilities of the space shuttle and key objectives required. This photography provides a historical record of the flight as well as material for release to the news media, to independent publishers, and film producers.

8. Documentary Still Photography (DSO 903)

The purpose of this DSO is to provide still photography of crew activities in the orbiter, spacecraft functions, accommodations, and mission-related scenes of general public and historical record of the flight and documentation of the flight for public release post flight.

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