

**FLIGHT DATA FILE**

*Shuttle*

# Flight Plan

## STS-48

**(CTL Cycle Trajectory)**

**Mission Operations Directorate  
Operations Division**

**Final PCN #1  
August 7, 1991**

Cover replaced  
by PCN-1  
(08/21/91)

<u>EVENT</u>	<u>CDT</u>		
Launch	17:57	Thur	Sept 12
UARS Release	22:37	Sat	Sept 14
KSC Landing	00:55	Wed	Sept 18



National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas



STS-48 FLIGHT PLAN

FINAL (August 7, 1991)

## PCN-1 (August 21, 1991) Sheet 1 of 1

## List of Implemented Change Requests (482s):

FLT PLN-1144	FLT PLN-1156	MULTI-467
FLT PLN-1148		MULTI-468
FLT PLN-1153A	FLT PLN-1158	
FLT PLN-1154	FLT PLN-1159	
FLT PLN-1155	FLT PLN-1160	

Incorporate the following:

1. Replace cover
2. Replace iii thru vi
3. Replace 1-1 & 1-2
4. Replace 2-1 thru 2-12
5. Replace 3-1 thru 3-34
6. Replace 4A-1 thru 4A-8
7. Replace 5-1 thru 5-4
8. Replace 6-3 & 6-4, 6-17 & 6-18
9. Replace 7-1 & 7-2

HE  
30pt 91

Prepared by:

*Gail A. Schneider*  
Book Manager

Approved by:

*M. R. Blum*  
Head, Flight Planning and  
Pointing Section

*M. R. Blum* FOR  
Chief, Flight Activity Branch

Encl: 71 pages



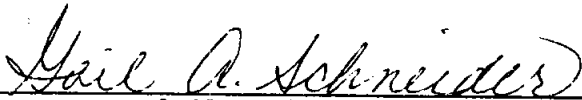
**File this PCN immediately behind the front cover as a permanent record**

MISSION OPERATIONS DIRECTORATE

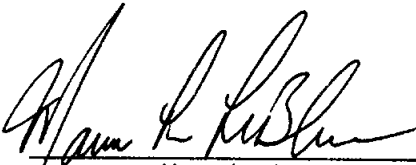
**STS-48 FLIGHT PLAN**

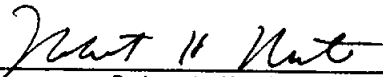
FINAL  
August 7, 1991

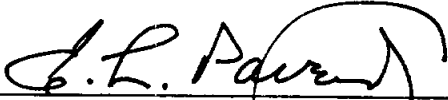
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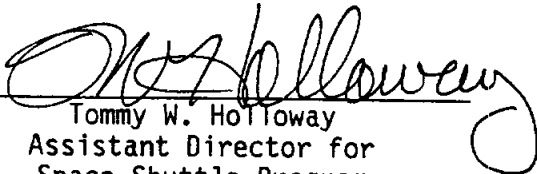
  
\_\_\_\_\_  
Gail A. Schneider  
Book Manager

APPROVED BY:

  
\_\_\_\_\_  
Marvin L. LeBlanc  
Head, Flight Planning and  
Pointing Section

  
\_\_\_\_\_  
Robert H. Nute  
Chief, Flight Activity Branch

  
\_\_\_\_\_  
Edward L. Pavelka, Jr.  
Chief, Operations Division

  
\_\_\_\_\_  
Tommy W. Holloway  
Assistant Director for  
Space Shuttle Program

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482#:	FLT PLN-1136	MULTI-462A	EXEMPTION#: 11,
	FLT PLN-1138	MULTI 468	23
	FLT PLN-1139	MULTI-471	
	FLT PLN-1143	FLT PLN - 1140	
	FLT PLN-1145	FLT PLN - 1141	
	FLT PLN-1146	FLT PLN - 1142	
	FLT PLN-1147		
	FLT PLN-1149		
	FLT PLN-1150		
	FLT PLN-1151		
	FLT PLN-1152		

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DH4/G. A. Schneider	483-4401
Nominal Timelines	DH4/F. F. Reynolds	483-4312
	DH4/W. F. Pafford	483-4358
Pointing	DH4/J. K. Lawson	483-4417

STS-48 FLIGHT PLAN

**LIST OF EFFECTIVE PAGES**

FINAL 08/07/91

PCN-1 08/21/91

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iii.....*	48/FIN 1	4-2.....	48/FIN
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v.....*	48/FIN 1	4A-2.....	48/FIN 1
vi.....*	48/FIN	4A-3.....	48/FIN 1
vii.....	48/FIN	4A-4.....	48/FIN 1
viii.....	48/FIN	4A-5.....	48/FIN 1
ix.....	48/FIN	4A-6.....	48/FIN 1
x.....	48/FIN	4A-7.....	48/FIN 1
1-1.....	48/FIN	4A-8.....	48/FIN
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2-2.....	48/FIN 1	5-1.....*	48/FIN
2-3.....	48/FIN 1	5-2.....*	48/FIN 1
2-4.....	48/FIN 1	5-3.....*	48/FIN 1
2-5.....	48/FIN 1	5-4.....*	48/FIN
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2-11.....	48/FIN 1	6-4.....*	48/FIN 1
2-12.....	48/FIN 1	6-5.....*	48/FIN
3-1.....	48/FIN	6-6.....*	48/FIN
3-2.....	48/FIN 1	6-7.....*	48/FIN
3-3.....	48/FIN 1	6-8.....*	48/FIN
3-4.....	48/FIN 1	6-9.....*	48/FIN
3-5.....	48/FIN 1	6-10.....*	48/FIN
3-6.....	48/FIN 1	6-11.....*	48/FIN
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3-8.....	48/FIN 1	6-13.....*	48/FIN
3-9.....	48/FIN 1	6-14.....*	48/FIN
3-10.....	48/FIN 1	6-15.....*	48/FIN
3-11.....	48/FIN 1	6-16.....*	48/FIN
3-12.....	48/FIN 1	6-17.....*	48/FIN 1
3-13.....	48/FIN 1	6-18.....*	48/FIN
3-14.....	48/FIN 1	7-1.....*	48/FIN
3-15.....	48/FIN 1	7-2.....*	48/FIN 1
3-16.....	48/FIN 1	7-3.....*	48/FIN
3-17.....	48/FIN 1	7-4.....*	48/FIN
3-18.....	48/FIN 1	7-5.....*	48/FIN
3-19.....	48/FIN	7-6.....*	48/FIN
3-20.....	48/FIN 1	7-7.....*	48/FIN
3-21.....	48/FIN 1	7-8.....*	48/FIN
3-22.....	48/FIN 1		
3-23.....	48/FIN 1		
3-24.....	48/FIN 1		
3-25.....	48/FIN		
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3-31.....	48/FIN		
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(\*) - Omit from flight book

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STS-48 FLT PLN CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card Code</u>
DAP Book Front Cover.....	6-5	FLT PLN-1a/48/O/A
UNIV PTG (Back of DAP Book Front Cover).....	6-5	FLT PLN-1b/48/O/A
DAP A TOC.....	6-6	FLT PLN-2a/48/O/A
DAP A1.....	6-6	FLT PLN-2b/48/O/A
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A5.....	6-8	FLT PLN-7a/48/O/A
DAP A6.....	6-9	FLT PLN-7b/48/O/A
A6.....	6-9	FLT PLN-8a/48/O/A
DAP A7.....	6-9	FLT PLN-8b/48/O/A
A7.....	6-9	FLT PLN-9a/48/O/A
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A8.....	6-10	FLT PLN-10a/48/O/A
DAP A9.....	6-10	FLT PLN-10b/48/O/A
A9.....	6-10	FLT PLN-11a/48/O/B
(Blank).....	6-11	FLT PLN-11b/48/O/A
ALT DAP TOC.....	6-11	FLT PLN-12a/48/O/A
DAP ALT 1.....	6-11	FLT PLN-12b/48/O/A
ALT 1.....	6-11	FLT PLN-13a/48/O/A
DAP ALT 2.....	6-12	FLT PLN-13b/48/O/A
ALT 2.....	6-12	FLT PLN-14a/48/O/B
(Blank).....	6-12	FLT PLN-14b/48/O/A
DAP B TOC.....	6-12	FLT PLN-15a/48/O/B
DAP B1.....	6-13	FLT PLN-15b/48/O/A
B1.....	6-13	FLT PLN-16a/48/O/A
DAP B2.....	6-13	FLT PLN-16b/48/O/A
B2.....	6-13	FLT PLN-17a/48/O/A
DAP B3.....	6-14	FLT PLN-17b/48/O/A
B3.....	6-14	FLT PLN-18a/48/O/A
DAP B4.....	6-14	FLT PLN-18b/48/O/A
B4.....	6-14	FLT PLN-19a/48/O/A
DAP B5.....	6-15	FLT PLN-19b/48/O/A
B5.....	6-15	FLT PLN-20a/48/O/A
DAP B6.....	6-15	FLT PLN-20b/48/O/A
B6.....	6-15	FLT PLN-21a/48/O/A
DAP B7.....	6-16	FLT PLN-21b/48/O/A
B7.....	6-16	FLT PLN-22a/48/O/A
DAP B8.....	6-16	FLT PLN-22b/48/O/A
B8.....	6-16	FLT PLN-23a/48/O/A
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TABLE.....	6-17	FLT PLN-24b/48/O/B
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DAP BOOK BACK COVER.....	6-18	FLT PLN-25b/48/O/A

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## INTRODUCTION

The STS-48 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 during the deploy timeframe are in the RMA Deploy 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-48 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the close to launch cycle version of the STS-48 Flight Initialization Data Pack.

The flight profile used for this Flight Plan is for a launch date of September 12, 1991, at 17:57 CDT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

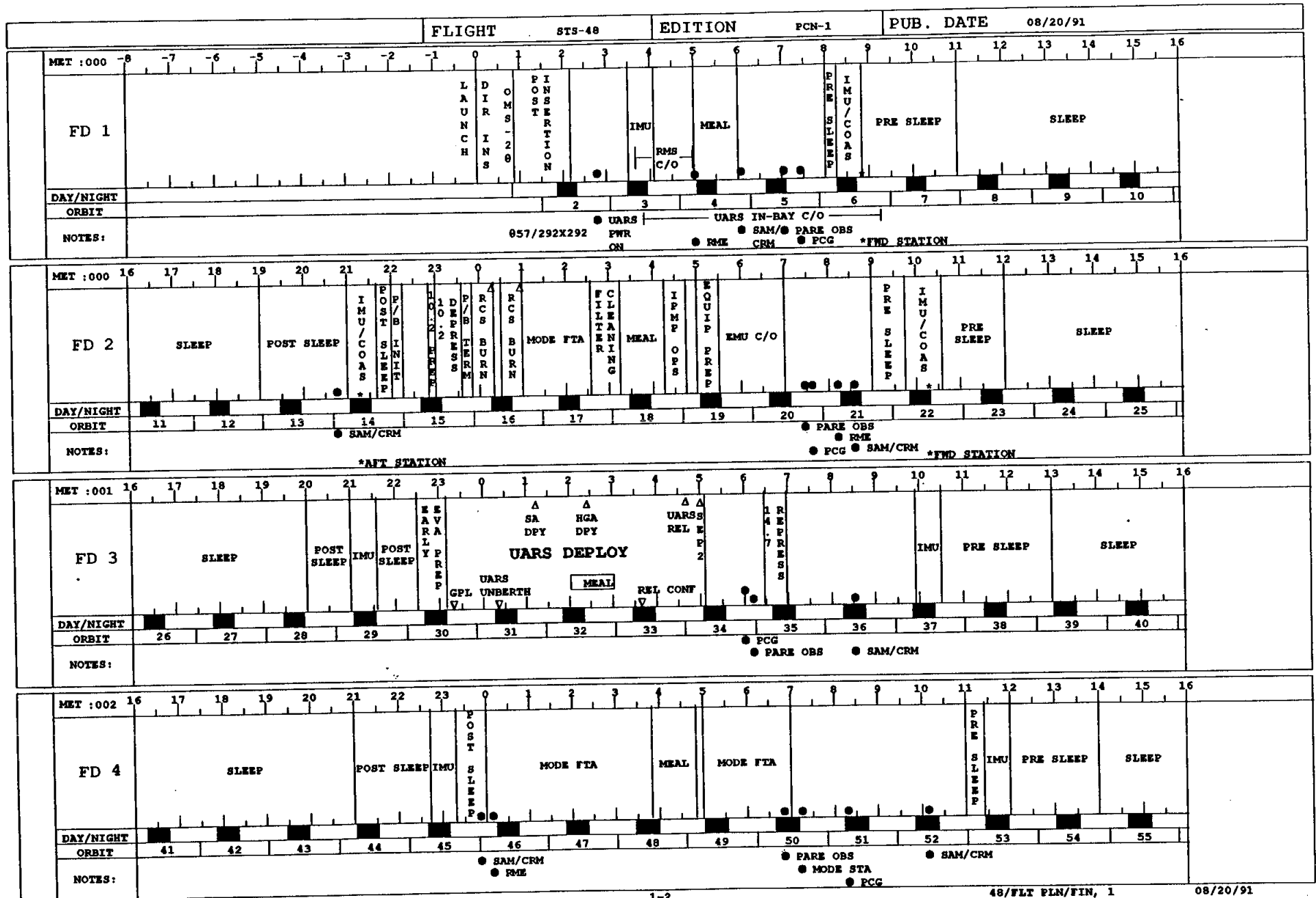
JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, Rev A, January 1990, has been used to build the timelines contained in this Flight Plan. Exemption 1403 #11 authorizes the Flight Day 3 quick response EVA timelines in Section 4. Exemption 1403 #23 authorizes the crew to waive the daily exercise requirement for the entire mission.

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-48 OVERVIEW

# OVERVIEW



		FLIGHT				STS-48		EDITION				FINAL		PUB. DATE											
														08/07/91											
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
FD 5	SLEEP																								
	POST SLEEP																								
	IMU																								
	FCS C/O																								
	HOT FIRE																								
	CERN																								
	MEAL																								
	CABIN STOW																								
	FILE TENDING																								
	PRE SLEEP																								
	IMU																								
	SLEEP																								
DAY/NIGHT	[Day/Night Cycle]																								
ORBIT	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70										
NOTES:	● SAM/CRM ● MODE STA ● MODE STA ● MODE STA ● PARE OBS ● MODE RME ● STA ● PCG DEACT ● SAM/CRM STOW																								
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
FD 6	SLEEP																								
	POST SLEEP																								
	IMU																								
	DEORBIT PREP																								
	DEORBIT																								
	BURST																								
	LANDING																								
DAY/NIGHT	[Day/Night Cycle]																								
ORBIT	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85										
NOTES:	● PARE OBS ● RME ● UASE PWR DN KSC LANDING: 5/06:58																								
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 7	[Empty]																								
DAY/NIGHT	[Day/Night Cycle]																								
ORBIT	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100										
NOTES:	[Empty]																								
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 8	[Empty]																								
DAY/NIGHT	[Day/Night Cycle]																								
ORBIT	101	102	103	104	105	106	107	108	109	110	111	112	113												
NOTES:	[Empty]																								

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SUMMARY TIMELINE

# SUMMARY TIMELINE

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
255:22:57/ 256:10:57	000:00:00/ 000:12:00	255:17:57/ 256:05:57	01/ 255 CDT	53.1	☉	SEPTEMBER 12, 1991	STS-48	FINAL	08/07/91
CDT :255 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)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
256:10:57/ 256:22:57	000:12:00/ 001:00:00	256:05:57/ 256:17:57	02/256 CDT	51.4	●	SEPTEMBER 13, 1991	STS-48	FINAL	08/07/91			
CDT :256												
FD :001	6	7	8	9	10	11	12	13	14			
MET :000	12	13	14	15	16	17	18	19	20			
								FD: 02	21			
									22			
									23			
									0 MET:001			
STS	SLEEP						ZLV SD YP M N V R	SD IM YP M N V R	ZLV M N V R	10.2 DEPRESS	1C 0C N 2F I G	
	POST SLEEP										H I R A I T F / B	H T R A R M F / B
										P S M / E I T I D V U D O P K 4	P A / C T I V O M 4 I D D R	
PL		● EPH LOAD										
DAY/NIGHT												
ORBIT	8	9	10	11	12	13	14	15				
CONTINGENCY GSTDN	-DGS -VAN				--DKR							
COVERAGE												
CONTINGENCY RIS												
COVERAGE	-IOS -HTS -VTS											
TDRS E W	[Timeline bars for TDRS E and W]											
ATTITUDE												
NOTES:	● - POCC CMDS IMU/COAS ● -ZLV, +YVV ● -ZLV, -XVV											

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
256:22:57/ 257:10:57	001:00:00/ 001:12:00	256:17:57/ 257:05:57	02/ 256 CDT	49.9	☉	SEPTEMBER 13, 1991	STS-48	FINAL	08/07/91

CDT :256	18	19	20	21	22	23	0	CDT:257	1	2	3	4	5	12
FD :002	0	1	2	3	4	5	6	7	8	9	10	11		
MET :001														

<b>STS</b>				<b>FILTER CLEANING</b>	<b>MEAL</b>				<b>OTO 648</b>			<b>ZLV</b> <b>MNV</b> <b>R</b>	<b>SDP</b> <b>LM</b> <b>YP</b>	<b>PC</b> <b>IN</b> <b>F</b>	<b>PR</b> <b>IN</b> <b>V</b>	<b>SD</b> <b>PU</b> <b>LM</b> <b>YP</b>	<b>I</b> <b>M</b> <b>U</b> <b>M</b>	<b>Y</b> <b>U</b> <b>M</b> <b>M</b>	<b>C</b> <b>U</b> <b>O</b> <b>C</b>	<b>W</b> <b>H</b> <b>E</b> <b>Y</b>	<b>Z</b> <b>U</b> <b>L</b> <b>V</b>	<b>M</b> <b>N</b> <b>N</b> <b>V</b> <b>R</b>		
------------	--	--	--	------------------------	-------------	--	--	--	----------------	--	--	--------------------------------------	--------------------------------------	------------------------------------	------------------------------------	--	--	--	--	--	--	--	--	--

	<b>DSO 604</b>	<b>P/TV06 SETUP MODE</b>				<b>EQUIP PREP</b>		<b>EMU C/O</b> <b>(2 EMU'S)</b>		<b>DSO 602 DOFF</b>				<b>PRE SLEEP</b>
--	----------------	--------------------------	--	--	--	-------------------	--	------------------------------------	--	---------------------	--	--	--	------------------

	<b>P/TV04 ACT MIDDK</b>	<b>FTA SETUP</b>	<b>FTA OPS</b>	<b>FTA</b> <b>S</b> <b>T</b> <b>O</b> <b>W</b>				<b>P/TV04 SETUP MIDDK</b>	<b>P/TV04 ACT MIDDK</b>	<b>P</b> <b>S</b> <b>E</b> <b>T</b> <b>T</b> <b>V</b> <b>P</b> <b>0</b> <b>7</b> <b>P</b> <b>C</b> <b>G</b>	<b>PCG</b> <b>VDA</b>		<b>1</b> <b>0</b> <b>2</b> <b>M</b> <b>A</b> <b>I</b> <b>N</b> <b>T</b> <b>I</b>
--	-------------------------	------------------	----------------	--	--	--	--	---------------------------	-------------------------	--	--------------------------	--	--

<b>PL</b>	<b>IPMP OPS</b>						<b>● EPH LOAD</b> <b>▽</b>			<b>P</b> <b>A</b> <b>R</b> <b>E</b> <b>O</b> <b>B</b> <b>S</b>	<b>P</b> <b>C</b> <b>G</b> <b>O</b> <b>B</b> <b>S</b>	<b>T</b> <b>A</b> <b>P</b> <b>E</b> <b>R</b> <b>E</b> <b>M</b>	<b>D</b> <b>E</b> <b>O</b> <b>V</b> <b>E</b> <b>R</b> <b>E</b> <b>C</b> <b>T</b> <b>O</b> <b>R</b>	<b>W</b> <b>H</b> <b>E</b> <b>R</b> <b>O</b> <b>F</b>
-----------	-----------------	--	--	--	--	--	-------------------------------	--	--	--	--	--	--	--

DAY/NIGHT: [Shaded bars indicating day/night cycle from 16:00 to 23:00]

ORBIT: 16 17 18 19 20 21 22 23

CONTINGENCY GSTDN: ---DGS (16), ---VAN, ---GDX, ---GDS, ---MIL, ---BDA (17), ---CAN, ---VAN, ---GDX, ---GDS, ---DKR (18), ---GDX, ---GDS, ---DKR, ---CAN (19), ---BDA, ---MIL, ---DKR (20), ---VAN, ---GDS, ---BDA (21), ---VAN, ---GDS, ---BDA (22), ---DGS (23), ---VAN, ---GDS, ---GDX (24)

CONTINGENCY RTS COVERAGE: ---IOS (16), ---DGS, ---IOS (17), ---NHS (18), ---HTS, ---VTS, ---CTS (19), ---NHS (20), ---HTS, ---VTS, ---CTS (21), ---GTS, ---NHS, ---VTS (22), ---GTS, ---NHS, ---VTS (23), ---VTS, ---CTS (24)

TDRS: [Timeline of TDRs from 16:00 to 23:00]

ATTITUDE: ---ZLV -XVV (18), IMU/COAS (21-22), ---ZLV -XVV (23)

NOTES:  
 ● - POCB CMDS  
 ◎ DSO 604 VIS VEST INTG 01-1  
 △ Flat bottom, Oil  
 ◎ DTO 648 ELECTRONIC CAMERA  
 ◎ PCG CLEANING/TEMP CHECK  
 ◎ DSO 602 BP VARIABILITY  
 ◎ MEMORY MODULE REPLACEMENT  
 ◎ -ZLV, +YVV  
 △ STATION 2-NaI  
 ◎ FWD STATION  
 ◎ -ZLV, -XVV

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																																						
257:10:57/ 257:22:57	001:12:00/ 002:00:00	257:05:57/ 257:17:57	03/ 257 CDT	48.0		SEPTEMBER 14, 1991	STS-48	FINAL	08/07/91																																						
CDT :257	FD :002	MET :001	12	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0																									
STS	SLEEP															IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU	IMU															
																POST SLEEP															E/TVO2P SETUP UARS	TVO2P/TV02 ACT UARS															
																10-2	MAINT	EVA PREP																UARS	PI LOCK												
PL																EPH LOAD																														UARS	PI LOCK
DAY/NIGHT	[Day/Night Cycle]																																														
ORBIT	23	24	25	26	27	28	29	30																																							
CONTINGENCY GSTDN COVERAGE	DGS	VAN											DKR	DKR	CAN	BDA	CAN	MIL	BDA	DGS	CAN																										
CONTINGENCY RIS COVERAGE	IOS	HTS	VTS	HTS	HTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	GTS	NHS																													
TDRS	[TDRS Coverage]																																														
ATTITUDE																-ZLV -XVV																IMU	-ZLV +YVV	-ZLV -XVV													
NOTES:	● - POCB CMDS																																						● -ZLV, +YVV	● UARS PREP	● UARS CONFIG	● -ZLV, -XVV					

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
257:22:57 / 258:10:57	002:00:00 / 002:12:00	257:17:57 / 258:05:57	03 / 257 CDT	46.4		SEPTEMBER 14, 1991	STS-48	FINAL	08/07/91				
CDT :257 FD :003 MET :002	18 19	20	21	22	23	0	1	2	3	4	5	11	12
STS	MNVR DPY ATT	MNVR DPY ATT	MEAL	UARS	RELEASE	TDRS	LOAD	POST EVA	PRE SLEEP				
	P/TV02 ACT UARS			RELEASE		POST EVA	PRE SLEEP						
	UARS RELEASE OPS												
PL	UARS UNBERTH	UARS SA REL	HGA DPY & TEST	HGA DPY & TEST	UARS REL CONF	UARS RELEASE	PCG HOBS	RMS PWRDN	CLOSEOUT	DSO 611	TAPE REM	SAM DET	AD
DAY/NIGHT													
ORBIT	31	32	33	34	35	36	37	38					
CONTINGENCY	DGS	VAN	CAN	VAN	GDS	BDA	MIL	BDA	VAN	GDS	DGS	MIL	DGS
GSTDN		GDX		GDX	BDA	DKR							
COVERAGE		GDS		GDS	DKR								
CONTINGENCY	IOS	VTS	IOS	NHS	NHS	VAN	GDS	MIL	VAN	GDS	DGS	MIL	DGS
COVERAGE		CTS		HTS	HTS	GTS	NHS						
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					
258:10:57/ 258:22:57	002:12:00/ 003:00:00	258:05:57/ 258:17:57	04/ 258 CDT	44.3		SEPTEMBER 15, 1991	STS-48	FINAL	08/07/91					
CDT :258	FD :003	MET :002					FD: 04		MET:003					
STS		SLEEP						ZLVMNV R	SDPULM YF	SDPULM YF	I M U M N V R	H C M N V R & INIT GG		
	PRE SLEEP													
													PS E / T U O F 6 M O D E	
PL													S A M T P T / O	
DAY/NIGHT														
ORBIT	38	39	40	41	42	43	44	45						
CONTINGENCY GSDN COVERAGE	DGS				DKR		DKR		CAN	BDA		CAN	BDA	MIL GDS VAN
CONTINGENCY RIS COVERAGE	IOS	HTS		IOS	HTS		GTS		GTS		GTS		NHS	CES VTS NHS
IDRS E W														
ATTITUDE					-ZLV +YVV						BIASED -ZLV		IMU	
NOTES:											BIASED -ZLV, +YVV			

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
258:22:57/ 259:10:57	003:00:00/ 003:12:00	258:17:57/ 259:05:57	04/258 CDT	42.4		SEPTEMBER 15, 1991	STS-48	FINAL	08/07/91
CDT :258					CDT:259				
FD :004	18	19	20	21	22	23	0	1	2
MET :003	0	1	2	3	4	5	6	7	8
STS			MEAL						
	FTA SETUP	FTA OPS		FTA OPS			STA OPS		
	DSO 604								
PL			DSO 602 DON				DTO 648		
DAY/NIGHT									
ORBIT	46	47	48	49	50	51	52	53	
CONTINGENCY	BDA	DGS	CAN	VAN	GDS	BDA	DGS	VAN	GDX
GSTDN		CAN		GDS		DKR		GDS	GDS
COVERAGE		VAN		GDX		CAN		GDX	
CONTINGENCY	IOS	VTS	IOS	NHS	NHS	GTS	NHS	VTS	VAN
COVERAGE		CTS		VTS	VTS	VTS	VTS	CTS	HTS
TDRS		NHS		CTS	CTS	CTS	CTS		VT
ATTITUDE			GRAVITY GRADIENT				BIASED -ZLV		IMU
NOTES:	DSO 604 VIS VEST INTG OI-1		DSO 602 BP VARIABILITY		BIASED -ZLV, +YVV			-ZLV, +YVV	
	MEMORY MODULE REPLACEMENT		Spher. bottom,oil		ASSEMBLE BASELINE CONFIG				
	Flat bottom,oil				PCG CLEANING/TEMP CHECK				
					DTO 648 ELECTRONIC CAMERA				
					STA 1, BGO				



GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
259:10:57/ 259:22:57	003:12:00/ 004:00:00	259:05:57/ 259:17:57	05/ 259 CDT	40.5		SEPTEMBER 16, 1991	STS-48	FINAL	08/07/91
CDT :259									
FD :004	6	7	8	9	10	11	12	13	14
MET :003	12	13	14	15	16	17	18	19	20
									21
									22
									23
									0
									MET:004
STS					SLEEP				ZLV MNV R
	PRE SLEEP								WD A S M T P E I N I T
PL									S A M T P T /
DAY/NIGHT									
ORBIT	53	54	55	56	57	58	59	60	
CONTINGENCY GSTDN COVERAGE	-DGS				-DKR	-CAN	-DKR	-CAN	-MIL -BDA
									-DGS CAN
CONTINGENCY RTS COVERAGE	-IOS	-HTS				-GTS			-CAN
									-NHS -IOS
TDRS									
ATTITUDE					-ZLV +YVV				
									BIASED -ZLV BIASED -ZLV, YVV
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
259:22:57/ 260:10:57	004:00:00/ 004:12:00	259:17:57/ 260:05:57	05/ 259 CDT	38.6		SEPTEMBER 16, 1991	STS-48	FINAL	08/07/91
CDT :259					CDT:260				
FD :005									
MET :004									
STS		FCS C/O			MEAL			CABIN STOW	
	POST SLEEP								PRE SLEEP
		STA OPS		STA OPS					FILTER CLEANING
PL			DSO 602 DOFF	DTO 648				PCG DEACT	SAM DEACT
DAY/NIGHT									
ORBIT	61	62	63	64	65	66	67	68	
CONTINGENCY	MIL BDA		CAN	VAN GDS	VAN GDS BDA		DGS	VAN GDS	GDX
GSTDN									
COVERAGE	DGS	CAN	VAN GDS	GDX BDA	DKR	CAN	VAN GDS	MIL BDA	DGS
CONTINGENCY	IOS		IOS	NHS	NHS	NHS	NHS	NHS	VAN GDS
GSTDN									
COVERAGE	VTS		VTS	HTS	HTS	GTS	GTS	VTS	HTS
TDRS									IOS
ATTITUDE		-ZLV +YVV		TDRS					BIASED -ZLV
	IMU		HOT FIRE						PTC IMU
NOTES:	o APU HTR ACT o -ZLV, +YVV o ASSEMBLE ALPHA JOINT		o DSO 602 BP VARIABILITY o APU HTR RECONFIG o DTO 648 ELECTRONIC CAMERA o -ZLV, +YVV o ASSEMBLE AJ + CORNER			o DSO 611 MAS o MEMORY MODULE REPLACEMENT o ADD FLEX APPENDAGE		o BIASED -ZLV, +YVV	

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE										
260:10:57/ 260:22:57	004:12:00/ 005:00:00	260:05:57/ 260:17:57	06/ 260 CDT	36.6		SEPTEMBER 17, 1991	STS-48	FINAL	08/07/91										
CDT :260																			
FD :005																			
MET :004																			
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0
	12	13	14	15	16	17	18	19	20	21	22	23	0						
STS	MI NN VI RT  4E 1 C						SLEEP												
		PRE SLEEP																	
PL																			
DAY/NIGHT																			
ORBIT	68	69	70	71	72	73	74	75											
CONTINGENCY GSTDN COVERAGE				-DKR	-DKR	-CAN	-DKR	-CAN	-DGS	-CAN	-MIL	-BDA	-DGS						
CONTINGENCY RIS COVERAGE	-IOS	-HTS	-HTS	-GTS	-GTS	-NHS	-NHS	-NHS	-NHS	-IOS									
TDRS E W																			
ATTITUDE							PTC												
NOTES:																			

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
260:22:57/ 261:10:57	005:00:00/ 005:12:00	260:17:57/ 261:05:57	06/260 CDT	34.6		SEPTEMBER 17, 1991	STS-48	FINAL	08/07/91
CDT :260 FD :006 MET :005									
STS	TERM PTC	IMU MNRV	IMU MNRV	IMU MNRV	IMU MNRV	IMU MNRV	IMU MNRV	IMU MNRV	IMU MNRV
	POST SLEEP								
PL									
DAY/NIGHT									
ORBIT	76	77	78	79	80	81	82	83	
CONTINGENCY GSTDN	BDA MIL								
COVERAGE									
CONTINGENCY R/S									
COVERAGE									
TDRS E W									
ATTITUDE									
NOTES:	<p>           @ ENTRY DSO PREP: 603            @ DSO 469 RAD DOSE DISTR DEACT            @ RME STOW         </p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 2px;">             * DEORBIT BURN 05/05:49           </div> <div style="border: 1px solid black; padding: 2px;">             * KSC LANDING 05/06:58           </div> </div>								

SUMMARY TIMELINE

# SUMMARY TIMELINE

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
255:22:57 / 256:10:57	000:00:00 / 000:12:00	255:17:57 / 256:05:57	01 / 255 CDT	53.1		SEPTEMBER 12, 1991	STS-48	PCN-1	08/20/91	
CDT :255	FD :001	MET :000								
<div style="display: flex; justify-content: space-between;"> <span>18</span><span>19</span><span>20</span><span>21</span><span>22</span><span>23</span><span>0</span><span>1</span><span>2</span><span>3</span><span>4</span><span>5</span><span>6</span><span>7</span><span>8</span><span>9</span><span>10</span><span>11</span><span>12</span> </div>										
STS	D LAUNCH	IR RECT	OM S-2	POST INSERTION	UNSTON CABIN	RMS C/O	SAM SETUP	PRE SLEEP	SLEEP	
PL	IN SERTION									
DAY/NIGHT										
ORBIT										
CONTINGENCY GSTDN COVERAGE										
CONTINGENCY RIS 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
256:10:57/ 256:22:57	000:12:00/ 001:00:00	256:05:57/ 256:17:57	02/ 256 CDT	51.4	●	SEPTEMBER 13, 1991	STS-48	PCN-1	08/20/91
CDT :256	FD :001	MET :000				FD: 02 20			MET:001
STS	SLEEP								
	POST SLEEP								
PL	● EPH LOAD								
DAY/NIGHT	ORBIT								
CONTINGENCY GSTDN COVERAGE	DGS VAN DKR DKR CAN DKR CAN NHS								MIL BDA
CONTINGENCY RNS COVERAGE	IOS HTS VTS IOS HTS GTS GTS								CTS
TDRS E W	-ZLV -XVV IMU/COAS -ZLV +YVV -ZLV -XVV RCS1								
ATTITUDE	● -ZLV, +YVV ● AFT STATION ● -ZLV, -XVV								
NOTES:	● - POCC CMDS								

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
256:22:57/ 257:10:57	001:00:00/ 001:12:00	256:17:57/ 257:05:57	02/ 256 CDT	49.9		SEPTEMBER 13, 1991	STS-48	PCN-1	08/20/91						
CDT :256					CDT:257										
FD :002															
MET :001															
STS	RCS - BURN RCS	RCS2 RCS BURN +X	ELV MNV R	FILTER CLEANING	MEAL	DTO 648	ELV MNV R	SD PULM MNV R	PCOIN MNV R	SD PULM MNV R	I MU MNV R	SD PULM MNV R	COIN MNV R	ELV MNV R	
	P/TV06 SETUP MODE			P/TV04 SETUP MIDDK		EQUIP PREP	EMU C/O (2 EMU'S)		DSO 602 DOFF				PRE SLEEP		
	DSO 604 SETUP	FTA SETUP	FTA OPS	FTA STOP		P/TV04 ACT MIDDK		P/TV04 SETUP MIDDK	P/TV04 ACT MIDDK			1 0 2 M A I N T			
PL				IPMP OPS				PAR GE O B S	P C G O B S	H I H P O W E R	T A P E R E M	D M O V E C T O R			
					EPH LOAD										
DAY/NIGHT															
ORBIT	16	17	18	19	20	21	22	23							
CONTINGENCY GSTDN COVERAGE	DGS	VAN GDX GDS MIL BDA	CAN VAN GDX GDS	VAN GDX GDS DKR	GDX GDS BDA DKR	BDA MIL DKR	VAN GDS BDA	DGS	VAN GDS GDX MIL	VAN GDS GDX MIL	VAN GDS GDX MIL	VAN GDS GDX MIL	VAN GDS GDX MIL	VAN GDS GDX	
CONTINGENCY RTS COVERAGE	IOS	VTS CTS NHS	IOS NHS	VTS CTS NHS	VTS CTS NHS	VTS CTS NHS	VTS CTS NHS	VTS CTS	VTS CTS NHS	VTS CTS NHS	VTS CTS NHS	VTS CTS NHS	VTS CTS	VTS CTS	
TDRS	E W														
ATTITUDE	RCS1 RCS2				ELV XVV				IMU/COAS					ELV XVV	
NOTES:	<p>DSO 604 VIS VEST INTG OI-1          @ -ELV, -XVV          A Flat bottom, Oil</p> <p>● - POCG CMDS</p> <p>DTO 648 ELECTRONIC CAMERA          PCG CLEANING/TEMP CHECK          DSO 602 BP VARIABILITY          MEMORY MODULE REPLACEMENT          @ -ELV, +YVV          A STATION 2-NaI</p> <p>JWD STATION          @ -ELV, -XVV</p>														



GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																			
257:10:57/ 257:22:57		001:12:00/ 002:00:00		257:05:57/ 257:17:57		03/ 257 CDT	48.0		SEPTEMBER 14, 1991	STS-48	PCN-1	08/20/91																			
CDT :257		FD :002		MET :001		6		7		8		9		10		11		12		13		14		15		16		17		0	
STS		SLEEP																													
PL																															
DAY/NIGHT																															
ORBIT		23		24		25		26		27		28		29		30															
CONTINGENCY GSTDN COVERAGE		DGS		VAN				DKR		DKR		CAN		BDA		CAN		MIL		BDA		DGS		CAN							
CONTINGENCY RIS COVERAGE		IOS		HTS		HTS		GTS		GTS		GTS		GTS		NHS															
TDRS		E		W																											
ATTITUDE																															
NOTES:																															


GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
257:22:57 / 258:10:57		002:00:00 / 002:12:00		257:17:57 / 258:05:57		03 / 257 CDT	46.4		SEPTEMBER 14, 1991	STS-48	PCN-1	08/20/91
CDT	:257							CDT:258				
FD	:003											
MET	:002											
STS		MNVR DPY ATT		MEAL		UARS RELEASE						
PL		UARS UNBERTH	UARS SA REL & DPY	HGA DPY & TEST	HGA DPY & TEST	UARS REL CONF						
DAY/NIGHT												
ORBIT		31	32	33	34	35	36	37	38			
CONTINGENCY GSTDN		DGS		CAN		GDS GDX BDA		BDA				
COVERAGE			VAN GDX GDS MIL VAN BDA									
CONTINGENCY RTS		IOS		IOS		NHS		NHS				
COVERAGE			VTS CTS NHS									
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										
258:10:57/ 258:22:57		002:12:00/ 003:00:00		258:05:57/ 258:17:57		04/258	CDT	44.3	SEPTEMBER 15, 1991	STS-48	PCN-1	08/20/91										
CDT	:258	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	MET:003	
FD	:003	12	13	14	15	16	17	18	19	20	21	22	23									
MET	:002																					
STS							SLEEP															
PL																						
DAY/NIGHT																						
ORBIT																						
CONTINGENCY CSIDN COVERAGE																						
CONTINGENCY RTS COVERAGE																						
TDRS E W																						
ATTITUDE																						
NOTES:																						

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
258:22:57/ 259:10:57	003:00:00/ 003:12:00	258:17:57/ 259:05:57	04/258 CDT	42.4		SEPTEMBER 15, 1991	STS-48	PCN-1	08/20/91
CDT :258					CDT:259				
FD :004									
MET :003									
STS			MEAL						
	FTA SETUP	FTA OPS		FTA OPS		STA OPS			PRE SLEEP
	DSO 604								
PL			DSO 602 DON				DTO 648		
DAY/NIGHT									
ORBIT	46	47	48	49	50	51	52	53	
CONTINGENCY GSTDN	-BDA	-DGS -CAN	-CAN -VAN -GDS -GDX	-GDS -BDA -DKR	-MIL -BDA	-VAN -GDS -GDX	-DGS -VAN -GDS -GDX	-GDX	
CONTINGENCY RTS COVERAGE	-IOS	-IOS -VTS -CTS -NHS	-NHS -HTS -VTS -CTS	-CAN -VAN -HTS -VTS -CTS	-VAN -GDS -MIL	-MIL -BDA	-DGS -VAN -HTS -VTS		
TDRS									
ATTITUDE			GRAVITY GRADIENT			BIASED -ZLV			
NOTES:	<p>           @DSO 604 VIS VEST INTG OI-1            @MEMORY MODULE REPLACEMENT            ● Spher. bottom,oil            ● Spher. bottom,water            ● Flat bottom,water            @DSO 602 BF VARIABILITY            ● Spher. bottom,water            @BIASED -ZLV, +YVV            @ ASSEMBLE BASELINE CONFIG            ● Spher. bottom water            @PCG CLEANING/TEMP CHECK            @DTO 648 ELECTRONIC CAMERA            ● STA 1, BGO         </p>								

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																	
259:10:57/ 259:22:57		003:12:00/ 004:00:00		259:05:57/ 259:17:57		05/ 259 CDT	40.5		SEPTEMBER 16, 1991	STS-48	PCN-1	08/20/91																	
CDT	:259	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	MET:004							
FD	:004	12	13	14	15	16	17	18	19	20	21	22	23																
MET	:003																												
STS	SLEEP															ZLV	W	D	M	A	S	M	F	T	E	I	N	I	T
	PRE SLEEP										POST SLEEP																		
PL																					S	A	M	T	P	T	/	O	
DAY/NIGHT																													
ORBIT	53	54	55	56	57	58	59	60																					
CONTINGENCY GSDN	-DGS		-DKR				-CAN		-DKR		-CAN		-BDA		-CAN		-MIL		-BDA		-DGS		-CAN						
CONTINGENCY RIS	-IOS		-HTS		-HTS		-CTS		-GTS		-NHS		-IOS																
TDRS	E																												
ATTITUDE	-ZLV +YVV															BIASED -ZLV					BIASED -ZLV, +YVV								
NOTES:																													

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE											
259:22:57/ 260:10:57	004:00:00/ 004:12:00	259:17:57/ 260:05:57	05/ 259 CDT	38.6		SEPTEMBER 16, 1991	STS-48	PCN-1	08/20/91											
CDT :259					CDT:260															
FD :005																				
MET :004																				
STS	18 M N V R M N V R M N V R	19 FCS C/O	20 FCS C/O	21 FCS C/O	22 FCS C/O	23 FCS C/O	0 MEAL	1 MEAL	2 MEAL	3 MEAL	4 MEAL	5 MEAL	6 MEAL	7 MEAL	8 MEAL	9 MEAL	10 MEAL	11 MEAL	12 MEAL	
	POST SLEEP	P/TV06 SETUP MODE		P/TV03 SETUP CONF		P/TV03 CONF		P/TV06 SETUP MODE		P/TV03 CONF		P/TV06 SETUP MODE		P/TV03 CONF		P/TV06 SETUP MODE		P/TV03 CONF		PRE SLEEP
		STA UNSTOW		STA OPS		STA OPS		STA OPS		STA OPS		STA STOW		STA OPS		STA STOW		STA OPS		FILTER CLEANING
PL				DSO 602 DOFF		DTO 648								PAR OBS		DSO 611		PCG DEACT		SAM DEACT
DAY/NIGHT																				
ORBIT	61	62	63	64	65	66	67	68												
CONTINGENCY GSTDN	MIL BDA	DGS	CAN	VAN GDS	VAN GDS	BDA	DGR	CAN	VAN GDS	MIL BDA	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS
COVERAGE		CAN	VAN GDS	DGR	CAN	VAN GDS	MIL BDA	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS	VAN GDS	DGS
CONTINGENCY RIS	IOS	VTS	IOS	NHS	HTS	VTS	CTE	NHS	HTS	VTS	CTE	NHS	HTS	VTS	CTE	NHS	HTS	VTS	CTE	IOS
COVERAGE		NHS																		
TDRS																				
ATTITUDE	IMU	-ELV +YVV	HOT FIRE	TDRS																BIASED -ELV +YVV
NOTES:	o APU HTR ACT o -ELV, +YVV o ASSEMBLE ALPHA JOINT		o DSO 602 BP VARIABILITY o APU HTR RECONFIG o DTO 648 ELECTRONIC CAMERA o -ELV, +YVV o ASSEMBLE AJ + CORNER		o DSO 611 MAS o MEMORY MODULE REPLACEMENT o ADD FLEX APPENDAGE		o BIASED -ELV, +YVV													

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON 	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE											
260:10:57/ 260:22:57		004:12:00/ 005:00:00		260:05:57/ 260:17:57		06/260 CDT	36.6		SEPTEMBER 17, 1991	STS-48	PCN-1	08/20/91											
CDT	:260	6																					
FD	:005	7																					
MET	:004	12	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	0	MET:005		
STS		SLEEP																					
		PRE SLEEP																					
		POST SLEEP																					
PL																							
DAY/NIGHT																							
ORBIT		68	69	70	71	72	73	74	75														
CONTINGENCY					-DKR					-DGR	CAN												
GSTDN																							
COVERAGE																							
CONTINGENCY																							
RTS																							
COVERAGE																							
TDRS																							
E																							
W																							
ATTITUDE																							
NOTES:																							

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
260:22:57 / 261:10:57		005:00:00 / 005:12:00		260:17:57 / 261:05:57		06/260 CDT	34.6		SEPTEMBER 17, 1991	STS-48	PCN-1	08/20/91				
CDT	:260											CDT:261				
FD	:006															
MET	:005															
STS	TERM PTC	IMU MNR	XSI MNR	PROV MED				IMU MNR	IPMB ALIP S							
	POST SLEEP		ENT DSO PREP		DEORBIT PREP				DEORBIT	KSC						
			DSO						BURN	LANDING						
PL	PARA OBES		RME STOW		CASE PWRDN				*	*						
DAY/NIGHT	[Day/Night Cycle Bar]															
ORBIT	76		77		78		79		80		81		82		83	
CONTINGENCY GSTDN	BDA MIL		DGS		CAN		VAN GDS		GDX MIL		DGS		VAN GDS		GDX	
COVERAGE	CAN		VAN GDX GDS		DKR		CAN		VAN GDS		MIL		VAN GDS MIL		DGS	
CONTINGENCY RTS	IOS		NHS		HTS		NHS		GTS		NHS		GTS		NHS	
COVERAGE	IOS		HTS VTS CTS		HTS VTS CTS		HTS VTS CTS		GTS VTS CTS		GTS VTS CTS		GTS VTS CTS		IOS	
TDRS	[TDRS Bar]															
ATTITUDE	IMU		XSI				IMU/VERIF				D/O		ENTRY			
NOTES:	<p>⊙ ENTRY DSO PREP: 603          ⊙ DSO 469 RAD DOSE DISTR DEACT          ⊙ RME STOW</p> <p>* DEORBIT BURN 05/05:49      * KSC LANDING 05/06:58</p>															



DETAILED TIMELINE

DETAILED  
TIMELINE

# DETAILED TIMELINE

## STS 48 (FD 01)

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

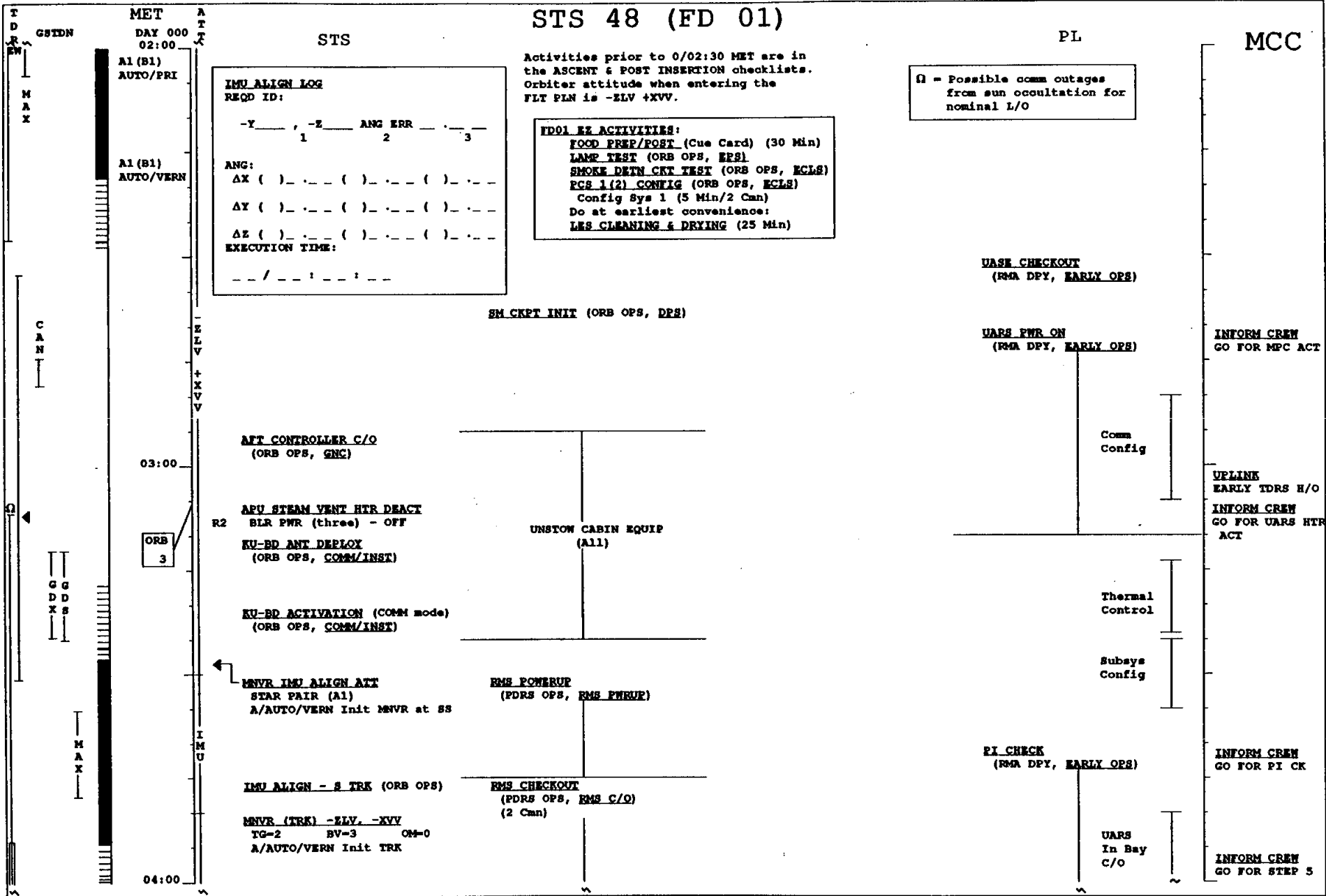
**FD01 RZ ACTIVITIES:**  
**FOOD PREP/POST** (Cue Card) (30 Min)  
**LAMP TEST** (ORB OPS, EPS)  
**SMOKE DETN CKT TEST** (ORB OPS, ECLS)  
**RCS 1(2) CONFIG** (ORB OPS, ECLS)  
 Config Sys 1 (5 Min/2 Can)  
 Do at earliest convenience:  
**LES CLEANING & DRYING** (25 Min)

**IMU ALIGN LOG**  
 REQD ID:  
 -Y\_\_\_\_, -Z\_\_\_\_ ANG ERR \_\_\_\_  
           1          2          3

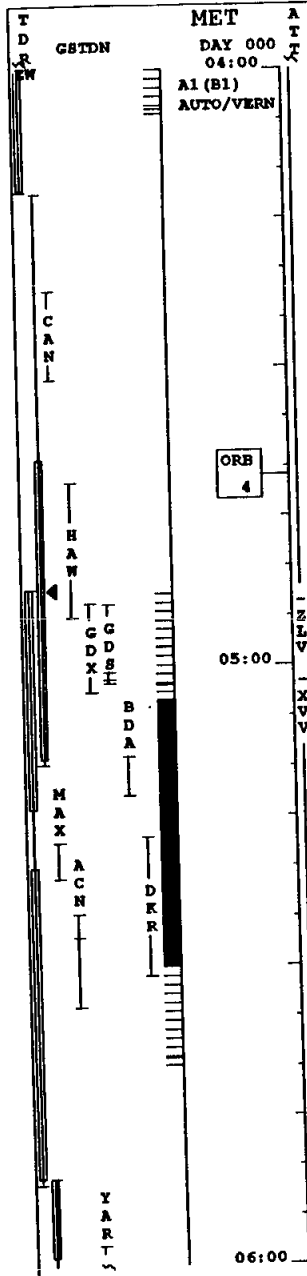
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 ΔY ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_  
 ΔZ ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_

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

Ω = Possible comm outages from sun occultation for nominal L/O



# STS 48 (FD 01)



**STS**  
 MNVR (TRK) -ZLV, -XVV  
 TG-2 BV-3 OM=0  
 A/AUTO/VERN Init TRK

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

APU COOL OFF (On MCC Cue)  
 R2 APU FUEL PUMP/VLV COOL B-OFF

**RMS CHECKOUT**  
 (PDRS OPS, RMS C/O)  
 (2 Cmn)

**UARS BAY SCAN**  
 (RMA DPY, EARLY OPS)

**RMS POWERDOWN**  
 (PDRS OPS, RMS PWDRN)

**P/TV04 SETUP (Middeck)**  
 (PHOTO/TV, P/TV SCENES)  
 SAM/CREAM Setup

**PL**  
**PI CHECK**  
 (RMA DPY, EARLY OPS)

**UARS MON DISP CK**  
 (RMA DPY, EARLY OPS)

**RAD DOSE DIST (DSO 469)**  
 (MED C/L, MED DSO's)  
 Step A, Photo H/W Config

**ACTIVATION/CHECKOUT**  
 (PL OPS, RMS III)  
 Locate at Sta 1, A/L ceiling

**MCC**

**INFORM CREW**  
 GO FOR APU  
 COOL OFF

**UPLINK**  
 FDA DSBL

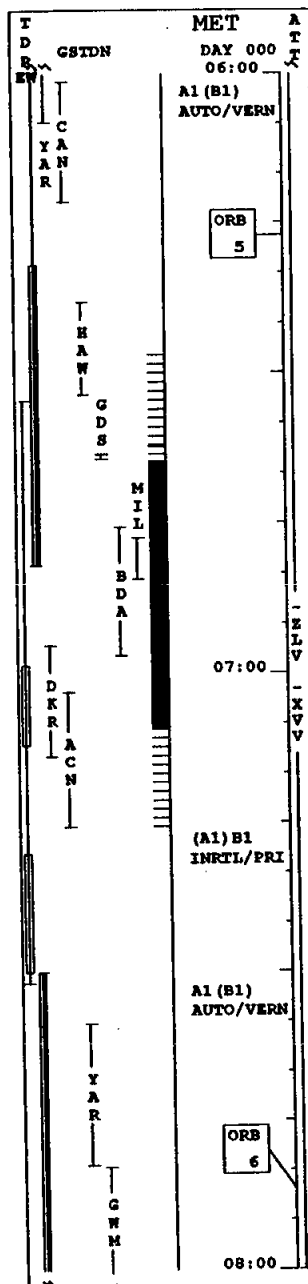
**UPLINK**  
 EARLY TDRS H/O

**UPLINK**  
 FDA ENA

MEAL  
 (All)

Predicted S-bd dropouts:	
W	0/04:12 - 0/04:34
W	0/05:05 - 0/05:06 (If no early H/O)
W	0/05:51 - 0/06:07

# STS 48 (FD 01)



**STS**  
**A12 APU HTR GAS GEN/FUEL PUMP (three) - B AUTO**

06:00

A1 (B1) AUTO/VERN

ORB 5

07:00

(A1) B1 INRTL/PRI

A1 (B1) AUTO/VERN

ORB 6

08:00

01 COAS - OFF Mount COAS - FWD

A12 APU HTR GG/FU (three) - A AUTO  
 TK/FU/H2O SYS 1A, 2A, 3A - AUTO  
 1B, 2B, 3B - OFF

**SAM SETUP (NaI, STA 1)**  
 (PL OPS, SAM)  
 Includes CREAM ACT  
 TAPE INSTALL  
**DETECTOR CALIBRATION**  
 (PL OPS, SAM)  
**TAPE WRITE VERIFICATION**  
 (PL OPS, SAM)  
 Includes DATA ACQ

**FOIL PLACEMENT**  
 (PL OPS, CREAM)  
 Photo document H/W config

**SAM TAPE CHECK**  
 Verify tape has advanced  
**SAM PWR OFF**  
 (PL OPS, SAM)

**BP VARIABILITY (DSO 602)**  
 (MED C/L, MED DSO's)  
 H/W Don

**P/TVO4 ACT (Middeck)**  
 (PHOTO/TV, P/TV SCENES)  
 SAM/CREAM Setup

**EGC ASSEMBLY (DTO 648)**  
 (PHOTO/TV, P/TV SYS)

**P/TV Q7 SETUP (PCG)**  
 (PHOTO/TV, P/TV SCENES)

Predicted S-bd dropouts:	
E	0/07:19 - 0/07:30
W	0/07:49 - 0/07:52

**PL**  
**AIR MONITORING (DSO 611)**  
 (MED C/L, MED DSO's)  
 MAS

**FARE OPS**  
 (PL OPS, FARE)

**PCG ACTIVATION**  
 (PL OPS, PCG)

**MCC**

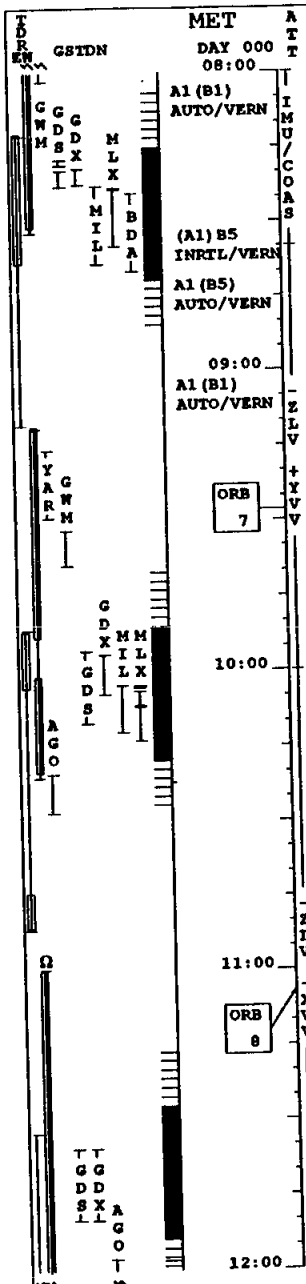
U  
A  
R  
S  
I  
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B  
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Y  
C  
/  
O

**UPLINK  
 REFSMAT  
 NORMALIZATION**

# STS 48 (FD 01)

PL

MCC



**STS**

MNVR IMU ALIGN ATT  
STAR PAIR (A2)  
A/AUTO/VERN (08:00) Init MNVR

IMU ALIGN - 8 TRK (ORB OPS)  
MNVR COAS CAL ATT  
TG-11 BV-1 OM-BLANK  
A/AUTO/VERN (08:20) Init TRK  
COAS CALIBRATION (ORB OPS)  
MNVR (TRK) -ZLV, +YVV  
TG-2 BV-3 OM-270  
A/AUTO/VERN Init TRK

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

Change DAP B to B1  
01 /COAS-OFF Stow COAS

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW EYE)

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

MNVR (TRK) -ZLV, -XVV  
TG-2 BV-3 OM-0  
A/AUTO/VERN Init TRK

- 06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE
- 06 UHF MODE - SPLYX (or as reqd)

Predicted S-bd dropouts:

W 0/08:20 - 0/08:33

E 0/10:02 - 0/10:06

FAM PWR ON  
(PL OPS, SAM)

**IMU ALIGN LOG**  
REQD ID:

-Y\_\_\_, -Z\_\_\_ ANG ERR \_\_\_

1 2 3

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

EXECUTION TIME:  
-- / -- : -- : --

**COAS CALIBRATION LOG**

STAR ID: +X 11, SIRIUS  
STAR AVAIL: 0 2:2 2 TO 0 2:1 6

+X A BIAS \_\_\_\_, \_\_\_\_, \_\_\_\_

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

U  
A  
R  
S  
I  
N  
B  
A  
Y  
C  
/  
O

INIT  
PREWARM

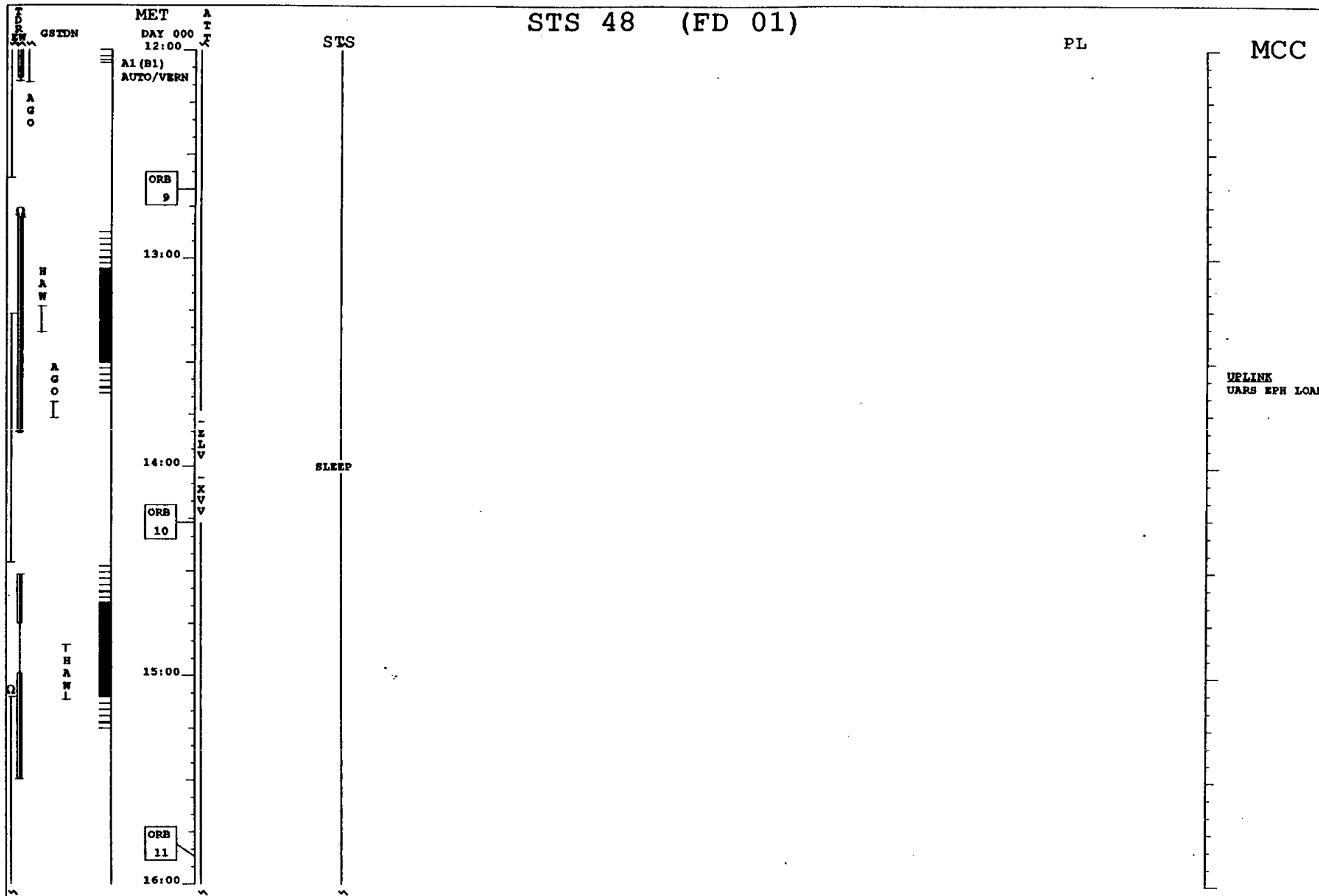
UPLINK  
FDA DSBL

UPDATE  
H2O SPLY DUMP  
QTY TR A & B

# STS 48 (FD 01)

PL

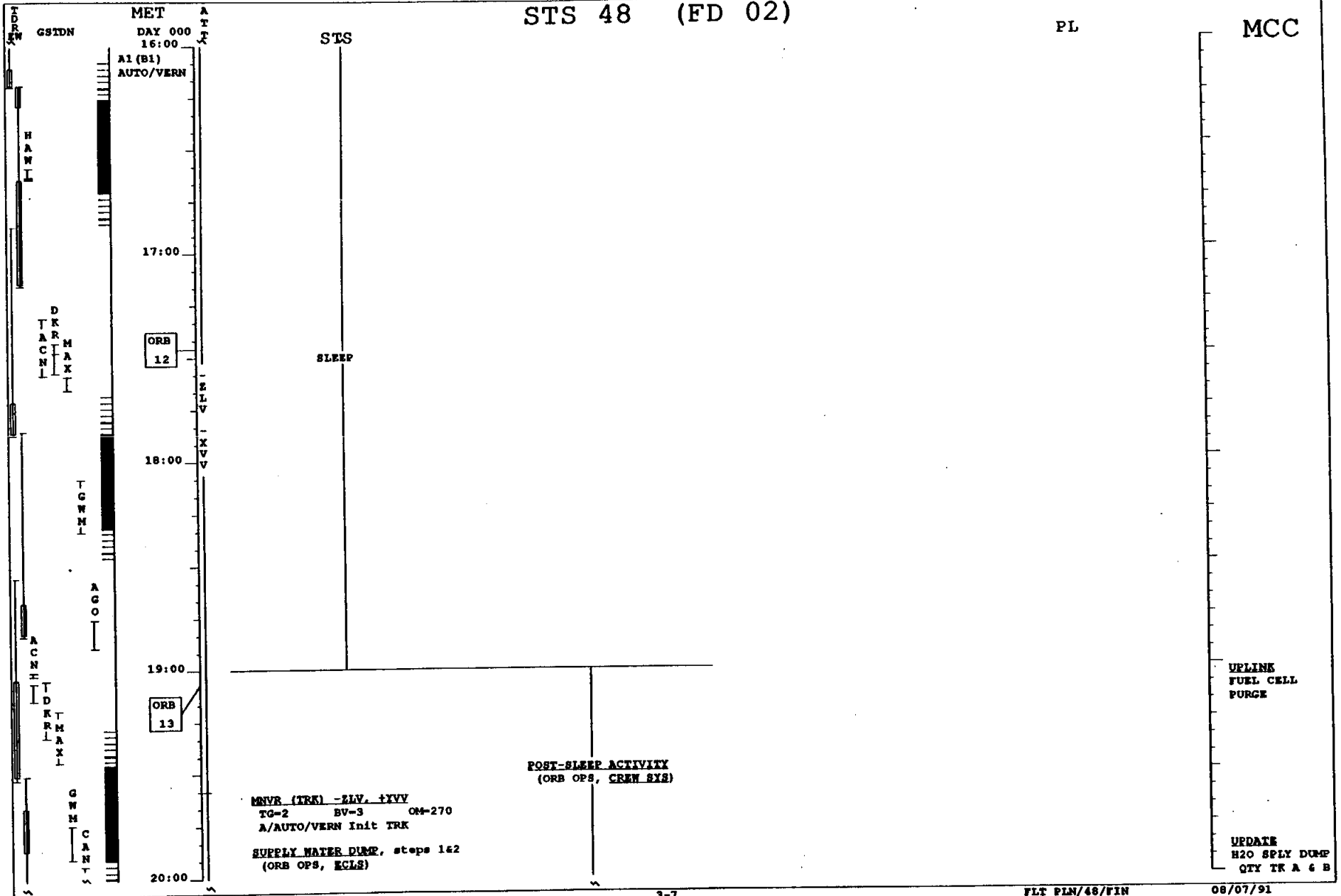
MCC

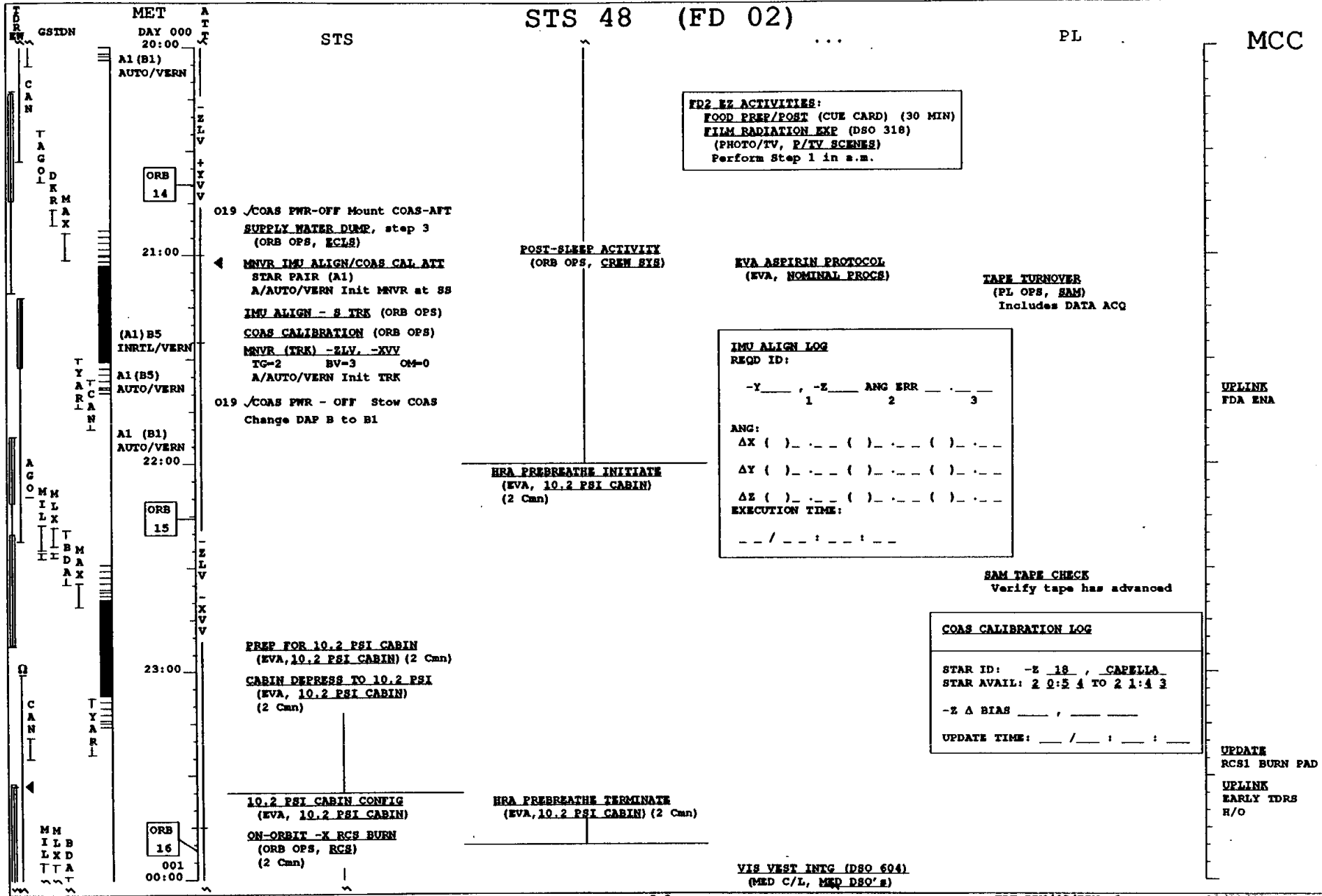


# STS 48 (FD 02)

PL

MCC





STS 48 (FD 02)

**FD2\_EZ ACTIVITIES:**  
**FOOD PREP/POST (CUE CARD) (30 MIN)**  
**FILM RADIATION EXP (DSO 318)**  
 (PHOTO/TV, P/TV SCENES)  
 Perform Step 1 in a.m.

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

**EVA ASPIRIN PROTOCOL**  
 (EVA, NOMINAL PROC)

**TAPE TURNOVER**  
 (PL OPS, SAM)  
 Includes DATA ACQ

**IMU ALIGN LOG**  
 REQD ID:  
 -Y \_\_\_\_\_, -Z \_\_\_\_\_ ANG ERR \_\_\_\_\_  
           1          2          3

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

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

**HRA PREBREATHE INITIATE**  
 (EVA, 10.2 PSI CABIN)  
 (2 Cmn)

**SAM TAPE CHECK**  
 Verify tape has advanced

**COAS CALIBRATION LOG**

STAR ID: -Z 18, CAPELLA  
 STAR AVAIL: 2 0:5 4 TO 2 1:4 3  
 -Z Δ BIAS \_\_\_\_\_, \_\_\_\_\_  
 UPDATE TIME: \_ / \_ : \_ : \_

**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)

**HRA PREBREATHE TERMINATE**  
 (EVA, 10.2 PSI CABIN) (2 Cmn)

**10.2 PSI CABIN CONFIG**  
 (EVA, 10.2 PSI CABIN)  
**ON-ORBIT -X RCS BURN**  
 (ORB OPS, RCS)  
 (2 Cmn)

**VIS VEST INTG (DSO 604)**  
 (MED C/L, MED DRG'S)

UPLINK  
 FDA ENA

UPDATE  
 RCS1 BURN PAD  
 UPLINK  
 EARLY IDRS  
 R/O



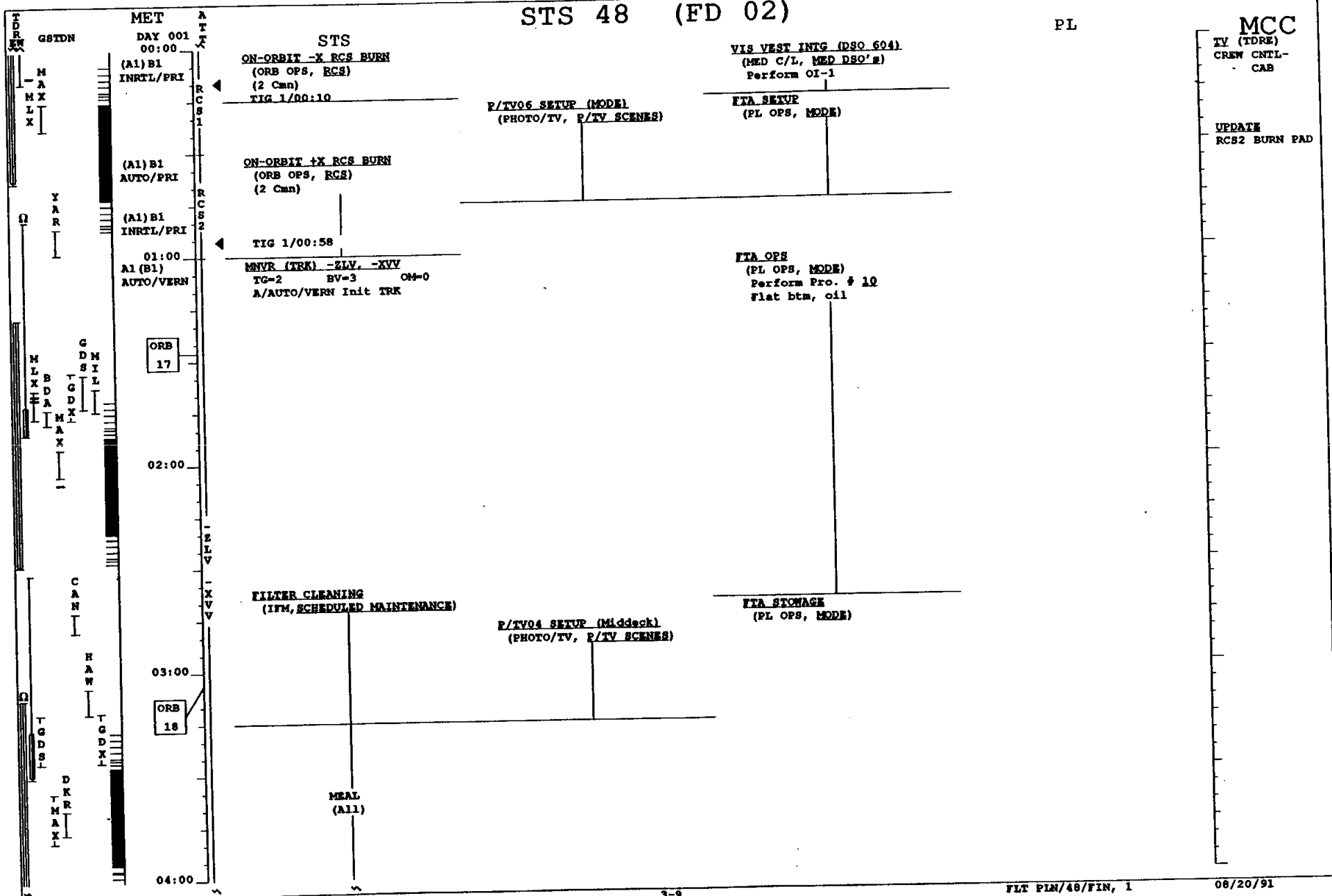
# STS 48 (FD 02)

PL

MCC

TY (TDRE)  
CREW CNTRL-  
CAB

UPDATE  
RCS2 BURN PAD



# STS 48 (FD 02)

PL

MCC

**MET**  
 DAY 001  
 04:00  
 A1 (B1)  
 AUTO/VERN

**STATION LIST**

**ORB 19**

05:00

**ORB 20**

06:00

**ORB 21**

07:00

08:00

**STATION CALL LETTERS:**  
 TDRW, GSDN, CAN, THAX, GGDS, BDA, TDKR, MACHN, YAR, TCAN, HAW, GDS, MLYL, TBCAN, DRCN, TYAR, GWM

**STS**  
 MEAL  
 (All)

**R/TV04 ACT (Middeck)**  
 (PHOTO/TV, R/TV SCENES)  
 IPMP Ops

**IPMP ACTIVATION**  
 (PL OPS, IPMP)  
 Minimize vibrations

**UPLINK**  
 EARLY TDRS H/O

**UPLINK**  
 UARS EPH LOAD

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

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

**ELEC STILL PHOTO (DFO 648)**  
 (PHOTO/TV, R/TV SYSTEMS)

**R/TV04 SETUP (Middeck)**  
 (PHOTO/TV, R/TV SCENES)  
 PARE, PCG, DSO 602 Ops

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

**R/TV04 ACT (Middeck)**  
 (PHOTO/TV, R/TV SCENES)  
 PARE, PCG, DSO 602 Ops

**PARE OPS**  
 (PL OPS, PARE)

**PCG HOUSEKEEPING**  
 Clean fan inlet and rod R/IM  
 Temp \_\_\_\_°C, \_\_\_\_/\_:\_\_\_\_ MET

**BE VARIABILITY (DSO 602)**  
 (MED C/L, MED DSO's)  
 H/W DoIf

# STS 48 (FD 02)

STS

PL

MCC

MET DAY 001  
08:00

BP VARIABILITY (DSO 602)  
(MED C/L, MED DSO's)  
H/W Doff

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

MEMORY MODULE REPLACEMENT  
(PL OPS, RME III)

TAPE REMOVAL  
(PL OPS, SAM)  
Includes TAPE INSTALL  
DETECTOR STATION MOVE  
(PL OPS, DET STA)  
STA 2-NaI  
Photo document H/W config

UPDATE  
H2O SPLY DUMP  
QTY TR A 4 B

UPLINK  
FDA DSBL

MNVR (TRK) -ZLV, +YVY  
TG-2 BV-3 OM-270  
A/AUTO/VERN Init TRK  
SUPPLY WATER DUMP, steps 1&2  
(ORB OPS, ECLS)

09:00

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE  
06 UHF MODE - SPLX (or as reqd)

ORB 22

01 /COAS - OFF Mount COAS - FWD  
SUPPLY WATER DUMP, step 3  
(ORB OPS, ECLS)

10:00

MNVR IMU ALIGN ATT  
STAR PAIR (A2)  
A/AUTO/VERN (09:45) Init MNVR

IMU ALIGN - S TRK (ORB OPS)  
MNVR COAS CAL ATT  
TG-11 BV-1 OM-BLANK  
A/AUTO/VERN (10:05) Init TRK  
COAS CALIBRATION (ORB OPS)

(A1)B5  
INRTL/VERN  
A1 (B5)  
AUTO/VERN

MNVR (TRK) -ZLV, -XVY  
TG-2 BV-3 OM-0  
A/AUTO/VERN Init TRK

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

01 /COAS-OFF Stow COAS  
Change DAP B to B1

A1 (B1)  
AUTO/VERN

11:00

ORB 23

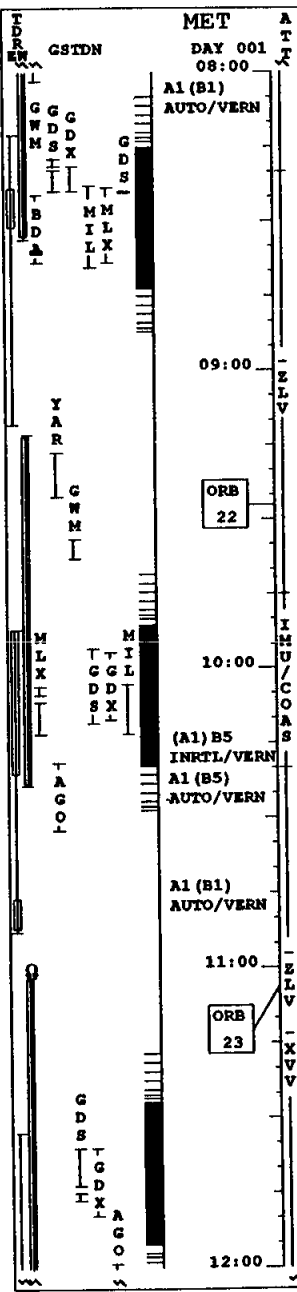
12:00

10.2 PSI MAINTENANCE  
(EVA, 10.2 PSI CABIN)

SAM TAPE CHECK  
Verify tape has advanced

IMU ALIGN LOG  
REQD ID:  
-Y\_\_\_\_, -Z\_\_\_\_ ANG ERR \_\_\_\_ . \_\_\_\_  
          1          2          3  
ANG:  
ΔX ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_  
ΔY ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_  
ΔZ ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_  
EXECUTION TIME:  
\_ \_ / \_ \_ : \_ \_ : \_ \_

COAS CALIBRATION LOG  
STAR ID: +X 11 , SIRIUS  
STAR AVAIL: 0 2:5 2 TO 1 0:5 2  
+X Δ BIAS \_\_\_\_ , \_\_\_\_  
UPDATE TIME: \_ \_ / \_ \_ : \_ \_ : \_ \_



# STS 48 (FD 02)

PL

MCC

**MET**  
DAY 001  
12:00  
A1 (S1)  
AUTO/VERN

**ACCO**  
**HAW**  
**ACCO**  
**THAW**  
**ACN**

**ORB 24**  
13:00  
**ORB 25**  
14:00  
**ORB 26**  
16:00

**ELV**  
**XXVV**

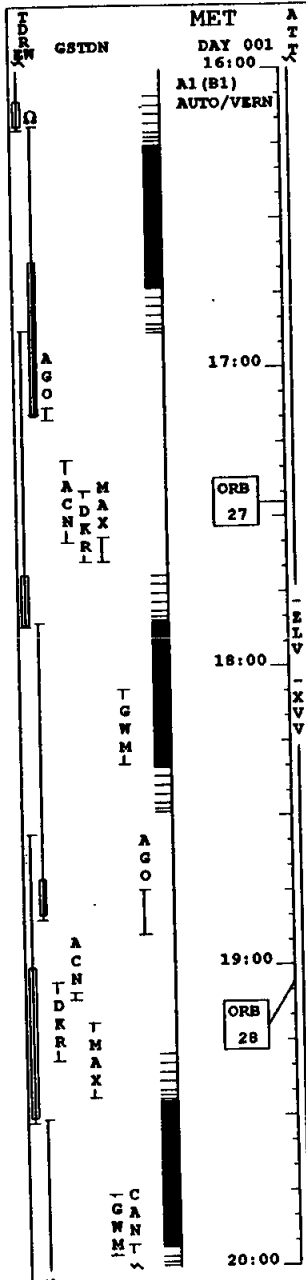
STS

SLEEP

# STS 48 (FD 02)

PL

MCC



STS

SLEEP

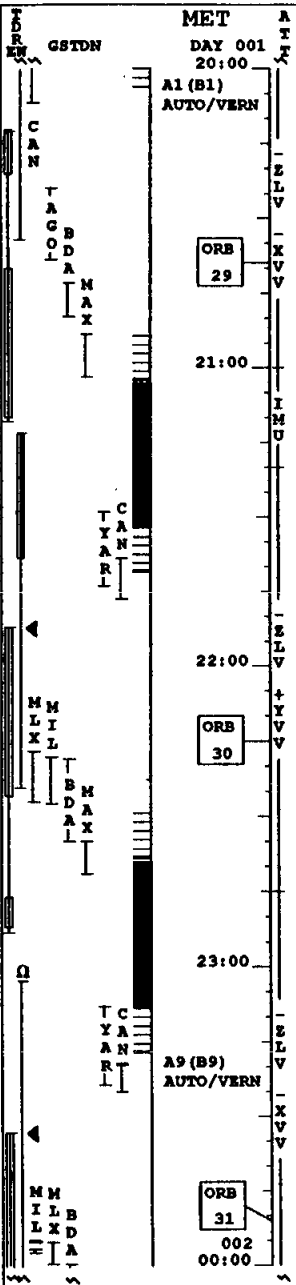
UPLINK  
UARS EPH LOAD

# STS 48 (FD 03)

STS

PL

MCC



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

**IMU ALIGN - 5 TRK (ORB OPS)**  
**MNVR (TRK) -ELV, +YV**  
 TG-2 BV-3 OM-270  
 A/AUTO/VERN Init TRK

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

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

**RMS POWERUP**  
 (PDRS OPS, RMS PWROUP)

**SUPPLY WATER DUMP, step 3**  
 (ORB OPS, ECLS)

**MNVR DEY ATT (-ELV, -XVV)**  
 TG-2 BV-3 OM-0  
 A/AUTO/VERN Init TRK

L1 FLASH EVAP CNTLR PRI A(B)-OFF

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

ASL PORT RMS HTR (two) - AUTO

If no comm at TDRE AOS,  
 SM 201 ANT  
 ITEM 14 EXEC

- 06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE
- 06 UHF MODE - SPLK (or as reqd)

**R/TVO2 ACT (UARS DEY)**  
 (PHOTO/TV, R/TV SCENES)

**FD03 EE ACTIVITIES:**  
**FOOD PREP/POST** (Cue Card) (30 Min)  
**FILM RADIATION EXP (DSO 318)**  
 In a.m., record stop MET on Canister #3  
 Place canister in HOUSTON Bag

**IMU ALIGN LOG**  
 REQD ID:

-Y\_\_\_, -Z\_\_\_ ANG ERR \_\_\_

1                  2                  3

ANG:  
 ΔX ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_  
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 ΔZ ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_

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

**RCE REGULATOR RECONFIGURE**  
 07/08 He PRESS A(three)-OP(tb-OP)  
 B(three)-OP(tb-OP)  
 then GPC  
 A(three)-CL(tb-CL)

**HEATER RECONFIG-Config B**  
 (ORB OPS, EPS)

**10.2 PSI MAINTENANCE**  
 (EVA, 10.2 PSI CABIN)

**EVA PREP**  
 (EVA, EVA PREP)  
 (3 Can)

**GRAPPLE**  
 (RMA DPY, GRAPPLE)

**PI LOCK**  
 (RMA DPY, GRAPPLE)

UARS  
PREP

UARS  
CONFIG

UPLINK  
FUEL CELL  
PURGE

UPLINK  
FDA ENA

UPDATE  
H2O SPLY DUMP  
QTY TK A & B

UPLINK  
Early TDRE H/O

UPLINK  
Early TDRE H/O

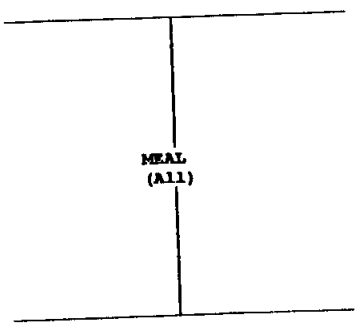
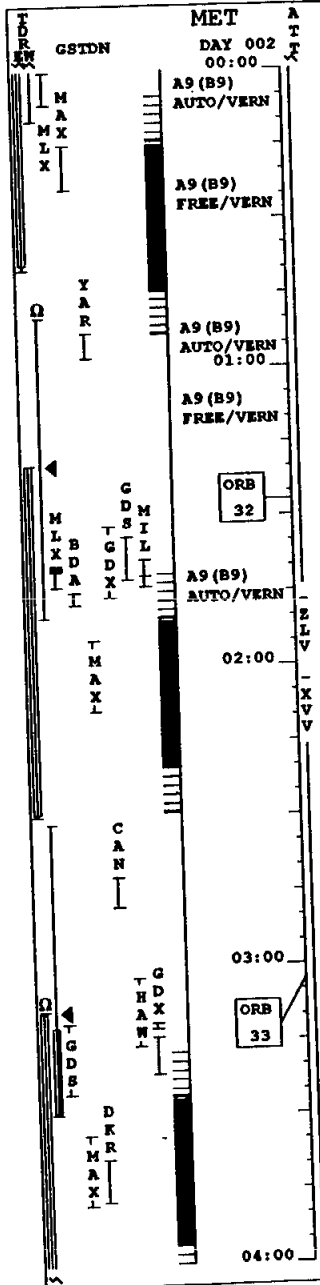
UPLINK  
Early TDRE H/O

INFORM CREW  
GO FOR PI LOCK

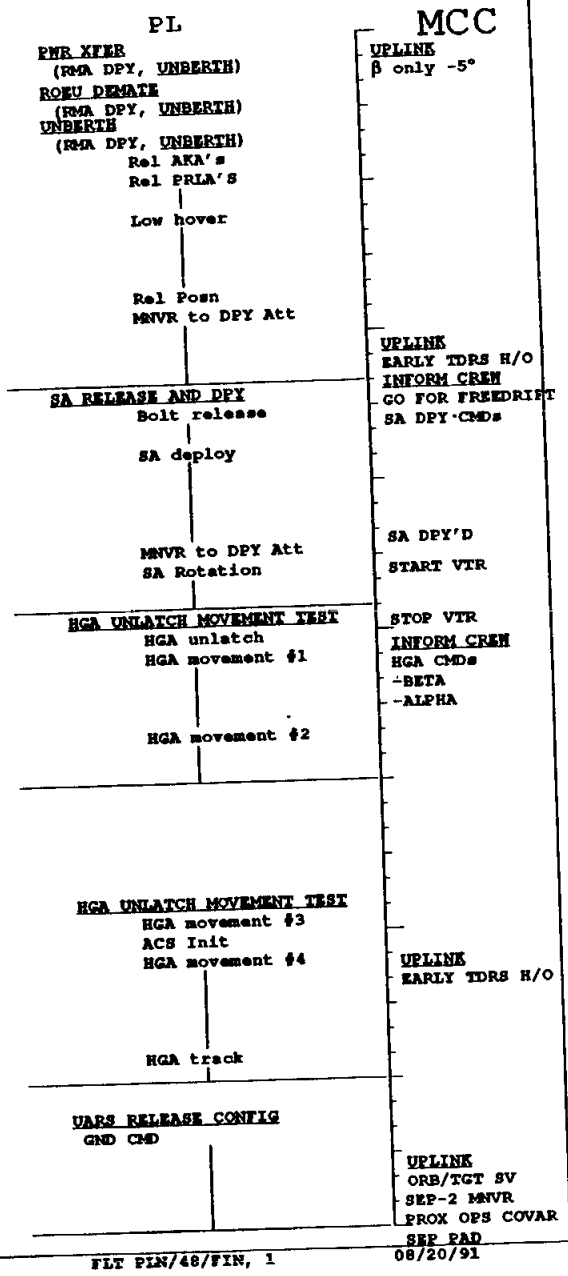
UPLINK  
Early TDRE H/O

INFORM CREW  
GO FOR MPC's  
OFF

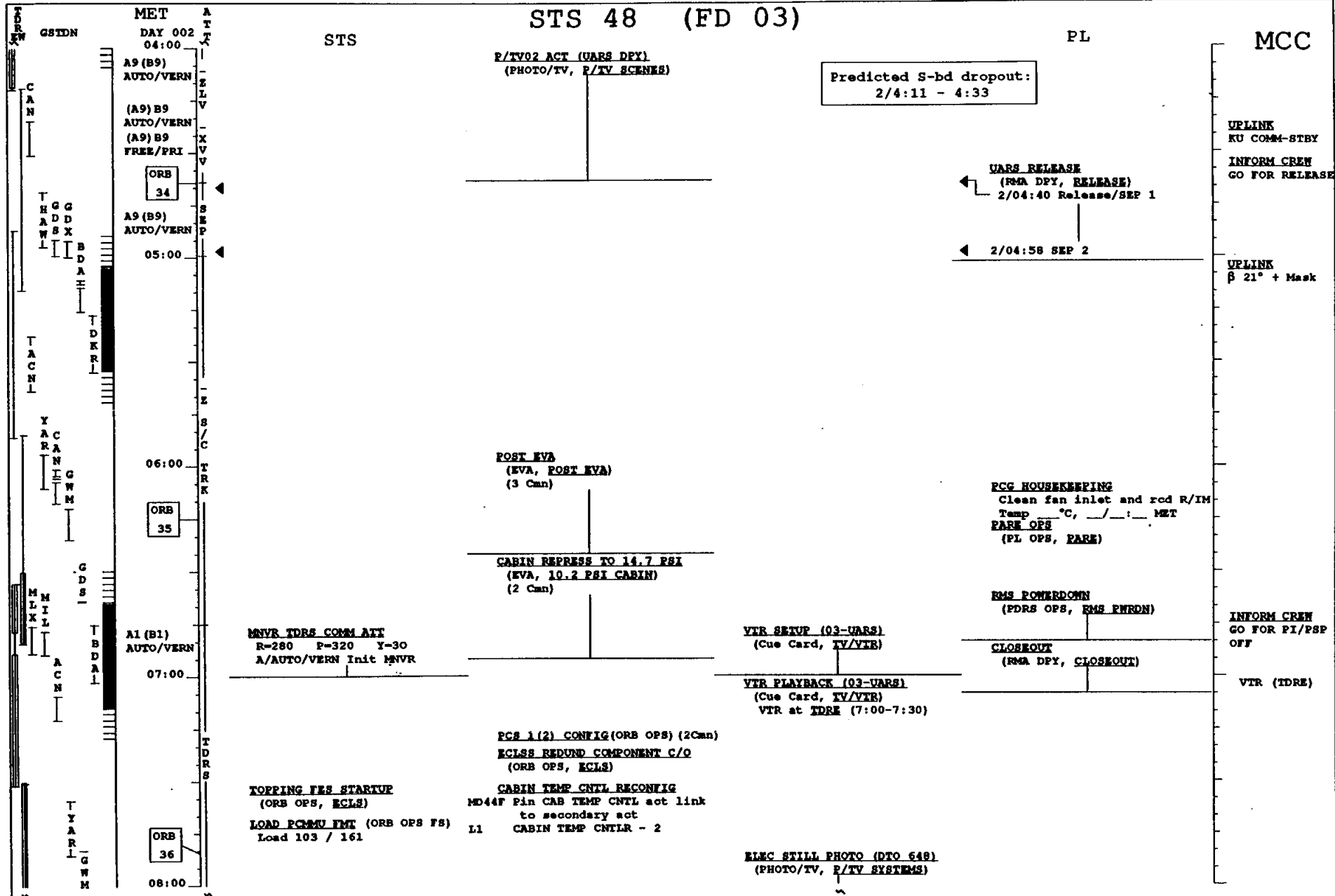
# STS 48 (FD 03)



Predicted S-bd-dropout:  
2/2:31 - 2:50



# STS 48 (FD 03)



**MET**  
 DAY 002  
 04:00  
 A9 (B9)  
 AUTO/VERN  
 (A9) B9  
 AUTO/VERN  
 (A9) B9  
 FREE/PRI  
 ORB 34  
 A9 (B9)  
 AUTO/VERN  
 05:00  
 ORB 35  
 A1 (B1)  
 AUTO/VERN  
 07:00  
 ORB 36  
 08:00

STS

**P/TV02 ACT (UARS DPX)**  
 (PHOTO/TV, P/TV SCENES)

Predicted S-bd dropout:  
 2/4:11 - 4:33

PL

MCC

UPLINK  
 KU COMM-STBY  
 INFORM CREW  
 GO FOR RELEASE

**UARS RELEASE**  
 (RMA DPX, RELEASE)  
 2/04:40 Release/SEP 1

2/04:58 SEP 2

UPLINK  
 β 21° + Mask

**POST EVA**  
 (EVA, POST EVA)  
 (3 Can)

**RCG HOUSEKEEPING**  
 Clean fan inlet and rod R/IM  
 Temp \_\_\_\_ °C, \_\_\_\_ / \_\_\_\_ MET  
**FARE OPS**  
 (PL OPS, FARE)

**CABIN REPRESS TO 14.7 PSI**  
 (EVA, 10.2 PSI CABIN)  
 (2 Can)

**RMS POWERDOWN**  
 (PDRS OPS, RMS PWDRN)

**MNVR TDRE COMM ATT**  
 R-280 P-320 Y-30  
 A/AUTO/VERN Init MNVR

**VTR SETUP (03-UARS)**  
 (Cue Card, TV/VTR)

INFORM CREW  
 GO FOR PI/PSP  
 OFF

**VTR PLAYBACK (03-UARS)**  
 (Cue Card, TV/VTR)  
 VTR at TDRE (7:00-7:30)

**CLOSEOUT**  
 (RMA DPX, CLOSEOUT)

VTR (IDRE)

**FCS 1(2) CONFIG (ORB OPS) (2Can)**  
**ECLSS REDUND COMPONENT C/O**  
 (ORB OPS, ECLSS)

**TOPPING FES STARTUP**  
 (ORB OPS, ECLSS)

**CABIN TEMP CNTL RECONFIG**  
 MD44F Pin CAB TEMP CNTL act link  
 to secondary act  
 L1 CABIN TEMP CNTLR - 2

**LOAD PCMMU FMT (ORB OPS FS)**  
 Load 103 / 161

**ELMC STILL PHOTO (DTO 648)**  
 (PHOTO/TV, P/TV SYSTEMS)



# STS 48 (FD 03)

PL

MCC

MET  
DAY 002  
08:00

STS

POST EVA ENT PREP  
(EVA, POST EVA ENT PREP)  
(2 Cmn)

ELEC STILL PHOTO (DFO 648)  
(PHOTO/TV, P/TV SYSTEMS)

AIR MONITORING (DSO 611)  
(MED C/L, MED DSO's)  
MAS

TAPE REMOVAL  
(PL OPS, SAM)  
Includes TAPE INSTALL  
DETECTOR CHANGE (BCO)  
(PL OPS, SAM)  
Includes DATA ACQ  
DET CAL

UPDATE  
H2O SPLY DUMP  
QTY TR A & B

A1 (B1)  
AUTO/VERN

MNVR (TRK) BIAS -2LV, +YVV  
TG-2 BV-5  
P-90 Y-340 OM-270  
A/AUTO/VERN Init TRK  
SUPPLY WATER DUMP, steps 1&2  
(ORB OPS, ECLE)

09:00  
HUM SEPS for H2O  
accumulation, then  
HUMIDITY SEP RECONFIG  
L1 HUMIDITY SEP A-OFF  
B-ON

ORB 37  
06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE  
06 UHF MODE - SPLX (or as reqd)

SUPPLY WATER DUMP, step 3  
(ORB OPS, ECLE)

10:00  
MNVN IMU ALIGN ATT  
STAR PAIR (A1)  
A/AUTO/VERN Init MNVR at 88  
IMU ALIGN - S TRK (ORB OPS)  
MNVN (TRK) -2LV, +YVV  
TG-2 BV-3 OM-270  
A/AUTO/VERN Init TRK

SAM TAPE CHECK  
Verify tape has advanced

IMU ALIGN LOG  
REQD ID:

-Y\_\_\_\_, -Z\_\_\_\_ ANG ERR \_\_\_\_  
1 2 3

ANG:

ΔX ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_

ΔY ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_

ΔZ ( ) \_ \_ \_ ( ) \_ \_ \_ ( ) \_ \_ \_

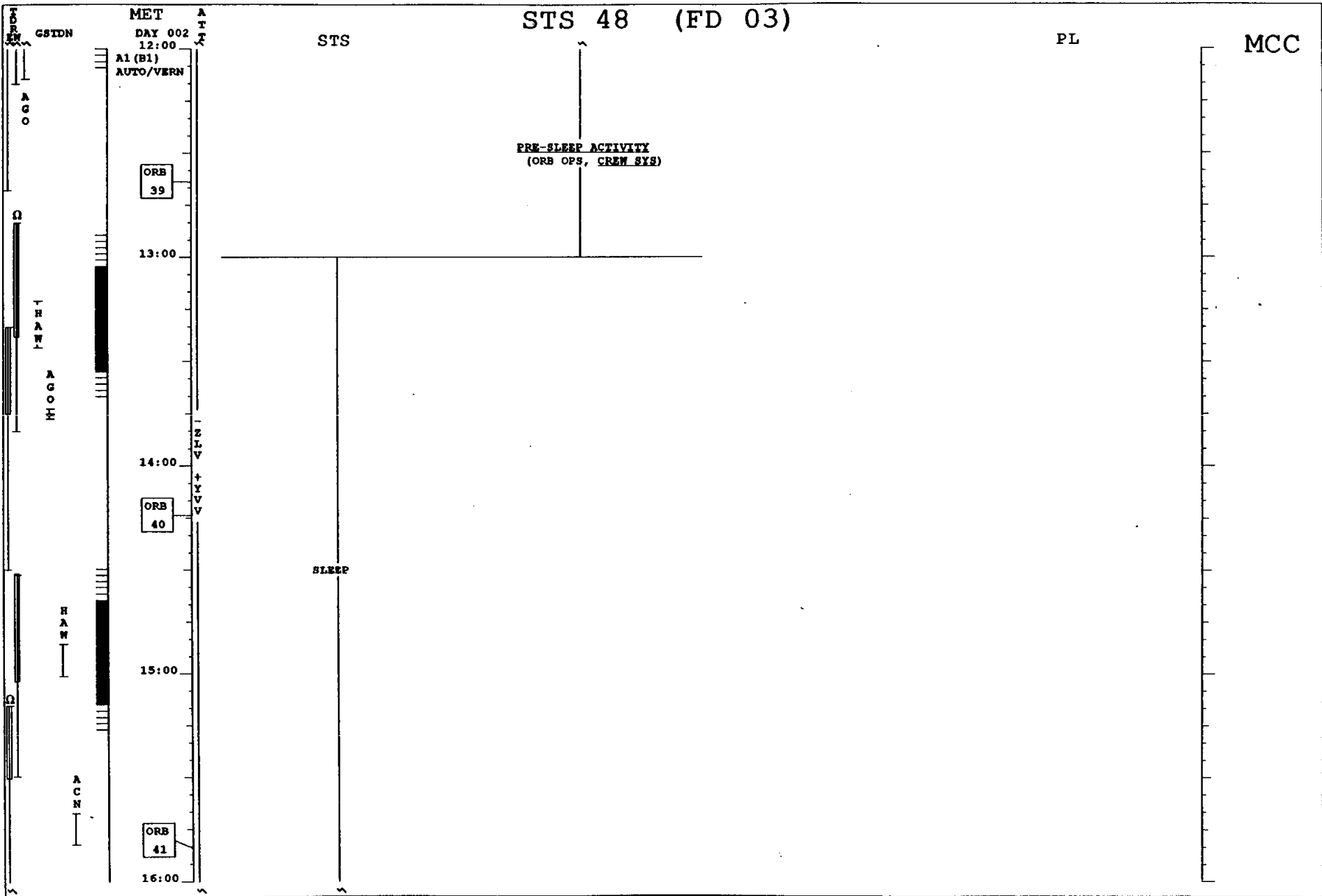
EXECUTION TIME:

\_\_ / \_\_ : \_\_ : \_\_

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

12:00

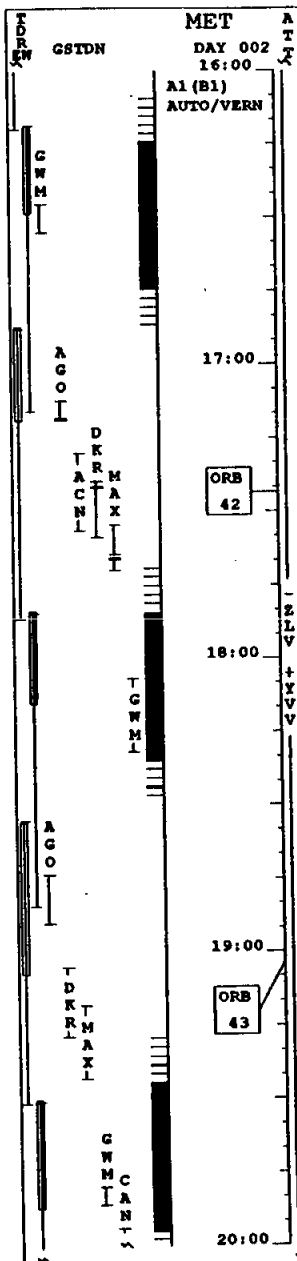
ORB 38



# STS 48 (FD 03)

PL

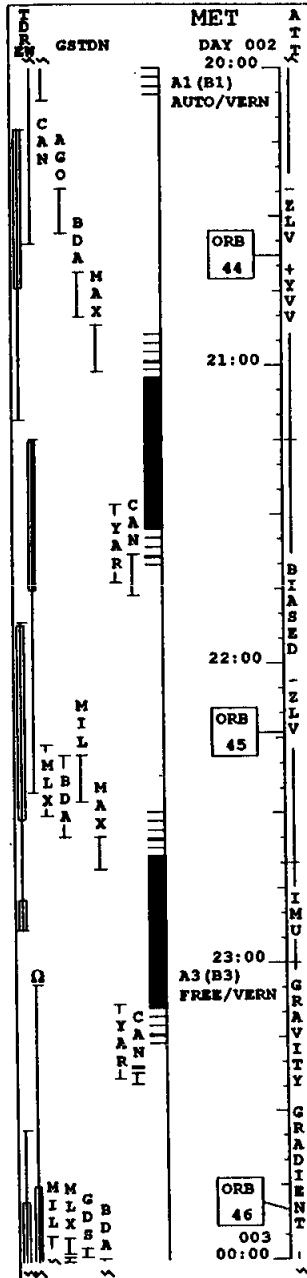
MCC



STS 48 (FD 04)

PL

MCC



STS  
SLEEP

**MNVR (TRK) BIAS -ZIV, +YVV**  
 TC-2 BV-5  
 P-90 Y-340 OM-270  
 A/AUTO/VERN Init TRK  
**SUPPLY WATER DUMP, steps 1&2**  
 (ORB OPS, ECLD)

**SUPPLY WATER DUMP, step 3**  
 (ORB OPS, ECLD)

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

**IMU ALIGN - S TRK (ORB OPS)**  
**CG FREE DRIFT, Steps 1 & 2**  
 (ORB OPS, RCE)  
 ATT ID: B

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

Do FC PURGE - MANUAL

**IMU ALIGN LOG**  
 REQD ID:

-Y \_\_\_\_\_, -Z \_\_\_\_\_ ANG ERR \_\_\_\_\_  
 1 2 3

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

EXECUTION TIME:  
 - - / - - : - - : - -

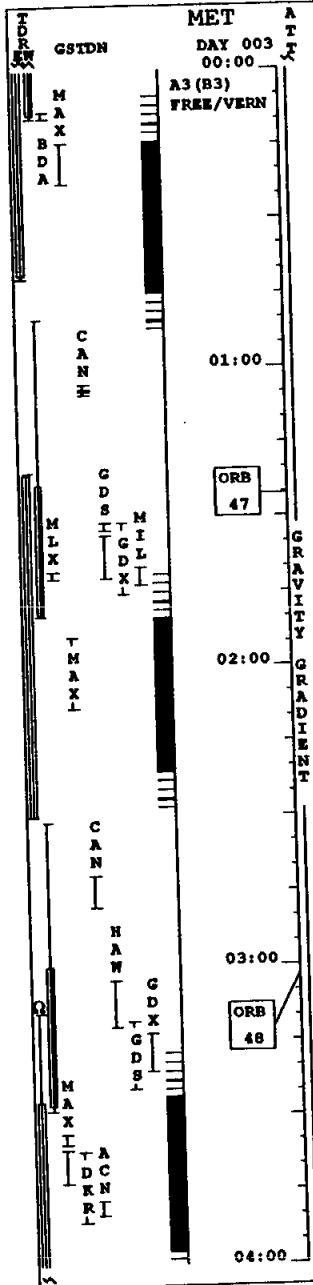
**FD04 EE ACTIVITIES:**  
**FOOD PREP/POST** (Cue Card) (30 Min)  
**FILM RADIATION EXP** (DSO 318)  
 In a.m., record stop MET on Canister #4  
 Place canister in HOUSTON Bag

**R/TV06 SETUP (MODE)**  
 (PHOTO/TV, R/TV SCENES)

**TAPE TURNOVER**  
 (PL OPS, SAM)  
 Includes DATA ACQ

**UPDATE**  
 H2O SPLY DUMP  
 QTY TR A & B

# STS 48 (FD 04)



STS

**ETA SETUP**  
(PL OPS, MODE)

**VIS VEST INTG (DSO 604)**  
(MED C/L, MED DSO's)  
Perform OI-1

**PL**  
**MEMORY MODULE REPLACEMENT**  
(PL OPS, RME III)

**MCC**

**ETA OPS**  
(PL OPS, MODE)  
Perform Pro. # 20  
Spher. btm, water

**SAM TAPE CHECK**  
Verify tape has advanced

Perform Pro. # 30  
Flat btm, water

Perform Pro. # 35  
Flat btm, water

**IV (IDRW)**  
**CREW CNTRL-CAB**

**BP VARIABILITY (DSO 602)**  
(MED C/L, MED DSO's)  
H/W Don

**MEAL**  
(All)

FLT PIN/48/FIN, 1

08/20/91

STS 48 (FD 04)

PL

MCC

MET

DAY 003  
04:00

A3 (B3)  
FREE/VERN

ORB  
49

05:00

ORB  
50

06:00

A1 (B1)  
INRTL/VERN

07:00

A1 (B1)  
AUTO/VERN

ORB  
51

08:00

STS

MEAL  
(All)

**ETA OPS**  
(PL OPS, MODE)  
Perform Pro. # 40  
Spher. btm, water

Perform Pro. # 45  
Spher. btm, water

**GG FREE DRIFT, Step 3**  
(ORB OPS, RCS)

Config DAP A1, B1: A/INRTL/VERN

**MNVR (TRK) -ELV, +XYV**  
TC-2 BV-3 OM-270  
A/AUTO/VERN Init TRK

**ETA STOWAGE**  
(PL OPS, MODE)

**ETA OPS**  
(PL OPS, MODE)  
Assemble baseline  
config

**FARE OPS**  
(PL OPS, FARE)

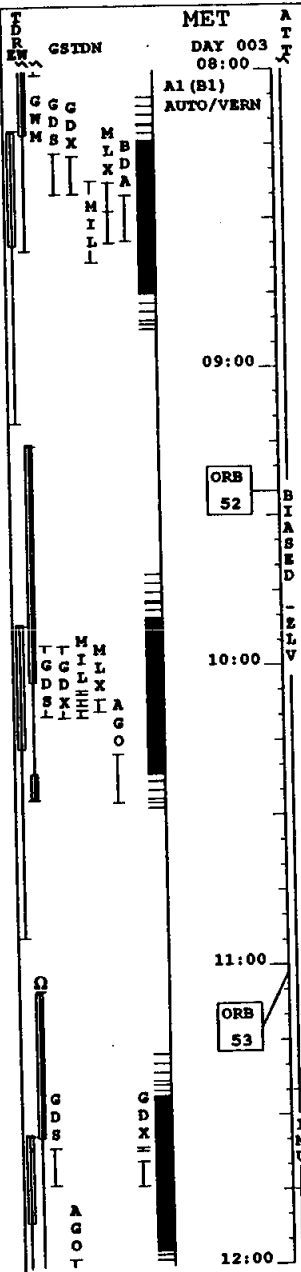
**FAM FWR OFF**  
(PL OPS, FAM)

Perform Protocol # 50

# STS 48 (FD 04)

PL

MCC



STS

STA OPS  
(PL OPS, MODE)

PCG HOUSEKEEPING  
Clean fan inlet and rod R/IM  
Temp \_\_\_\_°C, \_\_\_\_/\_\_\_\_ MET

PAM FWR ON  
(PL OPS, SAM)

Perform Protocol # 51

IMU ALIGN LOG			
REQD ID:			
-Y	-Z	ANG ERR	
1	2	3	
ANG:			
ΔX	( )	( )	( )
ΔY	( )	( )	( )
ΔZ	( )	( )	( )
EXECUTION TIME:			
---	---	---	---

ELEC STILL PHOTO (DTO 648)  
(PHOTO/TV, R/TV SYSTEMS)

SUPPLY WATER DUMP, steps 162  
(ORB OPS, ECLS)

Perform Protocol # 52

TAPE REMOVAL  
(PL OPS, SAM)  
Includes TAPE INSTALL  
DETECTOR STATION MOVE  
(PL OPS, DET STA)  
STA 1 BGO  
Includes DATA ACQ  
Photo document R/W config

UPDATE  
H2O SPLY DUMP  
QTY TK A & B

STA TEMP STOP

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

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SELX (or as reqd)  
MNRV IMU ALIGN ATT  
STAR PAIR (A1)  
A/AUTO/VERN Init MNRV at SS

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

IMU ALIGN - S TRK (ORB OPS)  
MNRV (TRK) -ZLV, +YV  
TG-2 BV-3 OM-270  
A/AUTO/VERN Init TRK

UPLINK  
FUEL CELL  
PURGE

SAM TAPE CHECK  
Verify tape has advanced

# STS 48 (FD 04)

STS

PL

MCC

MET  
DAY 003  
12:00  
A1 (B1)  
AUTO/VERN

ORB  
54

13:00

PRE-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

14:00

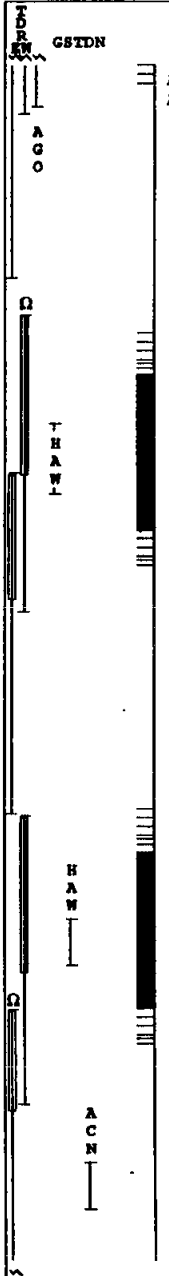
ORB  
55

15:00

SLEEP

ORB  
56

16:00

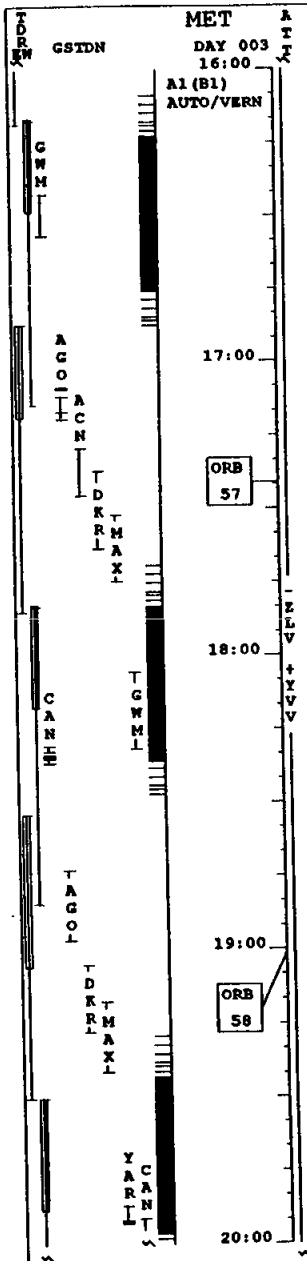




STS 48 (FD 04)

PL

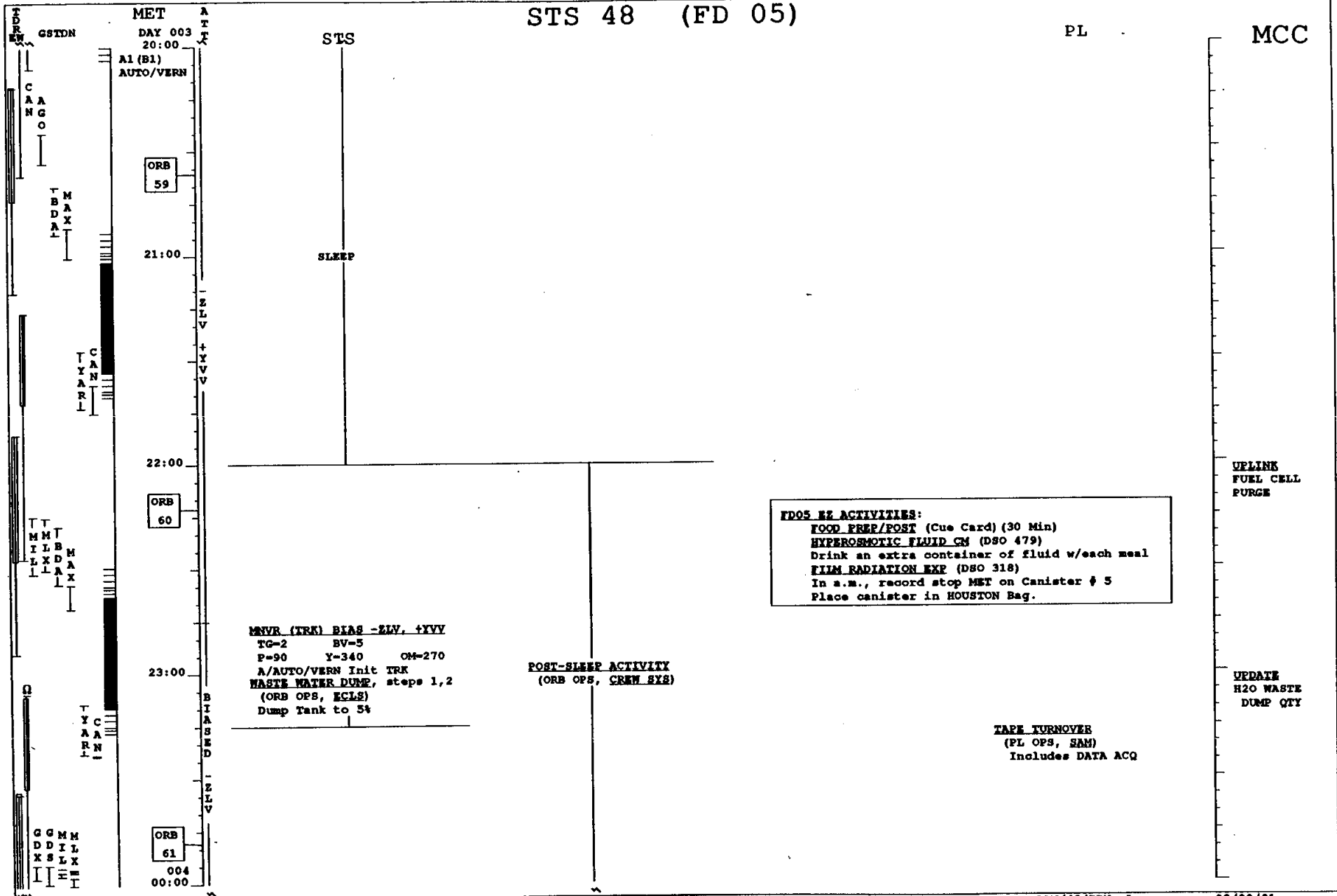
MCC



# STS 48 (FD 05)

PL

MCC



# STS 48 (FD 05)

PL

MCC

MET DAY 004  
00:00

A1 (B1)  
AUTO/VERN

01:00

ORB  
62

A1 (B1)  
FREE/VERN  
02:00

A1 (B1)  
AUTO/VERN

A1 (B1)  
FREE/PRI

AUTO/VERN

03:00

ORB  
63

04:00

## STS

WASTE WATER DUME, step 3  
(ORB OPS, ECLS)  
APU STREAM VENT HTR ACT  
BLR CNTLR/HTR (three) -B  
PWR (three) -ON  
MNVR IMU ALIGN ATT  
STAR PAIR (A1)  
A/AUTO/VERN Init MNVR at SS  
IMU ALIGN - S TRK (ORB OPS)  
MNVR (TRK) -ZLV, +YVV  
TG=2 BV=3 OM=270  
A/AUTO/VERN Init TRK

POST-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

R/TVO6 SETUP (MODE)  
(PHOTO/TV, R/TV SCENES)

STA UNSTON  
(PL OPS, MODE)

SAM TAPE CHECK  
Verify tape has advanced

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

STA OPS  
(PL OPS, MODE)  
Assemble Alpha joint  
Perform Protocol #60

R/TVO3 SETUP (Crew Conf)  
(PHOTO/TV, R/TV SCENES)

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

Config DAP: A/AUTO/VERN  
MNVR TRK CORR ATT  
R=210 P=40 Y=15  
A/AUTO/VERN Init MNVR

R/TVO3 ACT (Crew Conf)  
(PHOTO/TV, R/TV SCENES)

CREW CONF AUDIO/TV CK

R2 APU COOL OFF (On MCC Cue)  
APU FUEL PUMP/VLV COOL A-OFF  
APU HTR RECONFIG (ORB OPS)

STA OPS  
(PL OPS, MODE)  
Perform Protocol # 61

BP VARIABILITY (DSO 602)  
(MED C/L, MED DSO's)  
H/W Doff

ELEC STILL PHOTO (DTO 648)  
(PHOTO/TV, R/TV SYSTEMS)

### IMU ALIGN LOG

REQD ID:

-Y\_\_\_, -Z\_\_\_ ANG ERR \_\_\_  
1 2 3

ANG:

ΔX ( ) ( ) ( ) ( )

ΔY ( ) ( ) ( ) ( )

ΔZ ( ) ( ) ( ) ( )

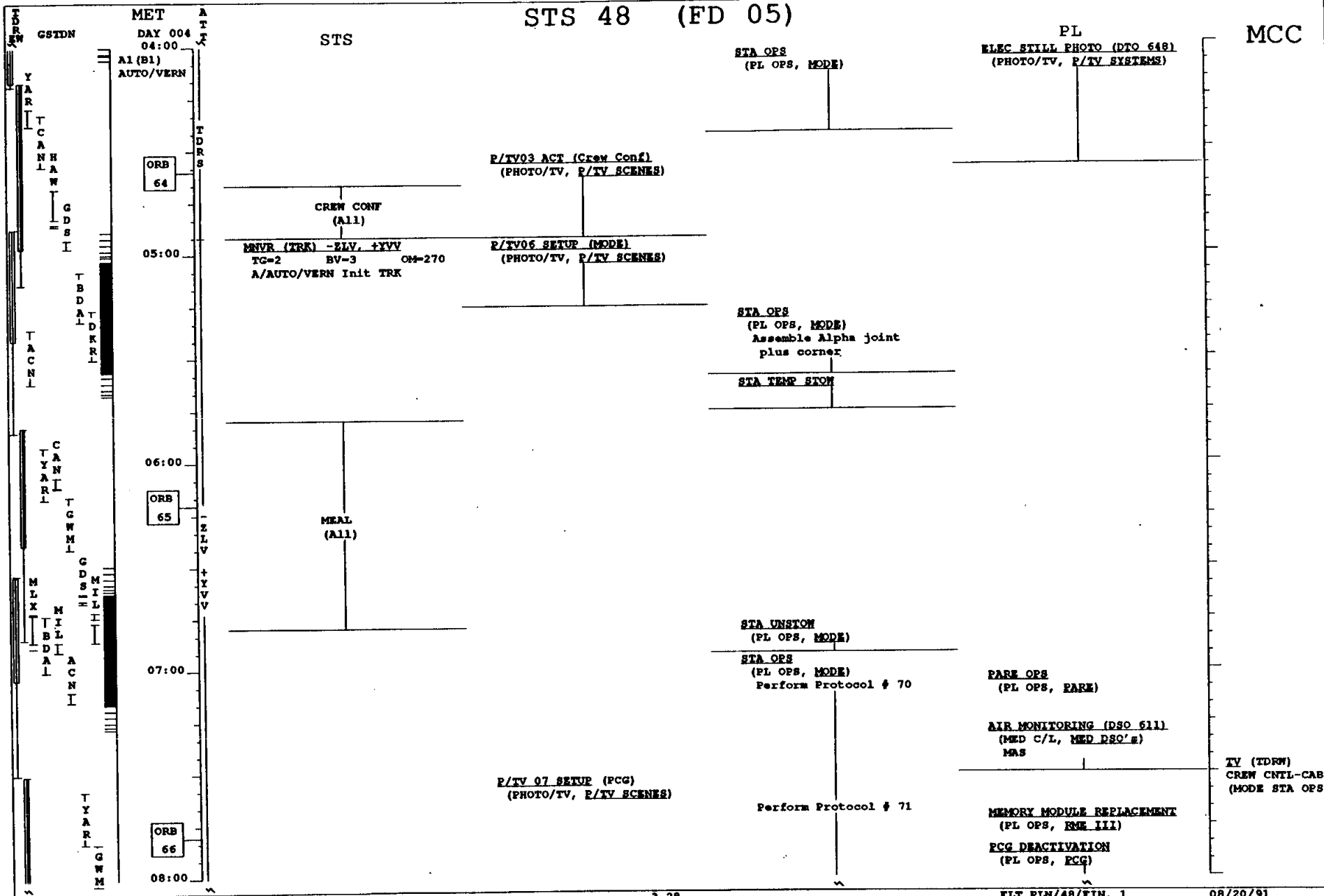
EXECUTION TIME:

\_\_\_ / \_\_\_ : \_\_\_ : \_\_\_

TY (TDRW)  
CREW CNTL-  
CAB

INFORM CREW  
GO FOR APU  
COOL OFF

# STS 48 (FD 05)



# STS 48 (FD 05)

MCC

**MET**  
DAY 004  
08:00  
A1 (B1)  
AUTO/VERN

**GSIDN**  
GG  
DD  
SX  
L  
M  
L  
D  
X  
A  
M  
I  
L  
L  
A  
G  
G  
O  
C  
T

**ORB 67**

**ORB 68**

**A2 (B1)**  
AUTO/PRI  
12:00

**AGG**  
H  
A  
G  
W  
D  
S  
B  
K  
M  
I  
I  
I

**AGG**  
T  
T  
G  
D  
D  
S  
X  
L  
L  
T  
A  
C  
O  
L

**AGG**  
H  
A  
G  
W  
D  
S  
B  
K  
M  
I  
I  
I

**STS**

**CABIN CONFIG/STOW**  
(All)

**MNVR (TRK) BIAS -ZLV, +YVV**  
TC-2 BV-5  
P-90 Y-340 OM-270  
**SUPPLY WATER DUMP, steps 1&2**  
(ORB OPS, ECLS)

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

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SPLY (or as reqd)  
**SUPPLY WATER DUMP, step 3**  
(ORB OPS, ECLS)

◀ **MNVR IMU ALIGN ATT**  
STAR PAIR (A1)  
A/AUTO/VERN Init MNVR (11:25)

◀ **IMU ALIGN - S TRK** (ORB OPS)

◀ **MNVR (TRK) ETC ATT**  
R-82 P-266 Y-315  
A/AUTO/VERN (11:45) Init MNVR  
0.4 DEG/SEC ETC Step 2 (ORB OPS)

**IMU ALIGN LOG**  
REQD ID:

-Y\_\_\_\_, -Z\_\_\_\_ ANG ERR \_\_\_\_  
          1          2          3

ANG:  
ΔX ( ) . . . ( ) . . . ( ) . . .  
ΔY ( ) . . . ( ) . . . ( ) . . .  
ΔZ ( ) . . . ( ) . . . ( ) . . .  
EXECUTION TIME:  
- / - : - : -

**STA OPS**  
(PL OPS, MODE)

Add flex appendage  
Perform protocol #80

**STA STORAGE**  
(PL OPS, MODE)

**RCG DEACTIVATION**  
(PL OPS, RCG)

**FILTER CLEANING**  
(ITM, SCHEDULED MAINTENANCE)

**SAM DEACT/STOW**  
(PL OPS, SAM)  
Includes CREAM DEACT  
TAPE REMOVAL

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

**UPDATE**  
H2O SPLY DUMP  
QTY TK A & B

*procedures manual*

*←*

*Name*

# STS 48 (FD 05)

PL

MCC

**MET**  
DAY 004  
12:00  
A2 (B1)  
AUTO/VERN

**GSTDN**  
A  
G  
O

**T H A W L**

**H A W**

**A C N D K R R**

**ORB 69**

**ORB 70**

**ORB 71**

12:00  
13:00  
14:00  
15:00  
16:00

**PHU**

STS

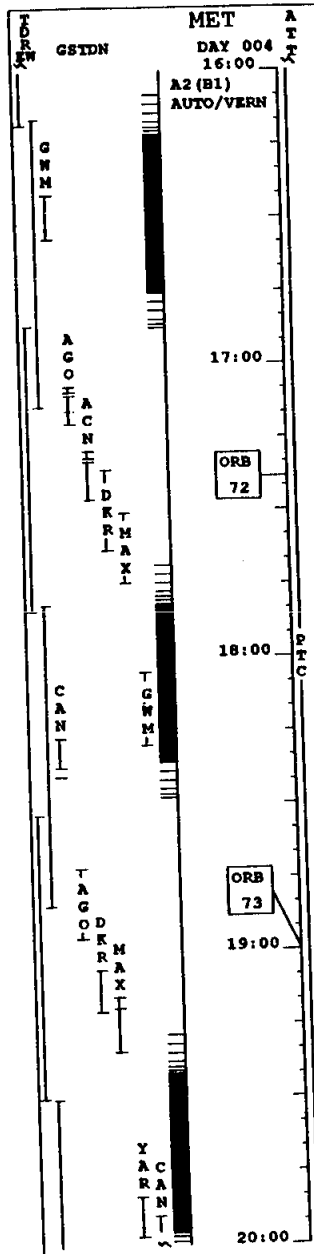
PRE-SLEEP ACTIVITY  
(ORB OPS, CREW EYE)

SLEEP

# STS 48 (FD 05)

PL

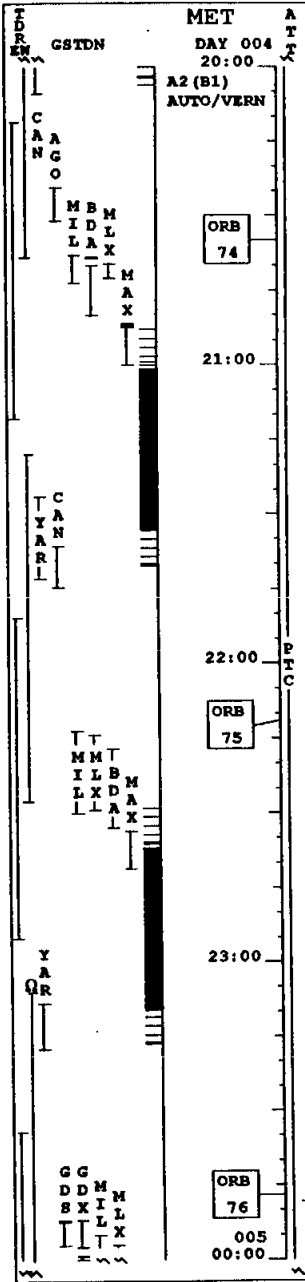
MCC



# STS 48 (FD 06)

PL

MCC



SIS

SLEEP

POST-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

UPLINK  
FUEL CELL  
PURGE



# STS 48 (FD 06)

PL

MCC

MET DAY 005  
00:00  
A2 (B1)  
AUTO/VERN  
A1 (B1)  
AUTO/VERN

01:00

ORB 77

02:00

ORB 78

03:00

04:00

**STS**  
**0.4 DEG/SEC PTC** (ORB OPS)  
 Step 3 - Term PTC Rotation  
 Config DAP A1, B1: A/AUTO/VERN  
**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 (00:35) Init TRK

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

06 UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

06 UHF MODE - SPLITX (or as reqd)  
If no comm at TDRE AOS,  
SM 201 ANT  
ITEM 14 EXEC

**DSO ENTRY PREP**  
(MED C/L, MED DSO's)  
DSO 603

Update: CRT TIMER SETUP PAD  
in NOMINAL DEORBIT PREP

**EE ACTIVITIES BEFORE LEAVING FLT PIN:**  
**AIR SAMPLE**  
 Red MET on bottle  
**HYPEROSMOTIC FLUID CM** (DSO 479)  
 Pen and ink NOMINAL DEORBIT PREP:  
 Delay BEGIN FLUID LOADING (TIG-1:35)  
 until TIG-1:00  
 Replace nominal salt/H2O protocol with  
 appropriate countermeasure  
 (MED C/L, MED DSO's)

**PARK OPS**  
(PL OPS, PARK)

**RME III**  
Stow RME in MF280

**RAD DOSE DIST (DSO 469)**  
(MED C/L, MED DSO's)  
Step B

**IMU ALIGN LOG**  
REQD ID:

-Y\_\_\_, -Z\_\_\_ ANG ERR \_\_\_

1 2 3

ANG:  
 ΔX ( ) ( ) ( )  
 ΔY ( ) ( ) ( )  
 ΔZ ( ) ( ) ( )  
 EXECUTION TIME:  
 - / - : - : -

**GO TO DEORBIT PREP AT 5/01:49**

UPLINK  
EARLY TDRE H/O

UPDATE  
CRT TIMER  
SETUP PAD

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CONTINGENCY TIMELINES

10.2 PSIA EVA..... 4A-1  
FD1 RELEASE TIMELINE..... 4B-1

CONTINGENCY  
TIMELINES

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## 10.2 PSIA EVA

### SA HUNG BOLT EVA TIMELINE

#### ASSUMPTIONS:

- A WORST CASE GO IS ASSUMED, 100 MINUTES FOLLOWING POWER TRANSFER.
- LESS THAN 5 MINUTES HAVE ELAPSED FROM PYRO SETS 1 AND 2 FIRING.
- TWO UPPER HUNG PYRO BOLTS HAVE FAILED TO FIRE.
- EVA CONSUMABLES ALLOW THE CREWMAN TO SUPPORT AN END EFFECTOR RELEASE IF REQUIRED.
- POST EVA ENTRY PREP WILL BE PERFORMED ON FD 4.
- THE AFT STATION COAS CAL CAN BE RESCHEDULED ON FD4.
- ALL ORBITER SIAP ACTIVITIES CAN BE RESCHEDULED ON FD4.
- DSO 611 MAS CAN BE RESCHEDULED ON FD4.
- THE SAM DATA TAKE ON FD3 EVENING WAS DELETED.
- DTO 648 WAS DELETED FOR FD3.



GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
258:10:57/ 258:22:57	002:12:00/ 003:00:00	258:05:57/ 258:17:57	04/ 258 CDT	44.3		SEPTEMBER 15, 1991	STS-48	PCN-1	08/20/91
CDT :258							15 FD: 04		MET:003
FD :003									
MET :002									
STS	I M U M N V R	H I M U T R K M N V R	S D P U R I M V Y P V	P R O N F I M H U	S D P U R I M V Y P V	SLEEP			S D P U R I M V Y P V
	PRE SLEEP								S D P U R I M V Y P V
	1 R 4 E 7 P R E S S								P S / T V U O P 6 M O D E
PL	R M S P W R D N	C L O S E O U T	P A R C G O H K						T A P E R E M S A M D E T
DAY/NIGHT									3 / 0 0 : 0 0
ORBIT	38	39	40	41	42	43	44	45	GDS
CONTINGENCY GSTDN COVERAGE					-DKR	-DKR	-BDA	-BDA -MIL	MIL VAN CTS VTS NHS
CONTINGENCY RTS COVERAGE		-IOS -HTS	-IOS -HTS	-GTS	-GTS	-GTS	-NHS		
TDRS E W									
ATTITUDE	I M U				BIASED -ELV, +YVV			I M U	
NOTES:		Ⓞ PCC CLEANING/TEMP CHECK							Ⓞ Sta 2, BGO

**TDR**  
**5X**  
**GSTDN**  
**M A X I M U M**  
**L X**  
  
**Y A R R**  
  
**M L X D D A I**  
**G D S I I I I**  
  
**T M A X I**  
  
**C A N N**  
  
**T G D S I**  
  
**D K R R**  
**T M A X I**  
  
**M E T**  
**DAY 002**  
**00:00**  
**A9 (B9)**  
**AUTO/VERN**  
  
**A9 (B9)**  
**FREE/VERN**  
  
**A9 (B9)**  
**AUTO/VERN**  
**01:00**  
  
**A9 (B9)**  
**FREE/VERN**  
  
**ORB**  
**32**  
  
**02:00**  
**A9 (B9)**  
**FREE/ALT**  
  
**A9 (B9)**  
**AUTO/ALT**  
  
**03:00**  
**ORB**  
**33**  
  
**A9 (B9)**  
**FREE/ALT**  
  
**04:00**

STS

STS 48 (FD 03)

R/TVO2 ACT (UARS DEX)  
(PHOTO/TV, P/TV SCENES)

PL  
 UARS UNBERTH  
 (RMA DPF, UNBERTH)  
 ROU DEMATE  
 UNBERTH

MCC

Rel AKA's  
 Rel PRLA'S  
  
 Low hover  
  
 Rel Posn  
 MNVR to DPF Att

SA RELEASE AND DEX  
 Bolt release  
 SA deploy

INFORM CREW  
 SA DPF CMDs

GO FOR EVA

MNVR UARS TO EVA POSITION 0  
 (PDRS OPS, CONTINGENCY OPS)

MNVR DEX ATT (-ELV, -XVV)  
 TG-2 EV-3 OM-0  
 A/AUTO/VERN Init TRK

EVA PREP  
 (EVA, EVA PREP)  
 (3 Can)

AIRLOCK DEPRESS  
 (Cue Card)  
 (3 Can)

SA BOLT EVA  
 (EVA, UARS EVA PROC)  
 EGRESS

EVA SUPPORT  
 (EVA, EVA T/L)

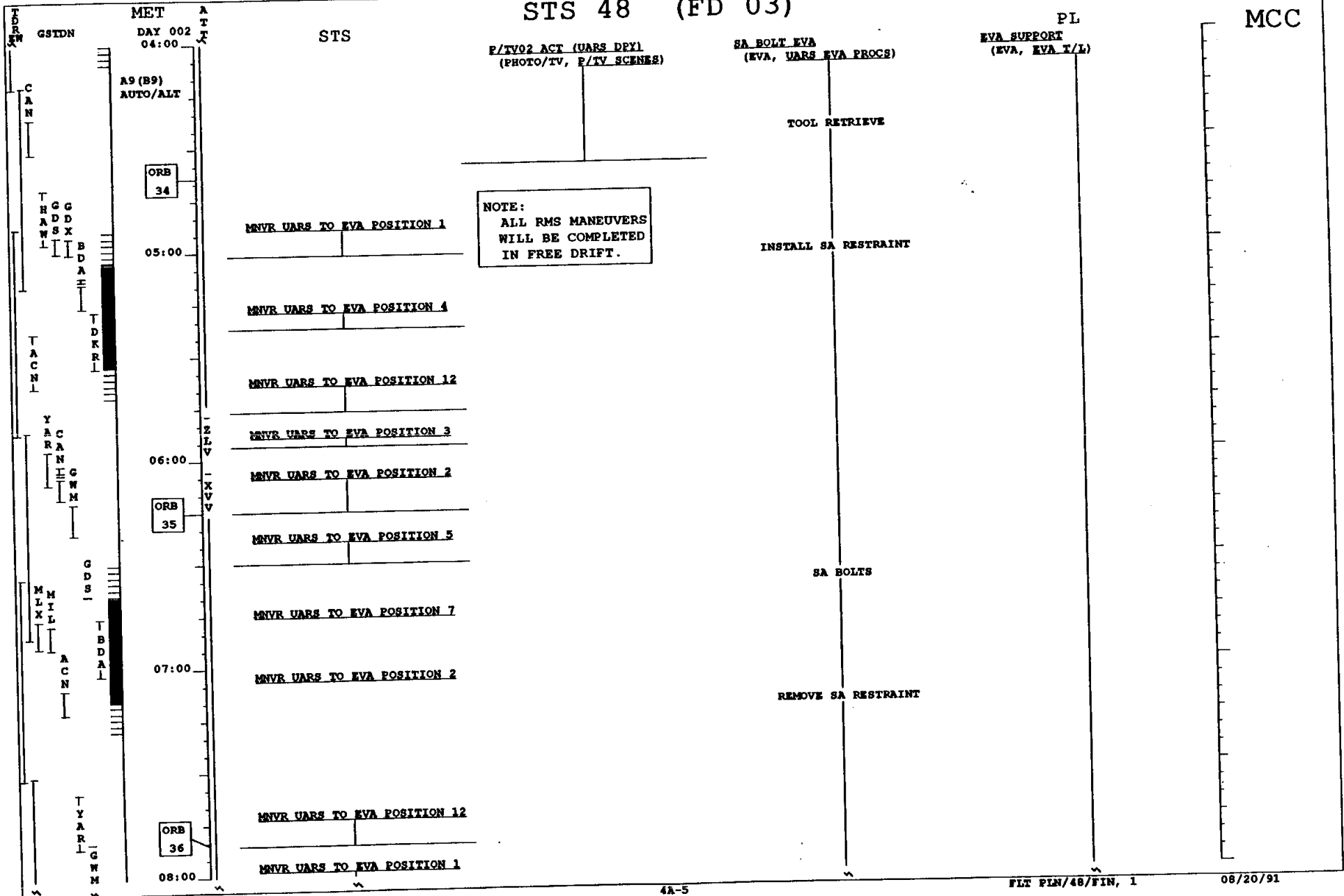
JUMPER CABLE

MNVR UARS TO EVA HOVER POSITION

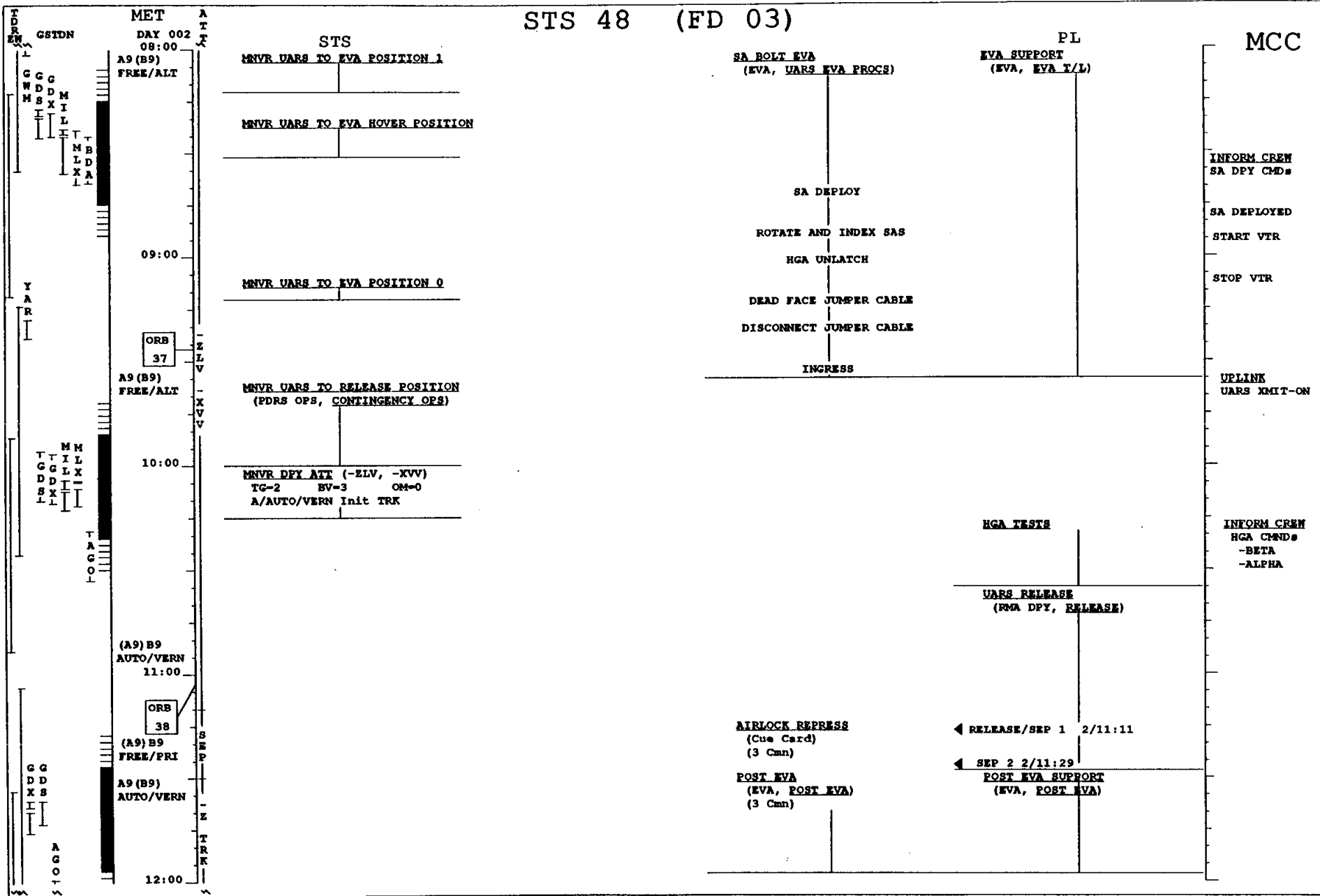
UPLINK  
 UARS XMIT-OFF



# STS 48 (FD 03)



# STS 48 (FD 03)



# STS 48 (FD 03)

**MET**  
DAY 002  
12:00

**ATL**

Change DAP A, B to A1, B1

Al (B1)  
AUTO/VERN

ORB 39

13:00

06

UHF MODE - OFF  
PRIVATE MEDICAL CONFERENCE

UHF MODE - SPLX (or as reqd)

14:00

ORB 40

15:00

SLEEP

16:00

ORB 41

CSIDN  
AGCO  
THAW  
AGOH  
HAW  
ACN

## STS

Change DAP A, B to A1, B1

**MNVR IMU ALIGN ATT**  
STAR PAIR (C1)  
A/AUTO/VERN (12:15) Init MNVR

**IMU ALIGN - S TRK (ORB OPS)**

**MNVR (TRK)**  
TC-2 BV-5  
P-90 Y-340 OM-270  
A/AUTO/VERN (12:35) Init TRK  
**SUPPLY WATER DUMP, steps 1&2**  
(ORB OPS, ECLB)

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

**SUPPLY WATER DUMP, step 3**  
(ORB OPS, ECLB)

**CABIN REPRESS TO 14.7 PSI**  
(EVA, 10.2 PSI CABIN)  
(2 Can)

**PL**  
**RMS POWERDOWN**  
(PDRS OPS, RMS PWRDN)

**CLOSEOUT**  
(RMA DPFY, CLOSEOUT)

**FARE OBS**  
(PL OPS, FARE)

**PCG HOUSEKEEPING**  
(PL OPS, PCG)

## MCC

**UPDATE**  
H2O SPLY DUMP  
QTY TK A & B

### IMU ALIGN LOG

REQD ID:

-Y\_\_\_\_, -Z\_\_\_\_ ANG ERR \_\_\_\_  
          1          2          3

ANG:

ΔX ( ) . . . ( ) . . . ( ) . . .

ΔY ( ) . . . ( ) . . . ( ) . . .

ΔZ ( ) . . . ( ) . . . ( ) . . .

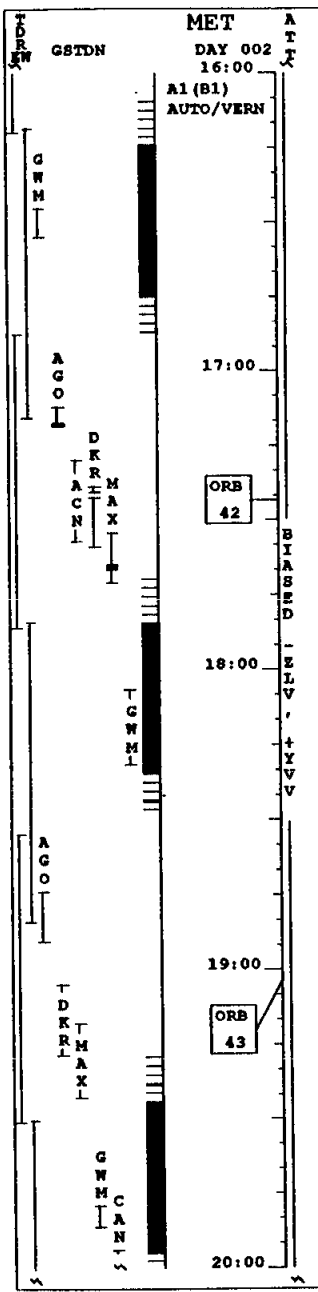
EXECUTION TIME:

\_\_\_ / \_\_\_ : \_\_\_ : \_\_\_

# STS 48 (FD 03)

PL

MCC



STS

SLEEP

STS 48 (FD 04)

PL

MCC

**MET**  
DAY 002  
20:00  
A1 (B1)  
AUTO/VERN

**ATT**  
21:00  
BIASED  
ZLV  
+YV  
22:00  
23:00  
IMU  
00:00

**GSTDN**  
CANGOO  
BDA  
MAX  
CANARRI  
MIL  
TMBLX  
LDA  
MAX  
CANARRI  
MIL  
LXSSA  
TMBLX

**ORB**  
44  
45  
46  
003

**A3 (B3)**  
FREE/VERN  
00:00

**FD04 E2 ACTIVITIES:**  
FOOD PREP/POST (Cue Card) (30 Min)  
FILM RADIATION EXP (DSO 318)  
In a.m., record stop MET on Canister #4  
Place canister in HOUSTON Bag

STS

SLEEP

SUPPLY WATER DUMP, steps 142  
(ORB OPS, ECLS)

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

MNVR IMU ALIGN ATT  
STAR PAIR (B1)  
A/AUTO/VERN (23:10) Init MNVR

IMU ALIGN - S TRK (ORB OPS)

GG FREE DRIFT, Steps 1 & 2  
(ORB OPS, RCS)  
ATT ID: B

POST-SLEEP ACTIVITY  
(ORB OPS, CREW SYS)

**RETURN TO NOMINAL AT 3/00:00**

**IMU ALIGN LOG**  
REQD ID:  
-Y\_\_\_, -Z\_\_\_ ANG ERR \_\_\_  
1 2 3  
ANG:  
ΔX ( ) \_\_\_ ( ) \_\_\_ ( ) \_\_\_  
ΔY ( ) \_\_\_ ( ) \_\_\_ ( ) \_\_\_  
ΔZ ( ) \_\_\_ ( ) \_\_\_ ( ) \_\_\_  
EXECUTION TIME:  
\_\_\_ / \_\_\_ : \_\_\_ : \_\_\_

**TAPE REMOVAL**  
(PL OPS, SAM)  
Includes tape install  
**DETECTOR CHANGE**  
(PL OPS, SAM)  
Includes DATA ACQ  
DET CAL

P/TV06 SETUP (MODE)  
(PHOTO/TV, P/TV SCENES)

UPDATE  
H2O SPLY DUMP  
QTY TK A & B

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## FD1 RELEASE TIMELINE

### ASSUMPTIONS

- NOMINAL PROCEDURES UNTIL 0/03:10 MET. AT THIS TIME, "GO FOR FD1 RELEASE" IS CALLED DUE TO NO ORBITER POWER TO UARS.
- NOMINAL RMS RELEASE PROCEDURES ARE THEN PERFORMED TO DEPLOY THE SOLAR ARRAY AS QUICKLY AS POSSIBLE.
- UARS RELEASE IS SCHEDULED AT THE LATEST POSSIBLE TIME IN THE RELEASE WINDOW FOR THAT REV. (15 MIN PRIOR TO ORBITAL SUNSET). ANY REALTIME DELAYS IN THE TIMELINE WILL FORCE RELEASE TO OCCUR AT THE OPENING OF THE RELEASE WINDOW ON THE FOLLOWING REV.
- CREW SLEEP PERIOD BEGINS AT 0/12:00.

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
255:22:57/ 256:10:57	000:00:00/ 000:12:00	255:17:57/ 256:05:57	01/ 255 CDT	53.1		SEPTEMBER 12, 1991	STS 48	FINAL	8/7/91
CDT :255					CDT:256				
FD :001	18	19	20	21	22	23	0	1	2
MET :000									
STS									
LAUNCH									
INSERTION									
PL									
DAY/NIGHT									
ORBIT									
CONTINGENCY GSTDN									
CONTINGENCY RNS									
TDRS									
ATTITUDE									
UARS COMM									
NOTES:	<ul style="list-style-type: none"> <li>○ APU HTR DEACT</li> <li>■ SM CRPT</li> <li>● S-BD CONFIG LOW FREQ (GND CMD)</li> <li>▶ ROEU DMATE</li> <li>● UARS GND CMDS</li> <li>● KEEP ALIVE PWR OFF (THERMAL CONTROL ESTABLISHED)</li> <li>○ -ZLV -XVV</li> <li>○ -ZLV -XVY</li> <li>○ APU HTR RECONFIG</li> <li>○ -ZLV -XVY</li> <li>○ APU HTR RECONFIG-A</li> <li>○ -ZLV, +YVV</li> <li>○ -ZLV, +XVV</li> </ul>								

**FD1 RMS RELEASE**



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

STS-48  
ATTITUDE TIMELINE

ATTITUDE  
TIMELINE

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 0/01:12:00 18:12	TRK TGT=2 BV=3( 90.00, 0.00) OM=180.00	A1 AUTO PRI	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD POSITIVE BETA
2 0/03:30:00 40:13	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 86	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
3 0/03:50:00 04:01:21	TRK TGT=2 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	-ZLV TAIL FWD SUN ON PORT
4 0/08:00:00 06:19	MNVR R+167.00 P+119.00 Y+ 56.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 69 P 177	STAR PR A2 -Z: 54 -Y: 18	IMU ALIGN
5 0/08:20:00 21:10	TRK TGT=11 BV=1( 0.00, 0.00) OM= BLANK	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 72 P 172	INRTL R+164 P+122 Y+ 70	+X COAS CAL STAR ID: 11
6 0/08:35:00 46:29	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 NOSE SOUTH WATER DUMP
7 0/10:00:00 07:31	TRK TGT=2 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	-ZLV TAIL FWD
8 0/19:35:00 42:31	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 NOSE SOUTH WATER DUMP
9 0/21:00:00 11:59	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 87	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN -Z COAS CAL STAR ID: 18
10 0/21:25:00 36:09	TRK TGT=2 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	-ZLV TAIL FWD
11 0/23:45:00 1/00:00:00	TRK TGT=2 BV=5(276.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 84 P 180	LVLH R+180 P+186 Y+ 0	RCS 1 -X (FWD) NEW LVLH PROCEDURE
12 1/00:09:30		B1 INRT PRI	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 57 P 115	INRTL R+321 P+172 Y+313	MODE TO INERTIAL 30 SEC PRIOR TO BURN

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 1/00:30:00 31:20	MNVR R+335.00 P+190.00 Y+306.00	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 37 P 258		RCS 2 +X (AFT)
2 1/01:00:00 14:57	TRK TGT=2 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	-ZLV TAIL FWD
3 1/08:20:00 34:58	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 NOSE SOUTH WATER DUMP
4 1/09:45:00 58:21	MNVR R+167.00 P+119.00 Y+ 56.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 69 P 176	STAR PR A2 -Z: 54 -Y: 18	IMU ALIGN
5 1/10:05:00 06:10	TRK TGT=11 BV=1( 0.00, 0.00) OM= BLANK	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 73 P 172	INRTL R+164 P+122 Y+ 70	+X COAS CAL STAR ID: 11
6 1/10:20:00 31:39	TRK TGT=2 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	-ZLV TAIL FWD
7 1/21:00:00 13:25	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 88	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
8 1/21:20:00 32:42	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 NOSE SOUTH WATER DUMP
9 1/22:45:00 52:31	TRK TGT=2 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	-ZLV TAIL FWD
10 2/04:38:30	- PITCH ROTATION	B9 FREE PRI	DSC 0.820		ROT R+129 START P+115 ATT Y+ 22	SEP 1 -X BACKAWAY IN FREE DRIFT
11 2/04:40:20 42:00	MNVR R+139.00 P+169.00 Y+320.00	B9 AUTO PRI	DSC 0.100 DB AT 3.00 DB RT 0.20	SUN T 49 P 292		-Z TGT TRACK
12 2/06:45:00 58:35	MNVR R+280.00 P+320.00 Y+ 30.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 225		TDRS KU COMM
13 2/08:30:00 39:35	TRK TGT=2 BV=5( 90.00, 340.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 340	LVLH R+200 P+ 0 Y+ 90	BIASED -ZLV NOSE SOUTH WATER DUMP

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 2/09:55:00 10:07:41	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 89	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
2 2/10:15:00 25:49	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 NOSE SOUTH
3 2/21:15:00 16:40	TRK TGT=2 BV=5( 90.00, 340.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 340	LVLH R+200 P+ 0 Y+ 90	BIASED -ZLV NOSE SOUTH WATER DUMP
4 2/22:40:00 52:06	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 90	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
5 2/23:00:00 10:22	TRK TGT=2 BV=5( 357.51, 359.23) OM=110.91	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 3 P 204	LVLH R+111 P+268 Y+ 2	GG NOSE TO EARTH BAY SOUTH
6 3/06:55:00 07:09:57	TRK TGT=2 BV=5( 90.00, 340.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 340	LVLH R+200 P+ 0 Y+ 90	BIASED -ZLV NOSE SOUTH WATER DUMP
7 3/11:25:00 36:31	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 90	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
8 3/11:45:00 56:58	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 NOSE SOUTH
9 3/22:45:00 46:40	TRK TGT=2 BV=5( 90.00, 340.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 340	LVLH R+200 P+ 0 Y+ 90	BIASED -ZLV NOSE SOUTH WATER DUMP
10 4/00:15:00 27:12	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 91	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
11 4/00:35:00 46:17	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 NOSE SOUTH
12 4/01:45:00	INERTIAL HOLD THEN FREE DRIFT	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 128 P 284	INRTL R+ 46 P+ 46 Y+319	FCS C/O PART 2 STEP 1 AND 2

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 4/02:20:00 30:56	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	FCS C/O PART 2 STEP 3 - 7
2 4/02:40:00	INERTIAL HOLD THEN FREE DRIFT	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 127 P 130	INRTL R+200 P+ 46 Y+319	RCS HOT FIRE
3 4/02:55:00 59:47	MNVR R+210.00 P+ 40.00 Y+ 15.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 137 P 176		TDRS KU COMM
4 4/04:55:00 05:08:24	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 NOSE SOUTH
5 4/10:00:00 01:40	TRK TGT=2 BV=5( 90.00, 340.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 340	LVLH R+200 P+ 0 Y+ 90	BIASED -ZLV NOSE SOUTH WATER DUMP
6 4/11:25:00 36:50	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 91	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
7 4/11:45:00 47:47	MNVR R+ 82.00 P+266.00 Y+315.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 89 P 90		PTC INIT
8 4/11:50:00	ROT BV=1( 0.00, 0.00)	A2 AUTO PRI	DSC 0.400 DB AT 1.00 DB RT 0.20		ROT R+ 82 START P+266 ATT Y+315	START PTC ROTATION
9 5/00:10:00	CANCEL	A2 AUTO PRI	DSC 0.400 DB AT 1.00 DB RT 0.20	SUN T 89 P 330	INRTL R+202 P+266 Y+315	TERM PTC
10 5/00:15:00 25:20	MNVR R+113.00 P+312.00 Y+319.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 92	STAR PR A1 -Z: 18 -Y: 54	IMU ALIGN
11 5/00:35:00 39:46	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 175 P 178	INRTL R+130 P+ 5 Y+351	BIASED TAIL SUN RAD COLDSOAK
12 5/02:49:00 03:03:54	MNVR R+ 13.00 P+152.00 Y+349.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 34 P 13	STAR PR -Z: 44 -Y: 43	D/O IMU ALIGN

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 5/03:10:00 12:02	MNVR R+ 8.00 P+211.00 Y+ 2.00		DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 29 P 166	STAR PR -Z: 38 -Y: 43	D/O IMU VERIF
2 5/05:34:00 38:24	MNVR R+187.00 P+ 39.00 Y+ 46.00		DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 120 P 220		D/O BURN

\*\*\*ALL ATTITUDES IN MEAN OF 1950\*\*\*

STS-48 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	0.50
<u>ROTATION</u>										
DSC RT NORM °/sec	2	0.200	0.400	0.200	0.500	0.200	0.200	0.200	0.200	0.100
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	0.04
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	3.00
VERN (deg)	9	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000	2.000
RATE NORM °/sec	10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN °/sec	11	.020	.020	.010	.020	.020	.020	.020	.020	0.050
<u>JET OPT</u>										
P	12	1	1	1	1	1	3	1 or 3	1	1
Y	13	1	1	3	1	1	3	1 or 3	1	1
<u>CNTL ACCEL</u>										
	14	0	0	0	0	0	0	0	0	0 to 4, TABLE

\*I-LOADED OPS-2 DAP Configuration

ALT DAP CONFIGURATIONS

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

\*I-LOADED OPS-2 DAP Configuration

RMS Configuration Dependent ALT DAP Delay Time and Control Accel

RMS Configuration	Delay (sec)	Control Accel
Low Hover	11.9	1
Deploy/Release	3.9	2
EVA Hover	10.4	4
EVA 0	10.4	3
EVA 1	11.4	3
EVA 2	8.5	3
EVA 3	8.7	3
EVA 4	11.3	3
EVA 5	9.8	3
EVA 6	9.8	3
EVA 7	9.0	3
EVA 8	8.9	3
EVA 9	9.5	3
EVA 9A	9.5	4
EVA 10	9.9	3
EVA 11	9.9	4
EVA 12	9.1	4

DAP B CONFIGURATIONS

	ITEM #	B1*	B2	B3	B4	B5	B6	B7	B8	B9
<u>TRANSLATION</u>										
PULSE ft/sec	15	0.02	0.02	0.02	0.02	0.02		0.05	0.01	0.20
<u>ROTATION</u>										
DSC RT NORM °/sec	16	0.500	0.200	0.200	0.200	0.200		0.500	0.200	0.100
VERN °/sec	17	0.200	0.200	0.200	0.008	0.016		0.200	0.200	0.024
PULSE NORM °/sec	18	0.04	0.04	0.04	0.04	0.04		0.04	0.04	0.04
VERN °/sec	19	0.002	0.002	0.002	0.002	0.002		0.002	0.002	0.002
COMP NORM °/sec	20	.00	.00	.00	.00	.00		.00	.00	.00
VERN °/sec	21	.000	.000	.000	.000	.000		.000	.000	.000
<u>DEADBAND</u>										
ATT NORM (deg)	22	3.00	3.00	3.00	0.30	3.00		2.00	2.00	1.00
VERN (deg)	23	1.000	1.000	1.000	0.100	0.033		1.000	1.000	0.50
RATE NORM °/sec	24	0.20	0.20	0.20	0.20	0.20		0.20	0.20	0.20
VERN °/sec	25	.020	.020	.020	.010	.020		.020	.020	.030
<u>JET OPT</u>										
P	26	1	3	1	3	3		1 or 3	1	3
Y	27	1	3	1	3	3		1 or 3	1	3
<u>CNTL ACCEL</u>	28	0	0	0	0	0		0	0	0 to 4, TABLE

\*I-LOADED OPS-2 DAP Configuration

# DAP BOOK

HOOK  
VELCRO

FLT PLN-1a/48/0/A

UNIV PTG	
<p>TGT ID = 1 Orbiting Vehicle                      = 2 Earth ctr                      = 3 Earth tgt                          Input LAT (<math>\pm 90</math>)                              LON (<math>\pm 180</math>, + = East)                              ALT (-3444.0 to                                  20000.0 nm)                      = 4 Sun ctr                      = 5 Celestial tgt                          Input RA (0-359.99)                          DEC (<math>\pm 90</math>)                      = 11-110 Nav Stars</p>	<p>CNTL ACCEL = 0 Orbiting Vehicle                      = 1 Low hover                      = 2 Release                      = 3 EVA POS'N #0 - 10                      = 4 EVA POS'N #11, 12, and                      EVA hover</p>
<p>BODY VECT = 1 +X*                      = 2 -X*                      = 3 -Z*                      = 4 PTC (<math>\sim 2^\circ</math> below +X)*                      = 5 Optional                          Input P (0-359.99)                              Y (270-359.99, 0-90)                              OM (0-359.99)</p>	<p>PRI JET OPT = 1 Normal                      = 2 Nose only                      = 3 Tail only</p> <p>Alt JET OPT = 1 Normal                      = 2 Illegal entry                      = 3 Tail only</p>
<p>* input OM <math>\rightarrow</math>                      MON AXIS = 1 +X                                2 -X</p>	

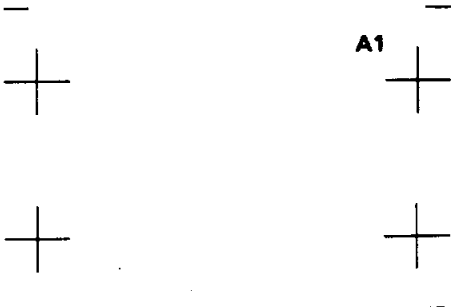
FLT PLN-1b/48/0/A



DAP                      PURPOSE

- A1 - NOMINAL  
IMU ALIGN  
LOSS OF VERN  
(NOSE & TAIL)
- A2 - PTC
- A3 - GG
- A4 - PRE/POST DEPLOY
- A5 - IMU ROTATION
- A6 - LOSS OF VERN  
(TAIL ONLY)
- A7 - RENDEZVOUS
- A8 - PROX OPS
- A9 - RMS (ALL UARS  
ACTIVITIES EXCEPT  
RELEASE)

FLT PLN-2a/48/0/A



**A1**

**DAP A1**

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

**A1**

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

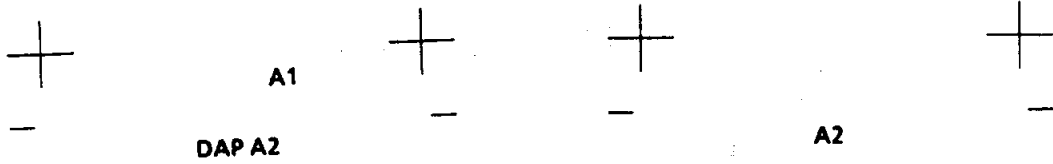
FLT PLN-2b/48/0/A



FLT PLN-3a/48/0/A



**A2**



A1

DAP A2

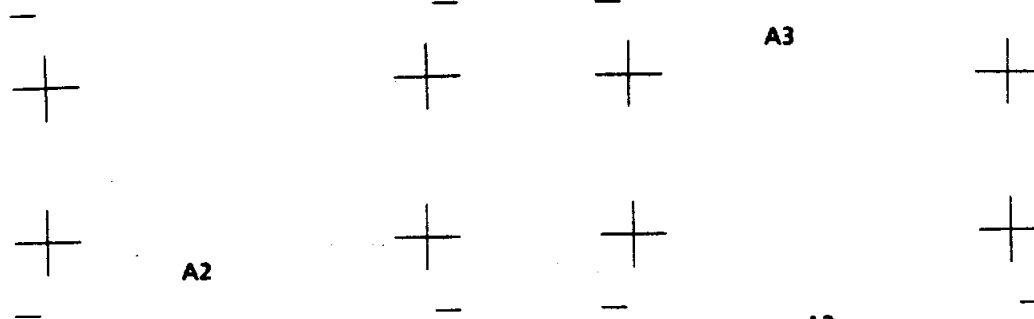
PURPOSE:  
PTC

A2

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

FLT PLN-3b/48/0/A

FLT PLN-4a/48/0/A



A2

DAP A3

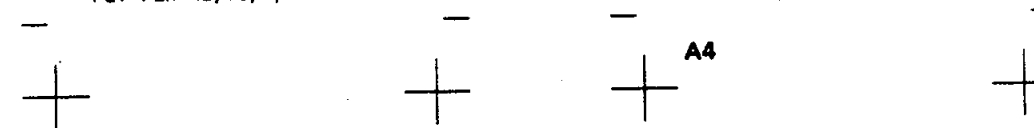
PURPOSE:  
GG

A3

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

FLT PLN-4b/48/0/A

FLT PLN-5a/48/0/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	VERN
0.1 0 0	4	PULSE	NORM
0.0 1 0	5	VERN	VERN
.0 0 0	6	COMP	NORM
.0 0 0	7	VERN	VERN
		DEADBAND	
3.0 0	8	ATT	NORM
1.0 0 0	9		VERN
0.2 0	10	RATE	NORM
0.0 2 0	11		VERN
1	12	JET OPT	P
1	13		Y
0	14	CNTL ACCEL	

FLT PLN-5b/48/0/A

FLT PLN-6a/48/0/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	VERN
0.1 0 0	4	PULSE	NORM
0.0 5 0	5	VERN	VERN
.0 0 0	6	COMP	NORM
.0 0 0	7	VERN	VERN
		DEADBAND	
5.0 0	8	ATT	NORM
1.0 0 0	9		VERN
0.2 0	10	RATE	NORM
0.0 2 0	11		VERN
1	12	JET OPT	P
1	13		Y
0	14	CNTL ACCEL	

FLT PLN-6b/48/0/A

FLT PLN-7a/48/0/A

+

+

+

A6

+



A5

DAP A6

PURPOSE:

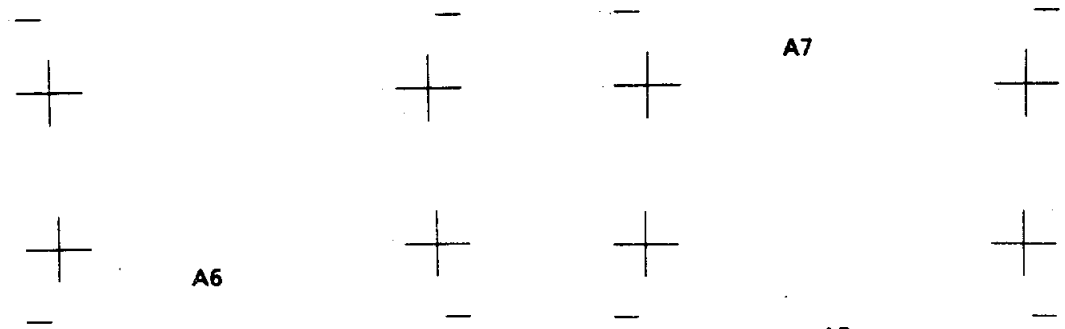
LOSS OF VERN  
(TAIL ONLY)

A6

- 0.1 0 1 TRANSLATION PULSE
- 0.2 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.1 0 4 PULSE NORM
- 0.0 1 0 5 VERN
- .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 0 11 VERN
- 3 12 JET OPT P
- 3 13 Y
- 0 14 CNTL ACCEL

FLT PLN-7b/48/0/A

FLT PLN-8a/48/0/A



A6

DAP A7

PURPOSE:

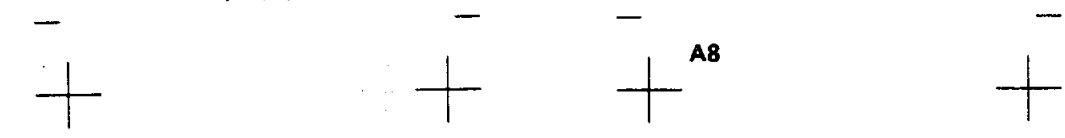
RENDEZVOUS

A7

- 0.1 0 1 TRANSLATION PULSE
- 0.2 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.1 0 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 6 COMP NORM
- .0 0 7 VERN
- 2.0 0 8 DEADBAND ATT NORM
- 1.0 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/48/0/A

FLT PLN-9a/48/0/A



A8





A7

**DAP A8**

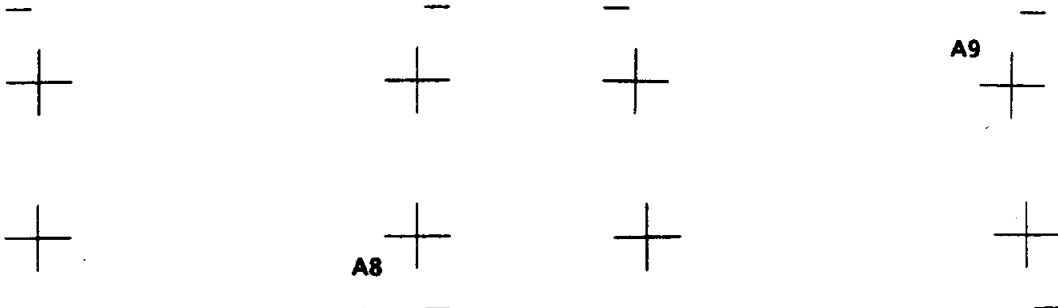
PURPOSE:  
PROX OPS

**A8**

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

FLT PLN-9b/48/0/A

FLT PLN-10a/48/0/A



A9

A8

**DAP A9**

PURPOSE:  
ALL RMS UARS LOADED  
ACTIVITIES EXCEPT  
RELEASE

**A9**

0.5 0	1	TRANSLATION	
		PULSE	
0.1 0 0	2	ROTATION	
0.2 0 0	3	DSC RT	NORM
0.0 4	4	PULSE	VERN
0.0 1 0	5		NORM
.0 0 0	6	COMP	VERN
.0 0 0	7		NORM
		DEADBAND	
3.0 0	8	ATT	NORM
2.0 0 0	9		VERN
0.2 0	10	RATE	NORM
0.0 5 0	11		VERN
1	12	JET OPT	P
1	13		Y
1 to 4	14	CNTL ACCEL	
TABLE			

FLT PLN-10b/48/0/A

FLT PLN-11a/48/0/B





A9



DAP

PURPOSE

ALT1 - NOMINAL I-LOAD  
ALT2 - UARS POST SOLAR  
ARRAY DEPLOY

FLT PLN-11b/48/0/A



FLT PLN-12a/48/0/A



ALT1



DAP ALT1

PURPOSE:

NOMINAL I-LOAD

ALT1

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

FLT PLN-12b/48/0/A

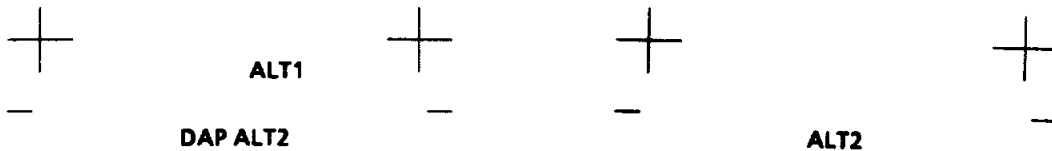


FLT PLN-13a/48/0/A



ALT2





ALT1

DAP ALT2

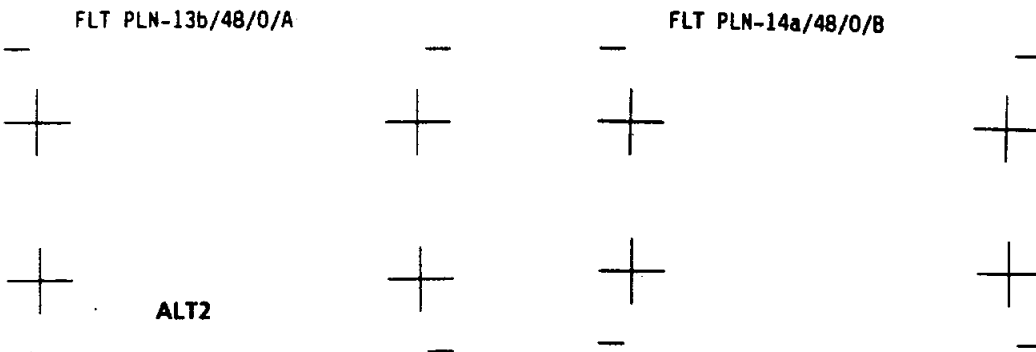
ALT2

PURPOSE:

UARS POST SOLAR  
ARRAY DEPLOY

0.1	0	0	32	RATE DB
			33	JET OPT
			34	# JETS
			35	ON TIME
			36	DELAY

RMS TABLE AT END OF DAP B



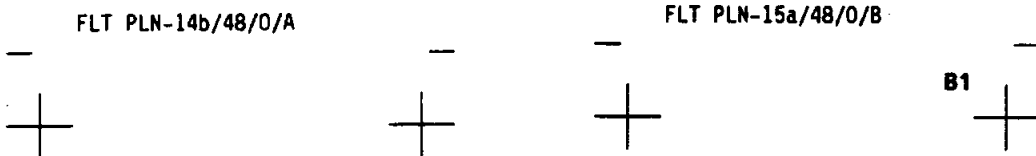
FLT PLN-13b/48/0/A

FLT PLN-14a/48/0/B

ALT2

<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	- (Blank)
B7	- RENDEZVOUS
B8	- PROX OPS
B9	- RMS (UARS RELEASE)

RMS TABLE



FLT PLN-14b/48/0/A

FLT PLN-15a/48/0/B

B1

DAP B1

PURPOSE:

NOMINAL  
PRCS IMU ALIGN  
OMS & RCS BURNS

FLT PLN-15b/48/0/A

B1

TRANSLATION				
PULSE	15	0.0	2	
ROTATION				
DSC RT	NORM 16	0.5	0 0	
	VERN 17	0.2	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	
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/48/0/A

B2

B1

DAP B2

PURPOSE:

LOSS OF VERN  
(TAIL ONLY)

FLT PLN-16b/48/0/A

B2

TRANSLATION				
PULSE	15	0.0	2	
ROTATION				
DSC RT	NORM 16	0.2	0 0	
	VERN 17	0.2	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	
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		1	
CNTL ACCEL	28		0	

FLT PLN-17a/48/0/A

B3

B2

DAP B3

PURPOSE:

LOSS OF VERN  
(NOSE & TAIL)  
GG MNVR

FLT PLN-17b/48/0/A

B3

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 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-18a/48/0/A

B4

B3

DAP B4

PURPOSE:

SSUS DEPLOY

FLT PLN-18b/48/0/A

B4

TRANSLATION  
PULSE 15 0.0 2

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 2  
COMP NORM 20 0.0 0  
VERN 21 .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-19a/48/0/A

B5

B4

DAP B5

PURPOSE:  
COAS CAL

FLT PLN-19b/48/0/A

B5

DAP B6

PURPOSE: (Blank)

FLT PLN-20b/48/0/A

B5

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	0	4
	VERN	19	0.0	0	2
COMP	NORM	20		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-20a/48/0/A



B6

B6


TRANSLATION					
PULSE	15		..	--	
ROTATION					
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-21a/48/0/A

B7


  
**B6**
  

  
**DAP B7**


PURPOSE:  
 RENDEZVOUS


  
 FLT PLN-21b/48/0/A




  

  

  
**B7**
  


**DAP B8**


PURPOSE:  
 PROX OPS






  
 FLT PLN-22b/48/0/A



  
**B7**
  



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 or 3  
           Y 27 1 or 3  
 CNTL ACCEL 28 0


  
 FLT PLN-22a/48/0/A


  
**B8**
  

  

  


**B8**

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 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-23a/48/0/A


  
**B9**
  


B8

DAP B9

PURPOSE:

PROX OPS

FLT PLN-23b/48/0/A

B9

TRANSLATION PULSE 15 0.2 0

ROTATION DSC RT NORM 16 .1 0 0
VERN 17 0.0 2 4
PULSE NORM 18 0.0 0 4
VERN 19 0.0 0 2
COMP NORM 20 .0 0 0
VERN 21 .0 0 0

DEADBAND ATT NORM 22 1.0 0
VERN 23 0.5 0 0

RATE NORM 24 0.2 0
VERN 25 0.0 3 0

JET OPT P 26 3
Y 27 3

CNTL ACCEL 28 0 to 4,
TABLE

FLT PLN-24a/48/0/C

B9

Table with 3 columns: RMS Configuration, Delay (sec), Control Accel. Rows include Low Hover, Deploy/Release, EVA Hover, EVA 0-12.

FLT PLN-24b/48/0/B





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FLT PLN-25a/48/0/A



# DAP BOOK



FLT PLN-25b/48/0/A



STS-48  
FLIGHT PLAN NOTES

FLT PLN NOTES

FLIGHT PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

The STS-48 (OV-103) launch from KSC on Sept 12, 1991, will be into a 291 nm orbit at an inclination of 57 degrees. On-orbit adjust burns will raise the orbit to an altitude of 305 nm. The mission duration will be 5 days. Nominal landing occurs at KSC on September 17, 1991.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Landing Site Time</u>
Nominal	Primary	80	KSC	01:55 EDT
	Weather Alt.	81	EDW	00:28 PDT
1 Day Late	Primary	95	KSC	01:55 EDT
	Weather Alt.	96	EDW	00:27 PDT
2 Days Late	Primary	110	KSC	01:54 EDT
	Weather Alt.	111	EDW	00:27 PDT

MAJOR EVENTS

<u>LAUNCH (KSC)</u>	Sept 12, 1991
<u>MET (DD/HH:MM)</u>	0/00:00
<u>Day of year</u>	255
<u>CDT/GMT</u>	17:57/22:57
<u>OMS-2</u>	
<u>MET (DD/HH:MM)</u>	0/00:48
<u>DV (fps)</u>	448.1
<u>ORBIT ha/hp (nm)</u>	293/291
<u>RCS-1 (FWD)</u>	
<u>MET (DD/HH:MM)</u>	01/00:10
<u>DV (fps)</u>	23.5
<u>ORBIT ha/hp (nm)</u>	305/292
<u>RCS-2 (AFT)</u>	
<u>MET (DD/HH:MM)</u>	01/00:58
<u>DV (fps)</u>	22.4
<u>ORBIT ha/hp (nm)</u>	306/305
<u>UARS DEPLOY</u>	
<u>MET (DD/HH:MM)</u>	02/04:40
<u>RCS-3 (SEP-1)</u>	
<u>MET (DD/HH:MM)</u>	02/04:40
<u>DV (fps)</u>	2.0
<u>ORBIT ha/hp (nm)</u>	308/306
<u>RCS-4 (SEP-2)</u>	
<u>MET (DD/HH:MM)</u>	02/04:58
<u>DV (fps)</u>	5.5
<u>ORBIT ha/hp (nm)</u>	306/303
<u>DEORBIT BURN</u>	
<u>MET (DD/HH:MM)</u>	05/05:49
<u>DV (fps)</u>	501
<u>LANDING (KSC)</u>	
<u>MET (DD/HH:MM)</u>	05/06:58
<u>Day of year</u>	261
<u>CDT/GMT</u>	00:55/05:55

FLT PLN NOTES

## B. CREW

### 1. The five crewmembers flying this mission are:

CDR - John O. Creighton  
PLT - Kenneth S. Reightler, Jr.  
MS1 - Charles D. Gemar  
MS2 - James F. Buchli  
MS3 - Mark N. Brown

### 2. The crewmembers responsible for performing an EVA, should one become necessary, are: MS2 will be EV1, MS1 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 supported by TDRS-E (41 degrees W) and TDRS-W (171 degrees W) and is the prime mode of communication coverage.
- c. TDRS Ku-band is the prime mode of real-time TV. There are also three GSTDN sites available as backup for TV (90 minute lead time required): GDS(GDX), MIL(MLX), VAN.
- d. HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.
- e. GSTDN sites available during the first 25 minutes of the mission are MIL(MLX), PDL, BDA, DKR, and IOS. IOS can be used for UHF voice during ascent.
- f. There are five GSTDN sites available on-orbit or for deorbit: VAN, GDS(GDX), MIL(MLX), BDA(BDX), and DFR. (Note: DFR is not shown in the Flight Plan). CAN and MAD can be called up for emergencies.

### 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 postsleep 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 doors (PLBDs) failed closed. On orbit, supply water will be managed with both dumps and the FES. A waste water dump is scheduled on FD5. All dumps will be inhibited during UARS operations on FD3.

### D. TEXT UPLINK SYSTEM

1. The teleprinter (TPR) will provide 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 page, 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 four PLB TV cameras. Two cameras are also attached to the RMS at the elbow and End Effector positions. There are three different lens assemblies for the PLB cameras (color lens assembly, monochrome lens assembly, and wide-angle lens assembly). The type of lens assembly for each PLB 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. Upper Atmosphere Research Satellite (UARS)

The UARS payload consists of the UARS observatory and the UASE. The UARS observatory consists of a primary support structure, 10 mission instruments, solar array, high gain antenna, attitude sensors and torquer bars, and a Multimission Modular Spacecraft (MMS). Three of the instruments are mounted on a gimballed structure referred to as the Solar Stellar Pointing Platform (SSPP). The objectives of the UARS mission are to conduct a detailed study of the Earth's stratosphere, mesosphere, and lower thermosphere; to establish a database on stratospheric ozone depletion; and to assess the role of human activity in atmospheric change.

2. Ascent Particle Monitor (APM)

The APM is an automatic system mounted in the orbiter cargo bay to measure particle contamination during the immediate prelaunch period and during ascent. Each flight unit weighs 10 lb, is battery powered, and has no external interfaces other than mechanical attachment. A clam shell-type door opens at a preselected time exposing sample coupons to the PLB environment. At a later preselected time the clam shell will close, sealing the coupons for later analysis.

3. RME-III

The RME-III configuration consists of a handheld instrument with replaceable memory modules. The equipment contains a Liquid Crystal Display (LCD) for real-time data display and a keyboard for controlling its functions. The experiment is self contained with two zinc air and five AA batteries contained in each memory module and a zinc air battery in the main module. The equipment takes measurements of the radiation environment at a specified sample rate.

4. Protein Crystal Growth (PCG II - 2) (block 1)

The PCG payload is designed to conduct experiments which will determine the potential for growing large, high quality protein crystals in microgravity. In the block 1 configuration, the refrigerator/incubator modules (R/IMs) consist of a carrier holding up to three Vapor Diffusion Apparatus (VDA) trays. Each VDA has 20 experiment chambers. Each RIM occupies one middeck locker and requires 28V dc power from prelaunch through post landing.

5. Middeck "0" gravity Dynamics Experiment (MODE)

The MODE payload is designed to study the behavior of space structures and contained fluids in microgravity. The experiment consists of four Fluid Test articles (FTAs), one Structural Test Article (STA), and the Experiment Support Module (ESM). The FTAs will be attached to a force balance and shaker. The fluid slosh forces will be measured for the different shaped tanks and shaking frequencies. Acceleration and strain will be measured on the STA for a number of configurations and frequencies.

6. Investigations Into Polymer Membrane Processing (IPMP)

The research objective of the IPMP payload is to flash evaporate mixed solvent systems in the absence of convection to control the porosity of the polymer membrane. The crewmember will activate the system during a period of low "G" and deactivate the test after the appropriate amount of time.

7. Physiological and Anatomical Rodent Experiment (PARE)

The PARE experiment is being conducted by the University of Arizona to study muscle atrophy in microgravity. The equipment consists of one animal enclosure module (AEM) which contains eight rodents. The payload requires 28V dc power and daily housekeeping and observation by the crew.

## 8. Shuttle Activation Monitor (SAM)

The SAM experiment consists of two separate data collection systems to count gamma rays as a function of time and location in the orbiter. The passive system requires the crew to install an activation foil packet at the four specified stations. The active system consists of a tape recorder, multichannel analyzer (MCA), a Particle Anticoincidence Mantle (PAM), and two detector assemblies. Each data run lasts approximately 12 hours and requires a specific detector and location.

## 9. Cosmic Radiation Effects and Activation Monitor (CREAM)

The objective of the CREAM is to collect data on cosmic ray energy loss spectra, neutron fluxes, and induced radioactivity as a function of geomagnetic coordinates and detector location within the orbiter. The flight hardware consists of an active cosmic ray monitor, a passive sodium iodide detector, and up to five passive detector packages. CREAM requires 28V dc power.

## G. ON-ORBIT DTOs

### 1. Electronic Still Photography (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 disks and can be converted to a format suitable for downlink transmission or enhanced using image processing software. The ability to enhance and/or downlink high resolution images in real time will greatly improve capabilities in Earth observations. The objective of this DTO is to determine camera response to the photographic conditions encountered on orbit, using a variety of lenses and camera settings. Low data rate downlink may be attempted on STS-48.

## H. ON-ORBIT DSOs

### 1. Radiation Effects on Film (DSO 318)

Past SSP missions at higher altitudes have experienced film fogging. It is believed that this is produced by the increased radiation exposure due to reduced atmospheric protection. Rollei film will be exposed to the cabin environment for various lengths of time in order to quantify the fogging.

### 2. Inflight Radiation Dose Distribution (DSO 469)

This investigation will establish, evaluate, and verify analytical and measurement methods for assessing and managing health risks from exposure to space radiation. The objective is to characterize the type and energy of the collected charged particles and to assess the risk to crew and vehicle from the complex radiation environment. The crew will activate the test equipment early in the flight and deact/stow the tests prior to deorbit prep.

3. Hyperosmotic Fluid Countermeasure (DSO 479)

The hypothesis of this test is that if a hyperosmotic saline countermeasure is ingested before return to 1-G, the crewmember will experience decreased loss of plasma volume and longer lasting protection against orthostatic intolerance than if an isosmotic countermeasure were ingested. Further, crewmembers who ingest a salt water solution will have better resistance to orthostatic stress than crewmembers who consume salt tablets and water of the same osmolality. The objective of this test is to compare different combinations of salt and water.

4. Variability of Blood Pressure and Heart Rate During Space Flight (DSO 602)

The objective of this DSO is to determine whether arterial blood pressure and heart rate exhibit less variability in a microgravity environment than on Earth. The data will be used to investigate whether reduced blood pressure variability in flight, if any, is correlated with the extent of baroreflex attenuation that has been measured postflight. Integrity of the baroreceptor function is required for the appropriate blood pressure responses to the orthostatic stresses imposed by entry, landing, and egress. The crewmember will wear blood pressure and electrocardiograph equipment for 2 flight days on orbit.

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 during deorbit preparation. Equipment consists of a blood pressure monitor, accelerometers, an Impedance Cardiograph, and Transcranial Doppler hardware. The crewmember wears the equipment and records verbal comments through entry.

6. Visual Vestibular Integration as a Function of Adaptation (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. For STS-48, three sessions will be scheduled where the crewmember performs head movements at a slow frequency while verbally recording self and surrounding motion sensations. The sessions are scheduled on flight day 2, flight day 4, and during entry.

7. Effects of Space Flight on Aerobic and Anaerobic Metabolism at Rest and During Exercise (DSO 608)

Changes in energy metabolism, shifts in fuel utilization, and decreases in muscle mass after extended duration space flight may limit a crewmember's ability to do physical work, both in flight and post flight. This DSO has no inflight requirements.



8. Air Monitoring Instrument Evaluation and Atmosphere Characterization (DSO 611)

The purpose of this DSO is to evaluate air monitoring equipment and to collect data on contaminant levels during missions of varying durations. STS-48 will fly the Microbial Air Sampler (MAS) detector.

9. The Effect of Prolonged Space Flight on Head and Gaze Stability During Locomotion (DSO 614)

The objective of this DSO is to characterize head and body movement along with gaze stability during exercise. Changes in these parameters due to the microgravity environment could impair a crewmember's ability to perform an emergency egress from the vehicle. There are no inflight requirements for this DSO.

10. Documentary Television (DSO 901)

This DSO requires live television transmission or VTR dumps of crew activities and spacecraft functions which include: Payload Bay Views, UARS Predeploy, Deploy and Separation Activities, views of PLB attached payloads, In-Flight Crew Conference, views of Middeck Payload Sessions, and unscheduled TV Activities.

11. Documentary Motion Picture Photography (DSO 902)

This DSO requires documentary and public affairs motion picture photography of significant activities which best depict the basic capabilities of the space shuttle and key objectives. This DSO includes motion picture photography of UARS Predeploy and Deploy Activities, Middeck Activities, and any unscheduled Motion Picture Photography.

12. Documentary Still Photography (DSO 903)

This DSO requires still photography of crew activities in the orbiter, spacecraft accommodations, and mission-related scenes of general public and historical interest. Still photography with 70mm format for exterior photography and 35mm format for interior photography is required.

I. TIMELINE FORMATS

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

FLIGHT DATA FILE  
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48 FLT PLN FIN

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GREGORY, J.

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KACHMAR, P.  
M54A/LARSON, R.A.  
MS4C/TURNBALL, J.

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MS737-5/MCGUIRE, G.M.

Intermetrics, Inc.-CA  
5312 Bolsa Ave  
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KOENLER, K.

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NIKKEL, G. (2)

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Sciences Company  
600 Maryland Ave S.W.  
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