

FLIGHT DATA FILE

Flight Plan

STS-37

(CTL-A Trajectory)

Mission Operations Directorate
Operations Division

Final
February 22, 1991

<u>EVENT</u>				
Launch	08:20 CST	Thu	Apr	4
GRO Release	11:55 CST	Sat	Apr	6
EVA	07:50 CDT	Sun	Apr	7
EDW Landing	09:32 CDT	Tue	Apr	9



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

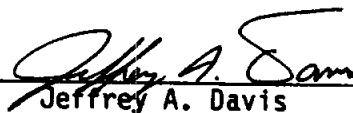


MISSION OPERATIONS DIRECTORATE

STS-37 FLIGHT PLAN

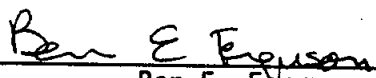
FINAL
February 22, 1991

PREPARED BY:

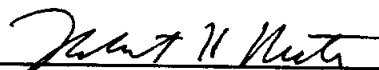


Jeffrey A. Davis
Book Manager

APPROVED BY:



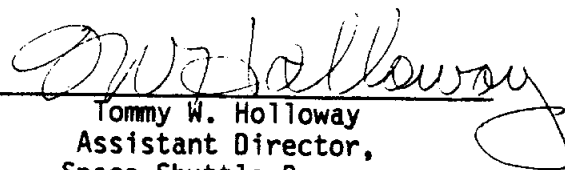
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STS-37 FLIGHT PLAN

LIST OF EFFECTIVE PAGES

FINAL 02/22/91

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v.....*	37/FIN	4-7.....	37/FIN
vi.....*	37/FIN	4-8.....	37/FIN
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3-9.....	37/FIN	7-5.....*	37/FIN
3-10.....	37/FIN	7-6.....*	37/FIN
3-11.....	37/FIN	7-7.....*	37/FIN
3-12.....	37/FIN	7-8.....*	37/FIN
3-13.....	37/FIN	7-9.....*	37/FIN
3-14.....	37/FIN	7-10.....*	37/FIN
3-15.....	37/FIN		
3-16.....	37/FIN		
3-17.....	37/FIN		
3-18.....	37/FIN		
3-19.....	37/FIN		
3-20.....	37/FIN		
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3-22.....	37/FIN		
3-23.....	37/FIN		
3-24.....	37/FIN		
3-25.....	37/FIN		
3-26.....	37/FIN		
3-27.....	37/FIN		
3-28.....	37/FIN		
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4-1.....	37/FIN		
4-2.....	37/FIN		

(*) - Omit from flight book

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STS-37 FLT PLN CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card Code</u>
DAP Book Front Cover.....	6-4	FLT PLN-1a/37/0/A
UNIV PTG (Back of DAP Book Front Cover).....	6-4	FLT PLN-1b/37/0/A
DAP A TOC.....	6-5	FLT PLN-2a/37/0/A
DAP A1.....	6-5	FLT PLN-2b/37/0/A
A1.....	6-5	FLT PLN-3a/37/0/A
DAP A2.....	6-6	FLT PLN-3b/37/0/A
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A6.....	6-8	FLT PLN-8a/37/0/A
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A7.....	6-8	FLT PLN-9a/37/0/B
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A8.....	6-9	FLT PLN-10a/37/0/A
DAP A9.....	6-9	FLT PLN-10b/37/0/A
A9.....	6-9	FLT PLN-11a/37/0/A
DAP A10.....	6-10	FLT PLN-11b/37/0/A
A10.....	6-10	FLT PLN-12a/37/0/A
(Blank).....	6-10	FLT PLN-12b/37/0/A
DAP B TOC.....	6-10	FLT PLN-13a/37/0/B
DAP B1.....	6-11	FLT PLN-13b/37/0/A
B1.....	6-11	FLT PLN-14a/37/0/A
DAP B2.....	6-11	FLT PLN-14b/37/0/A
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B8.....	6-14	FLT PLN-21a/37/0/C
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(Blank).....	6-16	FLT PLN-22a/37/0/B
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INTRODUCTION

The STS-37 Flight Plan is the flight data file article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry Checklists. The detailed deploy procedures required for the deploy timeframe are in the GRO Deploy Checklist. The detailed rendezvous procedures required for DTO 822 are in the Orbit Ops Flight Supplement. The detailed timeline and procedures for the FD 4 planned EVA are in the EVA Checklist. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-37 Flight Requirements Document. This Flight Plan, as part of the Flight Data File, meets the specifications of the STS-37 Flight Initialization Data Pack. (CTL Cycle, Release A)

The flight profile used for this Flight Plan is for a launch date of April 4, 1991, at 08:20 CST. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

JSC-22354, Crew Scheduling Constraints (Appendix K, CPMP), Basic Rev A, January 1990, has been used to build the timelines contained in this Flight Plan. Exemption 1403 #6 authorizes the FD 3 unscheduled/quick response EVA for GRO solar array deployment anomalies. Exemption 1403 #14 concerns an interrupted meal on FD 5 due to a DTO 822 rendezvous station keeping burn.

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

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STS-37 OVERVIEW

		FLIGHT STS-37		EDITION FINAL		PUB. DATE 02/22/91																						
MET :000	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
FD 1									LAUNCH	DIRMS-2	POST INSERTION	IMU	PCG II	DSO 469	MEAL	RMS C/O	BIMDA	IMU/COAS										
DAY/NIGHT																												
ORBIT										2		3		4		5		6		7		8		9		10		11
NOTES:	■ 28.45/243 X 244 △ GRO ACTIVATION												■ SAREX SETUP ■ PCG II ⊙ DTO 623 CABIN AIR MONITORING/RME ACT															
MET :000	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
FD 2																												
DAY/NIGHT																												
ORBIT	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26												
NOTES:	■ PCG II ⊙ BIMDA												■ DTO 640 HYDRAZINE MONITOR ■ PCG II △ 10.2 DEPRESS ⊙ AMOS															
MET :001	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
FD 3																												
DAY/NIGHT																												
ORBIT	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41													
NOTES:	■ RME MEMORY MODULE C/O												⊙ DTO 1204 SHARE II ○ AIRLOCK RECONFIG ■ DTO 623 CABIN AIR MONITORING															
MET :002	16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
FD 4																												
DAY/NIGHT																												
ORBIT	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57												
NOTES:	■ DTO 640 HYDRAZINE MONITOR ⊙ DTOs 639, 1202, 1203, 1205												⊙ DTO 640 HYDRAZINE MONITOR ■ RME MEMORY MODULE C/O ■ DTO 623 CABIN AIR MONITORING															

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		Δ NCI	POST SLEEP	IMU	1 R 4 P 7 R E S S	FCS C/O SHARE	HOT FILT C C C O N F	Δ N C 2	Δ N C C	Δ V B N 1	Δ N C C 3 MEAL	Δ N C 4	Δ N C 5	Δ S E P 2	PRE SLEEP	IMU	PRE SLEEP	SLEEP								
DAY/NIGHT	ORBIT	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72										
NOTES:	■ RME DEACT ⊙ SAREX STOW ▷ DTO 623 CABIN AIR MONITORING																									

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	DEORBIT PREP			D E O U R R B I T	L A E N D D I N G																
DAY/NIGHT	ORBIT	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88								
NOTES:	⊙ DSO 469 RAD DOSE STOW ⊙ DTO 623 CABIN AIR MONITORING ■ AESE HTR DEACT																								

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	
FD																										
DAY/NIGHT	ORBIT	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103									
NOTES:																										

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	
FD																										
DAY/NIGHT	ORBIT	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118										
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
094:14:20/ 095:02:20	000:00:00/ 000:12:00	094:08:20/ 094:20:20	01/ 094 CST	-14.2		APRIL 4, 1991	STS-37	FINAL	02/22/91
CST :094	FD :001	MET :000							
STS									
LAUNCH									
INSERTION									
PL									
DAY/NIGHT									
ORBIT									
CONTINGENCY GSTDN COVERAGE									
CONTINGENCY RTS COVERAGE									
TDRS E W									
ATTITUDE									
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
095:02:20/ 095:14:20	000:12:00/ 001:00:00	094:20:20/ 095:08:20	02/ 094 CST	-12.8		APRIL 4, 1991	STS-37	FINAL	02/22/91
CST :094									
FD :001	12	21	13	22	14	23	15	0	CST:095
MET :000									16
									17
									18
									19
									20
									21
									22
									23
									0
									MET:001
STS	SLEEP								
	POST SLEEP								
	GRO IN BAY C/O I								
PL	GRO IN BAY C/O II								
DAY/NIGHT									
ORBIT	9	10	11	12	13	14	15	16	
CONTINGENCY GSTDN COVERAGE	-DKR								
CONTINGENCY RTS COVERAGE	-GTS								
TDRS									
ATTITUDE	-ZLV -YVV								
NOTES:	IMU/COAS @ SETTING 3 @ FWD STATION @ DTO 640 HYDRAZINE MONITORING @ -ZLV, -YVV @ DTO 640 HYDRAZINE MONITORING								

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE		
095:14:20/ 096:02:20	001:00:00/ 001:12:00	095:08:20/ 095:20:20	02/ 095 CST	-11.1	☾	APRIL 5, 1991	STS-37	FINAL	02/22/91		
CST :095	FD :002	MET :001									
STS	AMOS HES ROLL	ZLV MNV R				HUM 10.2 S E P C W	IMU M N V R	COAS C A L C U L A T O R	ZLV M N V R	PROF M E D	SLEEP
	P/TV05 SETUP MD DK	MEAL	P/TV05 ACT MD DK			PRE SLEEP					
	EQUIP PREP	EMU C/O									
PL	C R O O I N I B A Y	SHARE II BUBBLE 1			B E I M D S A M E						
DAY/NIGHT	[Day/Night Cycle: 16D, 17N, 18D, 19N, 20D, 21N, 22D, 23N, 24D]										
ORBIT	[Orbit Numbers: 16, 17, 18, 19, 20, 21, 22, 23, 24]										
CONTINGENCY GSDN	VAN MIL BDA DKR										
COVERAGE	VAN MIL BDA										
CONTINGENCY RTS	HTS VIS CTS										
COVERAGE	HTS VIS CTS										
TDRS	[Timeline of TDRS events]										
ATTITUDE	+XSI -ZLV -YVV IMU/COAS -ZLV +YVV										
NOTES:	@ -ZLV, -YVV @ SETTING 4 @ DTO 1204 SHARE II FLIGHT DEMONSTRATION @ DTO 623 CABIN AIR MONITORING @ AFT STATION @ -ZLV, +YVV										

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
096:02:20/ 096:14:20	001:12:00/ 002:00:00	095:20:20/ 096:08:20	03/ 095 CST	-9.6		APRIL 5, 1991	STS-37	FINAL	02/22/91								
CST :095	21	22	23	15	0	CST:096	1	17	FD:03	18	19	20	21	22	23	8	MET:002
FD :002	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
MET :001																	
STS	SLEEP																
	POST SLEEP																
	P/TV02 SETUP GRO																
	P/TV02 ACT GRO																
	RMS PWRUP																
	EVA PREP																
PL	GRO PREP																
	GRO UNBERTH																
	GRO SA DFLY +Y -Y SA SA																
	GRO HGA DFLY HGA																
DAY/NIGHT																	
ORBIT	24	25	26	27	28	29	30	31									
CONTINGENCY GSIDN	-DKR																
COVERAGE	-MIL -BDA -DKR																
CONTINGENCY RTS COVERAGE	-GTS																
TDRS E W																	
ATTITUDE	-ZLV +YVV																
	IMU																
	BIASED +ESI																
	BATT CHARGE																
NOTES:	◊ RMS HTR ACT ∇ POCC COMMANDING ∇ GRO TO INTERNAL POWER ∇ PRLA REL/SURS REL																


GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
096:14:20 / 097:02:20	002:00:00 / 002:12:00	096:08:20 / 096:20:20	03 / 096 CST	-7.6		APRIL 6, 1991	STS-37	FINAL	02/22/91
CST :096	FD :003	MET :002							
STS	MEAL							SLEEP	
PL	PRERELEASE CONFIG (POCC COMMANDS)								
DAY/NIGHT									
ORBIT									
CONTINGENCY									
GSTDN									
COVERAGE									
CONTINGENCY									
RTS									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p>① DTO 1204 SHARE II FLIGHT DEMONSTRATION</p> <p>② CONFIG KU FOR COMM</p> <p>③ CABIN TEMP UNTIL RECONFIG</p> <p>④ DTO 623 CABIN AIR MONITORING</p> <p>⑤ BIASED -ZLV, -YVV</p>								

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/DOY	BETA	MOON 	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
097:14:20 / 098:02:20		003:00:00 / 003:12:00		097:09:20 / 097:21:20		04 / 097 CDT	-3.9		APRIL 7, 1991	STS-37	FINAL	02/22/91	
CDT	:097												
FD	:004												
MET	:003												
STS		P/TV03 ACT EVA		RELEASE OPS		ZVV MNVV		PC IN F		10-2 M A I N T		SLEEP (7.0)	
		EVA (EDFE)		TGT DPLY V		A R E L P R E S S		P O S T E V A		P R E S L E E P			
		EVA SUPPORT											
PL													
DAY/NIGHT													
ORBIT		47	48	49	50	51	52	53	54				
CONTINGENCY GSTDN COVERAGE		VAN MIL BDA		VAN MIL		VAN						DKR	
CONTINGENCY RTS COVERAGE		GTS HTS VTS CTS		GTS HTS VTS CTS		GTS HTS VTS CTS		GTS HTS VTS CTS		GTS HTS VTS CTS		GTS	
IDRS E W													
ATTITUDE		-ZLV -YVV		-XLV +ZVV		SEP		TGT TRK		+YLV -ZVV		-ZLV -YVV	
NOTES:		<p>⊙ +YLV -ZVV ⊙ -ZLV, -YVV</p> <p>⊙ DTO 640 HYDRAZINE MONITORING ⊙ RAD OUT NORM</p> <p>⊙ DTO 0623 CABIN AIR MONITORING</p>											

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE									
098:02:20/ 098:14:20	003:12:00/ 004:00:00	097:21:20/ 098:09:20	05/097 CDT	-2.0		APRIL 7, 1991	STS-37	FINAL	02/22/91									
CDT :097																		
FD :004																		
MET :003	12	22	13	23	14	0	CDT:098	1	2	3	4	5	6	7	8	9	0	MET:004
STS	SLEEP (7.0)																	
PL																		
DAY/NIGHT																		
ORBIT	55	56	57	58	59	60	61	62										
CONTINGENCY GSIDN		-DKR																
COVERAGE																		
CONTINGENCY RTS																		
COVERAGE																		
TDRS																		
ATTITUDE																		
NOTES:																		

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
098:14:20/ 099:02:20	004:00:00/ 004:12:00	098:09:20/ 098:21:20	05/ 098 CDT	-0.1		APRIL 8, 1991	STS-37	FINAL	02/22/91			
CDT :098												
FD :005												
MET :004												
STS	A R N C S B U R N		S T R K N A V	A R N C S B U R N	S T R K N A V	S T R K N A V	A S E P R C S B U R N	P R O I V M E D	I M U M N V R	Z L V M N V R	K U - B D S T O W	S L E E P
MEAL			C A B I N S T O W				P R E S L E E P					
					S A R E X S T O W							
PL	B B I M D S A M P D A		B D I M D S A M P D A	B I M D S A M P D A	R M D S A M P D A							
DAY/NIGHT	[Shaded]		[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]
ORBIT	63		64	65	66	67	68	69	70			
CONTINGENCY GSDN	- VAN - MIL - BDA		- VAN - MIL		- VAN				- DKR			
CONTINGENCY RTS	- GTS - HTS - VTS - CTS		- HTS - VTS - CTS		- HTS - VTS		- IOS - GTS - HTS		- HTS		- GTS	
CONTINGENCY COVERAGE			- GTS		- IOS		- GTS		- IOS		- GTS	
TDRS	E W		E W		E W		E W		E W		E W	
ATTITUDE			- YLV - ZVV				- ZLV - YVV					
NOTES:	@IMU @ZLV, -YVV @DTO 623 CABIN AIR MONITORING											

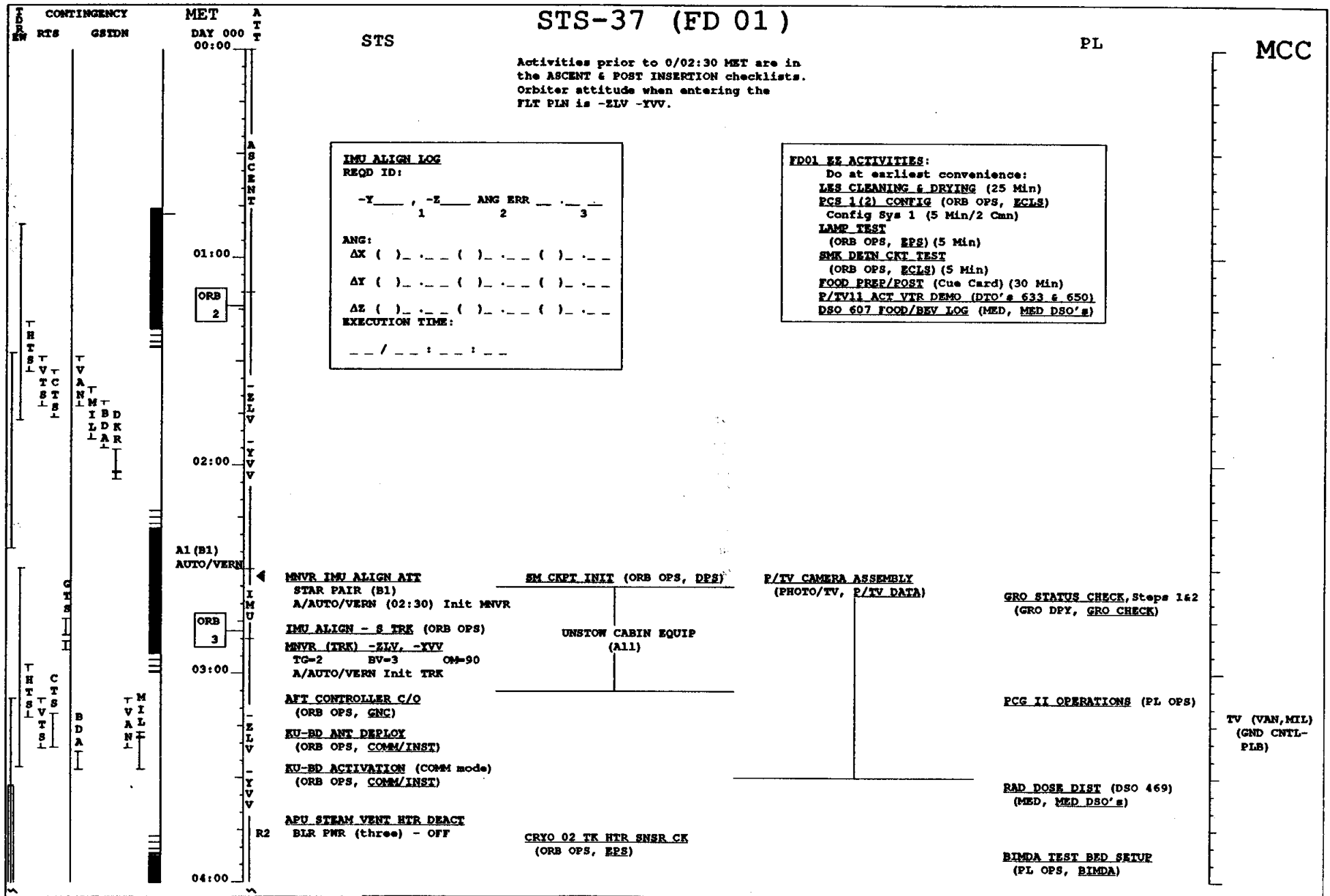
GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
099:02:20/ 099:14:20	004:12:00/ 005:00:00	098:21:20/ 099:09:20	06/098 CDT	1.9		APRIL 8, 1991	STS-37	FINAL	02/22/91	
CDT :098										
FD :005										
MET :004	12 22 13 23 14	0 CDT:099 1 15 16 17 18	2 3	4 5	6 7	8 9	0		MET:005	
STS	SLEEP		IMU MNV R PC RO IN VF XSI MNV R D			IMU MNV R IP ML UB A LO PS		IMU MNV R D E O R B I T B U R N *		
		POST SLEEP						DEORBIT PREP		
					DSO 603					
PL					DSO 603 DSO 469 P W R C A B L E S T O M A C H S C A B L E S C A B L E					
DAY/NIGHT										
ORBIT	70	71	72	73	74	75	76	77	78	
CONTINGENCY GSTDN COVERAGE	--DKR		--DKR		--BDA --DKR		--MIL --BDA --DKR		--VAN --MIL --BDA --DKR	
CONTINGENCY RTS COVERAGE	--GTS		--IOS		--IOS		--IOS --VTS --CTS		--IOS --VTS --CTS	
TDRS										
ATTITUDE	--ELV -YVV IMU BIASED -XSI IMU/VERIF D/O ENTRY									
NOTES:	@DSO 603 ORTHOSTATIC FUNCTION DURING ENTRY @DSO 469 RADIATION DOSE DISTRIBUTION @DTO 623 CABIN AIR MONITORING ▶ ASESE HTR DEACT * DEORBIT BURN 4/23:04									

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON 	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
099:14:20/ 100:02:20	005:00:00/ 005:12:00	099:09:20/ 099:21:20	06/099 CDT	3.7		APRIL 9, 1991	STS-37	FINAL	02/22/91
CDT :099									
FD :006									
MET :005									
STS									
PL									
DAY/NIGHT									
ORBIT	78	79	80	81	82	83	84	85	
GSTDN COVERAGE	MIL BDA	VAN MIL	VAN					DKR	
RTS COVERAGE	GTS HTS VTS CTS	GTS HTS VTS	HTS	IOS	GTS HTS	GTS HTS	GTS	GTS	
TDRS	E W								
ATTITUDE									
NOTES:	<p>* EDW LANDING 5/00:12</p>								

DETAILED TIMELINE

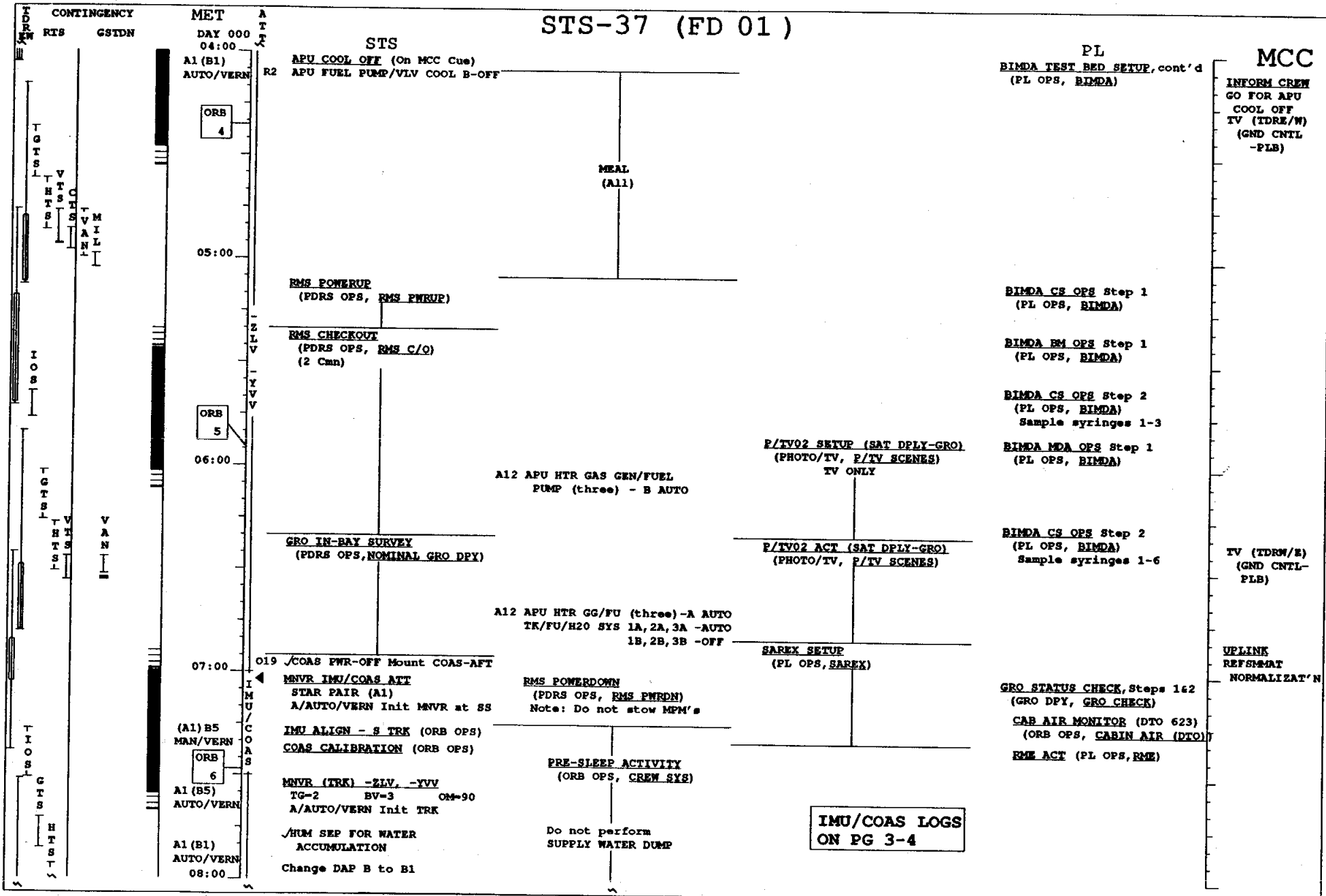
**DETAILED
TIMELINE**

DETAILED TIMELINE



3-2

FLT PLN/37/FIN
02/22/91



STS-37 (FD 01)

PL

MCC

CONTINGENCY	MET	A
RTS	DAY 000	T
GSTDN	08:00	T
	AI (B1)	T
	AUTO/VERN	T
	09:00	T
	ORB 7	T
	10:00	T
	ORB 8	T
	11:00	T
	12:00	T

STS
019 /COAS FWR - OFF Stow COAS

PRIVATE MEDICAL CONFERENCE

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

PCG II OPERATIONS (PL OPS)

SLEEP

IMU ALIGN LOG

REQD ID:

-Y ___ , -Z ___ ANG ERR ___
1 2 3

ANG:

ΔX () () ()

ΔY () () ()

ΔZ () () ()

EXECUTION TIME:

__ / __ : __ : __

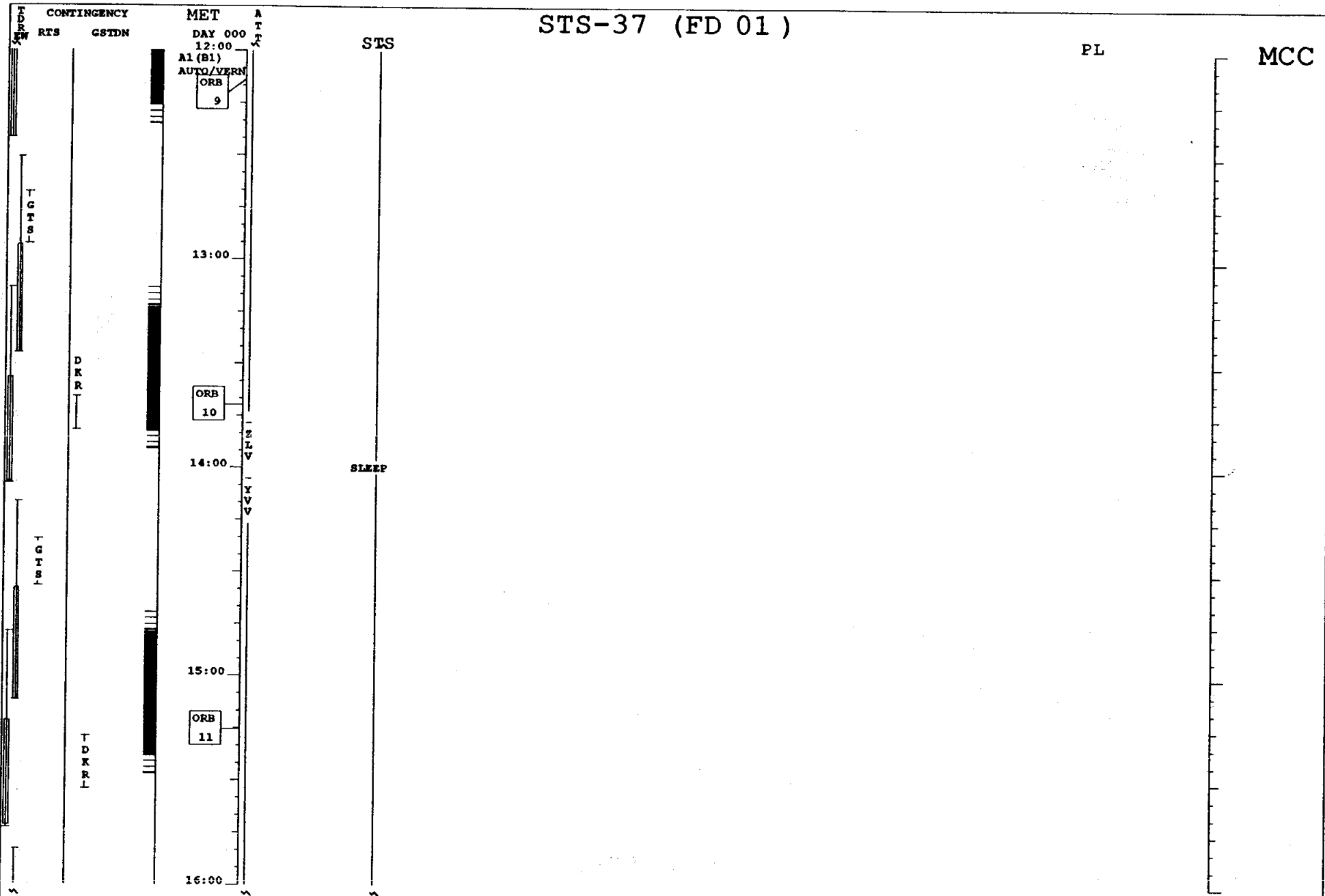
COAS CALIBRATION LOG

STAR ID: -E 15. HADAE
STAR AVAIL: 06:51 TO 07:37

-E Δ BIAS ___ , ___

UPDATE TIME: __ / __ : __ : __

STS-37 (FD 01)



STS-37 (FD 02)

PL

MCC

CONTINGENCY
RTS CSTDN

MET
DAY 000
16:00
A1 (B1)
AUTO/VERN

ATT
ZLV
YVV

ORB 12
17:00

ORB 13
18:00

ORB 14
19:00

20:00

TDRR
MILADRR
IOS

STS

SLEEP

IMU ALIGN LOG
REQD ID:

-Y _____ , -E _____ ANG ERR _____
1 2 3

ANG:
ΔX () _ _ _ () _ _ _ () _ _ _
ΔY () _ _ _ () _ _ _ () _ _ _
ΔZ () _ _ _ () _ _ _ () _ _ _

EXECUTION TIME:
_ / _ : _ : _

FD02 EE ACTIVITIES:
EXERCISE (1 Hr/All)
FOOD PREP/POST (Cue Card) (30 Min)
PCG FAN INLET CLEANING & TEMP CK
BIMDA FAN INLET CLEANING
SAREX OPERATIONS
(PL OPS, SAREX)
P/TVII ACT VTR DEMO (DTO's 633 & 650)
DSO 607 FOOD/BEV LOG (MED, MED DSO's)

COAS CALIBRATION LOG

STAR ID: +X 20 , ARCTURUS
STAR AVAIL: 19:28 TO 20:17

+X Δ BIAS _____ , _____

UPDATE TIME: _ / _ : _ : _

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
Supply Water Dump

HYDRAZINE MONITOR, Step 1
(ORB OPS, HYD MON (DTO))

PCG II OPERATIONS (PL OPS)

BIMDA CS OPS Step 2
(PL OPS, BIMDA)
Sample syringes 4-6

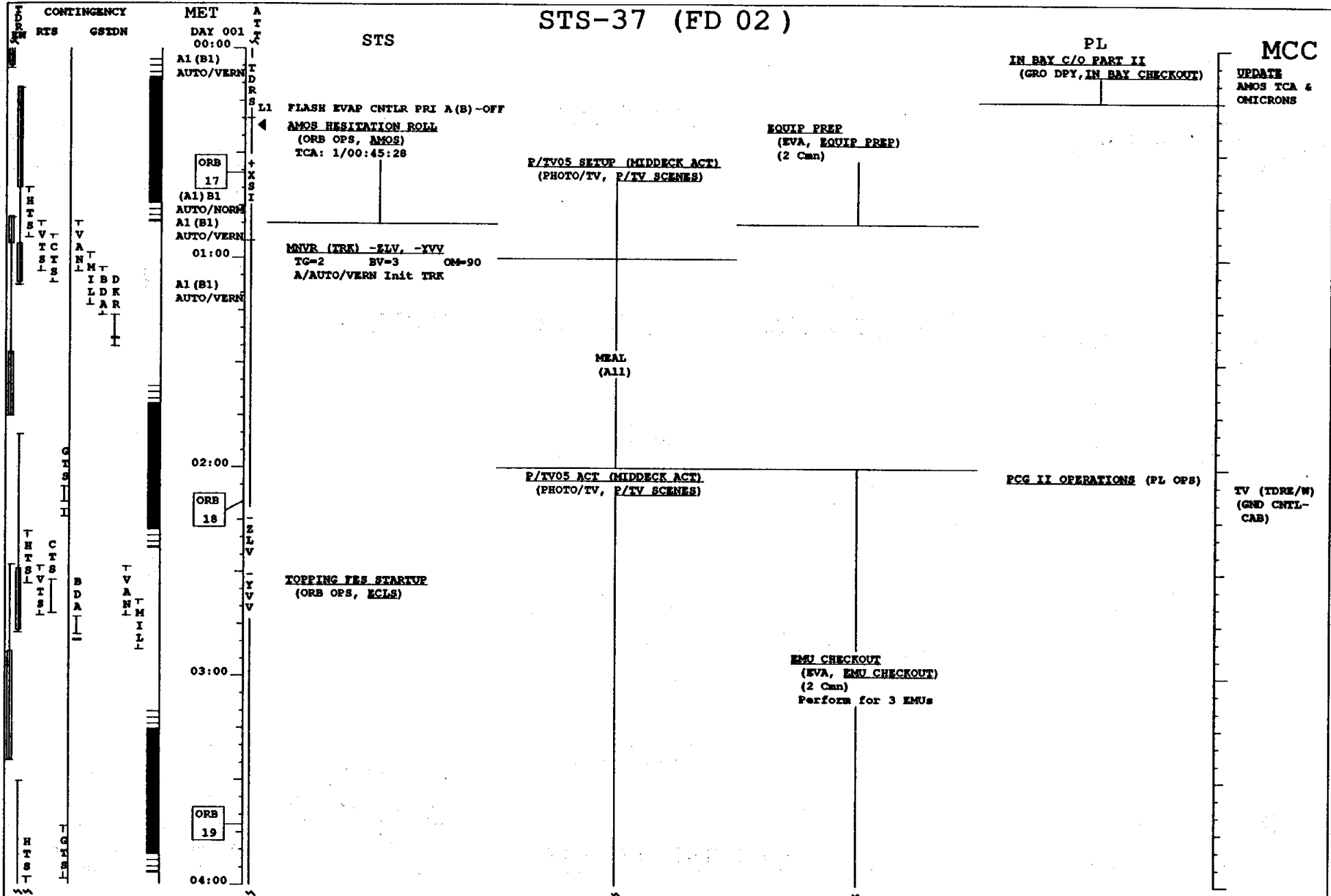
BIMDA EM OPS Step 2
(PL OPS, BIMDA)
Sample modules 3&4

EVA ASPIRIN PROTOCOL
(EVA, NOMINAL PROCS)

01 ✓COAS - OFF Mount COAS - FWD
◀ **MNVR IMU ALIGN ATT**
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS

IMU ALIGN - S TRK (ORB OPS)
◀ **MNVR COAS CAL ATT**
R=192 P=203 Y=329
A/AUTO/VERN (19:46) Init MNVR
COAS CALIBRATION (ORB OPS)

STS-37 (FD 02)



CONTINGENCY

MET

STS

PL
IN BAY C/O PART II
(GRO DPY, IN BAY CHECKOUT)

MCC

DAY 001
00:00

A1 (B1)
AUTO/VERN

FLASH EVAP CNTRL PRI A(B)-OFF
AMOE HESITATION ROLL
(ORB OPS, AMOS)
TCA: 1/00:45:28

P/TVO5 SETUP (MIDDECK ACT)
(PHOTO/TV, P/TV SCENES)

EQUIP PREP
(EVA, EQUIP PREP)
(2 Cmn)

UPDATE
AMOS TCA &
OMICRONS

ORB 17

(A1) B1
AUTO/NORM

A1 (B1)

AUTO/VERN

MNVR (TRK) -ELV, -YVV
TC-2 BV-3 OR-90
A/AUTO/VERN Init TRK

MEAL
(ALL)

02:00

ORB 18

P/TVO5 ACT (MIDDECK ACT)
(PHOTO/TV, P/TV SCENES)

PCG II OPERATIONS (PL OPS)

TV (TDRE/W)
(GND CNTRL-
CAB)

TOPPING FES STARTUP
(ORB OPS, ECLS)

03:00

EMU CHECKOUT
(EVA, EMU CHECKOUT)
(2 Cmn)
Perform for 3 EMUs

ORB 19

04:00

STS-37 (FD 02)

CONTINGENCY
RTS GSTDN

MET
DAY 001
04:00

STS

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

PL

MCC
TV (IDRE/W)
(GND CNTL-
CAB)

IMU ALIGN LOG
REQD ID:

-Y ____ , -Z ____ ANG ERR ____
 1 2 3

ANG:
ΔX () _ _ _ () _ _ _ () _ _ _
ΔY () _ _ _ () _ _ _ () _ _ _
ΔZ () _ _ _ () _ _ _ () _ _ _

EXECUTION TIME:
_ _ / _ _ : _ _ : _ _

EMU CHECKOUT
(EVA, EMU CHECKOUT)
(2 Cmn)
Perform for 3 EMUs

SHARE II BUBBLE MANAGEMENT
(PL OPS, SHARE II)

GRO STATUS CHECK, Steps 1&2
(GRO DPY, GRO CHECK)

BIMDA EM OPS Step 2
(PL OPS, BIMDA)
Sample modules 5&6

CAB AIR MONITOR (DTO 623)
(ORB OPS, CABIN AIR (DTO))

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

COAS CALIBRATION LOG

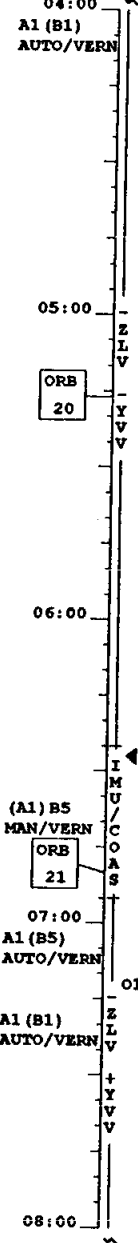
STAR ID: -Z 15, HADAR
STAR AVAIL: 06:13 TO 07:00

-Z Δ BIAS ____ , ____

UPDATE TIME: _ _ / _ _ : _ _ : _ _

Do not perform
Supply Water Dump

PRIVATE MEDICAL CONFERENCE



STS-37 (FD 02)

PL

MCC

CONTINGENCY
RTS GSTDN

MET
DAY 001
08:00
A1 (B1)
AUTO/VERN

ATTN

08:00

09:00

10:00

11:00

12:00

ORB 22

ORB 23

ORB 24

STS + MDA

THISS

STG

HTS

HROM

HTS

STS
PRIVATE MEDICAL CONFERENCE

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
Supply Water Dump

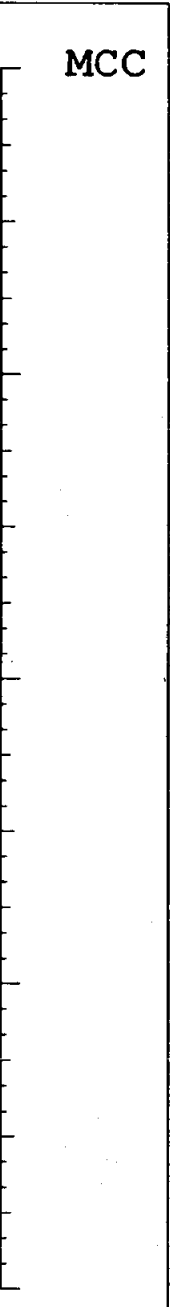
09:00

10:00

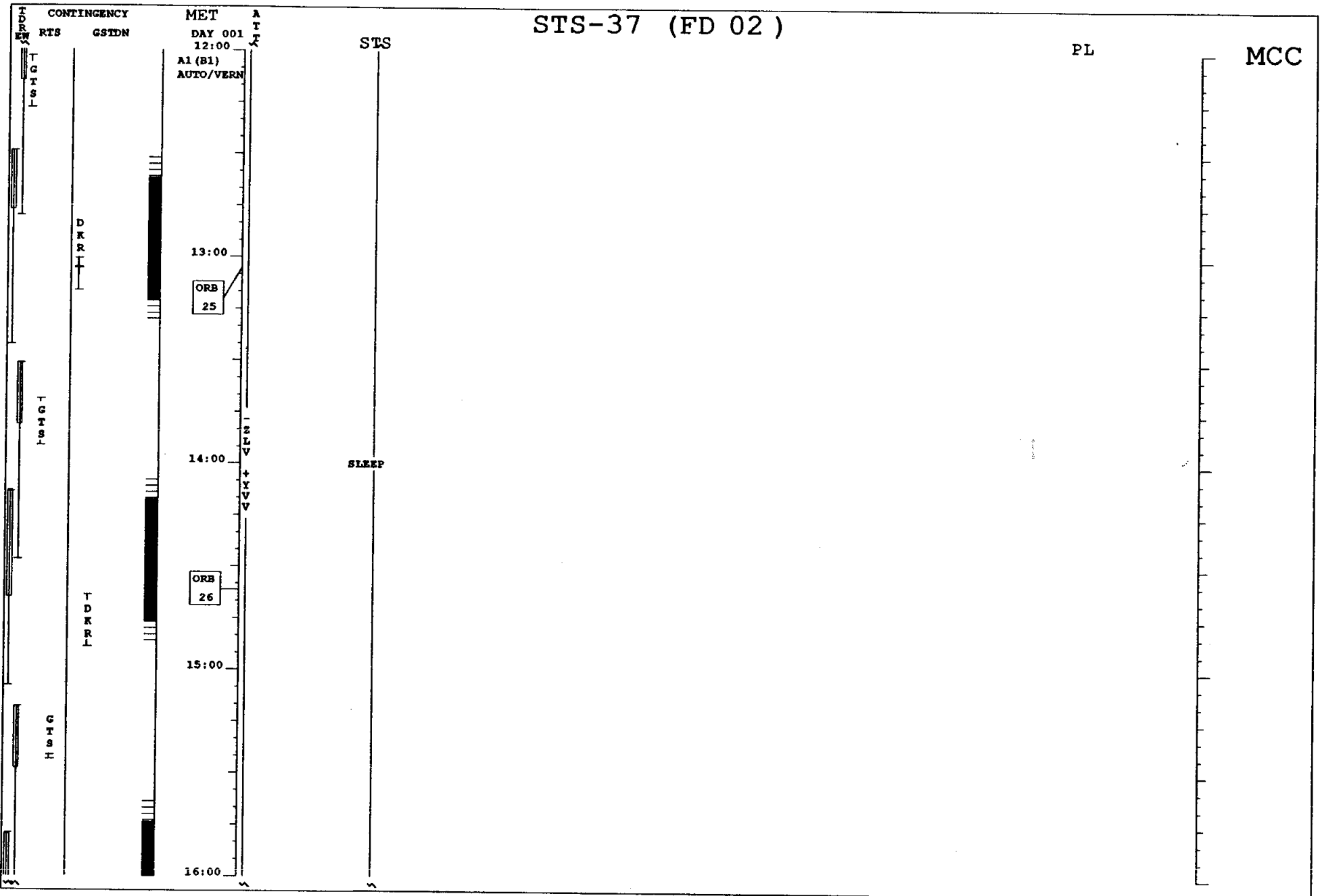
11:00

12:00

SLEEP



STS-37 (FD 02)



STS-37 (FD 03)

PL

MCC

CONTINGENCY
RTS GSTDN

MET
DAY 001
16:00
A1 (B1)
AUTO/VERN
ORB 27

STS
SLEEP

ORB 28

ORB 29

17:00
18:00
19:00
20:00

TDRRL
MIDLADKRI
IOS
DKRI
MTIBLDAI

16:00
17:00
18:00
19:00
20:00

ZLV
+YVV
IMU
BIASED
+ZSBI

16:00
17:00
18:00
19:00
20:00

16:00
17:00
18:00
19:00
20:00

FD03 EZ ACTIVITIES:
EXERCISE (1 Hr/All)
FOOD PREP/POST (Cue Card) (30 Min)
FCG FAN INLET CLEANING & TEMP CK
BIMDA FAN INLET CLEANING
DSO 469 AIR VENT CLEANING
DSO 607 FOOD/BEV LOG (MED, MED DSO's)
SAREX OPERATIONS
 (PL OPS, SAREX)
E/TV11 ACT VTR DEMO (DTO's 633 & 650)

IMU ALIGN LOG
 REQD ID: _____
 -Y____, -Z____ ANG ERR ____
 1 2 3
 ANG:
 ΔX () _ _ _ () _ _ _ () _ _ _
 ΔY () _ _ _ () _ _ _ () _ _ _
 ΔZ () _ _ _ () _ _ _ () _ _ _
 EXECUTION TIME:
 _ _ / _ _ : _ _ : _ _

SUPPLY WATER DUMP, steps 1&2
 (ORB OPS, ECLS)

ASL PORT RMS HTR (two)-AUTO

SUPPLY WATER DUMP, steps 3&4
 (ORB OPS, ECLS)

POST-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

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

IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) BIASED +ZSI
 TG-4 BV-5
 P-250 Y=0 CM-35
 A/AUTO/VERN (19:10) Init TRK

10.2 PSI MAINTENANCE
 (EVA, 10.2 PSI CABIN)

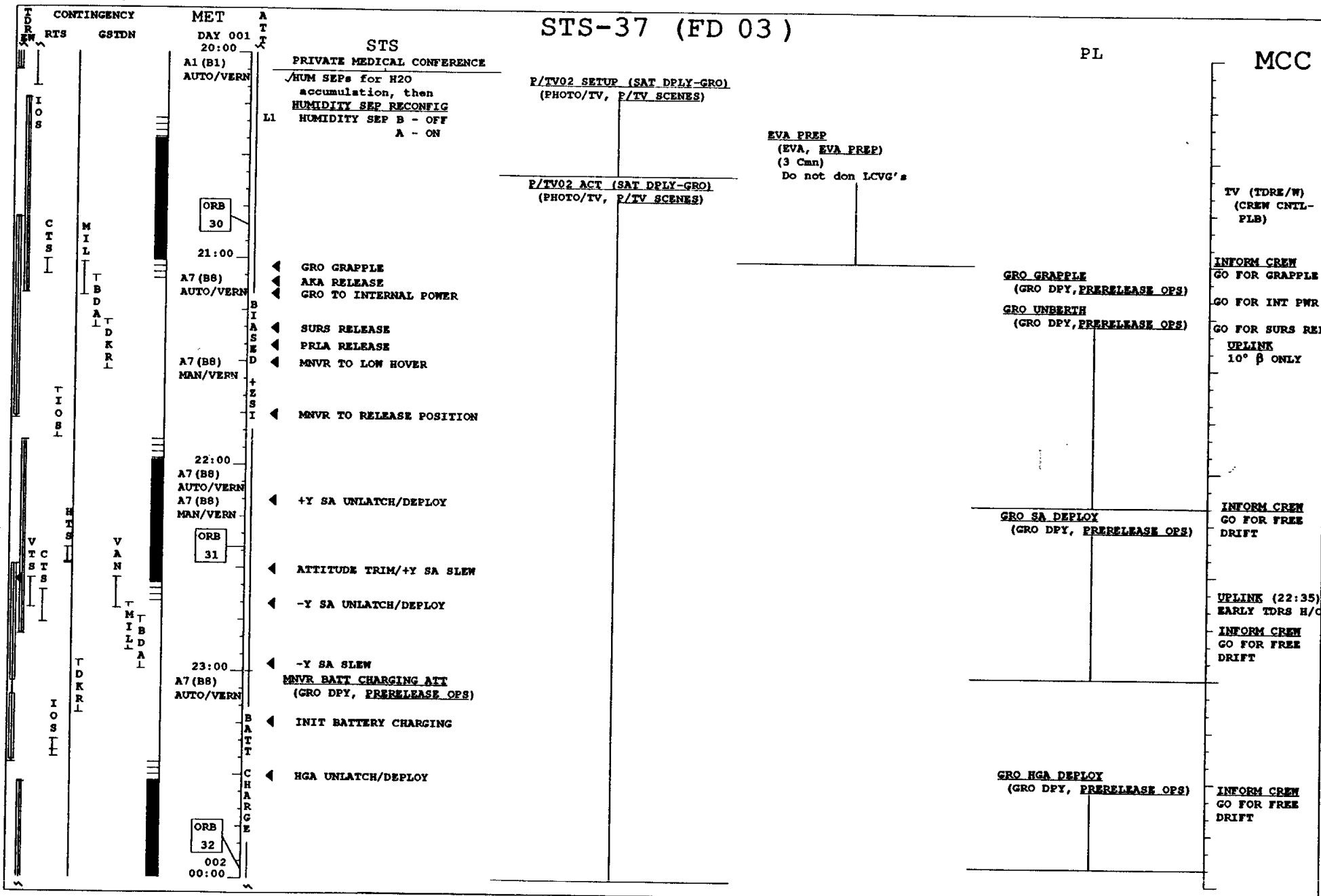
PRIVATE MEDICAL CONFERENCE

RMS POWERUP
 (PDRS OPS, RMS PWRUP)

RME MEM MODULE (PL OPS, RME)

GRO PREP
 (GRO DPY, PRRERELEASE OPS)

UPDATE
 H2O SPLY DUMP
 QTY TRK A & B



STS-37 (FD 03)

PL

MCC

CONTINGENCY
RTS GSTDN

MET
DAY 001
20:00

A
T
T

STS

PRIVATE MEDICAL CONFERENCE

▲ /HUM SEPs for H2O accumulation, then
HUMIDITY SEP RECONFIG
L1 HUMIDITY SEP B - OFF
A - ON

P/TV02 SETUP (SAT DPLY-GRO)
(PHOTO/TV, P/TV SCENES)

EVA PREP
(EVA, EVA PREP)
(3 Cmn)
Do not don LCVG's

P/TV02 ACT (SAT DPLY-GRO)
(PHOTO/TV, P/TV SCENES)

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

INFORM CREW
GO FOR GRAPPLE

GRO GRAPPLE
(GRO DPLY, PRERELEASE OPS)

GO FOR INT PWR

GRO UNBERTH
(GRO DPLY, PRERELEASE OPS)

GO FOR SURS REI

UPLINK
10° β ONLY

ORB
30

21:00

▲ A7 (B8)
AUTO/VERN
▲ GRO GRAPPLE
▲ AKA RELEASE
▲ GRO TO INTERNAL POWER

▲ A7 (B8)
MAN/VERN
▲ SURS RELEASE
▲ PRLA RELEASE
▲ MNVR TO LOW HOVER

▲ MNVR TO RELEASE POSITION

22:00

▲ A7 (B8)
AUTO/VERN
▲ +Y SA UNLATCH/DEPLOY
A7 (B8)
MAN/VERN

ORB
31

▲ ATTITUDE TRIM/+Y SA SLEW

▲ -Y SA UNLATCH/DEPLOY

23:00

▲ A7 (B8)
AUTO/VERN
▲ -Y SA SLEW
▲ MNVR BATT CHARGING ATT
(GRO DPLY, PRERELEASE OPS)

▲ INIT BATTERY CHARGING

▲ HGA UNLATCH/DEPLOY

ORB
32

002
00:00

INFORM CREW
GO FOR FREE
DRIFT

GRO SA DEPLOY
(GRO DPLY, PRERELEASE OPS)

UPLINK (22:35)
EARLY TDRS H/C

INFORM CREW
GO FOR FREE
DRIFT

GRO HGA DEPLOY
(GRO DPLY, PRERELEASE OPS)

INFORM CREW
GO FOR FREE
DRIFT

STS-37 (FD 03)

PL

MCC

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

P/TV02 ACT (SAT DPLY-GRO)
(PHOTO/TV, P/TV SCENES)

STS

MET DAY 002
00:00
A7 (B8)
AUTO/VERN
01:00
ORB 33
02:00
ORB 34
03:00
04:00

ATT
BATT
CHARGE
RELEASE
SEP

ATTITUDE TRIM
HGA GIMBAL TEST

MEAL
(ALL)

MNVR TO DIRECT CK ATT
TG-4 BV-5
P=20 Y=0 OM=195
A/AUTO/VERN(01:30) Init MNVR

TDRS DIRECT C/O
(GRO DPLY, PRERELEASE OPS)

+Y SA INDEXING
-Y SA INDEXING

L1 FLASH EVAP CNTLR PRI A(B)-OFF
MNVR TO RELEASE ATT
(GRO DPLY, RELEASE OPS)

GRO RELEASE
(GRO DPLY, GRO RELEASE OPS)

GRO RELEASE/SEP 1 (2/03:35)

SEP 2 TIG (2/03:57)

UPLINK
ORB/TGT SV

UPLINK
EARLY TDRS H/O

INFORM CREW
GO FOR PI
DEACT

INFORM CREW
GO FOR PI ACT

UPDATE
DEPLOY/SEP PAD

INFORM CREW
GO FOR RELEASE
UPLINK
EARLY TDRS H/O

STS-37 (FD 03)

STS

PL

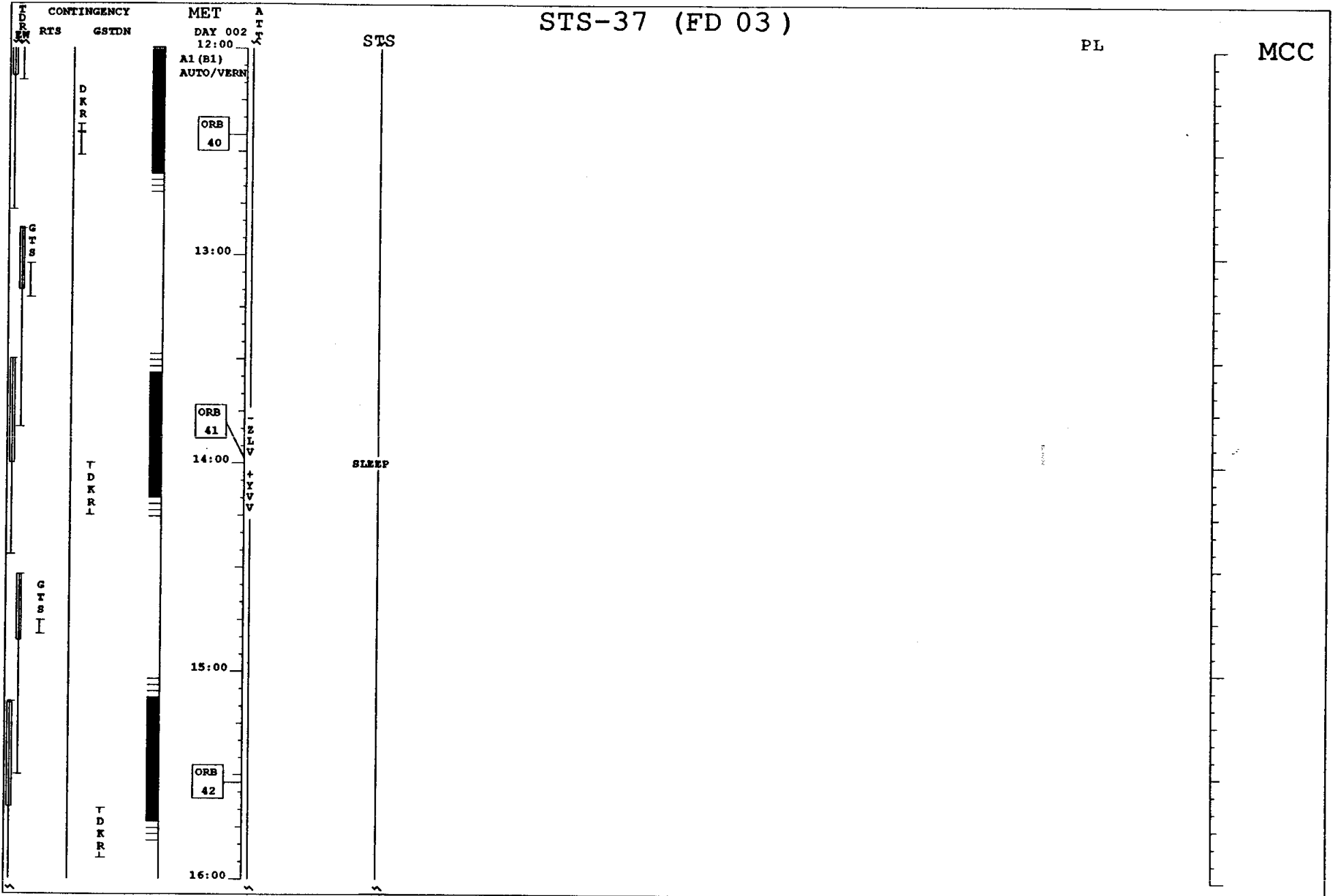
MCC

CONTINGENCY	MET	ACTV
RTS	DAY 002	
GSDN	08:00	
	A1 (B1)	
	AUTO/VERN	
	09:00	
	ORB 38	
	10:00	
	ORB 39	
	11:00	
	12:00	

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

SLEEP

STS-37 (FD 03)



STS-37 (FD 04)

PL

MCC

FD04 EZ ACTIVITIES:
 EXERCISE (1 Hr/All)
 FOOD PREP/POST (Cue Card) (30 Min)
 PCG FAN INLET CLEANING & TEMP CK
 BMDA FAN INLET CLEANING
 SAREX OPERATIONS
 (PL OPS, SAREX)
 P/TV11 ACT VTR DEMO (DTS's 633 & 650)
 DSO 607 FOOD/BEV LOG (MED, MED DSO's)

IMU ALIGN LOG
 REQD ID:
 -Y____, -E____ ANG ERR ____
 1 2 3
 ANG:
 ΔX ()_ . . . ()_ . . . ()_ . . .
 ΔY ()_ . . . ()_ . . . ()_ . . .
 ΔZ ()_ . . . ()_ . . . ()_ . . .
 EXECUTION TIME:
 _ _ / _ _ : _ _ : _ _

CONTINGENCY
 RTS GSTDN
 MET
 DAY 002
 16:00
 A1 (B1)
 AUTO/VERN
 A T T X
 Z L V
 Y V V V
 17:00
 ORB 43
 I M U
 18:00
 ORB 44
 E L V
 Y V V V
 19:00
 E L V
 Y V V V
 20:00

B D A K R
 I O S
 M I L
 B D A K R
 I O S

STS
 SLEEP
 WASTE WATER DUMP, steps 1&2
 (ORB OPS, ECLS)

POST-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

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

Do not perform
 Supply Water Dump

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

IMU ALIGN - 8 TRK (ORB OPS)

MNVR (TRK) -ZLV, -YVV
 TG-2 BV=3 OM-90
 A/AUTO/VERN Init TRK

10.2 PSI MAINTENANCE
 (EVA, 10.2 PSI CABIN)

PRIVATE MEDICAL CONFERENCE

UPDATE
 H2O WASTE
 DUMP QTY

STS-37 (FD 04)

STS

PL

MCC

CONTINGENCY
RTS GSTDN

MET
DAY 002
20:00
A1 (B1)
AUTO/VERM
ORB 45

AT
ZLV
YVV

21:00

ORB 46

22:00

23:00

ORB 47

003
00:00

CONTINGENCY
RTS GSTDN
M I L
T B D A L
T D K R R L
T I O S I
H T S
V A N M I L
T B D A L
T D K R R L
I O S I
T H T S
T V A N M I L
M T
I B D
L D K R R L
A R L T

ASL PORT RMS HTR (two)-AUTO

RMS POWERUP
(PDRS OPS, RMS PWUP)

P/TV03 ACT (EVA)
(PHOTO/TV, P/TV SCENES)

MAN CART EVAL

EVA PREP
(EVA, EVA PREP)
(3 Cmn)

EDFE PROCEDURES (EVA)
AIRLOCK DEPRESS/EGRESS

P/TV09 SETUP (EVA PREP)
(PHOTO/TV, P/TV SCENES)

P/TV09 ACT (EVA PREP)
(PHOTO/TV, P/TV SCENES)

P/TV03 SETUP (EVA)
(PHOTO/TV, P/TV SCENES)

EVA SUPPORT
(EVA, EDFE PROCEDURES)

HYDRAZINE MONITOR, Step 1
(ORB OPS, HYD MON (DTO))

00:00 PET = 22:15 MET
(EVA OPS)

TV (TDRE)
(GND CNTRL-
CAB)

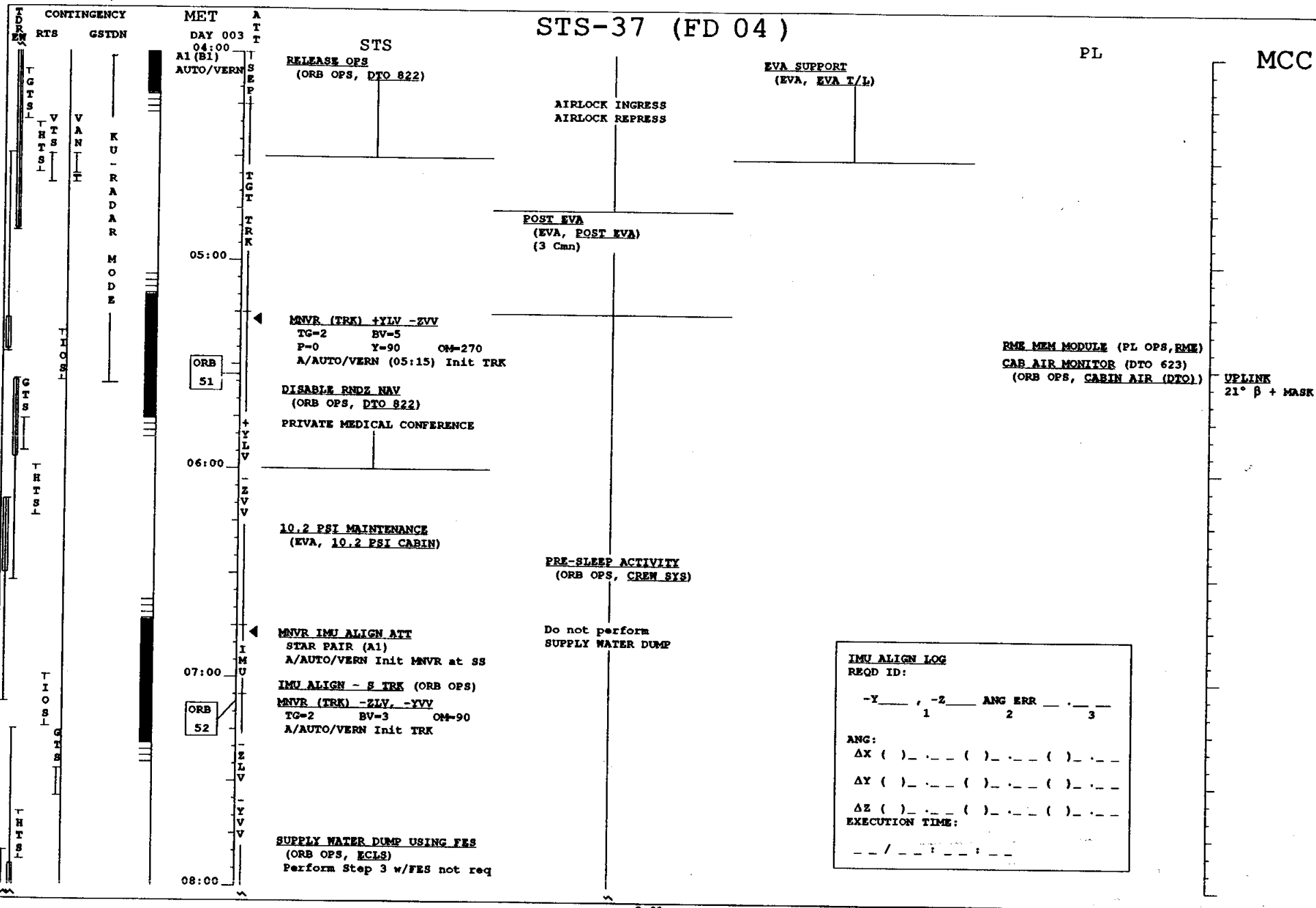
UPLINK
10° β ONLY

TV (TDRE/W)
(CREW CNTRL-
PLB)

STS-37 (FD 04)

PL

MCC



STS-37 (FD 04)

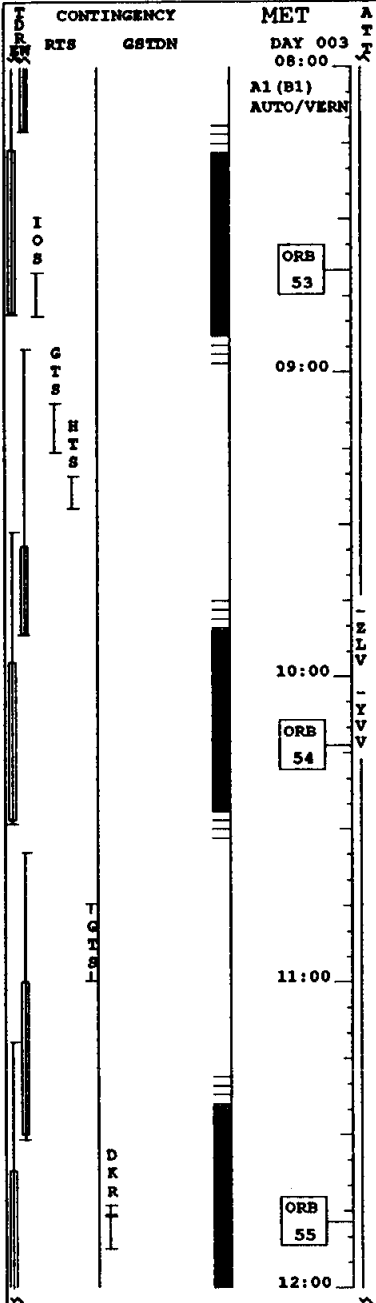
PL

MCC

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)
Do not perform
SUPPLY WATER DUMP

STS

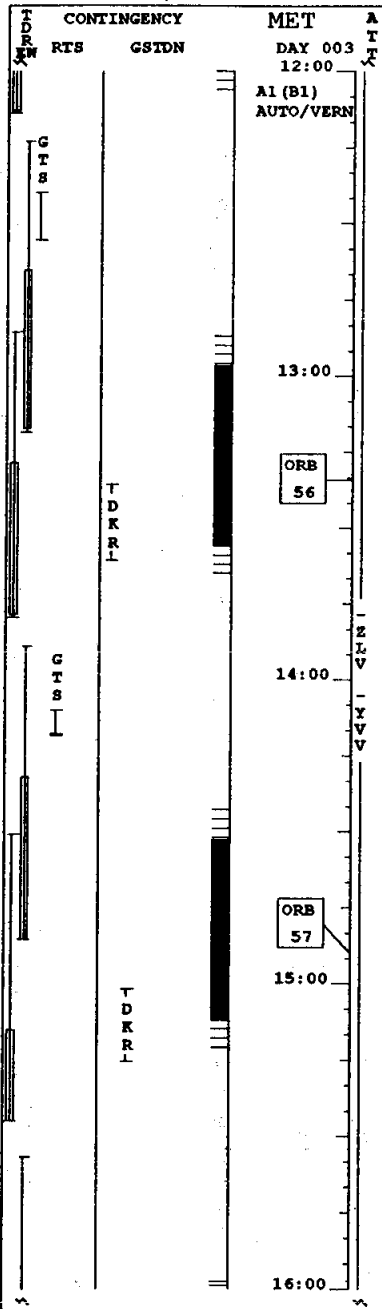
SLEEP



STS-37 (FD 05)

PL

MCC



STS

SLEEP

FD05_EZ ACTIVITIES:
EXERCISE (1 Hr/All)
FOOD PREP/POST (Cue Card) (30 Min)
PCG FAN INLET CLEANING & TEMP CK
BIMDA FAN INLET CLEANING
SAREX OPERATIONS
 (PL OPS, SAREX)
DSO 607 FOOD/BEV LOG (MED, MED DSO's)
P/TV11 ACT VTR DEMO (DTO's 633 & 650)

POST-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

NOTE: Consume one extra
 container of fluid at meal
 (DSO 479)

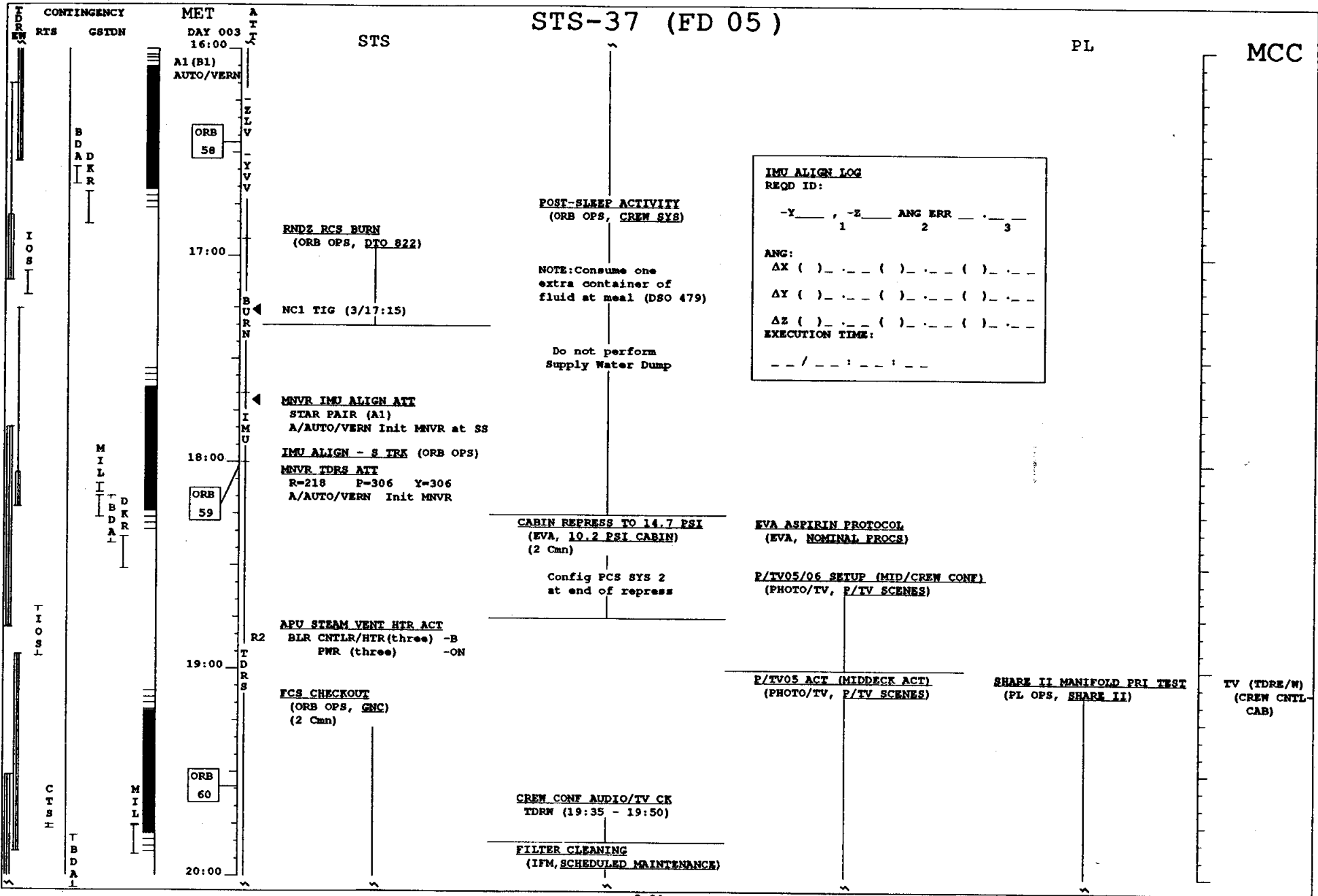
SUPPLY WATER DUMP USING FES
 (ORB OPS, ECLS) Steps 1&2

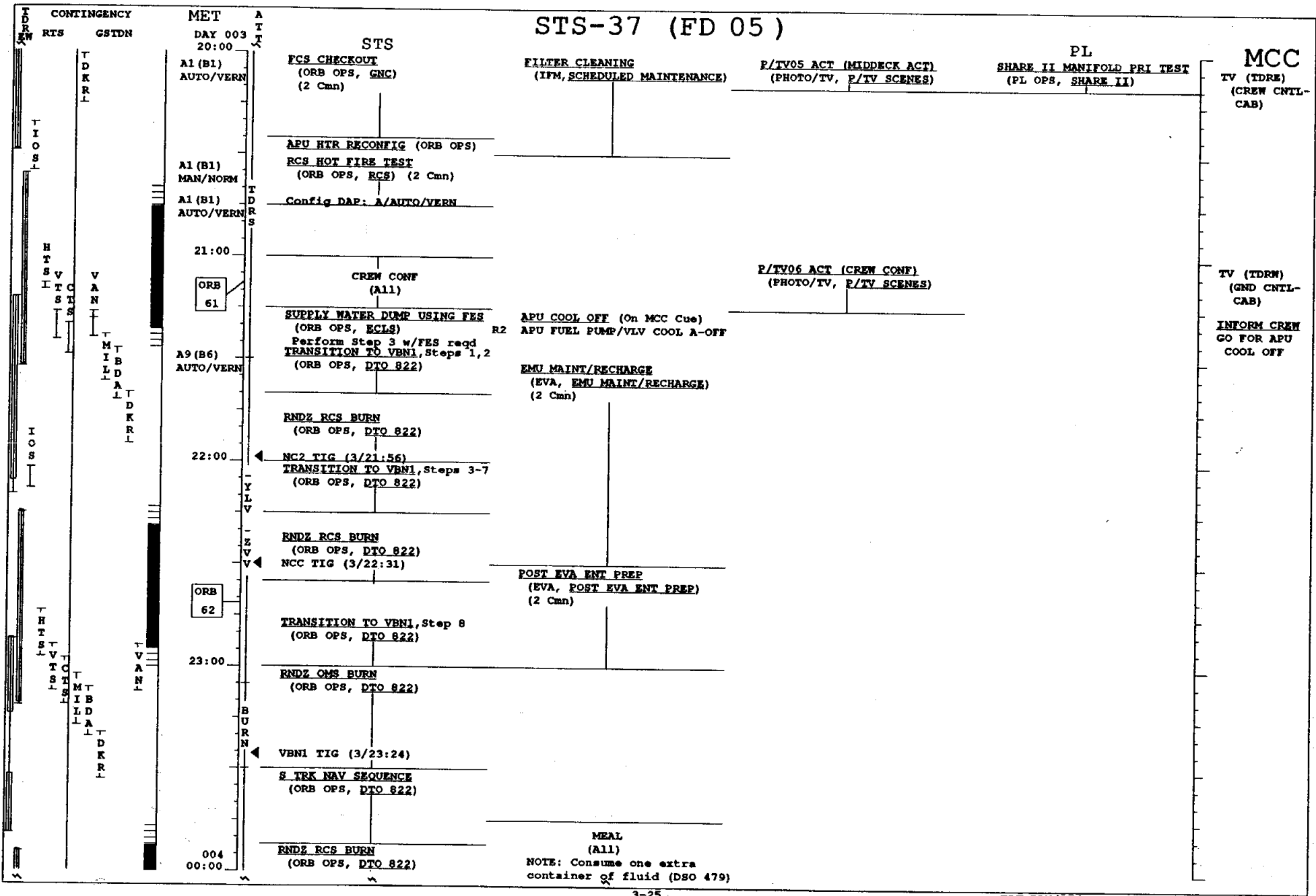
Do not perform
 Supply Water Dump

STS-37 (FD 05)

PL

MCC

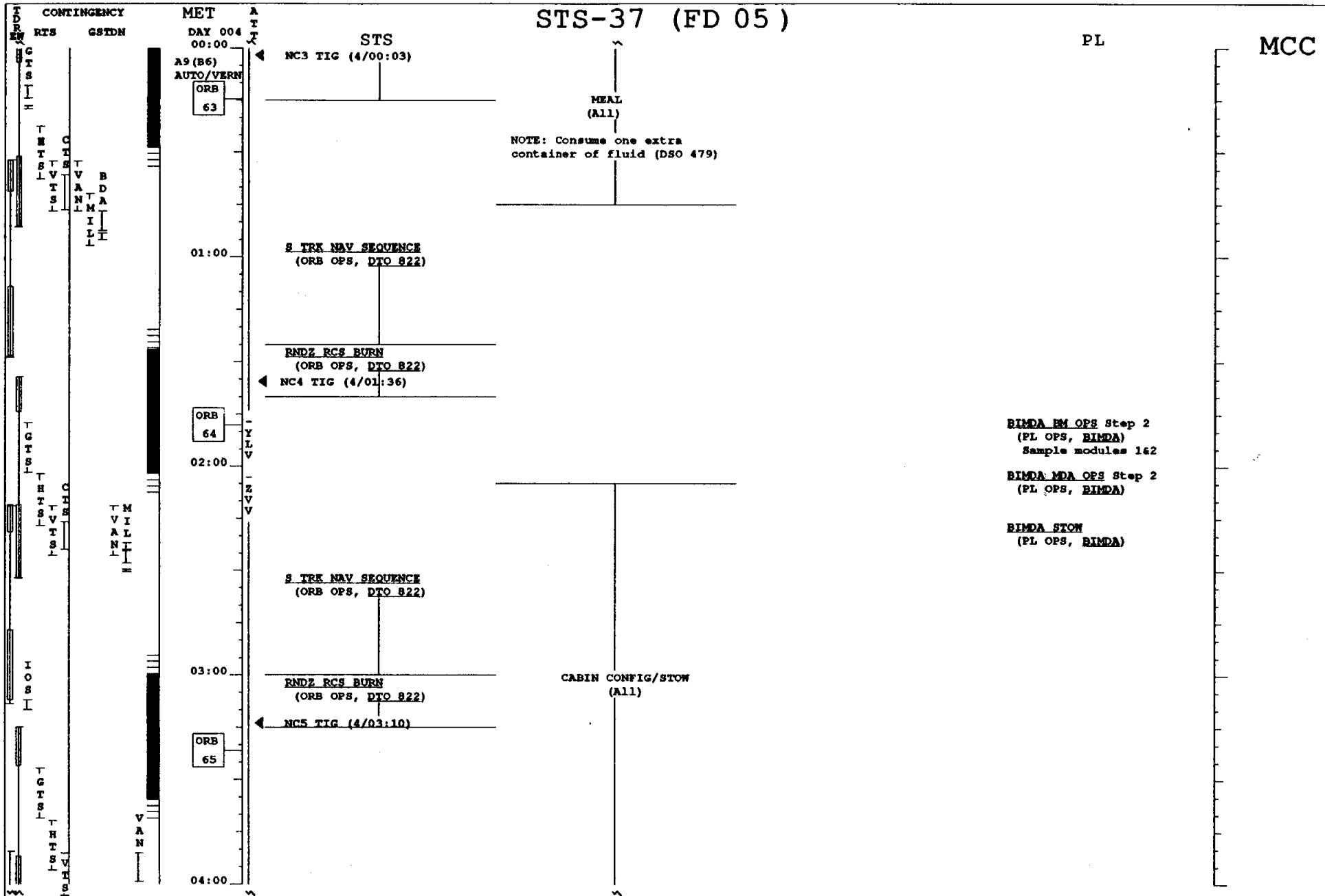


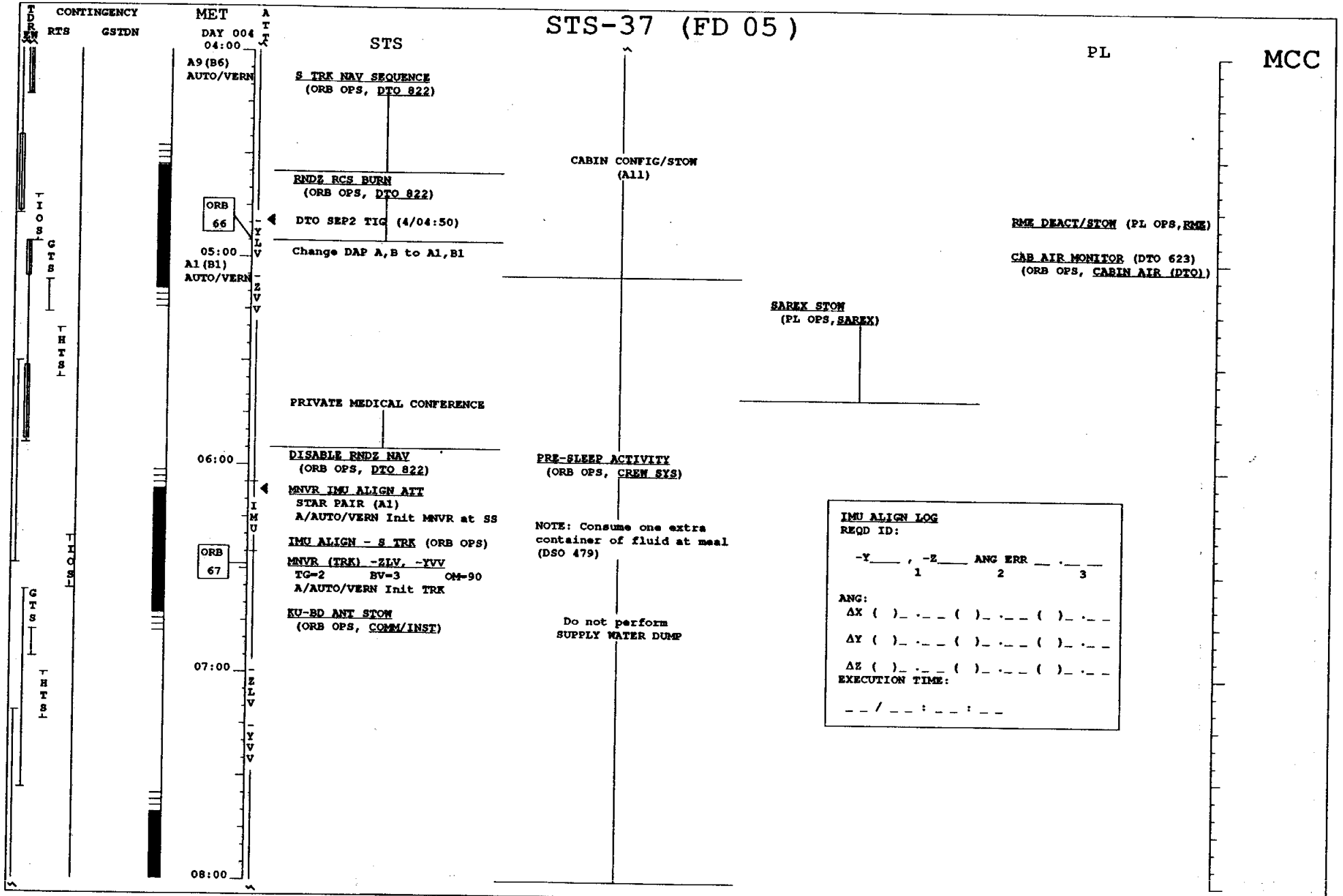


STS-37 (FD 05)

PL

MCC

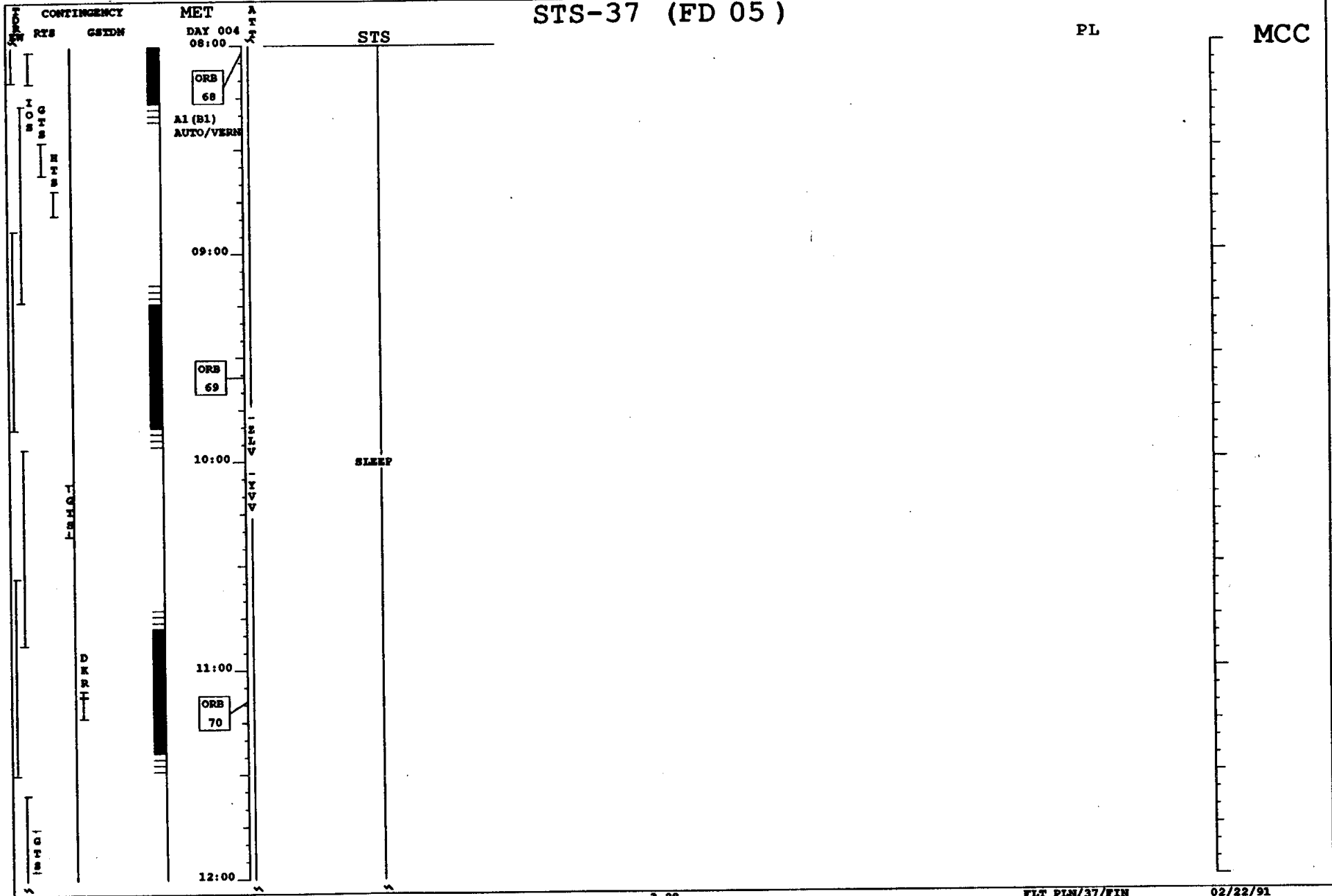




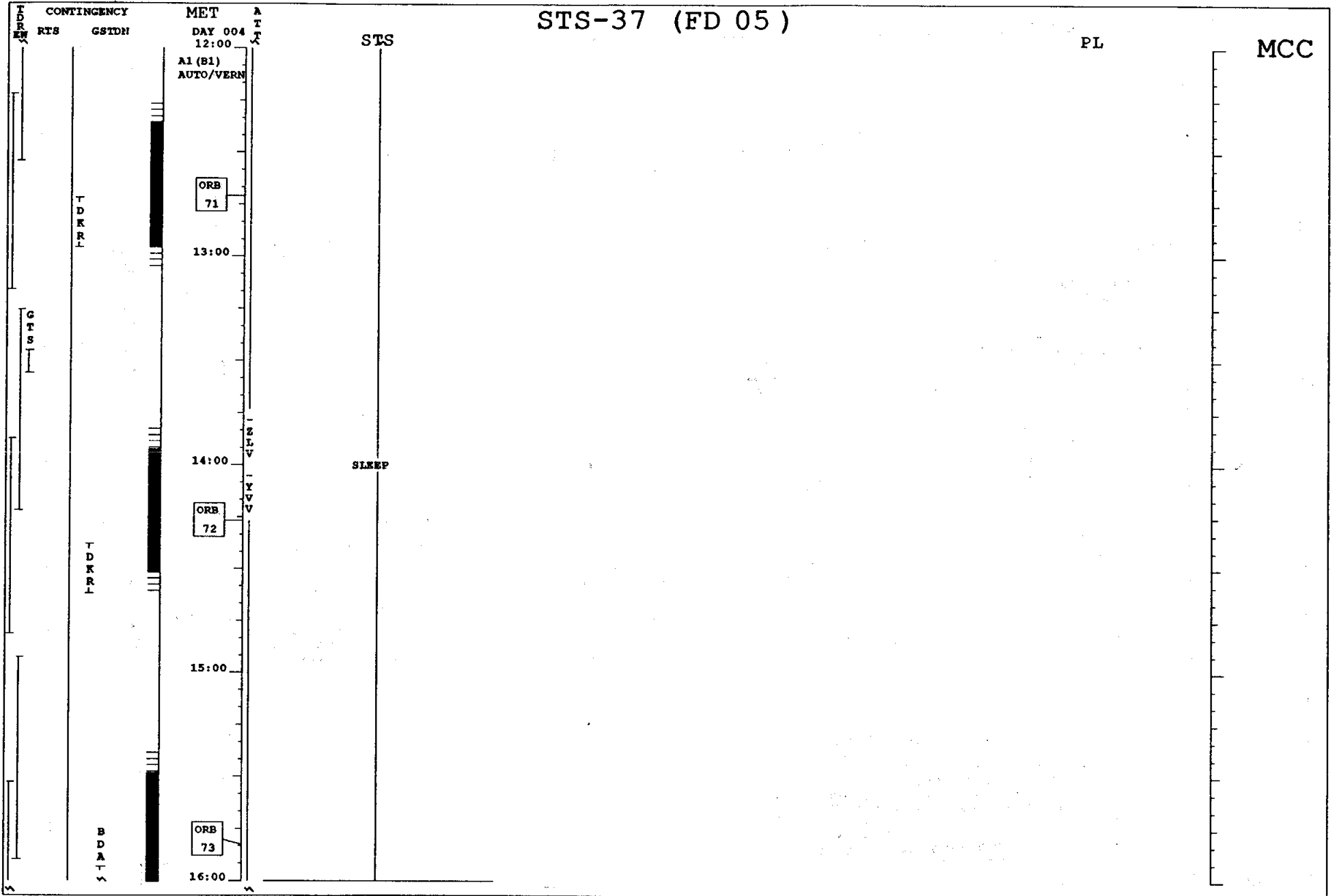
STS-37 (FD 05)

PL

MCC



STS-37 (FD 05)



STS-37 (FD 06)

PL

MCC

EE ACTIVITIES BEFORE LEAVING FLT PLAN:
AIR SAMPLE
 Red MET on bottle
HYPEROSMOTIC FLUID COUNTERMEASURE
 (DSO 479) (MED, MED DSO's)
 Pen and Ink NOMINAL DEORBIT PREP:
 Delay BEGIN FLUID LOADING (TIG-1:35)
 until TIG-1:00
DSO 607 FOOD/BEV LOG (MED, MED DSO's)

IMU ALIGN LOG
 REQD ID:
 -Y____, -Z____ ANG ERR ____
 1 2 3
 ANG:
 ΔX ()_ . _ . ()_ . _ . ()_ . _ .
 ΔY ()_ . _ . ()_ . _ . ()_ . _ .
 ΔZ ()_ . _ . ()_ . _ . ()_ . _ .
 EXECUTION TIME:
 _ / _ : _ : _

POST-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

ORTHOSTATIC FUNCTION (DSO 603)
 Steps 1-11
 (MED, MED DSO's)

RAD DOSE DIST (DSO 469)
 (MED, MED DSO's)

POWER CABLE RECONFIG
 (PL OPS, DEORBIT PREP)

CAB AIR MONITOR (DTO 623)
 (ORB OPS, CABIN AIR (DTO))

UPDATE CRT TIMER SETUP PAD

MNVR IMU ALIGN ATT
 STAR PAIR (A1)
 A/AUTO/VERN Init MNVR at SS
IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) BIASED -XSI
 TG-4 BV-5
 P-184 Y=0 OM-90
 A/AUTO/VERN (17:25) Init TRK
 PRIVATE MEDICAL CONFERENCE

Update: CRT TIMER SETUP PAD
 in NOMINAL DEORBIT PREP

Go to DEORBIT PREP at 4/19:04 MET

CONTINGENCY
 RTS GSIDN
 I O S I
 B D A
 D K R
 M I B L D I A
 D K R
 T I O S I
 T B D A I T D K R I
 T I O S I

MET
 DAY 004
 16:00
 A1 (B1)
 AUTO/VERN

STS

A T T
 Z L V
 Y V V
 I M U
 B I A S E D
 X S I

ORB 74
 ORB 75

17:00
 18:00
 19:00
 20:00


CONTINGENCY TIMELINES

CONTINGENCY
TIMELINES

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FD 3 DUAL SOLAR ARRAY EVA

The FD 3 Dual Solar Array EVA Timeline is designed to accommodate delaying GRO deploy until Rev 37 following an EVA to manually deploy both solar arrays. The timeline represents the worst case scenario in which both solar arrays require manual deployment. The EVA crewmembers will begin EVA PREP (starting with EMU DONNING) following deployment failure of the first array. The 10.2 psi cabin EVA protocol is used. The 10.2 cabin depress and EMU C/O are performed FD2 in the nominal timeline. In the nominal timeline the EVA crewmembers perform part of the EVA PREP (MIDDECK PREP and PREP FOR DONNING) in order to expedite preparation in the event the EVA is required. Additional assumptions are shown on page 4-4. The timeline is based on the nominal CTL-A trajectory.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON 	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
096:02:20/ 096:14:20	001:12:00/ 002:00:00	095:20:20/ 096:08:20	03/ 095 CST	-9.6		APRIL 5, 1991	STS-37	FINAL	02/22/91

PET
 FD :002 12 13 14 15 16 17 18 19 20 21 -3 22 -2 23 -1 0 MET:002
 MET :001

STS	SLEEP										SD PU LM XF	SD PU LM XF	I M U	I M U	P C H C R O O C I N M V F F	P C H C R O O C I N M V F F							
	<p>THE FD3 GRO DUAL ARRAY EVA TIMELINE MAKES THE FOLLOWING ASSUMPTIONS:</p> <ul style="list-style-type: none"> - GO FOR EVA IS RECEIVED AT 23:10. - A 40 MIN PREBREATHE IN THE EMU WILL BE DONE BEFORE A/L DEPRESS. - THE +Y SOLAR ARRAY WILL BE DEPLOYED WITHIN 2 HRS OF EGRESS. GRO BATTERY CHARGING WILL START IMMEDIATELY. - EVA CREWMEMBERS REMAIN AT VACUUM, POST SOLAR ARRAY DEPLOY, TO PROTECT AGAINST RMS END EFFECTOR FAILURE. - THE CREW SLEEP WILL BE DELAYED UP TO 10:30 TO ALLOW FOR MAXIMUM GRO BATTERY CHARGING AND A LATEST GRO RELEASE AT 2/08:15. - ORBITER SIAPP ACTIVITIES WILL BE RESCHEDULED ON FD4. - SHARE II BUBBLE TEST WILL BE REPLANNED. 										POST SLEEP					P/TVO2 SETUP GRO		P/TVO2 ACT GRO					G O F O R
	<ul style="list-style-type: none"> - ORBITER SIAPP ACTIVITIES WILL BE RESCHEDULED ON FD4. - SHARE II BUBBLE TEST WILL BE REPLANNED. 										R M S		P W R U P		EVA PREP					E V A	EVA PREP		
PL											GRO PREP		GRO UNBERTH		GRO SA DPLY								

DAY/NIGHT	[Day/Night Cycle]																					
ORBIT	24	25	26	27	28	29	30	31														
CONTINGENCY GSTDN COVERAGE	-DKR										-MIL -BDA -DKR		-MIL -BDA -DKR		-VAN -MIL -VTS -CTS		-BDA -DKR					
CONTINGENCY RIS COVERAGE	-GTS										-IOS		-IOS		-CTS		-IOS		-HTS		-IOS	
TDRS E W	[TDRS E W]										[TDRS E W]		[TDRS E W]		[TDRS E W]		[TDRS E W]		[TDRS E W]		[TDRS E W]	
ATTITUDE	-ELV +YVV										IMU		BIASED +ESI									

NOTES:

⊙ RMS HTR ACT

∇ POCC COMMANDING

∇ GRO TO INTERNAL POWER

∇ PRLA REL/SURS REL

⊙ EVA PREP (EVA, EVA FREE)

■ W/FULL POCC COMMANDING

FD3 DUAL SOLAR ARRAY EVA

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE									
096:14:20/ 097:02:20	002:00:00/ 002:12:00	096:08:20/ 096:20:20	03/ 096 CST	-7.6		APRIL 6, 1991	STS-37	FINAL	02/22/91									
PET FD :003 MET :002																		
STS	HE RICO DEPR	RMS MNV R	L A T E S	B I S I M N V R	B I S I M N V R	R M S M N V R	B A T T M C H R G	H C U M F S I G P L H	M R A N E T S V L T R E A S E	A S E P 1	A S E P 2	A S E P 3	I M U M N V R	Z L V M N V R	P C R O I N F M E E D	SLEEP		
			P/TV02 ACT GRO			P/TV03 ACT EVA	TDRS DIR C/O		P/TV03 ACT EVA	P/TV02 ACT GRO	R M S P W R D N						PRE SLEEP	
	A S O U I T E V A P R E P M H P N V R B	A D E P R E S S S	E V A +Y SA	E V A -Y SA		E V A (EDFE)			I N G R E S S	R E L E A S E	A R E P P R E S S						POST EVA	
PL			EVA SUPPORT			GRO HGA DPLY												PRE-RELEASE CONFIG (POCC COMMANDING)
						HGA V				GRO RELEASE								
DAY/NIGHT																		
ORBIT	32	33	34	35	36	37	38	39										
CONTINGENCY GSTDN																		
COVERAGE																		
CONTINGENCY RTS																		
COVERAGE																		
TDRS E W																		
ATTITUDE																		
NOTES:	<ul style="list-style-type: none"> ⊙ EVA PREP (EVA, EVA PREP) ⊙ BIASED +XSI (TGT=-4, BV=5, P=0, Y=15) ⊙ RELEASE POSITION ⊙ DEPRESS/REPRESS (Cue Card) ⊙ POST EVA (EVA, POST EVA) Incl. EMU BATT CHARGE ⊙ EVA POSITION ⊙ BIASED +XSI (TGT=-4, BV=5, P=0, Y=345) ⊙ CLOSEOUT (GRO DPLY, CLOSEOUT) ■ MCC UPLINK -20° β ONLY ⊙ GRO EVA PROCEDURES (EVA) ⊙ -ZLV, +YVV ■ W/NO POCC COMMANDING ⊙ DTO 623 CABIN AIR MONITORING 																	

FD3 DUAL SOLAR ARRAY EVA

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FD 3 SINGLE SOLAR ARRAY EVA

The FD 3 Single Solar Array EVA Timeline is designed to accommodate delaying GRO deploy until Rev 36 following an EVA to manually deploy one solar array. The timeline represents the more complicated scenario in which -Y solar array requires manual deployment. The EVA crewmembers will begin EVA PREP (starting with EMU DONNING) following deployment failure of the array. The 10.2 psi cabin EVA protocol is used. The 10.2 cabin depress and EMU C/O are performed FD2 in the nominal timeline. In the nominal timeline the EVA crewmembers perform part of the EVA PREP (MIDDECK PREP and PREP FOR DONNING) in order to expedite preparation in the event the EVA is required. Additional assumptions are shown on page 4-8. The timeline is based on the nominal CTL-A trajectory.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE												
096:02:20/ 096:14:20	001:12:00/ 002:00:00	095:20:20/ 096:08:20	03/095 CST	-9.6		APRIL 5, 1991	STS-37	FINAL	02/22/91												
PET FD :002 MET :001	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	02/22/91
STS	SLEEP																POST SLEEP	P/TVO2 SETUP GRO	P/TVO2 ACT GRO	G O F O R	
PL	<p>THE FD3 GRO SINGLE ARRAY EVA TIMELINE MAKES THE FOLLOWING ASSUMPTIONS:</p> <ul style="list-style-type: none"> - GO FOR EVA IS RECEIVED AT 23:10. - ONLY THE -Y SA FAILED TO DEPLOY. - A 40 MIN PREBREATHE IN THE EMU WILL BE DONE BEFORE A/L DEPRESS. - AFTER +Y SA DEPLOYMENT THE ORBITER WILL BE MANEUVERED AND SINGLE ARRAY BATTERY CHARGING WILL BE INITIATED. - PRIOR TO EGRESS, THE GRO WILL BE LOWERED TO THE EVA CLIMB-ON POSITION AND THE ORBITER MANEUVERED TO A BIASED +XSI ATTITUDE FOR CONTINUED CHARGING. - AFTER -Y SA UNLATCHING THE ORBITER WILL BE MANEUVERED TO A SECOND BIASED +XSI ATTITUDE TO PROTECT THE -Y SA FROM THE RMS SHADOW. POCC WILL SLEW THE -Y SA 40° TO ALLEVIATE SHADOW CONCERN DURING HGA FREE DRIFT. - EVA CREWMEMBERS REMAIN AT VACUUM, POST SOLAR ARRAY DEPLOY, TO PROTECT AGAINST RMS END EFFECTOR FAILURE. - THE CREW SLEEP MAY BE DELAYED TO 10:30 TO ALLOW FOR MAXIMUM GRO BATTERY CHARGING. - ORBITER SIAPP ACTIVITIES WILL BE RESCHEDULED ON FD4. - SHARE II BUBBLE TEST WILL BE REPLANNED. 																RMS PWRRUP	EVA PREP	EVA PREP		
DAY/NIGHT	[Day/Night Cycle]																				
ORBIT	24	25	26	27	28	29	30	31													
CONTINGENCY GSTDN COVERAGE	-DKR																-MIL -BDA -DKR	-MIL -BDA -DKR	-VAN -MIL -VTS -CTS		
CONTINGENCY RIS COVERAGE	-GTS																-IOS	-IOS	-IOS	-IOS	
TDRS E W	[TDRS Coverage]																				
ATTITUDE	-ZLV +YV																BIASED +ZSI				
NOTES:																	⊙ RMS HTR ACT	⊙ EVA PREP (EVA, EVA PREP)			
																	V POCC COMMANDING	V GRO TO INTERNAL POWER	V PRLA REL/SURS REL		

FD3 SINGLE SOLAR ARRAY EVA

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
096:14:20/ 097:02:20	002:00:00/ 002:12:00	096:08:20/ 096:20:20	03/096 CST	-7.6		APRIL 6, 1991	STS-37	FINAL	02/22/91							
PET FD :003 MET :002	0 1 2 3 4 5 6 7 8 9 10 11 12															
STS	H HCO DFR	B X S R I A I M S E M D N V R		B X S R I A I M S E M D N V R		R M S M N V R G		A S S E P A S S E P A S S E P I M U C M H Z L V H C U C M N S I E G E B P C R O M V F		SLEEP						
	P/TV02 ACT GRO			P/TV03 ACT		TDRS DIR C/O	P/TV03 ACT	P/TV02 ACT GRO	PRE SLEEP							
	S U A D O I T E M E V A P R E P I P N / B	E V A -Y S A		E V A (E D F E)		I N G R E S S		A R E P P R E S S P O S T E V A								
PL	EVA SUPPORT		GRO HGA DFLY	PRE-RELEASE CONFIG (POCC COMMANDING)		GRO RELEASE		C R C O O C H G O M S M R C C O D								
DAY/NIGHT																
ORBIT	32		33		34		35		36		37		38		39	
CONTINGENCY GSTDN	VAN MIL BDA DKR		VAN MIL BDA		VAN MIL		VAN									
CONTINGENCY RIS COVERAGE	HTS VTS CTS		HTS VTS CTS		HTS VTS CTS		GTS HTS VTS		GTS HTS		IOS GTS HTS		IOS GTS HTS		GTS HTS	
TDRS																
ATTITUDE																
NOTES:	<p> @EVA PREP (EVA, EVA PREP) @BIASED +XSI @BIASED +XSI (TGT=4, BV=5, P=0, Y=15) @RELEASE POSITION @EVA POSITION @POST EVA (EVA, POST EVA), Including EMU BATT CHARGE @DEPRESS/REPRESS (Cue Card) @CLOSEOUT (GRO DPY, CLOSEOUT) ■ MCC UPLINK -20° β ONLY @GRO EVA PROCEDURES (EVA) V -Y SA SLEW </p>															

FD3 SINGLE SOLAR ARRAY EVA

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

ATTITUDE TIMELINE

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 0/01:12:00 19:29	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO NORM	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+270	-ZLV -YVV PLEBD OPENING ATTITUDE
2 0/02:30:00 35:36	MNVR R+327.00 P+196.00 Y+332.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 155 P 1	-Y:36 -Z:27	IMU ALIGN STAR PAIR B1
3 0/02:50:00 59:16	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
4 0/07:00:00 09:40 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 129 P 131	-Y:25 -Z:15	IMU ALIGN -Z COAS CAL STAR PAIR A1
5 0/07:30:00 42:32	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
6 0/19:28:00 37:38 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 130 P 131	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
7 0/19:46:00 47:45	MNVR R+192.00 P+203.00 Y+329.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 148 P 142	+X:20 ARCTURUS	+X COAS CAL MIN MNVR FROM IMU ATT
8 0/20:05:00 14:52	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
9 0/22:25:00 35:10	MNVR R+213.00 P+295.00 Y+289.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 94 P 181		GRO DIR CHK ATT
10 1/00:29:00 42:49	TRK TGT=4 BV=1(0.00, 0.00) OM=205.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 0 P 75	INRTL R+ 94 P+354 Y+ 14	AMOS HES-ROLL INIT ATTITUDE
11 1/00:45:15 45:41	TRK TGT=4 BV=1(0.00, 0.00) OM=218.00 CHECK DAP MODFD B1	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 0 P 62	INRTL R+107 P+354 Y+ 14	AMOS HES-ROLL ATTITUDE #2
12 1/00:45:35 46:01	TRK TGT=4 BV=1(0.00, 0.00) OM=231.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 0 P 49	INRTL R+120 P+354 Y+ 14	AMOS HES-ROLL ATTITUDE #3

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 1/00:45:55 46:21	TRK TGT=4 BV=1(0.00, 0.00) OM=244.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 0 P 36	INRTL R+133 P+354 Y+ 14	AMOS HES-ROLL ATTITUDE #4
2 1/00:55:00 01:03:59	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
3 1/06:23:00 32:43 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 130 P 132	-Y:25 -Z:15	IMU ALIGN COAS CAL STAR PAIR A1
4 1/06:55:00 07:04:22	TRK TGT=2 BV=3(90.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+ 90	-ZLV +YVV
5 1/18:51:00 19:04:57 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 130 P 132	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
6 1/19:10:00 17:13	TRK TGT=4 BV=5(250.00, 0.00) OM= 35.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 111 P 180	INRTL R+ 25 P+112 Y+283	BIASED +ZSI GRO APPENDAGE DEPLOY ATT
7 1/23:00:00 13:02	TRK TGT=4 BV=5(20.00, 0.00) OM=275.00	A7 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.07	SUN T 20 P 1	INRTL R+158 P+ 13 Y+ 8	BATTERY CHARGING ATTITUDE
8 2/01:30:00 36:40	TRK TGT=4 BV=5(20.00, 0.00) OM=195.00	A7 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.07	SUN T 20 P 1	INRTL R+ 82 P+351 Y+355	BATT CHG ATT GRO LGA TO TDRE
9 2/03:05:00 09:11	TRK TGT=4 BV=5(70.00, 0.00) OM=200.00 CHECK DAP A7	A7 AUTO VERN	DSC 0.200 DB AT 2.00 DB RT 0.07	SUN T 70 P 1	INRTL R+ 84 P+348 Y+305	GRO RELEASE ATTITUDE
10 2/03:58:00 04:07:02	MNVR R+205.00 P+175.00 Y+325.00	A7 AUTO NORM	DSC 0.200 DB AT 5.00 DB RT 0.20	SUN T 160 P 70		SEP 3 ATT INTRL EQUIV OF +XVV +YLV
11 2/04:13:00 22:47	TRK TGT=1 BV=3(90.00, 0.00) OM= 0.00	A7 AUTO NORM	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH T 180 P 0	LVLH R+ 0 P+ 90 Y+ 0	GRO TGT TRACK
12 2/05:46:00 57:06 MVNR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 130 P 133	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1

ALL ATTITUDES IN MEAN OF 1950

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 2/06:05:00 18:42	TRK TGT=2 BV=3(90.00, 0.00) OM=110.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+290	H2O DUMP ATT 20DEG OUT OF PLANE
2 2/07:40:00 53:20	TRK TGT=2 BV=3(90.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	-ZLV +YVV
3 2/18:15:00 28:42 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 130 P 133	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
4 2/18:35:00 49:46	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV EVA ATTITUDE
5 3/03:40:00 50:00	TRK TGT=2 BV=2(180.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 0 P+ 90 Y+ 0	DTO 822 TGT DEPLOY ATT
6 3/04:15:00 22:30	TRK TGT=1 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	TGT TRACK DTO 822
7 3/05:15:00 25:00	TRK TGT=2 BV=5(0.00, 90.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+270	+YLV -ZVV STARS OF OPP
8 3/06:43:00 49:28 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 131 P 134	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
9 3/07:05:00 19:54	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
10 3/17:38:00 47:49 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 131 P 134	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
11 3/18:00:00 06:16	MNVR R+218.00 P+306.00 Y+306.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 81 P 187		TDRS ATT FOR CREW CONFERENCE
12 3/21:30:00 44:45	TRK TGT=1 BV=3(90.00, 0.00) OM=270.00	A9 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 270	LVLH R+270 P+ 0 Y+ 90	TGT TRK ATT DTO 822

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 3/23:05:00 18:44	MNVR R+120.00 P+240.00 Y+ 36.00	A9 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 97 P 267		OMS OOP VBN1
2 3/23:26:00 39:38	TRK TGT=1 BV=3(90.00, 0.00) OM=270.00	A9 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 0 P+ 90 Y+ 90	TGT TRK DTO 822
3 4/06:07:00 16:24 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 131 P 135	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
4 4/06:25:00 39:10	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+180 P+ 0 Y+270	-ZLV -YVV
5 4/17:03:00 13:08 MNVR AT SS	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 131 P 136	-Y:25 -Z:15	IMU ALIGN STAR PAIR A1
6 4/17:25:00 37:32	TRK TGT=4 BV=5(184.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 177 P 183	INRTL R+ 25 P+169 Y+341	BIASED -XSI COLD SOAK ATT
7 4/20:04:00 16:32 MNVR TIG-3	MNVR R+202.00 P+219.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 131 P 136	-Y:25 -Z:15	IMU ALIGN
8 4/20:21:00 22:59	MNVR R+287.00 P+335.00 Y+293.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 85 P 147	-Y:29 -Z:53	IMU VERIF
9 4/22:49:00 51:49	MNVR R+243.00 P+350.60 Y+359.70	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 18 P 202		D/O BURN ATT

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DAP BOOK

STS-37 DAP BOOK

DAP A CONFIGURATIONS

	A1*	A2	A3	A4	A5	A6	A7	A8	A9	A10
<u>TRANSLATION</u>										
PULSE ft/sec	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.05
<u>ROTATION</u>										
DSC RT NORM °/sec	0.200	0.400	0.200	0.200	0.200	0.200	0.200	0.500	0.200	0.200
VERN °/sec	0.200	0.400	0.200	0.008	0.200	0.200	0.200	0.200	0.200	0.200
PULSE NORM °/sec	0.10	0.10	0.30	0.10	0.10	0.10	0.04	0.10	0.10	0.10
VERN °/sec	0.010	0.010	0.010	0.010	0.050	0.010	0.01	0.010	0.010	0.010
COMP NORM °/sec	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
VERN °/sec	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>										
ATT NORM (deg)	5.00	1.00	5.00	1.00	5.00	5.00	5.00	3.00	2.00	2.00
VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000	2.000	1.000	1.000	1.000
RATE NORM °/sec	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN °/sec	.020	.020	.020	.010	.020	.020	.07	.020	.020	.020
<u>JET OPT</u>										
P	1	1	3	1	1	3	1	1	1	1
Y	1	1	3	3	1	3	1	1	1	1
CNTL ACCEL	0	0	0	0	0	0	0-4	0	0	0

*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

	B1*	B2	B3	B4	B5	B6	B7	B8
<u>TRANSLATION</u>								
PULSE ft/sec	0.02	0.02	0.02	0.02	0.02	0.05	0.01	0.1
<u>ROTATION</u>								
DSC RT NORM °/sec	0.500	0.200	0.200	0.200	0.200	0.500	0.200	0.5
VERN °/sec	0.200	0.200	0.200	0.008	0.016	0.200	0.200	0.024
PULSE NORM °/sec	0.04	0.04	0.04	0.04	0.04	0.04	0.04	.04
VERN °/sec	0.002	0.002	0.002	0.002	0.002	0.002	0.002	.005
COMP NORM °/sec	.00	.00	.00	.00	.00	.00	.00	.00
VERN °/sec	.000	.000	.000	.000	.000	.000	.000	.00
<u>DEADBAND</u>								
ATT NORM (deg)	3.00	3.00	3.00	0.30	3.00	2.00	2.00	2.0
VERN (deg)	1.000	1.000	1.000	0.100	0.033	1.000	1.000	.5
RATE NORM °/sec	0.20	0.20	0.20	0.20	0.20	0.20	0.20	.2
VERN °/sec	.020	.020	.020	.010	.020	.020	.020	.03
<u>JET OPT</u>								
P	1	3	1	3	3	1	1	1
Y	1	3	1	3	3	1	1	1
CNTL ACCEL	0	0	0	0	0	0	0	0,4

*I-LOADED OPS-2 DAP Configuration

DAP BOOK

HOOK
VELCRO

FLT PLN-1a/37/0/A

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	PTC ($\sim 2^\circ$ below +X)*
= 5	Optional
	Input P (0-359.99)
	Y (270-359.99, 0-90)
* input OM +	OM (0-359.99)
MON AXIS = 1	+X
2	-X

FLT PLN-1b/37/0/A

G20 DAP CONFIG	
CNTL ACCEL = 0	Orbiter alone
= 1	Low hover
= 2	EVA access
= 3	Intermediate
= 4	Release
= 5	Not used
JET OPT = 1	Normal
= 2	Nose only
= 3	Tail only

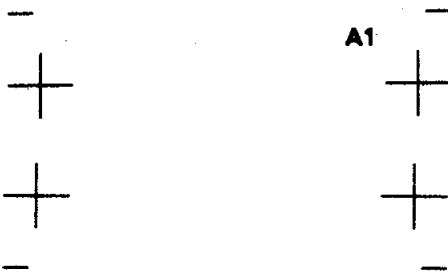
TOP



DAP PURPOSE

- A1 - NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)
- A2 - PTC
- A3 - RCS HOT FIRE
- A4 - GG
- A5 - IMU ROTATION
- A6 - LOSS OF VERN
(TAIL ONLY)
- A7 - RMS
- A8 - PRE/POST DEPLOY
- A9 - RENDEZVOUS
- A10 - PROX OPS

FLT PLN-2a/37/0/A



A1

TOP

DAP A1

PURPOSE:

NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)

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

FLT PLN-2b/37/0/A

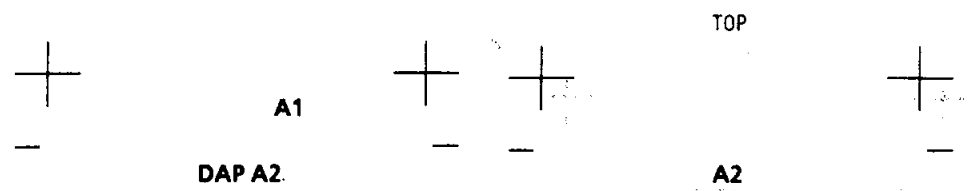


TOP

FLT PLN-3a/37/0/A



A2



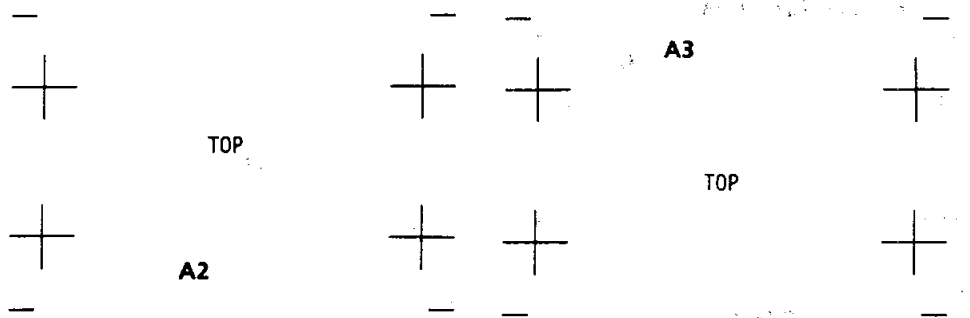
PURPOSE:
PTC

DAP A2

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

FLT PLN-3b/37/0/A

FLT PLN-4a/37/0/A



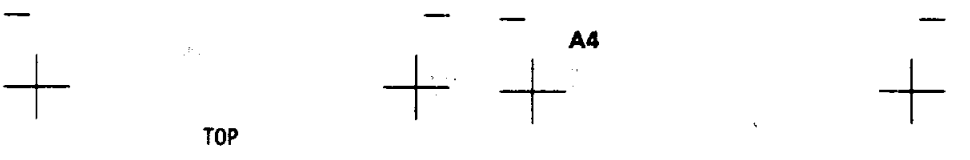
PURPOSE:
RCS HOT FIRE

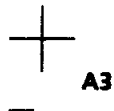
DAP A3

- 0.1 0 1 TRANSLATION PULSE
- 0.2 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.3 0 0 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 0 6 COMP NORM
- .0 0 0 7 VERN
- 5.0 0 8 DEADBAND ATT NORM
- 1.0 0 0 9 VERN
- 0.2 0 10 RATE NORM
- .0 2 0 11 VERN
- 3 12 JET OPT P
- 3 13 Y
- 0 14 CNTL ACCEL

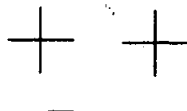
FLT PLN-4b/37/0/A

FLT PLN-5a/37/0/A





A3



TOP



DAP A4

A4

PURPOSE:

GG

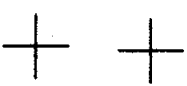
0.1 0	1	TRANSLATION PULSE
ROTATION		
0.2 0 0	2	DSC RT NORM
0.0 0 8	3	VERN
0.1 0	4	PULSE NORM
0.0 1 0	5	VERN
.0 0 0	6	COMP NORM
.0 0 0	7	VERN
DEADBAND		
1.0 0	8	ATT NORM
0.0 7 0	9	VERN
RATE		
0.2 0	10	NORM
.0 1 0	11	VERN
1	12	JET OPT P
3	13	Y
0	14	CNTL ACCEL

FLT PLN-5b/37/0/A

FLT PLN-6a/37/0/A



TOP



A5



A4

TOP



DAP A5

A5

PURPOSE:

IMU ROTATION

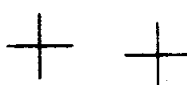
0.1 0	1	TRANSLATION PULSE
ROTATION		
0.2 0 0	2	DSC RT NORM
0.2 0 0	3	VERN
0.1 0	4	PULSE NORM
0.0 5 0	5	VERN
.0 0 0	6	COMP NORM
.0 0 0	7	VERN
DEADBAND		
5.0 0	8	ATT NORM
1.0 0 0	9	VERN
RATE		
0.2 0	10	NORM
.0 2 0	11	VERN
1	12	JET OPT P
1	13	Y
0	14	CNTL ACCEL

FLT PLN-6b/37/0/A

FLT PLN-7a/37/0/A



TOP



A6



TOP

A5

DAP A6

PURPOSE:

LOSS OF VERN
(TAIL ONLY)

0.1 0

1 TRANSLATION
PULSE

0.2 0 0

2 ROTATION

DSC RT NORM

0.2 0 0 0

3 VERN

0.1 0 0

4 PULSE NORM

0.0 1 0 0

5 VERN

.0 0 0

6 COMP NORM

.0 0 0

7 VERN

DEADBAND

5.0 0 0

8 ATT NORM

1.0 0 0

9 VERN

0.2 0 0

10 RATE NORM

.0 2 0

11 VERN

3

12 JET OPT P

3

13 Y

0

14 CNTL ACCEL

FLT PLN-7b/37/0/A

FLT PLN-8a/37/0/A

A7

TOP

TOP

A6

DAP A7

PURPOSE:

RMS

0.1 0

1 TRANSLATION
PULSE

0.2 0 0

2 ROTATION

DSC RT NORM

0.2 0 0 0

3 VERN

0.0 4 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 0

8 ATT NORM

2.0 0 0

9 VERN

0.2 0 0

10 RATE NORM

.0 7 0

11 VERN

1

12 JET OPT P

1

13 Y

0-4

14 CNTL ACCEL

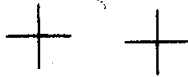
FLT PLN-8b/37/0/A

FLT PLN-9a/37/0/B

A8

TOP

TOP

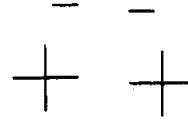


DAP A8
PURPOSE:
PRE/POST DEPLOY

0.1 0	1	TRANSLATION	
		PULSE	
		ROTATION	
0.5 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	
3.0 0 0	8	ATT	NORM
1.0 0 0	9		VERN
		RATE	NORM
0.2 0 0	10		VERN
.0 2 0	11		
		JET OPT	P
1	12		
1	13		Y
		CNTL ACCEL	
0	14		

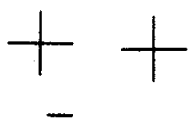
FLT PLN-9b/37/0/A

FLT PLN-10a/37/0/A



TOP

TOP



DAP A9

PURPOSE:
RENDEZVOUS

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 0	8	ATT	NORM
1.0 0 0	9		VERN
		RATE	NORM
0.2 0 0	10		VERN
.0 2 0	11		
		JET OPT	P
1	12		
1	13		Y
		CNTL ACCEL	
0	14		

FLT PLN-10b/37/0/A

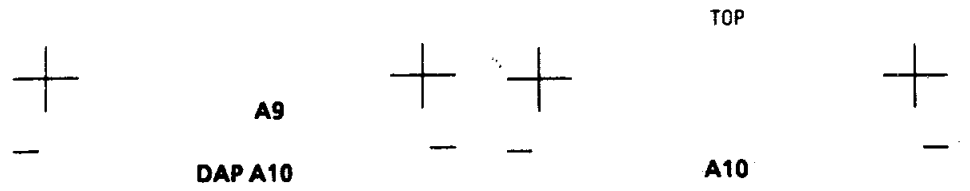
FLT PLN-11a/37/0/A



TOP

A10

(reduced copy)

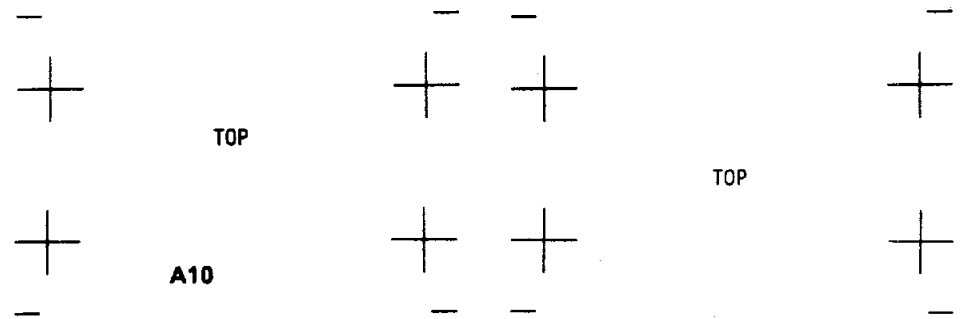


PURPOSE:
PROX OPS

0.0	5	1	TRANSLATION	
			PULSE	
ROTATION				
0.2	0	0	2	DSC RT NORM
0.2	0	0	3	VERN
0.1	0	0	4	PULSE NORM
0.0	1	0	5	VERN
0.0	0	0	6	COMP NORM
0.0	0	0	7	VERN
DEADBAND				
2.0	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-11b/37/0/A

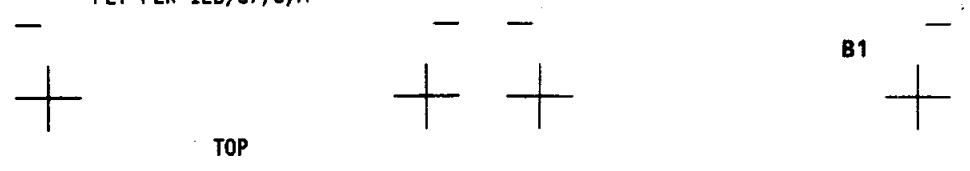
FLT PLN-12a/37/0/A



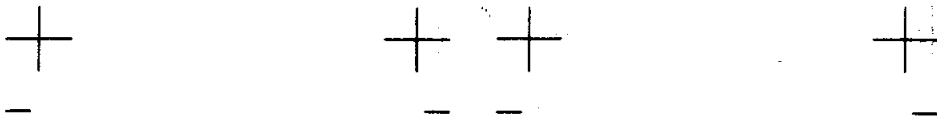
<u>DAP</u>	<u>PURPOSE</u>
B1	- NOMINAL PRCS IMU ALIGN OMS & RCS BURNS
B2	- LOSS OF VERN (TAIL ONLY)
B3	- LOSS OF VERN (NOSE & TAIL) GG MNVR
B4	- SSUS DEPLOY
B5	- COAS CAL
B6	- RENDEZVOUS
B7	- PROX OPS
B8	- RMS

FLT PLN-12b/37/0/A

FLT PLN-13a/37/0/B



TOP



DAP B1

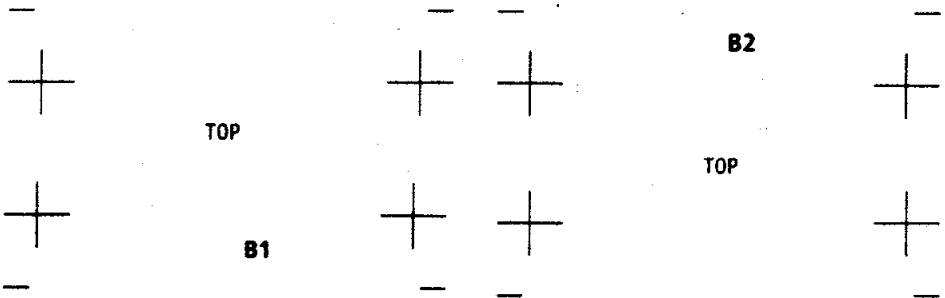
B1

PURPOSE:
NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

TRANSLATION			
PULSE	15	0.0	2
ROTATION			
DSC RT	NORM	16	0.5 0 0
	VERN	17	0.2 0 0
PULSE	NORM	18	0.0 4
	VERN	19	0.0 0 2
COMP	NORM	20	.0 0 0
	VERN	21	.0 0 0
DEADBAND			
ATT	NORM	22	3.0 0
	VERN	23	1.0 0 0
RATE			
	NORM	24	0.2 0
	VERN	25	.0 2 0
JET OPT			
	P	26	1
	Y	27	1
CNTL ACCEL	28	0	

FLT PLN-13b/37/0/A

FLT PLN-14a/37/0/A



TOP

B2

TOP

B1

DAP B2

B2

PURPOSE:
LOSS OF VERN
(TAIL ONLY)

TRANSLATION			
PULSE	15	0.0	2
ROTATION			
DSC RT	NORM	16	0.2 0 0
	VERN	17	0.2 0 0
PULSE	NORM	18	0.0 4
	VERN	19	0.0 0 2
COMP	NORM	20	.0 0 0
	VERN	21	.0 0 0
DEADBAND			
ATT	NORM	22	3.0 0
	VERN	23	1.0 0 0
RATE			
	NORM	24	0.2 0
	VERN	25	.0 2 0
JET OPT			
	P	26	3
	Y	27	3
CNTL ACCEL	28	0	

FLT PLN-14b/37/0/A

FLT PLN-15a/37/0/A



TOP

B3

B2

DAP B3

PURPOSE: WET LIZMANT
 SSUS DEPLOY
 ROTATOR
 DSC RT NORM 16
 VERN 17
 PULSE NORM 18
 VERN 19
 COMP NORM 20
 VERN 21
 DEADBAND ATT NORM 22
 VERN 23
 RATE NORM 24
 VERN 25
 JET OPT P 26
 Y 27
 CNTL ACCEL 28

FLT PLN-15b/37/0/A

TRANSLATION PULSE 15 0.0 2
 ROTATION DSC RT NORM 16 0.2 0 0
 VERN 17 0.2 0 0
 PULSE NORM 18 0.0 4
 VERN 19 0.0 0 2
 COMP NORM 20 0.0 0
 VERN 21 0.0 0 0
 DEADBAND ATT NORM 22 3.0 0
 VERN 23 1.0 0 0
 RATE NORM 24 0.2 0
 VERN 25 0.2 0
 JET OPT P 26 1
 Y 27 1
 CNTL ACCEL 28 0

FLT PLN-16a/37/0/A

B3

TOP

B4

TOP

B3

DAP B4

PURPOSE: WET LIZMANT
 SSUS DEPLOY
 ROTATOR
 DSC RT NORM 16
 VERN 17
 PULSE NORM 18
 VERN 19
 COMP NORM 20
 VERN 21
 DEADBAND ATT NORM 22
 VERN 23
 RATE NORM 24
 VERN 25
 JET OPT P 26
 Y 27
 CNTL ACCEL 28

FLT PLN-16b/37/0/A

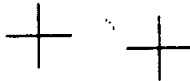
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 ROTATION DSC RT NORM 16 0.2 0 0
 VERN 17 0.0 0 0
 PULSE NORM 18 0.0 4
 VERN 19 0.0 0 2
 COMP NORM 20 0.0 0
 VERN 21 0.0 0 0
 DEADBAND ATT NORM 22 0.3 0
 VERN 23 0.1 0 0
 RATE NORM 24 0.2 0
 VERN 25 0.1 0
 JET OPT P 26 3
 Y 27 3
 CNTL ACCEL 28 0

FLT PLN-17a/37/0/A

B5

TOP

TOP



B4

DAP B5

B5

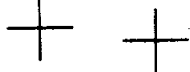
PURPOSE:
COAS CAL

TRANSLATION					
PULSE	15		0.0	2	
ROTATION					
DSC RT	NORM	16	0.2	0	0
	VERN	17	0.0	1	6
PULSE	NORM	18	0.0	4	
	VERN	19	0.0	0	2
COMP	NORM	20	.0	0	0
	VERN	21	.0	0	0
DEADBAND					
ATT	NORM	22	3.0	0	
	VERN	23	0.0	3	3
RATE					
	NORM	24	0.2	0	
	VERN	25	.0	2	0
JET OPT					
	P	26		3	
	Y	27		3	
CNTL ACCEL		28		0	

FLT PLN-17b/37/0/A

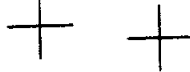
FLT PLN-18a/37/0/A

B6



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B5

DAP B6

B6

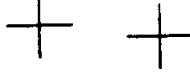
PURPOSE:
RENDEZVOUS

TRANSLATION					
PULSE	15		0.0	5	
ROTATION					
DSC RT	NORM	16	0.5	0	0
	VERN	17	0.2	0	0
PULSE	NORM	18	0.0	4	
	VERN	19	0.0	0	2
COMP	NORM	20	.0	0	0
	VERN	21	.0	0	0
DEADBAND					
ATT	NORM	22	2.0	0	
	VERN	23	1.0	0	0
RATE					
	NORM	24	0.2	0	
	VERN	25	.0	2	0
JET OPT					
	P	26		1	
	Y	27		1	
CNTL ACCEL		28		0	

FLT PLN-18b/37/0/A

FLT PLN-19a/37/0/A

B7



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DAP B7

PURPOSE:
PROX OPS

TRANSLATION				
PULSE	15		0.0	1
ROTATION				
DSC RT	NORM	16	0.2	0 0
	VERN	17	0.2	0 0
PULSE	NORM	18	0.0	0 4
	VERN	19	0.0	0 2
COMP	NORM	20	0.0	0 0
	VERN	21	0.0	0 0
DEADBAND				
ATT	NORM	22	2.0	0
	VERN	23	1.0	0 0
RATE				
	NORM	24	0.2	0
	VERN	25	0.2	0
JET OPT				
	P	26		1
	Y	27		1
CNTL ACCEL	28			0

FLT PLN-19b/37/0/A

FLT PLN-20a/37/0/A



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B8



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B7

DAP B8

PURPOSE:
RMS

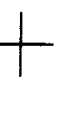
TRANSLATION				
PULSE	15		0.1	0
ROTATION				
DSC RT	NORM	16	0.5	0 0
	VERN	17	0.0	2 4
PULSE	NORM	18	0.0	0 4
	VERN	19	0.0	0 5
COMP	NORM	20	0.0	0 0
	VERN	21	0.0	0 0
DEADBAND				
ATT	NORM	22	2.0	0
	VERN	23	1.5	0 0
RATE				
	NORM	24	0.2	0
	VERN	25	0.3	0
JET OPT				
	P	26		1
	Y	27		1
CNTL ACCEL	28			0.4

FLT PLN-20b/37/0/A

FLT PLN-21a/37/0/C



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FLT PLN-21b/37/0/B



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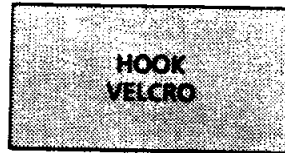


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FLT PLN-22b/37/0/B



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STS-37
FLIGHT PLAN NOTES

FLT PLN NOTES

FLIGHT PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-37 (OV-104) launch from KSC on April 4, 1991, will be into a 243 nm orbit at an inclination of 28.45 degrees. The mission duration will be 5 days. Nominal landing occurs at EDW on April 9, 1991.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Local Time</u>
Nominal	Primary	78	EDW	07:32 PDT
	Weather Alt.	78	KSC	10:41 EDT
1 Day Late	Primary	93	EDW	06:54 PDT
	Weather Alt.	93	KSC	10:03 EDT
2 Days Late	Primary	108	EDW	06:16 PDT
	Weather Alt.	108	KSC	09:25 EDT

MAJOR EVENTS

LAUNCH (KSC) Apr 4, 1991
 MET (DD/HH:MM) 0/00:00
 Day of year 94
 CST/GMT 08:20/14:20

OMS-2
 MET (DD/HH:MM) 00/00:46
 DV (fps) 368.6
 ORBIT ha/hp (nm) 244/242

GRO RELEASE
 MET (DD/HH:MM) 02/03:35

GRO SEP 1
 MET (DD/HH:MM) 02/03:35
 DV (fps) 0.5
 ORBIT ha/hp (nm) 244/241

GRO SEP 2
 MET (DD/HH:MM) 02/03:57
 DV (fps) 2.0
 ORBIT ha/hp (nm) 244/241

GRO SEP 3
 MET (DD/HH:MM) 02/04:12
 DV (fps) 3.0
 ORBIT ha/hp (nm) 245/242

DTO 822 SEP 1
 MET (DD/HH:MM) 03/04:00
 DV (fps) 1.5
 ORBIT ha/hp (nm) 247/242

FLT PLN NOTES

<u>NC1</u>	
MET (DD/HH:MM)	03/17:15
DV (fps)	3.3
ORBIT ha/hp (nm)	247/240
<u>NC2</u>	
MET (DD/HH:MM)	03/21:56
DV (fps)	2.5
ORBIT ha/hp (nm)	247/239
<u>VBN1</u>	
MET (DD/HH:MM)	03/23:24
DV (fps)	7.2
ORBIT ha/hp (nm)	246/242
<u>NC3</u>	
MET (DD/HH:MM)	04/00:03
DV (fps)	0.2
ORBIT ha/hp (nm)	247/242
<u>NC4</u>	
MET (DD/HH:MM)	04/01:36
DV (fps)	0.2
ORBIT ha/hp (nm)	246/242
<u>NC5</u>	
MET (DD/HH:MM)	04/03:10
DV (fps)	0.2
ORBIT ha/hp (nm)	246/242
<u>DTO 822 SEP 2</u>	
MET (DD/HH:MM)	04/04:50
DV (fps)	3.0
ORBIT ha/hp (nm)	248/241
<u>DEORBIT BURN</u>	
MET (DD/HH:MM)	04/23:04
<u>LANDING (EDW)</u>	
MET (DD/HH:MM)	05/00:12
Day of year	99
CDT/GMT	09:32/14:32

B. CREW

- The 5 crewmembers flying this mission are:
 - CDR - Steve R. Nagel
 - PLT - Ken D. Cameron
 - MS1 - Linda M. Godwin
 - MS2 - Jerry L. Ross
 - MS3 - Jay Apt
- The crewmembers responsible for performing the EVA are: MS2 will be EV1, MS3 will be EV2, and PLT will be IV1

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink real-time commands (RTCs) coordinated with the crew.
- b. TDRS coverage is assumed to be supported by TDRS-E (41 degrees W) and TDRS-W (171 degrees W) and is the prime mode of communication coverage.
- c. There are six GN sites available for on-orbit contingency support: VAN, MIL(MLX), BDA(BDX), DKR, DFR, and GDS. MAD and CAN are emergency sites. Two-hour lead time required.
- d. TDRS-Ku-Band is the prime mode of real-time TV; however, there are also three GN sites available as backups on GDS(GDX), MIL(MLX), and VAN (90-min lead time required).
- e. TDRS-E and TDRS-W are available for ascent and entry support. IOS and OTS are available for UHF voice in emergency (2-hr lead time required).
- f. RTS sites are available for contingency support or when scheduled in advance (4-hour lead time required): HTS, GTS, VTS, IOS, CTS, NTS, OTS, and DGS.
- g. TDRS-W and TDRS-E are available to support Ku-Band uplink (e.g., TAGS). TDRS-W forward link is only scheduled as needed.
- h. HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.

2. Guidance and Navigation

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

3. Environmental Control and Life Support Subsystem (ECLSS)

- a. Two CO₂ absorbers are installed prior to launch. On-orbit, the canisters are alternately replaced as required per the cue card.

- b. There are four supply water tanks and one waste water tank which are loaded for launch with volumes sufficient to meet a launch day deorbit opportunity with Payload Bay (PLB) Doors failed closed. A real-time call will be made to inform the crew to what level each dump is made. Tanks A and B will be dumped to a level that will allow the tanks to be full prior to the next daily group of deorbit opportunities.

4. DC Utility Power Usage

STS-37 DC UTILITY POWER OUTLET SCHEDULE

MET OUTLET		PRELAUNCH	POST INSERTION	ON-ORBIT		DEORBIT PREP
			0/02:00	0/03:30	0/06:50	
MNA	019	PLT*	--	LINHOF	LINHOF	PLT*
	M052J	MS3*	PDB**	PDB**	PDB**	MS3*
MNB	F1	--	--	PGSC	PGSC	--
	M013Q	PDB**	--	DSO 469	DSO 469	PDB**
MNC	A11	MS1*,MS2*	--	--	--	MS1*,MS2*
	A15	CDR*	TPR	TPR	TPR	CDR*
	M030F	--	--	--	SAREX	--

NOTES: *Crewmember suit fan

**PCG and BIMDA connected to Power Distribution Box (PDB)

D. TEXT UPLINK SYSTEM

1. The Text and Graphics System (TAGS) is a high-resolution facsimile system that scans text or graphics material and converts the analog SCAN data into serial digital data. This data is transmitted via a telemetry link to the cathode-ray tube hardcopier. Transmission time for an 8-1/2 by 11-inch page can vary from just over 1 minute to just over 16 minutes depending on the hardcopy resolution desired. The TAGS can only uplink images using Ku-Band. Instrumentation has the capability to uplink onboard hardcopier control commands via S-Band or Ku-Band for power on, advance, off, and overtemp reset.
2. The teleprinter (TPR) will provide a backup on-orbit capability to receive and reproduce text-only data from MCC. The TPR uses S-Band and is not dependent on TDRS Ku-Band. TPR requires 1 to 2.5 minutes per message, depending on the number of lines (up to 66).

E. TELEVISION/PHOTOGRAPHY

1. The CCTV systems provide two color, wide-angle cameras for in-cabin coverage. There will also be five PLB TV and two RMS cameras. The type of lens assembly for each camera is documented in the Flight Requirements Document.
2. There is a video tape recorder available with 30-minute cassettes.
3. Three camera systems are available: 35mm, 16mm, and 70mm.

F. PAYLOADS

1. GRO (Gamma Ray Observatory)

The GRO is an RMS deployable, low Earth-orbiting (243 nm) spacecraft designed to collect high-resolution data on gamma ray sources in the sky. The GRO is equipped with four science instruments: OSSE, EGRET, COMPTEL, and BATSE. Key services provided by the orbiter/crew include: direct ascent to 243 nm, a pre-deploy GRO systems checkout, RMS deployment, and EVA capability to deploy the two solar arrays and the HGA (as backup to PCCC commands). The GRO maintains its operational orbit after release with four 100-lbf thrusters and is expected to have a minimum 5-year mission.

2. CETA (Crew and Equipment Translation Aid)

The CETA hardware consists of a 50-foot rail, a truck which moves on the rail, and two or more proof-of-concept CETA carts which attach to the truck. The objective is to obtain design data in a zero gravity environment. Areas of specific interest include crew restraints, cart propulsion methods, crew-to-rail interface, translation dynamics, crew workload, and timelines.

3. BIMDA (Bioserve-Instrumentation Technology Associates Materials Dispersion Apparatus)

The BIMDA consists of three experiments housed within a refrigerator/incubator module (R/IM). The payload elements are as follows: four material dispersion apparatus (MDA) minilabs, six bioprocessing modules (BM), six cell syringes (CS), and one automatic temperature recorder. The BIMDA occupies the space of one middeck locker, and draws 28 Vdc power for the R/IM. The MDA will study protein crystal growth, collagen polymerization and several other phenomena. MDA is the primary objective. The BM and CS experiments will study the response of live cells to various stimulating agents.

4. PCG (Protein Crystal Growth) Block II

The PCG payload is designed to conduct experiments which will supply information on the scientific methods and commercial potential for growing large, high-quality protein crystals in microgravity. The PCG will be installed and operated on the orbiter middeck.

5. RME-III (Radiation Monitor Experiment III)

The RME measures the radiation at different locations throughout the orbiter. The experiment contains a liquid crystal display (LCD) for real-time data display and a keyboard for controlling its functions.

6. SAREX-II (Shuttle Amateur Radio Experiment)

The SAREX payload provides voice communications between the orbiter and amateur radio operators on the Earth. The SAREX will be operated at the discretion of the licensed crewmember. All crewmembers are licensed radio operators for STS-37.

7. AMOS (Air Force Maui Optical Site)

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

G. ON-ORBIT DTOs

1. Cabin Air Monitoring (DTO 623)

This DTO will use the solid sorbent sampler to continuously sample the orbiter atmosphere throughout the flight. The sampler collects trace levels of volatile contaminants which are used to determine spacecraft air quality and the effectiveness of the ECLSS in removing these compounds from the air.

2. VTR Demonstration (DTO 633)

The current orbiter VTRs are technologically outdated and have a recording time limit of 30 minutes. Commercial, off-the-shelf video recorders offer higher picture resolution and greater recording time. The purpose of this DTO is to evaluate the operational characteristics of off-the-shelf VCRs in zero-G.

3. Advanced EMU Glove Evaluation (DTO 639)

The purpose of this DTO is to evaluate fit, function, and thermal protection capabilities of an advanced (5000 series) EMU glove during an operational EVA.

4. Hydrazine Monitor (DTO 640)

The hydrazine monitor will sample the cabin air to detect the presence of hydrazine or monomethylhydrazine after completion of an EVA. Also a baseline sample is taken early in the mission before the EVA.

5. VTR Demonstration Enhancement (DTO 650)

The purpose of DTO 650 is to evaluate state-of-the-art camera and Liquid Crystal Display (LCD) technology in zero-g, as well as enhance the evaluation of DTO 633. Data consists of crew observations and downlinked video.

6. Mid-Range Targeted Stationkeeping (DTO 822)

The purpose of DTO 822 is to determine how accurately the orbiter may intercept a point and maintain this position several miles behind a target. At the 8 nmi range, the orbiter will perform a series of out-of-plane burns to evaluate the accuracy of star tracker navigation in maintaining a constant downrange position. A target will be deployed by an EVA crewmember. GRO will be the backup target.

7. SSF EVA Translation Evaluation (DTO 1202)

The purpose of this DTO is to provide on-orbit evaluation of EVA translation rates and techniques while performing representative Space Station tasks. This design data is required for sizing the SS EMU emergency reserve systems and establishing SS timelines. The DTO objectives include obtaining data during hand-over-hand translation along the orbiter sill, the same translation with the second crewmember on the crewmember's back (simulating the larger mass of the SS EMU), translation along a nonrigid translation aid, translation with a handheld item, and maneuvering a crewmember in a MFR with the RMS (if available).

8. SSF EVA Crew Loads Data Acquisition (DTO 1203)

The purpose of this DTO is to perform EVA tests to measure the crew induced and applied loads which will be encountered by handrails, foot restraints, CETA carts and rails, and truss structure during representative Space Station Freedom (SSF) EVA assembly and maintenance tasks. DTO objectives include obtaining crew loads applied to instrumented worksite. Additional tests will look at unrestrained EVA task evaluations, impulse loads, and translational loads.

9. SHARE II (Middeck) Flight Demonstration (DTO 1204)

Space Station Heatpipe Advanced Radiator Element (SHARE) was a full size, high capacity heatpipe which flew on STS-29. SHARE II, a reflight of the SHARE with a redesigned heatpipe, is currently in work. This middeck prototype will supply video data of heatpipe priming and bubble-management dynamics, and confirm the design of SHARE II.

10. TRAC Application for RMS Alignment/Deflection Measurements Evaluation (DTO 1205)

The purpose of this DTO is to provide on-orbit evaluation of the effectiveness of the TRAC (Targeting and Reflective Alignment Concept) for observing and measuring RMS deflections and as an aid for precise positioning of the RMS. The TRAC data is required for development of the RMS Dextrous End Effector. The RMS stiffness data is required to establish stiffness characteristics as design data for the Space Station Freedom Astronaut Positioning System (APS).

H. ON-ORBIT DSOs

1. Inflight Radiation Dose Distribution (DSO 469) Config 2

This DSO is to establish and evaluate analytical and measurement methods for assessing and managing health risks from exposure to space radiation. A charged particle spectrometer will measure the radiation environment inside the orbiter.

2. Hyperosmotic Fluid Countermeasure (DSO 479)

The purpose of this DSO is to compare different concentrations of salt and water in order to determine which concentration provides optimum protection against orthostatic stresses when returning to Earth. When the osmolality is greater, protection against orthostatic intolerance lasts longer. Each crewmember will drink one container of a premixed saline solution at each meal on the day before entry.

3. Documentary Television (DSO 901)

The purpose of DSO 901 is to provide live television or VTR dumps of crew activities, orbiter operations, payload deployment 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 accompanied with operational air-to-ground and/or operational intercom audio. VTR recording may be used when live television is not possible.

4. 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.

5. Documentary Still Photography (DSO 903)

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

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