

Flight Data File Crew Activity Plan STS 41-D

Mission Operations Directorate
Operations Division

Final, PCN-1
June 6, 1984

Launch	7:43 CDT	Mon	June 25
SYNCOM Deploy (17D)	8:21 CDT	Tues	June 26
Crew Conference	6:48 CDT	Sun	July 1
Landing (EDW)	8:36 CDT	Mon	July 2



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

6:48 CDT

6:48 CDT

FLIGHT DATA FILE

CONTROL

Ascent Checklist

Post Insertion

Crew Activity Plan

Deorbit Prep

Entry Checklist

SUPPORT

Cue Cards Book

EVA Checklist

Flight Maps and Charts Book

Orbit Operations Checklist

Payload Deploy Checklist*

Payload Operations Checklist*

PDRS Operations Checklist*

Photo/TV Checklist

Rendezvous/Proximity Operations*

OFF-NOMINAL

Ascent Pocket Checklist

Orbit Pocket Checklist

Entry Pocket Checklist

Ascent/Entry Systems Procedures

Contingency Deorbit Prep

Contingency EVA Operations

In-Flight Maintenance Checklist

Medical Checklist

Payload Systems Data and Malfunction Procedures*

Malfunction Procedures

REFERENCE

Data Processing System Dictionary

Reference Data

Systems Data

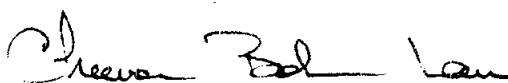
*If required

MISSION OPERATIONS DIRECTORATE

STS 41-D CREW ACTIVITY PLAN

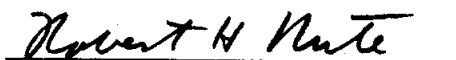

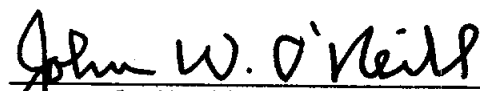
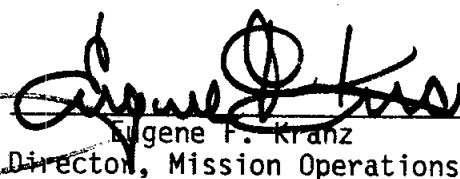
FINAL
May 20, 1984

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This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted on standard JSC Form 482 to DH4/R. D. Snyder, Bldg 4, Rm 352, 713-483-2868.

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Incorporates 482	
No: CAP-167	CAP-185A
CAP-169A	CAP-186
CAP-171	CAP-187B
CAP-172	CAP-189B
CAP-174	CAP-190
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CAP-179A	CAP-193
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ACKNOWLEDGMENTS

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STS 41-D CREW ACTIVITY PLAN

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PCN-1 06/06/84

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A3.....	9-14	41-D/O/BAS
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A4.....	9-15	41-D/O/BAS
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(Blank).....	9-17	41-D/O/BAS
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DAP B1.....	9-18	41-D/O/BAS
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INTRODUCTION

The STS 41-D Crew Activity 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. 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 (Ref. 1) and the requirements of the 41-D Flight Requirements Document (Ref. 2).

The flight profile (Cycle 3A trajectory data, Ref. 3) used for this Crew Activity Plan is for a launch date of June 20, 1984, 12:43 GMT.

Any payload specialist (PS) activities that are to be scheduled will appear in the MS3 row (for summary timelines)/column (for detailed timelines) and annotated with a 'PS'.

References to TDRS and KU-BD activities will appear on the timelines and notes sections even though TDRS-E will not be available during the flight.

The attitude maneuvers that were launch-day-dependent were updated to reflect a June 25, 1984, launch. The CAP trajectory times (sunrise, sunset, etc.) did not significantly change and were not updated.

From flight days 4 through 8 (entry day), the summary and detailed timeline pages will reflect the combined EZ CAP and non-crewmembers specific formats.

- A. The objective of the EZ CAP is to not schedule activities that can be performed anytime during the designated day or anytime from flight days 4 through 7.

These activities include:

- Meal Prep
- Lunch Meal
- Exercise
- RCS Regulator Reconfig
- ECLSS Redundant Component C/O
- Heater Reconfig - B
- PCS (1)2 Config
- Lamp & Fire Suppr Test
- Radiation Monitoring Equipment (RME) Activation/Deactivation
- Medical DSOs (Near Vis & Contrast; Visual Perf Test)
- Cabin Config/Stow
- Meal Cleanup/Stowage
- TV Setup & Activation prior to daily designated live TV pass or VTR dump
- Cinema 360 photos of OAST activities
- IMAX photos of OAST activities, CFES ops, and in-cabin activities
- CFES
- 'Shopping list' activities (not mandatory that they be performed during the flight)

The EZ CAP activities' appropriate durations and constraints are contained on page 4-14A, 'EZ CAP - CREW SCHEDULED ACTIVITIES'. Page 4-14A also includes a log to aid the crew in their daily EZ CAP Status Report during the presleep timeframe.

- B. The objective of the non-crewmembers specific format is to schedule activities under a STS or Payload heading. If several crewmembers are required for an activity, the number of crewmembers required will appear with that activity. This is shown only on the detailed timeline pages.

For the summary format, the top row is the STS row and the bottom row is the PL row; the middle rows are for simultaneous STS or PL activities.

Similarly for the detailed format, the STS column is the left column, and the PL column is the right column. The two middle columns are used for STS or PL activities to indicate when simultaneous (parallel) STS or PL activities are scheduled.

TIMELINE FORMAT SYMBOL NOMENCLATURE

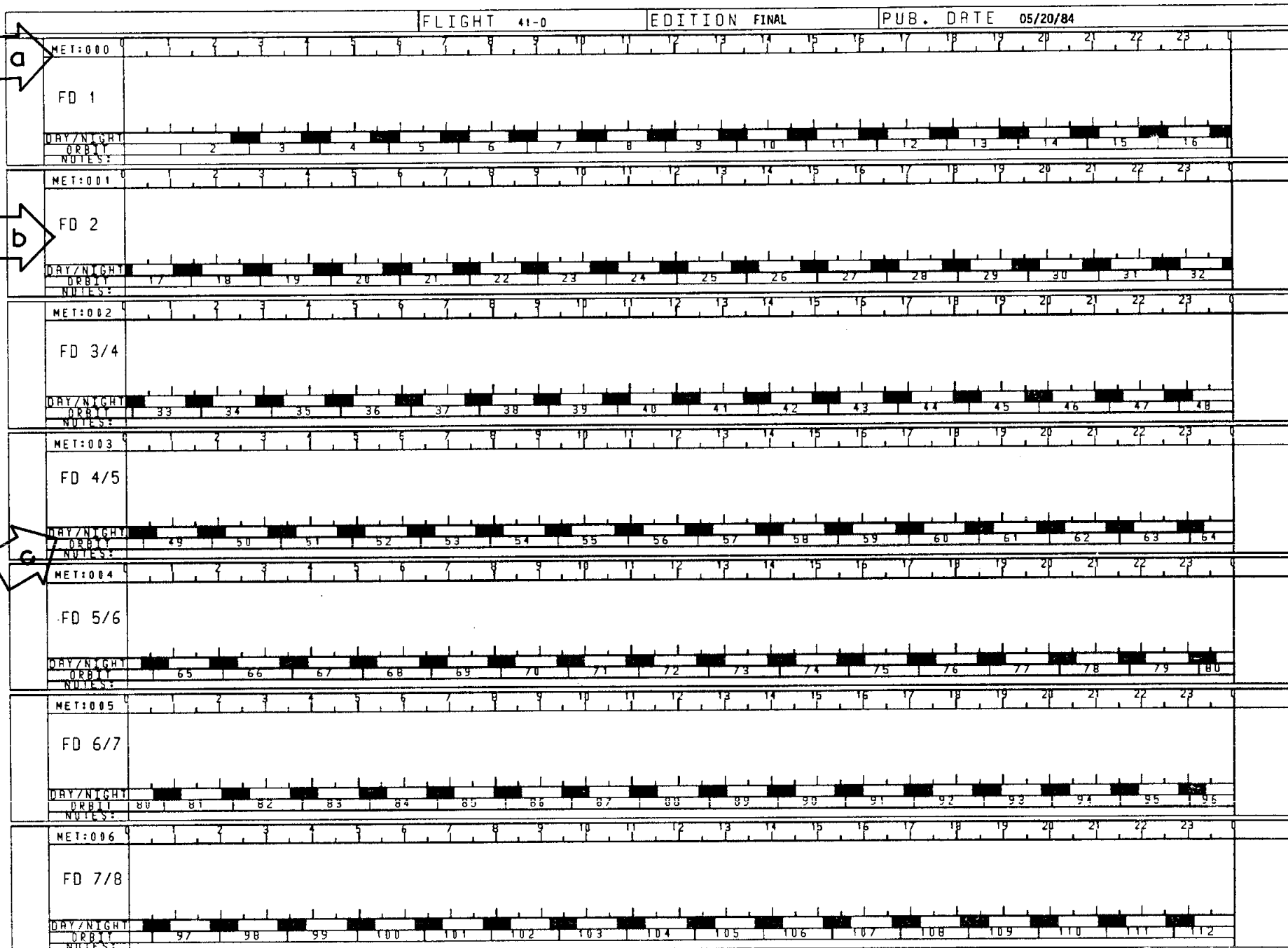


Figure 1-1 Overview
1-2

A. FORMAT SYMBOL NOMENCLATURE

1. Overview Timeline

The following letters (a-c) refer to those highlighted in Figure 1-1.

- a. **TIMESCALE** - The time reference used on this format is cumulative Mission Elapsed Time (MET) expressed in days and hours. MET is referenced to liftoff, which occurs at 0/00:00:00 (days, hours, minutes, seconds).
- b. **ACTIVITY COLUMN** - This row presents an overview of activities scheduled during the flight. For clarity of presentation, only major activities are presented, and activity durations are sometimes lengthened. Abbreviated activity titles can be found in the Abbreviations/Acronyms section of this CAP.
- c. **ORBIT and DAY/NIGHT**
 - 1) **Orbit** - Indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the Orbiter crosses the Earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this column starting with Orbit 1 for launch.
 - 2) **Day/Night** - The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.

2. Summary Level Timeline (12-Hr Timespan)

The following letters (a-g) refer to those highlighted in Figure 1-2.

- a. **TIMESCALES** - Two of the three time references are presented in this section of the summary timeline format. The time references used are Time of Ignition minus (TIG), Central Daylight Time (CDT), and Mission Elapsed Time (MET). MET is referenced to liftoff, beginning at 0/00:00:00 (days, hours, minutes, seconds). TIG is referenced to the deorbit ignition time and counts down to 0/00:00:00 at ignition on the CRT timer. TIG is only used for the deorbit preparations on entry day.
- b. **CREWMAN (CDR, PLT, MS1, MS2, MS3)** - This is the crewman row of the format, where titles of scheduled activities are shown for the commander (CDR), pilot (PLT), and each mission specialist (MS1, MS2, MS3) at the appropriate times in the flight. Any PS (payload specialist) activities needing to be scheduled will appear in the MS3 row and annotated with a 'PS'.

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
163:23:08/ 164:11:08	007:11:00/ 007:23:00	163:18:08/ 164:06:08	/ 163 GMT	42.6	○	JUNE 11, 1984	41-D	FINAL	05/20/84

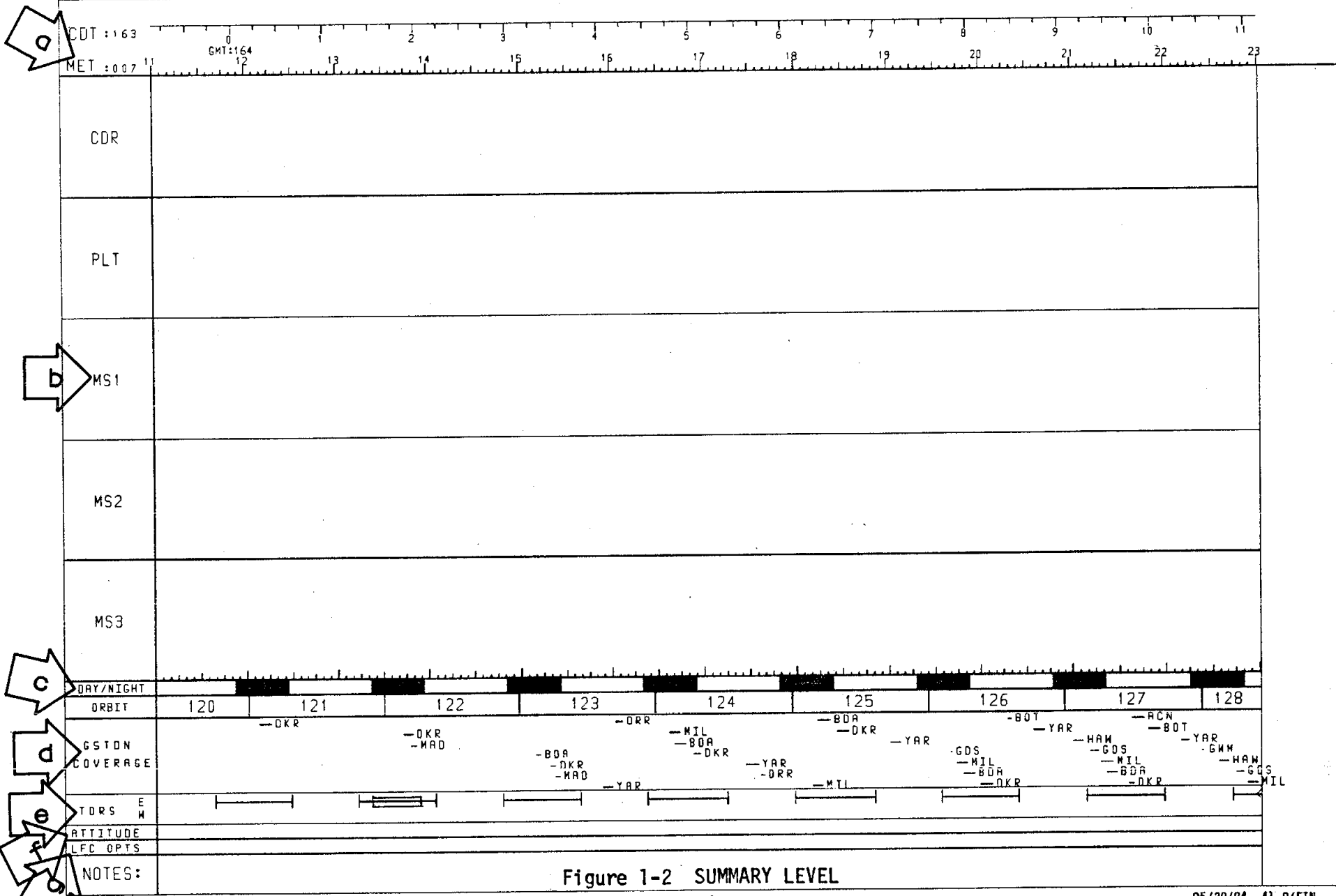


Figure 1-2 SUMMARY LEVEL

c. DAY/NIGHT and ORBIT

- 1) Day/Night - The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.
- 2) Orbit - Indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the Orbiter crosses the Earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this row starting with Orbit 1 for launch.

- d. GSTDN COVERAGE - The GSTDN communication coverage periods are identified in this area with a horizontal line indicating when communication is available; the GSTDN site is identified to the right of the line.
- e. TDRS - The TDRS communication coverage periods are identified in this area, with a horizontal line indicating when there is a line-of-sight between TDRS and the Orbiter. The boxed areas indicate when there is Ku-Band communication which is based upon an unblocked line-of-sight between the Ku-Band antenna and TDRS.
- f. ATTITUDE - The attitude of the vehicle (-ZLV, IMU, etc.) is shown in this row.
- g. LFC OPTS - LFC experiment opportunity times are identified in this row. LFC data takes occur when the Orbiter is in -ZLV +XVV attitude.

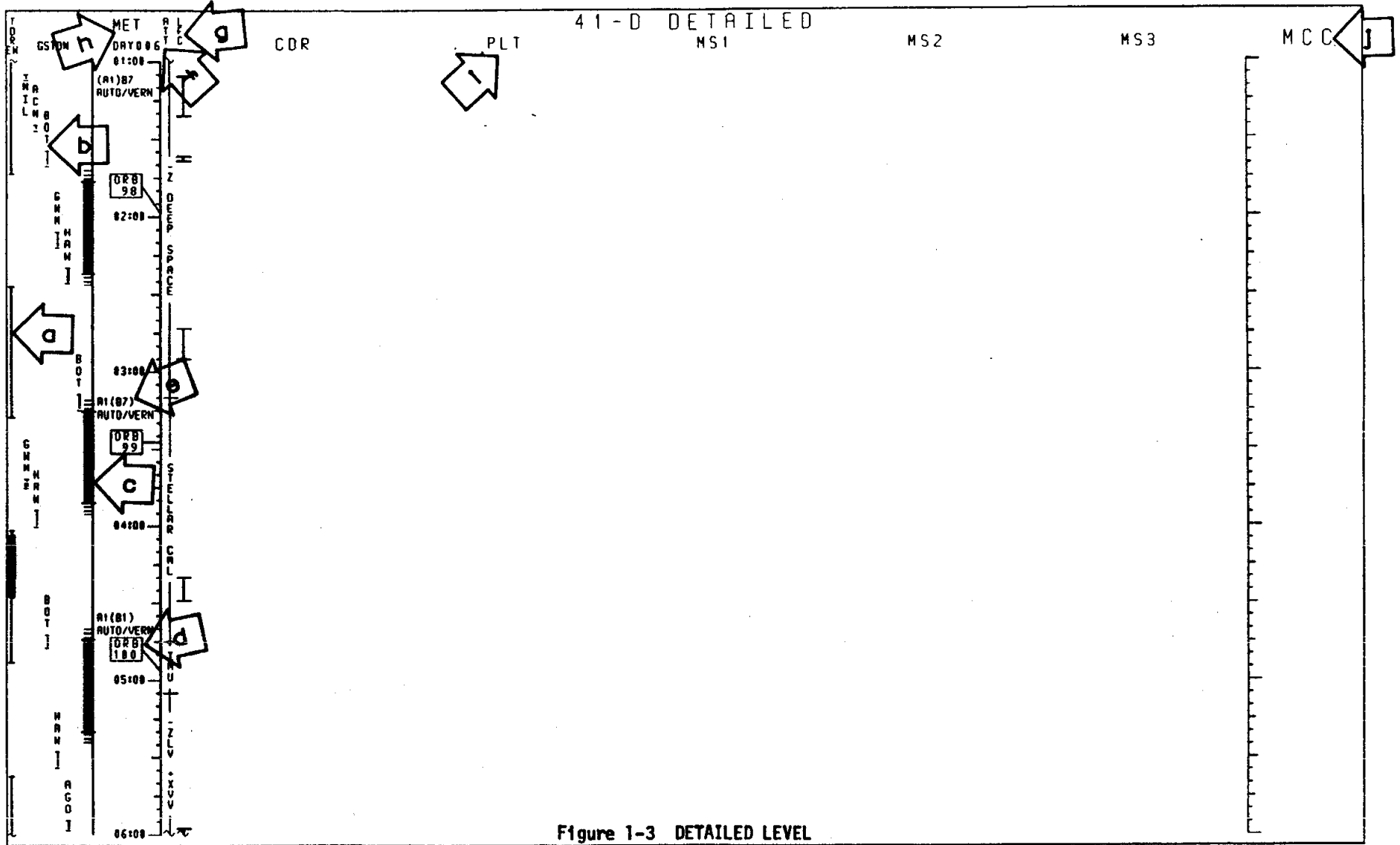


Figure 1-3 DETAILED LEVEL

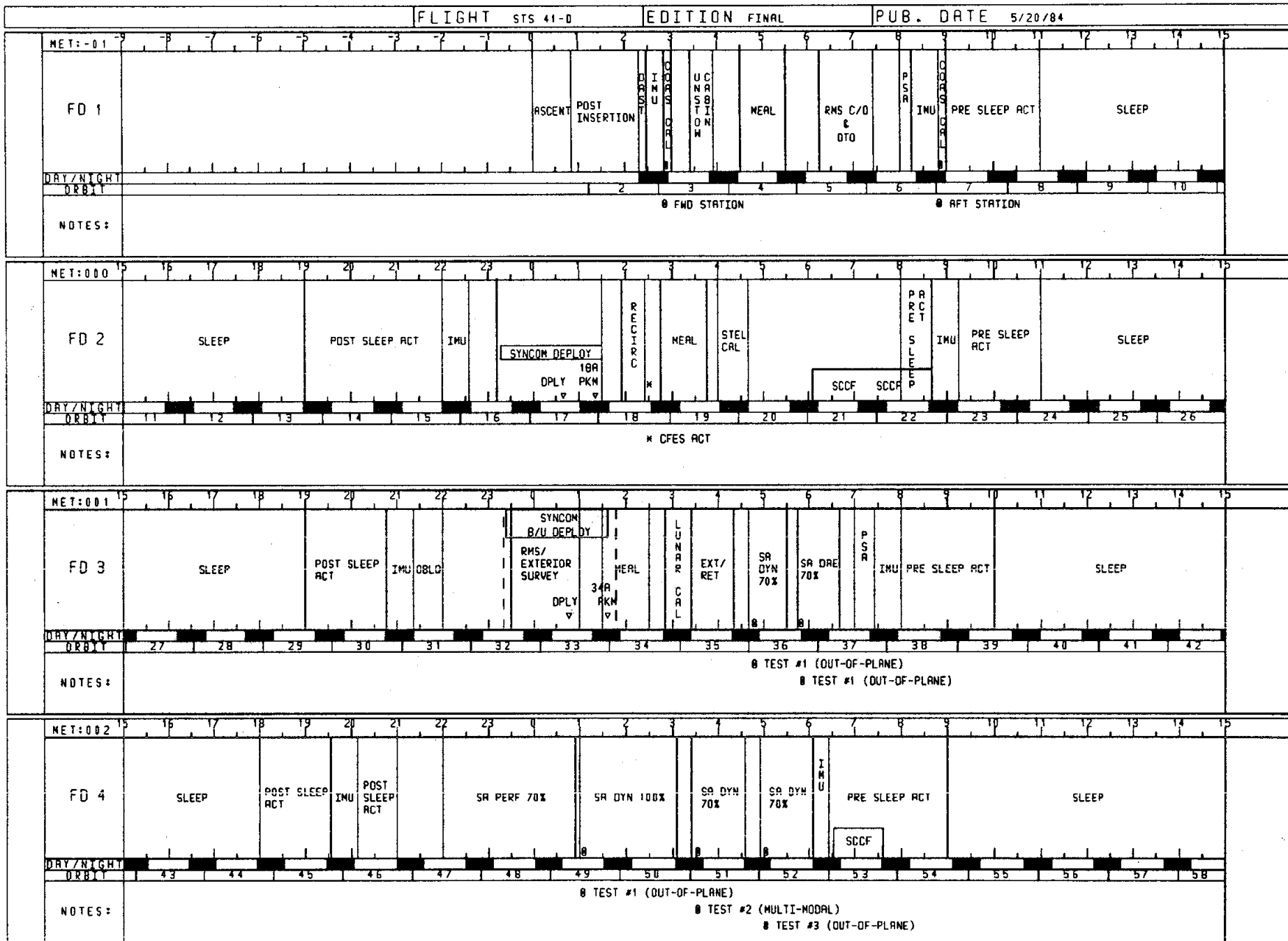
3. Detailed Level Timeline (5-Hr Timespan)

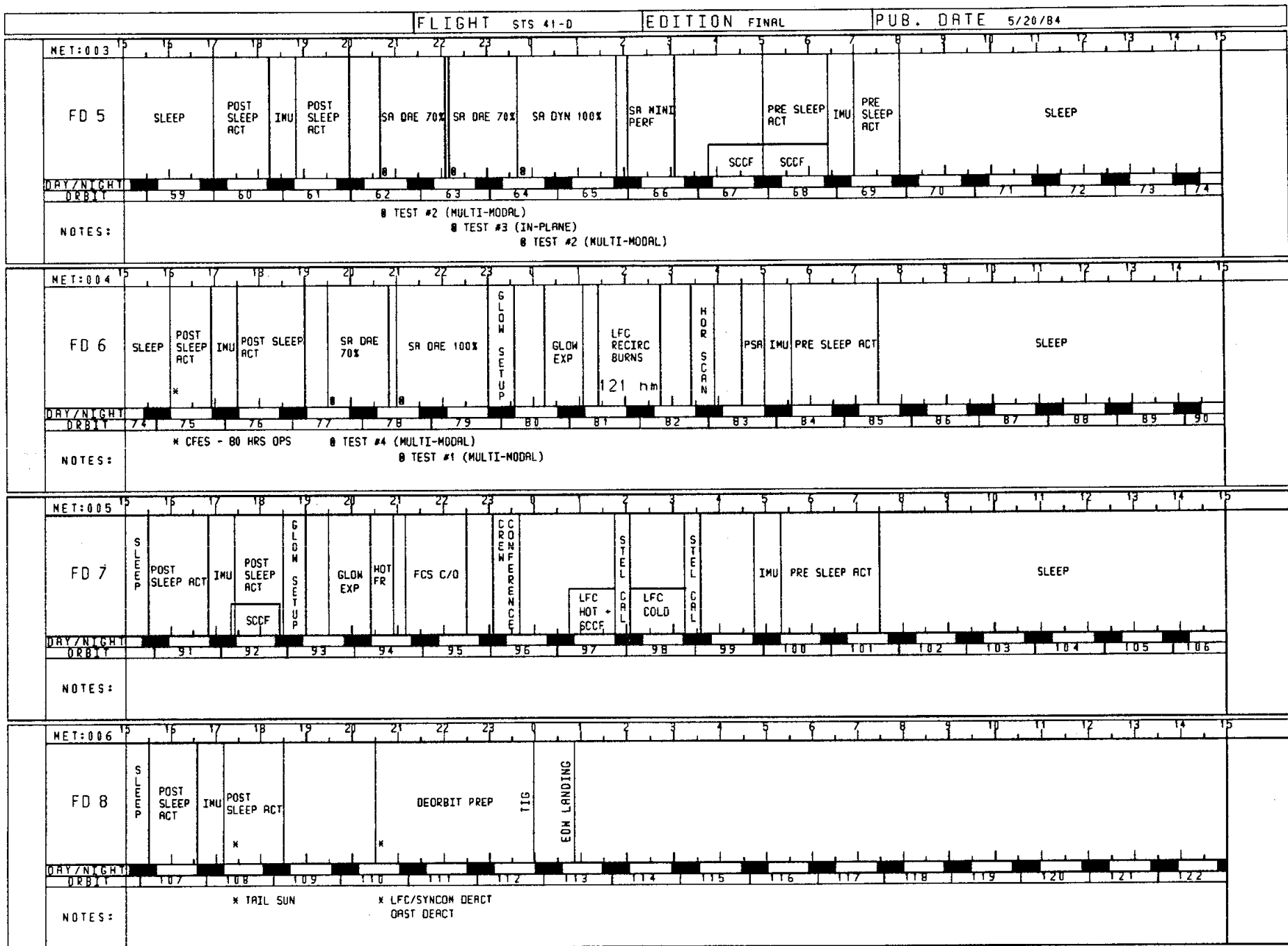
The following letters (a-j) refer to those highlighted in Figure 1-3.

- a. TDRS - The TDRS communication coverage periods are identified in this area, with a vertical line indicating when there is a line-of-sight between TDRS and the Orbiter. The boxed areas indicate when there is Ku-Band communication which is based upon an unblocked line-of-sight between the Ku-Band antenna and TDRS.
- b. GSTDN COVERAGE - In this column the GSTDN sites and their acquisition periods are identified.
- c. DAY/NIGHT CYCLE - In this column a solid bar indicates the period when the Orbiter and Earth are in darkness. A slashed line indicates when the Orbiter is in daylight but the Earth beneath the Orbiter is still in darkness (terminator).
- d. ORBIT - Indicates which orbit the spacecraft is in by numerical sequence. Orbit 1 begins at liftoff with subsequent orbits starting when the Earth's equator is crossed (ascending node).
- e. In the timescale a DAP A and DAP B CONFIG reference will be included. A number is associated with both DAPs A and B; each number indicates a particular DAP configuration; either DAP A or DAP B. The DAP reference without parentheses indicates the 'active' DAP for that time period on the page. Table 9-11 identifies the various configurations for DAP A and DAP B that are used.
- f. ATT - Indicates Orbiter attitude.
- g. LFC - Indicates LFC experiment opportunity times. Must be in -ZLV +XVV for data takes.
- h. MET TIMESCALE - This format is a 5-hour format with 5-minute tick marks on the vertical timescale referenced to Mission Elapsed Time (MET) with liftoff occurring at 0/00:00:00.
- i. CREWMAN COLUMNS - The activities for the CDR, PLT, MS1, MS2 and MS3 are scheduled in this area. Any Payload Specialist (PS) activities needing to be scheduled will appear in the MS3 column and annotated with a 'PS'.
- j. MCC COLUMN - Any uplinks, commands, or updates required are scheduled at the appropriate time in this column. TV coverage is also identified in this column. During the live TV Pass, all cabin cameras will be crew controlled unless specified otherwise.

41-D
OVERVIEW

OVERVIEW





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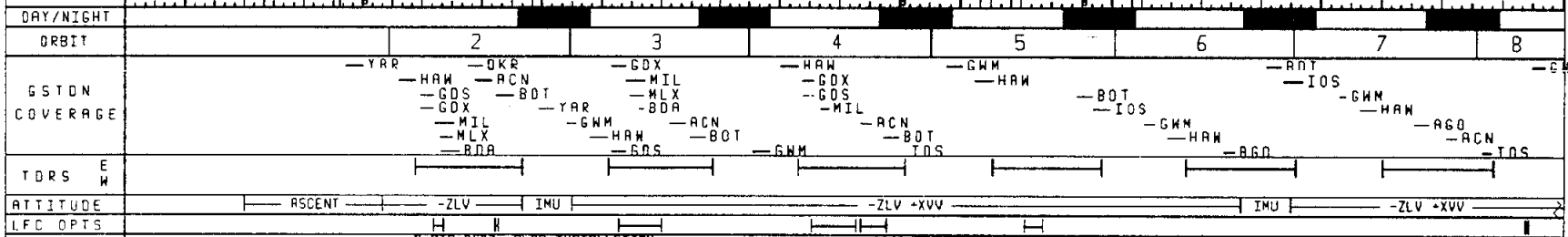
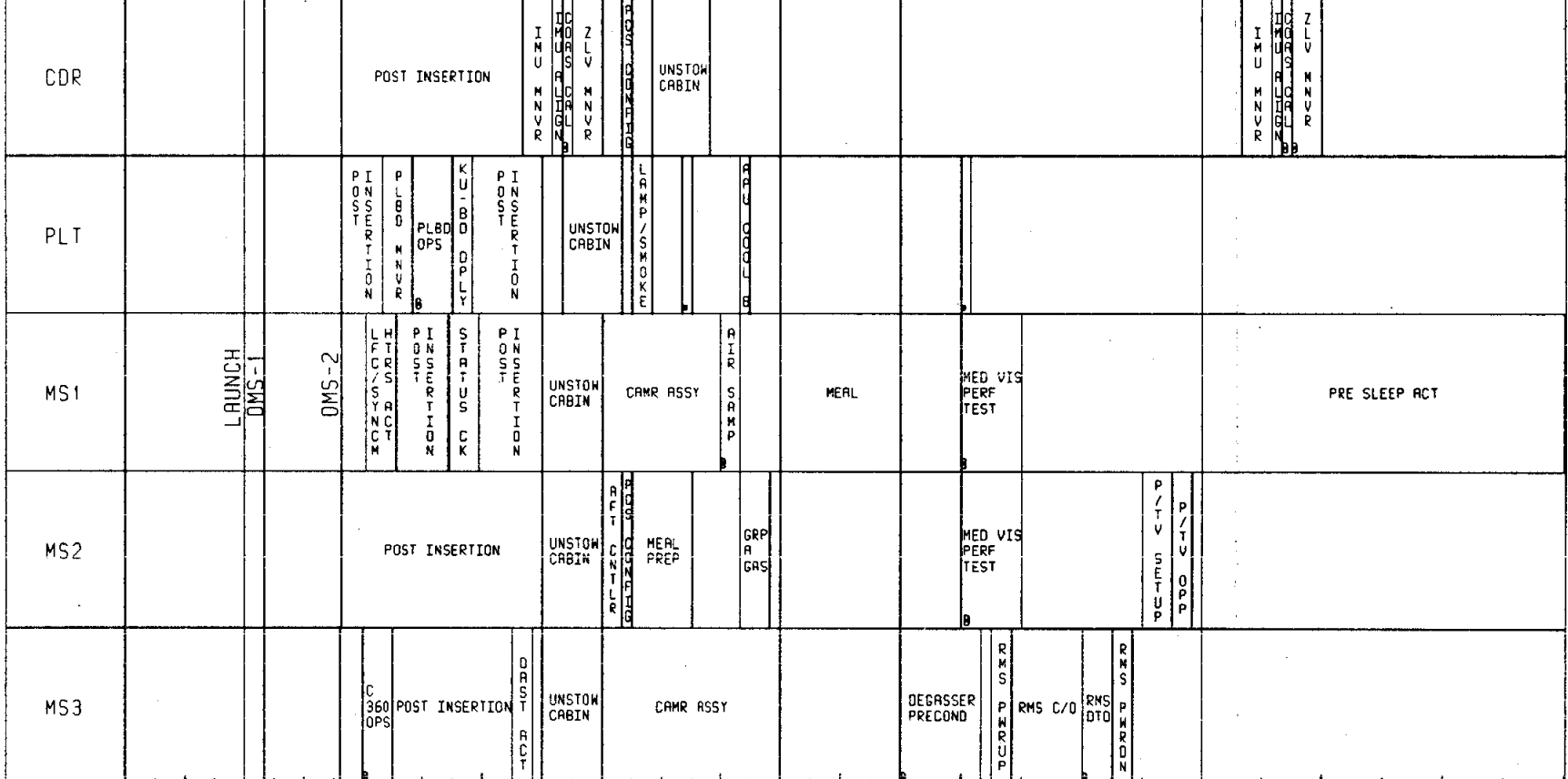
SUMMARY TIMELINE

SUMMARY
TIMELINE

SUMMARY TIMELINE

GMT (O:H:M)	MET (O:H:M)	CDT (O:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
172:11:43 / 172:23:43	000:01:00 / 000:11:00	172:06:43 / 172:18:43	01 / 172 CDT	10.7	☾	JUNE 20, 1984	STS 41-D	FINAL	5/20/84

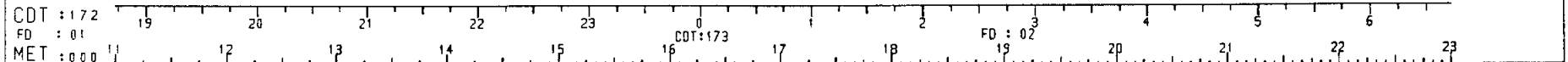
CDT : 172
FD : 01
MET : -01



NOTES:

- DTD 0507 PLBD INSTALLATION
- DTD 0522 CABIN ATMOSPHERE VERIF-FULL PRES
- DTD 0621 FIRST PROD UNIT RMS
- APU HTR DEACT
- APU HTR RECONFIG
- AFT STATION
- DTD 0440 CREW VISUAL PERF TESTING
- -ZLV, +XVV
- C 360 HTR ACT/PLBD SCENE S/U
- CFES (PS)

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
172:23:43/ 173:11:43	000:11:00/ 000:23:00	172:18:43/ 173:06:43	01/ 172 CDT	12.2	☉	JUNE 20, 1984	STS 41-D	FINAL	5/20/84

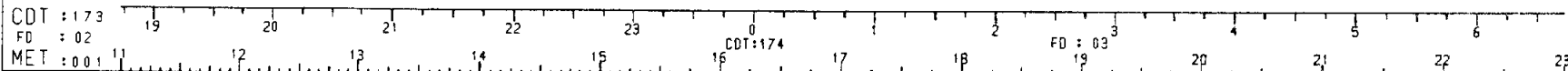


CDR													I M U M N V R	Z L V M N V R																
PLT													P/TV SETUP	P/TV ACT																
MS1	SLEEP										POST SLEEP ACT										EXERCISE									
MS2																									P/ T/ V O P P					
MS3																												P/TV SETUP		

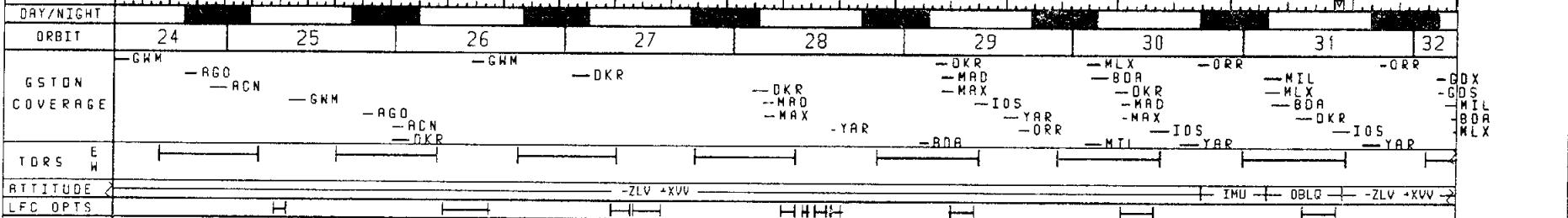
DAY/NIGHT																		
ORBIT	8	9	10	11	12	13	14	15	16									
GSTON COVERAGE	-AGO -ACN	-GNM	-AGO -ACN -DKR	-DKR -WAD -MAX	-DKR -WAD -MAX	-MAX -YAR -ORR	-MIL -MLX -BDA -DKR	-IOS -YAR -ORR	-BDA -DKR -IOS -YAR -ORR	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	-DKR -MIL -MLX	
TDRS E H																		
ATTITUDE																-ZLV -XVV	IMU	-ZLV -XVV
LFC OPTS																		
NOTES:																0 -ZLV, -XVV		

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
173:11:43 / 173:23:43	000:23:00 / 001:11:00	173:06:43 / 173:18:43	02 / 173 CDT	14.0		JUNE 21, 1984	STS 41-D	FINAL	5/20/84						
CDT : 173 FD : 02 MET : 000															
COR	START DPLY DPT	PLY MNV	OM S SEP	WIND DOWN	PKM	DMS BURN MNV	ZLV MNV	CFES SUPPORT	EXERCISE	CFES SUPPORT	SCCF DATA TAKE	CFES SUPPORT	PCR OR TR EIN	IMU MNV	ZLV MNV
PLT	P/TV ACT	LY COUNT	MNV	BURN MNV	VTR SETUP	DMS-4 BURN	STELLAR CAL	ZLV MNV	EXERCISE	NEAR VIS & CONTRST					
MS1	EXERCISE PREP	PREP RET	STAT UP	MEAL PREP	FLTR IFM	MEAL	STELLAR CAL				PRE SLEEP ACT				
MS2	CHEC KS	P/TV CHECK	DEP LOY	FLTR IFM	P/TV OP	FLTR IFM	ORST VTR C/D			EXERCISE					
MS3	EXERCISE	EXERCISE (PS)	P/TV SETUP	CFES ACT (PS)	CFES SEP PREP	CFES PROC STAB	CFES CAL SAMP PUMP	CFES ELISA		NEAR VIS & CONTRST (PS)					
DAY/NIGHT	[Day/Night Cycle Bar]														
ORBIT	16	17	18	19	20	21	22	23	24						
GSTDN COVERAGE	-DKR -IOS -YAR	-BDA -MLX -DKR -ACN -GOS -BOT -YAR	-GDX -GDS -MIL -MLX -BDA -ACN -HAW -BOT	-YAR -GMM -HAW -GDS -GDX -MIL -MLX	-RCN -BOT -GMM -HAW -GDS -GDX -MIL -MLX	-IOS -GMM -HAW	-AGO -BOT -IOS -GMM -HAW			-AGO -BOT -IOS -GMM -HAW					
TORS E W	[TORS E W Bar]														
ATTITUDE	-ZLV -XVV DPY SEP MIN DMS -ZLV +XVV STEL -ZLV +XVV -ZSI IMU -ZLV -XVV														
LFC OPTS	[LFC OPTS Bar]														
NOTES:	0 DTD 316 UPPER STAGE PLUME DAMAGE MODEL VERIF 0 CABIN FAN FLTR CLEAN 0 -ZLV, +XVV 0 DSO 0408 NEAR VISION ACUITY AND CONTRAST SENSITIVITY 0 -ZLV, +XVV 0 CFES														

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
173:23:43 / 174:11:43	001:11:00 / 061:23:00	173:18:43 / 174:06:43	02 / 173 CDT	15.0		JUNE 21, 1984	STS 41-D	FINAL	5/20/84



CDR								IMU ALIGN	OBLIQUE	ZLV MNR		
PLT								P/TV SETUP	P/TV ACT			EXERCISE
MS1			SLEEP						POST SLEEP ACT	OBLIQUE		
MS2												P/TV
MS3												EXERCISE



ATTITUDE: -ZLV +XVV

LFC OPTS: [H] [H] [H] [H] [H]

NOTES:

0 -ZLV, +XVV
 v CFES ELISA CL-PS
 UNLOCK

GMT (O:H:M)	MET (O:H:M)	CDT (O:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
174:11:43/ 174:23:43	001:23:00/ 002:11:00	174:06:43/ 174:18:43	03/ 174 CDT	17.7		JUNE 22, 1984	STS 41-D	FINAL, 1	6/06/84

CDT : 174 FD : 03 MET : 001	MET:002									
CDR	EXERCISE		LUNAR CAL		ORST-1 SUPPORT			P/TV OPP	IMU MNV R	ZLV MNV R
PLT	EXERCISE	P/TV SETUP		P/TV ACT	EXTENSION	1ST RETRACT	SA DYN 70%	SA DAE 70%		
MS1	MEAL PREP		MEAL	LUNAR CAL	EXERCISE		MED VIS PERF TEST	PRE SLEEP ACT		SLEEP
MS2	P/TV OPP			EXERCISE			ORST-1 SUPPORT	MED VIS PERF TEST		
MS3	RMS PWRUP	EXTERIOR SURVEY		RMS PWRDN	EXERCISE (PS)	CFES FILTRATE TEST	EXTENSION	1ST RETRACT	SA DYN 70%	SA DAE 70%
DAY/NIGHT	[Shaded bars indicating day/night cycle]									
DRBIT	32	33	34	35	36	37	38	39		
GSTON COVERAGE	MIL -BDA -MLX -DKR -ACN -BOT -YBR	-HAW -GDX -BDS -MIL -MLX -BDA -DKR	-ACN -BOT -YBR -GMM -HAW -GDS -GDX	-MIL -MLX -BDA -ACN -BOT -GMM -HAW	-GDX -BDS -MIL -ACN -BOT -GMM -HAW	-HAW -BOT -IOS -GMM -HAW -AGO -BOT	-IOS -GMM -HAW -AGO -BOT	-GMM -HAW -AGO -BOT	-HAW -AGO -ACN -IOS -GMM	-AGO -ACN
TDRS E M	[Horizontal bars representing TDRS events]									
ATTITUDE	-ZLV +XVV MOON B/-XLV -YVV B/-XLV -YVV IMU -ZLV +XVV									
LFC OPTS	H H H H H H									

NOTES: 0 DTG 0322 TFS POST LAUNCH EVALUATION OF DV-103 0 PS 0 TEST #1 (OUT-OF-PLANE) 0 DSO 0440 CREW VISUAL PERFORMANCE TESTING 0 -ZLV, +XVV

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
174:23:43/ 175:11:43	002:11:00/ 002:23:00	174:18:43/ 175:06:43	03/ 174 CDT	19.7	☉	JUNE 22, 1984	STS 41-D	FINAL	5/20/84

CDT : 174
 FD : 03
 MET : 002

CDT: 175
 FD : 04

STS	SLEEP	POST SLEEP ACT	I H U M N V R	Z L V M N V R	PDST SLEEP ACT	TRK M N V R	PD /O TW VN LT NK
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PL							SR PERF 70%
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DAY/NIGHT	[Shaded bars indicating day/night cycle]							
ORBIT	40	41	42	43	44	45	46	47

GSTON COVERAGE	-GMM	-AGO -RCN -DKR	-GMM	-AGO -DKR	-DKR -MAD -MAX	-YAR	-MIL -MLX -BDA -DKR -MAD -MAX	-IOS -YAR -ORR	-IOS -YAR -ORR	-IOS -YAR	HRW
TDRS E W	[Timeline with horizontal bars and labels]										

ATTITUDE	-ZLV +XVV										
LFC OPTS	IMU -ZLV +XVV C360 SR -XSI										

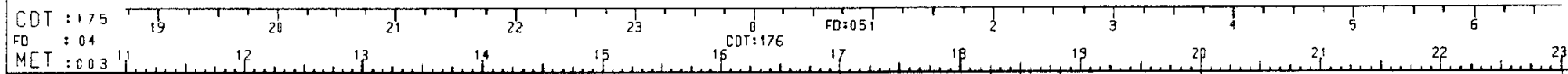
NOTES:

EZ CAP

8 -ZLV, +XVV

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
175:11:43/ 175:23:43	002:23:00/ 003:11:00	175:06:43/ 175:18:43	04/ 175 CDT	21.6	●	JUNE 23, 1984	STS 41-D	FINAL	5/20/84							
CDT : 175	7 8 9 10 11 12 13 14 15 16 17 18															
FD : 04	MET:003															
MET : 002	23 0 1 2 3 4 5 6 7 8 9 10 11															
STS	P/D TH V N L I N K					I M U M N V R		Z L V M N V R		S L E E P						
						C C T V D U R C H										
	P / T V O P P		P / T V O P P													
PL	SA PERF 70%		SA DYN 100%		SA DYN 70%		SA DYN 70%		SCCF DATA TAKE							
DAY/NIGHT	[Day/Night Cycle Bar]															
ORBIT	48		49		50		51		52		53		54		55	
GSTON COVERAGE	-GDS -BOT -YAR -BDA -ACN -GDY -GDS -IOS -GMM -HAW -AGO -ACN -GMM -AGO -RCN -MIL -HAW -GDY -BOT -YAR -MLX -GMM -ACN -BOT -IOS -GMM -HAW -AGO -BOT -IOS -GMM -RCN -BDA -MLX -GDS -MIL -HAW -GMM -HAW -BOT -GMM -HAW -BOT -IOS -GMM -DKR -ACN -MLX -GDS -HAW -GMM -HAW -BOT -IOS -GMM															
TDRS E W	[TDRS Coverage Bar]															
ATTITUDE	-XSI B/-XLV -YVV B/-XLV -YVV B/-XLV -YVV -IMU -ZSI -ZLV +XVV															
LFC OPTS	[LFC OPTS Bar]															
NOTES:	◉ TEST #1 (OUT-OF-PLANE) ◉ TEST #2 (MULTI-MODAL) ◉ TEST #3 (OUT-OF-PLANE) ◉ -ZLV, +XVV EZ CAP															

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
175:23:43/ 176:11:43	003:11:00/ 003:23:00	175:18:43/ 176:06:43	05/ 175 CDT	23.6		JUNE 23, 1984	STS 41-D	FINAL	5/20/84



STS	SLEEP	POST SLEEP ACT	I M U M N V R	Z L V M N V R	POST SLEEP ACT
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PL						SA DRE 70%	SA DRE 70%
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DAY/NIGHT	ORBIT	56	57	58	59	60	61	62	63
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GSTON COVERAGE	-GWM	-AGO -ACN -DKR	-GWM	-DKR	-MAD -MAX -YAR	-DKR -MAD -MAX	-IOS -YAR -ORR	-MAD -MAX -IOS -YAR -ORR	-BDA -DKR -IOS -YAR -ORR	-GOS -MIL -BDA -MLX -DKR -ACN -BOT	-YAR
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TORS	E										
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ATTITUDE			-ZLV +XVV				IMU		-ZLV +XVV		B/-XLV -YVV
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LFC OPTS	H		HI		HHHH		H				HI
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NOTES:	8 -ZLV, +XVV 8 TEST #2 (MULTI-MODAL) 8 TEST #3 (IN-PLANE) EZ CAP										
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GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
176:11:43/ 176:23:43	003:23:00/ 004:11:00	176:06:43/ 176:18:43	05/ 176 CDT	25.6	☉	JUNE 24, 1984	STS 41-D	FINAL	5/20/84

CDT : 176
 FD : 05
 MET : 003 23
 MET:004

STS

P/D/T/V
L
I
N
K

PRE SLEEP ACT

I
M
U
M
N
V
R

Z
L
V
M
N
V
R

PRE SLEEP ACT

SLEEP

P
/
T
V
D
P
P

PL

SA DAE 70%

SA DYN 100%

SA MINI PERF

SCCF DATA TAKE

DAY/NIGHT

ORBIT

64 65 66 67 68 69 70 71

GSTON COVERAGE

HAW ACN MIL GDX HAW IOS GMM HAW AGO ACN GMM AGO

GDX BOT NLX GDS BOT MIL GMM HAW IOS GMM HAW AGO ACN GMM AGO

MIL YAR BDA ACN BOT ACN BOT IOS GMM HAW AGO ACN IOS GMM

MLX GMM HAW BOT GMM HAW AGO BOT GMM

BDR GDS GDX GMM HAW GMM

DKR

TORS E H

ATTITUDE

LFC OPTS

B/-XLV -YVV -XSI -ZSI IMU -ZLV +XVV

NOTES:

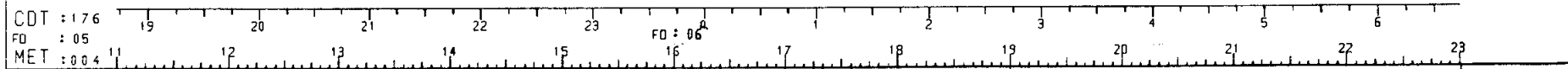
⊘ TEST #3 (IN-PLANE)

⊘ TEST #2 (MULTI-MODAL)

⊘ -ZLV, +XVV

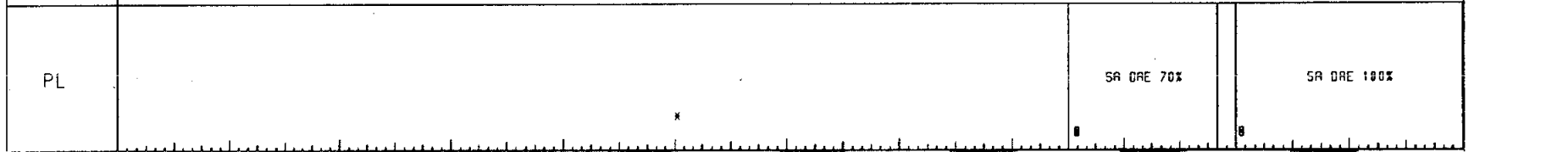
EZ CAP

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
176:23:43/ 177:11:43	004:11:00/ 004:23:00	176:18:43/ 177:06:43	06/ 176 CDT	27.6		JUNE 24, 1984	STS 41-D	FINAL	5/20/84



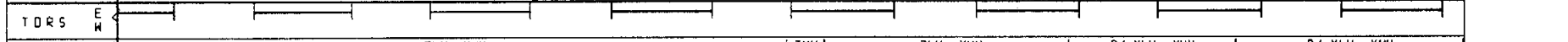
STS	SLEEP	POST SLEEP ACT	POST SLEEP ACT
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PL			SA DAE 70%	SA DAE 100%
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DRY/NIGHT ORBIT	72	73	74	75	76	77	78	79
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GSTON COVERAGE	-ACN -DKR	-GMM -AGO -DKR	-MAX -DKR -MAD -MAX	-YAR -ORR	-MLX -BOA -DKR -MAD -MAX	-ORR -MIL -MLX -BOA -DKR	-ORR -MIL -MLX -BOA -DKR	-HAW -ACN -GOS -BOA -MIL -DKR -MLX -DKR
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ATTITUDE	-ZLV -XVV		IMU		-ZLV -XVV		B/-XLV -YVV		B/-XLV -YVV	
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LFC OPTS	H	H	H	H	H	H	H	H	H	H
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NOTES:

* CFES - 80 HRS OPS

B TEST #4 (MULTI-MODAL)

B TEST #1 (MULTI-MODAL)

EZ CAP

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DCY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
177:11:43 / 177:23:43	004:23:00 / 005:11:00	177:06:43 / 177:18:43	06 / 177 CD	29.6		JUNE 25, 1984	STS 41-D	FINAL	5/20/84			
CDT : 177 FD : 06 MET : 004												
STS	ZLV MNVVR	TRK MNVVR	P/TV ACT	OMS-5 BURN	OMS-6	ZLV MNVVR	ZLV MNVVR	PPE SLEEP ACT	JMU MNVVR	ZLV MNVVR	PRE SLEEP ACT	SLEEP
	P/TV SETUP				DOWNLINK							
	C T V D E A C T											
PL	P/TV OPP				HOR SCAN							
DAY/NIGHT	[Day/Night Cycle]											
ORBIT	80 81 82 83 84 85 86 87											
GSTDN COVERAGE	YAR -HAW -ACN -BOT -MIL -MLX -IOS -GWM -HAW -IOS -HAW -AGD -ACN -GWM -AGD											
TORS	[TORS Data]											
ATTITUDE	-ZLV +XVV +XLV -ZVV RECIRC BURNS -ZLV +XVV SCAN -ZLV +XVV IMU -ZLV +XVV											
LFC OPTS	[LFC OPTS Data]											
NOTES:	-ZLV, +XVV DSO 305 CHARACTERIZATION OF SURFACE-ORIGINATED VEHICLE GLOW -ZLV, +XVV -ZLV, +XVV EZ CAP											

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
177:23:43/ 178:11:43	005:11:00/ 005:23:00	177:18:43/ 178:06:43	07/ 177 CDT	31.6		JUNE 25, 1984	STS 41-D	FINAL	5/20/84

CDT : 177
 FD : 06
 MET : 005

19 20 21 22 23 0 1 2 3 4 5 6

FO : 07 CDT:178

11 12 13 14 15 16 17 18 19 20 21 22 23

STS	SLEEP	POST SLEEP ACT	IMU MNV R	POST SLEEP ACT	ZLV MNV R	TRK MNV R	P/TV ACT	ZLV MNV R	FCS C/D
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					P/TV SETUP		P/TV DOWN	PRCS HOT FIRE	
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						P/TV ACT			
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PL				SCCF DATA TAKE		CRYSTAL S/U & ACT	P/TV SETUP	CCRE STACK	P/TV SETUP	P/TV ACT
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DRY/NIGHT										
ORBIT	88	89	90	91	92	93	94	95		

6 STDN COVERAGE	-ACN -DKR	-GWH	-DKR	-MAD -MAX	-YAR -ORR	-DKR -MAD	-IOS	-BDA -DKR	-IOS	-YAR -ORR	-BDA -DKR	-YAR	-MLX -BDA	-DKR	-ACN -BOT	-YAR
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TDRS E H																
ATTITUDE			-ZLV +XVV		IMU	-ZSI		-ZLV +XVV	+XLV -ZVV	HOT FR			-ZLV +XVV			
LFC OPTS			HHH	H	H	H	H									

NOTES:

EZ CAP

0 STUDENT EXPERIMENT
 0 -ZLV, +XVV
 0 DTO 0402 FOLLOW-ON VEHICLE PRCS
 HOT FIRE TEST
 0 -ZLV, +XVV
 0 DSO 305 CHARACTERIZATION OF SURFACE-
 ORIGINATED VEHICLE GLOW
 0 APU HTR ACT

GMT (O:H:M)		MET (O:H:M)		CDT (O:H:M)		FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
178:11:43 / 178:23:43		005:23:00 / 006:11:00		178:06:43 / 178:18:43		07 / 178 CDT	33.7		JUNE 26, 1984	STS 41-D	FINAL	5/20/84

CDT : 178
 FD : 07
 MET : 005

STS	CC REN FER ENCE		A U T O		Z L V		P R E T S L E E P	I M U	Z L V		PRE SLEEP ACT		SLEEP
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	P / T V												
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	P / T V												
--	------------------	--	--	--	--	--	--	--	--	--	--	--	--

PL	C D R E A S T T A L		S C D F O A T A T A K E L F C		S T A L L A R		S T A L L A R						
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DAY/NIGHT													
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ORBIT	96	97	98	99	100	101	102	103
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GSTDN COVERAGE	-HAW -GDS -GDX -MIL -MLX -BDR -ACN	-BOT -GMM -HAW -GOX -GDS -MIL -ACN	-BOT -GMM -HAW	-BOT -IOS -HAW -AGD -IOS -GMM -HAW	-BOT -IOS -HAW -AGD -IOS -GMM -HAW	-BOT -IOS -HAW -AGD -IOS -GMM -HAW	-BOT -IOS -HAW -AGD -IOS -GMM -HAW	-BOT -IOS -HAW -AGD -IOS -GMM -HAW
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TORS E								
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ATTITUDE	-ZLV +XVV	-ZSI	CAL	DEEP SPACE	CAL	-ZLV +XVV	IMU	-ZLV +XVV
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LFC OPTS	H	H						
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NOTES:
 EZ CAP

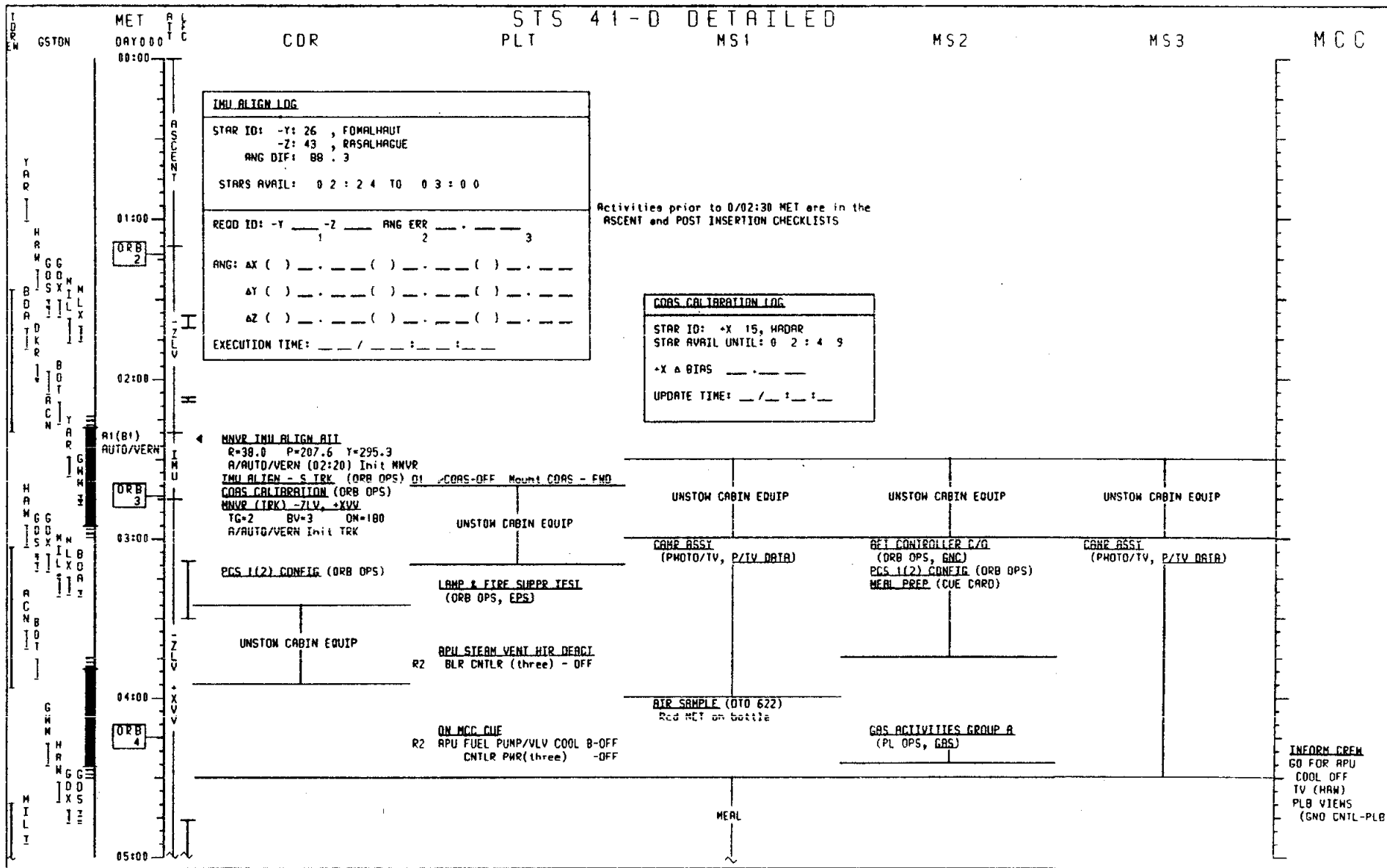
GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
178:23:43 / 179:11:43		006:11:00 / 006:23:00		178:18:43 / 179:06:43		07 / 178 CDT	35.7		JUNE 26, 1984	STS 41-D	FINAL	5/20/84
TIG CDT : 178 FD : 07 MET : 006												
PL 												
DAY/NIGHT ORBIT STON COVERAGE TDRS ATTITUDE LFC OPTS												
NOTES: EZ CAP												

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
179:11:43 / 179:23:43	006:23:00 / 007:11:00	179:06:43 / 179:18:43	08 / 179 CDT	37.6	●	JUNE 27, 1984	STS 41-D	FINAL	5/20/84	
TIG										
CDT : 179 FD : 08 MET : 006										
STS	DEORBIT PREP									
	DEORBIT BURN	ENTRY INTERFACE	EDW LANDING (7:00:53)							
PL										
DAY/NIGHT										
ORBIT	112	113	114	115	116	117	118	119	120	
GSTON COVERAGE	-GDX -GDS -MLX -MIL	-HAW -GOS -GOX	-ACN -BOT	-BOT -IDS -GMM -HAW	-BOT -IDS -HAW	-AGD -IDS -GMM -AGD -ACN	-ACN -GMM -AGD -ACN	-GMM -AGD	-AGD -DKR	
TORS E W										
ATTITUDE	DEORBIT BURN ENTRY									
LFC OPTS	H H I H H H H									
NOTES:	EZ CAP									

DETAILED TIMELINE

DETAILED
TIMELINE

DETAILED TIMELINE



STS 41-D DETAILED

CDR

PLT

MS1

MS2

MS3

MCC

GSTDN

MET 09Y000

05:00

A1(B1)
AUTO/VERN

06:00

07:00

08:00

09:00

10:00

MEAL

DEGRASSER PRECONDITIONING
(PL OPS, CEF OPERATIONS)
(PS)

A12 APU HTR GAS GEN/FUEL
PUMP (three) - A AUTO

VISUAL PERF TEST (DSO 0440)
(MED, MED DSOa)

VISUAL PERF TEST (DSO 0440)
(MED, MED DSOa)

RMS POWERUP
(PDRS OPS, RMS PWRUP)
RMS CHECKOUT
(PDRS OPS, RMS C/O)

IMU ALIGN LOG

STAR ID: -Y: 42 , ALPHECCA
-Z: 15 , MADAR
ANG DIF: 89 . 1

STARS AVAIL: 0 0 : 1 4 TO 0 8 : 5 2

RECD ID: -Y ____ -Z ____ ANG ERR ____ . ____ . ____ 3
1 2

ANG: AX () . ____ () . ____ () . ____ . ____ . ____
AY () . ____ () . ____ () . ____ . ____ . ____
AZ () . ____ () . ____ () . ____ . ____ . ____

EXECUTION TIME: ____ / ____ : ____ : ____

RMS D/O (OTO 621)
(PDRS OPS, RMS D/O)

RMS POWERDOWN
(PDRS OPS, RMS PWRDN)
NOTE: In Step 2, leave the
arm deployed

P/TV 19 SETUP (CLOUDS)
(PHOTO/TV, P/TV SCENES)

4 P/TV 19 (CLOUDS)
MAUI (07:47 - 07:49)

B19 COAS PWR-OFF Mount COAS-AFT

MNVR IMU ALIGN AIT
R=241.7 P=307.7 Y=353.2
A/AUTO/VERN (08:20) Init MNVR
IMU ALIGN - S TRK (ORB OPS)
COAS CALIBRATION (ORB OPS)
MNVR (TRK) -ZLV, +XVU
TG=2 BV=3 ON=180
A/AUTO/VERN Init TRK

PRE SLEEP ACTIVITY
(ORB OPS, CREW SYS)

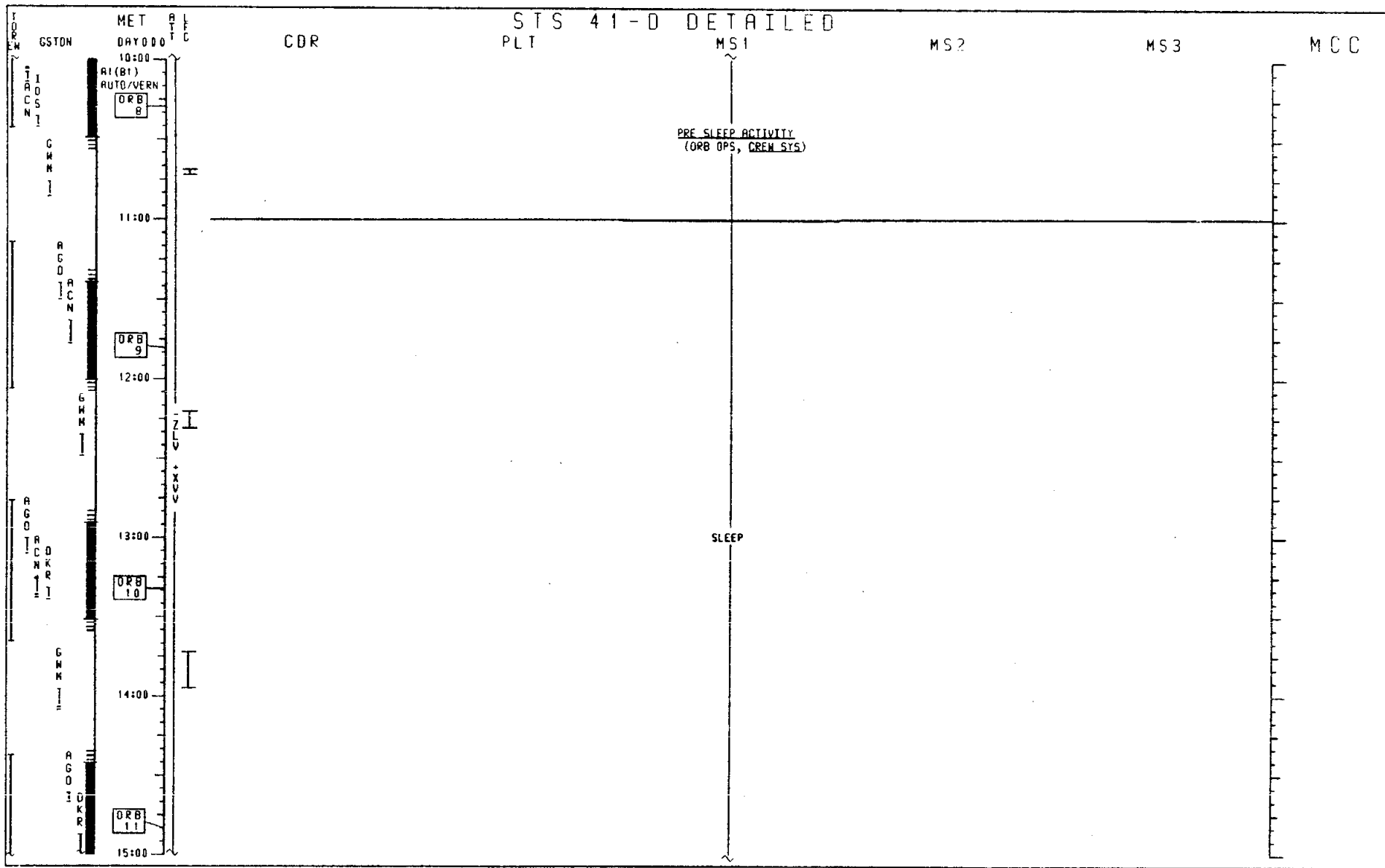
COAS CALIBRATION LOG

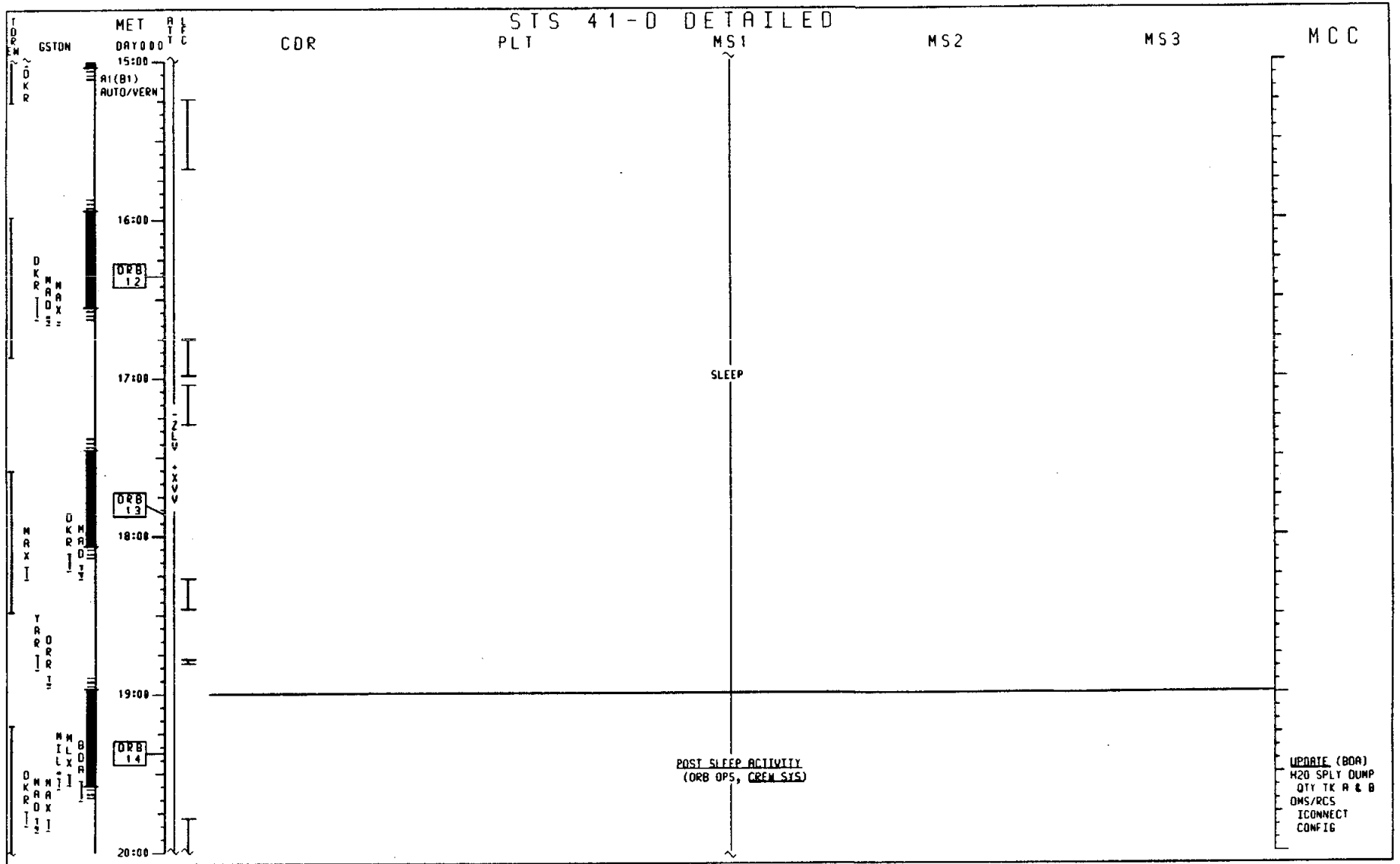
STAR ID: -Z 15 , MADAR
STAR AVAIL UNTIL: 0 8 : 5 2

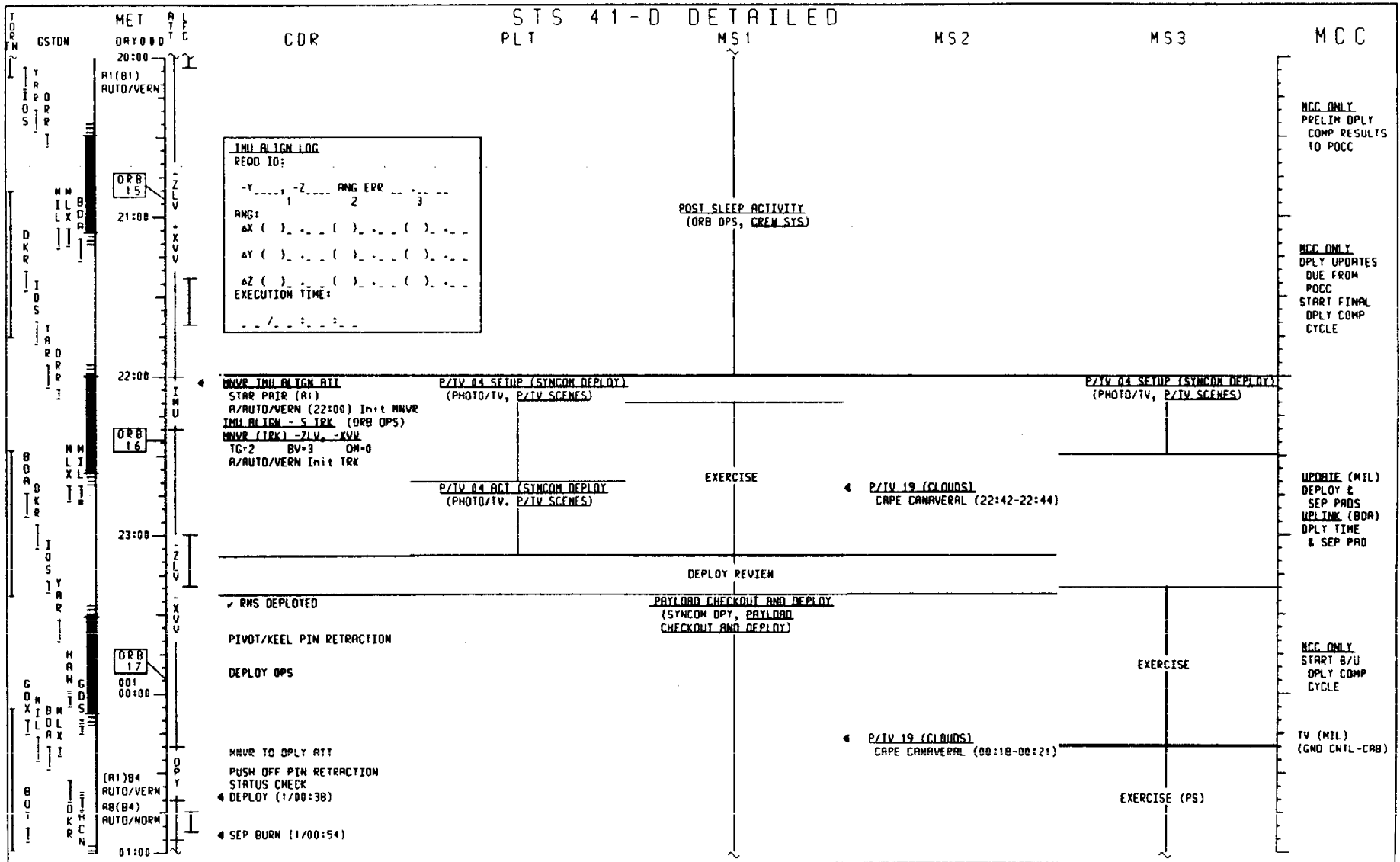
-Z & BIAS ____ . ____ . ____

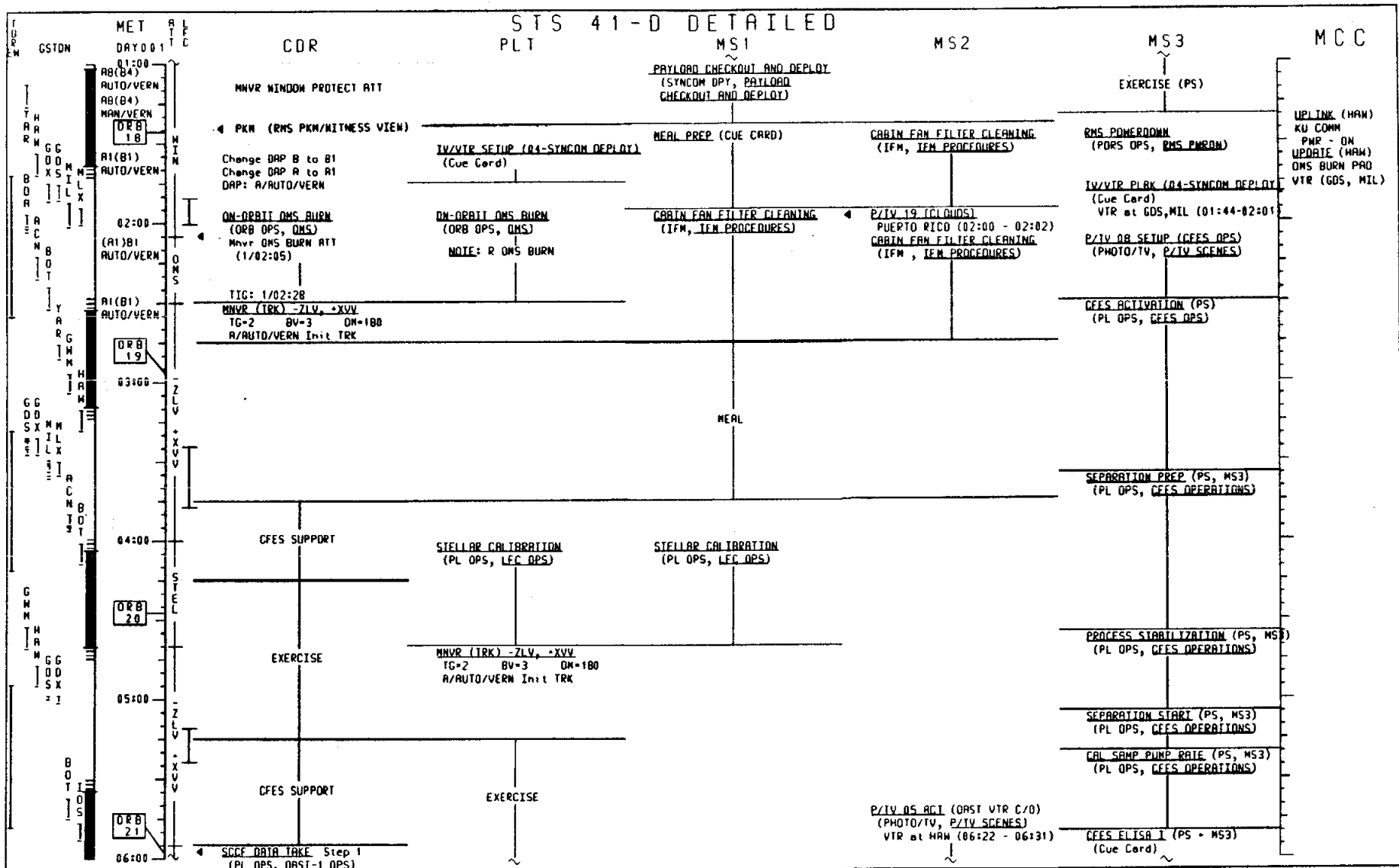
UPDATE TIME: ____ / ____ : ____ : ____

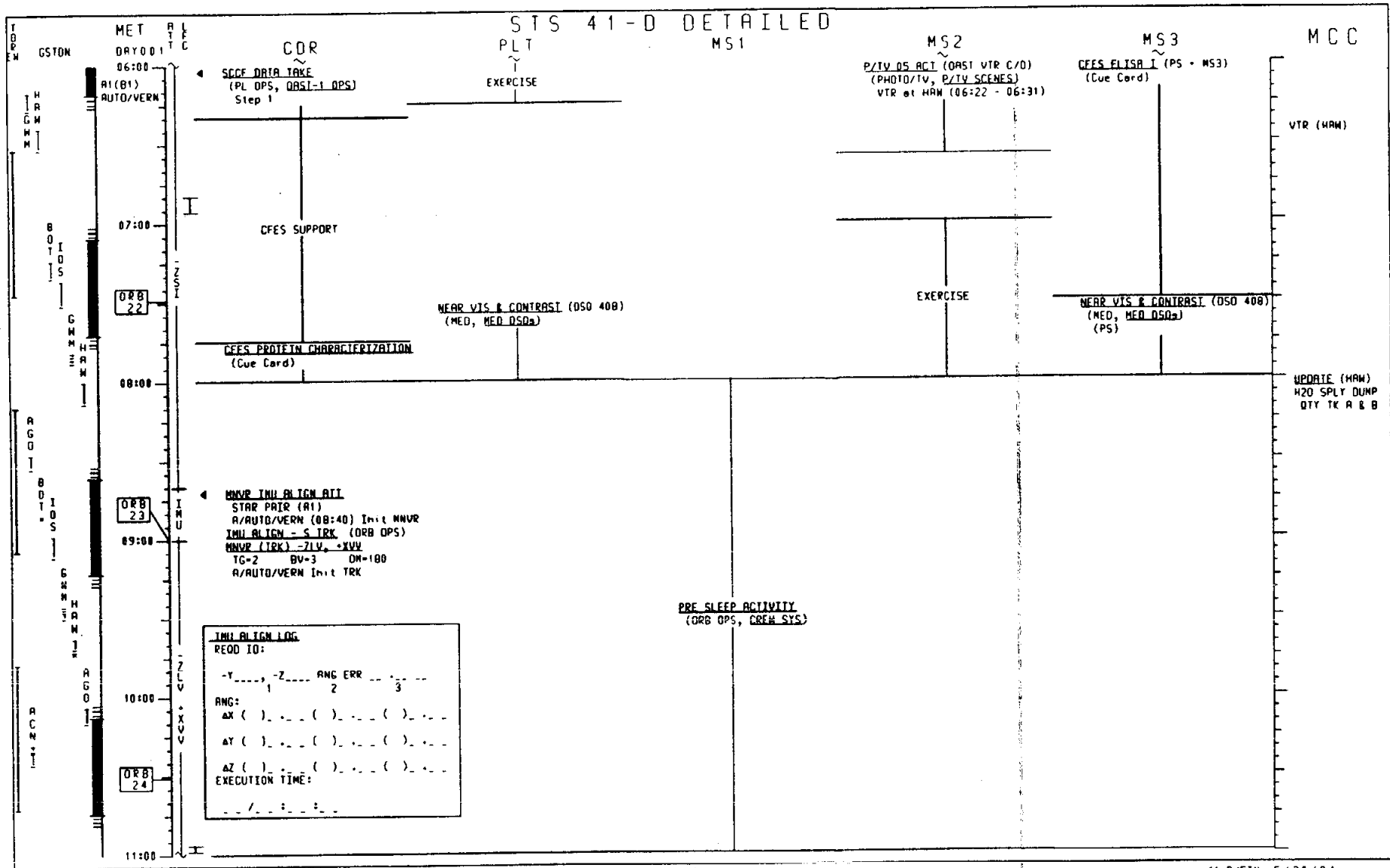
UPDATE (BOT)
H2O SPLY DUMP
QTY TK A & B

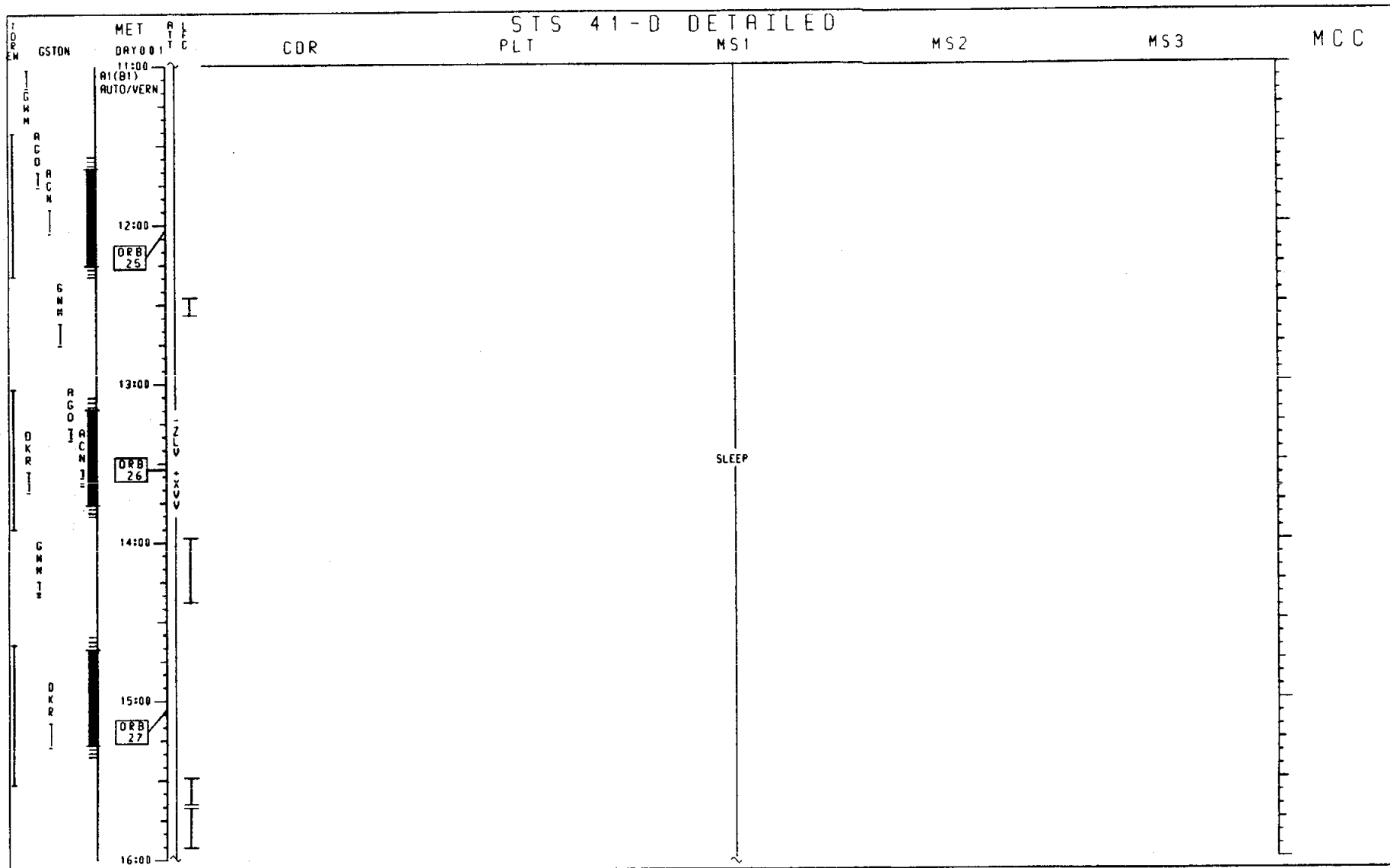


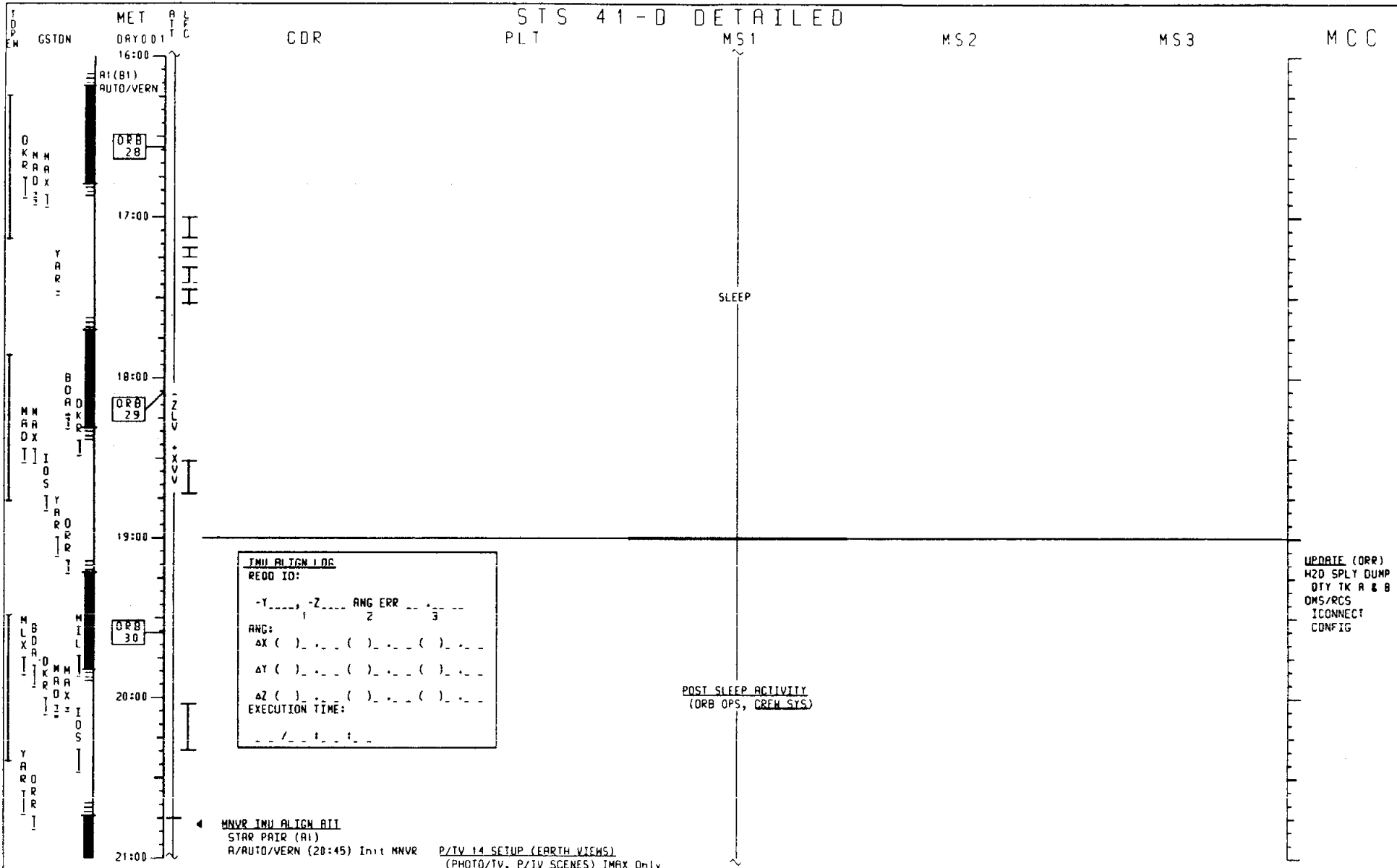


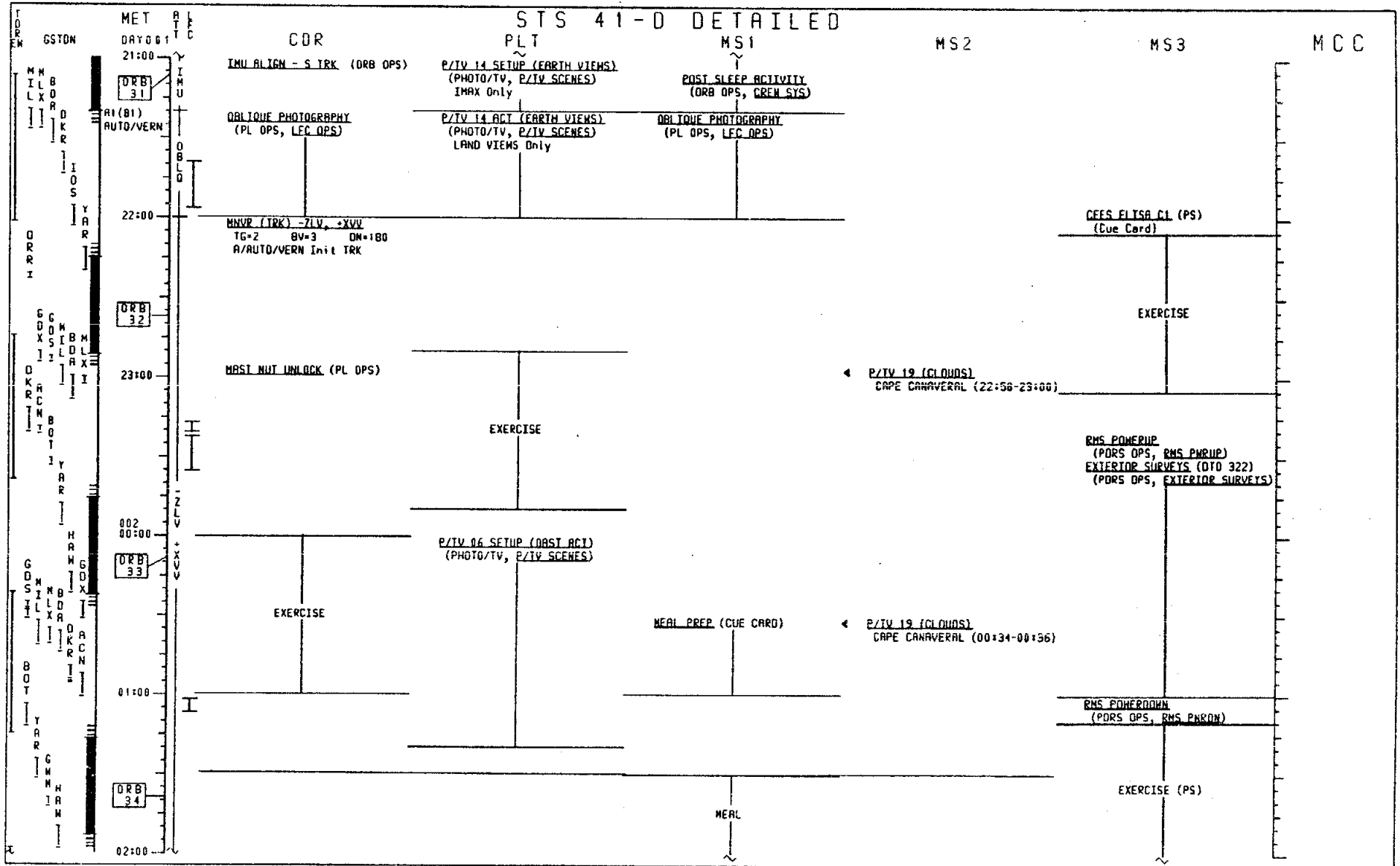










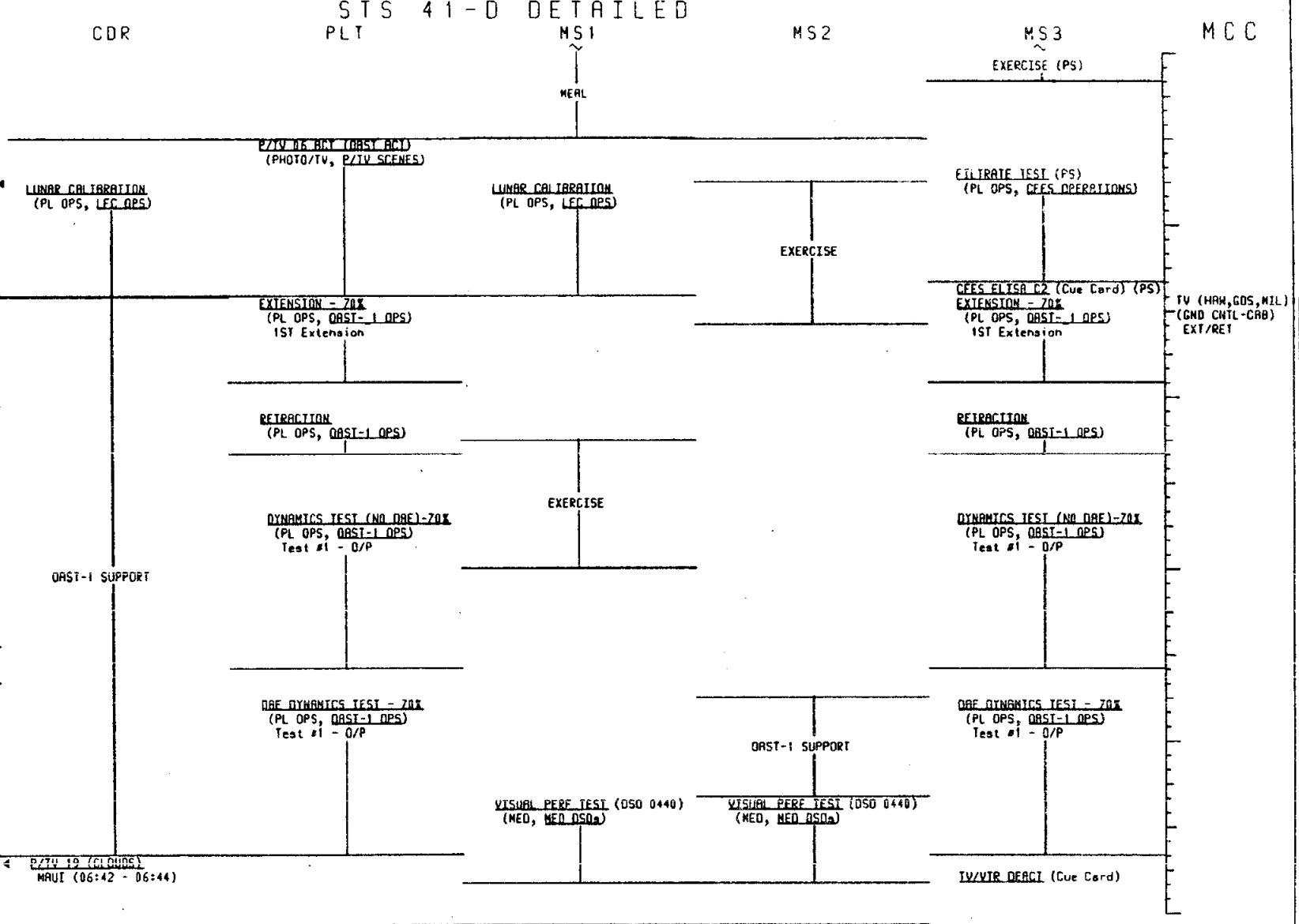


STS 41-D DETAILED
PLT MS1 MS2 MS3 MCC

MET
DAY 002

TDRN
 GSTDM
 A1(B1)
 AUTO/VERN
 ORB 35
 A7(B6)
 AUTO/VERN
 ORB 36
 ORB 37
 A1(B1)
 AUTO/VERN
 ORB 35
 A7(B6)
 AUTO/VERN
 ORB 36
 ORB 37
 A1(B1)
 AUTO/VERN
 ORB 35
 A7(B6)
 AUTO/VERN
 ORB 36
 ORB 37

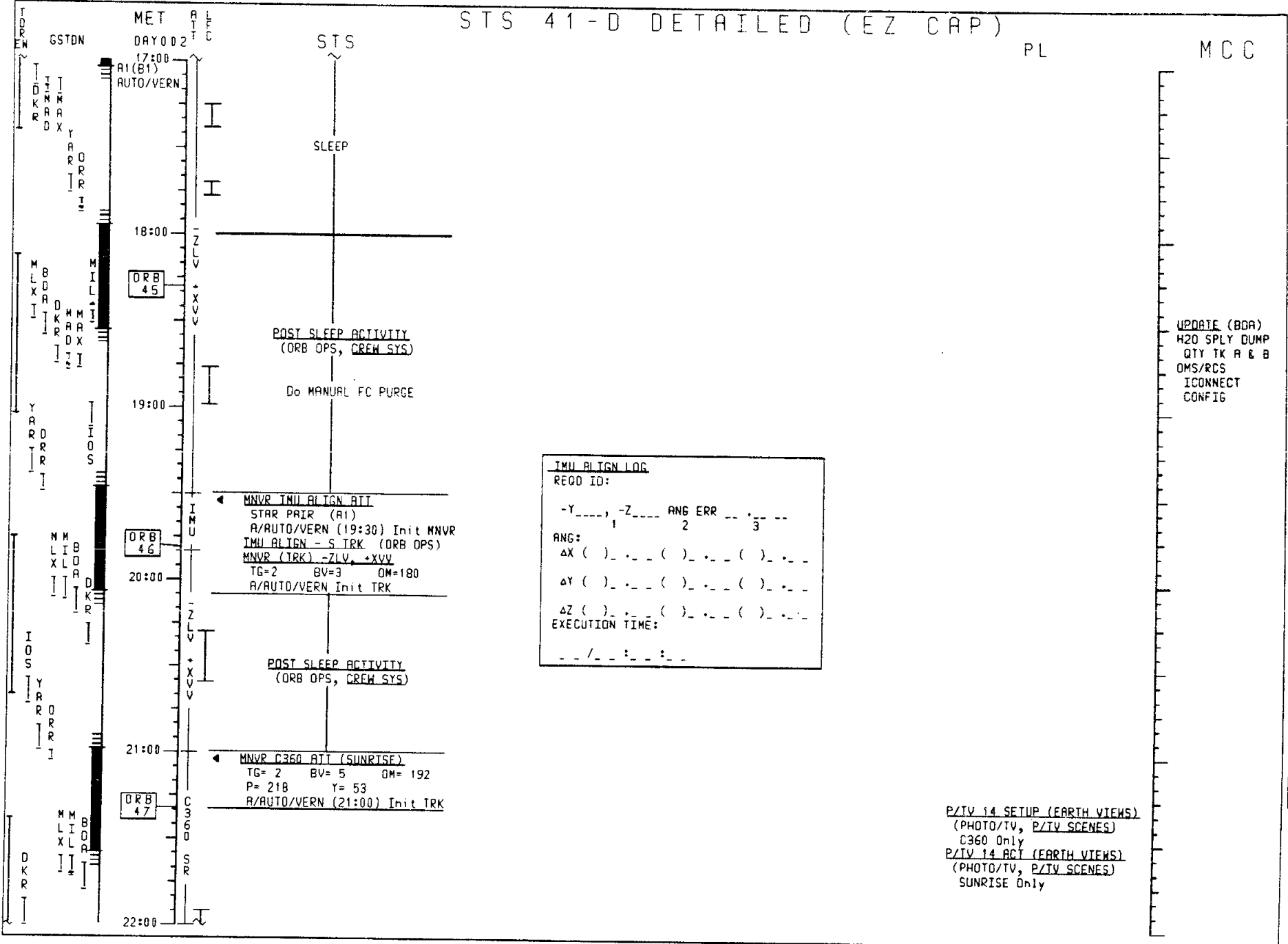
02:00
03:00
04:00
05:00
06:00
07:00



STS 41-D DETAILED (EZ CAP)

PL

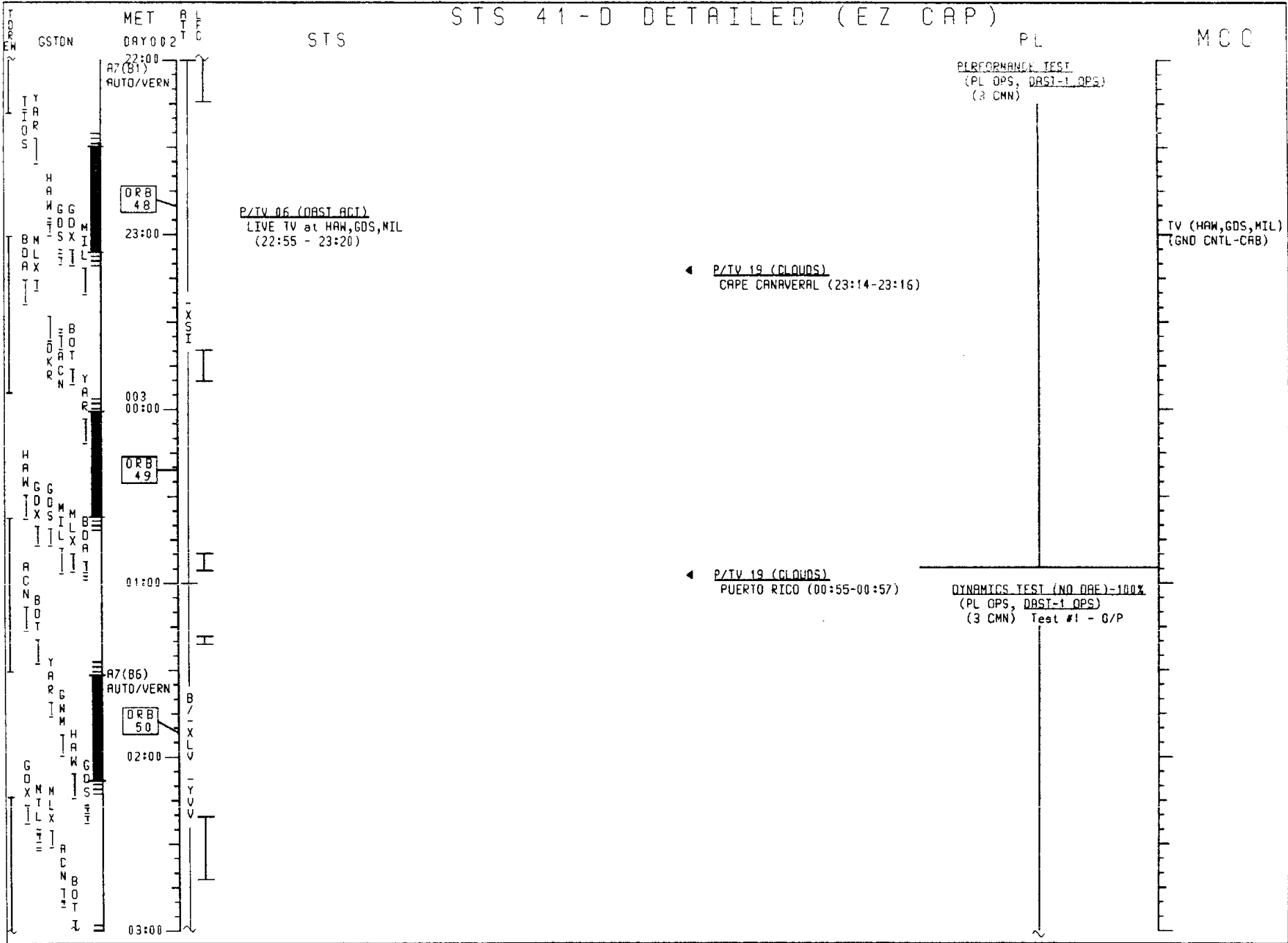
MCC



UPDATE (BDA)
M20 SPLY DUMP
QTY TK A & B
OMS/RCS
ICONNECT
CONFIG

P/TV 14 SETUP (EARTH VIEWS)
(PHOTO/TV, P/TV SCENES)
C360 Only
P/TV 14 ACT (EARTH VIEWS)
(PHOTO/TV, P/TV SCENES)
SUNRISE Only

STS 41-D DETAILED (EZ CAP)



EZ CAP - CREW SCHEDULED ACTIVITIES

NOTES:

(X/Y) - X: Crew Time Required
Y: No. of Persons if > 1

Unless stated otherwise, procedures are in the Orb Ops or Cue Card.
MEAL and EXERCISE do not have a procedure.

CLOUDS Opps after FD7 Presleep will not be shown.

Constraints (noted with '*'):

No C360 ops or LFC data takes 10 min prior to or during SPLY H2O DUMP
No EXERCISE during OAST-1 EXT, RET, or DYN TESTS
Complete CFES OPS VTR (P/TV 08) and review prior to FD5

PERFORM DAILY:

Meal Prep (30 min)
Meal (1 hr/6)
Exercise* (1 hr/6)
IMAX Reload (30 min/2)

SCHEDULE ANYTIME:

P/TV 06 OAST - 1 Activities

- C360/IMAX - Static Mast (100%)
Solar Array front-lit by sun
- IMAX - Dynamic Mast
- Top of Mast

P/TV 08 CFES OPS*

- IMAX/PAO

P/TV 09,10,11 In-Cabin Activities

- IMAX

Crew Module Measurement (DTO 0321 - Cue Card)

- Alignment Marks (1 hr)
- GAP Measurement (40 min/2)
- Tape Measurements (20 min/2)

SCHEDULE ANYTIME (cont):

P/TV 14 Earth Views

- IMAX - Earth Features (3 sites)
 - Terminator Crossing
 - Circular Storm

SHOPPING LIST:

FD1 - MCP Activities (DSO 0439 - MED DSO)

- P/TV 17 Glow (DSO 0305)

- P/TV 19 CLOUDS Opps. (Presleep)

- OKINAWA 0/09:05 - 0/09:07
0/10:41 - 0/10:43

FD2 - P/TV 19 CLOUDS Opps. (Presleep)

- MAUI 1/08:03 - 1/08:04

- OKINAWA 1/09:21 - 1/09:23
1/10:57 - 1/10:59

FD3 - P/TV 19 CLOUDS Opps. (Postsleep)

- DIEGO GARCIA 1/20:25 - 1/20:27

- P/TV 19 CLOUDS Opps. (Presleep)

- OKINAWA 2/09:36 - 2/09:38

ADDITIONAL OAST TEST:* (PL OPS)

- SA DAE 100% (Test #2 - O/P)
- SA DYN 70% (Test #4 - M/M)
- RET/EXT PERF
- MAST TEMP GRADIENT

ADDITIONAL C360 SCENES:*

- P/TV 14 EARTH VIEWS
- Terminator Transit
- Exposure Experiment

FD4

Set-up for Live TV, Orb 48:

P/TV 06 OAST-1 Activities (15 min)

Midflight Reconfig:

- RCS Regulator Reconfig (a.m.) (10 min) /_:_
- 07/08 He PRESS A(three)-CL (tb-CL) /_:_
- B(three)-GPC (tb-OP) /_:_
- ECLSS Redundant Component C/O (10 min) /_:_
- HTR Reconfig - B (6 min) /_:_
- PCS (1) 2 Config (5 min/2) /_:_
- AIR SAMPLE (DTO 0622) Rcd MET on Bottle /_:_

RME OPS (PL OPS):

- PRM Act (Step 1) (5 min) /_:_
- HRM Act (Step 1) (5 min) /_:_
- HRM Deact (Step 2) (15 min) /_:_

CFES OPS (PL OPS):

- ELISA C3, C4 (Cue Card) (2.5 hrs)
- FILTRATE TEST (30 min)

MED DSO (MED):

Near Vis & Contrast (DSO 0408) /_:_
(30 min/PLT,PS)

SHOPPING LIST - P/TV 19 CLOUDS Opps. (Presleep)

MAUI 3/06:58 - 3/07:00

FD5

Set-up for VTR Dump, Orb 67:

P/TV 08 CFES OPS (15 min)

RME OPS (PL OPS):

- PRM Deact (Step 2) (5 min) /_:_
- PRM Act (Step 1) (5 min) /_:_
- HRM Act (Step 1) (5 min) /_:_
- HRM Deact (Step 2) (15 min) /_:_

CFES OPS (PL OPS):

- ELISA D (Cue Card) (4 hrs)
- ELISA C5 (Cue Card) (2.5 hrs)
- FILTRATE TEST (30 min)
- STOP COLLECTION (10 min)

MED DSO (MED):

Visual Perf Test (DSO 0440) /_:_
(30 min/MS1,MS2)

P/TV 17 GLOW

GLOW setup for next morning (20 min)

SHOPPING LIST - P/TV 19 CLOUDS Opps.

Postsleep
DIEGO GARCIA 3/19:21 - 3/19:22

Presleep
MAUI 4/05:37 - 4/05:39

FD6

Set-up for Live TV, Orb 82:

P/TV 12 - LFC OMS BURN (25 min)

RME OPS (PL OPS):

PRM Deact (Step 2) (5 min) /:—
HRM Act (Step 1) (5 min) /:—
HRM Deact (Step 2) (15 min) /:—

CFES OPS (PL OPS):

FILTRATE TEST (30 min)
START COLLECTION (30 min)
FLUSH & DEACT (30 min)
POST-PROCESS PRODUCT MIX (30 min)
PROTEIN CHARACTERIZATION (Cue Card) (30 min)

MED DSO (MED):

Near Vis & Contrast (DSO 0408)
(30 min/PLT,PS) /:—

P/TV 17 GLOW

GLOW setup for next morning (20 min)

SHOPPING LIST - P/TV 19 CLOUDS Opps (Presleep)

MAUI 5/05:48 - 5/05:50

FD7

Set-up for Live TV/VTR Dump, Orb 94:

P/TV 15 Student Experiment (35 min)

Set-up for Live TV, Orb 96:

P/TV 13 Crew Conference (20 min)

RME OPS (PL OPS):

HRM Act (Step 1) (5 min) /:—
HRM Deact (Step 2) (15 min) /:—

CFES OPS (PL OPS):

POST-PROCESS PROD. MIX STOP (15 min)

MED DSO (MED):

Visual Perf Test (DSO 0440)
(30 min/MS1,MS2)

Day Before Entry Reconfig:

LAMP & FIRE SUPPR TEST (10 min) /:—
CABIN CONFIG/STOW (2.5 hrs/6)

SHOPPING LIST - P/TV 19 CLOUDS Opps.

Postsleep
DIEGO GARCIA 5/17:54 - 5/17:56

FD8

Before Leaving CAP

Meal Cleanup/Stowage (10 min)

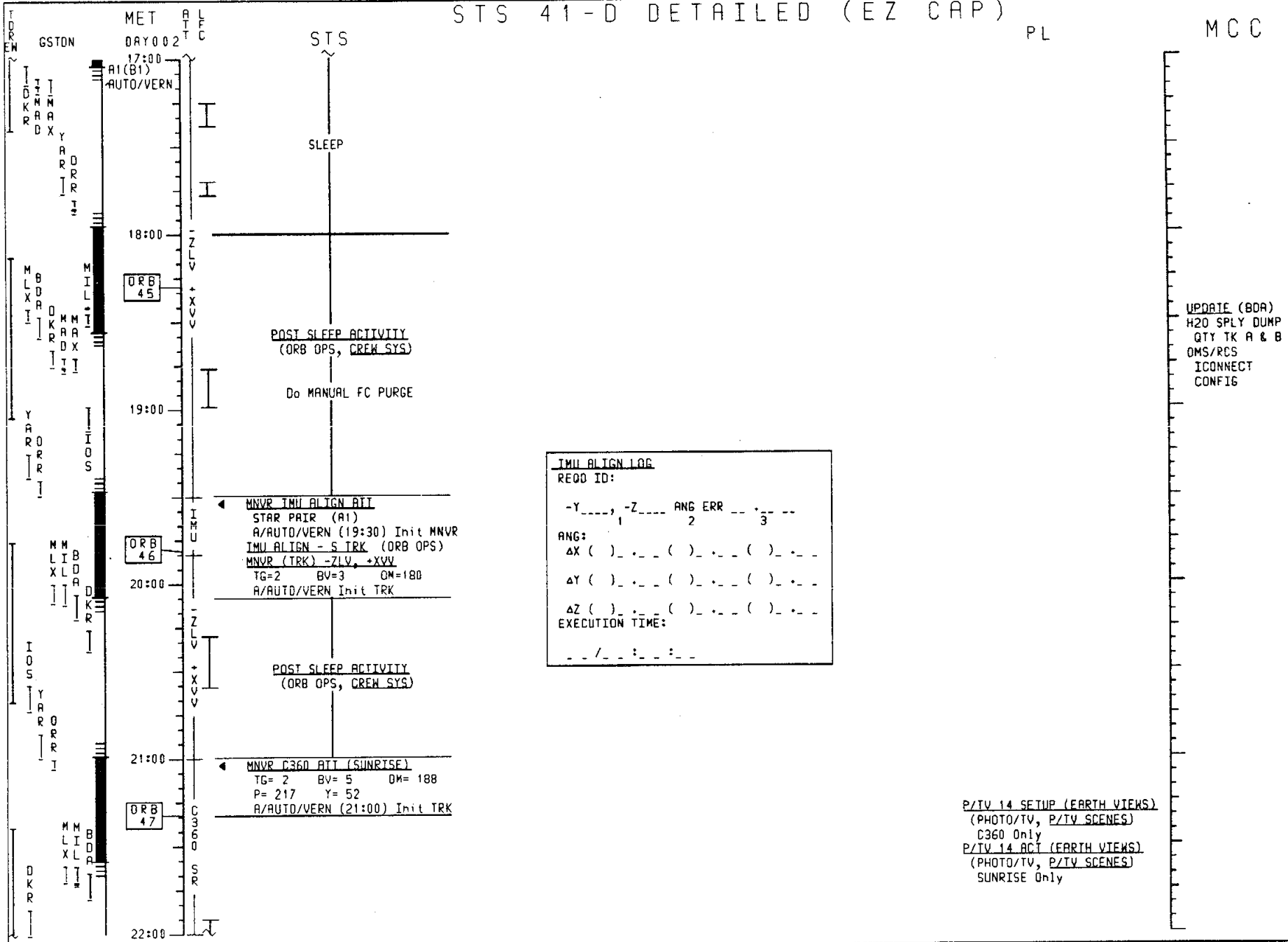
Fluid Loading Prep (DSO 0402)
Fill 4 drink containers with 8oz H2O each (per crew member)

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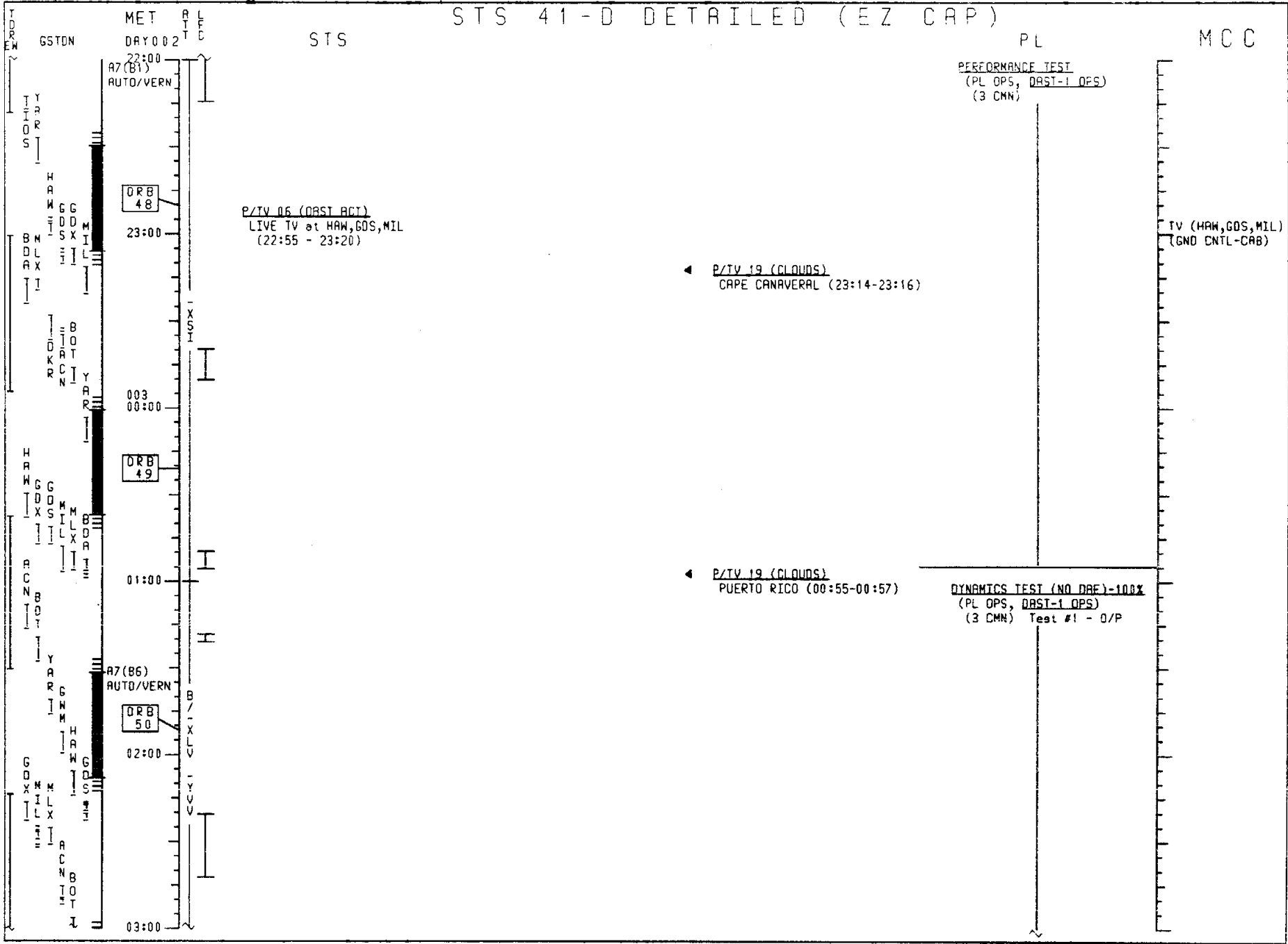
STS 41-D DETAILED (EZ CAP)

PL

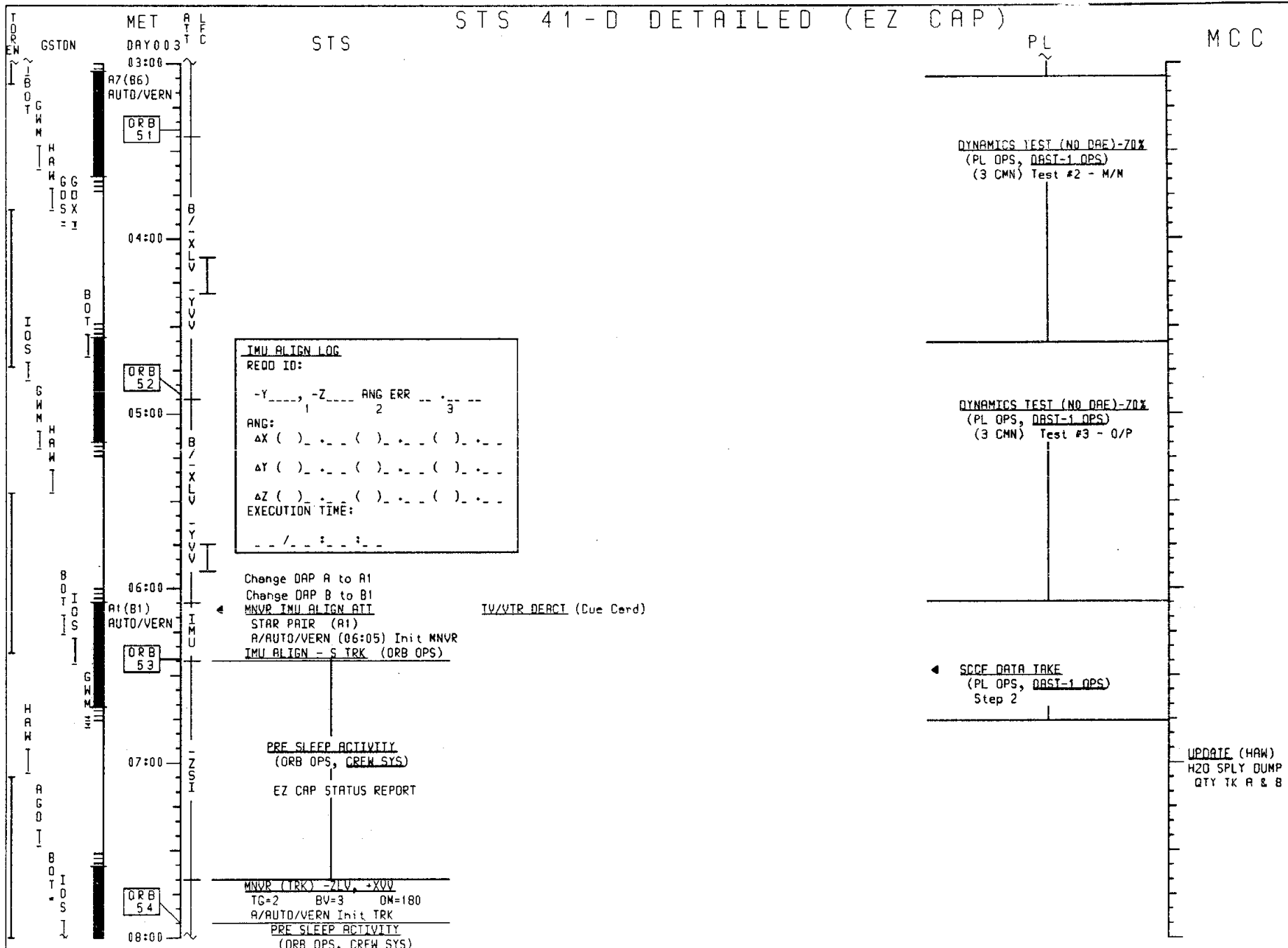
MCC



STS 41-D DETAILED (EZ CAP)



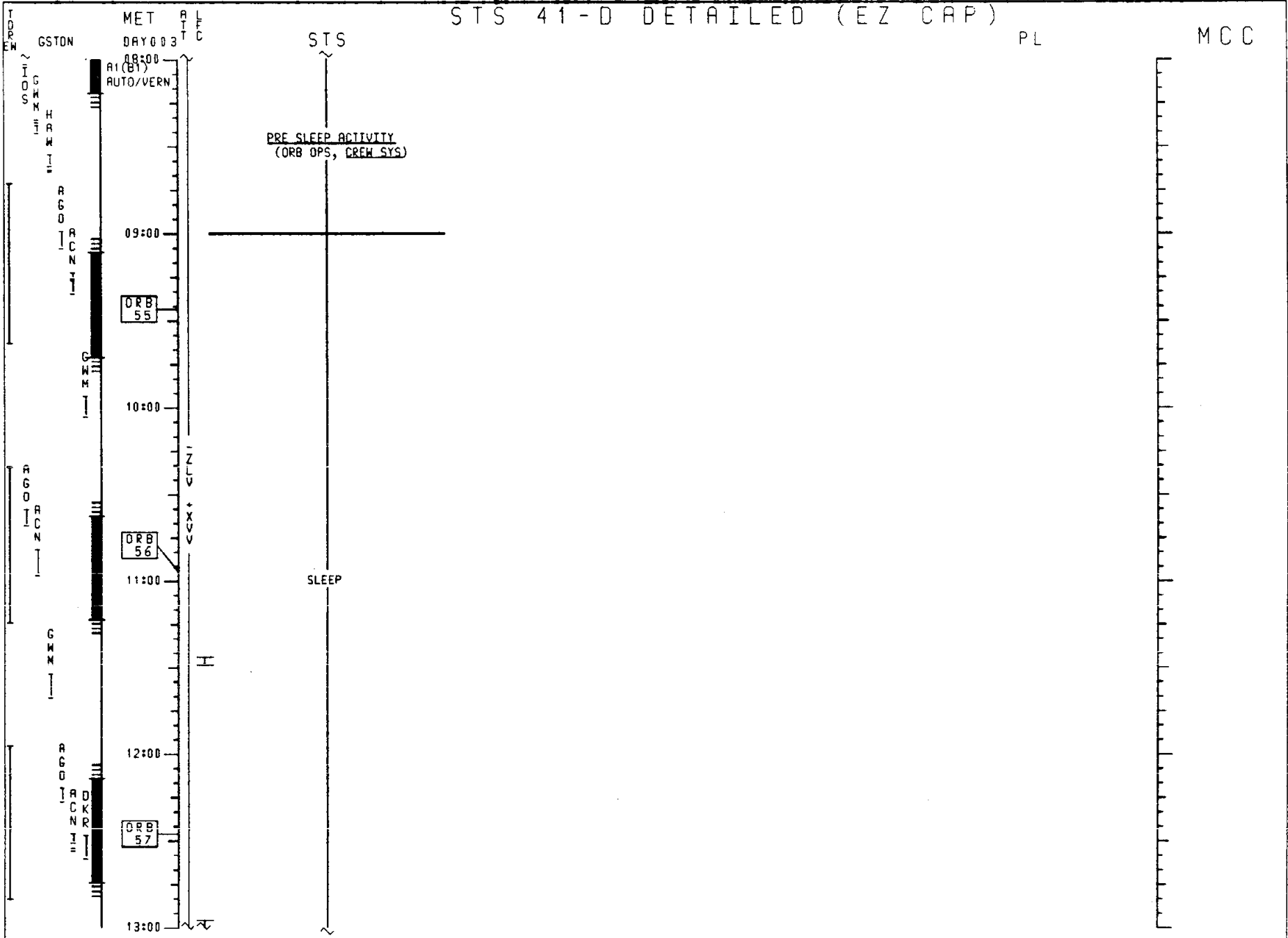
STS 41-D DETAILED (EZ CAP)



STS 41-D DETAILED (EZ CAP)

PL

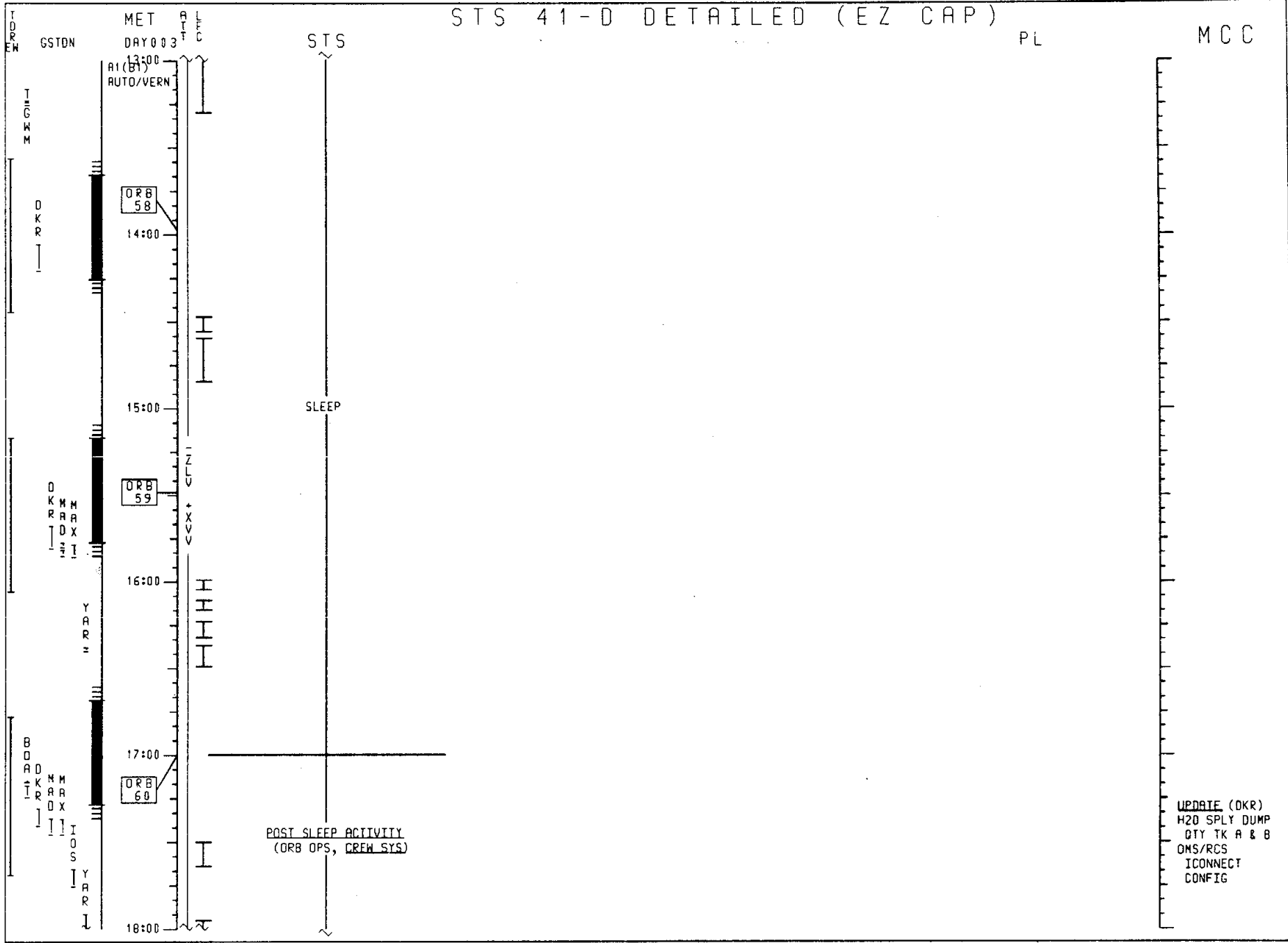
MCC



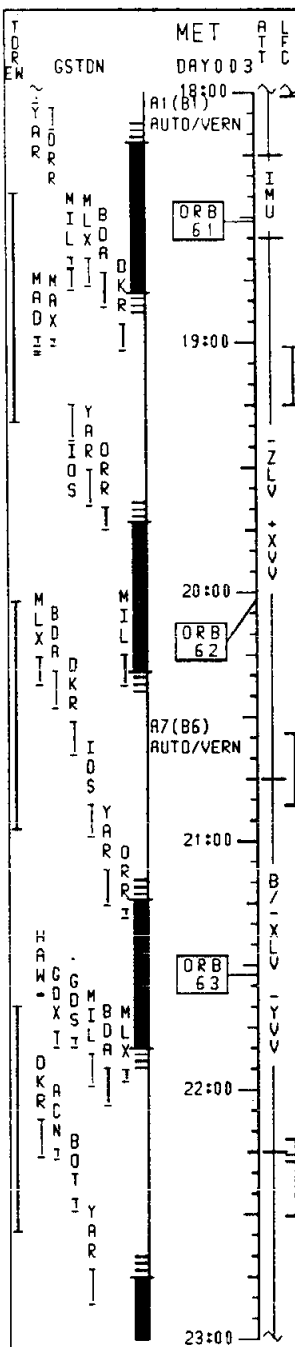
STS 41-D DETAILED (EZ CAP)

PL

MCC



UPDATE (OKR)
 H2O SPLY DUMP
 QTY TK A & B
 ONS/RCS
 ICONNECT
 CONFIG



SIS

POST SLEEP ACTIVITY
(ORB OPS, CREW SYS)

MNVR IMU ALIGN RTI
STAR PAIR (A1)
A/AUTO/VERN (18:15) Init MNVR
IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) -7LV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK

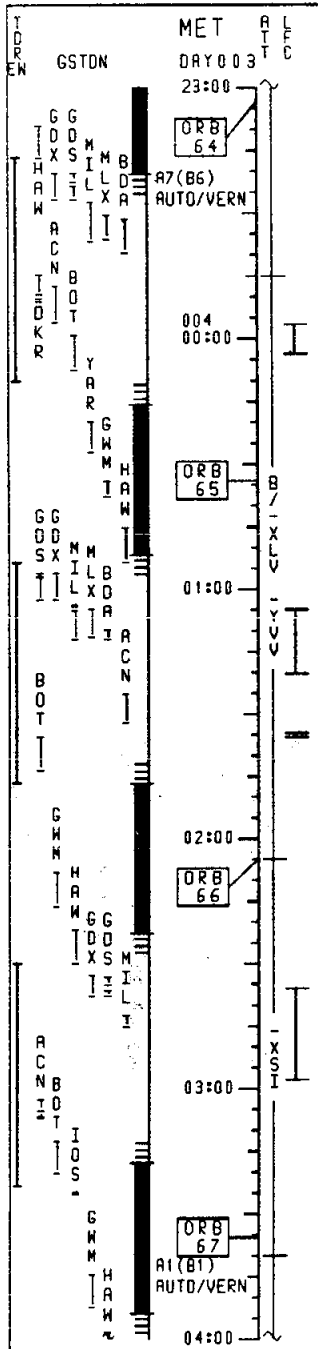
POST SLEEP ACTIVITY
(ORB OPS, CREW SYS)

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

DAE DYNAMICS TEST - 70X
(PL OPS, OAST-1 OPS)
(4 CMN) Test #2 - N/M

DAE DYNAMICS TEST - 70X
(PL OPS, OAST-1 OPS)
(4 CMN) Test #3 - I/P

STS 41-D DETAILED (EZ CAP)



STS

PL

MCC

◀ P/TV 19 (CLOUDS)
CAPE CANAVERAL (23:30-23:31)

DYNAMICS TEST (NO OAE)-100%
(PL OPS, OAST-1 OPS)
(3 CMN) Test #2 - W/M

MINI PERFORMANCE TEST
(PL OPS, OAST-1 OPS)
(3 CMN)

Change DAP A to A1
Change DAP B to B1
◀ SCCE DATA TAKE
(PL OPS, OAST-1 OPS)
Step 2

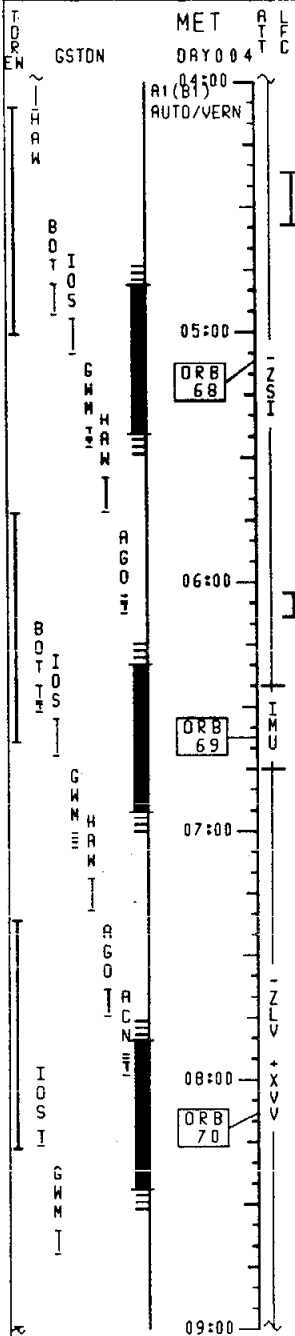
P/TV 08 (CFES OPS)
VTR DUMP at HAW (03:57-04:05)

VTR (HAW)

STS 41-D DETAILED (EZ CAP)

PL

MCC



P/TV OR (CFES OPS)
VTR DUMP (HAW)

ORB 68

PRE SLEEP ACTIVITY
(ORB OPS, CREW SYS)

EZ CAP STATUS REPORT

ORB 69

◀ MNVR TMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN (06:25) Init MNVR
TMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 DM=180
A/AUTO/VERN Init TRK

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

ORB 70

PRE SLEEP ACTIVITY
(ORB OPS, CREW SYS)

SLEEP

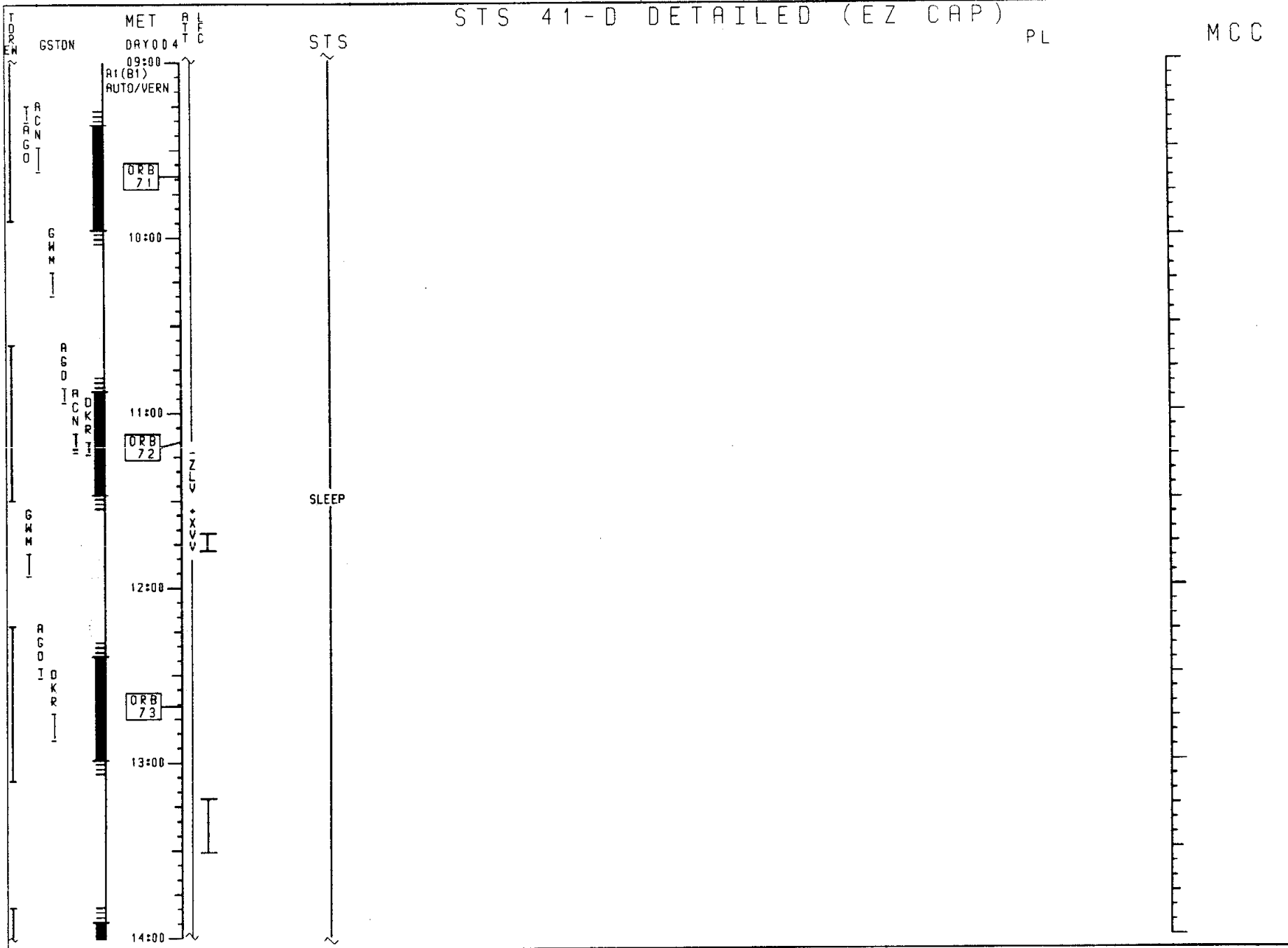
UPDATE
H2O SPLY DUMP
QTY TK A & B

NOTE: CFES - 80 HRS OPS TIME ENDS
AT 4/16:00 MET

STS 41-D DETAILED (EZ CAP)

PL

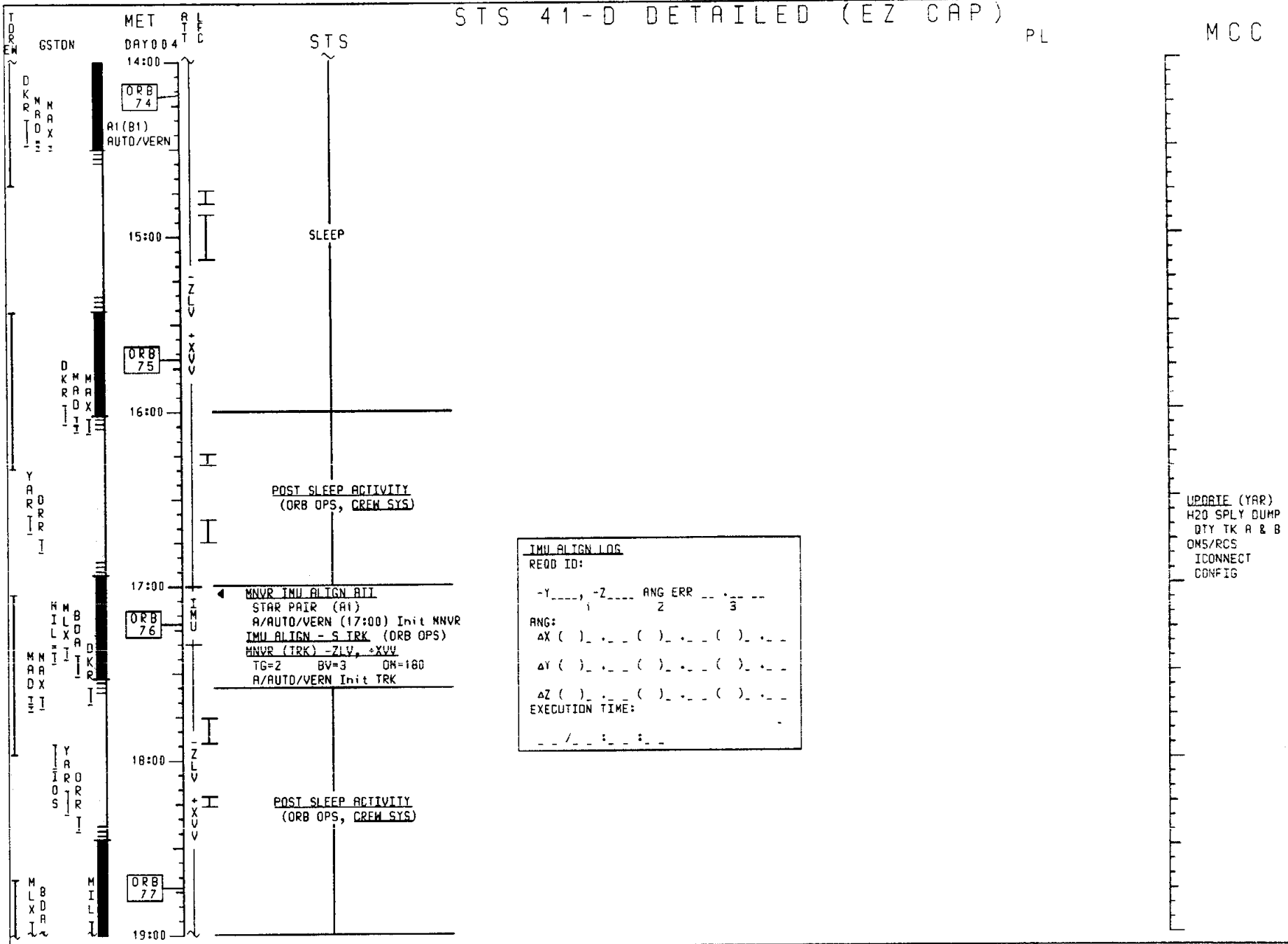
MCC



STS 41-D DETAILED (EZ CAP)

PL

MCC



STS 41-D DETAILED (EZ CAP)

STS

PL

MCC

MET DAY 004

19:00
A1 (B1)
AUTO/VERN

20:00
A7 (B6)
AUTO/VERN

21:00

22:00

23:00
A1 (B1)
AUTO/VERN

005
00:00

TDR EN

GSTDN

MILX

BDA

I O O S

YARR

ORRI

MILX

BDA

I O O S

YARR

HARR

G O O S

MILX

BDA

I O O S

YARR

HARR

G O O S

MILX

BDA

I O O S

YARR

ORB
78

ORB
79

ORB
80

Change DAP A to A1
Change DAP B to B1
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 DN=180
A/AUTO/VERN Init TRK

P/TV 17 SETUP (GLOW)
(PHOTO/TV, P/TV SCENES)

TV/VIR DEACT (Cue Card)

DRE DYNAMICS TEST - 70%
(PL OPS, DBST-1 OPS)
(4 CMN) Test #4 - N/M

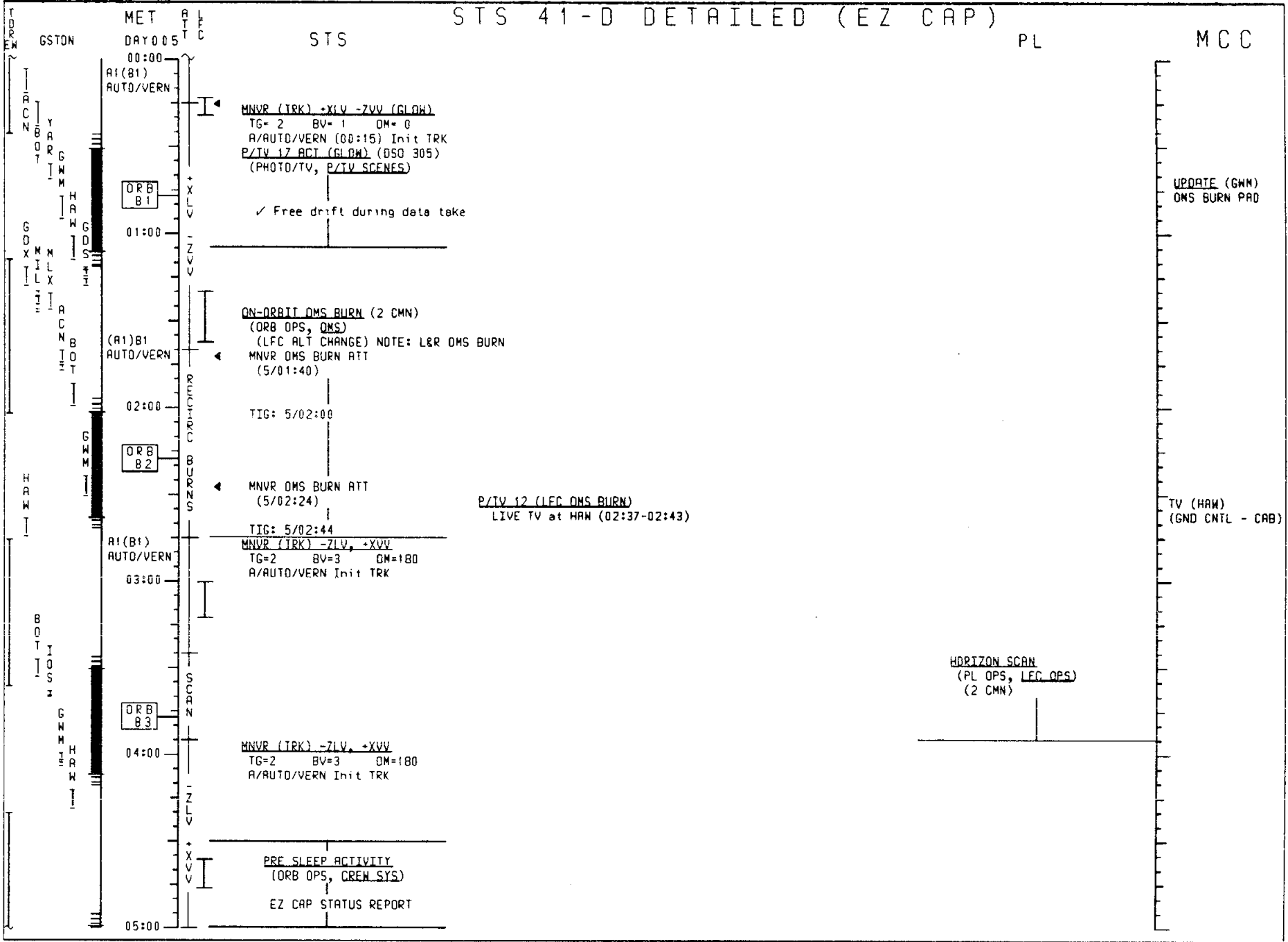
DRE DYNAMICS TEST - 100%
(PL OPS, DBST-1 OPS)
(4 CMN) Test #1 - N/M

◀ P/TV 19 (CLOUDS)
PUERTO RICO (23:50-23:52)

STS 41-D DETAILED (EZ CAP)

PL

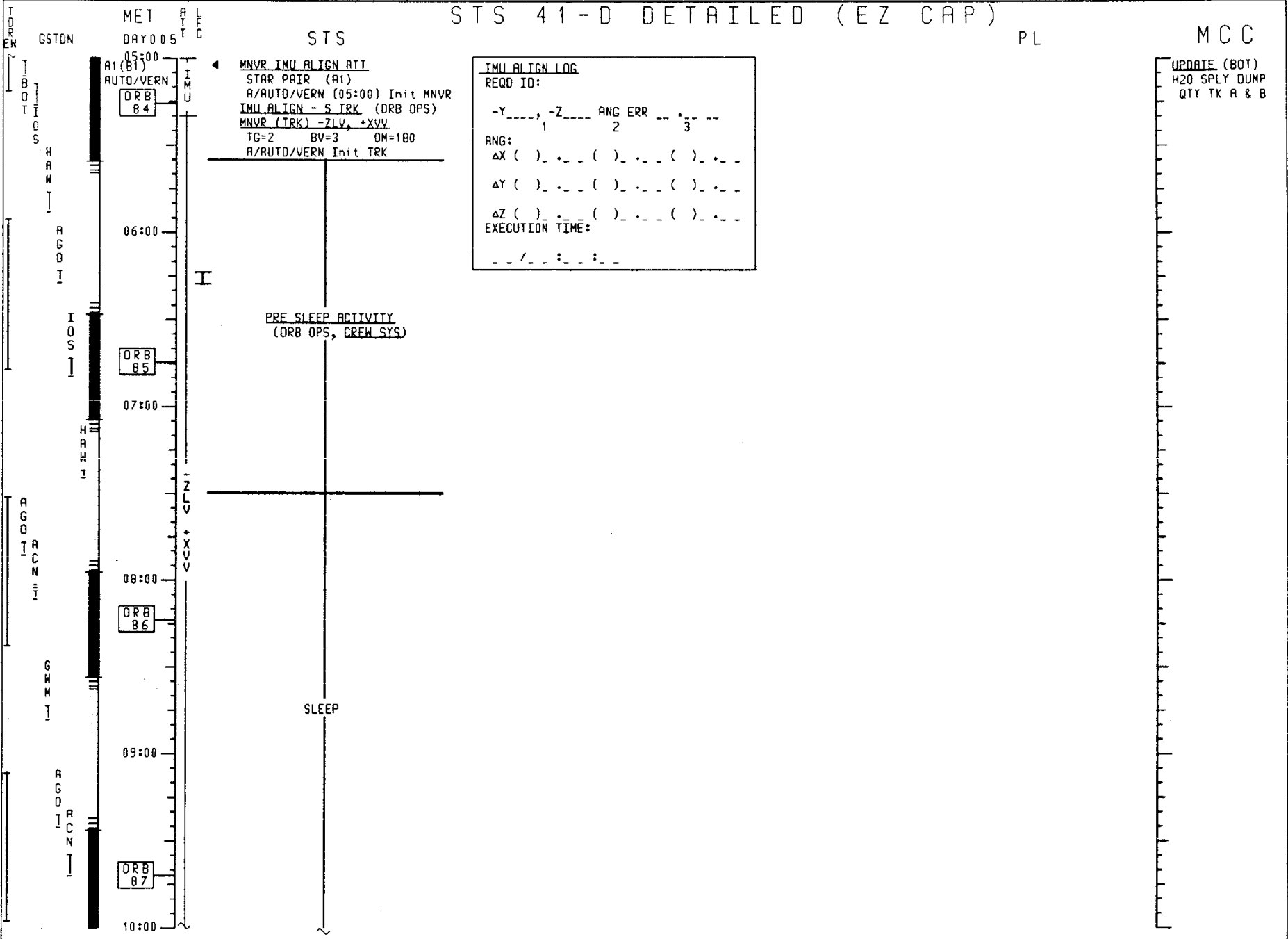
MCC



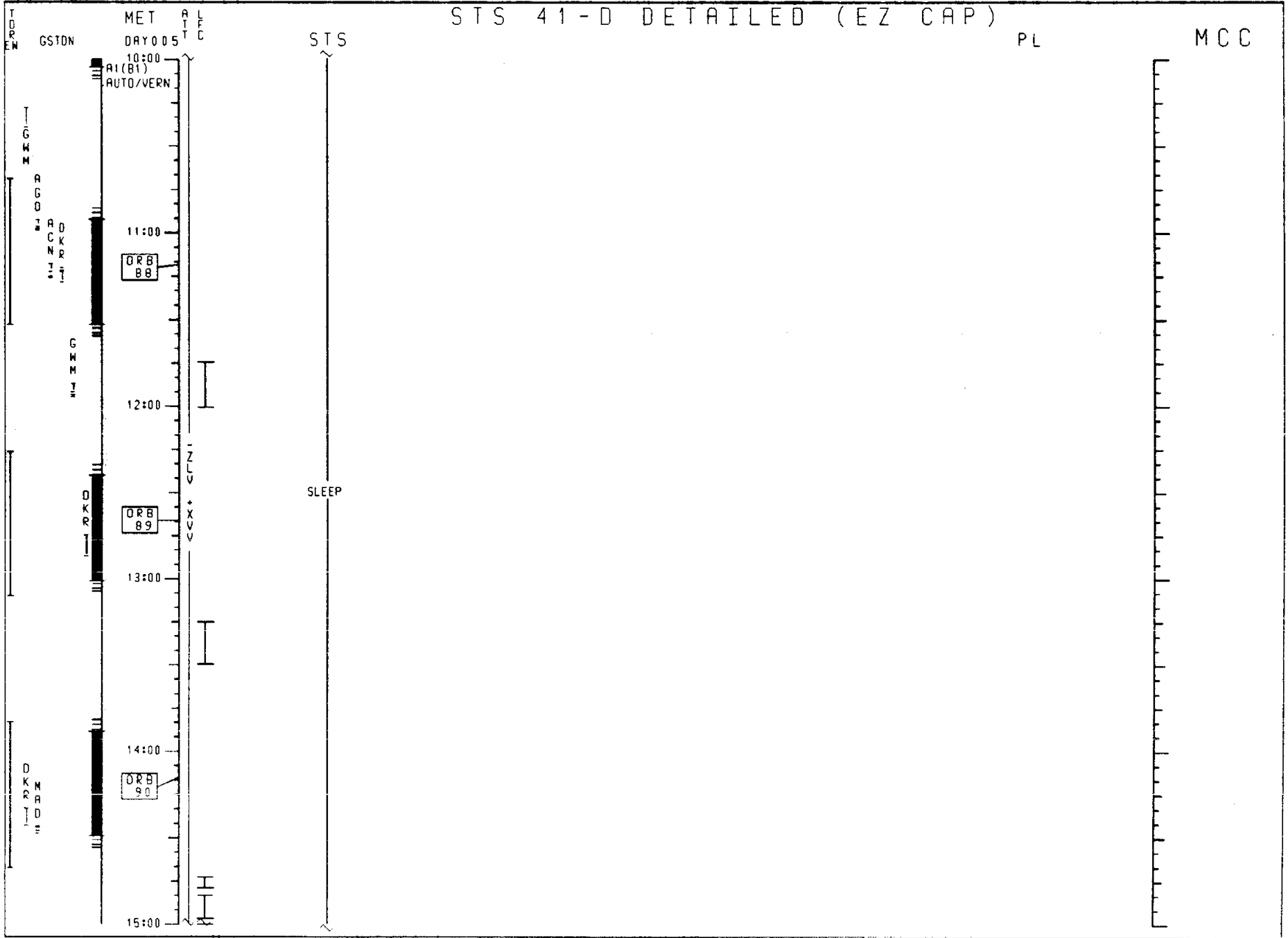
STS 41-D DETAILED (EZ CAP)

PL

MCC



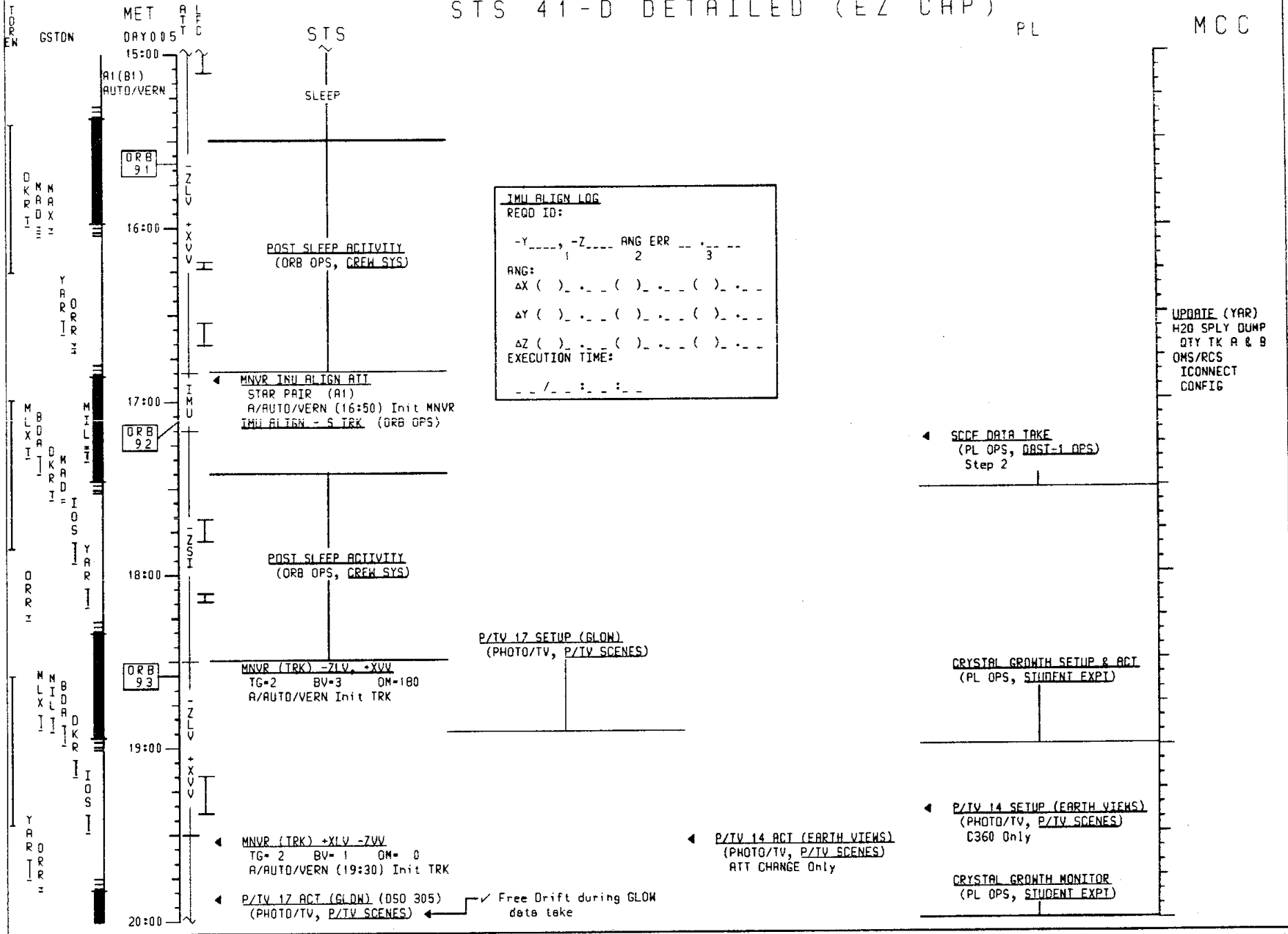
STS 41-D DETAILED (EZ CAP)



STS 41-D DETAILED (EZ CAP)

PL

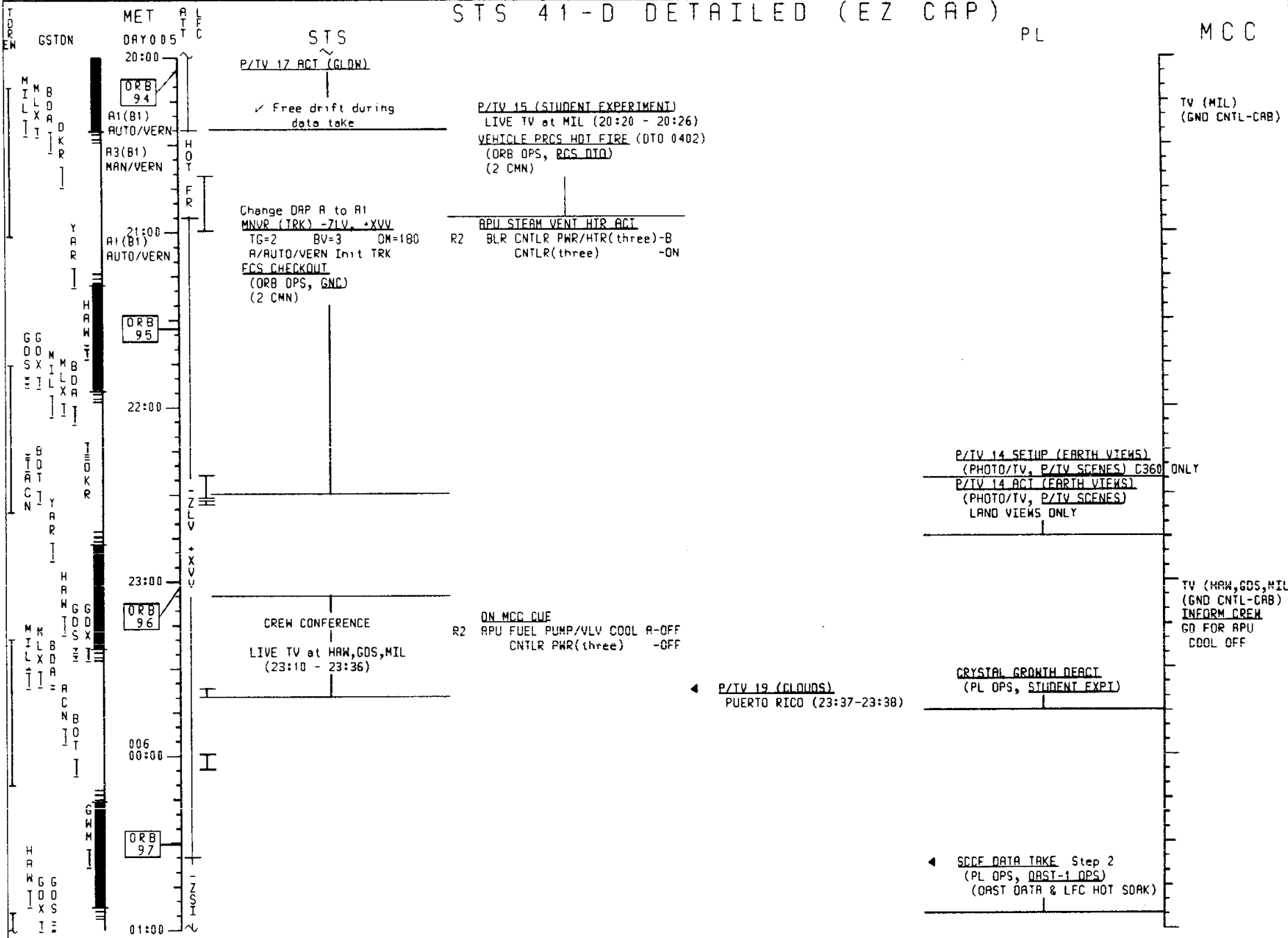
MCC



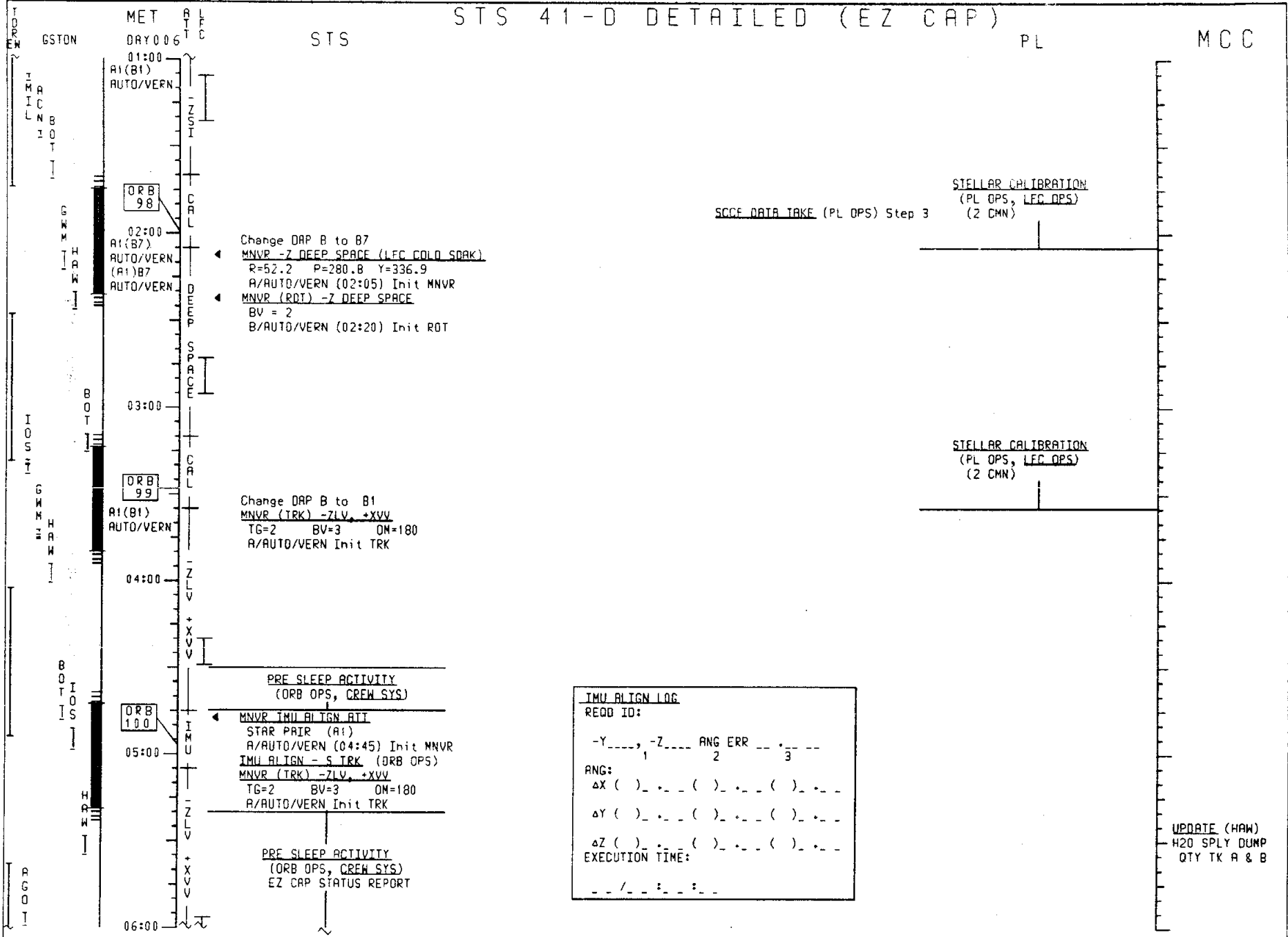
STS 41-D DETAILED (EZ CAP)

PL

MCC



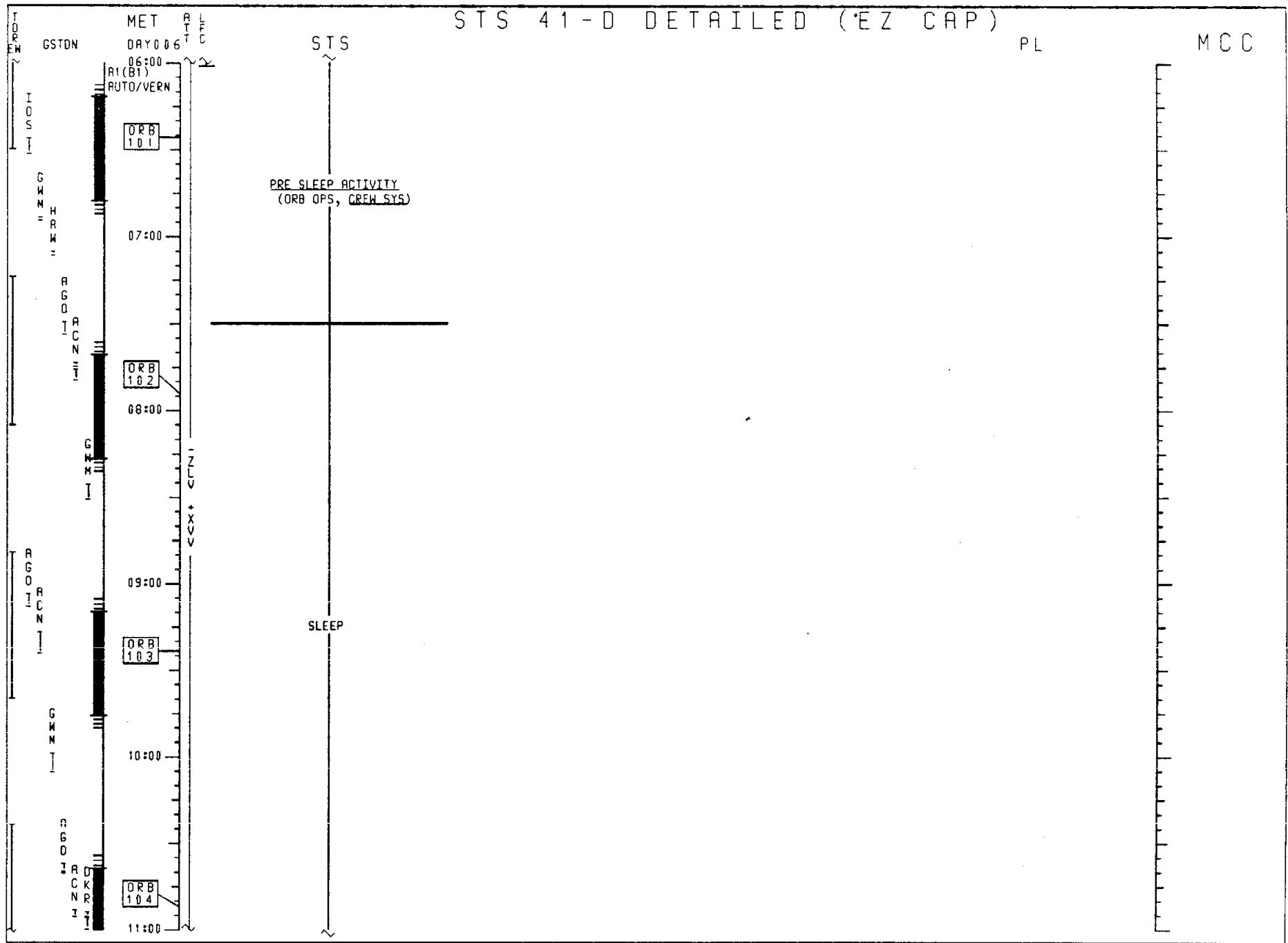
STS 41-D DETAILED (EZ CAP)



STS 41-D DETAILED (EZ CAP)

PL

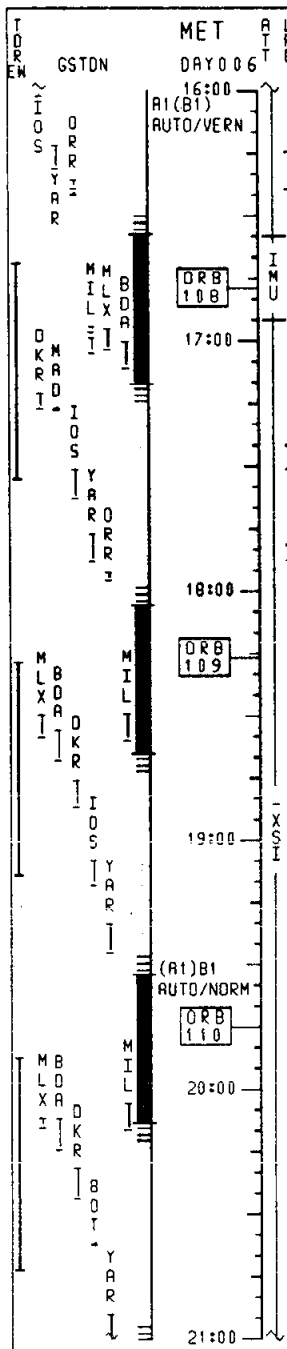
MCC



STS 41-D DETAILED (EZ CAP)

PL

MCC



STS

POST SLEEP ACTIVITY
(ORB OPS, CREW SYS)

MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN (16:35) Init MNVR
IMU ALIGN - S TRK (ORB OPS)

MNVR (TRK) -XST ATT
TG=4 BV=5 OM=270
P=184 Y=0
A/AUTO/VERN Init TRK

POST SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Update: CRT TIMER SETUP PAD
in NOMINAL DEORBIT PREP

L1 HI LOAD DUCT HTR - B

DAP: B/AUTO/NORM
L1 HI LOAD EVAP - ENA
RAD BYPASS/EFS C/D
(ORB OPS, ECLS)
Steps 1,2,4
(Delete last 2 lines
of step 4)

Go to DEORBIT PREP
at 6/20:29 MET

IMU ALIGN LOG

READ ID:

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

ANG:

ΔX () . . . () . . . () . . .

ΔY () . . . () . . . () . . .

ΔZ () . . . () . . . () . . .

EXECUTION TIME:

--- / --- : --- : ---

UPDATE (YAR)
H2O SPLY DUMP
DTY TK A & B
OMS/RCS
ICONNECT
CONFIG

UPDATE
CRT TIMER
SETUP PAD

GAS ACTIVITIES GROUP B
(PL OPS, GAS)

C 360 OPS (Cue Card)
Step 6
Stow GAS ENCODER

CONTINGENCY TIMELINES

CONTINGENCY
TIMELINES

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FLIGHT DAY 3 DEPLOYMENT

OVERVIEW

A timeline is provided for the orbit 33D deployment of Syncom IV. The nominal timeline for flight days 1 and 2 can be followed except the Solar Cell Calibration Facility (SCCF) data activity (-ZSI attitude) will be delayed until after the deployment due to the payload's thermal constraints.

The FD3 deployment timelines begin at 1/19:00 (Post Sleep timeframe) and return to the nominal timeline at 2/02:35 (after the OMS burn).

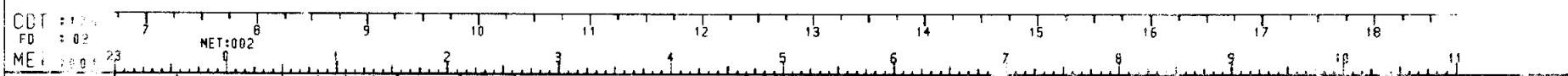
NOMINAL FD2 CHANGES:

- Replace the 'SCCF DATA TAKE' at 1/05:55 with a '-ZLV +XVV MNVR'
- Complete P/TV 06 (OAST ACTIVITIES) SETUP & ACT before '1ST EXTENSION'

The following activities will be rescheduled if time permits:

- Two 'SCCF' data takes (two daylight passes)
- Exercise for the CDR and MS3
- IMAX land view (P/TV 14)

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
174:11:43/ 174:23:43	001:23:00/ 002:11:00	174:06:43/ 174:18:43	03/ 174 CDT	17.7	●	JUNE 22, 1984	STS 41-D	FINAL	5/20/84



CDR	START DPLY	OPPLY RTT	DEPLY	OMS SEP	WIN DOW	P K M	OMS BURN	
PLT	DPLY COUNT	M N V R	DEPLY	BURN	M N V R		OMS BURN	<div style="border: 1px solid black; padding: 5px;"> <p>RETURN TO THE NOMINAL TIMELINE AT 2/02:35 (AFTER THE OMS BURN).</p> <p>COMPLETE P/TV 06 (DAST ACTIVITIES) SETUP & ACT BEFORE '1ST EXTENSION'.</p> <p>THE FOLLOWING ACTIVITIES WILL BE RESCHEDULED IF TIME PERMITS:</p> <ul style="list-style-type: none"> -TWO 'SCCF' DATA TAKES. -EXERCISE FOR THE CDR AND MS3. -P/TV 14 (IMAX Land Views). </div>
MS1	PRE DE P L O Y	P I N R E T	START STATUS	OMS I S P A I N			MEAL	
MS2	C H E C K S	K R A C T I O N	P /TV O P P O R T	C H E C K	D E P L O Y			
MS3	P /TV A C T		MEAL PREP	V T R S E T U P	P K M / W I T N S	EXERCISE (PS)	V T R P L Y B C K	V T R O U T L O O K

DAY/NIGHT	DAY		NIGHT		DAY		NIGHT		DAY		NIGHT		DAY			
ORBIT	32		33		34		35		36		37		38		39	
GSTON COVERAGE	-MIL -BDA -MLX	-HAW -GDX -BOS	-ACN -BOT -YAR	-MIL -MLX -BDA	-GDX -GDS -MIL	-HAW -BOT -IOS	-ACN -GMM -HAW	-ACN -BOT -IOS	-HAW -GMM -HAW	-ACN -BOT -IOS	-HAW -GMM -HAW	-ACN -BOT -IOS	-HAW -GMM -HAW	-ACN -BOT -IOS	-HAW -GMM -HAW	
TORS	E		W		E		W		E		W		E		W	
ATTITUDE	-ZLV -XVV		DPLY SEP		WIN		BURN									
LFC OPTS	H		H		H		H		H		H		H		H	
NOTES:	CAPE CANVERAL RMS ROLLBACK SYNCOM FD3 DEPLOY DTD 316 UPPER STAGE PLUME DAMAGE MODEL VERIF															

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HIGH-PRIORITY MISSION

The High Priority Timeline is based on the following assumptions:

- The Mission is 97 hours with landing on FD5
- The following priority activities, as defined by the Flight Rules, are scheduled:
 - (1) SYNCOM IV - deployment
 - (2) CFES - 48 hrs of operation
 - (3) OAST-1
 - a) Extension/Retraction Test
 - b) One Performance Test
 - c) One Dynamics test of each type at 70%
 - In-Plane (DAE)
 - Out-of-Plane
 - Multi-Modal
 - d) One SCCF daylight pass
 - (4) LFC
 - a) Stellar Calibration
 - b) Thermal Verification - Hot
 - c) Thermal Verification - Cold
 - d) As many -ZLV data takes as practical
- Other payload/DTO activities will be scheduled to the maximum extent possible.
- FD1 and the SYNCOM IV deployment on FD2 are nominal. The High Priority Timeline begins at MET 01/03:45
- The Primary landing site on FD5 is EDW (orbit 65) at MET 04/01:10 (CDT 08:53)
The crossrange is 392 NM
- If Syncom is deployed on FD3 rather than FD2, the OAST tests will be affected.

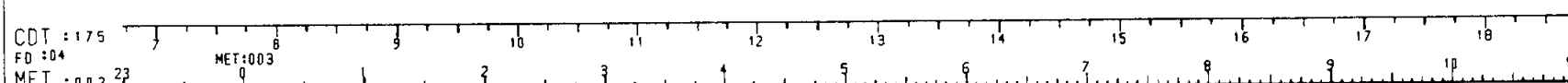
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CDT : 173 FD : 03 MET : 001										
CDR						ZLV MNVV IMU MNVV		OAST-1 SUPPORT	CS SUPPORT	SA OYN 70%
PLT								SA OYN 70%		EXERCISE
MS1	SLEEP						POST SLEEP ACT			CS SUPPORT
MS2										
MS3								CFES ELISA C1		SA OYN 70%
DAY/NIGHT										
ORBIT	24	25	26	27	28	29	30	31	32	
GSTON COVERAGE	-GMM -AGO -ACN	-GMM -AGO -ACN -DKP	-GMM -DKR	-DKR -MAD	-YAR	-MAD -IOS -YAR -ORR	-MAD -IOS -YAR -ORR -MIL -BDA -DKP	-IOS -YAR -ORR -MIL -BDA -DKP	-IOS -YAR -ORR	-GOS -MIL -BDA
TORS E W										
ATTITUDE										
LFC OPSS										
NOTES:	HIGH PRIORITY									

• ZLV, +XVV
 • DTG 0622 CAB ATM VERIF - FULL PRESSURE
 • MANUAL PS
 • FC PURGE HTR ON • TEST #1 (OUT-OF-PLANE) • TEST #2
 • FC PURGE HTR OFF (MULTI-MODAL)

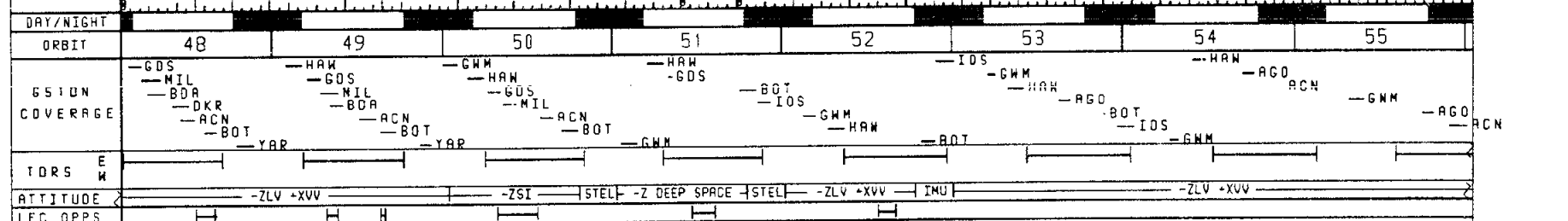
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CDT : 174 FD : 03 MET : 001 <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;">7</td><td style="width:10%;">8</td><td style="width:10%;">9</td><td style="width:10%;">10</td><td style="width:10%;">11</td><td style="width:10%;">12</td><td style="width:10%;">13</td><td style="width:10%;">14</td><td style="width:10%;">15</td><td style="width:10%;">16</td><td style="width:10%;">17</td><td style="width:10%;">18</td><td style="width:10%;">19</td><td style="width:10%;">20</td><td style="width:10%;">21</td><td style="width:10%;">22</td><td style="width:10%;">23</td> </tr> </table>										7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23										
CDR	SA DYN 70%		OAST-1 SUPPORT			EXERCISE																				
PLT			SA PERF 70%			SA OAE 70%	ZLV MNVVR																			
MS1	OAST-1 SUPPORT	MEAL		EXERCISE	OAST-1 SUPPORT	MED VIS PERF TEST		PRE SLEEP ACT		SLEEP																
MS2		HRM DEACT				MED VIS PERF TEST																				
MS3	SA DYN 70%	CFES FILTRATE TEST	CFES ELISA C2	SA PERF 70%			SA OAE 70%																			
DAY/NIGHT	[Day/Night Cycle Indicators]																									
ORBIT	32	33	34	35	36	37	38	39																		
GSTON COVERAGE	MIL BDA DKR ACN BOT	GDS MIL BDA DKR ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT	GMM HAW GDS MIL BDA ACN BOT							
TDRS	[TDRS Schedule]																									
ATTITUDE	[Attitude Schedule]																									
LFC OPSS	[LFC OPSS Schedule]																									
NOTES:	HIGH PRIORITY • TEST #3 (IN-PLANE) • -ZLV, +XVV • DSO 0440 Crew Visual Perf Test • -ZLV, +XVV																									

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
174:23:43/ 175:11:43	002:11:00/ 002:23:00	174:18:43/ 175:06:43	04/ 174 CDT	19.7	☉	JUNE 22, 1984	STS 41-D	FINAL	5/20/84	
CDT : 174 FD : 03 MET : 002										
CDR						IMU MNV R	ZLV MNV R	EXERCISE	CFES SUPPORT	FCS C/O
PLT							NEAR VIS & CONTRST	EXERCISE		FCS C/O
MS1	SLEEP					POST SLEEP ACT				EXERCISE
MS2							CRYSTAL S/U & EACT		CC RYE S T R A L	
MS3							NEAR VIS & CONTRST (PS)	CFES ELISA C3		
DAY/NIGHT										
ORBIT	40	41	42	43	44	45	46	47		
GSTON COVERAGE	-GWM -RGO -ACN -DKR	-GWM -RGO -DKR	-DKR -MAD	-DKR -MAD	-YAR -ORR	-BDR -DKR -MAD -IOS -YAR -ORR	-BDR -DKR -IOS -YAR -ORR	-DKR -IOS -YAR	-DKR -IOS -YAR	HAN
TDRS E W										
ATTITUDE	-ZLV +XVV									
LFC OPSS	H	HH		HH	H	H				
NOTES:	HIGH PRIORITY					-ZLV +XVV * DSD 0408 Near Vision Acuity and Contrast * STUDENT EXPERIMENT * PS * APU HTR ACT				

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
175:11:43/ 175:23:43	002:23:00/ 003:11:00	175:06:43/ 175:18:43	04 / 175 CDT	21.6	☉	JUNE 23, 1984	STS 41-D	FINAL	5/20/84



COR	FCS C/O	PRCS HOT FIRE		CABIN STOM	SCCF DATA	CABIN STOM	SC TEL LAR	AUTO M N V R		CABIN STOM	SC TEL LAR	ZLV M N V R		IMU M N V R	ZLV M N V R		
PLT	FCS C/O	PRCS HOT FIRE				CABIN STOM	SC TEL LAR			CABIN STOM							
MS1			MEAL			CABIN STOM	SC TEL LAR			CABIN STOM	SC TEL LAR			PRE SLEEP ACT			SLEEP
MS2		EXERCISE								CABIN STOM							
MS3	CFES FILTRATE TEST					EXERCISE (PS)	EXERCISE	FLUSH DEACT	PROTIEN CHAR								* CFES - COMPLETION OF 48 HRS OPS



NOTES: PS 0 DTO 0402 Follow-on Vehicle PRCS Hot Fire Test 0 -Z DEEP SPACE 0 -ZLV, +XVV 0 -ZLV, +XVV
HIGH PRIORITY 0 STEP 1 0 STEP 3 0 CFES 0 CFES

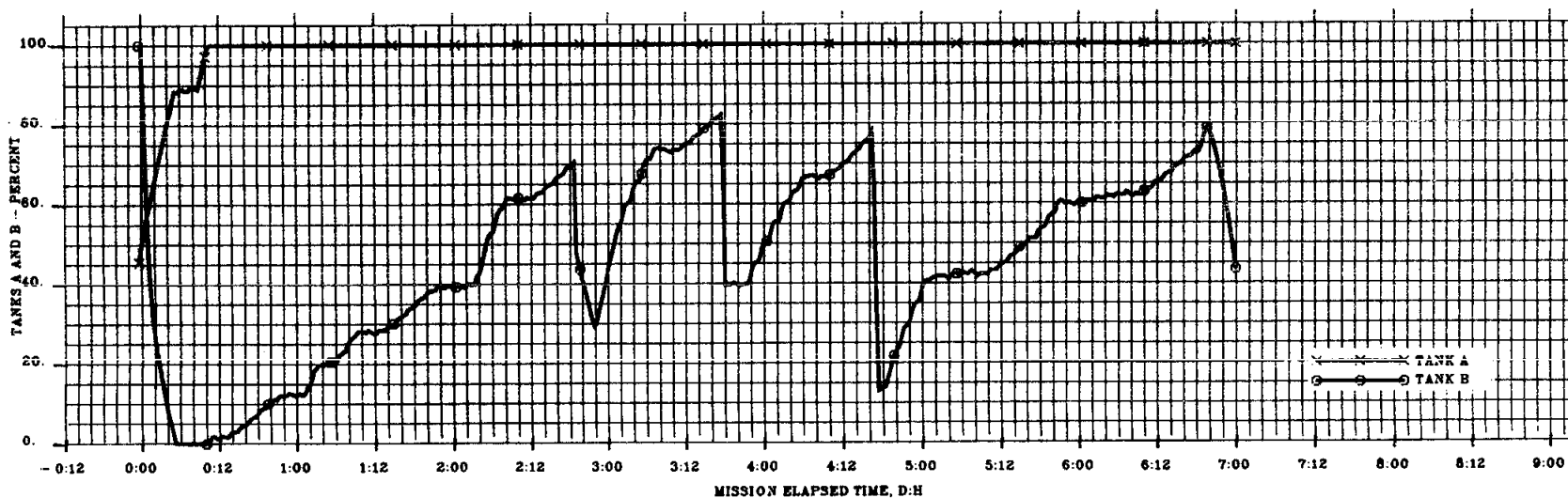
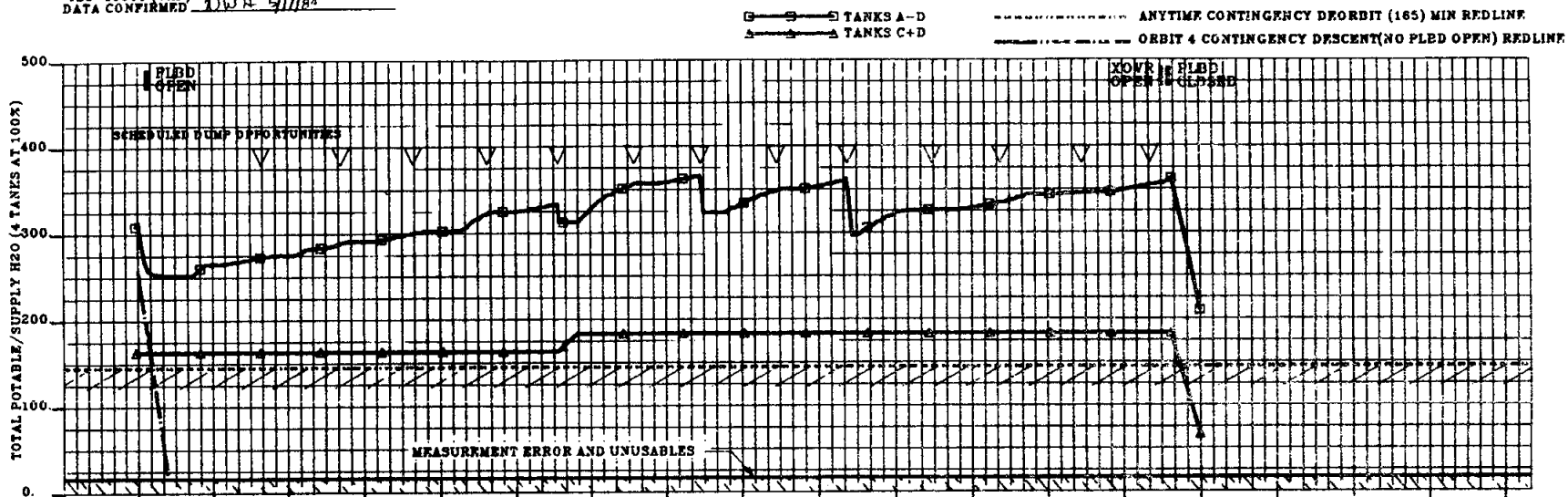
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TIG CDT : 176 FO : 05 MET : 003									
CDR									
PLT									
MS1	DEORBIT PREP	DEORBIT BURN	LANDING EDW 4/01:10						
MS2									
MS3									
DAY/NIGHT									
ORBIT	64	65	66	67	68	69	70	71	
GSTON COVERAGE	-HAW -GDS -MIL -BDA -DKR -RCN -BOT	-YAR -GMM -HAW -GDS -MIL -BDA -RCN	-BOT -GMM -HAW -GDS -MIL -RCN -BOT	-IOS -GMM -HAW	-AGO -BOT -IOS -GMM -HAW -RCN	-IOS -GMM -HAW -AGO -RCN	-AGO -RCN -GMM -AGO		
TORS E H									
ATTITUDE									
LFC OPS									
NOTES:	HIGH PRIORITY								

CONSUMABLES CURVES

CONSUMABLES CURVES

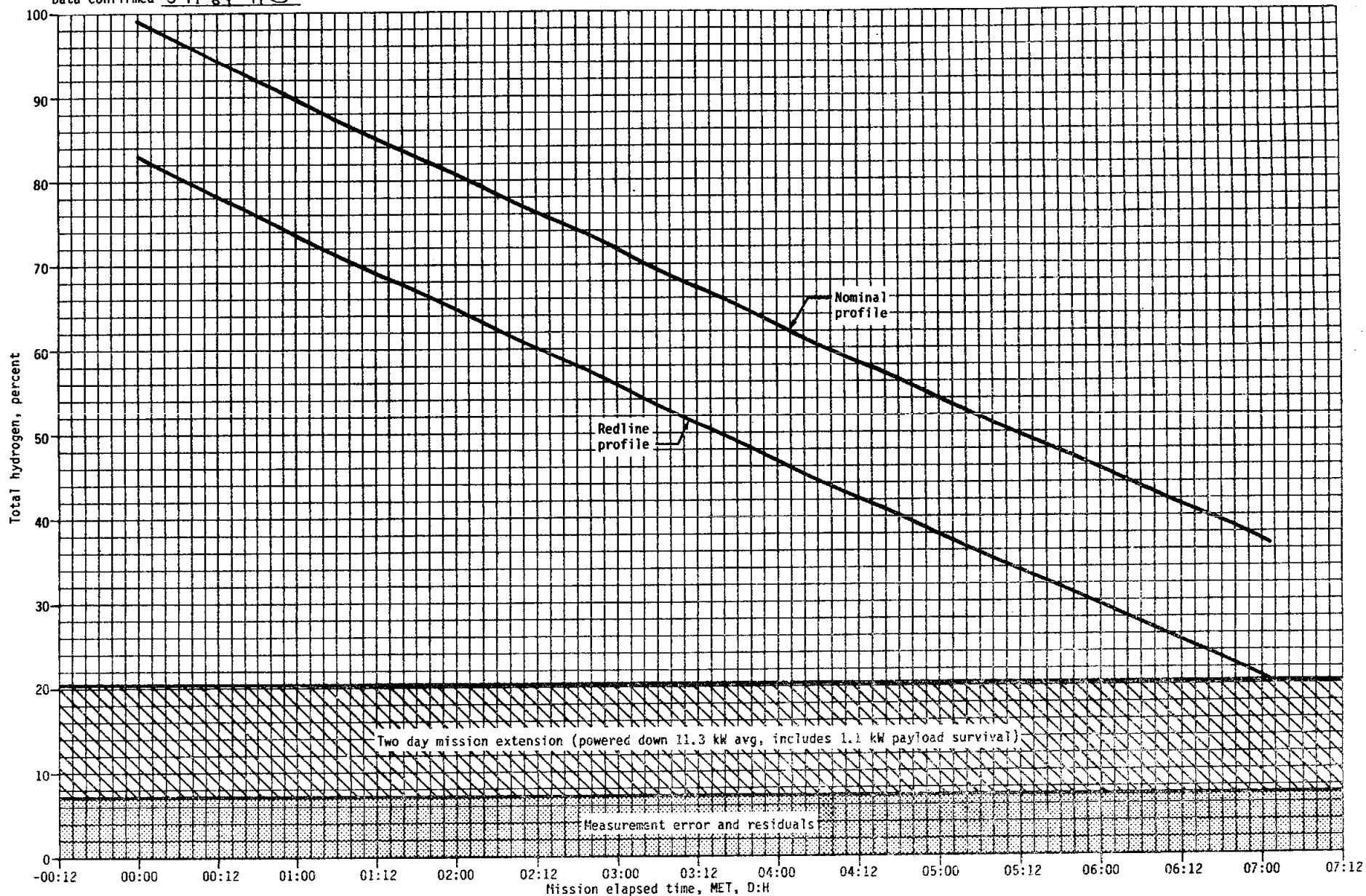
D. HEATH S. THOMAS
JSC-19044 (CAP) 2/3/84
DATA CONFIRMED *DWH 5/17/84*

TRAJECTORY OFF CYCLE 3
CAP: 8/18/84
ANALYSIS DATE: 3/16/84



S. Price, T. Cleghorn/FPB/MPAD
Data source JSC 19044(CAP) 2/3/84
Data confirmed 5-17-84 TFC

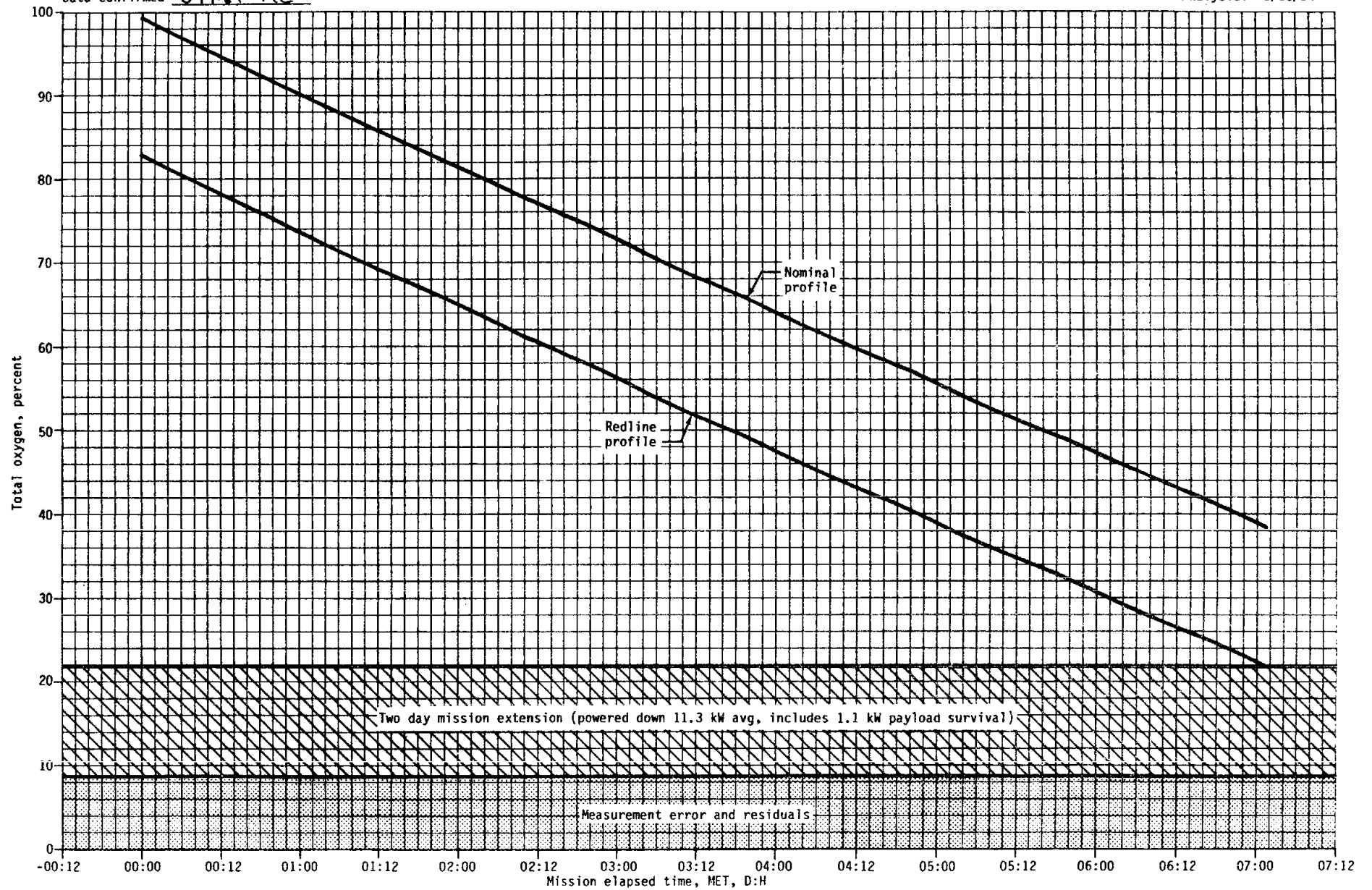
Trajectory: Cycle 3A
CAP: Basic 2/3/84
Analysis: 5/11/84



STS 41-D cryogenic hydrogen profile.

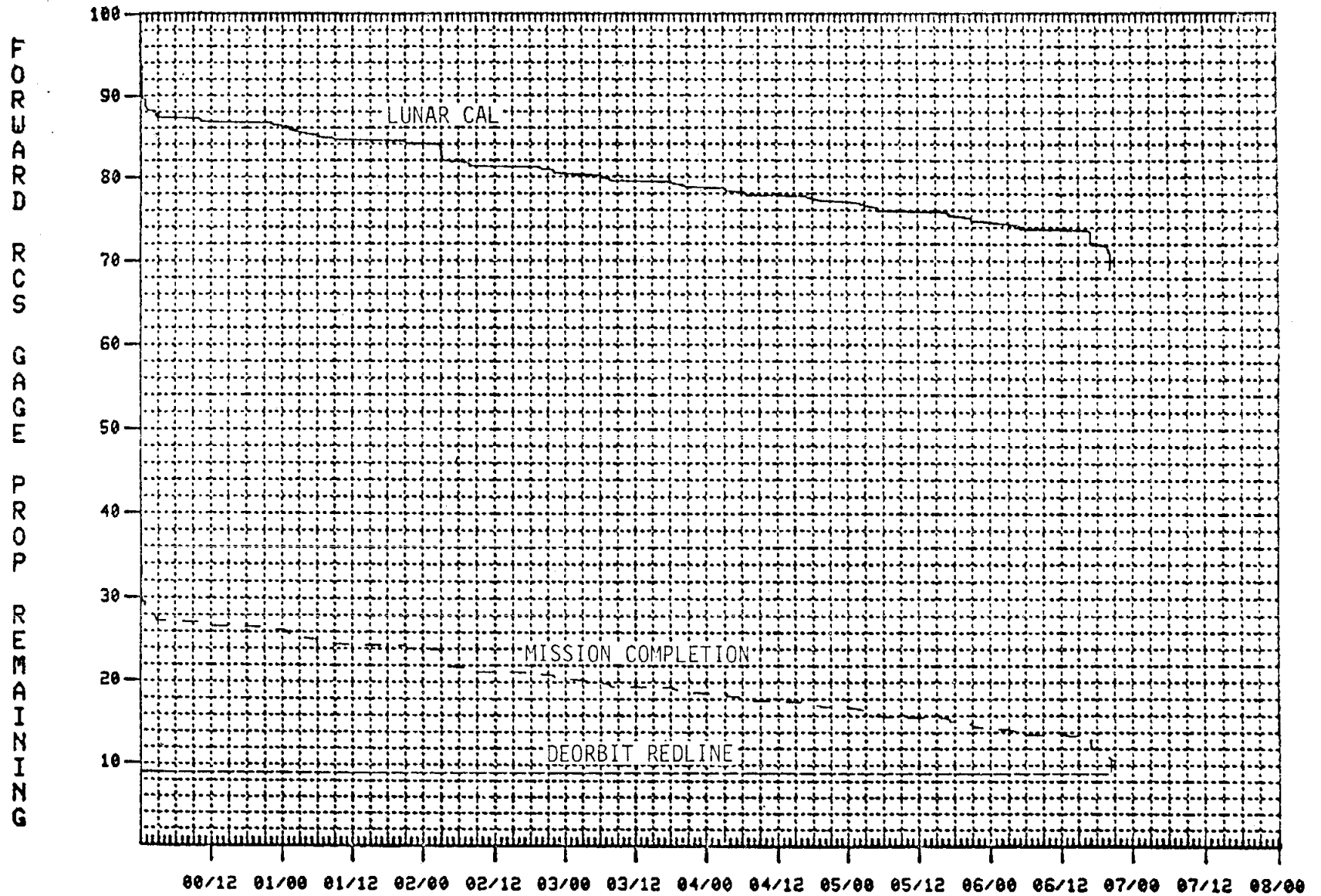
S. Price, T. Cleghorn/FPB/MPAD
Data source JSC 19044(CAP) 2/3/84
Data confirmed 5-17-84 TEC

Trajectory: Cycle 3A
CAP: Basic 2/3/84
Analysis: 5/11/84



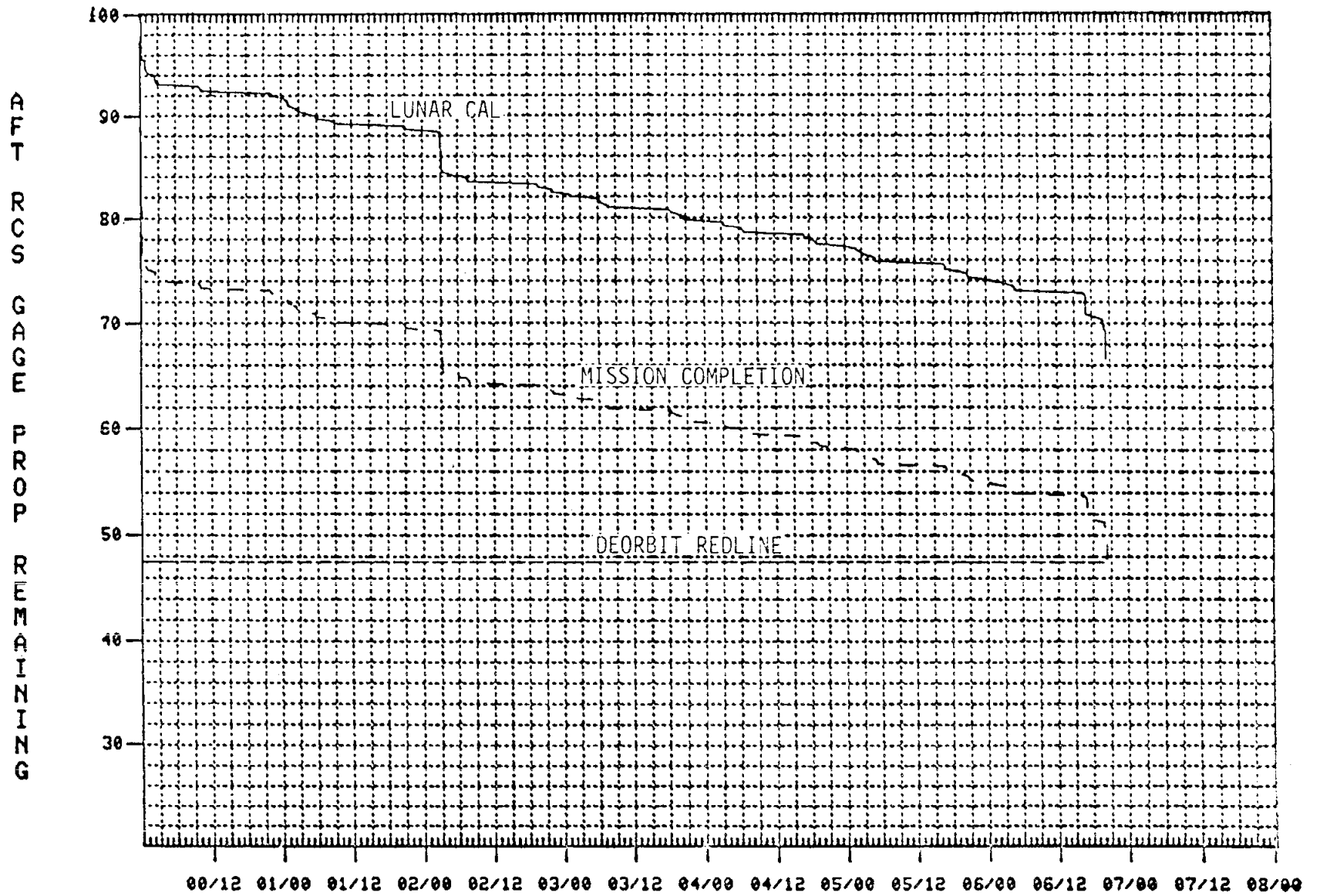
STS 41-D cryogenic oxygen profile.

41-D FORWARD RCS PROP REMAINING(% GAGE)



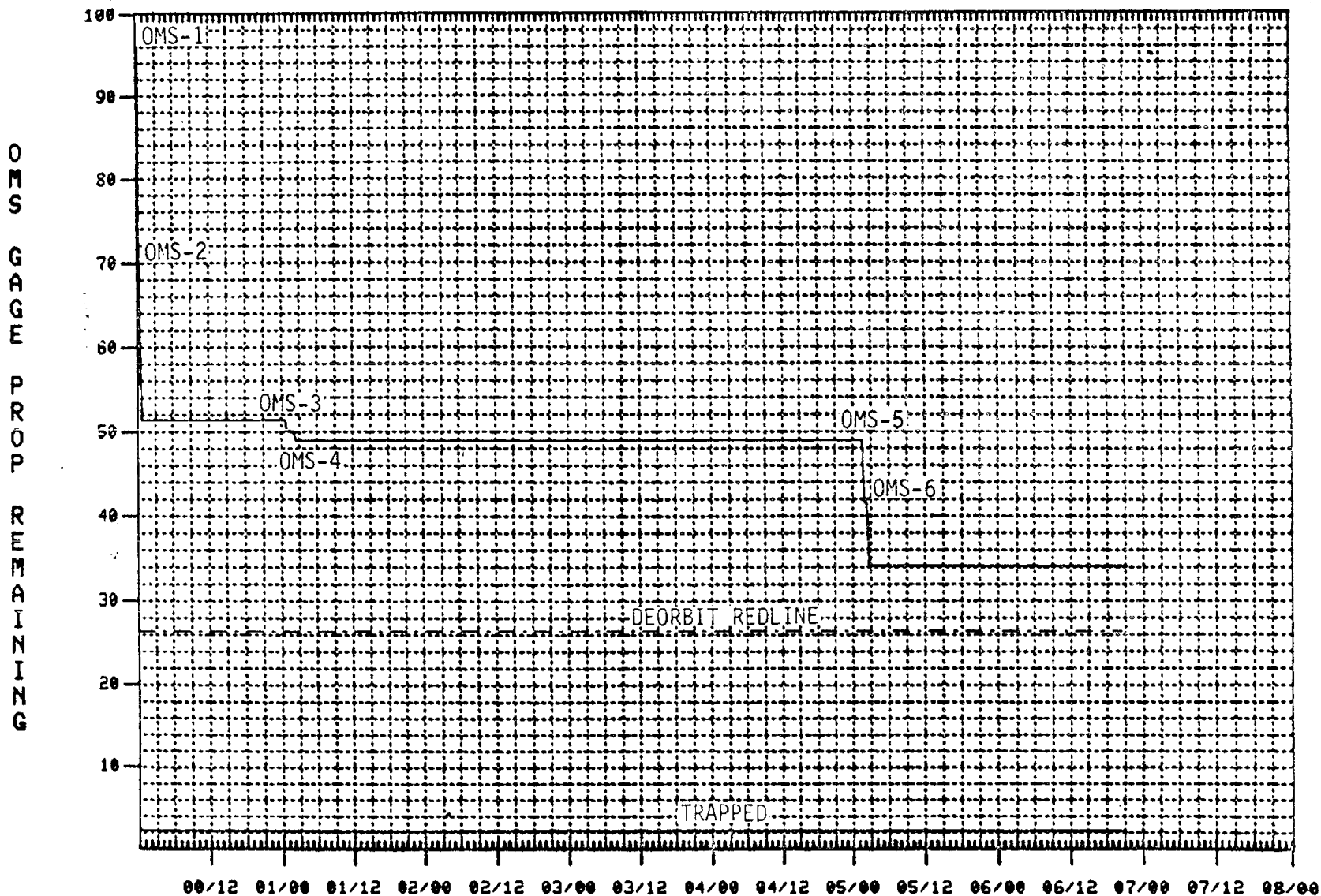
MISSION ELAPSED TIME IN DAYS/HOURS

41-D AFT RCS PROP REMAINING(% GAGE)



MISSION ELAPSED TIME IN DAYS/HOURS

41-D OMS PROP REMAINING(% GAGE)



MISSION ELAPSED TIME IN DAYS/HOURS

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

CREW ACTIVITY PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

FLIGHT DESCRIPTION..... 7-2
CREW..... 7-3
ORBITER SYSTEMS..... 7-4
 COMMUNICATIONS AND INSTRUMENTATION..... 7-4
 GUIDANCE AND NAVIGATION..... 7-4
 ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM..... 7-4
TEXT UPLINK SYSTEM..... 7-5
TELEVISION/PHOTOGRAPHY..... 7-5
REMOTE MANIPULATOR SYSTEM (RMS)..... 7-5
PAYLOADS..... 7-6

CAP NOTES

CREW ACTIVITY PLAN NOTES (CONSTRAINTS AND GUIDELINES)

A. FLIGHT DESCRIPTION

41-D (OV-103) will launch from KSC on June 20, 1984, into a 173 nm orbit at an inclination of 28.5°. The mission duration will be 7 days (~168 hours). Nominal landing occurs at EDW on June 27, 1984.

Landing opportunities are:

		<u>LANDING ORBIT NO.</u>	<u>SITE</u>	<u>LOCAL TIME</u>
Nominal	Primary	113	EDW	06:36 PDT
	Backup	NONE		
	Weather Alternate	112	KSC	08:11 EDT
1 Day Late	Primary	129	EDW	06:19 PDT
	Backup	NONE		
	Weather Alternate	128	KSC	07:53 EDT
2 Days Late	Primary	145	EDW	06:00 PDT
	Backup	NONE		
	Weather Alternate	144	KSC	07:35 EDT

MAJOR EVENTS

LAUNCH (KSC) June 20, 1984
 MET (DD/HH:MM:SS) 0/00:00:00
 Day of year 172
 CDT/GMT 07:43/12:43

MECO
 MET (DD/HH:MM:SS) 0/00:08:45
 ALT ha/hp (nm) 84 x -2

OMS-1
 MET (DD/HH:MM:SS) 0/00:10:41
 ΔV (fps) 264
 ΔT (MM:SS) 02:39
 ORBIT ha/hp (nm) 173 x 52

OMS-2
 MET (DD/HH:MM:SS) 0/00:46:01
 ΔV (fps) 216
 ΔT (MM:SS) 02:20
 ORBIT ha/hp (nm) 173 x 173

SYNCOM SEPARATION (OMS)
 MET (DD/HH:MM:SS) 1/00:54:15
 ΔV (fps) 15
 ΔT (MM:SS) 00:11
 ORBIT ha/hp (nm) 181 x 173

<u>RECIRC OMS</u>	
MET (DD/HH:MM:SS)	1/02:27:39
ΔV (fps)	12
ΔT (MM:SS)	00:10
ORBIT ha/hp (nm)	173 x 173

<u>LFC ORBIT ADJUST BURN (OMS)</u>	
MET (DD/HH:MM:SS)	5/02:00:00
ΔV (fps)	92
ΔT (MM:SS)	00:55
ORBIT ha/hp (nm)	173 x 121

MET (DD/HH:MM:SS)	5/02:44:08
ΔV (fps)	93
ΔT (MM:SS)	00:55
ORBIT ha/hp (nm)	121 x 121

<u>DEORBIT BURN</u>	
MET (DD/HH:MM:SS)	7/00:00
ΔV (fps)	256
ΔT (MM:SS)	02:11
ORBIT ha/hp (nm)	120 x -18

<u>ENTRY INTERFACE</u>	
MET (DD/HH:MM:SS)	7/00:23

<u>LANDING (EDW)</u>	
MET (DD/HH:MM:SS)	7/00:53
Day of year	179
CDT/GMT	8:36/13:36

B. CREW

1. The crewmen responsible for performing an EVA, should one become necessary, are: MS1 will be EV1, MS2 will be EV2, and MS3 will be IV1.

2. There will be 6 crewmen flying this mission, with each specialist assigned to the following tasks:

- CDR - Overall mission decisions, vehicle control, G&N, ECLSS, Guidance, FCS
- PLT - Backup flight control, G&N, IMAX, DTO's, APU/HYD, MPS, EPS, Cryo
- MS1 - Backup System procedures, P/L monitor, SYNCOM, LFC, CINEMA 360, Earth Obs, C&W, Mech/PLBD
- MS2 - Systems procedures, backup G&N, Student Exp, CLOUDS, RME, DSO's, Flight Rules, DPS, Nav
- MS3 - OAST-1, RMS, CFES, IFM, Comm/Inst, OMS, RCS
- PS - CFES

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink RTC coordinated with the crew.
- b. There are 12 GSTDN sites available for on-orbit coverage: ORR, GDS(GDX), MIL(MLX), BDA, HAW, GWM, AGO, ACN, MAD(MAX), YAR, BOT, and DKR.
- c. There are 3 GSTDN sites available for real-time TV: GDS(GDX), MIL(MLX), and HAW.
- d. There are 2 GSTDN sites available for UHF voice only: YAR and BOT.
- e. TDRS is assumed to be in position (41⁰W) for this edition of the Crew Activity Plan.

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 much 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 morning and evening activities and prior to major events requiring low navigation uncertainty.

3. Environmental Control and Life Support Subsystem (ECLSS)

- a. The CO₂ absorbers are installed for launch and entry and are alternately replaced on-orbit as required.
- b. The four supply water tanks and one waste water tank are loaded for launch with volumes sufficient to meet an orbit 3 launch day deorbit opportunity with PLBDs failed closed. If waste water production exceeds storage capacity, a real-time call will be made to perform a waste tank dump. Normally two supply water dumps will occur per flight day. A real-time call will be made prior to each to inform the crew whether a dump is required, and to what level. Tanks A and B will be dumped to a level that will allow the tanks to be full prior to the next daily group of deorbit opportunities.

D. TEXT UPLINK SYSTEM

1. The teleprinter (TPR) will provide an on-orbit capability to receive and reproduce text-only data (such as procedures, weather data, and CAP updates or changes) from MCC. The TPR uses S-Band and is not dependent on TDRS Ku-Band. TPR uplink requires 1 to 2.5 minutes per message, depending upon the number of lines (up to 66). Activation includes powering up the unit during Post Insertion. The TPR will remain on continuously until deactivation prior to seat ingress on entry day.
2. The Text and Graphics System (TAGs) will not be flown.

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, and two RMS TV cameras configured as follows:

<u>Camera</u>	<u>Lens</u>
A(Port Fwd).....	Monochrome Lens Assembly (MLA)
B(Port Aft).....	MLA
C(STBD Aft).....	MLA
D(STBD Fwd).....	MLA
RMS End Effector.....	MLA
Elbow (RMS).....	Wide Angle

2. The video tape recorder (VTR) is available with 30-minute cassettes.
3. 16mm, 35mm, and 70mm camera systems are available.
4. Four dedicated video tape recorders are available for OAST-1 operations. One VTR will be available for the other payload/Orbiter activities.
5. The Cinema 360 camera will be used for photography from the payload bay.
6. The IMAX camera will be used in the cabin for in-cabin and out-the-window photography.

F. REMOTE MANIPULATOR SYSTEM (RMS)

The RMS will be used and evaluated in the accomplishment of the following DTO s:

DTO 0316 Upper Stage Plume Damage Model Verification (Plume Witness Plate)

DTO 0322 TPS - Post Launch Evaluation of OV-103

DTO 0621 First Production Unit Remote Manipulator Tests

The RMS will also be available for contingency purposes for OAST-1. The elbow TV camera will be used for photographic documentation.

G. PAYLOADS

1. SYNCOM IV

The SYNCOM payload is a communications satellite with integral solid rocket perigee kick motor and liquid propellant apogee motors. The deployment opportunities are determined by constraints imposed on the right ascension of the ascending node of the orbit. Normally, a deployment at the descending node of orbit 17 is planned, followed 45 minutes later by a PKM burn on the ascending node of orbit 18. If the deployment has to be delayed, a second attempt will be scheduled on FD 3 with an orbit 33D deployment and an orbit 34A PKM burn. SYNCOM is 'frisbee' deployed (i.e., the deploy consists of a simultaneous rotation and translation along the -Z axis).

SYNCOM deployment events and times are presented in Table 9-1.

2. OAST-1 (Office of Applications and Space Technology-1)

OAST-1 is a payload containing three experiments mounted onto a support structure. The three experiments include the following: 1) Solar Array Experiment which consists of an extendable Solar Array wing with the capability of extension to about 100 feet (ft); 2) Dynamic Augmentation Experiment which is a structure containing sensor and electronics packages; and 3) Solar Cell Calibration Facility which is a self-contained, data acquisition and storage package.

The Solar Array Experiment (SA or SAE) will be unfolded from its container in the payload bay to a length of 73.5 ft (70% extended) and 105 ft (100% extended) and used for dynamic and thermal testing. The dynamics tests will consist of a quiescent array excited by VRCS pulses. The amount of tip deflection will be measured using orbiter CCTV cameras and sometimes by a Dynamic Augmentation Experiment (DAE) which uses a low power laser. The crew will be required to extend and retract the array, input the pulses, operate the cameras, and provide constant monitoring of the array's stability.

A Solar Cell Calibration Facility (SCCF) will be used to determine the validity of balloon flight solar cell calibration and laboratory-generated solar cell temperature coefficients. The SCCF is self-contained and requires minimal crew interface.

OAST-1 events and times are presented in Table 9-2.

3. LFC (Large Format Camera)

The Large Format Camera is a precision cartographic camera which will acquire high resolution photography of the Earth's surface. All land masses with the sun elevation angle greater than 25° are considered candidate targets for LFC photography. Data acquisition on-orbit will be ground controlled except for specific engineering tests commanded by the crew.

LFC events and times are provided in Table 9-3.

4. RME (Radiation Monitoring Equipment)

The RME experiment is designed to measure radiation levels in the Orbiter middeck at various times throughout the flight. Experiment equipment includes the Handheld Radiation Monitor (HRM-III), a gamma and electron dosimeter, and the Pocket RME Meter (PRM), a neutron and proton dosimeter. The HRM-III will operate four times during the mission for durations of 1 hour to 3 hours, while the PRM will operate twice for durations of 8-18 hours.

RME operation times are provided in Table 9-4.

5. CFES (Continuous Flow Electrophoresis System)

The CFES is an electrochemical system that can segregate particles of varying electrical charges within a biological sample using a continuous separation process. The process is based on the relative motion of the particles within an electric field (Electrophoresis). CFES III is designed to run continuously for 80 hours. CFES III operations will also include a new activity known as 'Elisa' or Enzyme Linked Immunosorbent Assay. Elisa is a biological antigen-antibody assay used for detection of a specific hormone. The activity duration will be from 2.5 to 4 hours depending upon the number of sample fractions assayed.

CFES operation times are provided in Table 9-5.

6. CINEMA 360

The Cinema 360 is part of a joint endeavor agreement between NASA and Cinema 360, Inc., a group of 3 planetariums, to produce a color motion picture film of Shuttle Flight Operations from launch to landing. One 35mm 'Arriflex' motion picture camera in the payload bay, port side, will be mounted in a heated pressurized 'GAS' can, viewing through an optical dome, using a 'Fisheye' lens. Interface from the cabin with Cinema 360 is via the Autonomous Payload Controller (APC).

Cinema 360 operation times are provided in Table 9-6.

7. IMAX

The IMAX camera is part of a joint endeavor agreement between NASA and IMAX Systems Corp. of Toronto, Canada, to produce a color motion picture film of Shuttle Flight Operations from launch to landing. One 70mm motion picture camera will be stowed in the middeck with several lenses, two loaded film magazines, and five rolls of reload film.

IMAX operation times are provided in Table 9-7.

8. STUDENT EXPERIMENT

The Student Experiment for this flight is the 'Purification and Growth of a Simple Gallium Crystal by the Float Zone Technique'. This experiment is designed to compare a crystal grown by the Float Zone technique in a low gravity environment to a crystal grown in an identical manner on earth. The material involved consists of a 10 in. rod of Gallium doped with Thallium. The crystal is contained in a Fluid Experiment Apparatus mounted in the middeck (in place of one stowage locker). To conduct the experiment (a 5-hour operation), the crew must mount a Super 8 camera atop the apparatus and apply heat to the crystal interface until a molten zone is formed. Once formed, the molten zone is slowly and uniformly translated the length of the rod. It is highly desirable to remain on VRCS control for the first two hours of the experiment.

The Student Experiment operation times are provided in Table 9-8.

9. CLOUDS

The purpose of this experiment is to document (photographically with a 35mm camera) cloud cover dynamics and morphology at least 4 times over any of eight weather stations (Maui, Cape Canaveral, Clark AFB Philippines, Eastern Mediterranean, Diego Garcia, Puerto Rico, Okinawa, Guam) where local atmospheric conditions can be measured concurrently. Targets of opportunity will be scheduled, but photographs will only be taken if there is scattered cloud cover.

Clouds events and times are provided in Table 9-9.

10. GAS

The GAS payload is a self-contained experiment package that requires minimal crew activity. One GAS payload has been defined for STS 41-D (G518).

The GAS G518 payload is by Utah State University and consists of three experiments. The first experiment is a solder-flux separation test, the second a study of capillary waves on water surfaces and finally a thermocapillary flow in liquid columns experiment. No OMS burns during the first 5 hours of experiment operation is desired.

GAS events and times are provided in Table 9-10.

ON ORBIT CREW ACTIVITY
DETAILED TEST OBJECTIVES (DTOs)
DETAILED SUPPLEMENTARY OBJECTIVES (DSOs)

INTRODUCTION..... 8-2
TABLE 8-1 41-D DTOs/DSOs..... 8-3

DTOs/DSOs

INTRODUCTION

The following table describes the scheduling data and rationale for on-orbit crew activity related DTOs/DSOs for 41-D. The current FRD (Ref. 2) was used for compiling this table.

DTOs/DSOs

TABLE 8-1
41-D ON-ORBIT CREW ACTIVITY RELATED DTOs/DSOs

DTO/DSO NUMBER	TITLE	SCHEDULED MET(D/HH:MM)	SCHEDULING REMARKS
DTO 0316	Upper Stage Plume Damage Model Verification	Syncom PKM (1/01:25)	The RMS will be positioned so that the witness plate (records upper stage solid rocket motor exhaust plume data) is perpendicular to the line-of-sight to the upper stage
DTO 0321	Crew Compartment Structure Deflection Investigation	Crew Discretion	Comprised of three major activities (tape measurements, locker gap measurements, and locker marking). This test is scheduled whenever compatible with other middeck activities
DTO 0322	TPS - Post Launch Evaluation of OV-103	1/23:30	Inspect the following areas: <ul style="list-style-type: none"> - Forward RCS - Areas adjacent to windshield - Crew Compartment Canopy/top - L/H OMS POD - L/H Vertical Tail/Speedbrake Panel If SYNCOM is deployed on FD3, this DTO becomes a shopping list item
DTO 0402	Follow-on Vehicle PRCS Hot Fire Test	5/20:25	Operate the THC/RHC to fire each jet a minimum of 240 ms
DTO 0507	PLBD Installation & Rigging Verification	Post Insertion Deorbit Prep	This test is performed on the first flight of a new vehicle. The purpose is to manually open/close the PLBD and take visual sightings and video tape recordings during the initial and final door operations

TABLE 8-1 (Continued)
41-D ON-ORBIT CREW ACTIVITY RELATED DTOs/DSOs

DTO/DSO NUMBER	TITLE	SCHEDULED MET(D/HH:MM)	SCHEDULING REMARKS
DTO 0621	First Production Unit Remote Manipulator System Test	0/07:00	Check the following RMS functions: <ul style="list-style-type: none"> - Opr CMD Mode Payload Handling - RMS Direct Drive Mode - RMS Single Mode - RMS Backup Mode - End Effector Grapple/Rigidization - End Effector Backup Release - Manual Augmented Mode Phasing
DTO 0622	Cabin Atmosphere Verification with Full Cabin Pressurization	0/04:00 FD4 FD7 (during cabin stow)	The 3 Whole Gas Samples are to be taken: <ul style="list-style-type: none"> - As soon as possible following launch - Near the midpoint of the mission - As near deorbit as possible
DTO 0705	Shuttle Launch Configuration Communications Performance	Shopping List	Crew Action is not required. The ground will: <ul style="list-style-type: none"> - Operate the orbiter S-BD PM system during one or more sequential MILA and BDA passes - Switch between the PM quad antenna system during at least one pass - Check the uplink/downlink unencrypted mode (highly desired)
DTO 0778	AFSCF Network Test	Shopping List	Crew communications via A/G voice. This DTO will demonstrate the RTS' capability to support the Orbiter's realtime uplink/downlink and recorder dumps

TABLE 8-1 (Continued)
41-D ON-ORBIT CREW ACTIVITY RELATED DTOs/DSOs

DTO/DSO NUMBER	TITLE	SCHEDULED MET(D/HH:MM)	SCHEDULING REMARKS
DSO 0305	Characterization of Surface-Originated Vehicle Glow	5/00:30 5/19:50 Shopping List	While in a +XLV, -ZVV attitude, subject RMS specimens to atomic oxygen during the night pass. The crew will set up the equipment an orbit before the glow test. A shopping list item is to perform another 'Glow' test as early into the flight as possible after obtaining the 173 nm circular orbit
DSO 0401	Validation of Predictive Tests and Countermeasures for Space Motion Sickness	At each crewman's convenience during the Pre-sleep timeframe	Allow 5 minutes per crewman each mission day after the evening meal before sleep. A debrief checklist and microcassette recorder will be used
DSO 0402	Cardiovascular Deconditioning Countermeasure Assessment	Prior to Deorbit Preparations (FD8)	Crew fills drink containers to use for fluid loading before entry
DSO 0408	Near Vision Acuity and Contrast Sensitivity	1/07:30 FD4 FD6	2 Crewmen at a time will perform this DSO. This DSO will be scheduled on flight day 2. For flight days 4 and 6, the crew will perform it at their discretion
DSO 0439	Documentation of the Action of Metaclopramide (MCP)	Priority shopping list item	It is desired that each crewmember make a recording of their bowel sounds. A recording of 15 minutes minimum any time on FDs 1 and 2 and one more any time thereafter and during the first time anyone takes MCP
DSO 0440	Crew Visual Performance Testing	0/06:00 2/06:20 FD5 FD7	2 Crewmen at a time will perform this DSO. This DSO will be scheduled on flight days 1 and 3. For flight days 5 and 7, the crew will perform it at their discretion

TABLE 8-1 (Concluded)
41-D ON-ORBIT CREW ACTIVITY RELATED DTOs/DSOs

DTO/DSO NUMBER	TITLE	SCHEDULED MET(D/HH:MM)	SCHEDULING REMARKS
DSO 0901	Documentary Television	FD1 FD2 FD3/4 FD5 FD6 FD7	Each day, one live TV, VTR dump, or bring home tape will be planned for a flight unique activity 02 - Payload Bay Views 04 - SYNCOM IV Deploy 06 - OAST-1 Activities 08 - CFES OPS (VTR Dump) 12 - LFC OMS BURN 15 - Student Experiment 13 - Crew Conference { Live TV - Predeploy activities { VTR Dump - Deploy
DSO 0902	Documentary Still Photography	FD2 FD3 FDs4-7	Document any significant activity that best depicts the basic capabilities of the Space Shuttle 04 - SYNCOM IV Deploy 06 - OAST-1 Activities Crew Discretion pictures
DSO 0903	Documentary Still Photography	FDs4-7	Document crew activities, orbiter functions and accommodations, mission-related scenes, and any unscheduled activities of interest (crew discretion pictures)

TABLES

TABLE 9-1 - SYCOM DEPLOYMENT EVENTS AND TIMES..... 9-2

TABLE 9-2 - OAST-1 EXPERIMENT ACTIVATION AND OPERATION TIMES.... 9-3

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AND DEACTIVATION DAYS..... 9-5

TABLE 9-5 - CFES ACTIVATION AND OPERATION TIME..... 9-5

TABLE 9-6 - CINEMA 360 ACTIVATION AND PHOTO DAYS..... 9-6

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TABLES

TABLE 9-1
 SYNCOM DEPLOYMENT EVENTS AND TIMES
 (ORBIT 18A PKM BURN)

EVENT	MET (D/HH:MM)	DEPLOY MINUS (HH:MM)
PREDEPLOY CHECKOUT	0/23:23	01:15
PIVOT/KEEL PIN RETRACTION	0/23:38	01:00
MNVR TO DEPLOY ATT	1/00:18	00:20
PUSH OFF PIN RETRACTION	1/00:28	00:10
STATUS CHECK	1/00:33	00:05
DEPLOY	1/00:38	00:00
OMNI ANT DEPLOY	1/00:39	(+)00:01
SPINUP	1/00:45	(+)00:07
OMS SEP MNVR	1/00:53	(+)00:15
WINDOW PROTECT MNVR	1/01:07	(+)00:29
PKM IGNITION	1/01:23	(+)00:45

TABLES

TABLE 9-2
OAST-1 EXPERIMENT ACTIVATION AND OPERATION TIMES

EVENT	APPROX MET (D/HH:MM)	DURATION (HH:MM)
OAST ACTIVATION	POST INSERTION	00:10
MAST NUT UNLOCK	1/22:55	00:05
1st EXTENSION	2/03:25	00:30
1st RETRACTION	2/04:05	00:15
SA DYNAMICS TEST 70% (O/P)	2/04:40	00:55
(M/M)	3/03:25	01:10
(O/P)	3/04:55	01:10
SA DYNAMICS TEST 100% (O/P)	3/01:00	02:05
(M/M)	3/23:45	02:05
SA DAE DYNAMICS TEST 70%		
(O/P)	2/05:45	00:55*
(M/M)	3/20:45	01:20
(I/P)	3/22:15	01:20
(M/M)	4/19:30	01:20
SA DAE DYNAMICS TEST 100%		
(M/M)	4/21:00	02:00
SA PERFORMANCE TEST	2/22:00	02:55
SA MINI PERFORMANCE TEST	4/02:05	01:00
SCCF DATA TAKE ACT(2 ORBITS)	1/05:55	00:25**
(1 ORBIT)	3/06:25	00:20
(2 ORBITS)	4/03:40	00:20
(1 ORBIT)	5/17:10	00:20
(1 ORBIT)	6/00:35	00:20
DEACT	6/01:50	
OAST DEACTIVATION	DEORBIT PREP	00:10

*NOTE: THIS TEST DOES NOT REQUIRE A SPECIAL ATTITUDE

**NOTE: THE DURATION REFLECTS CREW TIME

TABLE 9-3
LFC EXPERIMENT ACTIVATION AND OPERATION TIMES

EVENT	APPROX MET (D/HH:MM)	DURATION (HH:MM)
LFC ACTIVATION	POST INSERTION	00:05
STELLAR CALIBRATION	1/04:00	00:40
	6/01:40	00:25
	6/03:10	00:25
OBLIQUE PHOTOGRAPHY	1/21:20	00:40
LUNAR CALIBRATION	2/02:45	00:40
HORIZON SCAN	5/03:25	00:30
THERMAL HOT SOAK	6/00:35	ONE DAYLIGHT PASS
THERMAL COLD SOAK	6/02:05	ONE DAYLIGHT PASS
LFC DEACTIVATION	DEORBIT PREP	00:10

TABLE 9-4
 RADIATION MONITORING EQUIPMENT (RME)
 ACTIVATION AND DEACTIVATION DAYS

EVENT		FLT. DAY
HRM	ACT	FD4
	DEACT	FD4
	ACT	FD5
	DEACT	FD5
	ACT	FD6
	DEACT	FD6
	ACT	FD7
	DEACT	FD7
PRM	ACT	FD4
	DEACT	FD5
	ACT	FD5
	DEACT	FD6

TABLE 9-5
 CFES ACTIVATION AND OPERATION TIME

EVENT	APPROX MET (D/HH:MM)	APPROX DURATION (HH:MM)
CFES Activation	1/02:30	~85:30
CFES Closeout	FD6	(80 HRS OPERATION TIME AFTER ELISA INITIATED)

TABLE 9-6
 CINEMA 360 ACTIVATION AND PHOTO DAYS

EVENT	MET OR FLT. DAY
CINEMA 360 ACTIVATION	FD1 (POST INSERTION)
PLBD OPS	FD1 (POST INSERTION)
SYNCOM DEPLOY	FD2
OAST - EXTENSION	FD3/CREW DISCRETION
SUNRISE	2/21:00
ORBITER ATTITUDE CHANGE	5/19:20
GEOGRAPHIC FEATURE	5/22:15
CINEMA 360 DEACTIVATION	6/19:40

TABLE 9-7
 IMAX PHOTO DAYS

EVENT	FLT. DAY
EARTH VIEW	1/20:55
OAST - EXTENSION/TESTS	FD3/CREW DISCRETION
CFES	CREW DISCRETION
IN-CABIN ACTIVITIES	CREW DISCRETION

TABLE 9-8
STUDENT EXPERIMENT OPERATION TIMES
CRYSTAL GROWTH BY FLOAT ZONE TECHNIQUE

EVENT	APPROX MET (D/HH:MM)
CRYSTAL GROWTH SETUP & ACT	5/18:30
CRYSTAL GROWTH CHECK	5/19:45
CRYSTAL GROWTH DEACT	5/23:30

TABLE 9-9
CLOUDS DATA OPPORTUNITIES

SCHEDULED SITES*	MET OF SITE AOS/LOS (D/HH:MM)
MAUI	00/07:47-07:49
CAPE CANAVERAL	00/22:42-22:44
CAPE CANAVERAL	01/00:19-00:21
PUERTO RICO	01/02:00-02:02
CAPE CANAVERAL	01/22:58-23:00
CAPE CANAVERAL	02/00:34-00:36
MAUI	02/06:42-06:44
CAPE CANAVERAL	02/23:13-23:16
PUERTO RICO	03/00:55-00:57
PUERTO RICO	04/23:49-23:52
PUERTO RICO	05/23:36-23:37

*SITES THAT OCCUR OUTSIDE OF THE PRESLEEP,
SLEEP, AND POSTSLEEP TIMEFRAMES

THE EZ CAP LIST (PG 4-14A) CONTAINS CLOUD
OPPORTUNITIES THAT OCCUR DURING THE
PRE/POST SLEEP TIMEFRAMES

TABLE 9-10
GAS ACTIVATION AND DEACTIVATION TIMES

EVENT	APPROX MET (D/HH:MM)
GROUP A (ACTIVATION)	0/04:10
GROUP B (DEACTIVATION)	6/18:15

TABLE 9-11
DAP A CONFIGURATIONS

	A1*	A2	A3	A4	A5	A6	A7	A8
<u>TRANSLATION</u>								
PULSE ft/sec	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
<u>ROTATION</u>								
DSC RT NORM o/sec	0.200	0.400	0.200	0.200	0.200	0.200	0.200	0.500
VERN o/sec	0.200	0.400	0.200	0.008	0.200	0.200	0.100	0.200
PULSE NORM o/sec	0.10	0.10	0.30	0.10	0.10	0.10	0.10	0.10
VERN o/sec	0.010	0.010	0.010	0.010	0.050	0.010		0.010
COMP NORM o/sec	.00	.00	.00	.00	.00	.00	.00	.00
VERN o/sec	.000	.000	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>								
ATT NORM (deg)	5.00	1.00	5.00	1.00	5.00	5.00	5.00	3.00
VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000	2.000	1.000
RATE NORM o/sec	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN o/sec	.020	.020	.020	.010	.020	.020	.020	.020
<u>JET OPT</u>								
P	1	1	3	1	1	3	1	1
Y	1	1	3	3	1	3	1	1
CNTL ACCEL	0	0	0	0	0	0		0

*I-LOADED OPS-2 DAP CONFIGURATION

TABLE 9-11 (Cont)
DAP B CONFIGURATIONS

	B1*	B2	B3	B4	B5	B6	B7
<u>TRANSLATION</u>							
PULSE ft/sec	0.02	0.02	0.02	0.02	0.02	0.01	0.02
<u>ROTATION</u>							
DSC RT NORM o/sec	0.500	0.200	0.200	0.200	0.200	0.200	0.068
VERN o/sec	0.200	0.200	0.200	0.008	0.016	0.100	0.068
PULSE NORM o/sec	0.04	0.04	0.04	0.04	0.04	0.10	0.04
VERN o/sec	0.002	0.002	0.002	0.002	0.002		0.002
COMP NORM o/sec	.00	.00	.00	.00	.00	.00	.00
VERN o/sec	.000	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>							
ATT NORM (deg)	3.00	3.00	3.00	0.300	3.00	5.00	3.00
VERN (deg)	1.000	1.000	1.000	0.100	0.033	2.000	1.000
RATE NORM o/sec	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN o/sec	.020	.020	.020	.010	.020	.020	.020
<u>JET OPT</u>							
P	1	3	1	1	3	1	1
Y	1	3	1	3	3	1	1
CNTL ACCEL	0	0	0	0	0		0

*I-LOADED OPS-2 DAP CONFIGURATION

DAP BOOK



41-D/O/BAS

41-D/O/BAS

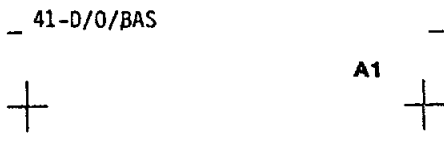
UNIV PTG	
TGT ID	= 1 Orbiting Vehicle
	= 2 Earth ctr
	= 3 Earth tgt
	Input LAT (± 90)
	LON (± 180 , + = East)
	ALT ($\pm 99.99\text{nm}$)
	= 4 Sun ctr
	= 5 Celestial tgt
	Input RA (0-359.99)
	DEC (± 90)
	= 11-60 Nav Stars
BODY VECT	= 1 +X*
	= 2 -X*
	= 3 -Z*
	= 4 PTC ($\sim 2^\circ$ below +X)*
	= 5 Optional
	Input P (0-359.99)
	Y (270-359.99, 0-90)
* input OM	→ OM (0-359.99)
MON AXIS	= 1 +X
	2 -X

G20 DAP CONFIG			
CNTL ACCEL = 0	Orbiter alone	JET OPT = 1	Normal
	= 1 OAST-1 Dynamics Test		= 2 Nose only
	= 2 OAST-1 Dynamics Test		= 3 Tail only
	= 3 OAST-1 Dynamics Test		
	= 4 OAST-1 Dynamics Test		

(reduced copy)



<u>DAP</u>	<u>PURPOSE</u>
A1	- NOMINAL -ZLV IMU ALIGN TAIL ONLY CONTROL BACKOUT PRE/POST PAM DEPLOY OMS BURN TAIL-TO-SUN LOSS OF VERN
A2	- PTC
A3	- RCS HOT FIRE
A4	- GG
A5	- IMU ROLL
A6	- LOSS OF VERN (TAIL ONLY)
A7	- OAST-1 OPS
A8	- SYNCOM-IV SEP



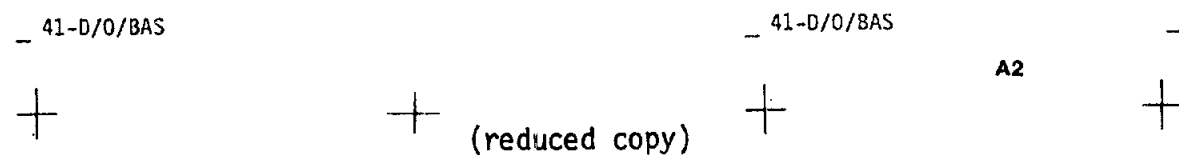
DAP A1

PURPOSE:

- ZLV
- IMU ALIGN
- TAIL ONLY CONTROL BACKOUT
- PRE/POST PAM DEPLOY
- OMS BURN
- TAIL-TO-SUN
- LOSS OF VERN
(NOSE & TAIL)

A1

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



+	+	+	+
-	-	-	-
A1			
DAP A2		A2	
PURPOSE:		TRANSLATION	
PTC		PULSE	
		0.1 0 1	
		ROTATION	
		0.4 0 0 2	DSC RT NORM
		0.4 0 0 3	VERN
		0.1 0 4	PULSE NORM
		0.0 1 0 5	VERN
		.0 0 0 6	COMP NORM
		.0 0 0 7	VERN
		DEADBAND	
		1.0 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
_ 41-D/O/BAS	-	_ 41-D/O/BAS	-
+	+	A3	+
+	+		+
-	-	A3	-
A2		A3	
DAP A3		TRANSLATION	
PURPOSE:		PULSE	
RCS HOT FIRE		0.1 0 1	
		ROTATION	
		0.2 0 0 2	DSC RT NORM
		0.2 0 0 3	VERN
		0.3 0 4	PULSE NORM
		0.0 1 0 5	VERN
		.0 0 0 6	COMP NORM
		.0 0 0 7	VERN
		DEADBAND	
		5.0 0 8	ATT NORM
		1.0 0 0 9	VERN
		0.2 0 10	RATE NORM
		.0 2 0 11	VERN
		3 12	JET OPT P
		3 13	Y
		0 14	CNTL ACCEL
_ 41-D/O/BAS	-	_ 41-D/O/BAS	-
+	+	A4	+
+	+		+

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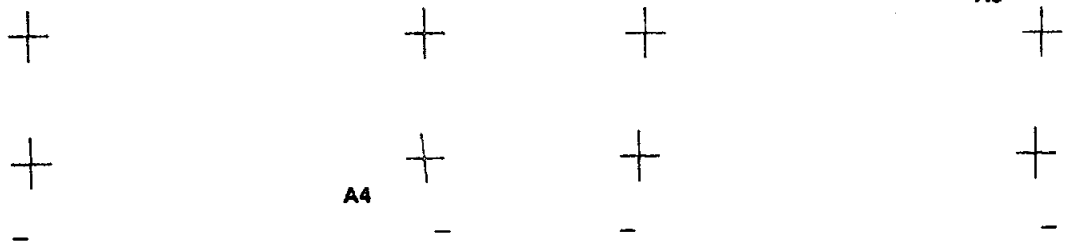
DAP A4

PURPOSE:
GG

		A4	
		TRANSLATION	
	<u>0.1 0</u>	1 PULSE	
		ROTATION	
	<u>0.2 0 0</u>	2 DSC RT NORM	
	<u>0.0 0 8</u>	3 VERN	
	<u>0.1 0</u>	4 PULSE NORM	
	<u>0.0 1 0</u>	5 VERN	
	<u>0.0 0 0</u>	6 COMP NORM	
	<u>.0 0 0</u>	7 VERN	
		DEADBAND	
	<u>1.0 0</u>	8 ATT NORM	
	<u>0.0 7 0</u>	9 VERN	
	<u>0.2 0</u>	10 RATE NORM	
	<u>.0 1 0</u>	11 VERN	
	<u>1</u>	12 JET OPT P	
	<u>3</u>	13 Y	
	<u>0</u>	14 CNTL ACCEL	

_ 41-D/O/BAS

_ 41-D/O/BAS



DAP A5

PURPOSE:
IMU ROLL

		A5	
		TRANSLATION	
	<u>0.1 0</u>	1 PULSE	
		ROTATION	
	<u>0.2 0 0</u>	2 DSC RT NORM	
	<u>0.2 0 0</u>	3 VERN	
	<u>0.1 0</u>	4 PULSE NORM	
	<u>0.0 5 0</u>	5 VERN	
	<u>.0 0 0</u>	6 COMP NORM	
	<u>.0 0 0</u>	7 VERN	
		DEADBAND	
	<u>5.0 0</u>	8 ATT NORM	
	<u>1.0 0 0</u>	9 VERN	
	<u>0.2 0</u>	10 RATE NORM	
	<u>0.0 2 0</u>	11 VERN	
	<u>1</u>	12 JET OPT P	
	<u>1</u>	13 Y	
	<u>0</u>	14 CNTL ACCEL	

_ 41-D/O/BAS

_ 41-D/O/BAS



(reduced copy)



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 0	6	COMP NORM
	0.0 0 0	7	VERN
			DEADBAND
	5.0 0	8	ATT NORM
	1.0 0 0	9	VERN
	0.2 0	10	RATE NORM
	0.0 2 0	11	VERN
		3	12 JET OPT P
		3	13 Y
		0	14 CNTL ACCEL

41-D/O/BAS

41-D/O/BAS



A7



A6

DAP A7

PURPOSE:

OAST-1 OPS

		A7	
	0.1 0	1	TRANSLATION PULSE
	0.2 0 0	2	ROTATION DSC RT NORM
	0.1 0 0	3	VERN
	0.1 0	4	PULSE NORM
		5	VERN
	0.0 0	6	COMP NORM
	0.0 0 0	7	VERN
			DEADBAND
	5.0 0	8	ATT NORM
	2.0 0 0	9	VERN
	0.2 0	10	RATE NORM
	0.0 2 0	11	VERN
		1	12 JET OPT P
		1	13 Y
			14 CNTL ACCEL

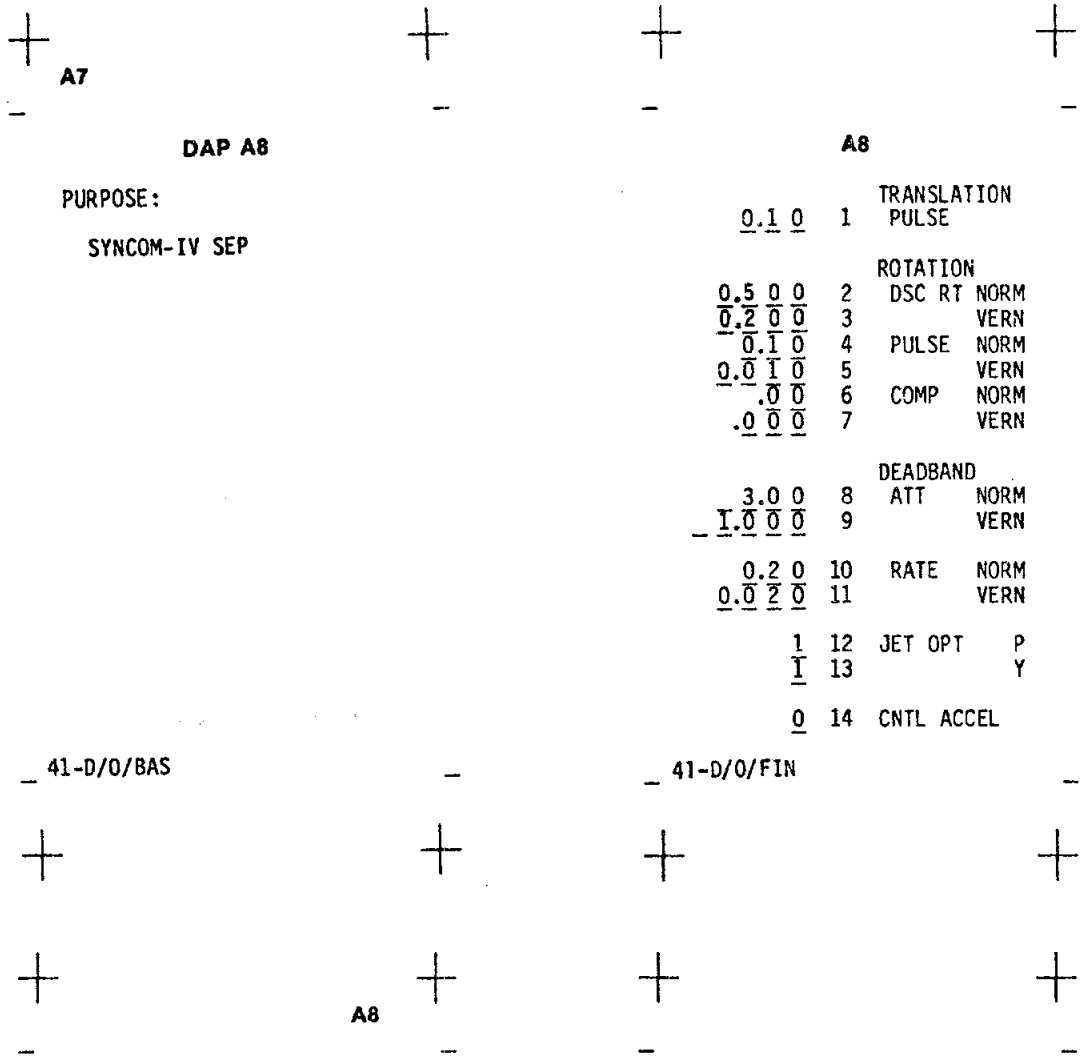
41-D/O/BAS

41-D/O/BAS



A8

(reduced copy)



DAP A8

PURPOSE:
SYNCOM-IV SEP

A8

- 0.1 0 1 TRANSLATION PULSE
- 0.5 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 0 6 COMP NORM
- .0 0 0 7 VERN
- 3.0 0 8 DEADBAND 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

41-D/O/BAS

41-D/O/FIN

A8

- | <u>DAP</u> | <u>PURPOSE</u> |
|------------|--|
| B1 | - NOMINAL
PRCS IMU ALIGN
TOP-TO-SUN
TAIL ONLY CNTRL
BACKOUT
OMS & RCS BURNS |
| B2 | - LOSS OF VERN
(TAIL ONLY) |
| B3 | - LOSS OF VERN; GG MNVR |
| B4 | - PAM/FRISBEE DEPLOY |
| B5 | - COAS CAL |
| B6 | - OAST-1 DYNAMICS |
| B7 | - LFC COLD SOAK |

41-D/O/BAS

41-D/O/FIN

B1

(reduced copy)

+ + + +
- - - -

DAP B1

PURPOSE:
PRCS IMU ALIGN
TOP-TO-SUN
TAIL ONLY CONTROL BACKOUT
OMS & RCS BURNS

B1

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

- 41-D/O/BAS

- 41-D/O/BAS

+ + + +
+ + + +
- - - -

B1

B2

DAP B2

PURPOSE:
LOSS OF VERN
(TAIL ONLY)

B2

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

- 41-D/O/BAS

- 41-D/O/BAS

+ + + +
+ + + +

B3

(reduced copy)

+ + + +
- - - -

B2

DAP B3

PURPOSE:

LOSS OF VERN
(NOSE & TAIL)
GG MNVR

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
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

- 41-D/O/BAS

- 41-D/O/BAS

+ + + +

B4

+ + + +
- - - -

B3

DAP B4

PURPOSE:

PAM DEPLOY
FRISBEE DEPLOY

B4

TRANSLATION PULSE	15	0.0 2
ROTATION		
DSC RT NORM	16	0.2 0 0
VERN	17	0.0 0 8
PULSE NORM	18	0.0 4
VERN	19	0.0 0 2
COMP NORM	20	.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	0.0 1 0
JET OPT P	26	1
Y	27	3
CNTL ACCEL	28	0

- 41-D/O/FIN

- 41-D/O/BAS

+ + + +

B5

(reduced copy)

B4

DAP B5

PURPOSE:
COAS CAL

B5

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

41-D/O/BAS

41-D/O/BAS

B6

B5

DAP B6

PURPOSE:
OAST-1 DYNAMICS

B6

TRANSLATION				
PULSE		15		<u>0.0 1</u>
ROTATION				
DISC RT	NORM	16		<u>0.2 0 0</u>
	VERN	17		<u>0.1 0 0</u>
PULSE	NORM	18		<u>0.1 0</u>
	VERN	19		<u>.0 0</u>
COMP	NORM	20		<u>.0 0 0</u>
	VERN	21		<u>.0 0 0</u>
DEADBAND				
ATT	NORM	22		<u>5.0 0</u>
	VERN	23		<u>2.0 0 0</u>
RATE				
	NORM	24		<u>0.2 0</u>
	VERN	25		<u>0.0 2 0</u>
JET OPT	P	26		<u>1</u>
	Y	27		<u>1</u>
CNTL ACCEL		28		<u>-</u>

41-D/O/BAS

41-D/O/BAS

B7

(reduced copy)

+

B6

+

+

+

DAP B7

B7

PURPOSE:

LFC COLD SOAK

TRANSLATION PULSE 15 0.0 2

ROTATION DSC RT NORM 16 0.0 6 8 VERN 17 0.0 6 8 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 0.0 2 0

JET OPT P 26 1 Y 27 1

CNTL ACCEL 28 0

41-D/O/BAS

41-D/O/BAS

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B7

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41-D/O/BAS

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(reduced copy)



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.....
.....;HOOK:.....
.....VELCRO:.....
.....
.....

41-D/O/BAS
+



(reduced copy)

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
0/00:09:30	MNVR R+336.00 P+118.00 Y+344.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 49 P 151		OMS 1 ATT
0/00:10:50	OMS IGNITION	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30		DV = 263.8 DT = 02:49	OMS 1
0/00:20:00 24:54	MNVR R+ 28.00 P+268.00 Y+ 1.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 156 P 63		OMS 2 ATT
0/00:46:26	OMS IGNITION	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30		DV = 214.3 DT = 02:14	OMS 2
0/01:10:00 17:34	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
0/02:20:00 28:02	MNVR R+ 38.00 P+207.60 Y+295.30	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 123 P 158	-Z:43 -Y:26 +X:15 02:27-02:50	IMU/+X COAS
0/02:46:00 03:00:12	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
0/08:20:00 32:46	MNVR R+241.70 P+307.70 Y+353.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 139 P 147	-ZST:15 -YST:42 08:18-08:54	IMU/-Z COAS
0/08:46:00 57:43	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
0/22:00:00 13:31	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 110 P 188	-ZST:30 -YST:29 21:54-22:37	IMU ALIGN PAIR A1
0/22:21:00 33:44	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 -XVV
1/00:18:21 25:00	MNVR R+184.01 P+356.67 Y+ 21.93	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 84 P 199		SYNCOM IV DEPLOY ATT

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1/00:38:21	DEPLOY	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			SYNCOM IV DEPLOY
1/00:41:21 47:16	MNVR R+ 24.00 P+228.10 Y+344.60	A8 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 140 P 138		OMS SEP ATT
1/00:54:15	OMS IGNITION	A8 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		DV = 15 DT = 00:11	SYNCOM IV SEP BURN
1/00:56:21 58:14	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	SYNCOM IV MONITOR ATT
1/01:07:21 21:48	TRK TGT=2 BV=5(249.00, 8.00) OM= 6.00	A8 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 111 P 172	LVLH R+ 5 P+ 21 Y+ 8	WINDOW PROTECT ATT
1/01:23:21	STOP	A8 MAN VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 112 P 191	INRTL R+200 P+333 Y+ 16	ATTITUDE HOLD FOR PKM
1/02:05:00 11:50	MNVR R+157.50 P+ 58.60 Y+ 17.50	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 29 P 219		SYNCOM IV RECIRC
1/02:27:39	OMS IGNITION	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		DV = 12.4 DT = 00:10	OMS RECIRC BURN
1/02:30:00 45:00	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
1/04:05:00 19:30	MNVR R+170.30 P+310.60 Y+ 78.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 75 P 241		LFC STELLAR CAL #1
1/04:40:00 49:35	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
1/05:55:00 06:09:59	TRK TGT=4 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 0	INRTL R+153 P+167 Y+333	-ZSI SCCF

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1/08:40:00 53:14	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 110 P 188	-ZST:30 -YST:29 08:32-09:14	IMU ALIGN PAIR A1
1/09:01:00 15:01	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
1/20:45:00 58:24	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 111 P 188	-ZST:30 -YST:29 20:39-21:21	IMU ALIGN PAIR A1
1/21:25:00 37:47	TRK TGT=2 BV=5(90.00, 306.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 306	LVLH R+234 P+ 0 Y+ 0	OBLIQUE
1/22:00:00 04:30	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
2/02:51:00 53:55	MNVR R+ 20.30 P+302.00 Y+340.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 150 P 353		LUNAR CAL #1
2/03:07:44 08:10	MNVR R+ 16.90 P+297.50 Y+338.30	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 155 P 352		LUNAR CAL #2
2/03:09:09 09:34	MNVR R+ 13.20 P+292.90 Y+336.40	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 159 P 351		LUNAR CAL #3
2/03:10:34 10:59	MNVR R+ 9.10 P+288.20 Y+335.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 164 P 349		LUNAR CAL #4
2/03:11:59 12:24	MNVR R+ 4.80 P+283.30 Y+334.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 168 P 346		LUNAR CAL #5
2/03:13:24 13:49	MNVR R+ 0.40 P+278.30 Y+333.50	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 172 P 338		LUNAR CAL #6
2/03:14:49 15:14	MNVR R+356.00 P+273.30 Y+333.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 176 P 316		LUNAR CAL #7

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
2/03:16:14 16:39	MNVR R+351.60 P+268.30 Y+334.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 177 P 233		LUNAR CAL #8
2/03:17:39 18:04	MNVR R+347.30 P+263.50 Y+335.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 174 P 203		LUNAR CAL #9
2/03:19:04 19:29	MNVR R+343.30 P+258.80 Y+336.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 169 P 193		LUNAR CAL #10
2/03:20:29 20:54	MNVR R+339.50 P+254.40 Y+338.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 165 P 189		LUNAR CAL #11
2/03:21:54 22:19	MNVR R+336.10 P+250.10 Y+341.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 160 P 187		LUNAR CAL #12
2/03:23:19 23:44	MNVR R+333.10 P+246.10 Y+344.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 156 P 185		LUNAR CAL #13
2/03:25:00 35:36	TRK TGT=4 BV=5(180.00, 330.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 150 P 270	INRTL R+200 P+256 Y+ 3	-XSI BIASED 1ST EXT
2/04:40:00 50:03	TRK TGT=2 BV=2(180.00, 0.00) OM= 60.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+300 P+ 90 Y+ 0	GG DYNAMICS
2/07:25:00 36:49	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 111 P 189	-ZST:30 -YST:29 07:16-07:58	IMU ALIGN PAIR A1
2/07:46:00 59:48	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
2/19:30:00 43:14	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 111 P 189	-ZST:30 -YST:29 19:23-20:05	IMU ALIGN PAIR A1
2/19:51:00 20:04:34	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
2/21:00:00 10:48	TRK TGT=2 BV=5(217.00, 52.00) OM=188.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 120 P 116	LVLH R+211 P+136 Y+316	C360 SUNRISE
2/22:30:00 53:46	TRK TGT=4 BV=2(180.00, 0.00) OM=270.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	SUN T 180 P 173	INRTL R+301 P+271 Y+337	-XSI PERFORMANCE
3/01:45:00 02:09:20	TRK TGT=2 BV=2(180.00, 0.00) OM= 60.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+300 P+ 90 Y+ 0	GG DYNAMICS
3/06:05:00 17:39	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 111 P 189	-ZST:30 -YST:29 06:00-06:41	IMU ALIGN PAIR A1
3/06:26:00 39:07	TRK TGT=4 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 360	INRTL R+153 P+168 Y+332	-ZSI SCCF
3/07:40:00 53:54	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
3/18:15:00 28:02	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 112 P 190	-ZST:30 -YST:29 18:07-18:48	IMU ALIGN PAIR A1
3/18:36:00 49:21	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
3/20:45:00 21:08:06	TRK TGT=2 BV=2(180.00, 0.00) OM=300.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 60 P+ 90 Y+ 0	GG DYNAMICS (C'')
3/22:15:00 35:00	TRK TGT=2 BV=2(180.00, 0.00) OM= 60.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+300 P+ 90 Y+ 0	GG DYNAMICS (C')
4/02:05:00 30:01	TRK TGT=4 BV=2(180.00, 0.00) OM=270.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	SUN T 180 P 179	INRTL R+301 P+273 Y+337	MINI PERF TEST
4/03:40:00 50:00	TRK TGT=4 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 0	INRTL R+153 P+169 Y+332	-ZSI SCCF

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
4/06:25:00 38:04	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 112 P 190	-ZST:30 -YST:29 06:15-06:56	IMU ALIGN PAIR A1
4/06:46:00 59:19	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
4/17:00:00 12:48	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 112 P 191	-ZST:30 -YST:29 16:51-17:32	IMU ALIGN PAIR A1
4/17:21:00 34:08	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
4/19:30:00 53:06	TRK TGT=2 BV=2(180.00, 0.00) OM= 60.00	A7 AUTO VERN	DSC 0.100 DB AT 2.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+300 P+ 90 Y+ 0	GG DYNAMICS
4/23:00:00 11:33	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
5/00:15:00 30:00	TRK TGT=2 BV=1(0.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 0 P 0	LVLH R+ 0 P+270 Y+ 0	GLOW #1
5/01:40:00 52:52	MNVR R+151.90 P+ 71.20 Y+356.70	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 34 P 260		LFC ORBIT ADJUST ATT
5/02:00:00	OMS IGNITION	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		DV = 92.2 DT = 00:55	ORBIT ADJUST BURN
5/02:24:00 38:43	MNVR R+208.20 P+248.20 Y+ 1.90	B1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 145 P 285		LFC RECIRC
5/02:44:00	OMS IGNITION	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		DV = 92.6 DT = 00:55	RECIRC BURN
5/02:46:00 03:01:00	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/03:30:00 33:50	TRK TGT=2 BV=5(83.00, 353.00) OM=135.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 83 P 353	LVLH R+180 P+350 Y+315	LFC HOR SCAN
5/03:45:00	STOP	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 94 P 61	INRTL R+351 P+348 Y+ 73	LFC HOR SCAN ATT HOLD
5/03:55:00 59:30	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
5/05:00:00 12:45	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 113 P 191	-ZST:30 -YST:29 04:56-05:36	IMU ALIGN PAIR A1
5/05:21:00 33:51	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
5/16:50:00 17:02:40	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 113 P 191	-ZST:30 -YST:29 16:47-17:27	IMU ALIGN PAIR A1
5/17:11:00 23:57	TRK TGT=4 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 360	INRTL R+154 P+172 Y+333	-ZSI SCCF
5/18:30:00 44:02	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
5/19:30:00 45:00	TRK TGT=2 BV=1(0.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 0 P 0	LVLH R+ 0 P+270 Y+ 0	GLOW #2
5/20:55:00 21:10:00	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
6/00:35:00 49:58	TRK TGT=4 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 360	INRTL R+154 P+172 Y+334	-ZSI SCCF
6/01:45:00 59:17	MNVR R+326.40 P+156.70 Y+ 46.50	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 54 P 216		LFC STELLAR CAL #2

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
6/02:05:00 18:15	MNVR R+ 55.10 P+274.60 Y+336.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 180 P 247		COLD SOAK ATT
6/02:20:00	ROT BV=2(180.00, 0.00)	B7 AUTO VERN	DSC 0.068 DB AT 1.00 DB RT 0.02		ROT R+ 55 START P+275 ATT Y+337	ROT
6/03:15:00 26:59	MNVR R+326.50 P+157.00 Y+ 45.30	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 54 P 215		LFC STELLAR CAL #3
6/03:35:00 47:12	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
6/04:45:00 57:26	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 113 P 192	-ZST:30 -YST:29 04:39-05:19	IMU ALIGN PAIR A1
6/05:06:00 18:39	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	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+ 0	-ZLV +XVV
6/16:35:00 47:21	MNVR R+216.40 P+316.60 Y+ 29.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 114 P 192	-ZST:30 -YST:29 16:30-17:11	IMU ALIGN PAIR A1
6/16:56:00 17:04:01	TRK TGT=4 BV=5(184.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 176 P 180	INRTL R+296 P+273 Y+340	-XSI
6/21:13:00 17:31	MNVR R+217.80 P+ 10.80 Y+347.60	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 90 P 166	-ZST:36 -YST:27 21:09-21:38	IMU ALIGN
6/21:28:00 30:06	MNVR R+226.90 P+ 35.90 Y+ 44.20	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 52 P 130	-ZST:26 -YST:14 21:17-21:48	IMU VERIF (B2)
6/21:43:00 46:08	MNVR R+158.80 P+ 90.20 Y+340.80	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 43 P 284		DEORBIT BURN ATT
7/00:00:09	OMS IGNITION	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30		DV = 253.7 DT = 02:15	DEORBIT BURN

TABLE 9-12 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
7/00:06:00 11:03	MNVR R+190.00 P+300.00 Y+ 28.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 123 P 233		EI-5
7/00:21:00	LVLH	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	EARTH T 109 P 180	LVLH R+ 1 P+ 59 Y+359	EI

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ABBREVIATIONS/ACRONYMS

More complete compilations of abbreviations and acronyms are available in the STS glossary (Ref. 8).

ABBREVIATIONS/
ACRONYMS

ABBREVIATIONS/ACRONYMS

ACN	ASCENSION ISLAND (STDN SITE)
ACT	ACTIVATE/ACTIVATION
AFT	AFT FLIGHT DECK
AGO	SANTIAGO, CHILE (STDN SITE)
ALN	ALIGNMENT
ANT	ANTENNA
AOS	ACQUISITION OF SIGNAL
APU	AUXILIARY POWER UNIT
ATT	ATTITUDE
B	BIASED
BDA	BERMUDA ISLAND, BWI (STDN SITE)
BOT	BOTSWANA (STDN SITE)
BYP	BYPASS
CAL	CALIBRATION
CAMR	CAMERA
CCTV	CLOSED-CIRCUIT TV
CDR	COMMANDER
CDT	CENTRAL DAYLIGHT TIME
CFES	CONTINUOUS FLOW ELECTROPHORESIS SYSTEM
CHG	CHANGE
CKS	CHECKS
C/L	CHECKLIST
CL	CLOSE/CLOSED
CLN	CLEAN
C/O	CHECKOUT
COAS	CREWMAN OPTICAL ALIGNMENT SIGHT

ABBREVIATIONS/
ACRONYMS

COMM	COMMUNICATIONS
CONF	CONFERENCE
CONFIG/CNFG	CONFIGURATION
CRDLE	CRADLE
CTLS	CONTROLS
C&W	CAUTION AND WARNING
DAE	DYNAMICS AUGMENTATION EXPERIMENT
DAP	DIGITAL AUTO PILOT
DB	DEADBAND
DEACT	DEACTIVATE
DEORB	DEORBIT
DISP	DISPLAY
DKR	DAKAR, SENEGAL (STDN SITE)
DPLY/DPY	DEPLOY
DSO	DETAILED SUPPLEMENTARY OBJECTIVE
DTO	DETAILED TEST OBJECTIVE
DYN	DYNAMICS
E	EAST
ECLS, ECLSS	ENVIRONMENTAL CONTROL LIFE SUPPORT SYSTEM
EDW	EDWARDS AFB, CALIFORNIA
EI	ENTRY INTERFACE
ENA	ENABLE
ENT	ENTRY
FC	FUEL CELL
FCS	FLIGHT CONTROL SYSTEM
FD	FREEZE DRIED; FLIGHT DAY; FLIGHT DECK
FDF	FLIGHT DATA FILE
FDRD	FLIGHT DEFINITION AND REQUIREMENTS DIRECTIVE

FES	FLASH EVAPORATOR SYSTEM
FLTR	FILTER
FM	FREQUENCY MODULATION
FOV	FIELD OF VIEW
FWD	FORWARD
GAS	GET AWAY SPECIAL
GDS	GOLDSTONE, CALIFORNIA (STDN SITE)
GMT	GREENWICH MEAN TIME
GNC	GUIDANCE NAVIGATION AND CONTROL
GPC	GENERAL PURPOSE COMPUTER
GRP	GROUP
GSE	GROUND SUPPORT EQUIPMENT
GSTDN	GROUND SPACE TRACKING & DATA NETWORK
GWM	GUAM ISLAND, U.S. (STDN SITE)
HAW	HAWAII (KAUAI, STDN SITE)
HL	HI LOAD FLASH EVAPORATOR
HOR	HORIZON
HRM	HANDHELD RADIATION MONITOR
HTR	HEATER
HYD	HYDRAULIC
ICONNECT/ I'CONNECT	INTERCONNECT
IFM	INFLIGHT MAINTENANCE
IMU	INERTIAL MEASUREMENT UNIT
INRTL	INERTIAL
I/P	IN-PLANE
KSC	KENNEDY SPACE CENTER

KU-BD	KU-BAND
LFC	LARGE FORMAT CAMERA
LOS	LOSS-OF-SIGNAL
LVLH	LOCAL VERTICAL LOCAL HORIZONTAL
MAD	MADRID, SPAIN (STDN SITE, 1ST ANTENNA)
MCC	MISSION CONTROL CENTER
MDM	MULTIPLEXER/DEMULTIPLEXER
MEC	MECHANICAL
MECH	MECHANISM; MECHANICAL
MECO	MAIN ENGINE CUTOFF
MED	MEDICAL
MET	MISSION ELAPSED TIME
MIL	MERRITT ISLAND, FLORIDA (STDN SITE)
M/M	MULTI-MODAL
MNVR	MANEUVER
MPS	MAIN PROPULSION SYSTEM
MS	MISSION SPECIALIST
MSG	MESSAGE
NAV	NAVIGATION
OAST	OFFICE OF APPLICATIONS AND SPACE TECHNOLOGY
OMS	ORBITAL MANEUVERING SYSTEM
O/O	ON ORBIT
O/P	OUT-OF-PLANE
OP	OPEN
OPS	OPERATIONS; OPERATIONAL SEQUENCE
ORB	ORBITER; ORBIT
ORR	ORRORAL VALLEY, AUSTRALIA (STDN SITE)

PCM	PULSE-CODE MODULATION
PCS	PRESSURE CONTROL SYSTEM
PERF	PERFORM; PERFORMANCE
PKM	PERIGEE KICK MOTOR
PLBD	PAYLOAD BAY DOORS
PL/PLD	PAYLOAD
PLT	PILOT
PLYBCK	PLAYBACK
PM	PHASE MODULATION
PRCS	PRIMARY REACTION CONTROL SYSTEM
PREP	PREPARATION
PRM	POCKET RADIATION MONITOR
PRO	PROTECT
PRSD	POWER REACTANT SUPPLY AND DISTRIBUTION
PS	PAYOAD SPECIALIST
PSA	PRE/POST SLEEP ACTIVITY
P/TV	PHOTO/TELEVISION
PWRDN	POWERDOWN
QTY	QUANTITY
RAD	RADIATOR
R/B	ROLLBACK
RCD	RECORD
RCS	REACTION CONTROL SYSTEM
REF	REFERENCE
REFSMMAT	REFERENCE STABLE MEMBER MATRIX
RELMAT	RELATIVE MATRIX
RF	RADIO FREQUENCY
RME	RADIATION MONITORING EQUIPMENT

RMS	REMOTE MANIPULATOR SYSTEM
R/O	ROLLOUT
ROT	ROTATION; ROTA FIELD
SA/SAE	SOLAR ARRAY/SOLAR ARRAY EXPERIMENT
S-BD	S-BAND
SCCF	SOLAR CELL CALIBRATION FACILITY
SEP	SEPARATION
SEQ	SEQUENCE
SNSHLD	SUNSHIELD
SPLY	SUPPLY
SS	SUNSHIELD
SSP	STANDARD SWITCH PANEL
STBD	STARBOARD
STDN	SPACE TRACKING & DATA NETWORK
ST/S TRKR	STAR TRACKER
STS	SPACE TRANSPORTATION SYSTEM
S/U	SETUP
SW	SWITCH
SYS	SYSTEM
TAGS	TEXT AND GRAPHICS SYSTEM
TB	TALKBACK
TDRE	TRACKING AND DATA RELAY SATELLITE (EAST)
TDRS	TRACKING AND DATA RELAY SATELLITE SYSTEM
TERM	TERMINATE; TERMINAL
TIG	TIME OF IGNITION
TK	TANK
TPR	TELEPRINTER
TRK	TRACK

TST	TEST
UHF	ULTRA HIGH FREQUENCY
VIS	VISUAL
VRCS	VERNIER REACTION CONTROL SYSTEM
VTR	VIDEO TAPE RECORDER
W	WEST
WCS	WASTE COLLECTION SYSTEM
XFER	TRANSFER
(±)XLV	(±)X LOCAL VERTICAL (± X BODY AXIS TOWARDS EARTH)
X-POP	X BODY AXIS PERPENDICULAR TO ORBIT PLANE
(±)XSI	(±)X SOLAR INERTIAL (± X BODY AXIS TOWARDS SUN)
+(-)X VV	+(-)X BODY AXIS COINCIDENT WITH VELOCITY VECTOR
YAR	YARRAGADEE (STDN SITE)
Y-POP	Y BODY AXIS PERPENDICULAR TO ORBIT PLANE
(±)YVV	(±)Y BODY AXIS INTO THE VELOCITY VECTOR
-ZLV	-Z LOCAL VERTICAL (-Z BODY AXIS TOWARDS EARTH)
-ZSI	-Z SOLAR INERTIAL (-Z BODY AXIS TOWARDS SUN)
(±)ZVV	(±)Z BODY AXIS INTO THE VELOCITY VECTOR

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REFERENCES

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