

Flight Plan

STS-54

BRANCH CHIEF
B. NUTE
DH41
BOND

1

(FRR Cycle Trajectory)

Mission Operations Directorate Operations Division

Final December 2, 1992

<u>EVENT</u>	<u>CST</u>		
Launch	07:52	Wed	Jan. 13
IUS/TDRS-F Deploy	14:05	Wed	Jan. 13
KSC Landing	07:24	Tue	Jan. 19

NASA

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

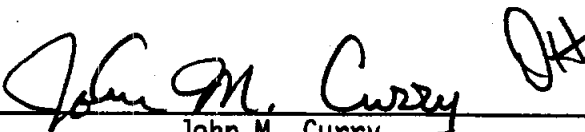


MISSION OPERATIONS DIRECTORATE

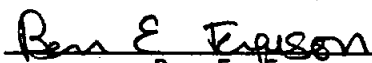
STS-54 FLIGHT PLAN

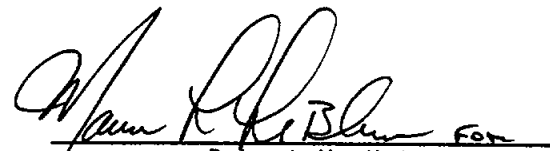
FINAL
December 2, 1992

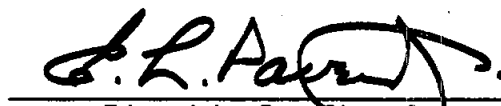
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	FLT PLN-1394		
	FLT PLN-1398	MULTI-751	
	FLT PLN-1399	MULTI-756	
		MULTI-757	
	FLT PLN-1402	MULTI-760	
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Contingency Timelines	DH4/R. Johnson	483-0316
	DH4/E. Jones	483-0276

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3-9.....	54/FIN	6-7.....*	54/FIN
3-10.....	54/FIN	6-8.....*	54/FIN
3-11.....	54/FIN	6-9.....*	54/FIN
3-12.....	54/FIN	6-10.....*	54/FIN
3-13.....	54/FIN	6-11.....*	54/FIN
3-14.....	54/FIN	6-12.....*	54/FIN
3-15.....	54/FIN	6-13.....*	54/FIN
3-16.....	54/FIN	6-14.....*	54/FIN
3-17.....	54/FIN	6-15.....*	54/FIN
3-18.....	54/FIN	6-16.....*	54/FIN
3-19.....	54/FIN	6-17.....*	54/FIN
3-20.....	54/FIN	6-18.....*	54/FIN
3-21.....	54/FIN	7-1.....*	54/FIN
3-22.....	54/FIN	7-2.....*	54/FIN
3-23.....	54/FIN	7-3.....*	54/FIN
3-24.....	54/FIN	7-4.....*	54/FIN
3-25.....	54/FIN	7-5.....*	54/FIN
3-26.....	54/FIN	7-6.....*	54/FIN
3-27.....	54/FIN	7-7.....*	54/FIN
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(*)- Omit from flight book

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A6.....	6-9	FLT PLN-8a/54/O/A
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A7.....	6-9	FLT PLN-9a/54/O/A
DAP A8.....	6-10	FLT PLN-9b/54/O/A
A8.....	6-10	FLT PLN-10a/54/O/A
DAP A9.....	6-10	FLT PLN-10b/54/O/A
A9.....	6-10	FLT PLN-11a/54/O/A
(Blank).....	6-11	FLT PLN-11b/54/O/A
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B3.....	6-12	FLT PLN-15a/54/O/A
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B4.....	6-13	FLT PLN-16a/54/O/A
DAP B5.....	6-13	FLT PLN-16b/54/O/A
B5.....	6-13	FLT PLN-17a/54/O/A
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DAP B7.....	6-14	FLT PLN-18b/54/O/A
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DAP B8.....	6-15	FLT PLN-19b/54/O/A
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(Blank).....	6-15	FLT PLN-20b/54/O/A
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DAP ALT2.....	6-16	FLT PLN-22b/54/O/A
ALT2.....	6-16	FLT PLN-23a/54/O/B
(Blank).....	6-17	FLT PLN-23b/54/O/A
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INTRODUCTION

The STS-54 Flight Plan is the Flight Data File article that contains the on-orbit timeline. The Ascent, Post Insertion, Deorbit Prep, and Entry Checklists contain the detailed timelines that the Flight Plan does not cover. The IUS Deploy Checklist contains the procedures required during the IUS/TDRS-F deploy time frame. For continuity, the summary level timeline includes the entire flight.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-54 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the STS-54 Flight Initialization Data Pack.

The flight profile used for this Flight Plan is for a launch date of January 13, 1993, at 13:52 GMT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

The trajectories used for the timelines were propagated from STS-54 FRR Cycle state vectors.

JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, Rev B, January 1992, has been used to build the timelines contained in this Flight Plan. Exemption 1403 #5 authorizes the Flight Day 2 unscheduled EVA timeline 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-54 OVERVIEW

FLIGHT: STS-54 EDITION: FINAL PUB. DATE: 12/02/92

MET: 003	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD5		POST SLEEP	EVA PREP		AL DEPR		EVA			AL DEPR	POST EVA	EMU MAINT RCHG	14 R SUBS	CGBA	CHROMEX/PARE	IMU				DXS OPS					POST SLEEP
DAY/NIGHT		000																							
ORBIT		60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75								
NOTES:		ØDSO 321 TERM ØDTO 656 INIT Ø10.2 MAINT											ØCGBA P/TV ØDTO 656 TERM ØDSO 321 INIT												

MET: 004	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD6		POST SLEEP	IMU	POST SLEEP	FCS C/O	HOT VEST	DSO 476	EVA PREP	CGBA	AUDIO CK	MEAL	CGBA	CABIN STOW	FCS PWRUP	PRE SLEEP	IMU	PRE SLEEP								POST SLEEP
DAY/NIGHT																									
ORBIT		75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91							
NOTES:		ØDSO 321 TERM/DTO 656 INIT ØDTO 700-3 ØDTO 412/DSO 604											ØDTO 656 TERM/CGBA DATA XFER ØDTO 700-3 ØDTO 412 ØCHROMEX/PARE DTO 700-3												

MET: 005	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD7		POST SLEEP	IMU	POST SLEEP	DSO PREP		DEORBIT	DBURN	KSC LANDING																
DAY/NIGHT																									
ORBIT		91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106								
NOTES:		ØDXS DEACT ØCHROMEX/PARE ØDTO 700-3											ØDSO 603B,604/GRP B PWRUP												

MET: 006	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
FD8																											
DAY/NIGHT																											
ORBIT		107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122										
NOTES:																											

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SUMMARY TIMELINE

SUMMARY
TIMELINE

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
013:13:52 / 014:01:52	000:00:00 / 000:12:00	013:07:52 / 013:19:52	1/013 CST	-36.2		JANUARY 13, 1993	STS-54	FINAL	12/02/92
CST :013 FD :001 MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS E W									
ATTITUDE									
DXS SECS									
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
014:01:52/ 014:13:52	000:12:00/ 001:00:00	013:19:52/ 014:07:52	2 /013 CST	-34.4		JANUARY 13, 1993	STS-54	FINAL	12/02/92				
CST :013 FD :001 MET :000	20 12	21 13	22 14	23 15	0 16	CST:014 17	18	19	20	21	22	23	0 MET:001
STS													
PL													
DAY/NIGHT													
ORBIT	9	10	11	12	13	14	15	16					
EARTH TRACE													
CONT COVERAGE	-GTS	-DKR	-GTS	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR	-DKR
TDRS													
ATTITUDE													
DXS SECS	690	690	930	1080	1900	690	720						
NOTES:													

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
014:13:52/ 015:01:52	001:00:00/ 001:12:00	014:07:52/ 014:19:52	2 /014 CST	-32.4		JANUARY 14, 1993	STS-54	FINAL	12/02/92					
CST :014 FD :002 MET :001	0 8 9 10 11 12 13 14 15 16 17 18 19 12													
STS	ZLV MNV R	DXS MNV R	OMS 4 BURN	DXS MNV R	ZLV MNV R	DXS MNV R	ZLV MNV R	DXS MNV R	ZLV MNV R	IMU MNV R	DXS MNV R	ZSI MNV R	PROV MED	DXS MNV R
	P/TV 04 FTDK	MEAL	P/TV 04 ACT FLTDK	FILTER CLEANING	EXERCISE MS3,1,2		PRE SLEEP		SLEEP					
	EXERCISE CDR		P/TV 05 MDDK	P/TV 05 ACT MIDDEK		PADM PWRDN	FIM ACT							
PL			CGBA TERM	OR REC CNP AF BLG	ST AT US	PAR E OP CT	BT ES E AL			CGBA TERM	GBA ACT	GBA BEGIN		
DAY/NIGHT	[Day/Night Cycle]													
ORBIT	17 18 19 20 21 22 23 24													
EARTH TRACE														
CONT COVERAGE	HTS-BDA -VTS-DKR -GDS -GDX -CTS -MIL -MLX	-MIL -MLX HTS-BDA -VTS -GDS -GDX -CTS	-GTX -CTS -MIL -MLX -GTS -HTS -GDS	-GDX -CTS -MIL -MLX -GTS -HTS -GDS	-VTS -GDS -GDX -GTS -HTS	-GDS -GDX -GTS -HTS	-IOS -DGS -GTS -HTS	-GTS -HTS	-IOS -GTS -HTS	-GTS -HTS	-IOS -GTS -HTS	-GTS -HTS	-GTS -HTS	-GTS
TDRS	[TDRS Schedule]													
ATTITUDE	-ZLV DXS OMS-4 DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS													
DXS SECS	840 1080 1110 1140 1140 1140 1140 1020 960 900													
NOTES:	@DSO 476B AEROBICS @-ZLV, +YVV @FPA SET 12 @DSO 316 BIOREACTOR FLOW @-ZLV, +YVV @DSO 476B AEROBICS @-ZLV, +YVV @FPA SETS 5 @DTO 656 PGSC UPSET MON TERM @FPA SET 1 @-ZLV, +YVV @DSO 321 FREQ INTER MEAS													

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
015:01:52/ 015:13:52	001:12:00/ 002:00:00	014:19:52/ 015:07:52	3 /014 CST	-30.3		JANUARY 14, 1993	STS-54	FINAL	12/02/92					
CST :014 FD :002 MET :001	20 12	21 13	22 14	23 15	0 16	CST:015 17	FD:003 18	19 19	20 20	21 21	22 22	23 23	0 0	MET:002
STS														
PL														
DAY/NIGHT														
ORBIT	25	26	27	28	29	30	31	32						
EARTH TRACE														
CONT COVERAGE	-GTS -DKR -GTS -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -MIL -MLX -BDA -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -IOS -DGS -MIL -MLX -BDA -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -HTS -BDA -VTS -DKR -GDS -GDX -CTS -MIL -MLX -BDA -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR -DKR													
TDRS														
ATTITUDE	DXS -ZSI IMU DXS -ZLV DXS -ZLV DXS -ZLV DXS -ZLV DXS													
DXS SECS	810 870 1140 1140 720 510 540 600													
NOTES:	@DSO 476B AEROBICS @-ZLV, -YVV @DSO 476B AEROBICS @FPA SET 1 @DSO 321 FREQ INTER MEAS @DSO 321 FREQ INTER MEAS @DSO 321 FREQ INTER MEAS @DTO 656 PGSC UPSET MON INIT @DSO 321 FREQ INTER MEAS @DSO 321 FREQ INTER MEAS @-ZLV, +YVV @DSO 321 FREQ INTER MEAS @DSO 321 FREQ INTER MEAS @DSO 316 BIOREACTOR FLOW @DSO 321 FREQ INTER MEAS @DSO 321 FREQ INTER MEAS													

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
015:13:52/ 016:01:52	002:00:00/ 002:12:00	015:07:52/ 015:19:52	3 /015 CST	-28.2		JANUARY 15, 1993	STS-54	FINAL	12/02/92						
CST :015 FD :003 MET :002	0 8 9 10 11 12 13 14 15 16 17 18 19 12														
STS	ZLV MNV R	LOAD MNV R	DXS MNV R	ZLV MNV R	DXS MNV R	ZSI MNV R	DXS MNV R	ZLV MNV R	I MU MNV R	DXS MNV R	ZSI MNV R	CONF MNV R	DXS MNV R		
	P/T V 06 D802	MEAL	P/T V 06 ACT DSO802			P/T V 05 ACT MIDDEK	PRE SLEEP			SLEEP					
	EXERCISE MS3, PLT, MS1, 2		EDUC ACTS MS3, MS1	AUD 802 BVC	EDUC ACTS R/T DNLC	EXERCISE (CDR)	SSCE BURN 2								
PL	GBA END	GBA BEGIN		BD REACT	CHROMEX	PAR OPS	CGBA TERM	GBA END	GBA BEGIN						
DAY/NIGHT															
ORBIT	33 34 35 36 37 38 39 40														
EARTH TRACE															
CONT COVERAGE	HTS-BDA VTS-DKR GDS GDX CTS MIL MLX	CTS MIL MLX HTS-BDA VTS GDS GDX	GDS GDX CTS MIL MLX HTS VTS		GDS GDX CTS MIL MLX HTS VTS	DGS GTS		HTS VTS GDS GDX		HTS		IOS DGS GTS	HTS	GTS	
TDRS															
ATTITUDE	-ZLV DXS -ZLV DXS -ZSI DXS -ZLV DXS I MU -ZSI DXS														
DXS SECS	810 1080 1020 1140 990 1110 1080														
NOTES:	@DSO 476B AEROBICS @-ZLV, +YVV @FPA SET 1 @DSO 802 @-ZLV, +YVV @FPA SET 2 @DSO 316 BIOREACTOR FLOW @FPA SETS 6,13,14 @-ZLV, +YVV @FPA SET 2 @FPA SET 3														

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
016:01:52/ 016:13:52	002:12:00/ 003:00:00	015:19:52/ 016:07:52	4 /015 CST	-26.1		JANUARY 15, 1993	STS-54	FINAL	12/02/92						
CST :015 FD :003 MET :002	20 12	21 13	22 14	23 15	0 16	CST:016 FD:004	17	18	19	20	21	22	23	0	MET:003
STS															
PL															
DAY/NIGHT															
ORBIT	41	42	43	44	45	46	47	48							
EARTH TRACE															
CONT COVERAGE	DKR	-GTS	-DKR	-GTS	-DKR	-DKR	-DGS	-DKR	-GDS	-MIL	-DKR	-GDS	-DKR	-GDS	-DKR
TDRS															
ATTITUDE															
DXS SECS		930	1230	1260	1170	1570	540	540							
NOTES:															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
016:13:52 / 017:01:52	003:00:00 / 003:12:00	016:07:52 / 016:19:52	4 / 016 CST	-24.0		JANUARY 16, 1993	STS-54	FINAL	12/02/92	
CST :016 FD :004 MET :003	0 8 9 10 11 12 13 14 15 16 17 18 19 12									
STS	-ZLV MNV R	WAS TE MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R	DWAU MNV R
MEAL	P/TV 06 ACT DS0802				PRE SLEEP			SLEEP		
EDUC ACTS	MS3, MS2	MS3, PLT	MS3, CDR	MS2, MS3	HC UN MN FI SIG PL B					
PL	PADM SETUP	PADM PWRD			FC HROM EX	STAT US	PAR E OPS			
DAY/NIGHT										
ORBIT	49	50	51	52	53	54	55	56		
EARTH TRACE										
CONT COVERAGE	-HTS-BDA -VTS-DKR -GDS -GDH -CTS -MIL -MLX	-GTS -HTS -VTS -GDS -GDH	-GTS -MLX -DGS -GTS -HTS -VTS	-GDS -GDH -HTS -VTS	-IOS -DGS -GTS -HTS	-DGS -GTS -HTS	-IOS -GTS -HTS	-GTS		
TDRS										
ATTITUDE	DXS	-ZLV	DXS	-ZLV	DXS	-ZLV	DXS	-ZLV	DXS	-ZLV
DXS SECS	900		1050		1080		1260		1050	
NOTES:	@-ZLV, +YVV @DSO 802 @DTO 656 PGSC UPSET MON INIT @-ZLV, +YVV		@-ZLV, +YVV @DTO 656 PGSC UPSET MON TERM @DSO 321 FREQ INTER MEAS @-ZLV, +YVV							

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																						
017:01:52 / 017:13:52	003:12:00 / 004:00:00	016:19:52 / 017:07:52	5 / 016 CST	-21.9		JANUARY 16, 1993	STS-54	FINAL	12/02/92																						
CST :016 FD :004 MET :003	20	21	22	23	FD:005	0	CST:017	1	2	3	4	5	6	7	0	MET:004															
STS																															
PL																															
DAY/NIGHT																															
ORBIT	57	58	59	60	61	62	63	64																							
EARTH TRACE																															
CONT COVERAGE	-DKR	-GTS	-DKR	-DKR	-DKR	-BDA	-DKR	-IOS	-DGS	-MIL	-MLX	-BDA	-DKR	-IOS	-DGS	-MIL	-MLX	-BDA	-DKR	-IOS	-DGS	-MIL	-MLX	-HTS	-BDA	-VTS	-DKR	-GDS	-GDX	-CTS	-MIL
TDRS																															
ATTITUDE																															
DXS SECS		1080	1260	1260	1870	420																									
NOTES:																															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
018:01:52/ 018:13:52	004:12:00/ 005:00:00	017:19:52/ 018:07:52	6 /017 CST	-17.7		JANUARY 17, 1993	STS-54	FINAL	12/02/92
CST :017 FD :005 MET :004	20 21 22	23 24 25	26 27 28	29 30 31	0 1 2	3 4 5	6 7 8	9 10 11	12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
STS									
	SLEEP		POST SLEEP			FCS C/O			
PL									
DAY/NIGHT									
ORBIT	73	74	75	76	77	78	79	80	
EARTH TRACE									
CONT COVERAGE	-DKR	-GTS	-DKR						
TDRS									
ATTITUDE		DXS							
DXS SECS		1230							
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
018:13:52 / 019:01:52	005:00:00 / 005:12:00	018:07:52 / 018:19:52	6 / 018 CST	-15.6		JANUARY 18, 1993	STS-54	FINAL	12/02/92
CST :018 FD :006 MET :005									
STS	CREW CONF -ZLV MNV R	FC 2 PWRUP	IMU MNV R	BIAS MNV R	PRIV MNV R			SLEEP	
	P/TV 07 ACT CONF	CABIN STOW		PRE SLEEP					
PL	CGBA TERM	CHROMEX PARA SOPS							
DAY/NIGHT ORBIT									
EARTH TRACE									
CONT COVERAGE	-GTS -HTS -VTS -GDS -GDX -CTS -MIL	-DGS -GTS -HTS -VTS -GDS -GDX	-IOS -DGS -GTS -HTS -VTS	-GTS -HTS	-IOS -DGS -GTS -HTS	-GTS		-GTS	-DKR -GTS
TDRS									
ATTITUDE	-ZLV +YVV IMU BIAS -ZLV +YVV								
DXS SECS									
NOTES:	@FPA SETS 9,10,18-24 @-ZLV, +YVV @DTO 412 FC SHTDN/RSTRT @DTO 700-3 ATM EFFECTS ON ST @BIAS -ZLV, +YVV (DTO 700-3 ATM EFFECTS ON ST)								

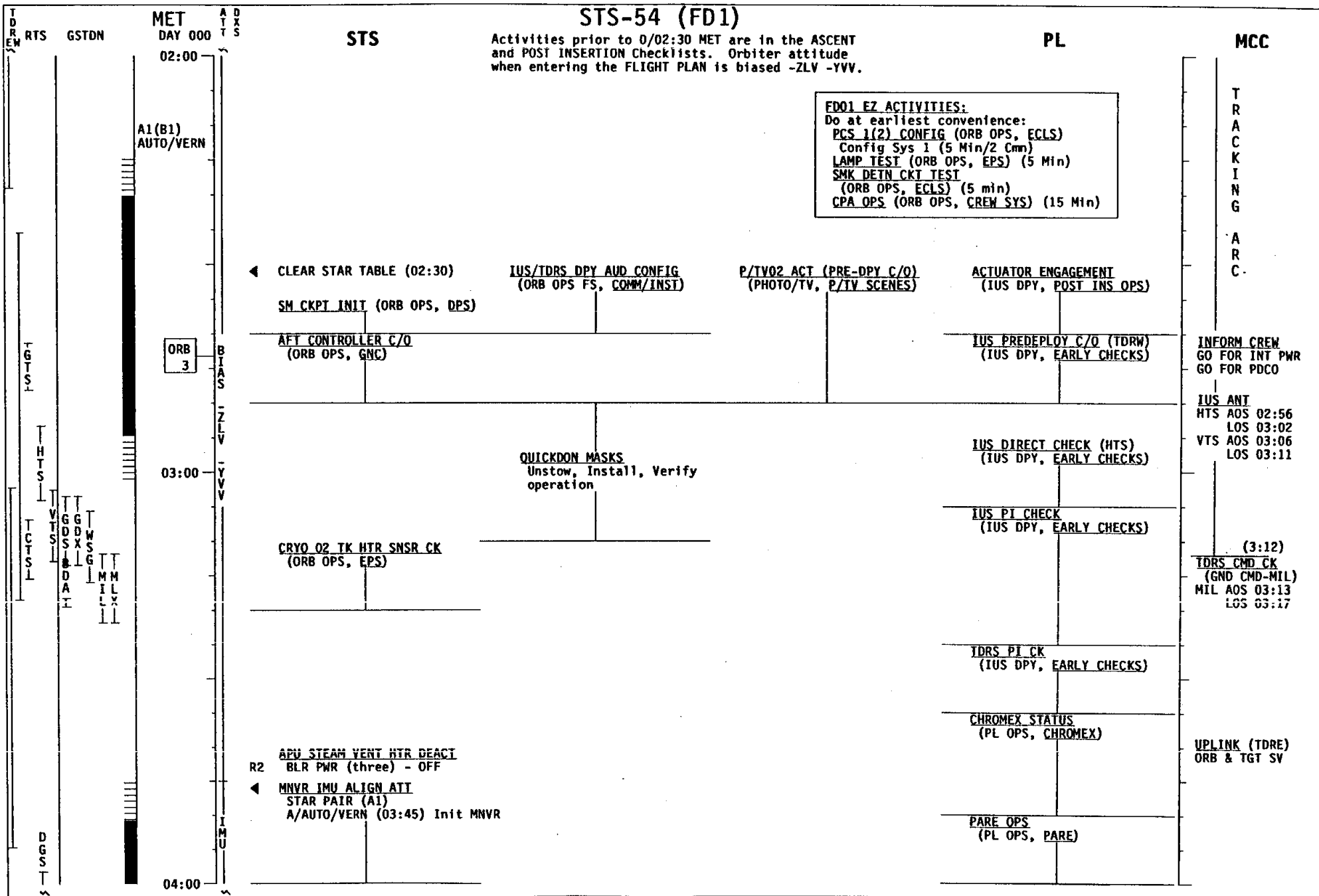
DETAILED TIMELINE

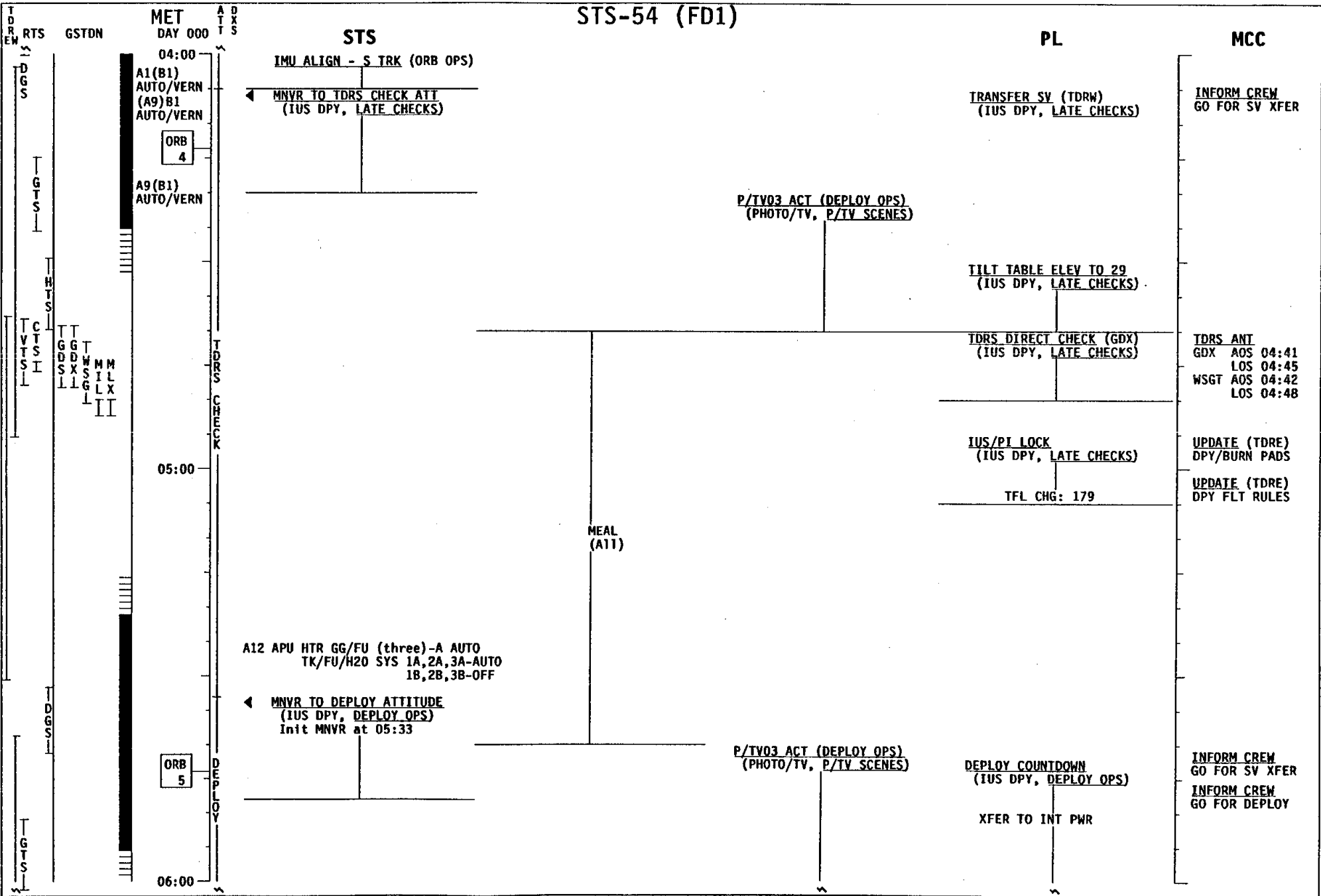
DETAILED
TIMELINE

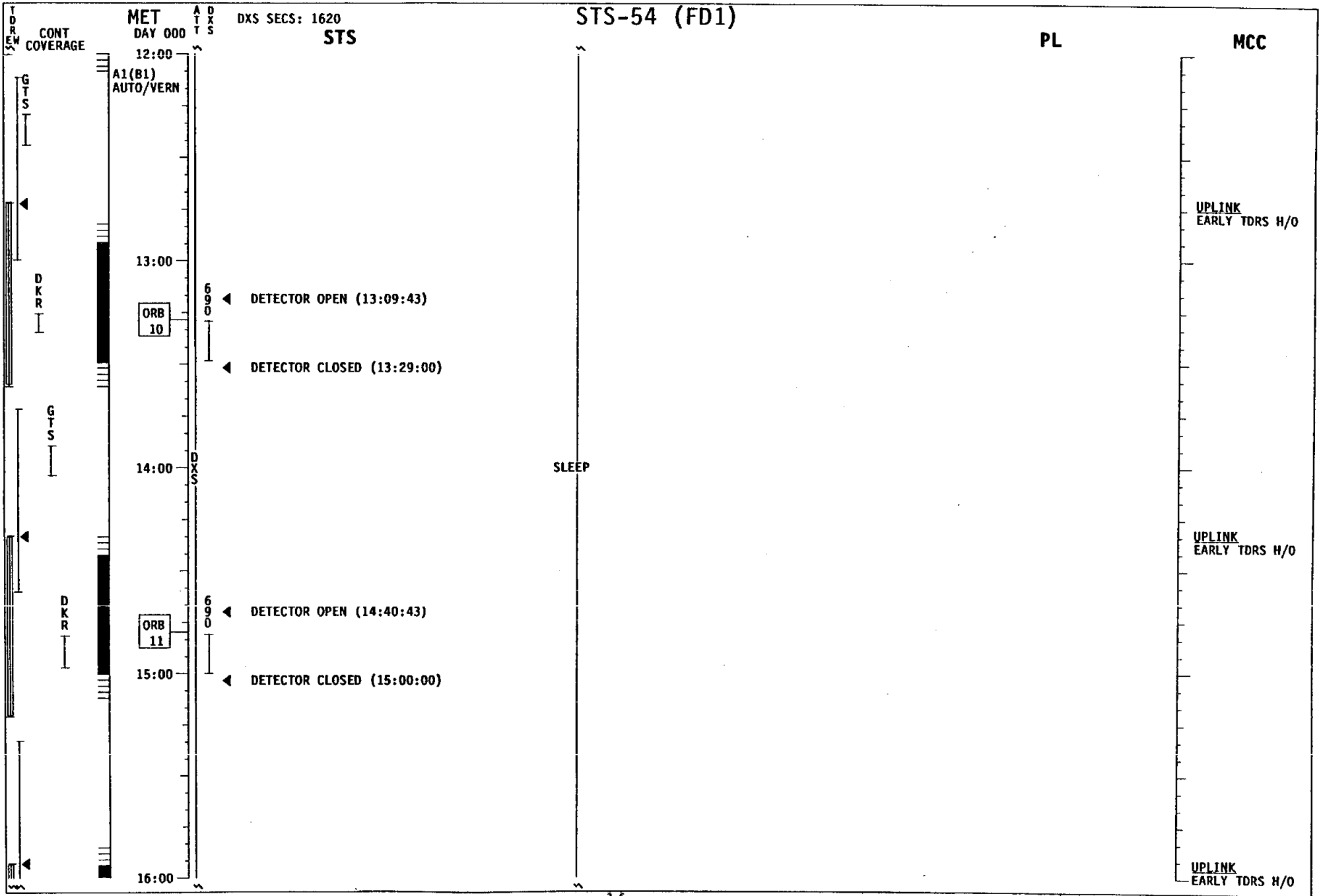
DETAILED TIMELINE

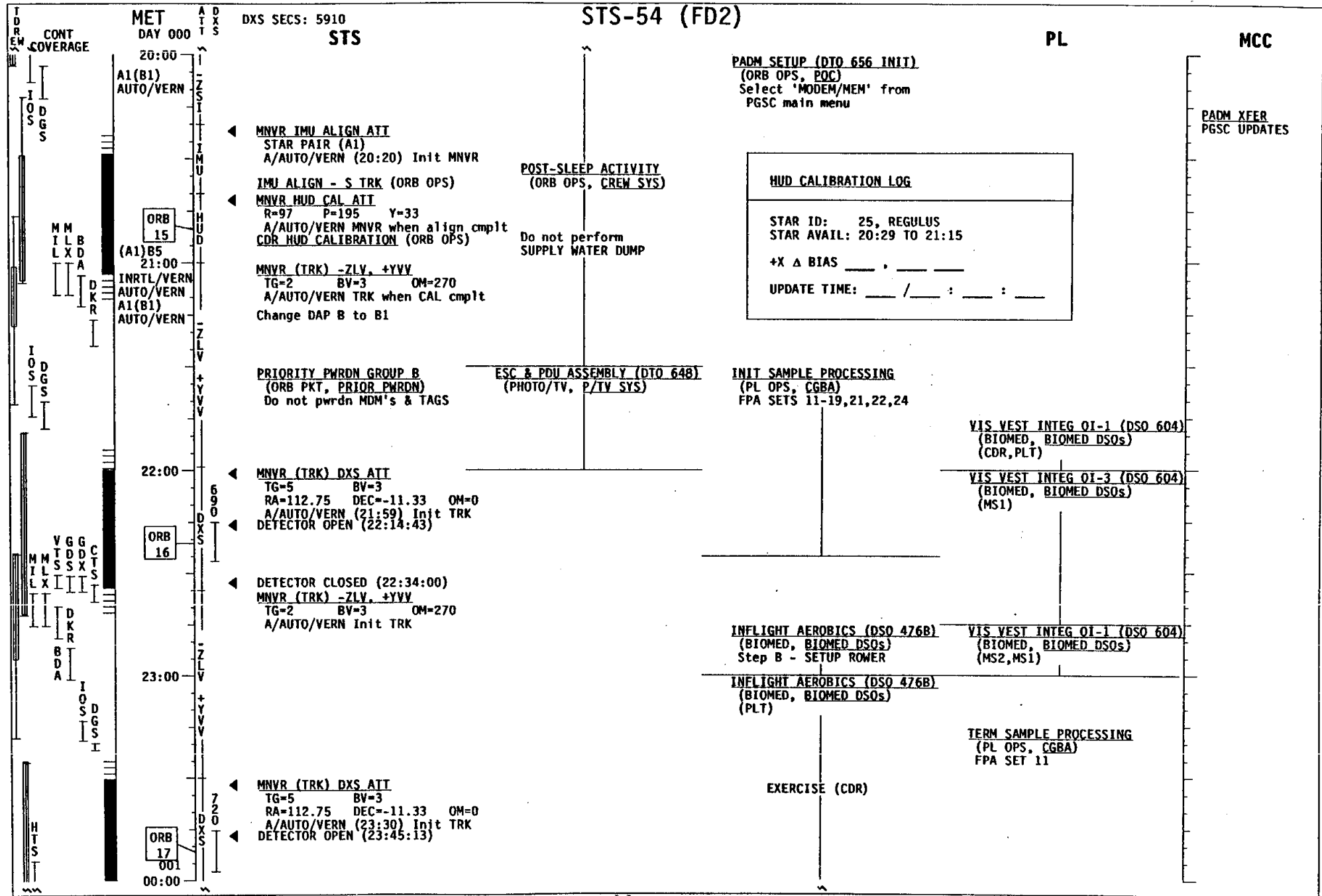
STS-54 (FD1)

Activities prior to 0/02:30 MET are in the ASCENT and POST INSERTION Checklists. Orbiter attitude when entering the FLIGHT PLAN is biased -ZLV -YVV.









MET DAY 000

DXS SECS: 5910
STS

STS-54 (FD2)

PL

MCC

PDM SETUP (DTO 656 INIT)
(ORB OPS, POC)
Select 'MODEM/MEM' from
PGSC main menu

PDM XFER
PGSC UPDATES

HUD CALIBRATION LOG

STAR ID: 25, REGULUS
STAR AVAIL: 20:29 TO 21:15

+X Δ BIAS _____

UPDATE TIME: ____ / ____ : ____ : ____

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

20:00
A1(B1)
AUTO/VERN

◀ MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN (20:20) Init MNVR

IMU ALIGN - S TRK (ORB OPS)

◀ MNVR HUD CAL ATT
R=97 P=195 Y=33
A/AUTO/VERN MNVR when align cmplt
CDR HUD CALIBRATION (ORB OPS)

MNVR (TRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN TRK when CAL cmplt
Change DAP B to B1

PRIORITY PWRDN GROUP B
(ORB PKT, PRIOR PWRDN)
Do not pwrdn MDM's & TAGS

ESC & PDU ASSEMBLY (DTO 648)
(PHOTO/TV, P/TV SYS)

INIT SAMPLE PROCESSING
(PL OPS, CGBA)
FPA SETS 11-19,21,22,24

VIS VEST INTEG OI-1 (DSO 604)
(BIOMED, BIOMED DSQs)
(CDR, PLT)

22:00

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (21:59) Init TRK

◀ DETECTOR OPEN (22:14:43)

VIS VEST INTEG OI-3 (DSO 604)
(BIOMED, BIOMED DSQs)
(MS1)

◀ DETECTOR CLOSED (22:34:00)
MNVR (TRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

INFLIGHT AEROBICS (DSO 476B)
(BIOMED, BIOMED DSQs)
Step B - SETUP ROWER

VIS VEST INTEG OI-1 (DSO 604)
(BIOMED, BIOMED DSQs)
(MS2, MS1)

23:00

INFLIGHT AEROBICS (DSO 476B)
(BIOMED, BIOMED DSQs)
(PLT)

TERM SAMPLE PROCESSING
(PL OPS, CGBA)
FPA SET 11

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (23:30) Init TRK

◀ DETECTOR OPEN (23:45:13)

EXERCISE (CDR)

STS-54 (FD2)

PL

MCC

DXS SECS: 7320

STS

MET DAY 001

00:00

A1(B1)
AUTO/VERN

DETECTOR CLOSED (00:04:30)
MNVR (TRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

INFLIGHT AEROBICS (cont'd)

P/TV04 SETUP (FLT DECK)
(PHOTO/TV, P/TV SCENES)

LOAD FUT START DXS ATT

TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (01:01) Init TRK

01:00

ORB 18

PRELOADED DXS MNVR (01:01)

MEAL (A11)

DETECTOR OPEN (01:16:13)

DETECTOR CLOSED (01:35:30)

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

PRE BURN CONFIG

014:E, cb DDU L(two)-CL
015:E
014:F, RJD LOGIC(eight)-ON
015:F, DRIVER(eight)-ON
016:F

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

OMS BURN

02:00

A1(B1)
AUTO/VERN

OMS-4 TIG (02:09)

POST BURN CONFIG
014:F, RJD DRIVER(eight)-OFF
015:F, LOGIC(eight)-OFF
016:F
014:E, cb DDU L(two)-OP
015:E

P/TV05 SETUP (MIDDECK)
(PHOTO/TV, P/TV SCENES)

TERM SAMPLE PROCESSING
(PL OPS, CGBA)
FPA SET 12

MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (02:32) Init TRK
DETECTOR OPEN (02:47:13)

P/TV05 ACT (MIDDECK)
(PHOTO/TV, P/TV SCENES)

ON-ORBIT CABLE RECONFIG
(PL OPS, CABLE CONFIG)

CHROMEX STATUS
(PL OPS, CHROMEX)

03:00

ORB 19

DETECTOR CLOSED (03:06:30)
MNVR (TRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

FILTER CLEANING
(IFM, SCHEDULED MAINTENANCE)

CREW CHOICE

PARE

PARE OPS
(PL OPS, PARE)

BIOREACTOR TEST (DSO 316)
(BIOMED, BIOMED DSOs)
Steps A&B - H/W ACT and
TEST ACT (First session)

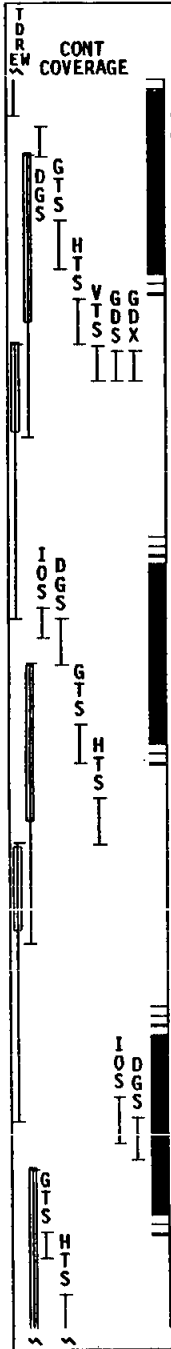
04:00

INFLIGHT AEROBICS (DSO 476B)
(BIOMED, BIOMED DSOs)
(MS3, MS1, MS2)

UPDATE
ORBITAL MNVR
PAD
TV (TDRW/E)
(CREW CNTL-CAB)

TV (TDRW/E)
(CREW CNTL-CAB)

UPLINK
(03:07-03:27)
FUEL CELL
PURGE



MET DAY 001
 04:00
 A1(B1)
 AUTO/VERN
 ORB 20
 05:00
 ORB 21
 06:00
 ORB 22
 07:00
 08:00

DXS SECS: 9240
STS

◀ MNVR (TRK) DXS ATT
 TG=5 BV=3
 RA=112.75 DEC=-11.33 OM=0
 A/AUTO/VERN (04:02) Init TRK
 DETECTOR OPEN (04:17:43)

◀ DETECTOR CLOSED (04:37:00)
MNVR (TRK) -ZLV, +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN Init TRK

◀ MNVR (TRK) DXS ATT
 TG=5 BV=3
 RA=112.75 DEC=-11.33 OM=0
 A/AUTO/VERN (05:33) Init TRK
 DETECTOR OPEN (05:48:13)

◀ DETECTOR CLOSED (06:07:30)
MNVR (TRK) -ZLV, +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN Init TRK

◀ MNVR IMU ALIGN ATT
 STAR PAIR (A1)
 A/AUTO/VERN (06:53) Init MNVR

◀ IMU ALIGN - S TRK (ORB OPS)
 ◀ MNVR (TRK) DXS ATT
 TG=5 BV=3
 RA=112.75 DEC=-11.33 OM=0
 A/AUTO/VERN (07:13) Init TRK
 DETECTOR OPEN (07:18:43)

◀ DETECTOR CLOSED (07:38:00)
 ◀ MNVR (TRK) -ZSI
 TG=4 BV=3 OM=270
 A/AUTO/VERN Init TRK at SR

INFLIGHT AEROBICS (DSO 476B)
 (BIOMED, BIOMED DSOs)
 (MS3,MS1,MS2)

DTO 656 TERM
 Press ALT-ESC then any
 key to exit MEM
PADM POWERDOWN
 (ORB OPS, PQC)
FIM ACTIVATION (DSO 321)
 (PL OPS, FIM)

PRE-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

Do not perform
 SUPPLY WATER DUMP

TERM SAMPLE PROCESSING
 (PL OPS, CGBA)
 FPA SET 5

GBA ACTIVATION
 (PL OPS, CGBA)

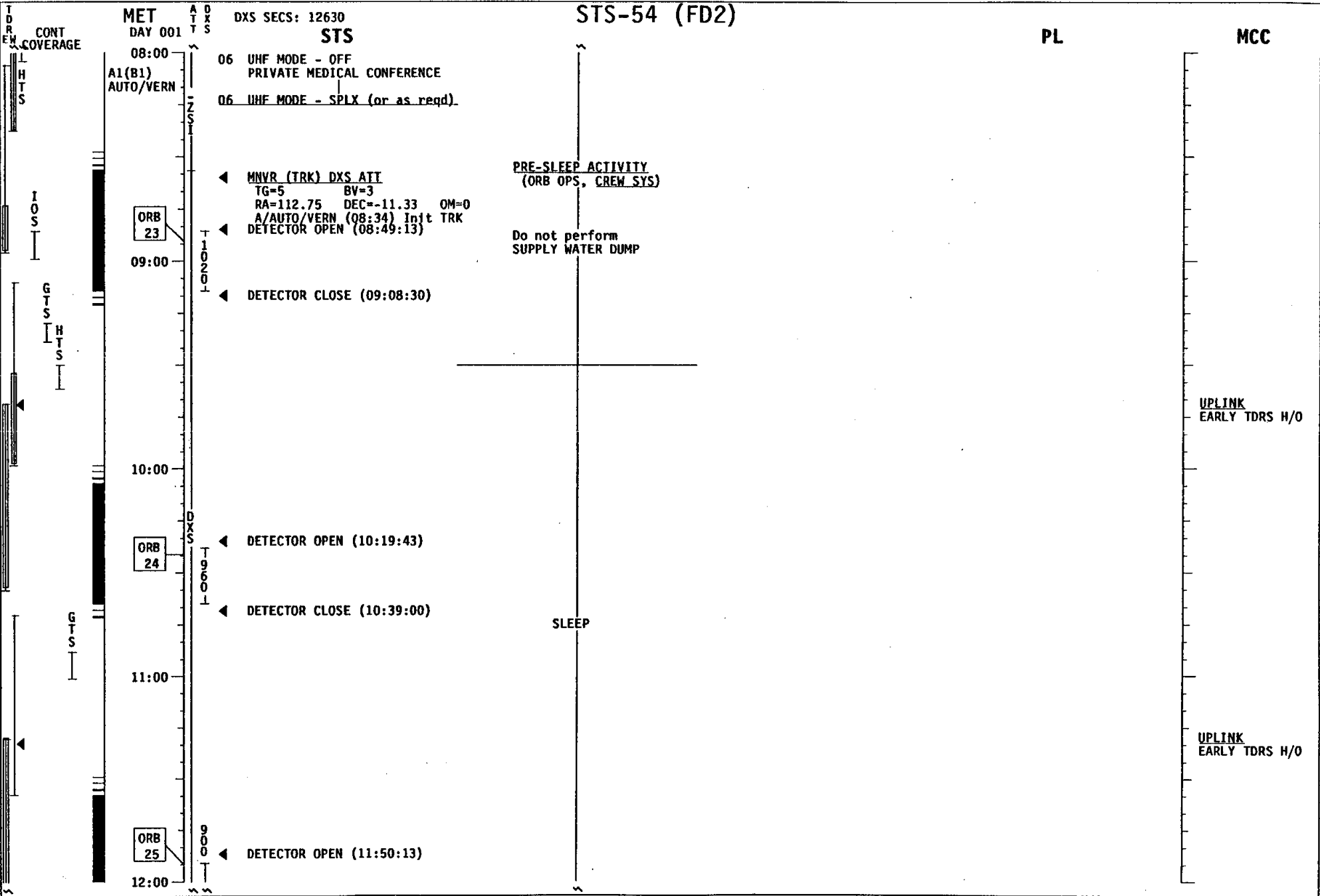
BEGIN GBA INCUBATION
 (PL OPS, CGBA)
 FPA SET 1

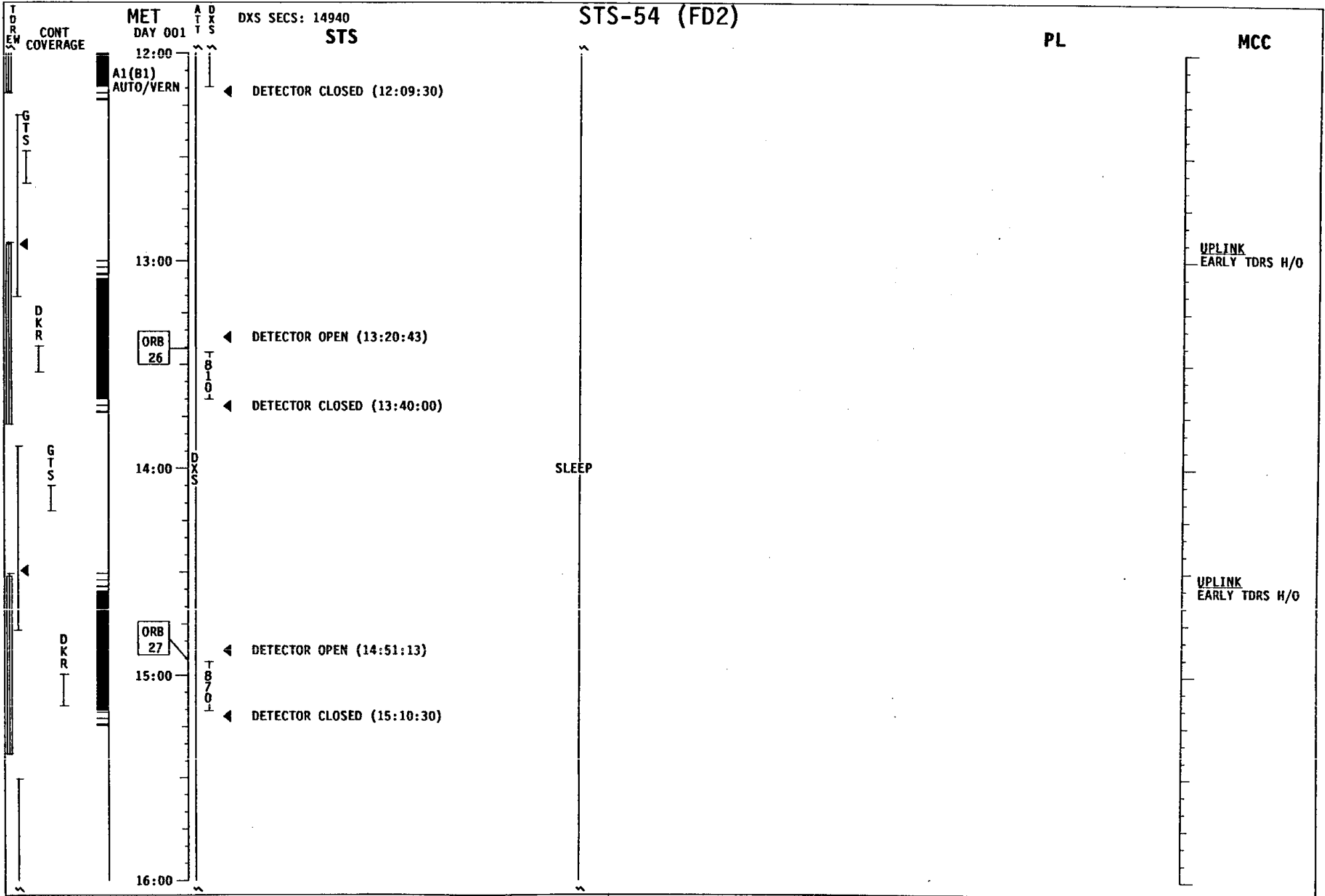
Note: Init after EXER cmlpt

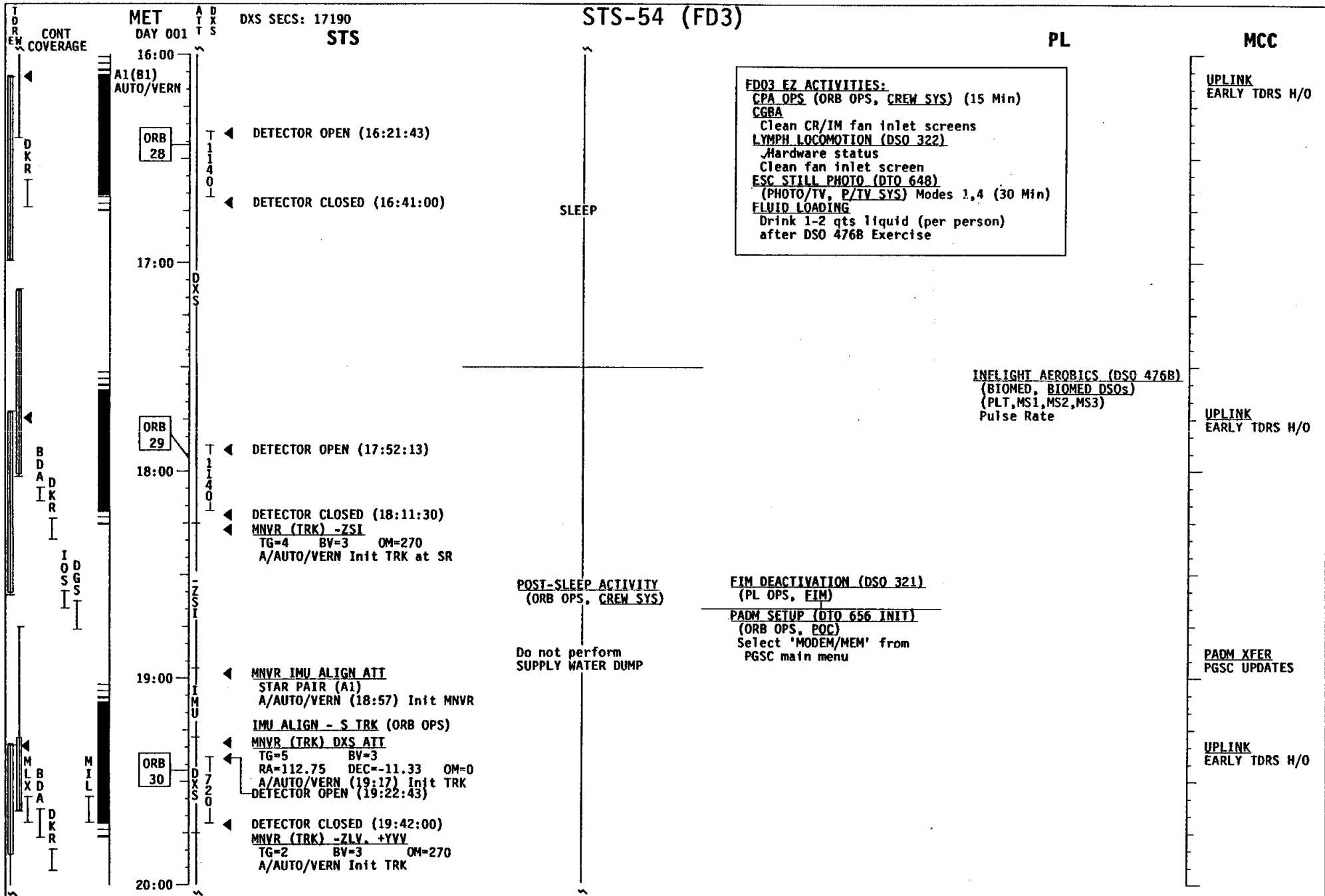
STS-54 (FD2)

PL

MCC







STS-54 (FD3)

PL

MCC

DXS SECS: 20190
STS

MET DAY 001

20:00

A1(B1)
AUTO/VERN

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

BIOREACTOR TEST (DSO 316)
(BIOMED, BIOMED DSOs)
Step B - TEST ACT (Second
session)

Take one aspirin
(EVA cmn - MS1,MS2)

P/TV05 SETUP (MIDDECK)
(PHOTO/TV, P/TV SCENES)

P/TV05 ACT (MIDDECK)
(PHOTO/TV, P/TV SCENES)

CREW CHOICE

SSCE BURN 1
(PL OPS, SSCE)

TV (TDRE)
(CREW CNTL-CAB)

INFLIGHT AEROBICS (DSO 476B)
(BIOMED, BIOMED DSOs)
(MS3,PLT,MS1,MS2)

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

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

Init Step 2 NET (22:43)
NLT (22:49)

10.2 PSI CABIN CONFIG
(EVA, 10.2 PSI CABIN)

END GBA INCUBATION
(PL OPS, CGBA)

21:00

ORB 31

A1(B1)
FREE/VERN

A1(B1)
AUTO/VERN

22:00

ORB 32

23:00

ORB 33

00:00

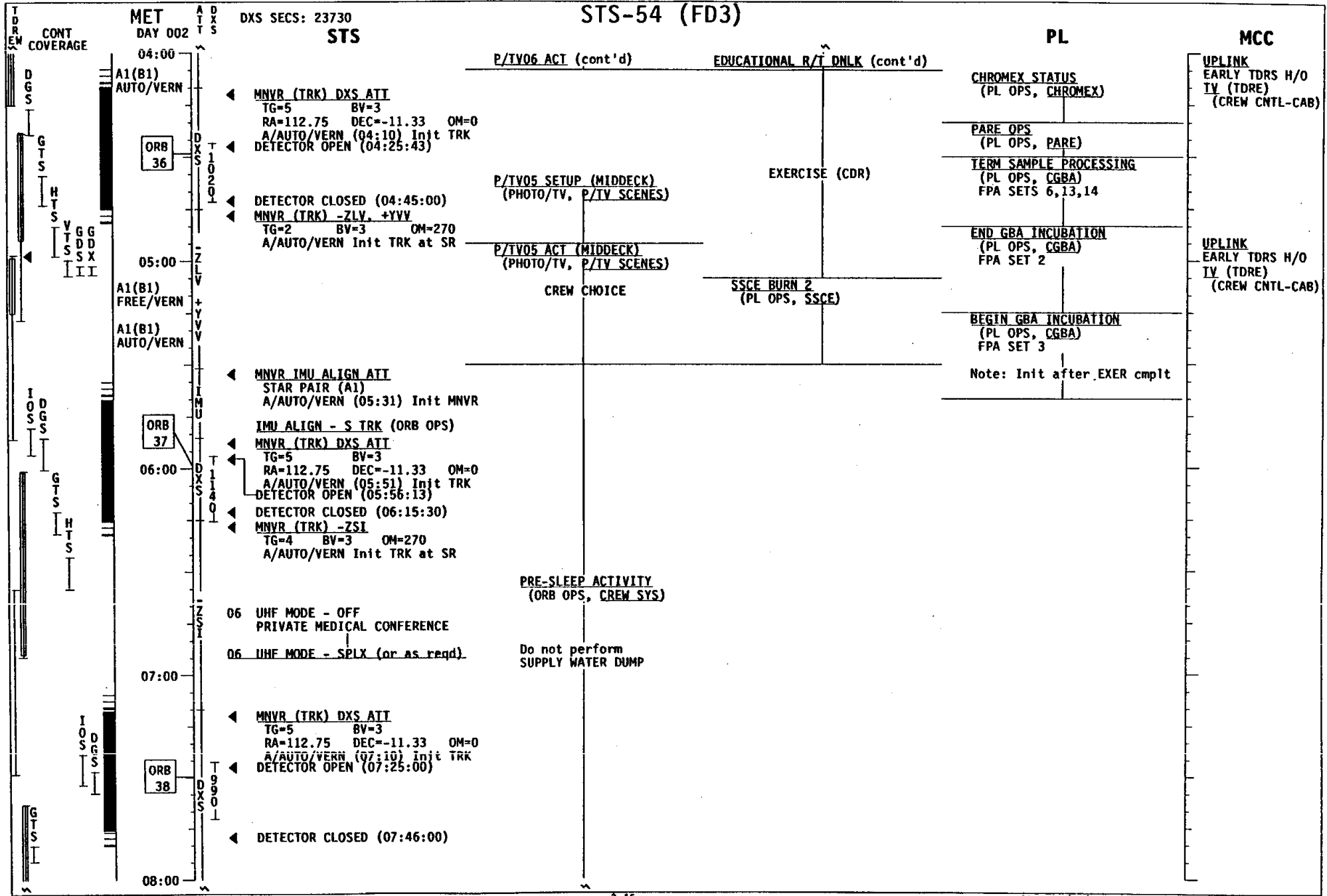
◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (20:38) Init TRK
DETECTOR OPEN (20:53:13)

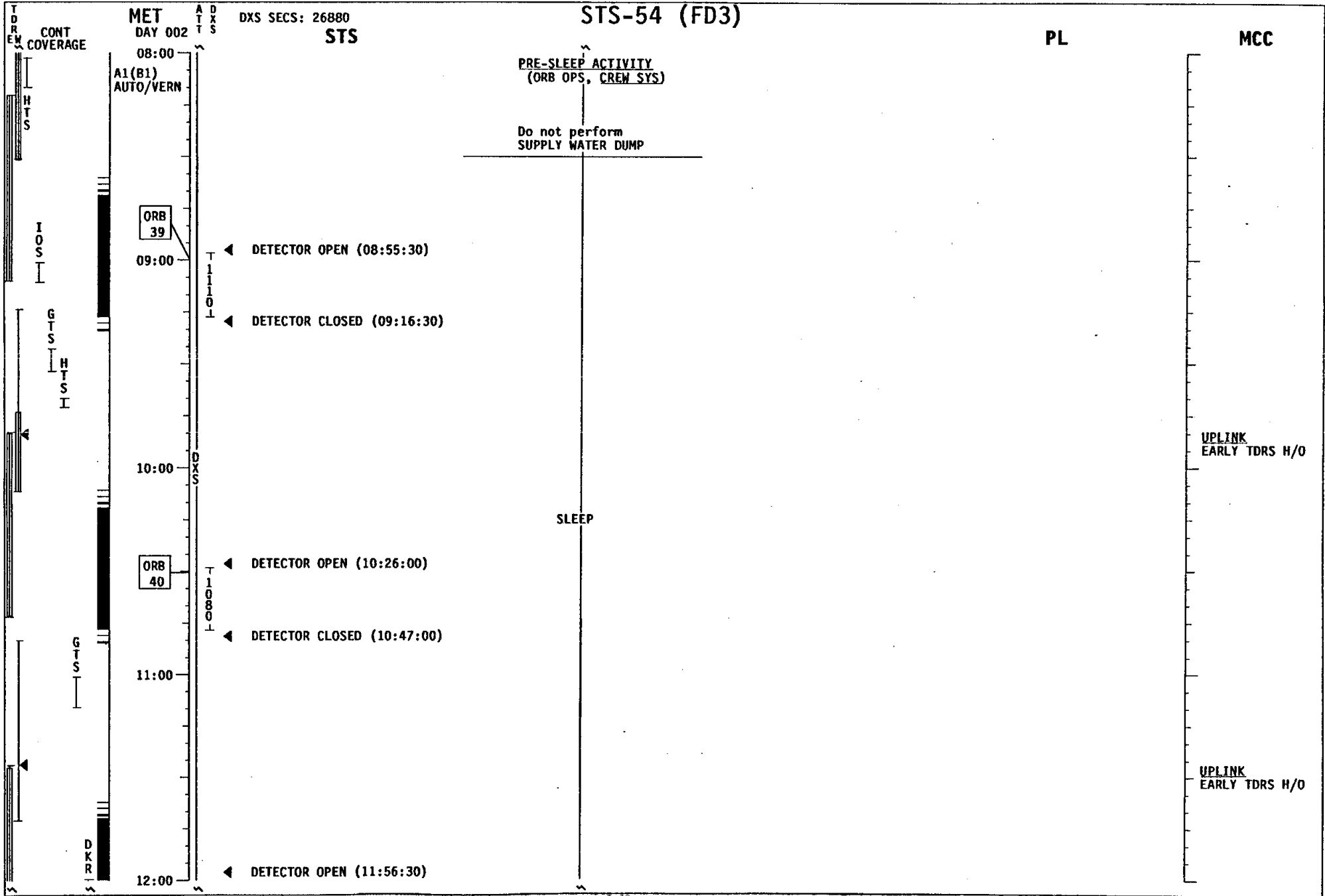
◀ DETECTOR CLOSED (21:12:30)
◀ MNVR (TRK) -ZLV, -YVV
TG=2 BV=3 OM=90
A/AUTO/VERN Init TRK at SR

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (22:08) Init TRK
DETECTOR OPEN (22:23:43)

◀ DETECTOR CLOSED (22:43:00)
◀ MNVR (TRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (23:39) Init TRK
DETECTOR OPEN (23:54:13)





TDRS
CONT
COVERAGE

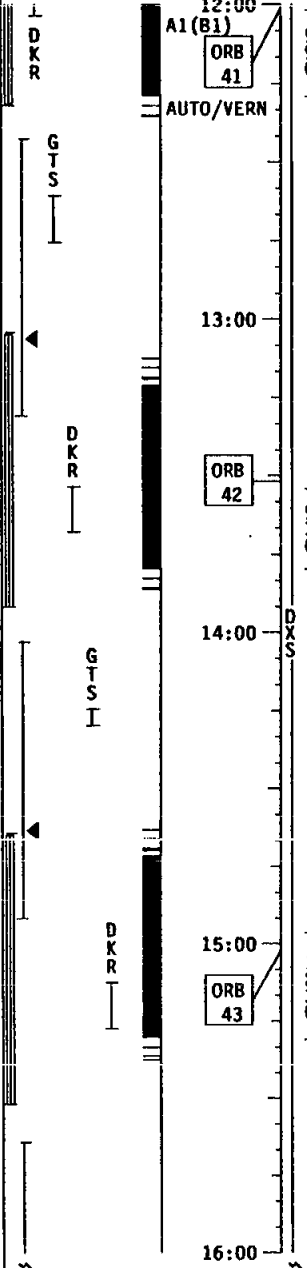
MET
DAY 002

DXS SECS: 29070
STS

STS-54 (FD3)

PL

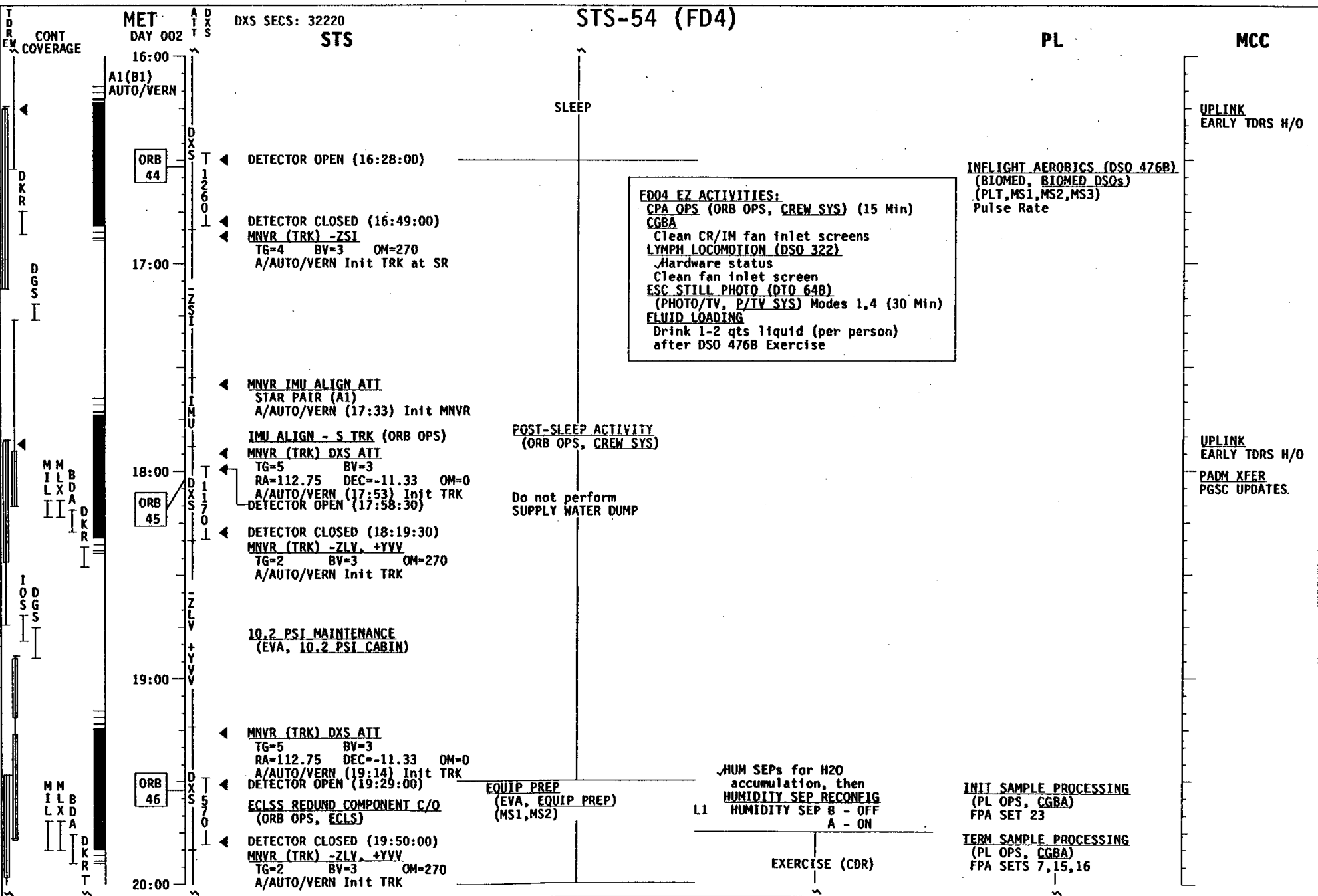
MCC

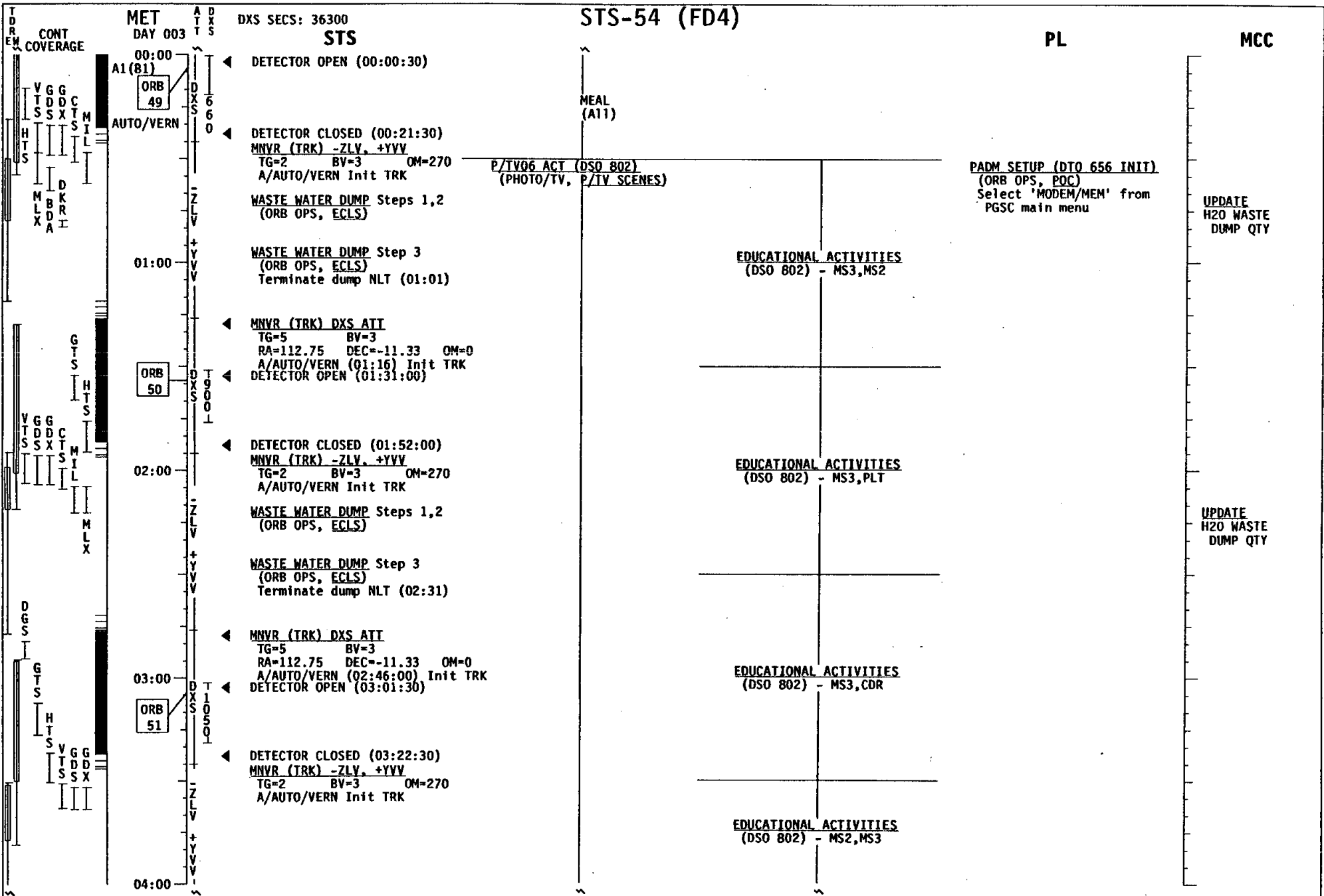


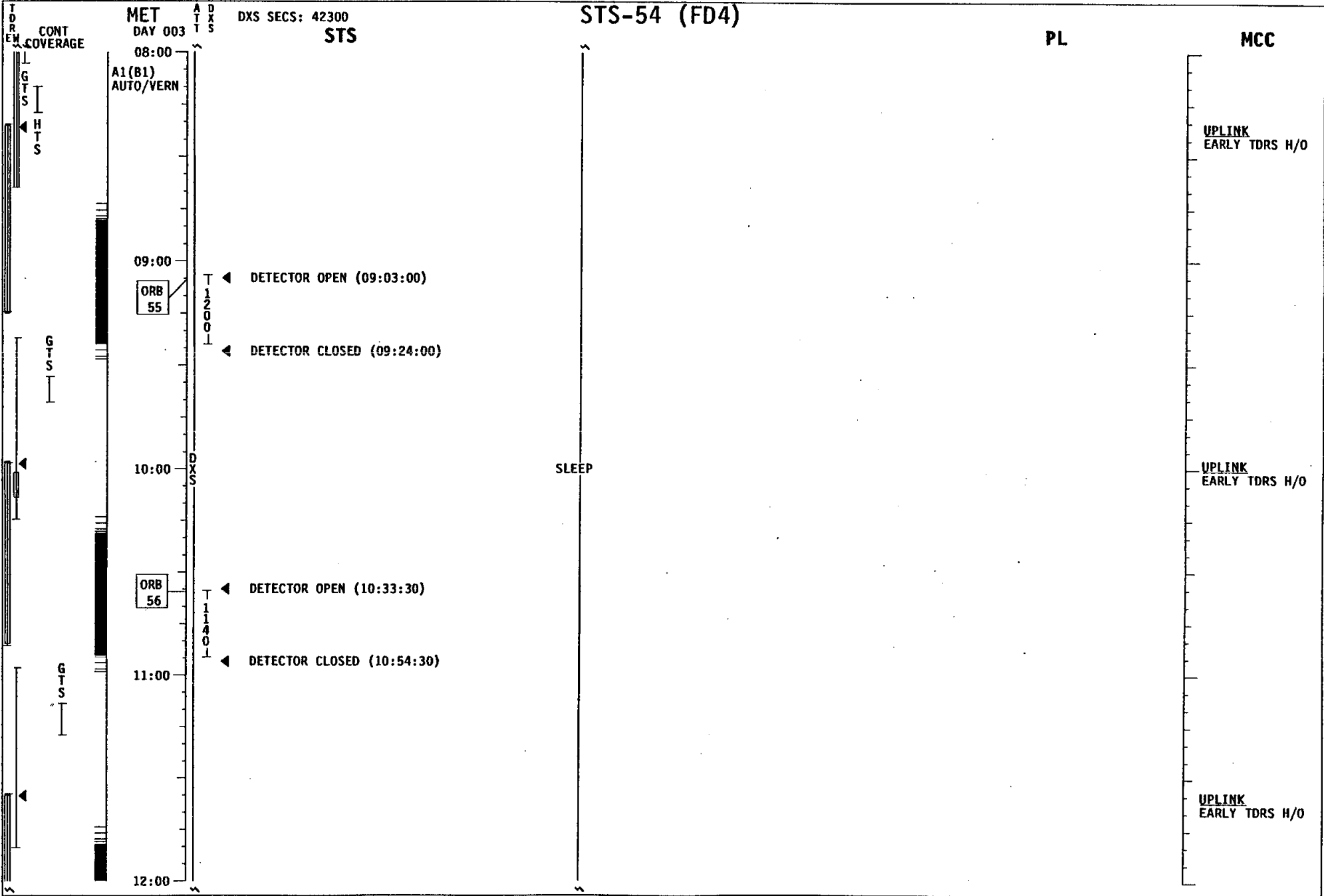
SLEEP

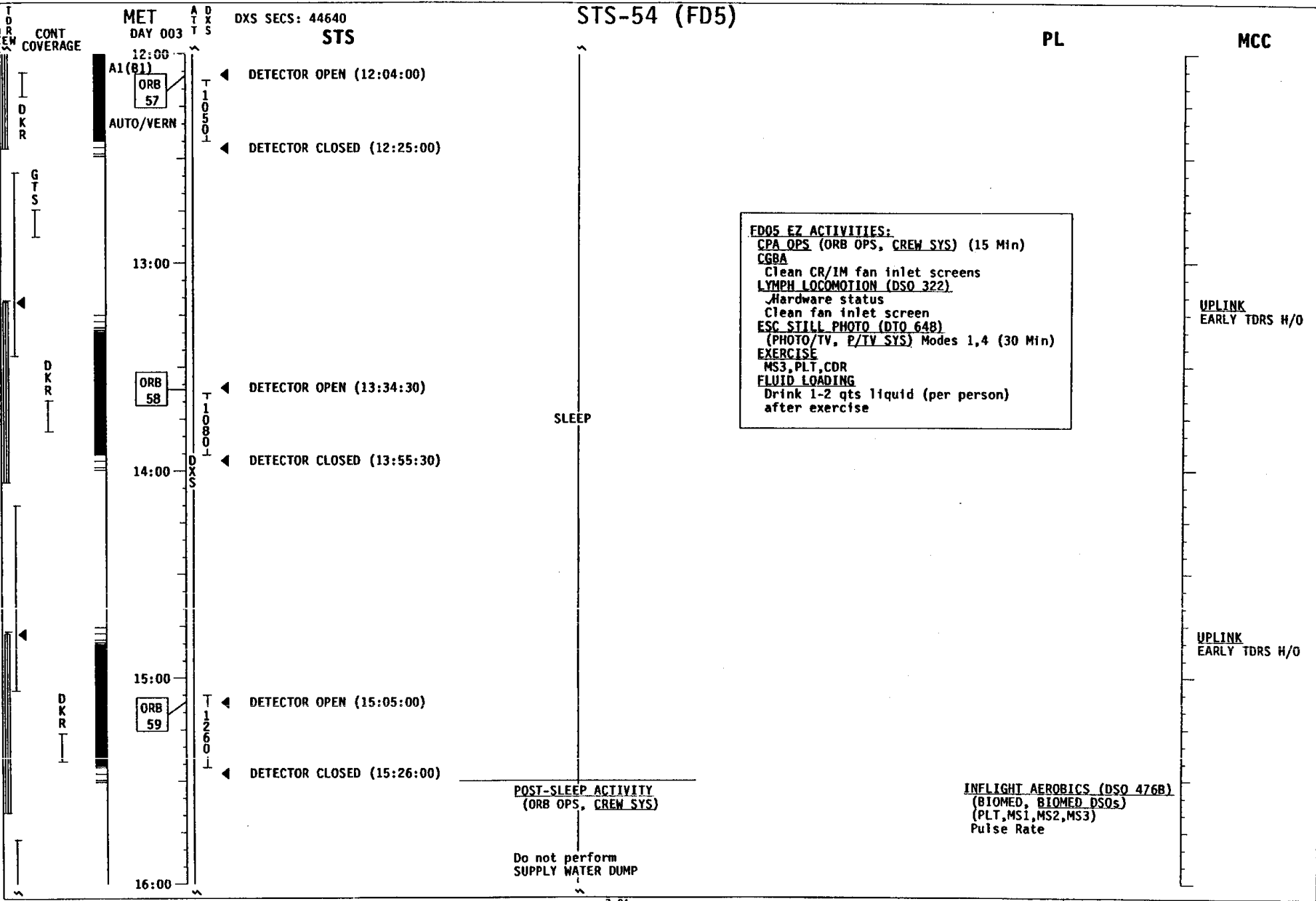
UPLINK
EARLY TDRS H/O

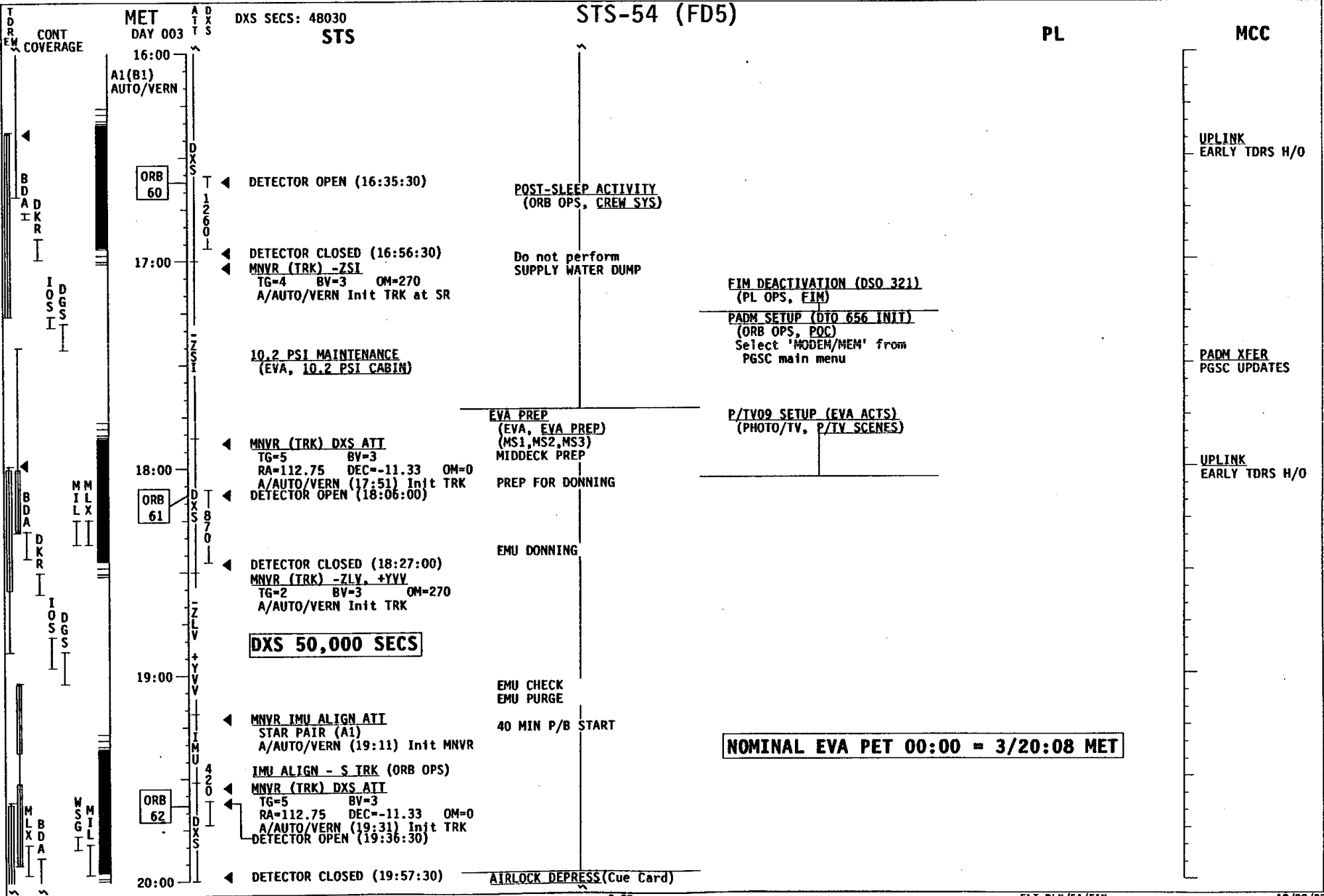
UPLINK
EARLY TDRS H/O











TDRS
 CONT COVERAGE
 A1(B1)
 AUTO/VERN
 20:00
 21:00
 22:00
 23:00
 004
 00:00

MET DAY 003

DXS SECS: 50580

STS-54 (FD5)

PL

MCC

STS

NOMINAL EVA PET 00:00 = 3/20:08 MET

← MNR (TRK) BIAS -ZLV, -XVV
 TG=2 BV=3 OM=315
 A/AUTO VERN (20:00) Init TRK

AIRLOCK DEPRESS (Cue Card)

EVA PROCEDURES (MS1,MS2)
 Airlock Egress

EVA SUPPORT (MS3)

UPLINK
β only 0°

UPLINK
EARLY TDRS H/O

UPLINK
EARLY TDRS H/O

← MNR (TRK) BIAS -ZLV, -XVV
 TG=2 BV=3 OM=335
 A/AUTO VERN (21:45) Init TRK

MEAL

ORB 63

ORB 64

STS-54 (FD5)

DXS SECS: 50580
STS

PL

MCC

MET DAY 004

CONT COVERAGE

00:00
A1(B1)
ORB 65

AUTO/VERN

01:00

02:00

03:00

04:00

ORB 66

ORB 67

DR

HTS

VTSS

GGDX

WCTS

MIL

MLX

BD A

GTS

HTS

VTSS

GGDX

WCTS

MIL

MLX

DGS

GTS

HTS

VTSS

GGDX

WCTS

MIL

MLX

HTS

VTSS

GGDX

WCTS

MIL

MLX

00:00
A1(B1)
ORB 65

01:00

02:00

03:00

04:00

ORB 66

ORB 67

HTS

VTSS

GGDX

WCTS

MIL

MLX

BD A

GTS

HTS

VTSS

GGDX

WCTS

MIL

MLX

DGS

GTS

HTS

VTSS

GGDX

WCTS

MIL

MLX

HTS

VTSS

GGDX

WCTS

MIL

MLX

EVA PROCEDURES (MS1,MS2)

EVA SUPPORT (MS3)

Airlock Ingress
AIRLOCK REPRESS (Cue Card)
Outer hatch closed NLT (01:08)

POST EVA
(EVA, POST EVA)
(MS1,MS2,MS3)

EMU MAINT/RECHARGE
(EVA, EMU MAINT/RECHARGE)
(2 Cmn)

CABIN REPRESS TO 14.7 PSI
(EVA, 10.2 PSI CABIN)

FILTER CLEANING
(IFM, SCHEDULED MAINTENANCE)

DIO 656 TERM
Press ALT-ESC then any
key to exit MEM

PADM POWERDOWN
(ORB OPS, POC)

FIM ACTIVATION (DSQ 321)
(PL OPS, FIM)

P/TV08 SETUP (CGBA)
(PHOTO/TV, P/IV SCENES)

P/TV08 ACT (CGBA)
(PHOTO/TV, P/TV SCENES)

TERM SAMPLE PROCESSING
(PL OPS, CGBA)
FPA SETS 8,17

CHROMEX STATUS
(PL OPS, CHROMEX)

PARE OPS
(PL OPS, PARE)

UPLINK
β 21° + MASK

TV (TDRE/W)
(CREW CNTL-CAB)

STS-54 (FD5)

PL

MCC

DXS SECS: 52410

STS

MET DAY 004

04:00

A1(B1)
AUTO/VERN

◀ MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN (04:14) Init MNVR

IMU ALIGN - S TRK (ORB OPS)

ORB 68

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (04:34) Init TRK
DETECTOR OPEN (04:39:30)

05:00

◀ DETECTOR CLOSED (05:00:30)

◀ MNVR (TRK) -ZSI
TG=4 BV=3 OM=270
A/AUTO/VERN Init TRK at SR

06 UHF MODE - OFF
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SPLX (or as reqd).

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

06:00

ORB 69

◀ MNVR (TRK) DXS ATT
TG=5 BV=3
RA=112.75 DEC=-11.33 OM=0
A/AUTO/VERN (05:55) Init TRK
DETECTOR OPEN (06:10:00)

◀ DETECTOR CLOSED (06:31:00)

07:00

ORB 70

◀ DETECTOR OPEN (07:40:30)

08:00

SLEEP

STS-54 (FD5)

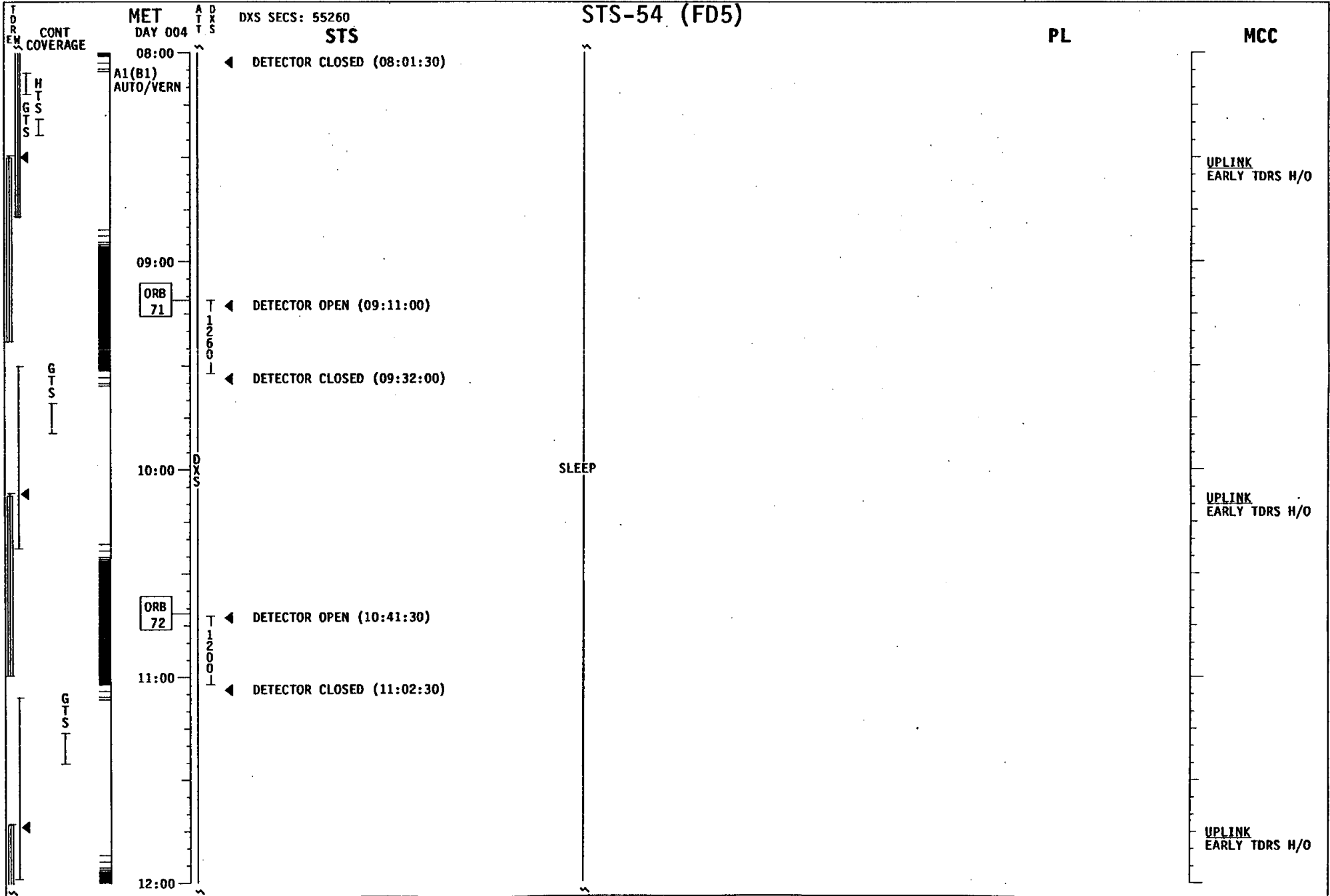
DXS SECS: 55260

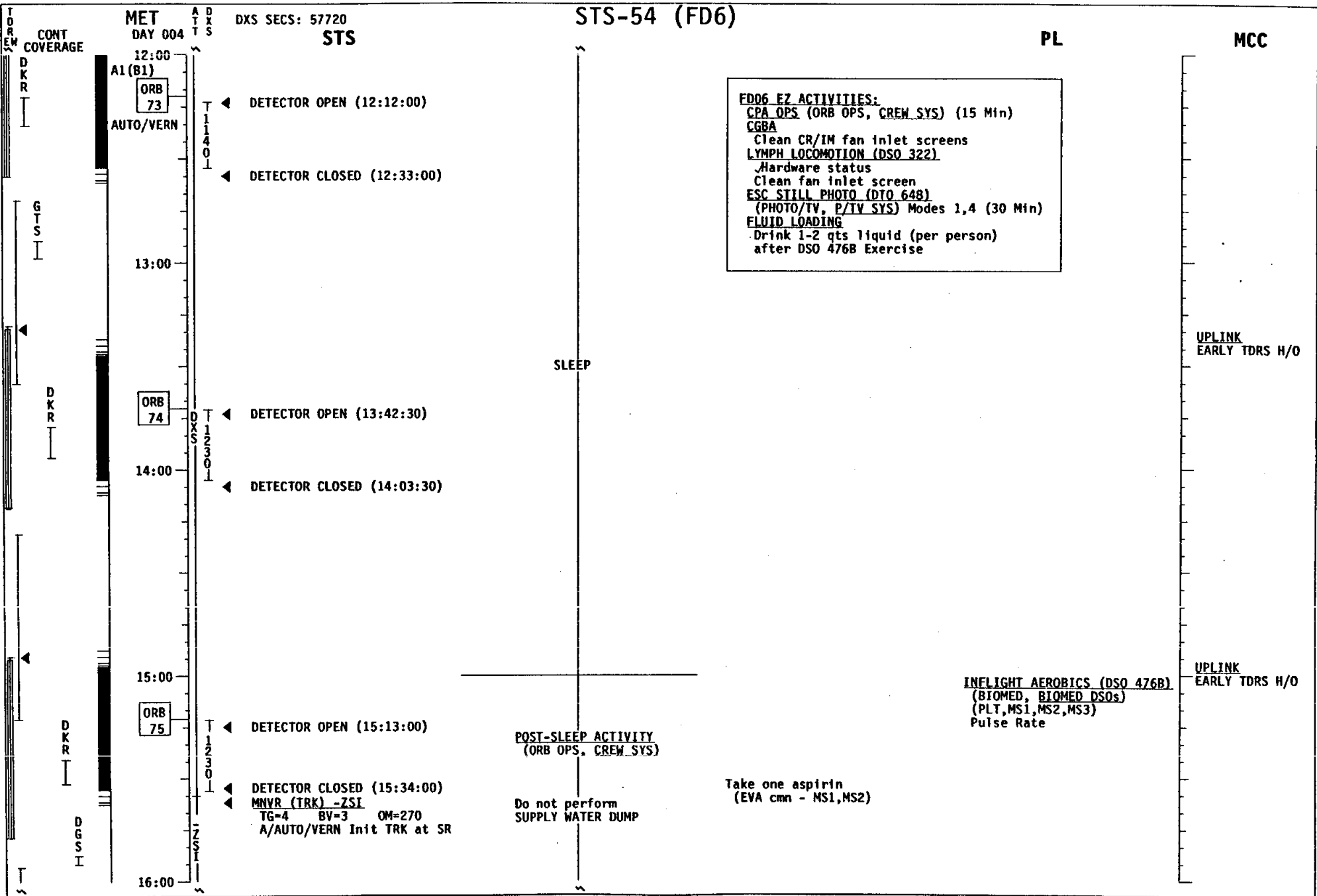
MET
DAY 004

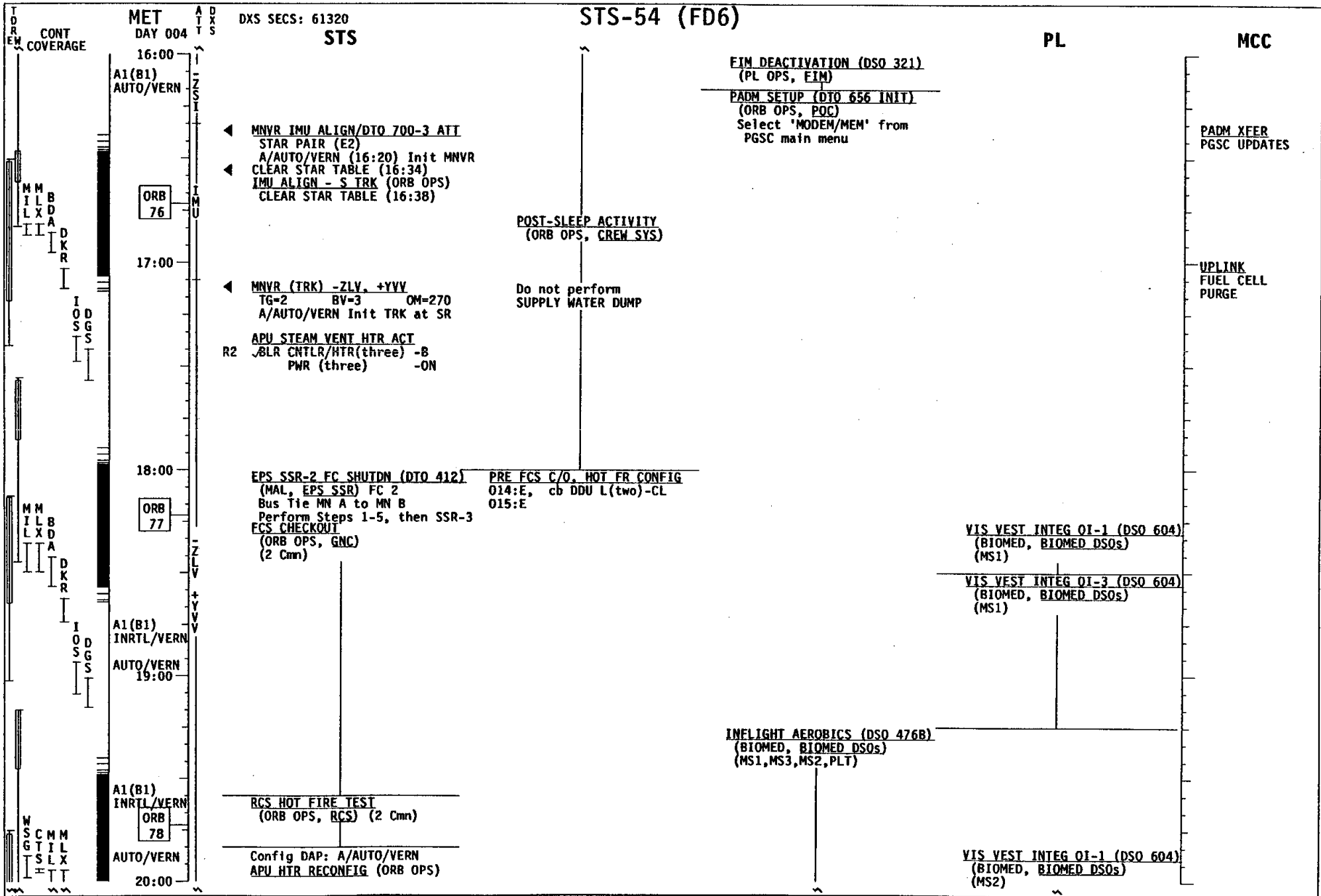
STS

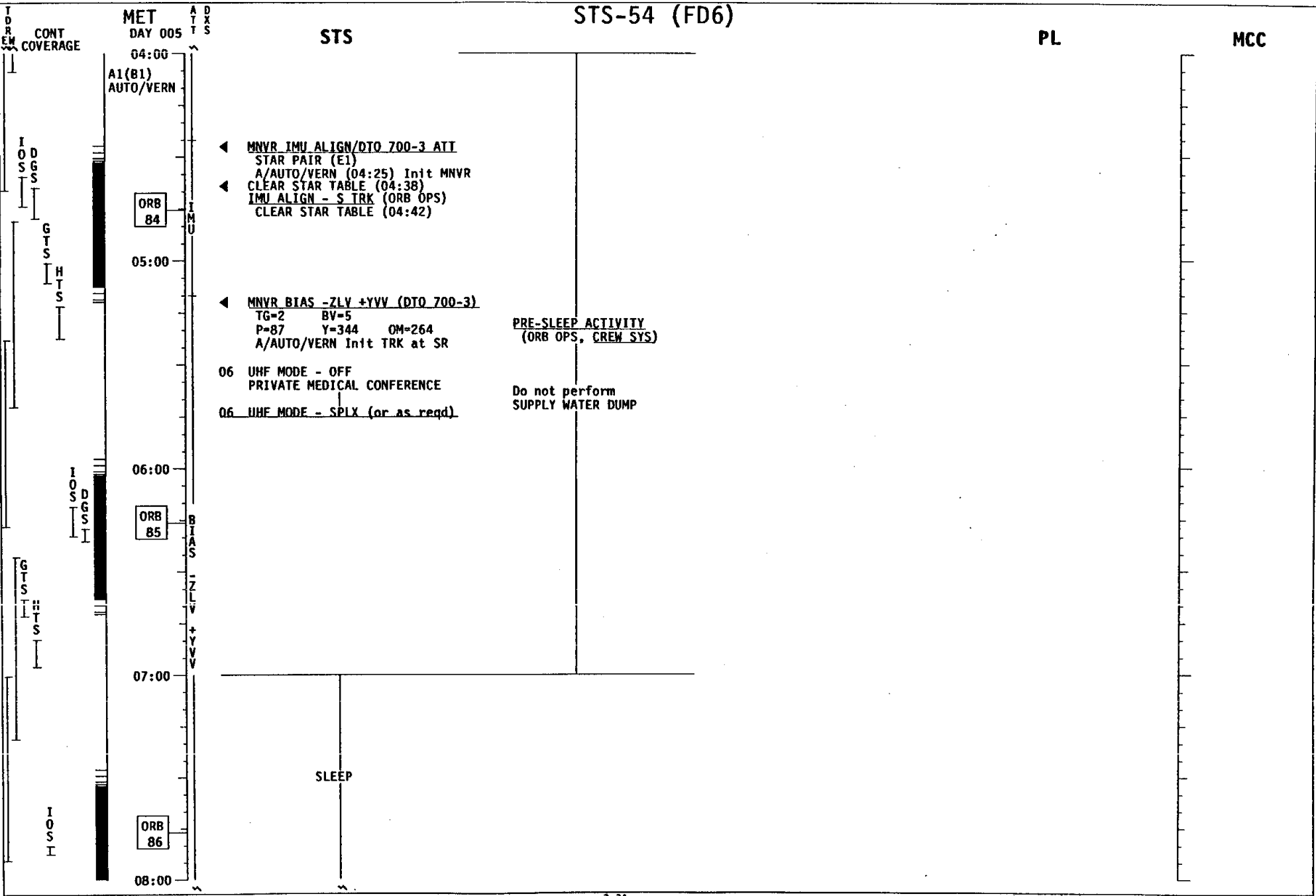
PL

MCC

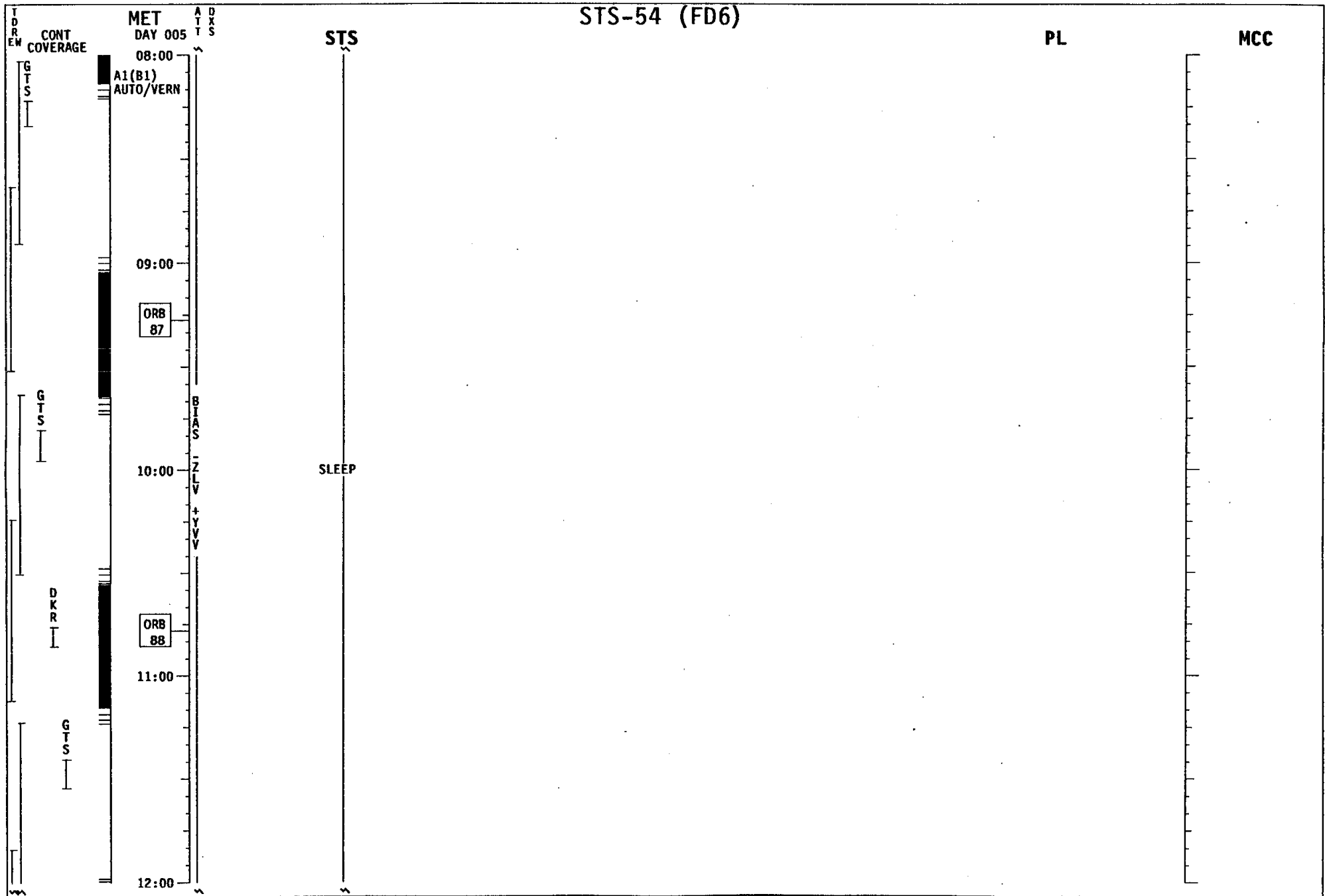




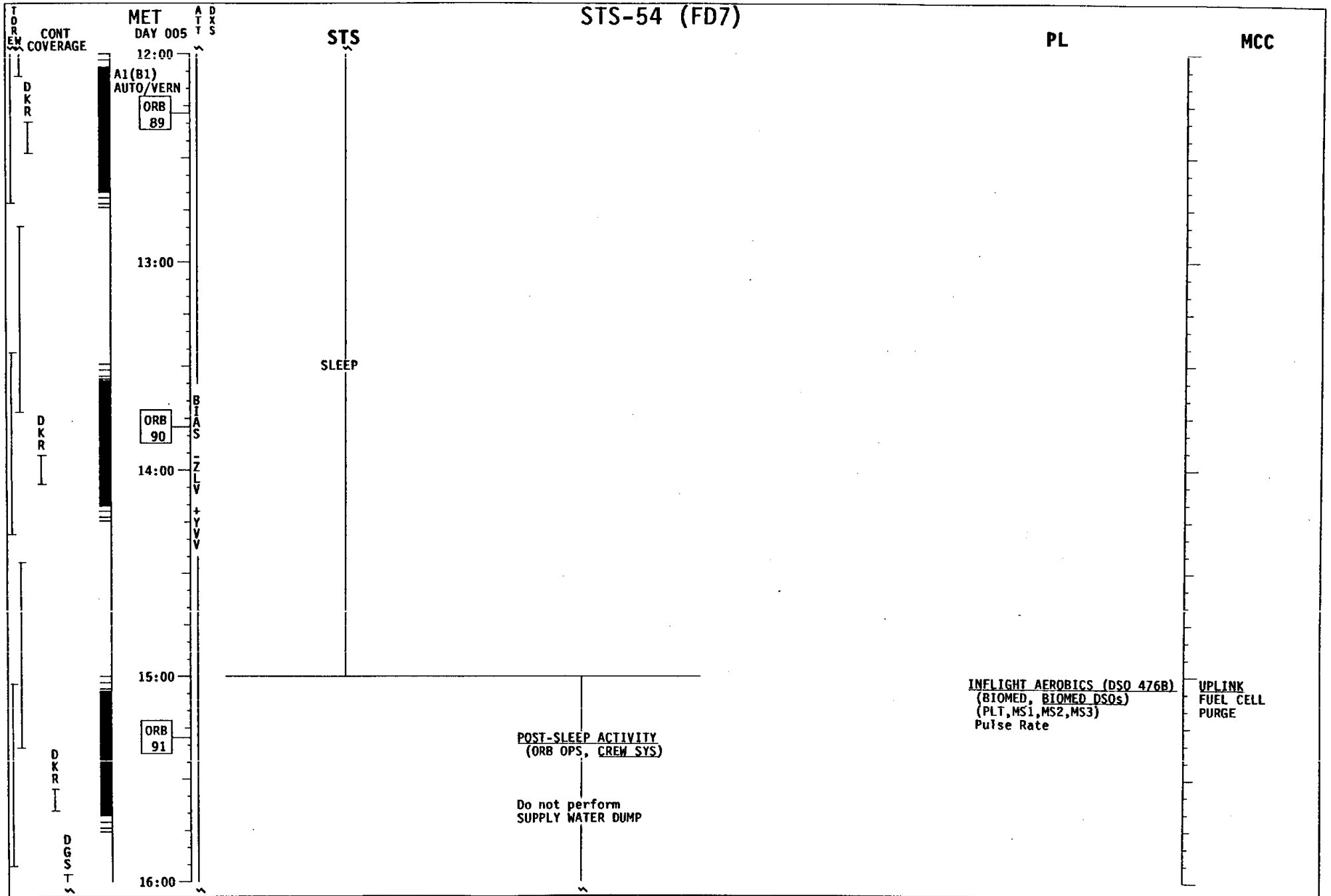




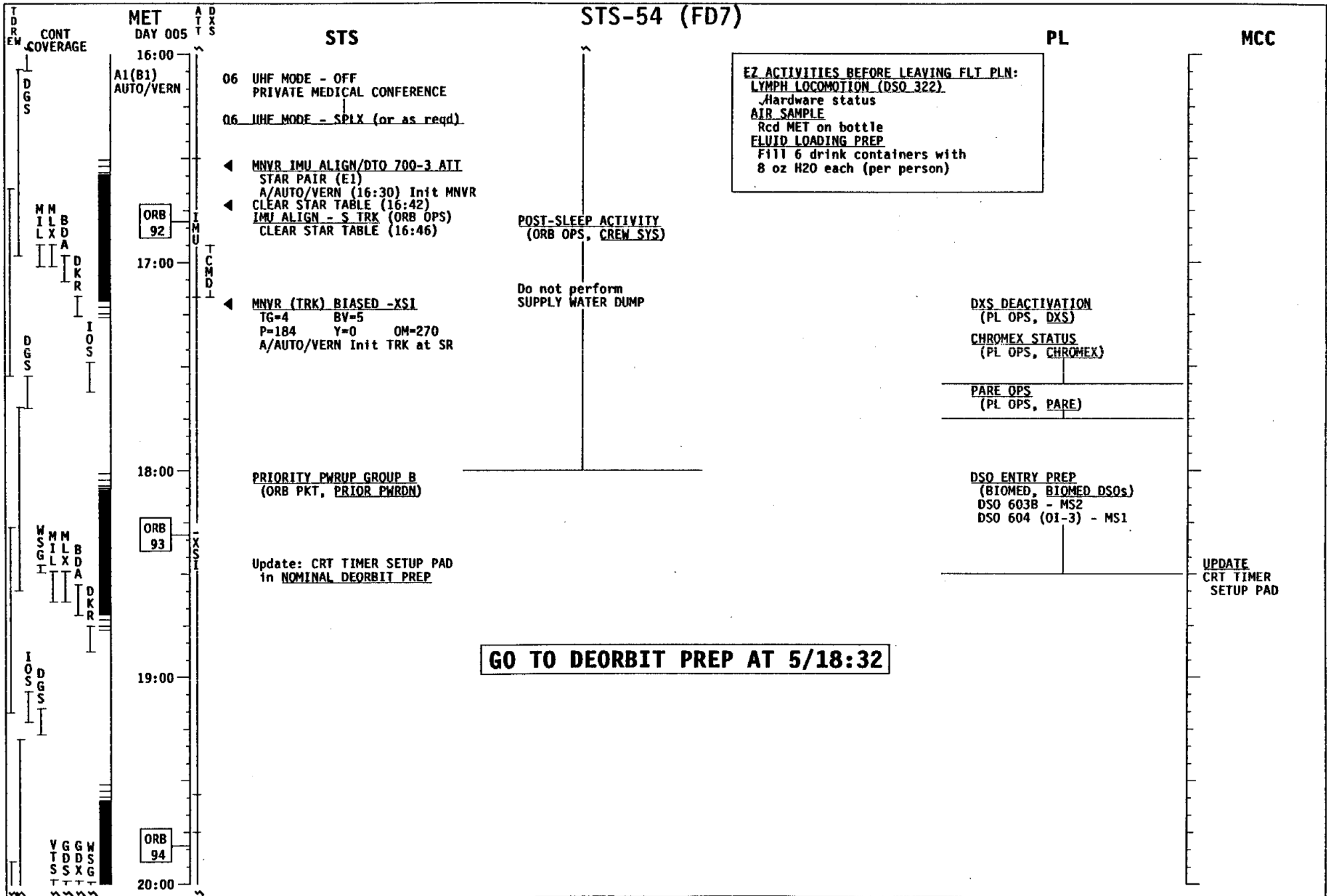
STS-54 (FD6)



STS-54 (FD7)



STS-54 (FD7)



GO TO DEORBIT PREP AT 5/18:32

STS-54 (FD7)

STS

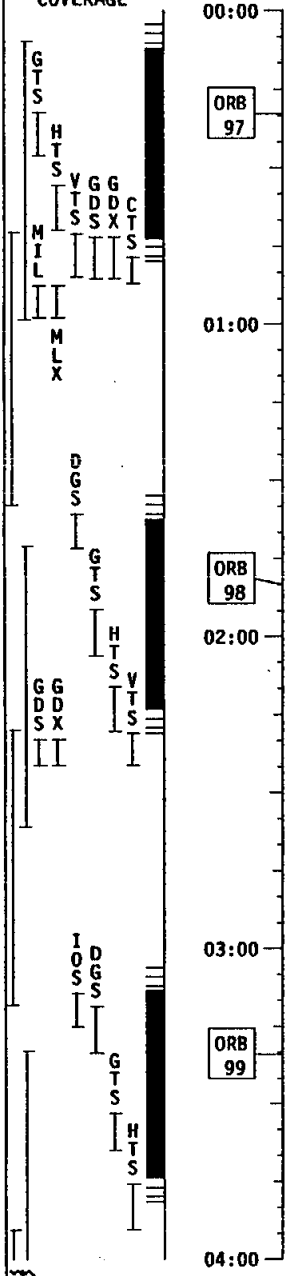
PL

MCC

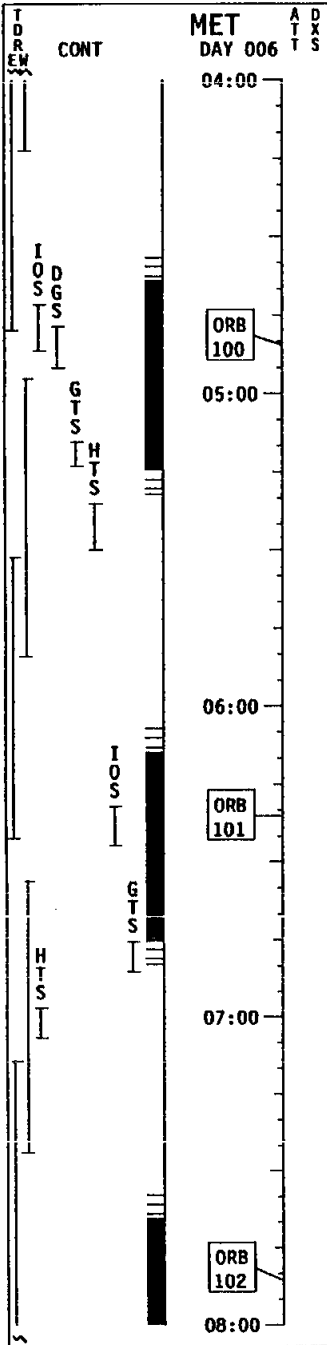
MET
DAY 006

A D
T X
T S

T D R
E W
CONT
COVERAGE



STS-54 (FD7)



STS

PL

MCC

CONTINGENCY TIMELINES

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16A TDRS INSERTION TIMELINE.....	4-6
18A TDRS (EVA) INSERTION TIMELINE.....	4-10
DXS FD3 UNLATCH EVA TIMELINE.....	4-14

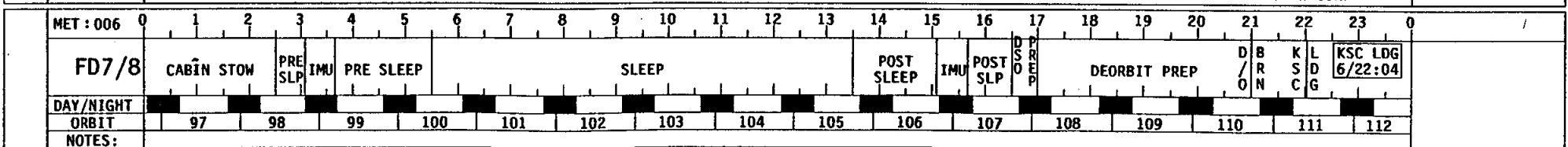
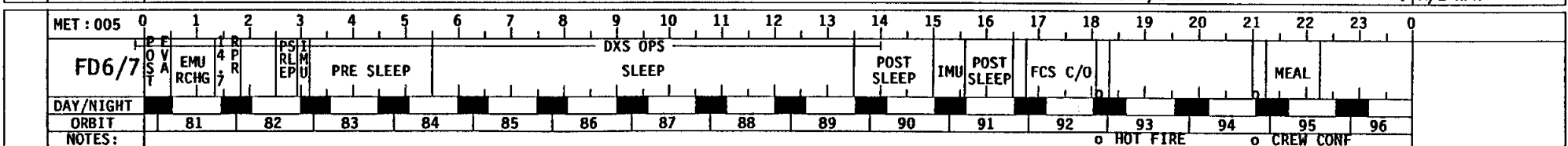
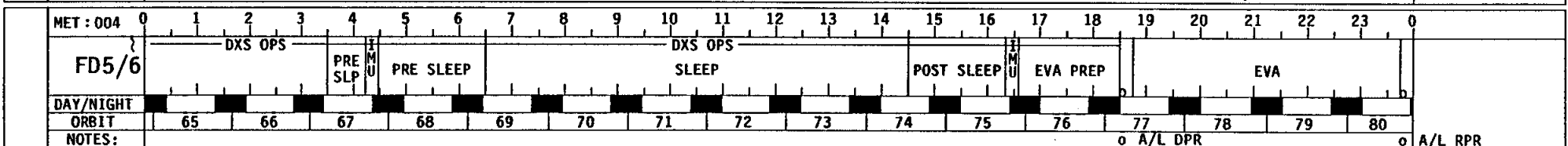
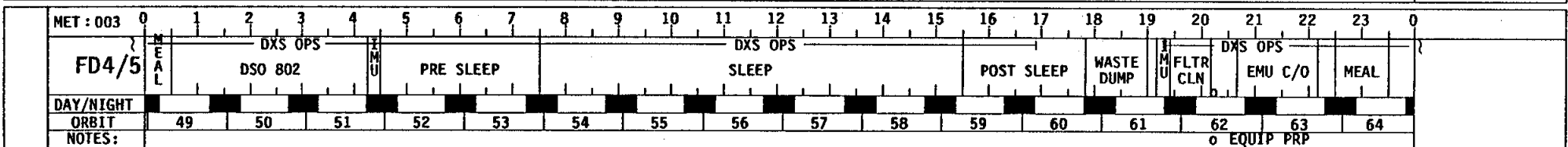
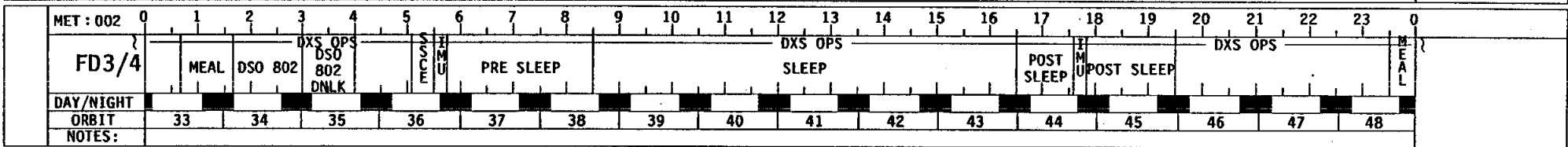
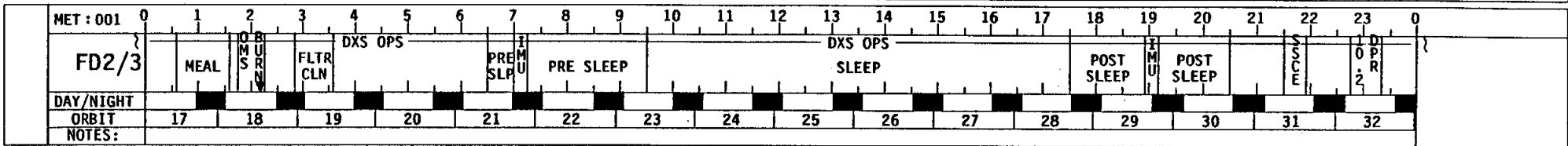
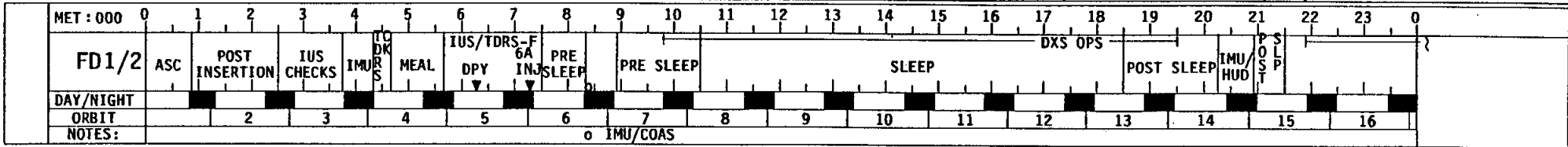
CONTINGENCY
TIMELINES

**CONTINGENCY
TIMELINES**

7-DAY MISSION TIMELINE

The 7-day mission timeline is applicable for launch after 15:04 GMT on January 13, 1993 (>1 hr 12 min pad hold). After 15:04 GMT, an extra mission day may be added while still protecting lighted landing through EOM +2. DXS may require an extra day on-orbit to accomplish 50,000 seconds of "good" data, depending upon the magnitude of the Electron Contamination Region (ECR). This additional day, if required, is added the flight day prior to the day before entry. The decision to extend the mission will be made real-time based upon data gathering trends outside the ECR. The 7-day timeline uses the FRR Cycle trajectory rotated to a 15:04 GMTLO on January 13, 1993.

FLIGHT: STS-54 EDITION: 7 DAY MISSION PUB. DATE: 12/02/92



7A TDRS INSERTION TIMELINE

The 7A TDRS Insertion Timeline is designed to accommodate delaying (6A) deployment of TDRS to the 7A Insertion opportunity. It assumes waveoff occurred after an unsuccessful TDRS Direct Check through GD_X/WSGT(4)*. The orbiter enters the timeline in the nominal direct check attitude. An attitude tweak for TDRS to DGS Signal Strength Verification must be computed. DXS operations begin with checkout on Orbit 7 and continue per the nominal timeline.

Other items to note are:

- (A) A waveoff could occur as late as the GO/NO-GO point in Deploy Countdown for the 6A opportunity. In this case the orbiter will remain in the Deploy attitude until the 7A opportunity.
- (B) The "2-Way PI CK" and "RTS SIG VERIF" are required to complete TDRS Direct Check requirements assuming the MIL(3) CMD check was successful.
- (C) The AFT Station COAS CAL is rescheduled to the same Flight Day 2 orbit as the forward station calibration. This minimizes DXS mission impacts.
- (D) Flight Day 2 crew wakeup occurs at 0/19:00 MET (vice 0/18:30).
- (E) The timeline is based upon a "NO 6A SEP" trajectory.
- (F) CGBA procession (FPA sets 5-10,20) will be rescheduled for Flight Day 2.

* If the TDRS Direct Check was successful and the 6A delay occurred for other reasons, the "2 Way PI CK" and "RTS SIG VERIF" are not required.

16A TDRS INSERTION TIMELINE

The 16A TDRS Insertion Timeline is designed to accommodate delaying (6A) deployment of TDRS to the 16A Insertion opportunity. It assumes waveoff occurred at the GO/NO GO decision point in the 7A deploy countdown procedure. The orbiter enters the timeline in the nominal deploy attitude with the tilt table at 29°.

Other items to note are:

- (A) The timeline is based upon a "NO 6A SEP" trajectory.
- (B) The AFT Station COAS CAL is rescheduled to the same Flight Day 2 orbit as the Forward Station calibration.
- (C) Standard EXERCISE will be done on Flight Day 2 instead of DSO 476 EXERCISE to minimize the exercise duration.
- (D) Termination of CGBA processing of FPA SET 5 will be rescheduled on Flight Day 3.
- (E) DXS will not scan until after IUS/TDRS-F deploy.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
013:13:52/ 014:01:52	000:00:00/ 000:12:00	013:07:52/ 013:19:52	1/013 CST	-36.2		JANUARY 13, 1993	STS-54	FINAL	12/02/92
CST :013 FD :001 MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS									
ATTITUDE									
DXS SECS									
NOTES:									

16A TDRS INSERTION

⊙ IUS OVERNIGHT CONFIG
(IUS DPY, CONT OPS)
NOTE: TFL CHG TO 179
⊙ DSO 322 HUMAN LYMPHOCYTE LOCOMOTION
⊙ -ZLV, -YVV ⊙ -ZLV, +YVV

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
014:01:52/ 014:13:52	000:12:00/ 001:00:00	013:19:52/ 014:07:52	2/013 CST	-34.4		JANUARY 13, 1993	STS-54	FINAL	12/02/92							
CST :013 FD :001 MET :000	20 13	21 14	22 15	23 16	0 17	CST:014 FD:002	18 19	20 21	22 23	0 MET:001						
STS	SLEEP (7.0)			AMU/IMU SEQ	-ZLV MNV R	TDRS DIR CK MNV R	DPY ATT	OMS SEP	WIN PRO	ASRM MNV R	-ZLV MNV R	KU-BBD ACT	DXS MNV R	PGRRP DOWN		
	POST SLEEP						DEPLOY	BURN	MNV R	MCIO CNF/STPGK	T PRR ACT	VTR ACT	VTR PLAYBACK	VTR BACKIT		
					XTRR 16-64	P/TV 03 ACT DPY	◀ TDRS-F DEPLOY ▶				LOAD PCMM		CGBA INIT	EA SS E MB PL DY		
PL					OS RDR	IUS ADCS	TILT TB 29	TDRS DIR	IUS PI	DEPLOY COUNT DOWN	LN RT TBL	CLOS SOFT	VIS VEST MS1	VTS VEST	VTS VEST	CGBA INIT
DAY/NIGHT ORBIT	9	10	11	12	13	14	15	16								
GSTDN COVERAGE	-DKR	-DKR	-DKR	-DKR	-DKR	-MLX -MIL	-DGR	-DGR	-MIL -MLX -BDA -DKR	-WGS MLX -MIL -BDA -DKR						
RTS COVERAGE	-GTS	-GTS			-DGS	-DGS	-DGS	-DGS	-DGS	-DGS	-DGS	-DGS	-DGS	-DGS		
TDRS ATTITUDE		-ZLV +YVV				-ZLV -YVV				DPLY	VIEW		-ZLV			
DXS SECS					AMU/IMU		TDRS CK		SEP		PROT			DXS		
NOTES:	16A TDRS INSERTION			DSO 476B AEROBICS	-ZLV, -YVV	IUS PDCO (TDRE)	TDRS DIR CK (MIL)	IUS/PI LOCK (TDRE)				-ZLV, +YVV	OTO 648 ESC			
													DSO 604 (OI-3) VIS VEST INTEG			
													DSO 604 (OI-1) VIS VEST INTEG			
													FPA SETS 5-10,20			
													FPA SETS 11-19,21			
														22,24		

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
014:13:52/ 015:01:52	001:00:00/ 001:12:00	014:07:52/ 014:19:52	2 /014 CST	-32.4		JANUARY 14, 1993	STS-54	FINAL	12/02/92
CST :014 FD :002 MET :001									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS									
ATTITUDE									
DXS SECS									
NOTES:									
16A TDRS INSERTION									

18A TDRS (EVA) INSERTION TIMELINE

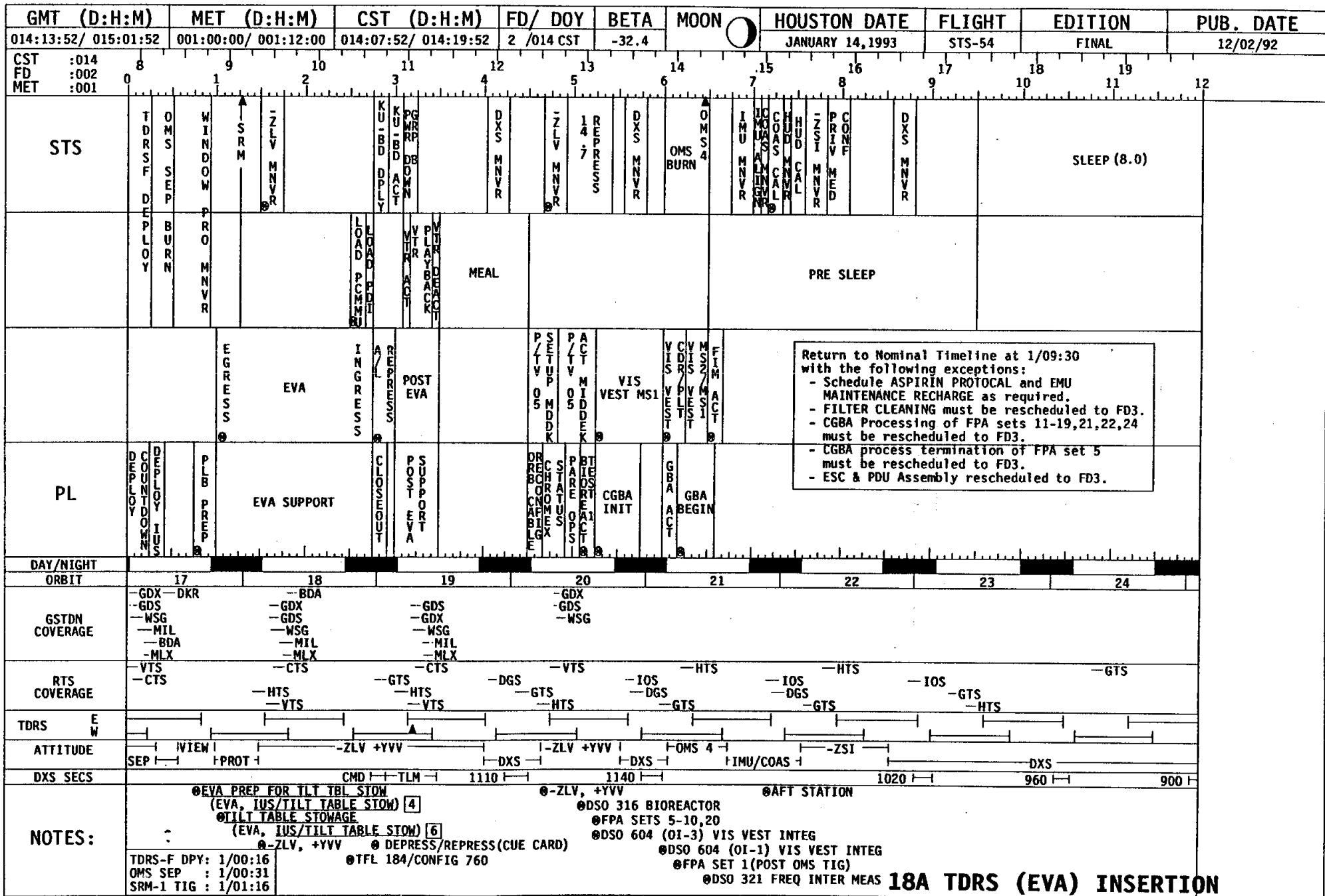
The 18A insertion timeline is designed to accommodate delaying deployment of TDRS until the first available opportunity following an EVA to manually raise the tilt table. The decision to perform an EVA must be made by 0/05:00 MET in order to meet EVA preparation and equipment constraints. Other items to note are:

- (A) "GO FOR EVA" occurs following failure to raise tilt table to 29°.
- (B) IUS thermally deployable on Flight Day 2.
- (C) Attempts will be made to raise the IUS/TDRS prior to airlock depress.
- (D) IUS is restowed prior to cycle PRLAS.
- (E) An STS-54 "NO 6A SEP" trajectory was used.
- (F) Appendix K exemption #5 covers this timeline.
- (G) DXS will not scan until after IUS/TDRS-F deploy.
- (H) DXS experiment power remains ON during the EVA to allow the heaters to provide thermal protection.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
013:13:52/ 014:01:52	000:00:00/ 000:12:00	013:07:52/ 013:19:52	1 /013 CST	-36.2		JANUARY 13, 1993	STS-54	FINAL	12/02/92
CST :013 FD :001 MET :000									
0	1	2	3	4	5	6	7	8	9
8	9	10	11	12	13	14	15	16	17
18	19	12							
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS									
ATTITUDE									
DXS SECS									
NOTES:									

18A TDRS (EVA) INSERTION

- ⊙TILT TABLE FAILS TO ELEVATE ⊙-ZLV, +YVV
- (PL SYS, PL MAL) 1.1C
- ⊙RESTOW IUS (UMB ATTACHED) ⊙IUS OVERNIGHT CONFIG
- (IUS DPY, CONT OPS) (IUS DPY, CONT OPS)
- ⊙-ZLV, -YVV NOTE: TFL CHG TO 179
- ⊙IF NOT PREVIOUSLY OPERATED
- ⊙ APU HTR RECONFIG
- ⊙DSO 322 HUMAN LYMPHOCYTE LOCOMOTION



DXS FD3 UNLATCH EVA TIMELINE

This timeline was designed to accommodate an EVA on Flight Day 3 to activate a DXS detector that failed to activate on Flight Day 1. The following guidelines apply:

- (A) Nominal trajectory is used for this timeline.
- (B) Liftoff is assumed to have occurred on time, implying a six-day mission.
- (C) The IUS/TDRS was successfully deployed on Flight Day 1.
- (D) One DXS detector antirotation latch failed during activation. The other detector latch was successfully unlatched and continued with nominal operations until the start of the EVA.
- (E) FD2 timeline remains nominal except for the addition of the following activities:
 - Aspirin protocol at 0/19:30
 - MASK Prebreathe init at 0/20:30
 - Prep for 10.2 PSI Cabin at 0/21:20
 - Cabin Depress to 10.2 PSI from 0/21:30 to 0/22:05
 - MASK Prebreathe term at 0/22:05
 - 10.2 PSI Cabin Config at 0/22:05
 - Equipment Prep at 0/22:20
 - EMU checkout (2 EMUs) from 0/22:50 to 1/00:20
 - DSO 604 (OI-1 & OI-3) will be performed after Flight Day 2 meal
- (F) FD4 timeline remains nominal except for the addition of the following activity:
 - Aspirin protocol at 2/17:30
- (G) FD6 timeline remains nominal except for the addition of maneuvers to support DXS operations on orbits 75, 76, 78, and 81 through 84. Consideration may be given to flying the DXS attitude during crew sleep Flight Day 6 (assuming thermal predicts are satisfactory) if 50,000 seconds of data have not been achieved.
- (H) The Flight Day 3 DSO 802 activities must be rescheduled.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
015:08:22/ 015:20:22	001:18:30/ 002:06:30	015:02:22/ 015:14:22	03/015 CST	-29.2		JANUARY 15, 1993	STS-54	FINAL	12/02/92							
CST :015	FD :003	MET :001	19	20	21	22	23	0	1	2	3	4	5	6	14	
STS	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	IMU MNVR	
	POST SLEEP	EVA PREP	50 min P/B	EVA	POST EVA	MEAL	EMU MAINT RCHG		P/TV 05 ACT MIDDEK	PRE SLEEP						
				EVA SUPPORT					EXERCISE (MS3, PLT)							
PL	FIM DEACT	PADM SETUP	BT DR EACT		GBA END	GBA BEGIN		SSCE BURN 1		BD IE OR EACT	CHROMEX	STRATUS	PARA OPS	CGBA TERM	GBA END	GBA BEGIN
DAY/NIGHT	[Day/Night Cycle]															
ORBIT	29	30	31	32	33	34	35	36	37							
EARTH TRACE	[Earth Trace Map]															
CONT COVERAGE	-IOS -DGS	-DGS	-MIL -MLX -BDA -DKR	-MIL -MLX -BDA -DKR	-HTS-BDA -VTS-DKR -GDS -GDX -CTS -MIL -MLX	-MIL -MLX -HTS-BDA -VTS-DKR -GDS -GDX -CTS	-GDS -GDX -CTS -MIL -HTS-BDA -VTS	-HTS -VTS -GDS -GDX -CTS -MIL -MLX	-DGS	-GTS	-HTS -VTS -GDS -GDX	-GTS	-HTS	-GTS	-DGS	
TDRS	[TDRS Coverage]															
ATTITUDE	-ZS1	DXS	-ZLV	DXS	-ZLV +YVV	DXS	-ZLV	DXS	-ZLV	DXS	-ZLV	DXS	-ZLV	IMU	-ZS1	
DXS SECS	720	510	DXS SCAN			810	1080	1020	1140							
NOTES:	@DSO 321 FREQ INTER MEAS @DTO 656 PGSC UPSET MON INIT @-ZLV, +YVV @DXS EXP PWR-OFF @FPA SET 1 @FPA SET 2 @-ZLV, +YVV @DSO 476B AEROBICS @FPA SET 3 @FPA SETS 6,13,14 @FPA SET 2															
DXS FD3 UNLATCH EVA																

RETURN TO NOMINAL

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DXS TABULAR DATA

DXS DATA

DXS DATA				
PBA=20° RA=112.75° DEC=-11.33°				
ORB	DETECTOR OPEN - CLOSED (MET - DD:HH:MM:SS)	"GOOD" SCIENCE DATA (MET - DD:HH:MM:SS)	DXS SECS	TOTAL SECS
7	0/10:08:13-0/10:27:30	0/10:13:30-0/10:27:30	840	840
8	0/11:38:43-0/11:58:00	0/11:45:00-0/11:58:00	780	1620
9	0/13:09:43-0/13:29:00	0/13:17:30-0/13:29:00	690	2310
10	0/14:40:43-0/15:00:00	0/14:48:30-0/15:00:00	690	3000
11	0/16:11:13-0/16:30:30	0/16:15:00-0/16:30:30	930	3930
12	0/17:42:13-0/18:01:30	0/17:42:30-0/18:01:30	1080	5010
13	0/19:13:13-0/19:32:30	0/19:13:30-0/19:32:30	900	5910
14	NO DXS DATA (ORBITER HUD CALIBRATION)			
15	0/22:14:43-0/22:34:00	0/22:15:00-0/22:26:30	690	6600
16	0/23:45:13-1/00:04:30	0/23:45:30-0/23:57:30	720	7320
17	1/01:16:13-1/01:35:30	1/01:16:30-1/01:30:30	840	8160
18	1/02:47:13-1/03:06:30	1/02:47:30-1/03:05:30	1080	9240
19	1/04:17:43-1/04:37:00	1/04:18:00-1/04:36:30	1110	10350
20	1/05:48:13-1/06:07:30	1/05:48:30-1/06:07:30	1140	11490
21	1/07:18:43-1/07:38:00	1/07:19:00-1/07:38:00	1140	12630
22	1/08:49:13-1/09:08:30	1/08:51:30-1/09:08:30	1020	13650
23	1/10:19:43-1/10:39:00	1/10:23:00-1/10:39:00	960	14610
24	1/11:50:13-1/12:09:30	1/11:54:30-1/12:09:30	900	15510
25	1/13:20:43-1/13:40:00	1/13:26:30-1/13:40:00	810	16320
26	1/14:51:13-1/15:10:30	1/14:56:00-1/15:10:30	870	17190
27	1/16:21:43-1/16:41:00	1/16:22:00-1/16:41:00	1140	18330
28	1/17:52:13-1/18:11:30	1/17:52:30-1/18:11:30	1140	19470
29	1/19:22:43-1/19:42:00	1/19:23:00-1/19:42:00	720	20190

DXS DATA

DXS DATA				
PBA=20° RA=112.75° DEC=-11.33°				
ORB	DETECTOR OPEN - CLOSED (MET - DD:HH:MM:SS)	"GOOD" SCIENCE DATA (MET - DD:HH:MM:SS)	DXS SECS	TOTAL SECS
30	1/20:53:13-1/21:12:30	1/20:53:30-1/21:02:00	510	20700
31	1/22:23:43-1/22:43:00	1/22:24:00-1/22:33:00	540	21240
32	1/23:54:13-2/00:13:30	1/23:54:30-2/00:04:30	600	21840
33	2/01:24:43-2/01:44:00	2/01:25:00-2/01:38:30	810	22650
34	2/02:55:13-2/03:14:30	2/02:55:30-2/03:13:30	1080	23730
35	2/04:25:43-2/04:45:00	2/04:26:00-2/04:43:00	1020	24750
36	2/05:56:13-2/06:15:30	2/05:56:30-2/06:15:30	1140	25890
37	2/07:25:00-2/07:46:00	2/07:25:30-2/07:42:00	990	26880
38	2/08:55:30-2/09:16:30	2/08:58:00-2/09:16:30	1110	27990
39	2/10:26:00-2/10:47:00	2/10:29:00-2/10:47:00	1080	29070
40	2/11:56:30-2/12:17:30	2/12:01:00-2/12:17:30	990	30060
41	2/13:27:00-2/13:48:00	2/13:32:30-2/13:48:00	930	30990
42	2/14:57:30-2/15:18:30	2/14:58:00-2/15:18:30	1230	32220
43	2/16:28:00-2/16:49:00	2/16:28:00-2/16:49:00	1260	33480
44	2/17:58:30-2/18:19:30	2/17:58:30-2/18:19:30	1170	34650
45	2/19:29:00-2/19:50:00	2/19:29:00-2/19:48:30	570	35220
46	2/20:59:30-2/21:20:30	2/20:59:30-2/21:08:30	540	35760
47	2/22:30:00-2/22:51:00	2/22:30:00-2/22:39:00	540	36300
48	3/00:00:30-3/00:21:30	3/00:00:30-3/00:11:30	660	36960
49	3/01:31:00-3/01:52:00	3/01:31:00-3/01:46:00	900	37860
50	3/03:01:30-3/03:22:30	3/03:01:30-3/03:19:00	1050	38910
51	3/04:32:00-3/04:53:00	3/04:32:00-3/04:50:00	1080	39990
52	3/06:02:00-3/06:23:00	3/06:02:00-3/06:23:00	1260	41250

DXS DATA				
PBA=20° RA=112.75° DEC=-11.33°				
ORB	DETECTOR OPEN - CLOSED (MET - DD:HH:MM:SS)	"GOOD" SCIENCE DATA (MET - DD:HH:MM:SS)	DXS SECS	TOTAL SECS
53	3/07:32:30-3/07:53:30	3/07:32:30-3/07:50:00	1050	42300
54	3/09:03:00-3/09:24:00	3/09:04:00-3/09:24:00	1200	43500
55	3/10:33:30-3/10:54:30	3/10:35:30-3/10:54:30	1140	44640
56	3/12:04:00-3/12:25:00	3/12:07:30-3/12:25:00	1050	45690
57	3/13:34:30-3/13:55:30	3/13:37:30-3/13:55:30	1080	46770
58	3/15:05:00-3/15:26:00	3/15:05:00-3/15:26:00	1260	48030
59	3/16:35:30-3/16:56:30	3/16:35:30-3/16:56:30	1260	49290
60	3/18:06:00-3/18:27:00	3/18:06:00-3/18:27:00	870	50160
61	3/19:36:30-3/19:57:30	3/19:36:30-3/19:43:30	420	50580
62				
63	NO DXS DATA (EVA)			
64				
65	4/01:38:30-4/01:59:30	4/01:38:30-4/01:54:00	930	51510
66	4/03:09:00-4/03:30:00	4/03:09:00-4/03:24:00	900	52410
67	4/04:39:30-4/05:00:30	4/04:39:30-4/04:57:00	1050	53460
68	4/06:10:00-4/06:31:00	4/06:10:00-4/06:22:30	750	54210
69	4/07:40:30-4/08:01:30	4/07:40:30-4/07:58:00	1050	55260
70	4/09:11:00-4/09:32:00	4/09:11:00-4/09:32:00	1260	56520
71	4/10:41:30-4/11:02:30	4/10:42:00-4/11:02:00	1200	57720
72	4/12:12:00-4/12:33:00	4/12:13:30-4/12:32:30	1140	58860
73	4/13:42:30-4/14:03:30	4/13:42:30-4/14:03:00	1230	60090
74	4/15:13:00-4/15:34:00	4/15:13:00-4/15:33:30	1230	61320
75	END OF DXS OBSERVATION ORBITS			61320

STS-54 DAP BOOK

DAP A CONFIGURATIONS

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

*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

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

*I-LOADED OPS-2 DAP Configuration

ALT DAP CONFIGURATIONS

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

*I-LOADED OPS-2 DAP Configuration

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

<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		

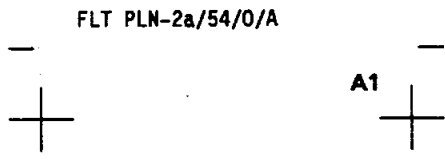
FLT PLN-1a/54/0/A

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FLT PLN-1b/54/0/A



DAP A



FLT PLN-2a/54/0/A

A1



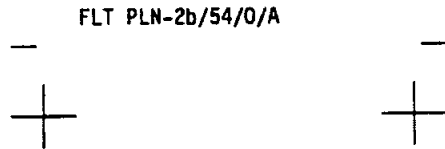
DAP A1

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

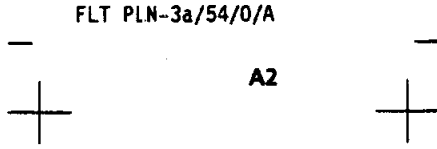


A1

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

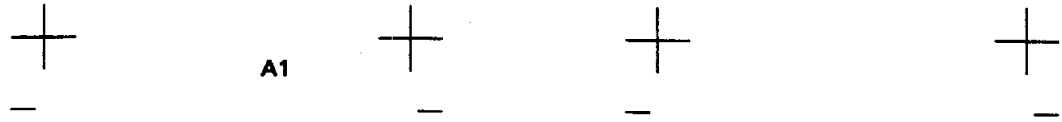


FLT PLN-2b/54/0/A



FLT PLN-3a/54/0/A

A2



A1

DAP A2

PURPOSE:
PTC

FLT PLN-3b/54/0/A



A2

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

FLT PLN-4a/54/0/A

A3



A2

DAP A3

PURPOSE:
GG

FLT PLN-4b/54/0/A

A3

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

FLT PLN-5a/54/0/A

A4





A3



DAP A4

PURPOSE:

PRE/POST DEPLOY

A4

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

FLT PLN-5b/54/0/A

FLT PLN-6a/54/0/A



A5



A4

DAP A5

PURPOSE:

IMU ROTATION

A5

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

FLT PLN-6b/54/0/A

FLT PLN-7a/54/0/A



A6



A5



DAP A6

PURPOSE:
LOSS OF VERN
(TAIL ONLY)

A6

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

FLT PLN-7b/54/0/A

FLT PLN-8a/54/0/A



A7



A6



DAP A7

PURPOSE:
RENDEZVOUS

A7

0.1 0	1	TRANSLATION	
		PULSE	
ROTATION			
0.2 0 0	2	DSC RT	NORM
0.2 0 0	3	VERN	
0.1 0 0	4	PULSE	NORM
0.0 1 0	5	VERN	
.0 0 0	6	COMP	NORM
.0 0 0	7	VERN	
DEADBAND			
2.0 0	8	ATT	NORM
1.0 0 0	9		VERN
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/54/0/A

FLT PLN-9a/54/0/A



A8



A7



DAP A8

PURPOSE:
PROX OPS

0.0 5

A8

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 1 0	11		VERN

1	12	JET OPT	P
1	13		Y

0 14 CNTL ACCEL

FLT PLN-9b/54/0/A

FLT PLN-10a/54/0/A



A9



A8



DAP A9

PURPOSE:
IUS DEPLOY

0.2 5

A9

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 1 0	11		VERN

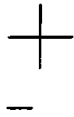
3	12	JET OPT	P
3	13		Y

0 14 CNTL ACCEL

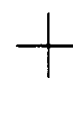
FLT PLN-10b/54/0/A

FLT PLN-11a/54/0/A





A9

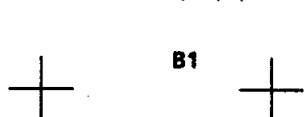


DAP B

FLT PLN-11b/54/0/A



FLT PLN-12a/54/0/A



B1



DAP B1

B1

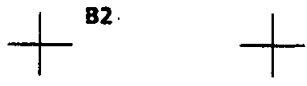
PURPOSE:
NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

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

FLT PLN-12b/54/0/A



FLT PLN-13a/54/0/A



B2



B1

DAP B2

PURPOSE:

LOSS OF VERN
(TAIL ONLY)

FLT PLN-13b/54/0/A



B2

DAP B3

PURPOSE:

LOSS OF VERN
(NOSE & TAIL)
GG MNVR

FLT PLN-14b/54/0/A



B2

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

FLT PLN-14a/54/0/A



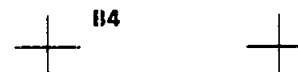
B3



B3

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

FLT PLN-15a/54/0/A



B4

+

B3

+

DAP B4

PURPOSE:
SSUS DEPLOY

+

B4

+

15	0.0	2
16	0.2	0 0
17	0.0	0 0 0 0
18	0.0	0 0 4
19	0.0	0 0 2
20	.0	0 0 0
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-15b/54/0/A

FLT PLN-16a/54/0/A

+

B4

+

DAP B5

PURPOSE:
COAS CAL

+

B5

+

15	0.0	2
16	0.2	0 0
17	0.0	0 1 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	3.0	0
23	0.0	3 3
24	0.2	0
25	.0	2 0
26		3
27		3
28		0

FLT PLN-16b/54/0/A

FLT PLN-17a/54/0/A

+

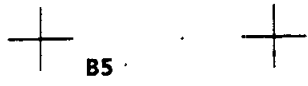
B6

+

+

B6

+

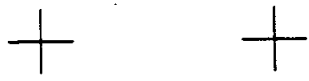


B5

DAP B6

PURPOSE:
(Blank)

FLT PLN-17b/54/0/A



B6

DAP B7

PURPOSE:
RENDEZVOUS

FLT PLN-18b/54/0/A



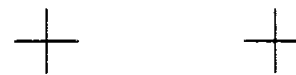
B6

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

FLT PLN-18a/54/0/A



B7



B7

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

FLT PLN-19a/54/0/A



B8

+ 87 +

DAP B8

PURPOSE:

PROX OPS

+ +

B8

15 0.0 1

16 0.2 0 0

17 0.2 0 0 0

18 0.0 0 4

19 0.0 0 2

20 .0 0 0

21 .0 0 0

22 2.0 0

23 1.0 0 0

24 0.2 0

25 .0 2 0

26 1

27 1

28 0

FLT PLN-19b/54/0/A

FLT PLN-20a/54/0/A

+ +

+ +

+ 88 +

DAP PURPOSE

ALT1 - NOMINAL

I-LOAD

ALT2 - LOSS OF

VERNS

FLT PLN-21a/54/0/A

+ ALT1 +

FLT PLN-20b/54/0/A

+ +



DAP ALT1

PURPOSE:
NOMINAL I-LOAD

FLT PLN-21b/54/0/A

ALT1

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

FLT PLN-22a/54/0/A



ALT2



DAP ALT2

PURPOSE:
LOSS OF VERNIS

FLT PLN-22b/54/0/A

ALT2

RATE DB	
32	0.0 7 0
JET OPT	
33	1 or 3
# JETS	
34	1
ON TIME	
35	- 0.0 8
DELAY	
36	- 0.0 0

FLT PLN-23a/54/0/B



ALT1



FLT PLN-23b/54/0/A



ALT2



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-24a/54/0/B

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FLT PLN-24b/54/0/B

ATTITUDE TIMELINE

ATTITUDE
TIMELINE

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/Z	REF ATT/REMARKS	EVENT	
000/01:12:00 MET 23:20	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 68.00	A1 AUTO PRI	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y=292.00	BIAS -ZLV N.N. PLBD OPENING IUS DIR CHECK
013/15:04:00 GMT 15:20						
000/03:45:00 MET 54:29	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 119 P 114	STAR PAIR A1 -Y ST: 66 -Z ST: 63	IMU ALIGN
013/17:37:00 GMT 46:29						
000/04:05:00 MET 11:00	INRTL R=124.00 MNVR P=271.00 Y=348.00	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 170 P 100		TDRS DIR CHECK
013/17:57:00 GMT 18:03:00						
000/05:33:00 MET 35:46	TGT=4 RA= 294.867 BV=5 DEC= -21.478S P=249.70 Y= 0.00 OM=270.00 DEPLOY 06:12:37	A9 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.01	SUN R 180 P 110	INRTL R=122.68 P=294.02 Y= 12.01	IUS/TDRS DEPLOY
013/19:25:00 GMT 27:46						
000/06:13:37 MET	INRTL BV=5 ROTR P= 0.00 Y=270.00	B1 FREE PRI	DSC 0.824 DB AT 3.00 DB RT 0.20		INRTL R=122.72 P=294.05 Y= 12.04	2.2 FPS -X SEP -70 DEG PITCH
013/20:05:37 GMT DPLY +01:00						
000/06:15:02 MET		B1 INRT PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 180 P 40	INRTL R=137.94 HOLD P=339.58 Y=315.40	NULL PITCH RATE
013/20:07:02 GMT						
000/06:19:37 MET 23:41	INRTL R=155.00 MNVR P= 33.00 Y= 67.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 122 P 125	TIG: 0/06:27:37	OMS SEP
013/20:11:37 GMT 15:41 DPLY +07:00						
000/06:29:37 MET 33:08	TGT=1 BV=3 P= 90.00 Y= 0.00 OM= 0.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20			IUS VIEWING
013/20:21:37 GMT 25:08						
000/06:57:37 MET 07:01:57	TGT=1 BV=5 P=320.00 Y= 0.00 OM= 0.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20			WINDOW PROTECT
013/20:49:37 GMT 53:57 DPLY +45:00						
000/07:12:37 MET		B1 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 145 P 89	INRTL R=119.44 HOLD P=212.26 Y=327.38	IUS SRM-1
013/21:04:37 GMT DPLY +60:00						
000/07:25:00 MET 36:24	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y=270.00	-ZLV NOSE NORTH VTR PLAYBACK
013/21:17:00 GMT 28:24						
000/08:15:00 MET 22:31	INRTL R=132.00 MNVR P= 24.00 Y= 24.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 148 P 83	STAR PAIR A2 -Y ST: 63 -Z ST: 66	IMU ALIGN
013/22:07:00 GMT 14:31						

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT
1 000/08:35:00 MET 42 013/22:27:00 GMT 42	TGT=18 RA= 78.249 BV=3 DEC= 45.946N P= 90.00 Y= 0.00 OM=(blank)	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 143 DB RT 0.02 P 77	SUN INRTL R=134.08 P= 29.39 Y= 18.62	COAS CAL -Z: 18, CAPELLA
2 000/08:55:00 MET 09:07:10 013/22:47:00 GMT 59:10	TGT=4 RA= 295.018 BV=3 DEC= -21.454S P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 360 DB RT 0.02 P 90	SUN INRTL R=237.84 P=125.06 Y= 4.96	-ZSI
3 000/09:53:00 MET 10:05:22 013/23:45:00 GMT 57:22	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 150 DB RT 0.02 P 104	SUN INRTL R=109.32 P=203.39 Y=343.37	DXS
4 000/19:35:00 MET 47:21 014/09:27:00 GMT 39:21	TGT=4 RA= 295.498 BV=3 DEC= -21.378S P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 360 DB RT 0.02 P 90	SUN INRTL R=237.44 P=125.63 Y= 4.27	-ZSI
5 000/20:20:00 MET 30:00 014/10:12:00 GMT 22:00	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 120 DB RT 0.02 P 115	SUN STAR PAIR A1	IMU ALIGN
6 000/20:40:00 MET 44:53 014/10:32:00 GMT 36:53	INRTL R= 97.00 MNVR P=195.00 Y= 33.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 144 DB RT 0.02 P 150	SUN	CDR HUD CAL +X: 25, REGULUS
7 000/21:00:00 MET 09:48 014/10:52:00 GMT 11:01:48	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 0 DB RT 0.02 P 90	EARTH LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
8 000/21:59:00 MET 22:10:42 014/11:51:00 GMT 12:02:42	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 151 DB RT 0.02 P 105	SUN INRTL R=109.61 P=204.42 Y=343.72	DXS
9 000/22:35:00 MET 45:14 014/12:27:00 GMT 37:14	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 360 DB RT 0.02 P 90	EARTH LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
10 000/23:30:00 MET 41:46 014/13:22:00 GMT 33:46	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 151 DB RT 0.02 P 105	SUN INRTL R=109.65 P=204.55 Y=343.77	DXS
11 001/00:05:00 MET 15:22 014/13:57:00 GMT 14:07:22	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 360 DB RT 0.02 P 90	EARTH LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
12 001/01:01:00 MET 12:50 014/14:53:00 GMT 15:04:50 FUTURE START	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 R 151 DB RT 0.02 P 105	SUN INRTL R=109.68 P=204.67 Y=343.81	DXS

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT
001/01:50:00 MET 52:18 014/15:42:00 GMT 44:18	INRTL R=106.00 MNVR P=197.00 Y=317.00	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 150 P 78 TIG: 1/02:09:00	OMS-4 CIRC
001/02:32:00 MET 34:18 014/16:24:00 GMT 26:18	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 105 INRTL R=109.72 P=204.79 Y=343.85	DXS
001/03:10:00 MET 19:39 014/17:02:00 GMT 11:39	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90 LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
001/04:02:00 MET 13:48 014/17:54:00 GMT 18:05:48	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 106 INRTL R=109.75 P=204.91 Y=343.89	DXS
001/04:40:00 MET 49:43 014/18:32:00 GMT 41:43	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90 LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
001/05:33:00 MET 44:56 014/19:25:00 GMT 36:56	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 106 INRTL R=109.78 P=205.03 Y=343.93	DXS
001/06:10:00 MET 19:48 014/20:02:00 GMT 11:48	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90 LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
001/06:53:00 MET 07:04:53 014/20:45:00 GMT 56:53	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 120 P 115 STAR PAIR A1	IMU ALIGN
001/07:13:00 MET 15:36 014/21:05:00 GMT 07:36	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 105 INRTL R=109.82 P=205.18 Y=343.98	DXS
001/07:40:00 MET 52:20 014/21:32:00 GMT 44:20	TGT=4 RA= 296.040 BV=3 DEC= -21.289S P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90 INRTL R=237.01 P=126.12 Y= 3.57	-ZSI
001/08:34:00 MET 46:20 014/22:26:00 GMT 38:20	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 106 INRTL R=109.85 P=205.26 Y=344.01	DXS
001/18:15:00 MET 27:19 015/08:07:00 GMT 19:19	TGT=4 RA= 296.514 BV=3 DEC= -21.210S P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90 INRTL R=236.65 P=126.42 Y= 3.02	-ZSI

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

Attitude Timeline

GHT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
001/18:57:00 MET 19:06:58 015/08:49:00 GMT 58:58	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 120 P 116	STAR PAIR A1	IMU ALIGN
001/19:17:00 MET 19:36 015/09:09:00 GMT 11:36	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 107	INRTL R=110.06 P=206.06 Y=344.29	DXS
001/19:45:00 MET 54:35 015/09:37:00 GMT 46:35	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
001/20:38:00 MET 50:06 015/10:30:00 GMT 42:06	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 151 P 107	INRTL R=110.08 P=206.13 Y=344.32	DXS
001/21:15:00 MET 24:31 015/11:07:00 GMT 16:31	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y=270.00	-ZLV NOSE NORTH SSCE TV
001/22:08:00 MET 20:10 015/12:00:00 GMT 12:10	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.11 P=206.23 Y=344.35	DXS
001/22:45:00 MET 54:44 015/12:37:00 GMT 46:44	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
001/23:39:00 MET 51:08 015/13:31:00 GMT 43:08	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.14 P=206.33 Y=344.39	DXS
002/00:15:00 MET 24:49 015/14:07:00 GMT 16:49	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
002/01:09:00 MET 21:02 015/15:01:00 GMT 13:02 FUTURE START	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.16 P=206.43 Y=344.42	DXS
002/01:45:00 MET 54:54 015/15:37:00 GMT 46:54	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
002/02:40:00 MET 52:10 015/16:32:00 GMT 44:10	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.19 P=206.53 Y=344.46	DXS

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 002/03:15:00 MET 27:19 015/17:07:00 GMT 19:19	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00 RA= 296.917 DEC= -21.141S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=236.36 P=126.60 Y= 2.60	-ZSI
2 002/04:10:00 MET 22:18 015/18:02:00 GMT 14:18	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.22 P=206.63 Y=344.49	DXS
3 002/04:45:00 MET 55:03 015/18:37:00 GMT 47:03	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
4 002/05:31:00 MET 43:11 015/19:23:00 GMT 35:11	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 120 P 116	STAR PAIR A1	IMU ALIGN
5 002/05:51:00 MET 53:36 015/19:43:00 GMT 45:36	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 107	INRTL R=110.25 P=206.76 Y=344.54	DXS
6 002/06:15:00 MET 27:18 015/20:07:00 GMT 19:18	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00 RA= 297.051 DEC= -21.118S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=236.26 P=126.64 Y= 2.48	-ZSI
7 002/07:10:00 MET 22:18 015/21:02:00 GMT 14:18	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 108	INRTL R=110.27 P=206.81 Y=344.56	DXS
8 002/16:50:00 MET 17:02:18 016/06:42:00 GMT 54:18	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00 RA= 297.525 DEC= -21.036S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=235.92 P=126.71 Y= 2.07	-ZSI
9 002/17:33:00 MET 42:57 016/07:25:00 GMT 34:57	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 121 P 117	STAR PAIR A1	IMU ALIGN
10 002/17:53:00 MET 55:35 016/07:45:00 GMT 47:35	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 108	INRTL R=110.44 P=207.46 Y=344.79	DXS
11 002/18:20:00 MET 29:48 016/08:12:00 GMT 21:48	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
12 002/19:14:00 MET 26:03 016/09:06:00 GMT 18:03	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 108	INRTL R=110.45 P=207.51 Y=344.81	DXS

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
002/19:50:00 MET 59:53 016/09:42:00 GMT 51:53	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
002/20:44:00 MET 55:58 016/10:36:00 GMT 47:58	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 152 P 108	INRTL R=110.47 P=207.59 Y=344.83	DXS
002/21:20:00 MET 29:58 016/11:12:00 GMT 21:58	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH MINI WASTE DUMP
002/22:15:00 MET 27:05 016/12:07:00 GMT 19:05	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 108	INRTL R=110.49 P=207.67 Y=344.86	DXS
002/22:55:00 MET 23:04:08 016/12:47:00 GMT 56:08	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 MINI WASTE DUMP
002/23:45:00 MET 57:00 016/13:37:00 GMT 49:00 FUTURE START	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.51 P=207.74 Y=344.89	DXS
003/00:25:00 MET 34:12 016/14:17:00 GMT 26:12	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH MINI WASTE DUMP
003/01:16:00 MET 28:08 016/15:08:00 GMT 20:08	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.53 P=207.82 Y=344.92	DXS
003/01:55:00 MET 02:04:17 016/15:47:00 GMT 56:17	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 MINI WASTE DUMP
003/02:46:00 MET 58:02 016/16:38:00 GMT 50:02	TGT=5 RA= 112.750 BV=3 DEC= -11.330S P= 90.00 Y= 0.00 OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.55 P=207.90 Y=344.95	DXS
003/03:25:00 MET 34:21 016/17:17:00 GMT 26:21	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
003/04:07:00 MET 19:05 016/17:59:00 GMT 18:11:05	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 121 P 117	STAR PAIR A1	IMU ALIGN

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT		
003/04:27:00 MET 29:35	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00	RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.58 P=208.00 Y=344.98	DXS
016/18:19:00 GMT 21:35							
003/04:55:00 MET 05:04:25	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
016/18:47:00 GMT 56:25							
003/05:47:00 MET 59:05	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00	RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.59 P=208.04 Y=345.00	DXS
016/19:39:00 GMT 51:05							
003/06:25:00 MET 37:18	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00	RA= 298.131 DEC= -20.929S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=235.49 P=126.66 Y= 1.64	--ZSI
016/20:17:00 GMT 29:18							
003/07:17:00 MET 29:18	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00	RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 109	INRTL R=110.61 P=208.11 Y=345.02	DXS
016/21:09:00 GMT 21:18							
003/17:00:00 MET 12:17	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00	RA= 298.603 DEC= -20.845S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=235.16 P=126.52 Y= 1.38	--ZSI
017/06:52:00 GMT 07:04:17							
003/17:51:00 MET 18:03:17	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00	RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 110	INRTL R=110.72 P=208.56 Y=345.19	DXS
017/07:43:00 GMT 55:17							
003/18:30:00 MET 39:11	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
017/08:22:00 GMT 31:11							
003/19:11:00 MET 23:02	INRTL R=139.00 MNVR P=203.00 Y=354.00		A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 121 P 118	STAR PAIR A1	IMU ALIGN
017/09:03:00 GMT 15:02							
003/19:31:00 MET 33:35	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00	RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 153 P 110	INRTL R=110.74 P=208.65 Y=345.22	DXS
017/09:23:00 GMT 25:35							
003/20:00:00 MET 07:15	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=315.00		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= 45.00	BIAS -ZLV -XV EVA OM FOR KU
017/09:52:00 GMT 59:15							
003/21:45:00 MET 46:40	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=335.00		A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 25.00	BIAS -ZLV -XV EVA OM FOR KU
017/11:37:00 GMT 38:40							

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 004/01:23:00 MET 33:49 017/15:15:00 GMT 25:49	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 154 P 110	INRTL R=110.79 P=208.84 Y=345.29	DXS
2 004/02:00:00 MET 10:04 017/15:52:00 GMT 16:02:04	TGT=2 BV=3 P= 90.00 Y= 0.00 OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 0 P 90	LVLH R= 0.00 P=180.00 Y=270.00	-ZLV NOSE NORTH CGBA TV
3 004/02:54:00 MET 03:05:44 017/16:46:00 GMT 57:44	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 154 P 110	INRTL R=110.81 P=208.89 Y=345.31	DXS
4 004/03:30:00 MET 39:36 017/17:22:00 GMT 31:36	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
5 004/04:14:00 MET 26:09 017/18:06:00 GMT 18:09	INRTL R=139.00 MNVR P=203.00 Y=354.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 121 P 118	STAR PAIR A1	IMU ALIGN
6 004/04:34:00 MET 36:35 017/18:26:00 GMT 28:35	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 154 P 110	INRTL R=110.82 P=208.97 Y=345.34	DXS
7 004/05:00:00 MET 12:17 017/18:52:00 GMT 19:04:17	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00 RA= 299.138 DEC= -20.747S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=234.78 P=126.26 Y= 1.15	-ZSI
8 004/05:55:00 MET 06:07:17 017/19:47:00 GMT 59:17	TGT=5 BV=3 P= 90.00 Y= 0.00 OM= 0.00 RA= 112.750 DEC= -11.330S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 154 P 110	INRTL R=110.83 P=208.99 Y=345.34	DXS
9 004/15:35:00 MET 47:17 018/05:27:00 GMT 39:17	TGT=4 BV=3 P= 90.00 Y= 0.00 OM=270.00 RA= 299.608 DEC= -20.659S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 360 P 90	INRTL R=234.45 P=125.94 Y= 1.01	-ZSI
10 004/16:20:00 MET 28:33 018/06:12:00 GMT 20:33	INRTL R=220.00 MNVR P=224.00 Y= 54.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 131 P 176	STAR PAIR E2 -Y ST: 12 -Z ST: 19	IMU ALIGN DTO 700-3
11 004/17:05:00 MET 17:19 018/06:57:00 GMT 07:09:19	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 FCS C/O PART 1
12 004/18:45:00 MET 018/08:37:00 GMT		A1 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 113 P 74	INRTL R=120.71 HOLD P=116.08 Y=347.62	FCS C/O PART 2

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

Attitude Timeline

GMT/MET	MNVR OPTION	DAP	E/S	REF ATT/REMARKS	EVENT	
1 004/18:55:00 MET 58:19 018/08:47:00 GMT 50:19	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	RETURN TO AUTO
2 004/19:35:00 MET 018/09:27:00 GMT		A1 INRT VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 312 P 74	INRTL R=281.83 HOLD P=116.14 Y=347.73	RCS HOT FIRE
3 004/19:50:00 MET 54:59 018/09:42:00 GMT 46:59	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	RETURN TO AUTO
4 004/22:25:00 MET 34:39 018/12:17:00 GMT 26:39	INRTL R=220.00 MNVR P=224.00 Y= 54.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 134 P 176	STAR PAIR E2	CREW CONF D'TO 700-3
5 005/00:35:00 MET 46:55 018/14:27:00 GMT 38:55	TGT=2 BV=3 P= 90.00 Y= 0.00 OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 360 P 90	LVLH R= 0.00 P=180.00 Y= 90.00	-ZLV NOSE SOUTH
6 005/04:25:00 MET 35:57 018/18:17:00 GMT 27:57	INRTL R= 73.00 MNVR P= 71.00 Y=312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 136 P 22	STAR PAIR E1 -Y ST: 19 -Z ST: 12	IHU ALIGN D'TO 700-3
7 005/05:10:00 MET 16:59 018/19:02:00 GMT 08:59	TGT=2 BV=5 P= 87.00 Y=344.00 OM=264.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH R 344 P 87	LVLH R=218.81 P=337.04 Y= 82.59	BIAS -ZLV N.S. D'TO 700-3
8 005/16:30:00 MET 40:30 019/06:22:00 GMT 32:30	INRTL R= 73.00 MNVR P= 71.00 Y=312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 135 P 22	STAR PAIR E1	IHU ALIGN D'TO 700-3
9 005/17:10:00 MET 24:23 019/07:02:00 GMT 16:23	TGT=4 BV=5 P=184.00 Y= 0.00 OM=270.00 RA= 300.744 DEC= -20.442S	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN R 180 P 176	INRTL R=173.05 P=222.80 Y= 53.35	BIASED -XSI RAD COLD SOAK
10 005/19:34:00 MET 38:16 019/09:26:00 GMT 30:16	INRTL R=170.00 MNVR P=195.00 Y= 11.00	A1 AUTO PRI	DSC 0.200 DB AT 5.00 DB RT 0.20	SUN R 83 P 134	-Y ST: 23 -Z ST: 34	DEORBIT ALIGN
11 005/19:45:00 MET 48:06 019/09:37:00 GMT 40:06	INRTL R=177.00 MNVR P=279.00 Y=324.00	B1 AUTO PRI	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN R 126 P 75	-Y ST: 18 -Z ST: 41	ALIGN VERIF
12 005/22:17:00 MET 19:28 019/12:09:00 GMT 11:28 -TIG -15:00	INRTL R=258.00 MNVR P= 20.00 Y=318.00	TRANS AUTO PRI	DSC 0.500 DB AT 3.50 DB RT 0.50	SUN R 49 P 16	TIG: 5/22:32:02	DEORBIT BURN

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

STS-54
FLIGHT PLAN NOTES

FLIGHT PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-54 (OV105) launch from KSC on January 13, 1993, will be into a 162 x 160 nm orbit at an inclination of 28.45 degrees. The mission duration will be 6 days for a launch from 13:52 to 15:04 GMT. After 15:04, the mission may be extended to 7 days, if required, since the capability exists for a 7-day mission plus 2 additional days for contingency operations and weather avoidance. Nominal landing occurs at KSC on January 19, 1993.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Local Time</u>
Nominal	Primary	96	KSC	08:24 EST
	Weather Alt. /1 rev late	97	EDW	06:50 PST
1 Day Late	Primary	112	KSC	08:31 EST
	Weather Alt.	113	EDW	06:58 PST
2 Days Late	Primary	127	KSC	07:03 EST
	Weather Alt.	129	EDW	07:05 PST

Major Events

<u>LAUNCH (KSC)</u>	January 13, 1993
Day of year	13
CST/GMT	07:52/13:52
<u>OMS-2 C/O</u>	
MET (DD/HH:MM)	00/00:42
DV (fps)	221.0
ORBIT ha/hp (nm)	162/160
<u>IUS/TDRS-F DEPLOY</u>	
MET (DD/HH:MM)	00/06:13
ORBIT ha/hp (nm)	162/160
<u>RCS-1</u>	
MET (DD/HH:MM)	00/06:14
DV (fps)	2.2
ORBIT ha/hp	162/160
<u>OMS-3</u>	
MET (DD/HH:MM)	00/06:28
DV (fps)	31.0
ORBIT ha/hp	178/162
<u>IUS/SRM-1 (6A INJECTION)</u>	
MET (DD/HH:MM)	00/07:13

CIRC BURN (OMS-4)
MET (DD/HH:MM) 01/02:09
DV (fps) 27.0
ORBIT ha/hp 162/162

DEORBIT BURN
MET (DD/HH:MM) 05/22:32
DV (fps) 306

LANDING (KSC) January 19, 1993
MET (DD/HH:MM) 05/23:32
Day of year 19
CST/GMT 07:24/13:24

B. CREW

1. There will be five crewmembers flying this mission with each specialist assigned to the following tasks:

CDR - John H. Casper
PLT - Donald R. McMonagle
MS1 - Mario Runco, Jr.
MS2 - Gregory J. Harbaugh
MS3 - Susan J. Helms

2. The crewmembers responsible for performing an EVA, should one become necessary, are MS2 as EV1, MS1 as EV2, and MS3 as IV.

C. COMMUNICATIONS AND INSTRUMENTATION

1. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink real-time commands (RTCs) coordinated with the crew.
2. TDRS coverage is assumed to be supported by TDRS-E (41 degrees W) and TDRS-W (174 degrees W) and is the prime mode of communication coverage.
3. TDRS Ku-band is the prime mode of real-time TV; however, there are also two ground network (GN) sites available as backups: GDS(GDX), and MIL(MLX) (90-minute lead time required).
4. Five GN sites are available through IUS/TDRS-F deploy and for on-orbit contingency support: MIL(MLX), BDA(BDX), DKR, DFR, and GDS(GDX). (Note: DFR is not shown in this Flight Plan). MAD(MAX) and CAN are available for emergency support (2-hour lead time required).
5. RTS sites are available for pre-deploy to support IUS activities. They are also available for contingency support or when scheduled in advance (4-hour lead time required): HTS, GTS, VTS, IOS, CTS, OTS, and DGS. Note: IOS and OTS also have UHF voice capability.
6. TDRS-E and TDRS-W are available to support Ku-band uplink (e.g., TAGS) after IUS/TDRS-F deploy.
7. S-band HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.

8. TDRS-E and TDRS-W are available for ascent and entry support. IOS (RTS site) is available for UHF voice in an emergency (2-hour lead time required).

D. TELEVISION/PHOTOGRAPHY

1. The Orbiter CCTV system provides one color, wide-angle camera for in-cabin coverage. There will also be four PLB TV cameras. There are three different lens assemblies for the PLB cameras (color, monochrome, and wide-angle lens assemblies). The type of lens assembly for each PLB camera is documented in the Flight Requirements Document.
2. The Orbiter has one video tape recorder available which uses 30-minute cassettes.
3. Three camera systems are available: 16mm, 35mm, and 70mm.

E. PAYLOADS

1. Tracking and Data Relay Satellite - F (TDRS-F)

The TDRS-F is a communication satellite which is the fifth spacecraft launched in the process of assembling the Tracking and Data Relay Satellite System. The system will provide a high-capacity communication and data link with the STS as well as other spacecraft and launch vehicles. The nominal IUS/TDRS-F deployment opportunity occurs 60 minutes prior to node 6A (ascending) at 00/06:13 MET. Backup opportunities occur prior to 7A and 16A. A contingency opportunity occurs 60 minutes prior to 8D (descending).

2. Inertial Upper Stage (IUS)

The IUS is a two-stage solid rocket with an inertially stabilized upper stage which will place TDRS-F in a geosynchronous orbit. The IUS nominally ignites its first stage (SRM-1) at the 6A node for transfer orbit insertion.

3. Diffuse X-ray Spectrometer (DXS)

The DXS is designed to observe X-rays emitted in the Milky Way galaxy near the solar system. The DXS can detect the wavelength and intensity of the strongest galactic X-rays emitted by the hot gas believed to occupy most of the interstellar medium. Two DXS instruments, each composed of a lead-stearate (PbSt) Bragg spectrometer, are affixed to the Shuttle Payload of Opportunity Carrier (SPOC) plates and mounted on the Get-Away-Special (GAS) adapter beams on each side of the payload bay. An across-bay cable electronically connects the port-side DXS instrument with the controlling hitchhiker avionics on the starboard side. During orbit night, the instruments oscillate about axes parallel to the shuttle's X-axis in synchronized operation, observing X-ray emissions from a specified region of interstellar space. When there is no atomic oxygen flow above the X-Y plane, no electron contamination, and if the instruments are scanning above 200 km altitude during orbit night, DXS is collecting "good" data.

4. Chromosome Plant Cell Division in Space (CHROMEX)

The CHROMEX payload is designed to determine the effects of microgravity on *Arabidopsis thaliana*. These plants will be flown in the Plant Growth Unit (PGU). Post-flight, data will be compared to that of similar plants grown at 1 g on Earth. Activities consist of crew verification and logging of nominal operations each flight day during the experiment's day cycle.

5. Commercial Generic Bioprocessing Apparatus - A (CGBA)

CGBA consists of a Generic Bioprocessing Apparatus (GBA), two Refrigeration/Incubation modules (CR/IMs), and a stowage locker. The GBA module is a self-contained mixing and heating module used to process biological fluid samples in microgravity. Activities consist of crew mixing of samples, incubation in the GBA, and data transfer to the PGSC.

6. Physiological and Anatomical Rodent Experiment (PARE-02)

The PARE experiment is being conducted to study acute adaptation of bone to spaceflight and the effects of microgravity on the skeletal system. The equipment consists of one animal enclosure module (AEM) which contains 6 rodents. The payload requires 28V dc power and daily housekeeping and observation by the crew.

7. Solid Surface Combustion Experiment (SSCE)

The SSCE consists of two Polymethyl Methacrylate (PMMA) samples internally mounted in a pressurized chamber. While the samples are burned, documentary photography of the front and side of the sample is taken. In addition, measurements are made of chamber temperature, chamber pressure, and middeck air temperature. The experiment must be run during a period of low Orbiter accelerations.

F. ON-ORBIT DTOS

1. Fuel Cell On-Orbit Shutdown/Restart (DTO 412)

One of the Orbiter's three fuel cells (FC2) will be shut down and subsequently restarted in order to gain confidence that a fuel cell may be shut down and restarted on-orbit successfully. Also, the fuel cell will remain shut down for an extended period to determine the magnitude of voltage degradation and the fuel cell cool-down rate. This data will be used as a baseline for the future long duration utilization flights to Space Station Freedom.

2. Electronic Still Photography Test (DTO 648)

Electronic still photography is a new technology which provides the means for a handheld camera to electronically capture and digitize an image with resolution approaching film quality. The digital image is stored on removable hard disks or small optical disks, and can be converted to a format suitable for downlink transmission or enhanced using image processing software. The only purpose of this DTO on STS-54 is to test the effectiveness of the ESC during on-orbit operations since there is no downlink interface.

3. PGSC Single Event Upset Monitoring (DTO 656)

The objective of the DTO is to determine Payload and General Support Computer (PGSC) random access memory susceptibility to single event upset caused by cosmic radiation. The information could lead to improved procedures, hardware, or software to reduce radiation effects.

4. Extended Duration Orbiter (EDO) Waste Collector System (WCS) Evaluation (DTO 662)

The purpose of this DTO is to verify the design for the new EDO WCS under microgravity conditions for a prolonged period on the OV105 orbiter. OV105 has been modified with additional structures in the Waste Management Compartment and additional avionics to support/restrain the EDO WCS.

5. Atmospheric Effects on Star Tracker Performance (DTO 700-3)

The purpose of this DTO is to collect data on the star trackers' ability to accurately acquire stars through the Earth's atmospheric layer. Since the atmosphere may cause diffraction of the apparent star position and changes to the apparent magnitude, the star trackers may acquire the stars with an angular error. This DTO will document the extent of the atmospheric effects and identify any potential impact to operational procedures for IMU alignments on stars acquired in the atmospheric layer.

6. EVA Operations Procedures/Training (DTO 1210)

The objectives of this DTO are to isolate and demonstrate specific differences between training facility simulations and operations in the extravehicular activity (EVA) environment and to broaden EVA procedures and training experience bases and proficiency in preparation for future EVAs such as Hubble Space Telescope (HST) and Space Station Freedom (SSF). The EVA will be performed on Flight Day 5 and is approximately 5 hours in duration.

G. ON-ORBIT DSOs

1. Bioreactor/Flow and Particle Trajectory in Microgravity (DSO 316)

The purpose of this DSO is to provide the necessary information with which to modify and improve existing Bioreactor technology. Specifically, the knowledge gained from this flight will be applied to the ASPEC experiment flying within the Spacehab payload on STS-57. Activities include activation and first test session initiation on Flight Day 2 and second test session initiation and subsequent deactivation on Flight Day 3. Each test session is 5 hours (3-hour run time followed by a 2-hour stabilization period).

2. Frequency Interference Measurement (FIM) (DSO 321)

The purpose of this DSO is to collect data on the interference in the 400 to 470 MHz frequency band and use this data to:

- (a) determine the optimum EVA and WCCS frequencies in this band.
- (b) determine whether interference mitigation circuitry must be included in the EVA and WCCS hardware.

This DSO will run during crew sleep on Flight Days 2, 4, and 5.

3. Human Lymphocyte Locomotion in Microgravity (DSO 322)

The purpose of this DSO is to provide data which illuminate microgravity effects on locomotion and migration of human lymphocytes through intercellular matrix, a function that is crucial to immunocompetence. In addition, this DSO will test the adequacy of the Rotating Wall Vessel (RWV), a laboratory-based microgravity simulation environment developed by NASA, and verify the Specimen Temperature Controller which is necessary to control the thermal environment of the living cells in flight.

4. In-Flight Aerobic Exercise (DSO 476)

Daily in-flight aerobic exercise will (a) inhibit the decrease in cardiac dimensions observed during space flight and thus improve post-flight orthostatic tolerance, and (b) minimize the loss of aerobic capacity after flight. The objectives of this DSO are to document the effects of daily aerobic exercise on (a) protection of left ventricular dimensions, (b) post-flight orthostatic function, and (c) the rate at which these factors return to their pre-flight baseline values during the postflight period. In addition, the effects of regular aerobic exercise on the maintenance of aerobic power and economy will be determined.

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

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

6. Visual Vestibular Integration as a Function of Adaption (DSO 604)

The objective of this DSO is to investigate visual vestibular and perceptual adaptive responses as a function of mission duration. The operational impact of these responses on the crewmembers ability to conduct entry, landing, and egress procedures will also be investigated. This data will be used to develop training and/or countermeasures to assure the safety and success of extended missions by promoting optimal neurosensory function needed for entry, landing, and possible emergency egress. The crew will perform investigations OI-1 and OI-3.

7. Educational Activities (DSO 802)

The objective of this DSO is to use the attraction of spaceflight to capture the interest of students and motivate them toward careers in science, engineering, and mathematics. Education activities will support NASA Administrator's educational initiatives to meet the goals of NASA's educational programs. For STS-54 the theme will be "Physics of Toys" and will include a real-time public affairs activity with four schools located in the astronauts' hometowns.

8. Documentary Television (DSO 901)

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

9. Documentary Motion Picture Photography (DSO 902)

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

10. Documentary Still Photography (DSO 903)

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

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