

FLIGHT DATA FILE

Flight Plan

STS-34

(Cycle 2 Trajectory)

Mission Operations Directorate
Operations Division

Final
September 7, 1989

<u>EVENT</u>	<u>CDT</u>		
Launch	12:30	Thu	Oct 12
Galileo Deploy	18:52	Thu	Oct 12
EDW Landing	15:15	Tue	Oct 17



National Aeronautics and
Space Administration

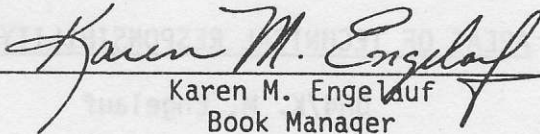
Lyndon B. Johnson Space Center
Houston, Texas

MISSION OPERATIONS DIRECTORATE

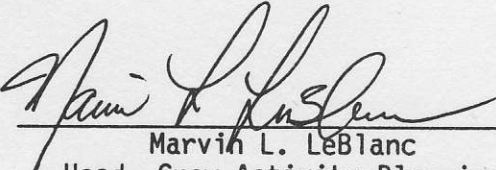
STS-34 FLIGHT PLAN

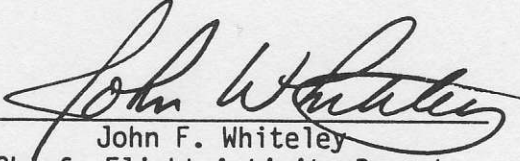
FINAL
September 7, 1989

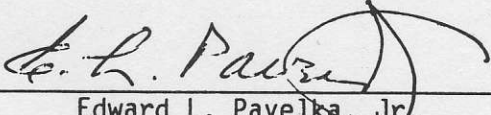
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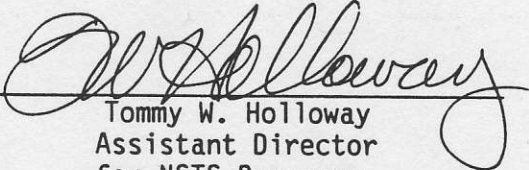

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482#:	FLT PLN-660	FLT PLN-676	EXEMPTION#: 5 & 12
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	FLT PLN-662	FLT PLN-678	
	FLT PLN-663A	FLT PLN-679	
	FLT PLN-664A	FLT PLN-680A	
		FLT PLN-681	
	FLT PLN-667	FLT PLN-682	
	FLT PLN-668	FLT PLN-683	
	FLT PLN-669	FLT PLN-684A	
	FLT PLN-670	FLT PLN-685	
	FLT PLN-671	FLT PLN-686	
	FLT PLN-672	FLT PLN-687	
	FLT PLN-673	FLT PLN-688	
	FLT PLN-674	FLT PLN-689	
	FLT PLN-675		

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DH4/K. M. Engelauf	483-4400
Nominal Timelines	DH4/B. L. Wedgeworth	483-4466
Pointing	DH4/R. Khatri	483-4460

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INTRODUCTION

The STS-34 Flight Plan is the flight data file article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry Checklists. The detailed deploy procedures required during the deploy timeframe are in the IUS Deploy Checklist. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the STS-34 Flight Requirements Document. The Flight Plan, as part of the Flight Data File, meets the specifications of the Cycle 2/Final version of the STS-34 Flight Initialization Data Pack.

The flight profile used for this Flight Plan is for a launch date of October 12, 1989, at 12:30 CDT. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

JSC-22359, Crew Scheduling Constraints (Appendix K, CPMP), Basic, March 1987, has been used to build the timelines contained in this Flight Plan. Exemption 1403 #5 authorizes the Flight Day 2 unscheduled EVA timelines in Section 4. Exemption 1403 #12 authorizes the STS-34 Flight Day 1 duration.

The timeline formats used in this Flight Plan are based on JSC-19933, Timeline Format Definitions and Standard Notes, Revision B, May 25, 1987.

The 212-34 flight plan is the flight data file which contains the on-air file. It does not contain the detailed checklist that are covered in the ascent, Post Instration, Descent Prep, and Entry Checklists. The detailed entry procedures required during the descent phase are in the ILS Entry Checklist. For continuity, the entire flight is shown in the summary level listing.

This overall checklist contains the objectives specified in the flight definition and requirements directive and the requirements of the 212-34 flight plan. The flight plan, as part of the flight data file, meets the specifications of the Civil Aeronautics Administration 212-34 flight plan for data base.

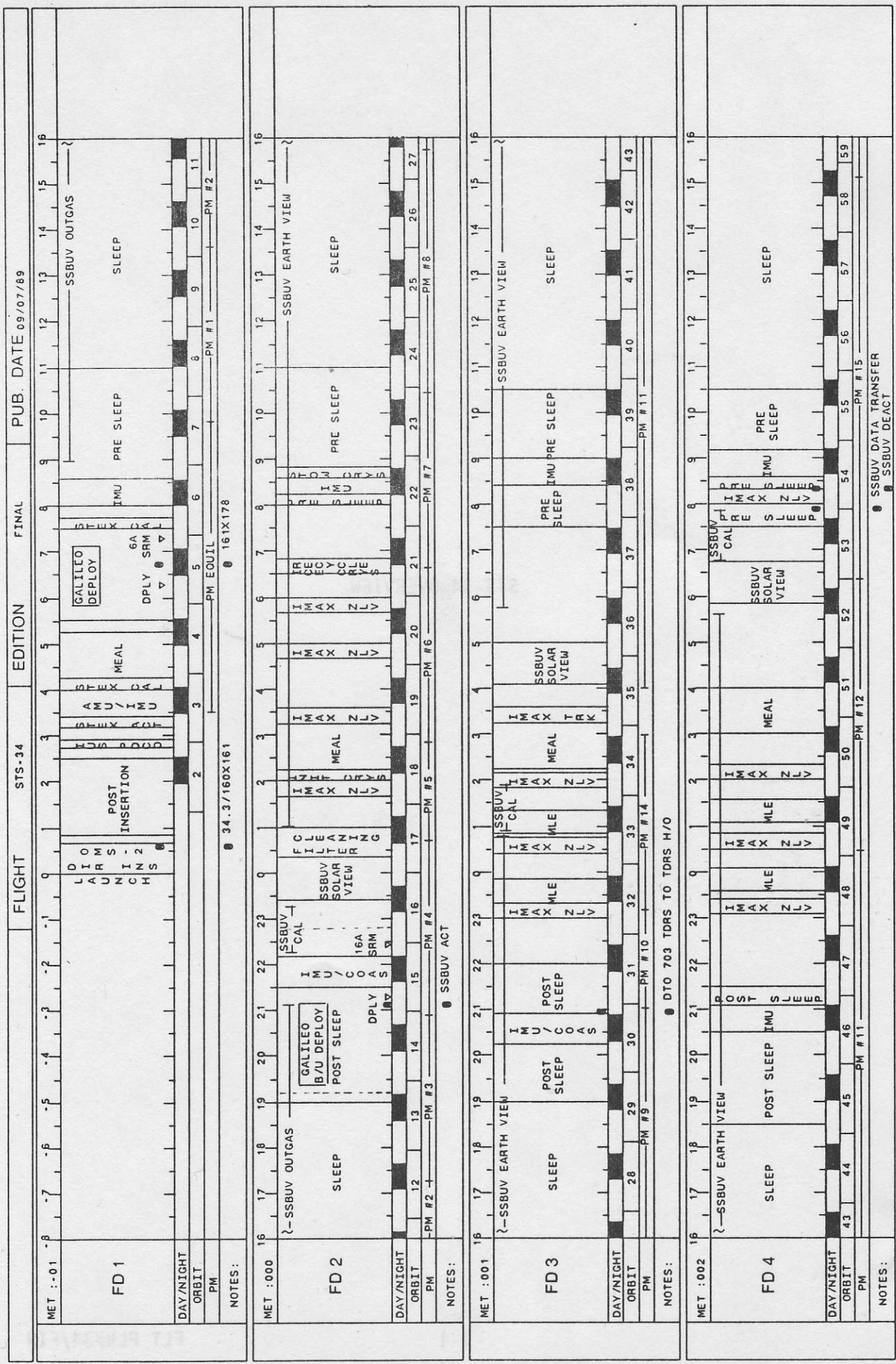
The flight profile used for this flight plan is for a launch date of October 15, 1989, at 12:30 GMT. Other time/altitude expressions relative to a year of 1989 (1989) reference time.

212-34 flight plan (Appendix A, CWP), Basic, March 1987, has been used to build the timelines contained in this flight plan. Exemption 1A01 is authorized for flight day 2 unaccompanied EVA timelines. In Section 4, Exemption 1A01 is authorized for 212-34 flight day 1 duration.

The timeline format used in this flight plan are based on JSC-19833 timeline format definitions and Standard Model, Revision 8, May 25, 1987.

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STS-34 OVERVIEW



		FLIGHT		STS-34		EDITION		FINAL		PUB. DATE																	
										09/07/89																	
MET :003		16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
FD 5	SLEEP				POST SLEEP	IMU POST SLEEP	CREW COOL	FCS C/O	TOP FUEL	FILE UTTERING	CLEARING	GICD OPS	MEAL	DELU DEKOP	CABIN STOW	PRE SLEEP	PRE SLEEP	PRE SLEEP	IMU	PRE SLEEP							
DAY/NIGHT																											
ORBIT		59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74										
PM				PM #16		PM #17																					
NOTES:		● DTO 703 TDRS TO TDRS H/O																									

MET :004		16	17	18	19	20	21	22	23	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
FD 6	SLEEP				POST SLEEP	IMU S	PM S	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP	DEORBIT PREP
DAY/NIGHT																											
ORBIT		75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90										
PM				PM #13																							
NOTES:		L A E N D O U R D I D B I N W I N G																									

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DATE	TIME	LOCATION	ACTIVITY	PERSONNEL	REMARKS
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10/15/73	0900
10/15/73	1000
10/15/73	1100
10/15/73	1200
10/15/73	1300
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10/15/73	2300
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10/15/73	0100
10/15/73	0200
10/15/73	0300
10/15/73	0400
10/15/73	0500
10/15/73	0600
10/15/73	0700

SUMMARY TIMELINE

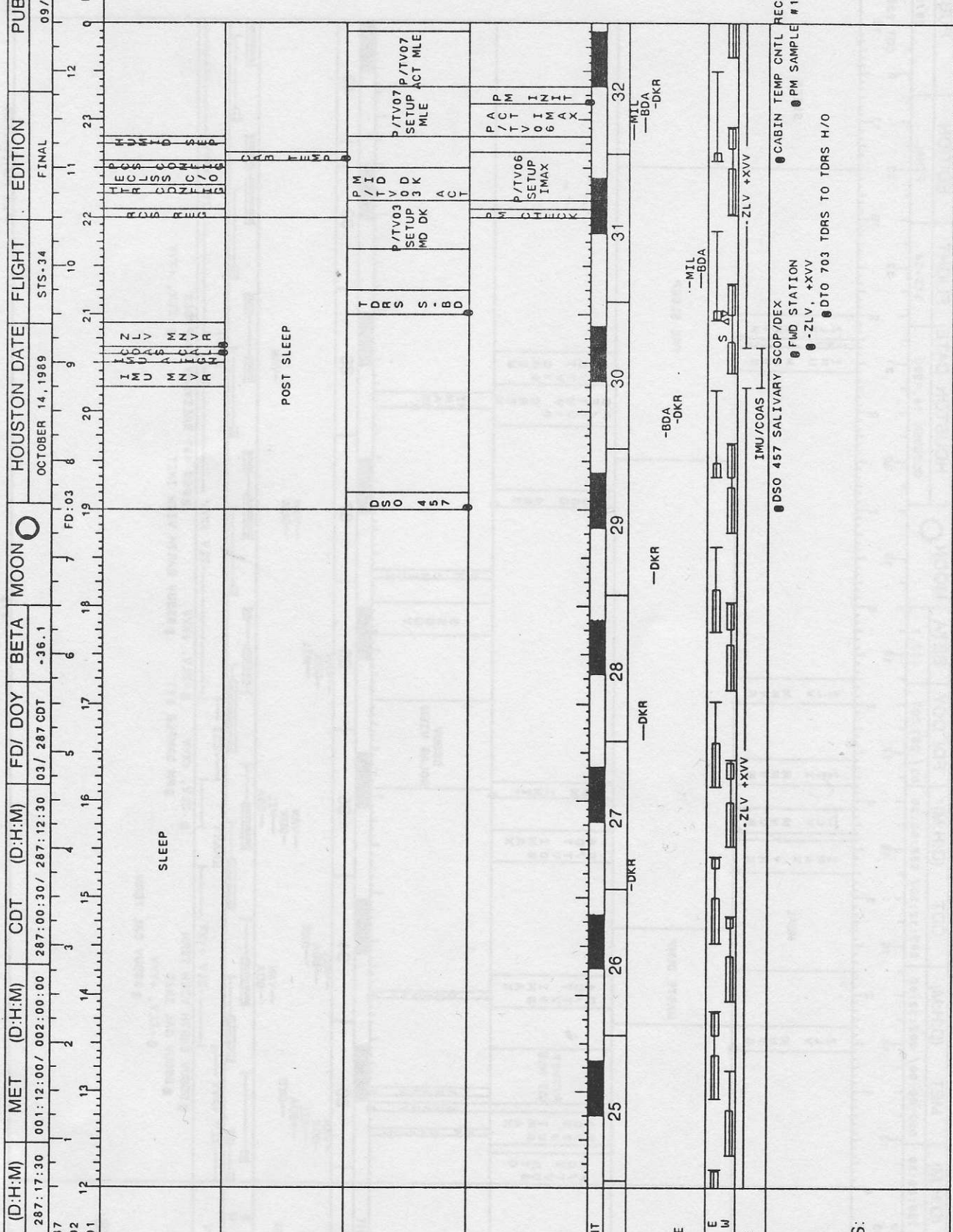
SUMMARY
TIMELINE

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CDT :287	FD :002	MET :001							
STS	SLEEP	POST SLEEP							
PL									
DAY/NIGHT									
ORBIT									
GSTDN									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:									

09/07/89

FLY PLN/347FIN

2-5



GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FDI DOY		BETA		MOON		HOUSTON DATE		FLIGHT		EDITION		PUB. DATE	
287:17:30 / 288:05:30		002:00:00 / 002:12:00		287:12:30 / 288:00:30		03 / 287 CDT		-37.7		OCTOBER 14, 1989		OCTOBER 14, 1989		STS-34		FINAL		09/07/89	
CDT :287		FD :003		MET :002															
STS		MEAL		WASTE DUMP		SLEEP													
PL		SSBUV		SSBUV		SSBUV		SSBUV		SSBUV		SSBUV		SSBUV		SSBUV		SSBUV	
DAY/NIGHT		ORBIT		GSTDN		COVERAGE		TORS		ATTITUDE		NOTES:							
33		34		35		36		37		38		39		40					
-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR		-VAN -GDX -MIL -BDA -DKR	
-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV		-ZLV +XVV	
SSBUV EARTH VIEW TERM		SSBUV CAL INIT		SSBUV CAL TERM		SSBUV EARTH VIEW TERM		SSBUV CAL INIT		SSBUV CAL TERM		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT	
SSBUV CAL INIT		SSBUV CAL TERM		SSBUV CAL TERM		SSBUV EARTH VIEW TERM		SSBUV CAL INIT		SSBUV CAL TERM		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT	
SSBUV CAL INIT		SSBUV CAL TERM		SSBUV CAL TERM		SSBUV EARTH VIEW TERM		SSBUV CAL INIT		SSBUV CAL TERM		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT		SSBUV EARTH VIEW INIT	

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
288:17:30 / 289:05:30	003:00:00 / 003:12:00	288:12:30 / 289:00:30	04 / 288 CDT	-40.3		OCTOBER 15, 1989	STS-34	FINAL	09/07/89
CDT :288									
FD :004									
MET :003									
STS	MEAL								SLEEP
PL									PRE SLEEP
DAY/NIGHT									
ORBIT									
GSTON									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:									

09/07/89

FLT PLN/34/FIN

2-8

● PM SAMPLE #12, 15, 16, 17
 ● DSO 457 SALIVARY SCOP/DEX
 ● DSO 473 ANTIGEN HYPERSENSITIVITY
 ● SSBUV CAL TERM
 ● SSBUV EARTH VIEW TERM
 ● SSBUV DATA TRANSFER
 ● -ZLV, +YVV
 ● SSBUV DEACTIVATION
 ● SSBUV CAL INIT
 ● -ZLV, +YVV

GMT (D:H:M)		MET (D:H:M)		CDT (D:H:M)		FD/DOY		BETA		MOON		HOUSTON DATE		FLIGHT		EDITION		PUB. DATE																					
289:05:30 / 289:17:30		003:12:00 / 004:00:00		289:00:30 / 289:12:30		05 / 289 CDT		-41.4		OCTOBER 16, 1989		STS-34		FINAL		09/07/89																							
CDT :289		FD :004		MET :003																																			
12		13		14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30			
STS		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP		SLEEP			
PL		P/TV05 SETUP CONF		TDRS KUBD		DSO 457		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK		P/M CHECK			
DAY/NIGHT		56		57		58		59		60		61		62		63		64		65		66		67		68		69		70		71		72		73		74	
ORBIT		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR			
GSTDN		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR	
COVERAGE		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR	
TDRS		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR	
ATTITUDE		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR		-DKR	
NOTES:		DSDO 457 SALIVARY SCOP/DEX		DTO 703 TDRS TO TDRS H/O		APU HTR ACT		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV		-ZLV +YVV	

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
289:17:30 / 290:05:30	004:00:00 / 004:12:00	289:12:30 / 290:00:30	05 / 289 CDT	-42.4		OCTOBER 16, 1985	STS-34	FINAL	09/07/89
CDT :289									
FD :005									
MET :004									
STS	MEAL			CABIN STOW					SLEEP
PL	FILTER CLEANING								PRE SLEEP
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p> ● DSO 457 SALIVARY SCOP/DEX ● -ZLV, +YVV ● DSO 474 RETINAL PHOTOGRAPHY ● DSO 816 GRAVITY GRADIENT ● PM ATTITUDE CONTROL ● PM SAMPLE # 13 ○ APU HTR RECONFIG </p>								

09/07/89

FLY PLN/34/FIN

2-10

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
290:17:30 / 291:05:30	005:00:00 / 005:12:00	290:12:30 / 291:00:30	06 / 290 CDT	-43.6	○	OCTOBER 17, 1989	STS-34	FINAL	09/07/89
CDT :290									
FD :006									
MET :005									
STS	DEORBIT PREP	DEORBIT BURN *							
PL		EDW LANDING *							
DAY/NIGHT									
ORBIT	80	81	82	83	84	85	86	87	88
GSTDN									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:									

X DEORBIT BURN 5/01:45

X EDW LANDING 5/02:45

X DEORBIT BURN 5/01:45

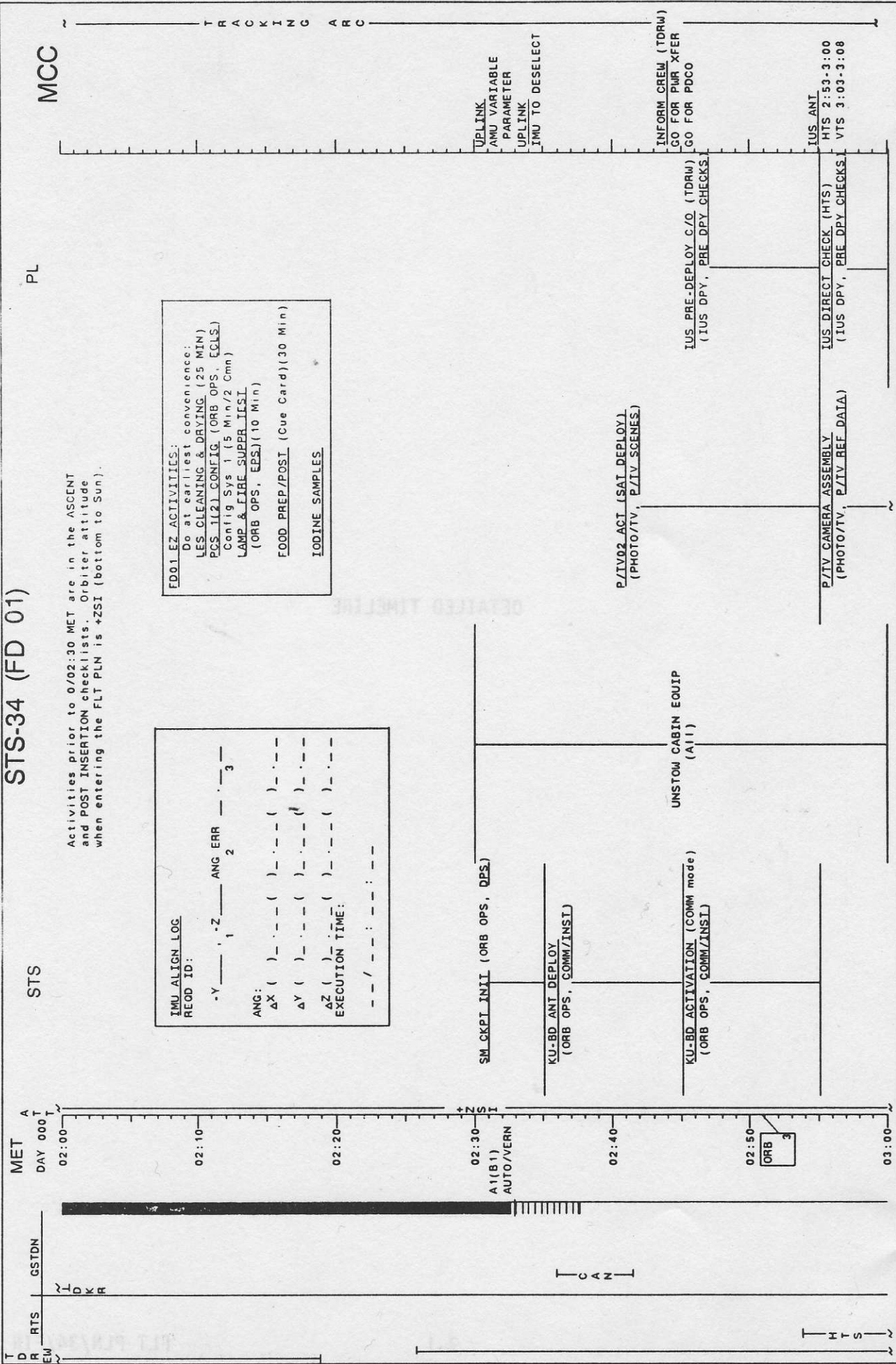
X EDW LANDING 5/02:45

DETAILED TIMELINE

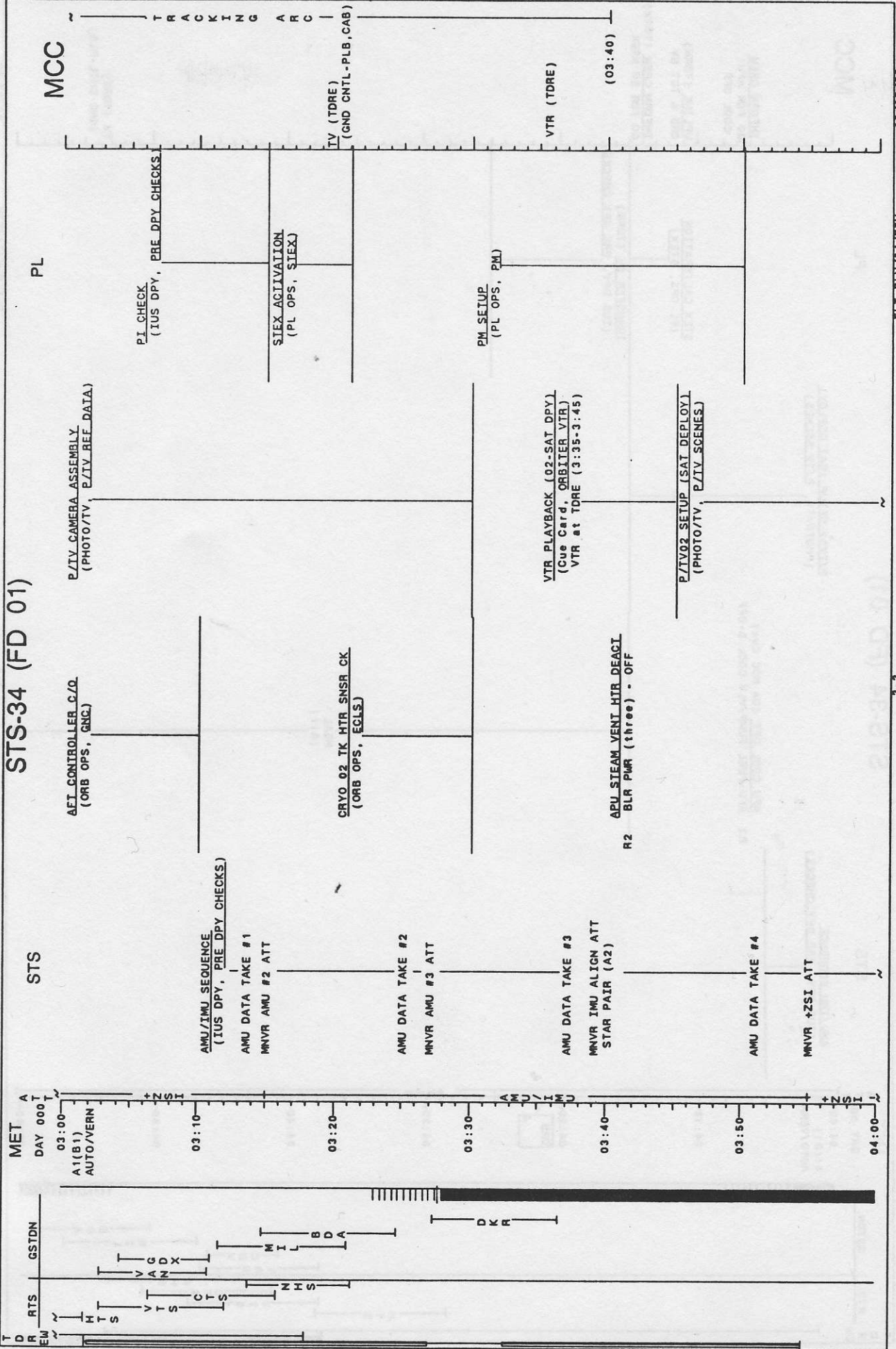
DETAILED
TIMELINE

DETAILED
TIMELINE

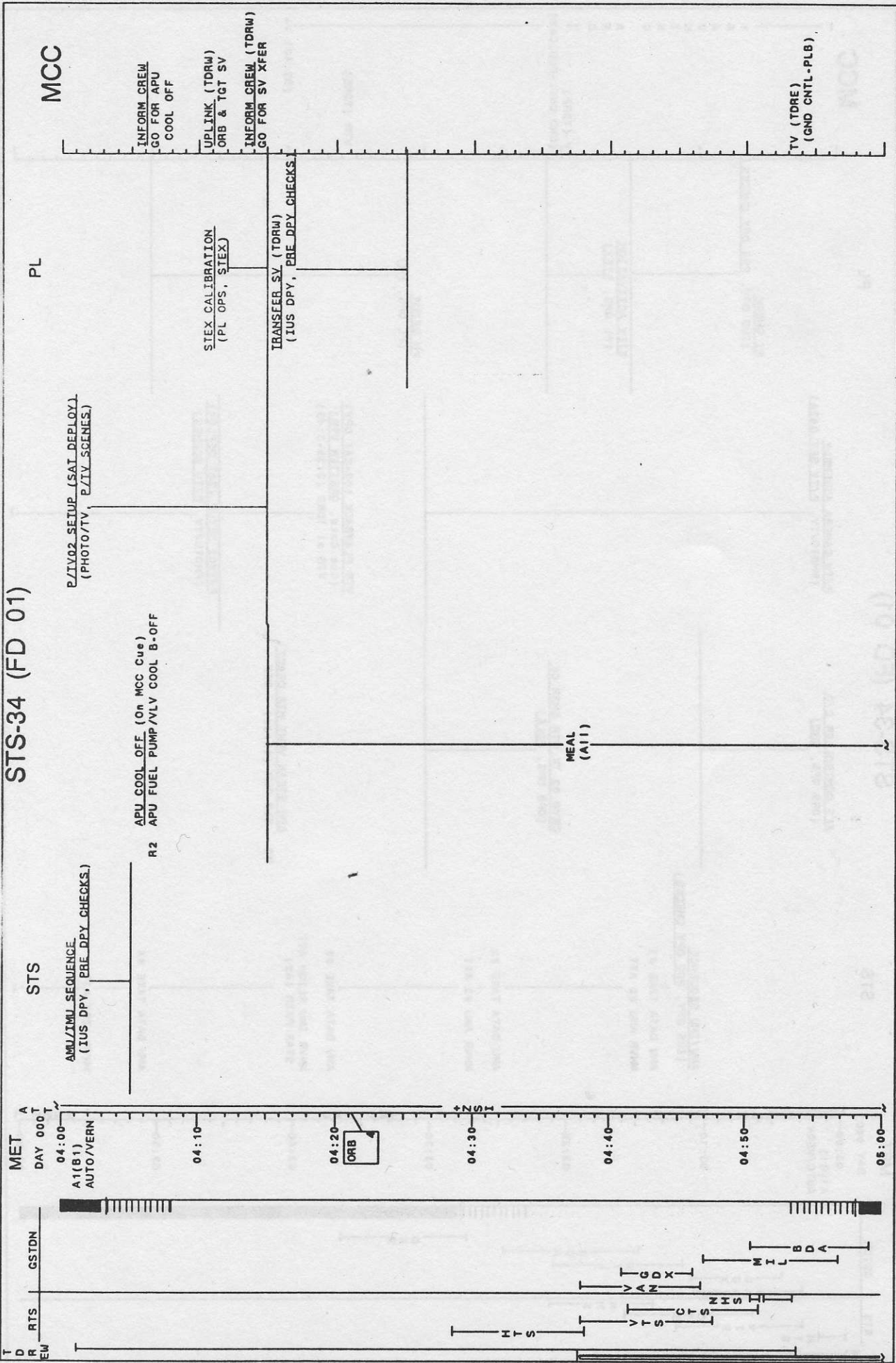
STS-34 (FD 01)



STS-34 (FD 01)



STS-34 (FD 01)

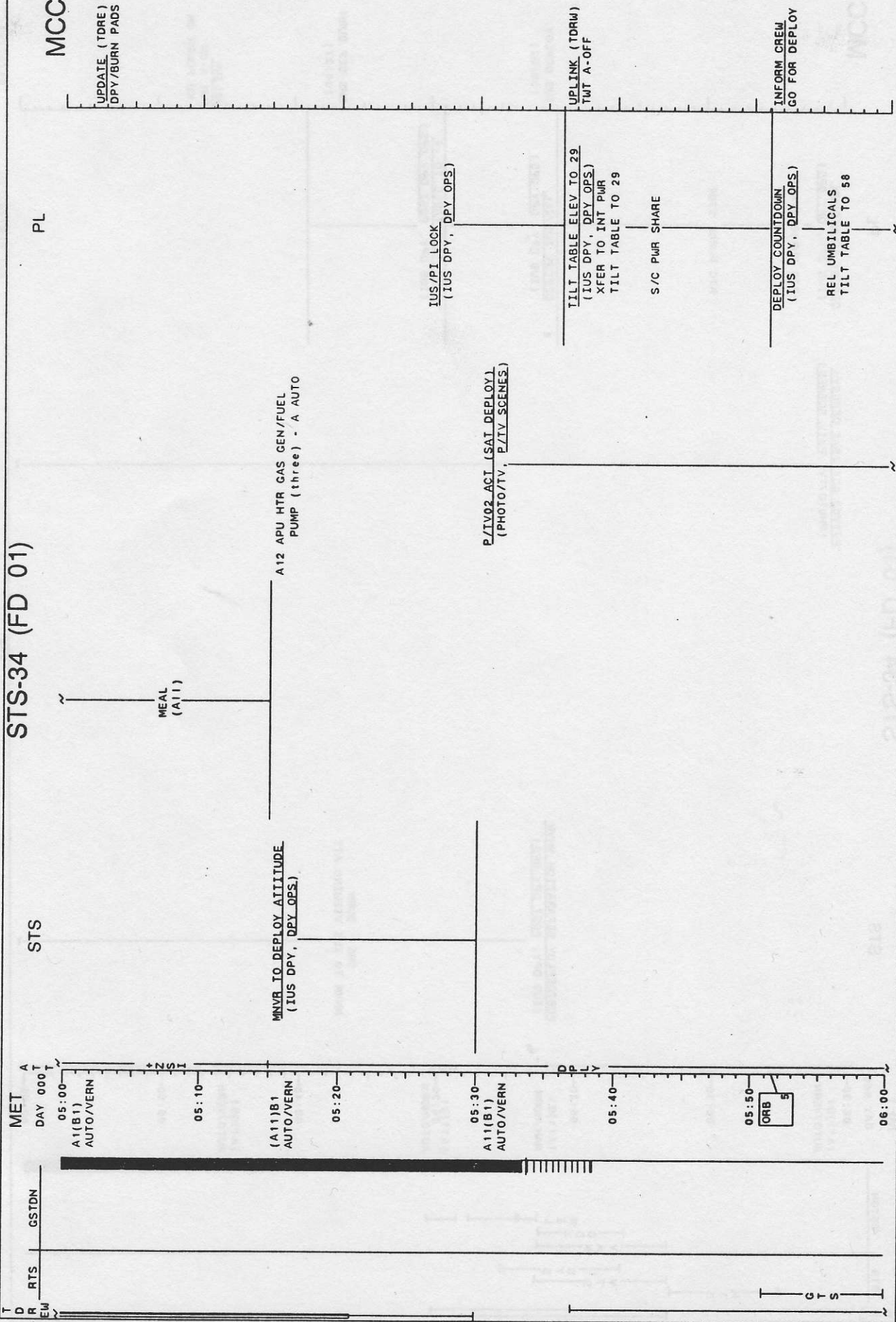


09707789

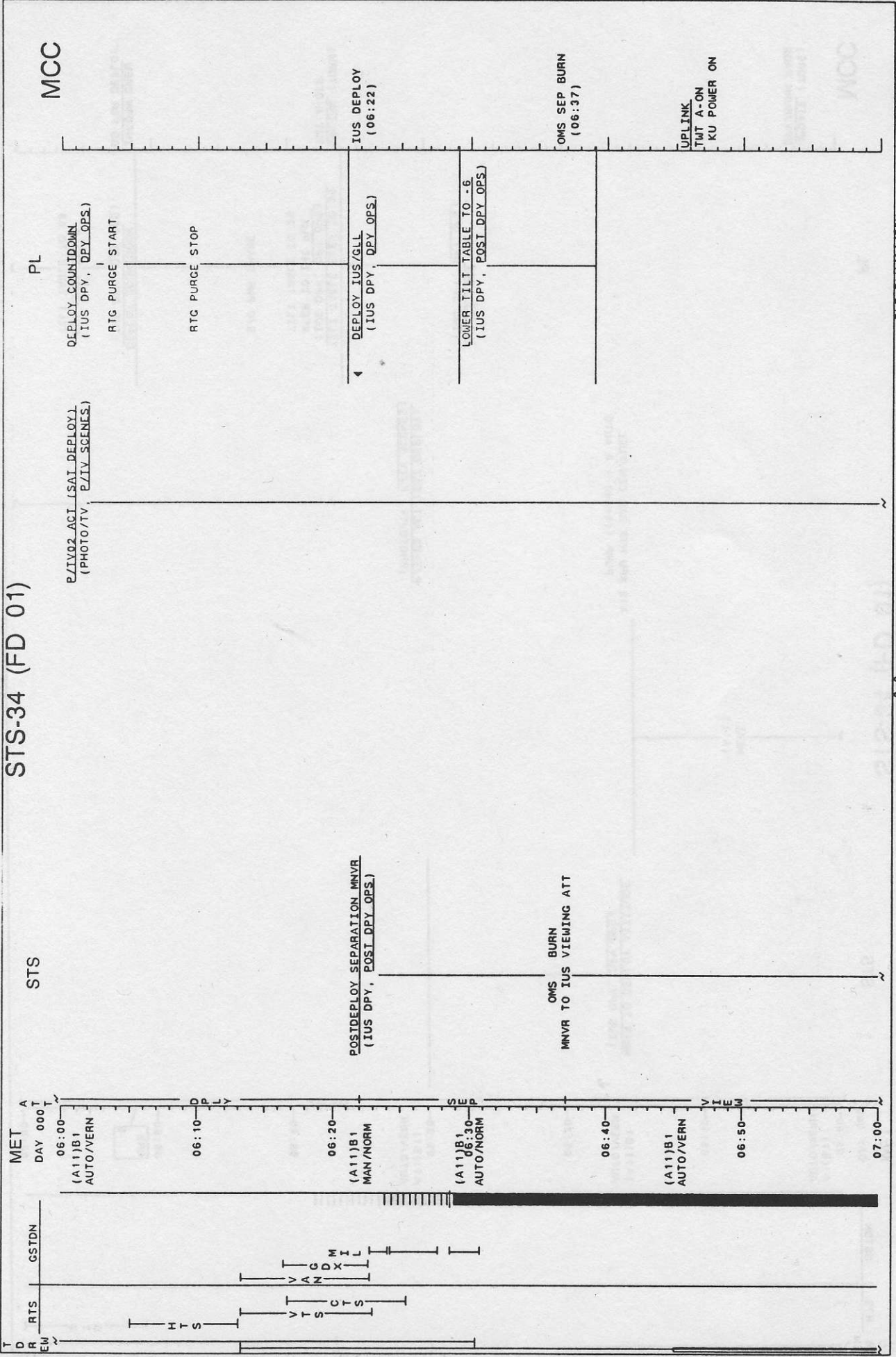
FLY PLAN 7347FIN

3-4

STS-34 (FD 01)



STS-34 (FD 01)

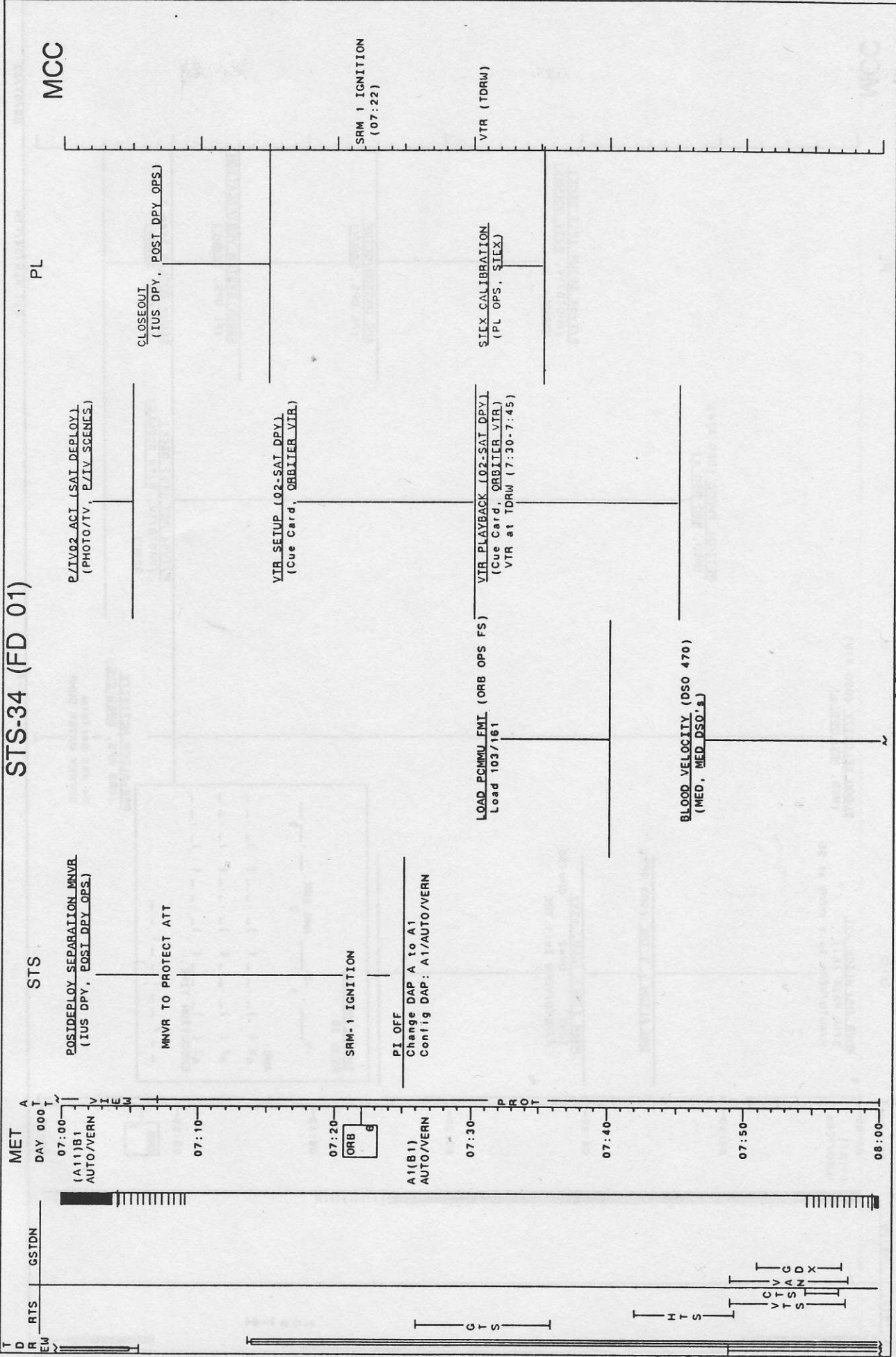


09/07/89

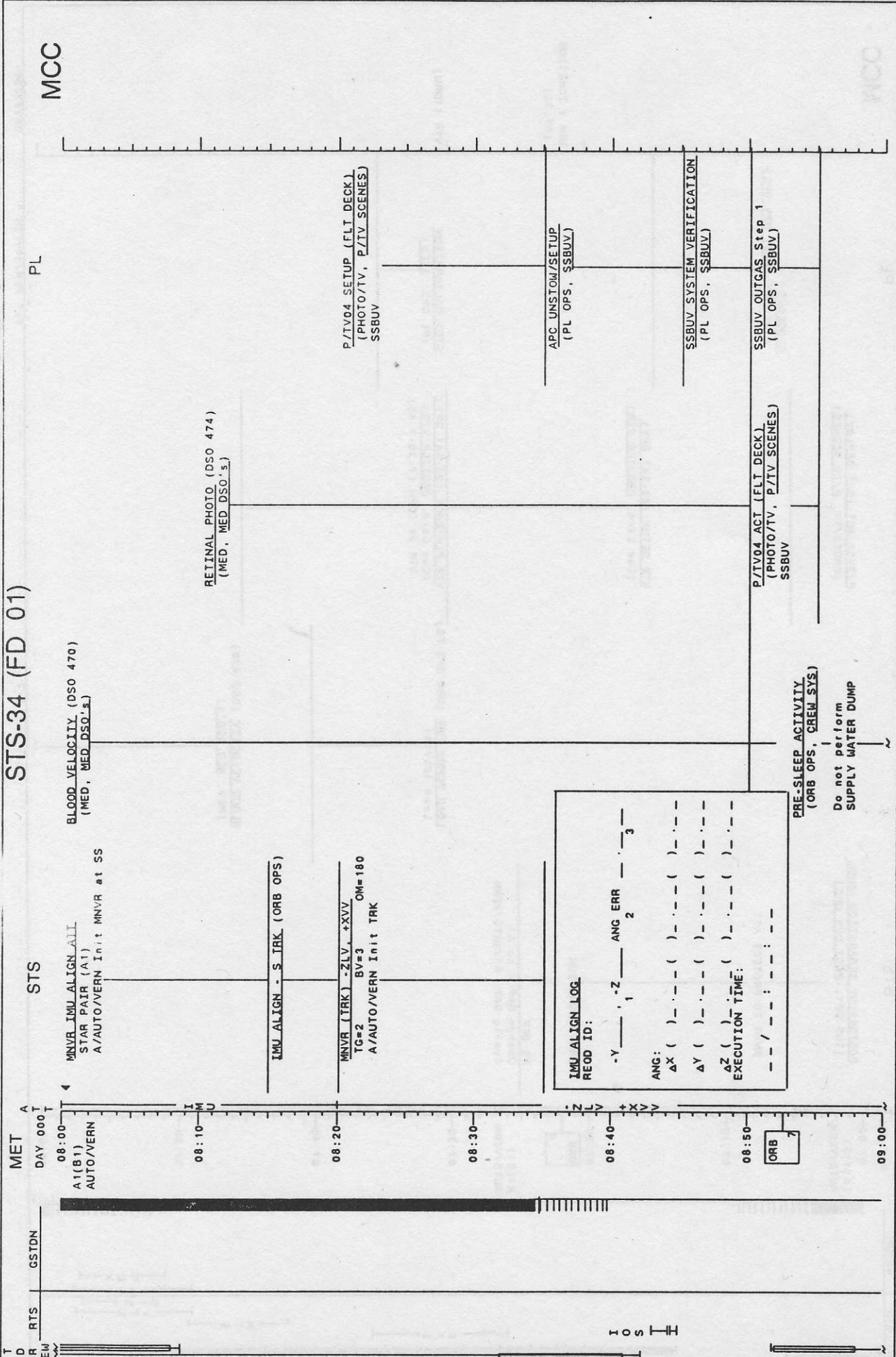
FLY PLN/34/FIN

3-6

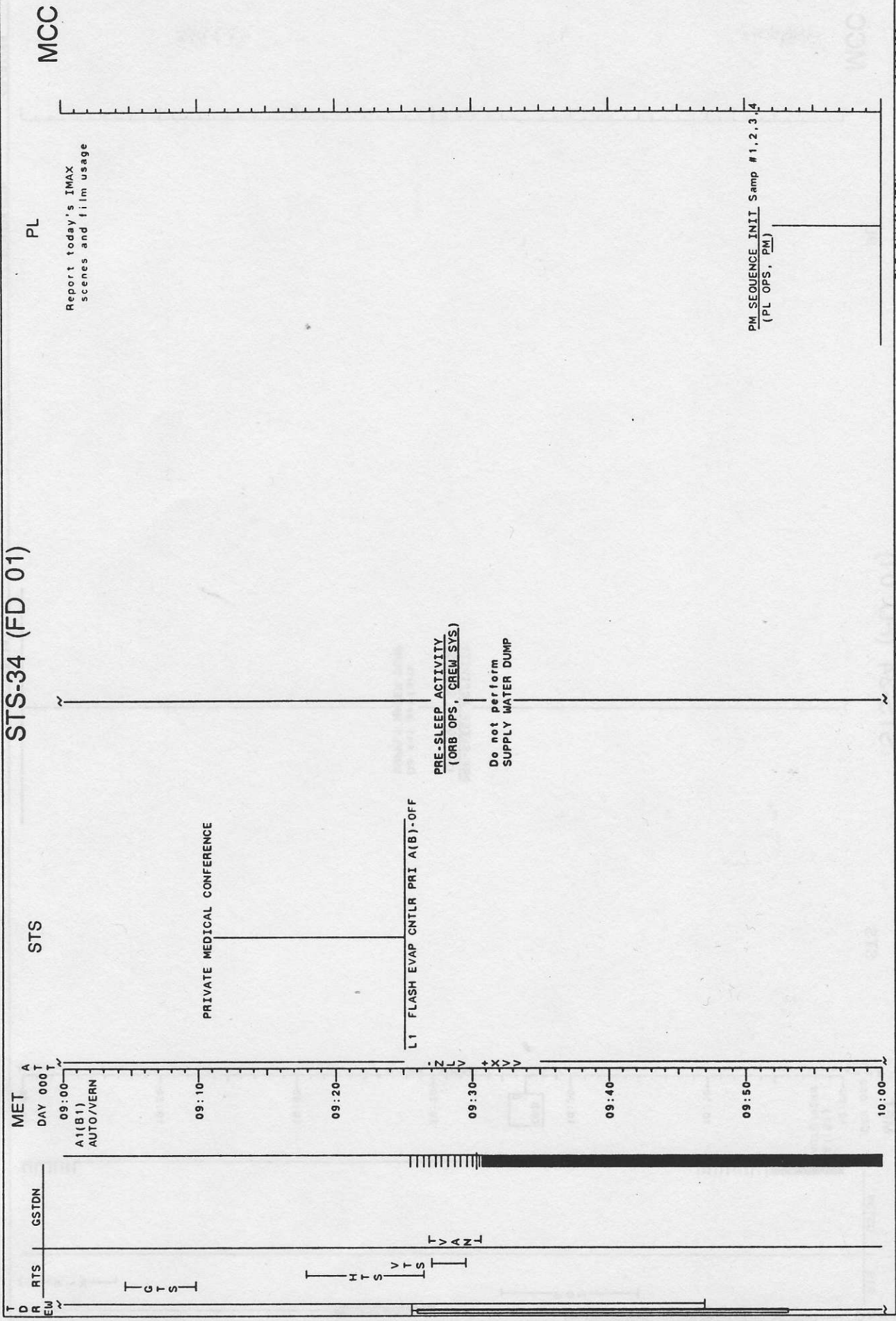
STS-34 (FD 01)



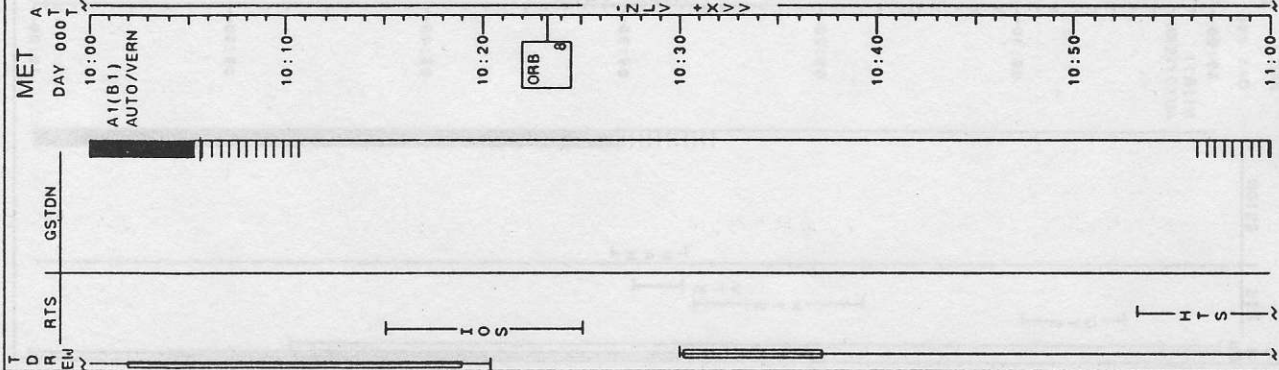
STS-34 (FD 01)



STS-34 (FD 01)



STS-34 (FD 01)

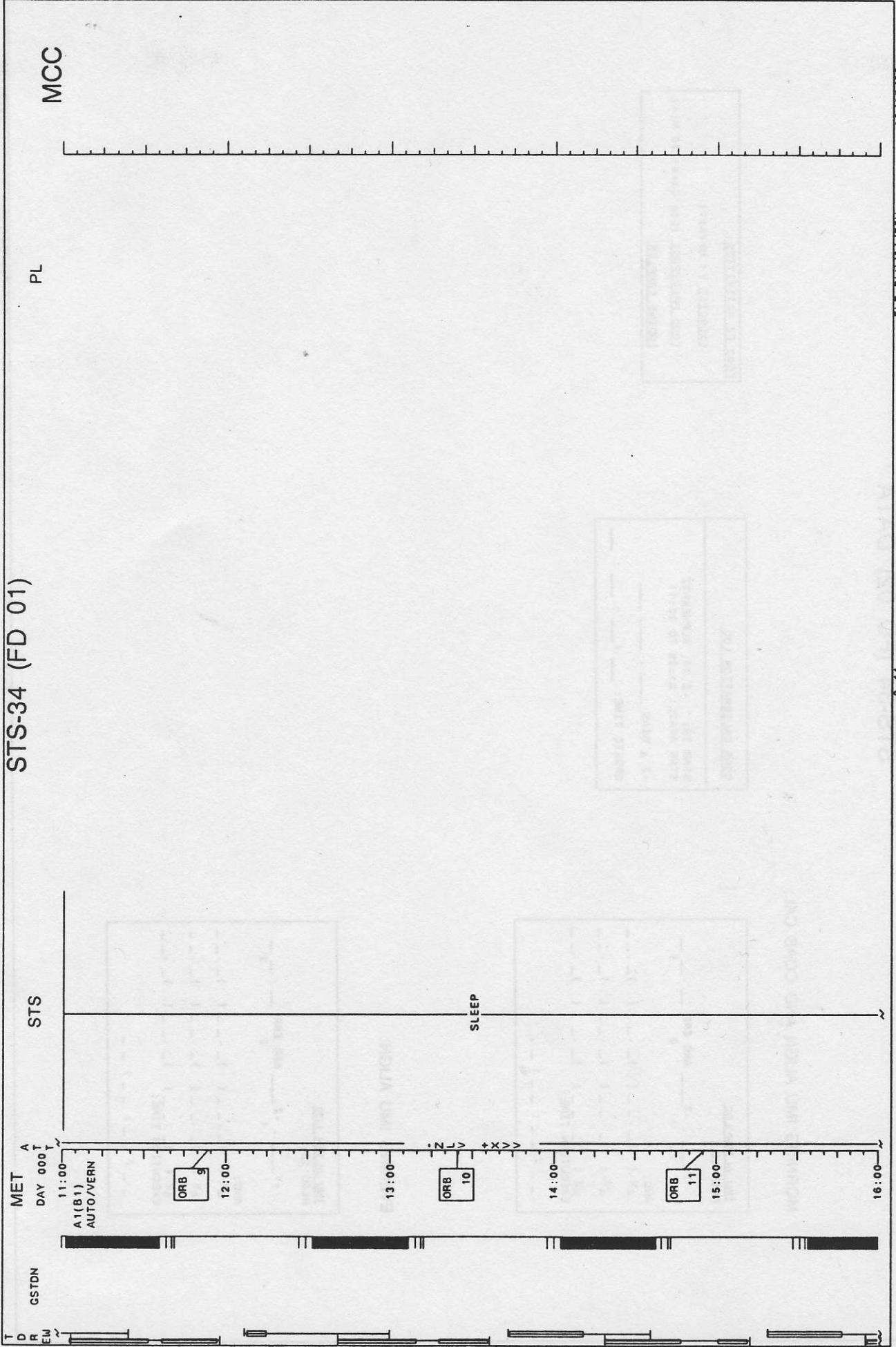


FLY PLN/34/FIN

3-10

09/07/89

STS-34 (FD 01)



T D R EW

MET DAY 000 T

STS

GSTDN

MCC

PL

A1(B1)
AUTO/VERN

ORB 9

ORB 10

ORB 11

SLEEP

STS-34 (FD 02) DATA

MORNING IMU ALIGN AND COAS CAL:

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

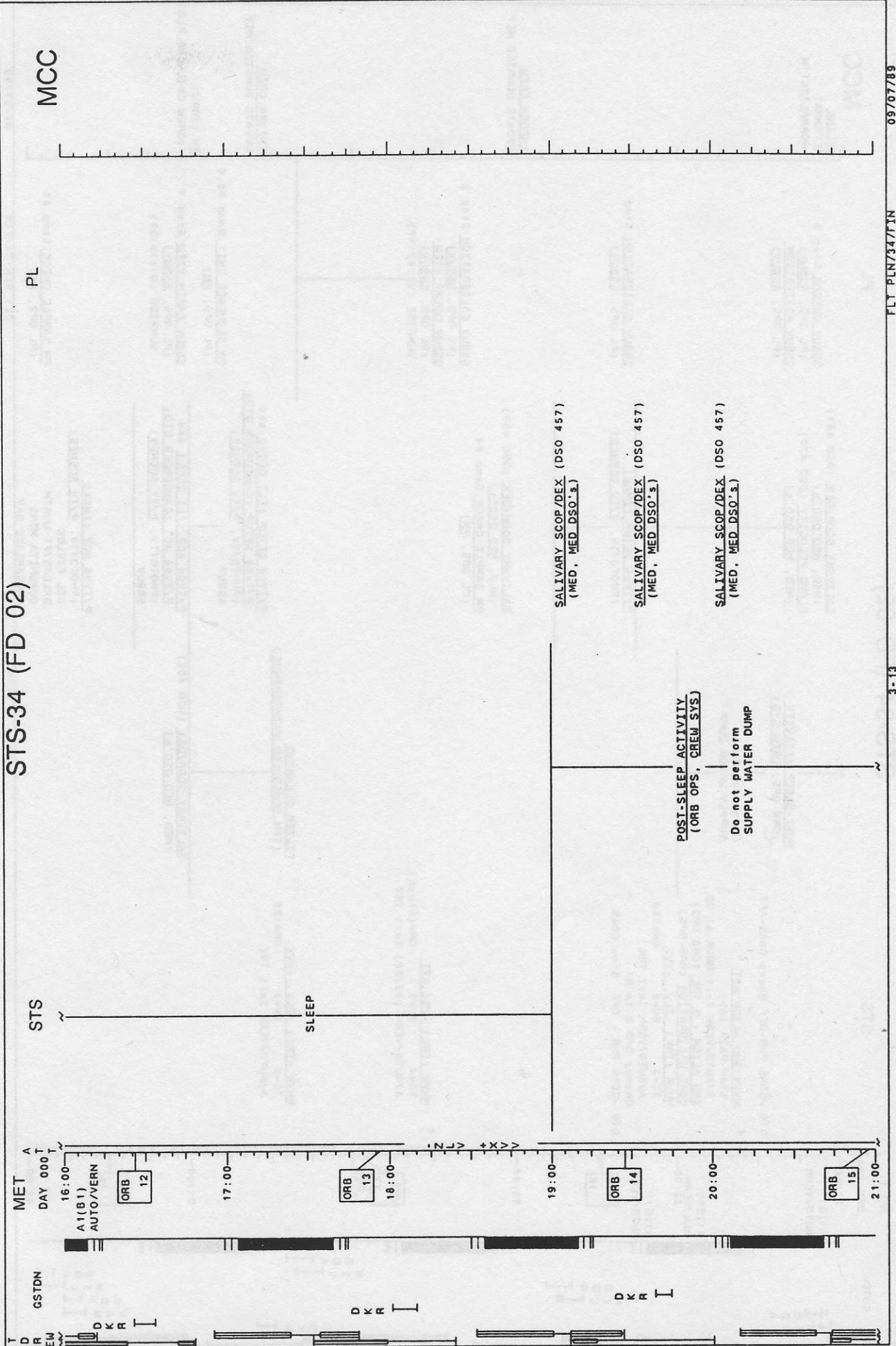
COAS CALIBRATION LOG
 STAR ID: -Z 37, ALPHERATZ
 STAR AVAIL: 21:25 TO 22:11
 -Z Δ BIAS ____ , ____ , ____
 UPDATE TIME: ____ / ____ : ____ : ____

FD02 EZ ACTIVITIES:
 EXERCISE (1 Hr/All)
 FOOD_PREP/POST (Cue Card)(30 Min)
 IODINE SAMPLES

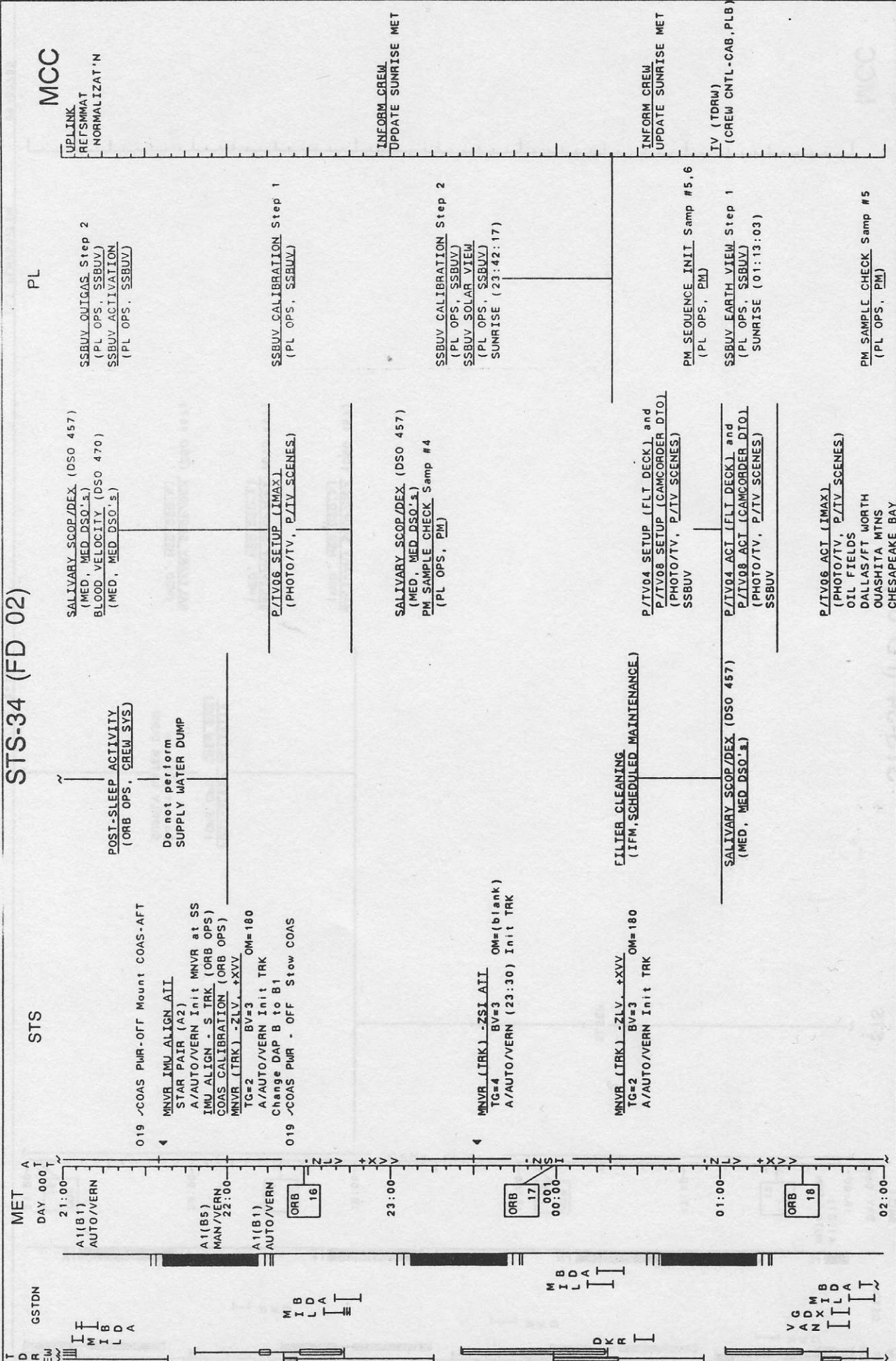
EVENING IMU ALIGN:

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

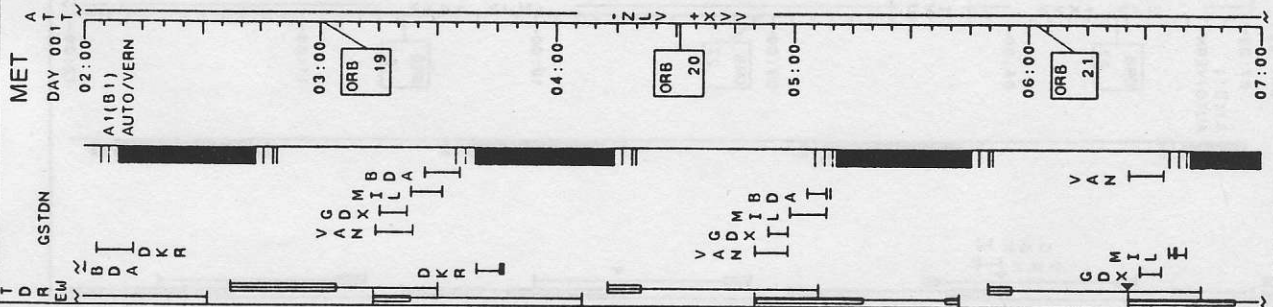
STS-34 (FD 02)



STS-34 (FD 02)



STS-34 (FD 02)



STS

PL

MCC

ICE CRYSTAL ACTIVATION
(PL OPS, SIU_EXE)

SALIVARY SCOP/DEX (DSO 457)
(MED, MED DSO's)

P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES.)
GRAND CANYON
QUASHITA MTNS

PAPER LOADING (DTO 786)
(CUE CARD, TAGS)
Unload and reload TAGS
paper roll

MEAL
(A11)

PM SAMPLE CHECK Samp #6
(PL OPS, PM)

P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES.)
GRAND CANYON
OIL FIELDS

SALIVARY SCOP/DEX (DSO 457)
(MED, MED DSO's)

P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES.)
INDONESIAN VOLCANOES

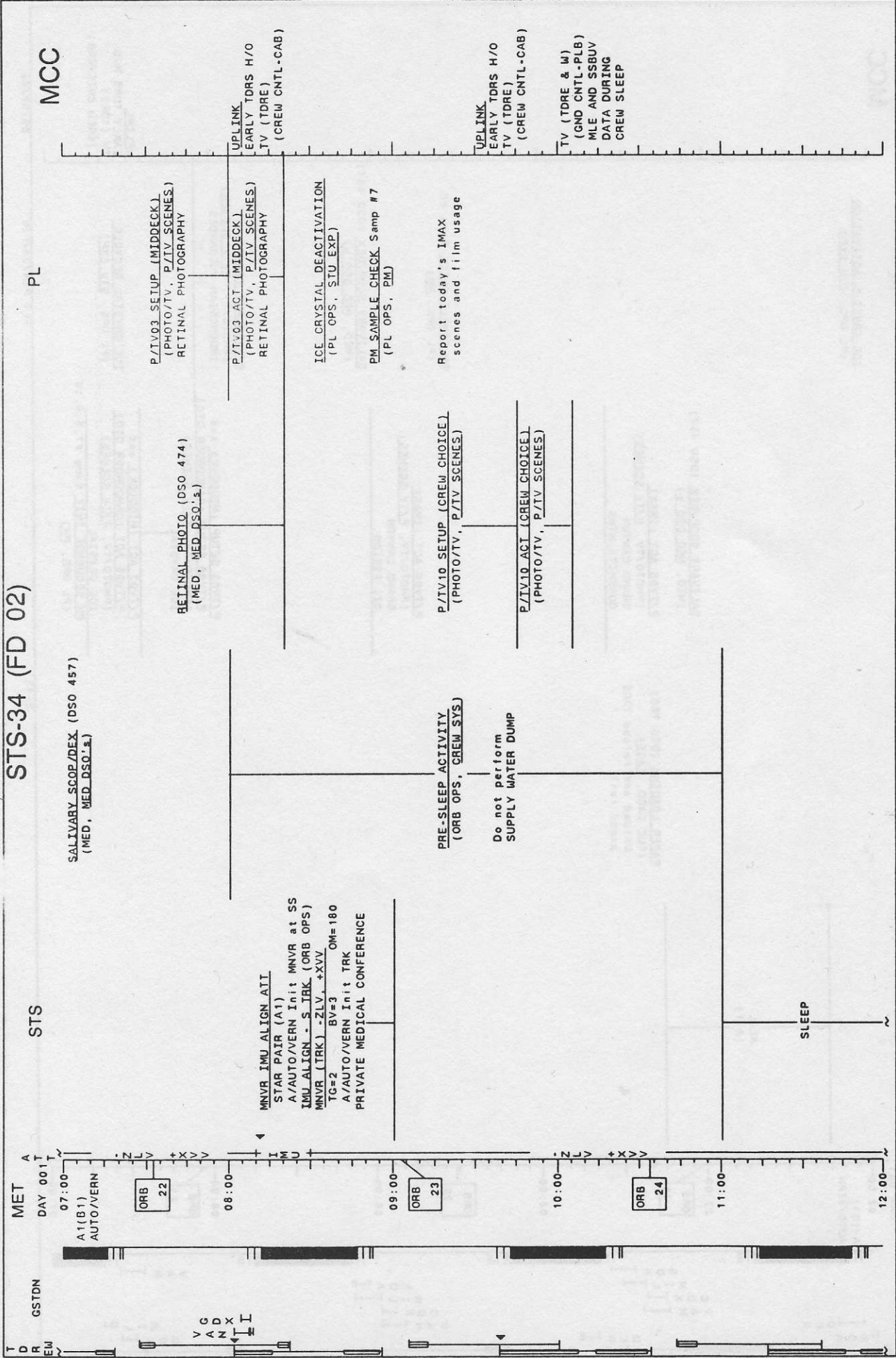
P/TV03 SETUP (MIDDECK) and
P/TV08 SETUP (CAMCORDER DIO)
(PHOTO/TV, P/TV SCENES)
ICE CRYSTAL

ICE CRYSTAL RECYCLE
(PL OPS, SIU EXP)

P/TV03 ACT (MIDDECK) and
P/TV08 ACT (CAMCORDER DIO)
(PHOTO/TV, P/TV SCENES)
ICE CRYSTAL

PM SEQUENCE INIL Samp #7,8,9,10
(PL OPS, PM)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)



STS-34 (FD 02)

MCC

PL

STATIONARY SCOP/DEX (DSO 457)
(MED, MED DSO's)

RETINAL PHOTO (DSO 474)
(MED, MED DSO's)

P/TV03 SETUP (MIDDECK)
(PHOTO/TV, P/TV SCENES)
RETINAL PHOTOGRAPHY

P/TV03 ACT (MIDDECK)
(PHOTO/TV, P/TV SCENES)
RETINAL PHOTOGRAPHY

ICE CRYSTAL DEACTIVATION
(PL OPS, STU EXP)

PM SAMPLE CHECK Samp #7
(PL OPS, PM)

Report today's IMAX scenes and film usage

P/TV10 SETUP (CREW CHOICE)
(PHOTO/TV, P/TV SCENES)

P/TV10 ACT (CREW CHOICE)
(PHOTO/TV, P/TV SCENES)

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform SUPPLY WATER DUMP

MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS
IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) - ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK
PRIVATE MEDICAL CONFERENCE

SLEEP

TV (TDRE & W)
(GND CNTL-PLB)
MLE AND SSBUY DATA DURING CREW SLEEP

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

UPLINK
EARLY TDRS H/O
TV (TDRE)
(CREW CNTL-CAB)

STS-34 (FD 03) DATA

MORNING IMU ALIGN AND COAS CAL:

IMU ALIGN LOG
 RECD ID: _____

-Y _____ 1 -Z _____ ANG ERR _____ 3

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

EXECUTION TIME: _____

_____/_____/_____:_____:_____

COAS CALIBRATION LOG

STAR ID: +X 23, BETELGEUSE
 STAR AVAIL: 20:31 TO 21:19

+X Δ BIAS _____

UPDATE TIME: _____/_____/_____:_____:_____

ED03_EZ_ACTIVITIES:

EXERCISE (1 Hr/All)

FOOD PREP/POST (Cue Card)(30 Min)

SAS MATRIX (DSO 474)
 (CUE CARD, SAS MATRIX)
 (5 Min/MS2, MS3)

IODINE SAMPLES

EVENING IMU ALIGN:

IMU ALIGN LOG
 RECD ID: _____

-Y _____ 1 -Z _____ ANG ERR _____ 3

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

EXECUTION TIME: _____

_____/_____/_____:_____:_____

STS-34 (FD 03)

TDR EW
GSTDN
MET DAY 001 T

17:00
A1(B1)
AUTO/VERN

18:00
ORB 29

19:00
ORB 30

20:00

21:00
A1(B5)
MAN/VERN
A1(B1)
AUTO/VERN
ORB 31

22:00

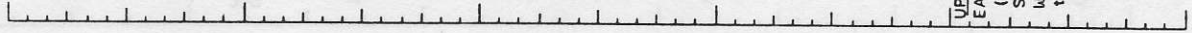
M B I D L A I I
S

D K R I
B D A K I R I

STS

PL

MCC



SALIVARY SCOP/DEX (DSO 457)
(MED, MED DSO.L)

01 ✓COAS - OFF Mount COAS - FMD
 4 MNVR IMU ALIGN ATT
 STAR PAIR (A1)
 A/AUTO/VERN Init MNVR at SS
 IMU ALIGN - S TRK (ORB OPS)
 COAS CALIBRATION (ORB OPS)
 MNVR (TRK) -ZLV, +XV
 TG=2 BV#3 OM=180
 A/AUTO/VERN Init TRK
 Change DAP B to B1
 01 ✓COAS-OFF Stow COAS

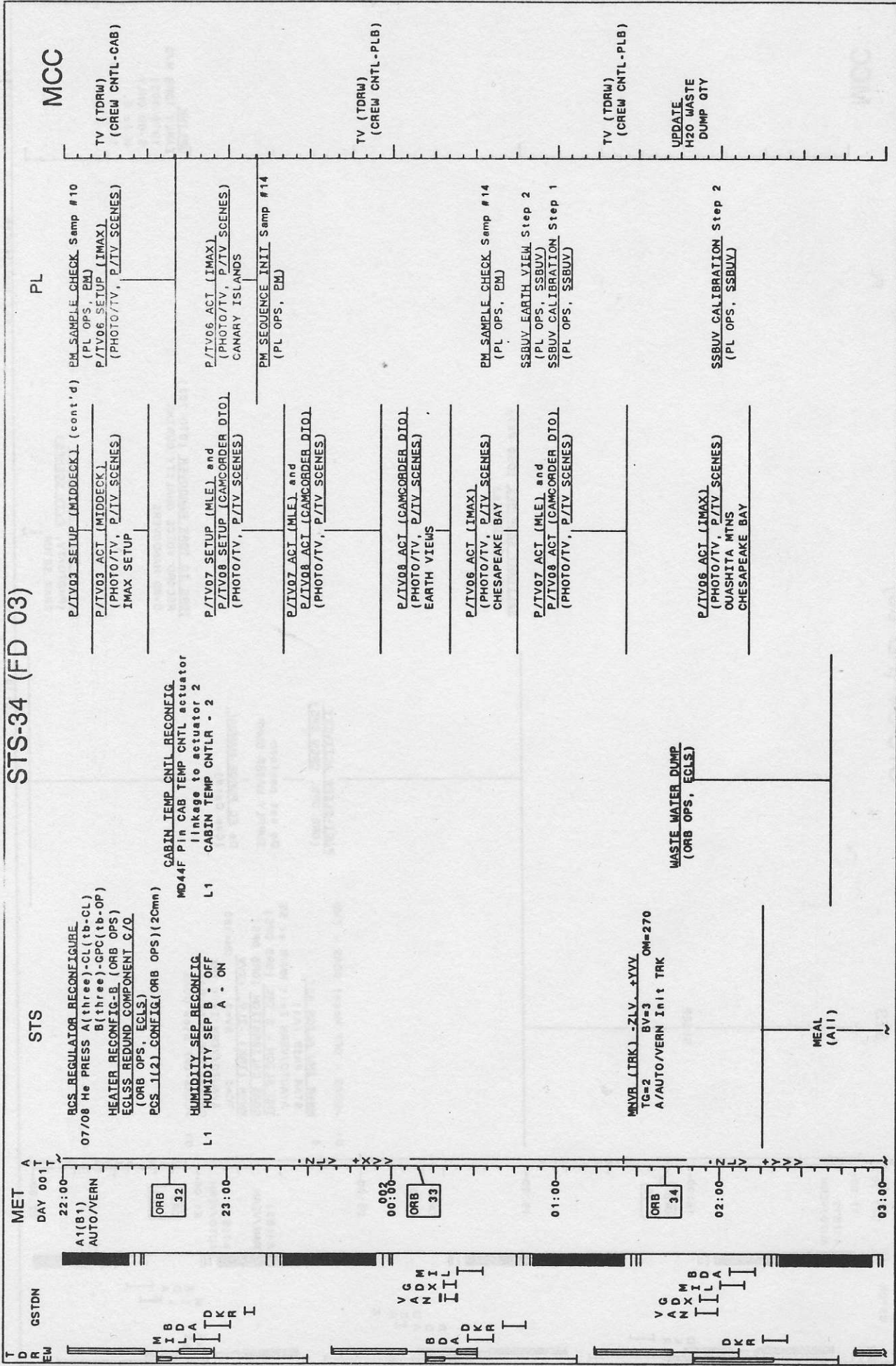
POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)
 Do not perform
 SUPPLY WATER DUMP
 Do FC PURGE-MANUAL
 (Cue Card)

IDRS TO IDRS HANDOVER (DTO 703)
 RECORD VOICE QUALITY DURING
 S-BD HANDOVERS

P/TV03 SETUP (MIDDECK)
 (PHOTO/TV, P/TV SCENES)
 IMAX SETUP

UPLINK
 EARLY IDRS H/O
 (DTO 703)
 S-BD ONLY
 W to E,
 then E to W

STS-34 (FD 03)

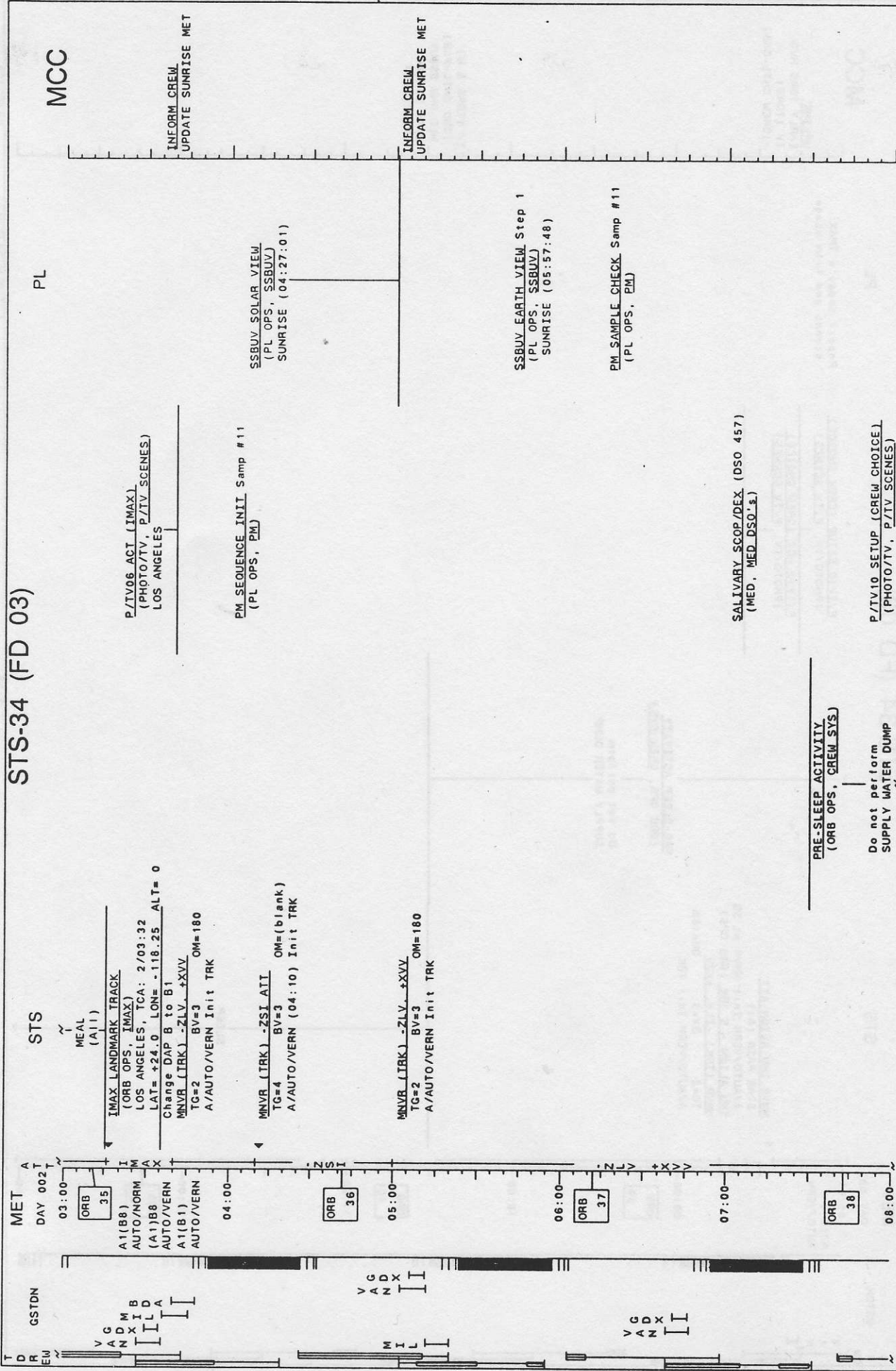


FLY PLAN/34/FXN

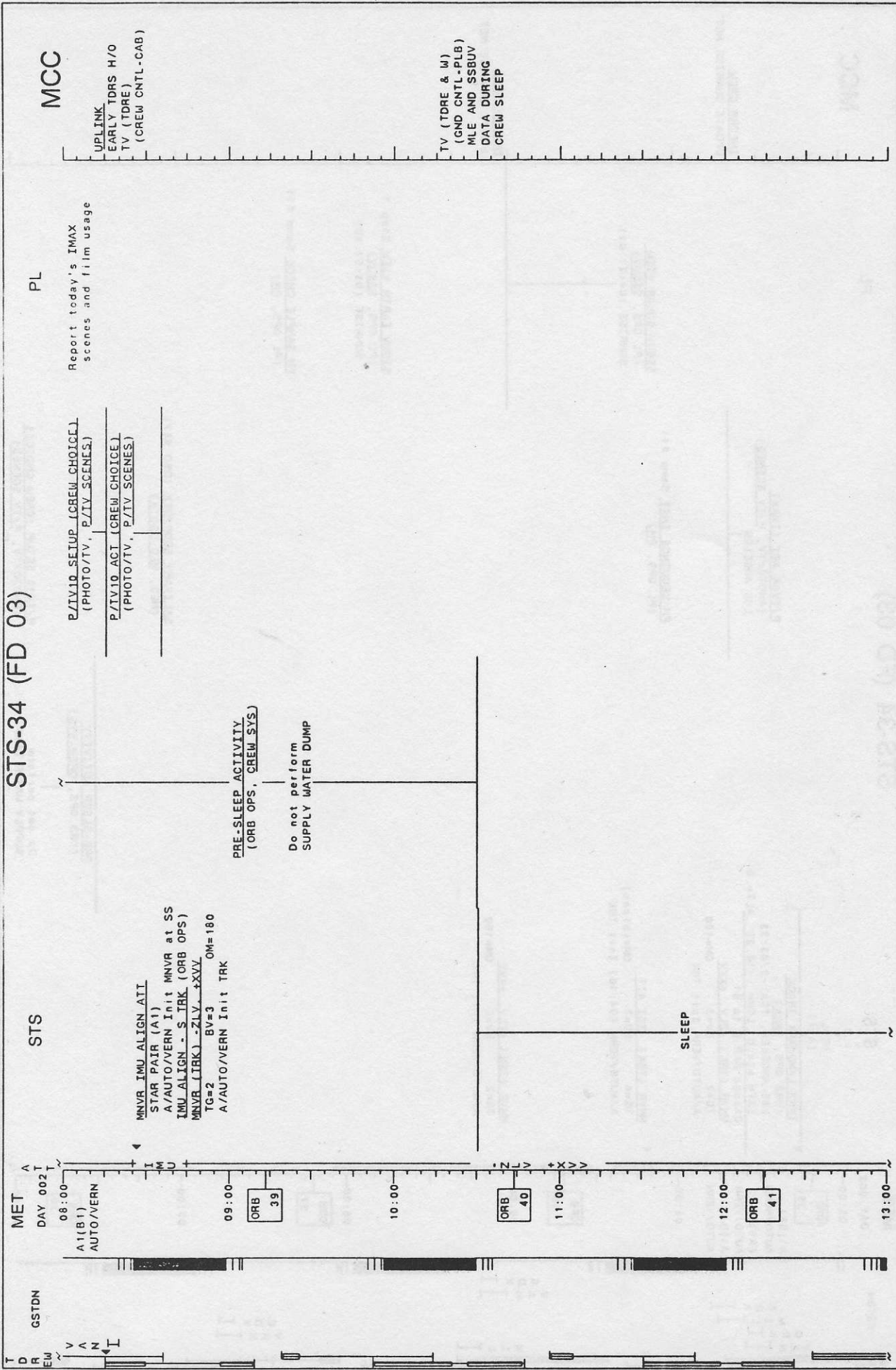
3-20

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STS-34 (FD 03)



STS-34 (FD 03)

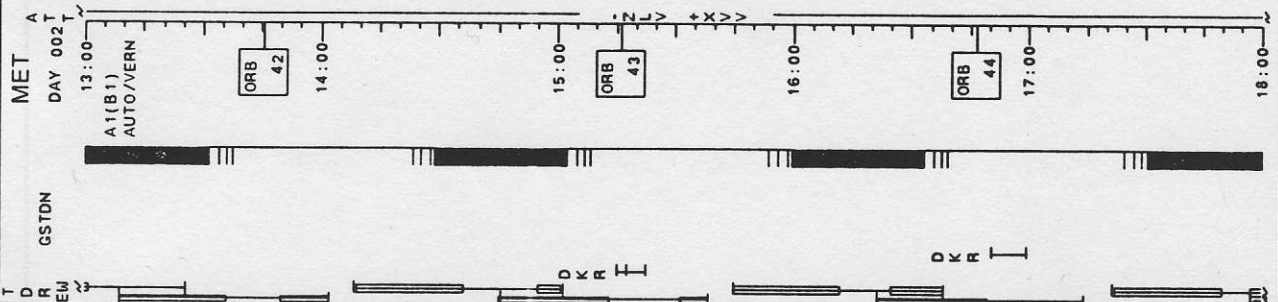


STS-34 (FD 03)

MET DAY 002 T

GSTDN

T D R EW

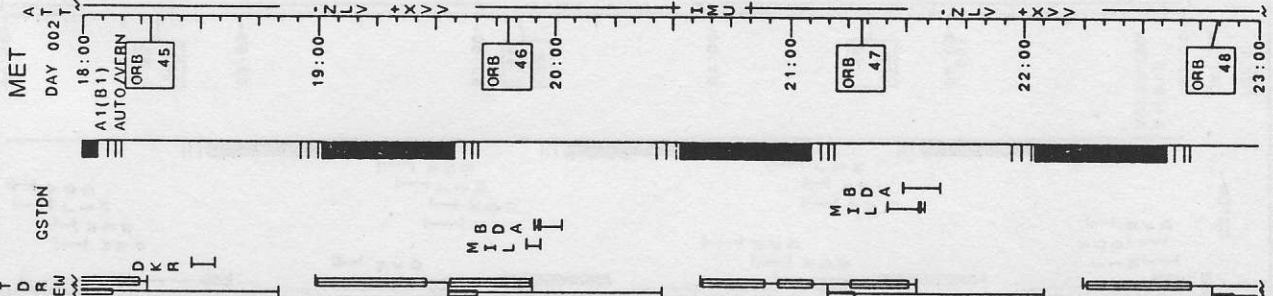


STS

PL

MCC

STS-34 (FD 04)



PL

MCC

SALIVARY SCOP/DEX (DSO 457)
(MED, MED_DSO's)

SALIVARY SCOP/DEX (DSO 457)
(MED, MED_DSO's)

SALIVARY SCOP/DEX (DSO 457)
(MED, MED_DSO's)

SALIVARY SCOP/DEX (DSO 457)
(MED, MED_DSO's)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS
IMU ALIGN - S TRK (ORB OPS)
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK

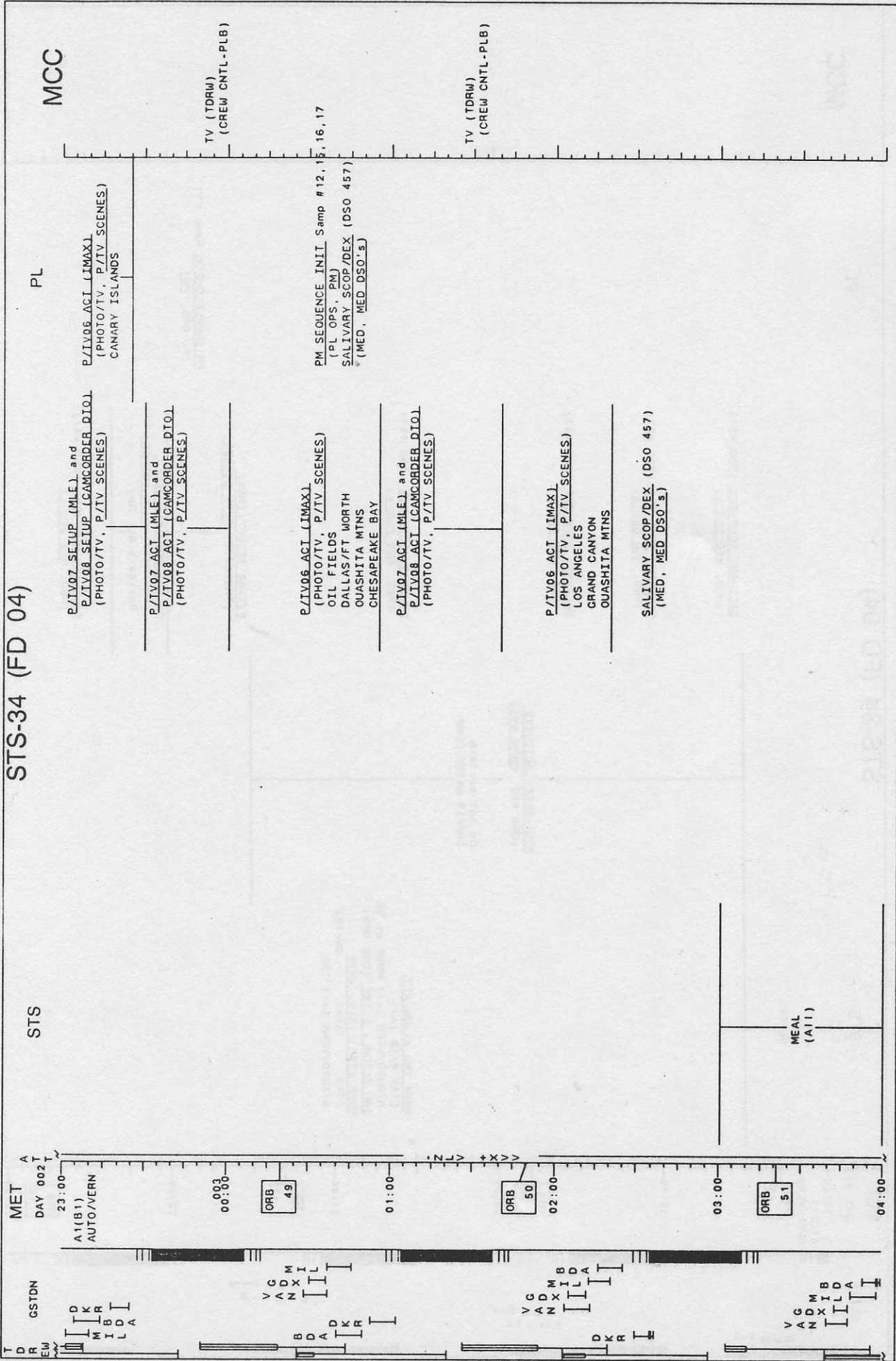
P/TV06 SETUP (IMAX)
(PHOTO/TV, P/TV SCENES)

P/TV04 ACT (ELI DECK)
(PHOTO/TV, P/TV SCENES)
Recreate GLL Dpy

SALIVARY SCOP/DEX (DSO 457)
(MED, MED_DSO's)

PM SAMPLE CHECK Samp #11
(PL OPS, PM)

STS-34 (FD 04)



STS-34 (FD 04)

MCC

PL

STS

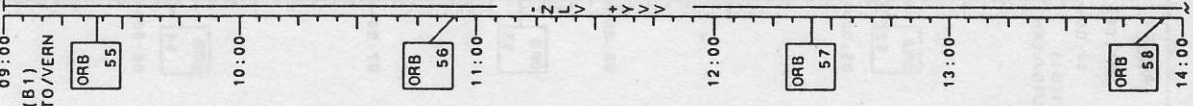
MNVR (TRK) -ZLV +YVV
TG=2 BV#3 OM=270
A/AUTO/VERN Init TRK

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

SLEEP

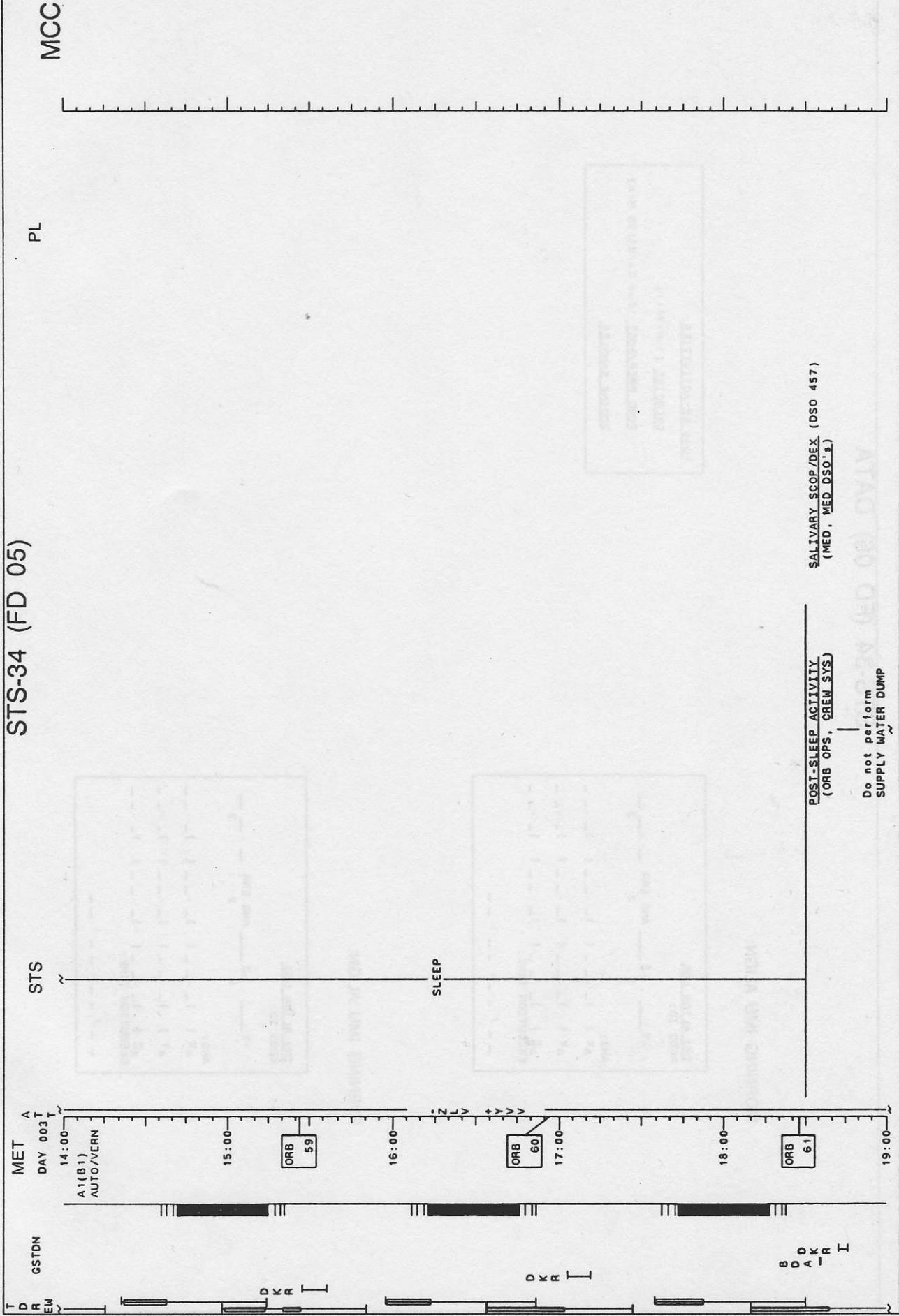
MET A
DAY 003 T



GSTDN

D K R E

STS-34 (FD 05)



STS-34 (FD 05) DATA

MORNING IMU ALIGN:

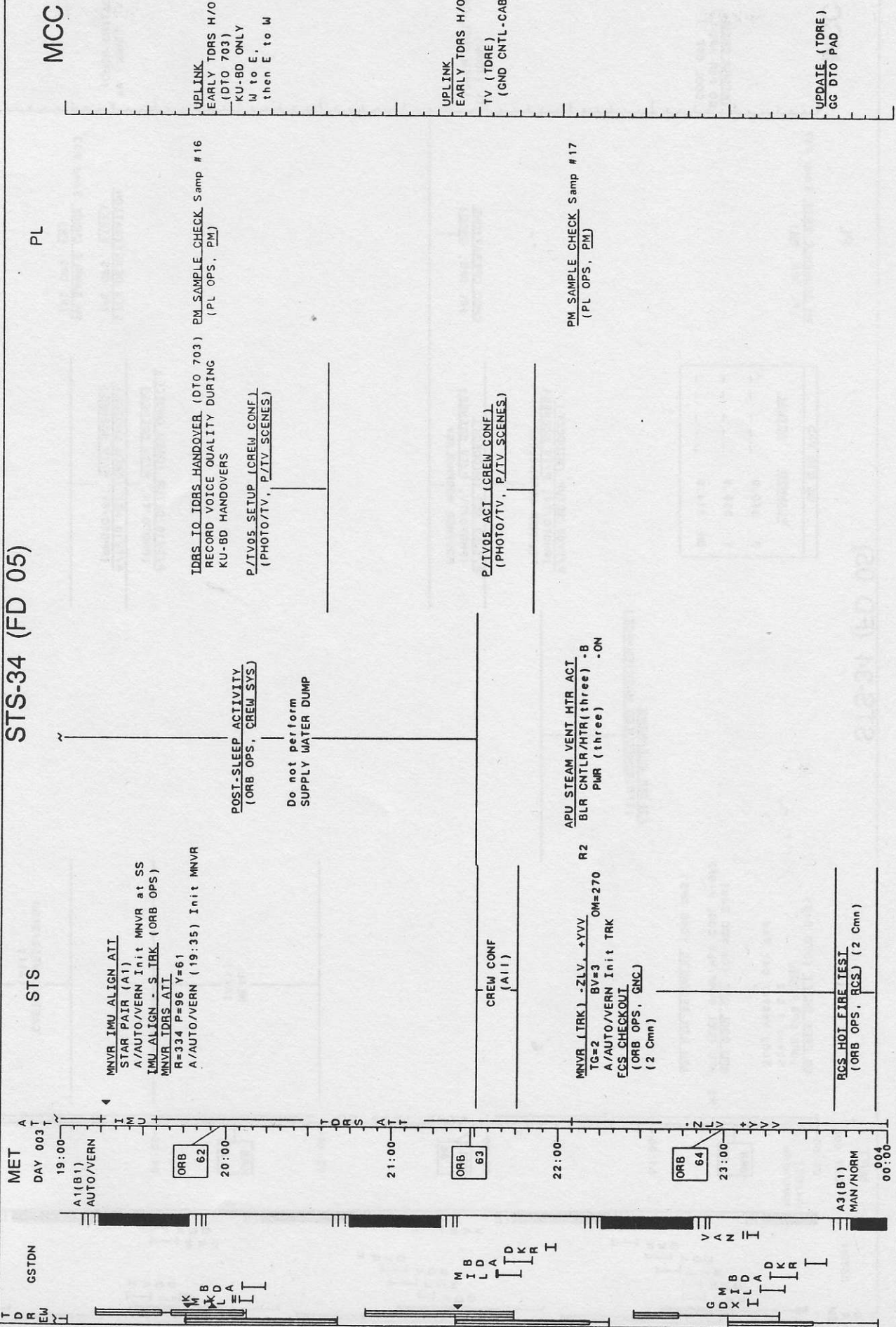
IMU_ALIGN_LOG
 REOD ID: -Y ____ , -Z ____ ANG ERR ____ 3
 1 ____ 2 ____
 ANG:
 ΔX () _ _ _ _ () _ _ _ _ () _ _ _ _
 ΔY () _ _ _ _ () _ _ _ _ () _ _ _ _
 ΔZ () _ _ _ _ () _ _ _ _ () _ _ _ _
 EXECUTION TIME: _ _ _ _ : _ _ _ _ : _ _ _ _
 _ _ _ _ / _ _ _ _ : _ _ _ _ : _ _ _ _

FD05 EZ ACTIVITIES:
 EXERCISE (1 Hr / All)
 FOOD_PREP/POSI. (Cue Card) (30 Min)
 IODINE_SAMPLES

EVENING IMU ALIGN:

IMU_ALIGN_LOG
 REOD ID: -Y ____ , -Z ____ ANG ERR ____ 3
 1 ____ 2 ____
 ANG:
 ΔX () _ _ _ _ () _ _ _ _ () _ _ _ _
 ΔY () _ _ _ _ () _ _ _ _ () _ _ _ _
 ΔZ () _ _ _ _ () _ _ _ _ () _ _ _ _
 EXECUTION TIME: _ _ _ _ : _ _ _ _ : _ _ _ _
 _ _ _ _ / _ _ _ _ : _ _ _ _ : _ _ _ _

STS-34 (FD 05)



MET DAY 003 T

STS

PL

MCC

19:00 A1(B1) AUTO/VERN
 20:00 ORB 62
 21:00 ORB 63
 22:00 ORB 64
 23:00 A3(B1) MAN/NORM
 00:00

MNVR IMU ALIGN ATT
 STAR PAIR (A1)
 A/AUTO/VERN Init MNVR at SS
 IMU ALIGN - S TRK (ORB OPS)
 MNVR IDRS ATT
 R-334 P=96 Y=61
 A/AUTO/VERN (19:35) Init MNVR

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

CREW CONF
 (ALL)

MNVR (TRK) -ZLV, +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN Init TRK
 ECS CHECKOUT
 (ORB OPS, GNC)
 (2 Cmn)

APU STEAM VENT HTR ACT
 BLR CNTLR/HTR(three) -B
 PWR (three) -ON

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

IDRS TO IDRS HANDOVER (DTO 703) PM SAMPLE CHECK Samp # 16
 RECORD VOICE QUALITY DURING
 KU-BD HANDOVERS

P/TV05 SETUP (CREW CONF)
 (PHOTO/TV, P/TV SCENES)

P/TV05 ACT (CREW CONF)
 (PHOTO/TV, P/TV SCENES)

PM SAMPLE CHECK Samp # 17
 (PL OPS, PM)

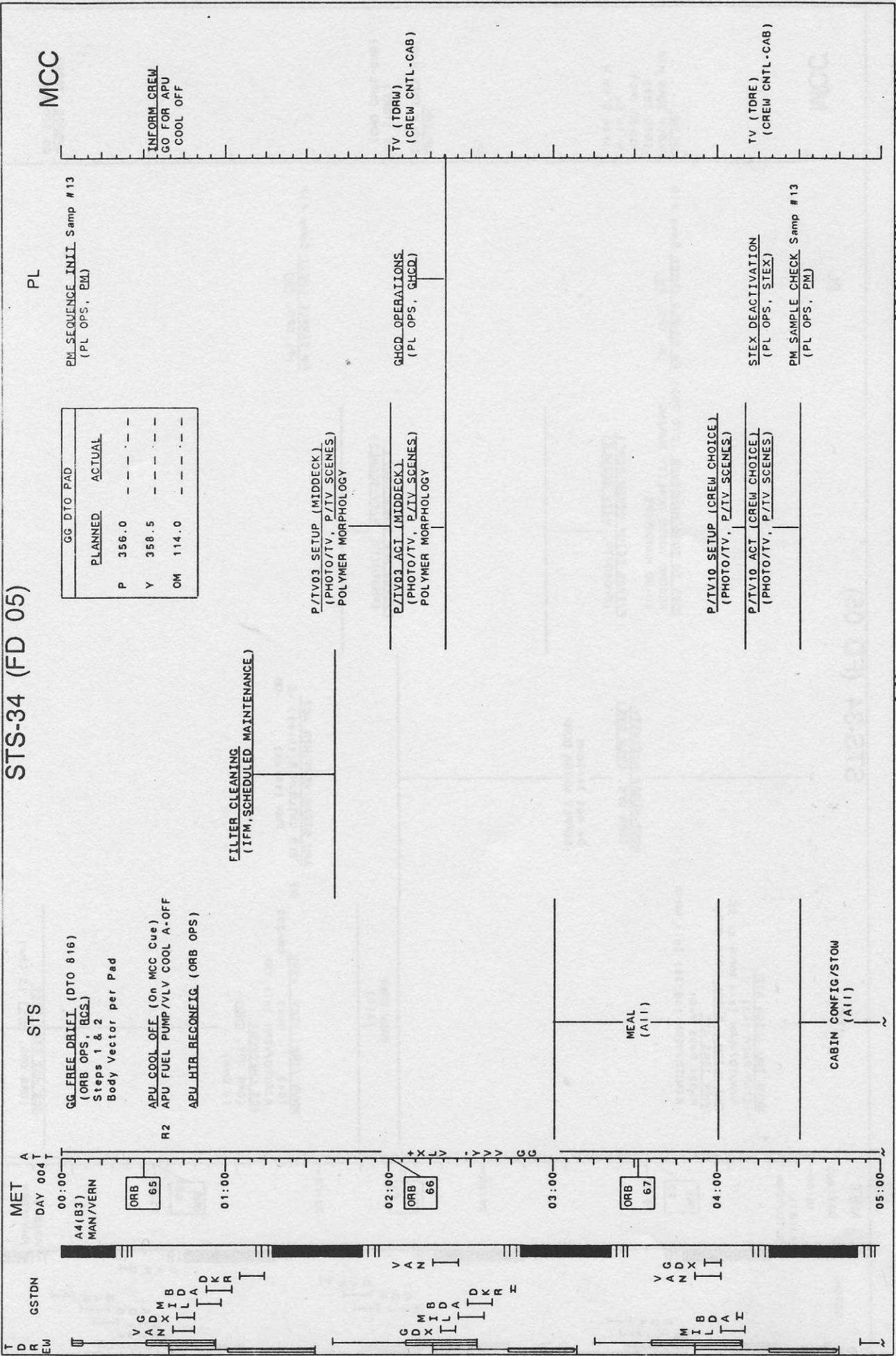
UPLINK
 EARLY TDRS H/O
 (DTO 703)
 KU-BD ONLY
 M to E.
 then E to W

UPLINK
 EARLY TDRS H/O
 TV (TDRE)
 (GND CNTL-CAB)

UPDATE (TDRE)
 GG DTO PAD

TDRS A I M U T TORS A T ZLV +YVV
 K M B X D L A I
 M B I D L A I K R I
 G M B X I D L A I K R I

STS-34 (FD 05)



MCC

PL

PM_SEQUENCE INIL Samp #13
(PL OPS, PM)

INFORM CREW
GO FOR APU
COOL OFF

TV (TDRM)
(CREW CNTL-CAB)

TV (TDRE)
(CREW CNTL-CAB)

FILTRER CLEANING
(IFM, SCHEDULED MAINTENANCE)

P/TV03 SETUP (MIDDECK)
(PHOTO/TV, P/TV SCENES)
POLYMER MORPHOLOGY

QHCD OPERATIONS
(PL OPS, QHCD)

P/TV03 ACT (MIDDECK)
(PHOTO/TV, P/TV SCENES)
POLYMER MORPHOLOGY

P/TV10 SETUP (CREW CHOICE)
(PHOTO/TV, P/TV SCENES)

STEX DEACTIVATION
(PL OPS, STEX)

PM_SAMPLE_CHECK Samp #13
(PL OPS, PM)

STS

GG_FREE BRIEF (DTC 816)
(ORB OPS, BCS)
Steps 1 & 2
Body Vector per Pad

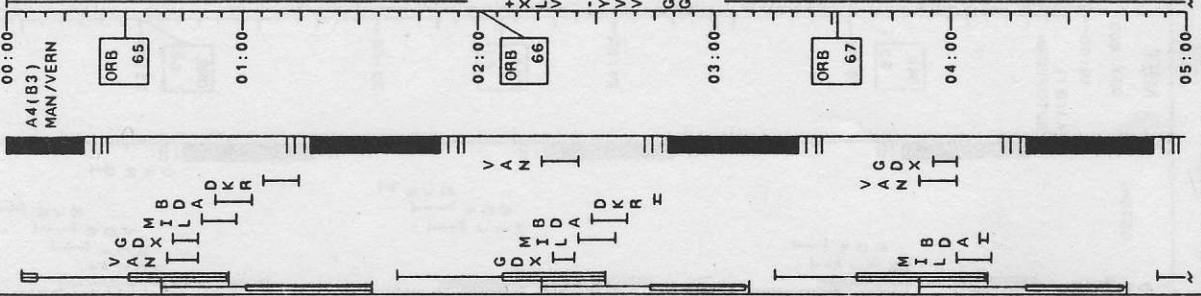
APU COOL OFF (On MCC Cue)
APU FUEL PUMP/VLV COOL A-OFF
APU_HIR RECONFIG. (ORB OPS)

MEAL
(ALL)

CABIN CONFIG/STOW
(ALL)

MET DAY 004 T

GSTDN



STS-34 (FD 05)

MET DAY 004 T

05:00

ORB 68

A4(B3)
MAN/VERN

06:00

CABIN CONFIG/STOW
(A11)

ORB 69

SALIVARY SCOP/DEX (DSO 457)
(MED, MED DSO's)

07:00

V A N I

08:00

ORB 70

GG FREE BRIEF, Step 3
(ORB OPS, RCS)
Change DAP A, B to A1, B1
MNVR IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN (08:35) Init MNVR
IMU ALIGN - S IRK (ORB OPS)
MNVR (IRK) -ZLV, +YVV
TG=2 BV=3 OM=270
A/AUTO/VERN Init TRK

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

RETINAL PHOTO (DSO 474)
(MED, MED DSO's)

Report today's IMAX
scenes and film usage

09:00

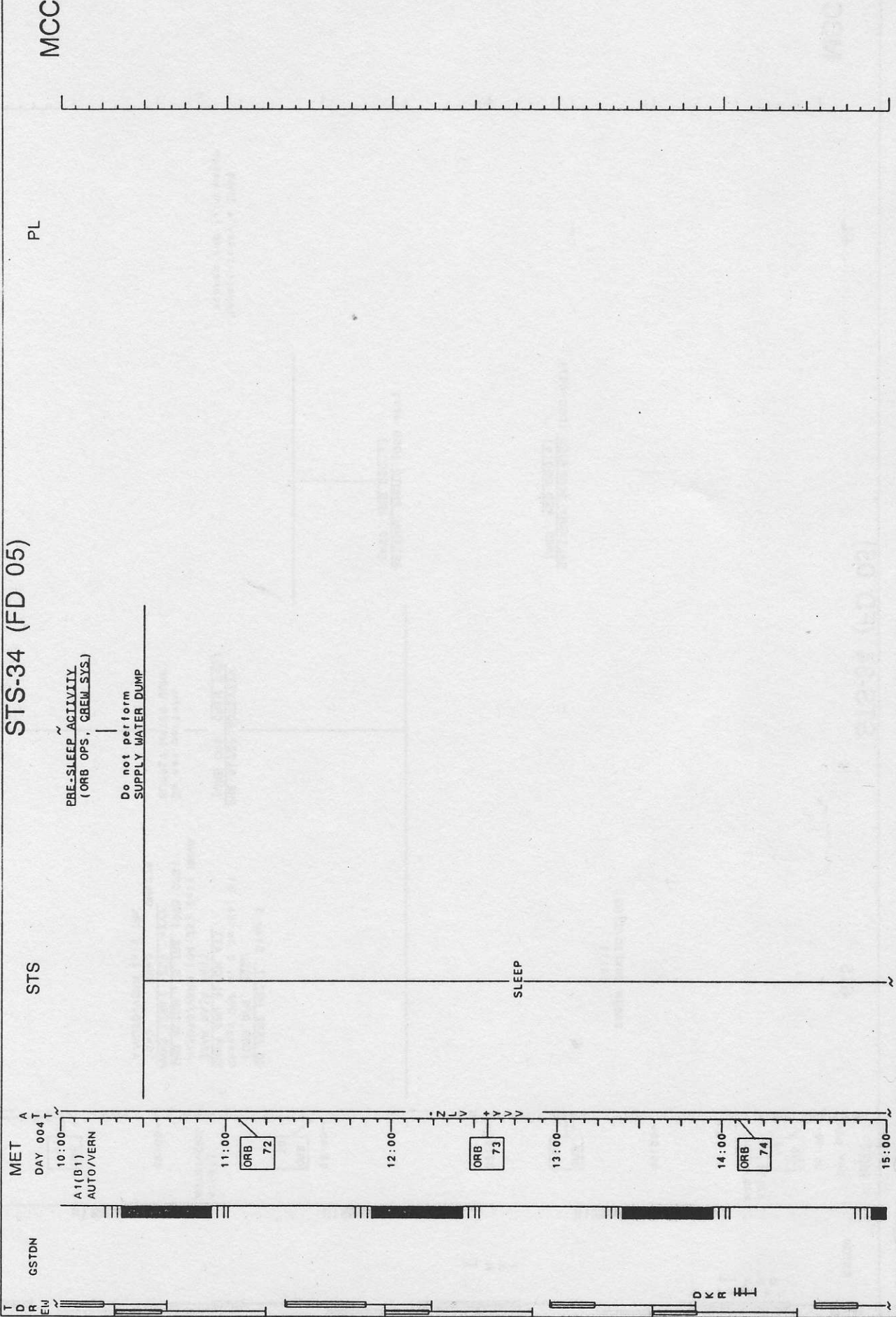
ORB 71

10:00

PL

MCC

STS-34 (FD 05)



STS-34 (FD 06)

MET DAY 004 T

15:00

16:00

17:00

18:00

19:00

20:00

GSTDN

T D R EW

D K R I

D K R I

D K R I

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A1(B1) AUTO/VERN

ORB 75

ORB 76

ORB 77

Z LV + Y V V

POST-SLEEP ACTIVITY (ORB OPS, CREW SYS)

Do not perform SUPPLY WATER DUMP

M B I D L A = I

STS

SLEEP

PL

MCC

99/07789

FLY PLN/347/FIN

3-35

STS-34 (FD 06) DATA

MORNING IMU ALIGN:

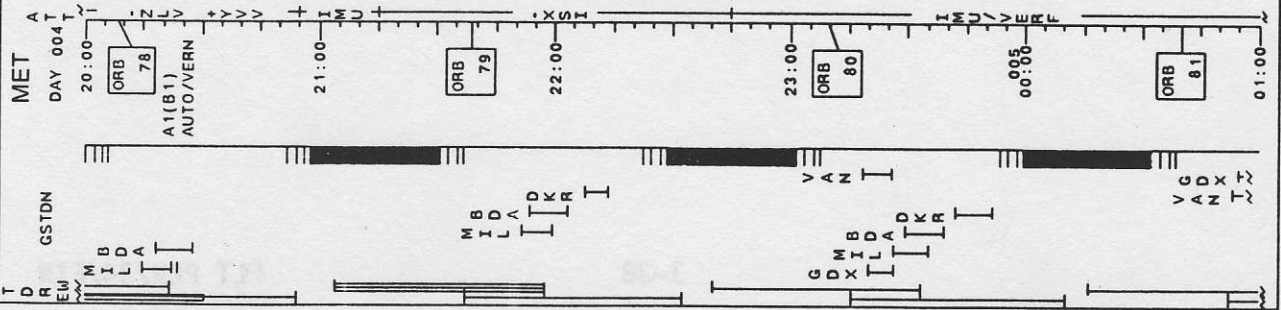
```

IMU_ALIGN_LOG
READ ID:
-Y ____ / -Z ____ ANG ERR ____ 3
          1          2
ANG:
ΔX ( ) _ _ _ _ ( ) _ _ _ _ ( ) _ _ _ _
ΔY ( ) _ _ _ _ ( ) _ _ _ _ ( ) _ _ _ _
ΔZ ( ) _ _ _ _ ( ) _ _ _ _ ( ) _ _ _ _
EXECUTION TIME:
- - / - - : - - -
    
```

```

EZ ACTIVITIES BEFORE LEAVING FLT PLN:
AIR SAMPLE
Rcd MET on bottle
FLUID LOADING PREP
Fill 4 drink containers with
8 oz H2O each (per person)
IODINE SAMPLES
    
```

STS-34 (FD 06)



Go to DEORBIT PREP at 4/21:45 MET

PL

MCC

PM STOW
(PL OPS, PM)

UPDATE
CRT TIMER
SETUP PAD

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CONTINGENCY TIMELINES

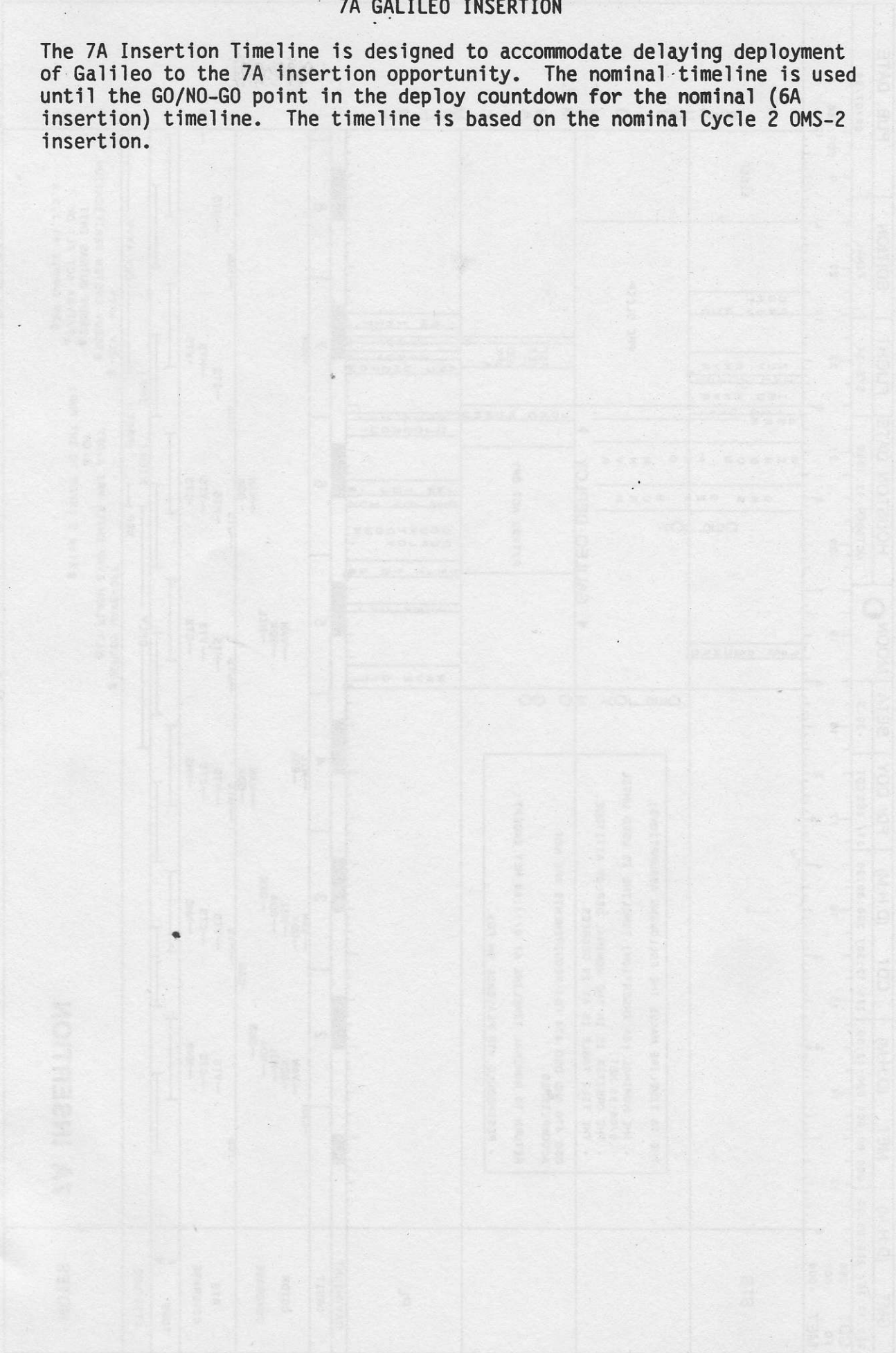
CONTINGENCY
TIMELINES

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CONTINGENCY
TIMELINES

7A GALILEO INSERTION

The 7A Insertion Timeline is designed to accommodate delaying deployment of Galileo to the 7A insertion opportunity. The nominal timeline is used until the GO/NO-GO point in the deploy countdown for the nominal (6A insertion) timeline. The timeline is based on the nominal Cycle 2 OMS-2 insertion.



7A
GALILEO

8A GALILEO INSERTION

The 8A Insertion Timeline is designed to accommodate delaying deployment of Galileo for the 8A insertion opportunity. The 7A insertion timeline is used up to the GO/NO-GO decision point in the deploy countdown. An 8A insertion will be considered if a high probability of deploying exists or if a 16A insertion cannot be accommodated due to orbiter or IUS/Galileo problems. Additional assumptions are shown on page 4B-2. The timeline is based on the nominal Cycle 2 OMS-2 insertion.

8A
GALILEO

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
286:05:30 / 286:17:30	000:12:00 / 001:00:00	286:00:30 / 286:12:30	02 / 286 CDT	-32.6		OCTOBER 13, 1989	STS-34	FINAL	09/07/89
CDT :286									
FD :001									
MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TORS									
ATTITUDE									
NOTES:									

RETURN TO NOMINAL TIMELINE

RETURN TO NOMINAL TIMELINE AT 1/00:00 MET EXCEPT:
 - PM ACTIVITIES AND DSO 457 SAMPLES REQUIRE RESCHEDULING.
 - RESCHEDULE VTR PLAYBACK ON FD2.

8A INSERTION

- DSO 457 SALIVARY SCOP/DEX
- SSBV OUTGAS TERM
- AFT STATION
- -ZLV, +XVV
- SSBV CAL INIT
- DSO 470 ARTERY BLOOD VELOCITY
- SSBV CAL TERM

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16A GALILEO INSERTION

The 16A Insertion Timeline is designed to accommodate delaying deployment of Galileo for the 16A insertion opportunity. The timeline assumes an attempt at 7A insertion failed at the GO/NO-GO decision point in the deploy countdown procedure. The timeline begins during crew pre-sleep and assumes the tilt table is at 29°, and that NASCOM commanding is available. Additional assumptions are shown on page 4C-2. The timeline is based on the nominal Cycle 2 OMS-2 insertion.

16A
GALILEO

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
285:17:30 / 286:05:30	000:00:00 / 000:12:00	285:12:30 / 286:00:30	01 / 285 CDT	-30.9		OCTOBER 12, 1989	STS-34	FINAL	09/07/89
CDT :285									
FD :001									
MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN									
COVERAGE									
RTS									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p>THE 16A TIMELINE MAKES THE FOLLOWING ASSUMPTIONS:</p> <ul style="list-style-type: none"> - THE 7A INSERTION TIMELINE IS USED UNTIL 0/07:30 MET - THE TILY TABLE IS AT 29 DEGREES PRIOR TO ENTERING THE 16A TIMELINE. - RTG COOLING IS MAINTAINED UNTIL JUST BEFORE DEPLOY. <p>DSO 470 AND DSO 474 FD1 REQUIREMENTS ARE NOT ACCOMPLISHED. DSO 457 FD2 ACTIVITIES ARE NOT ACCOMPLISHED.</p>								

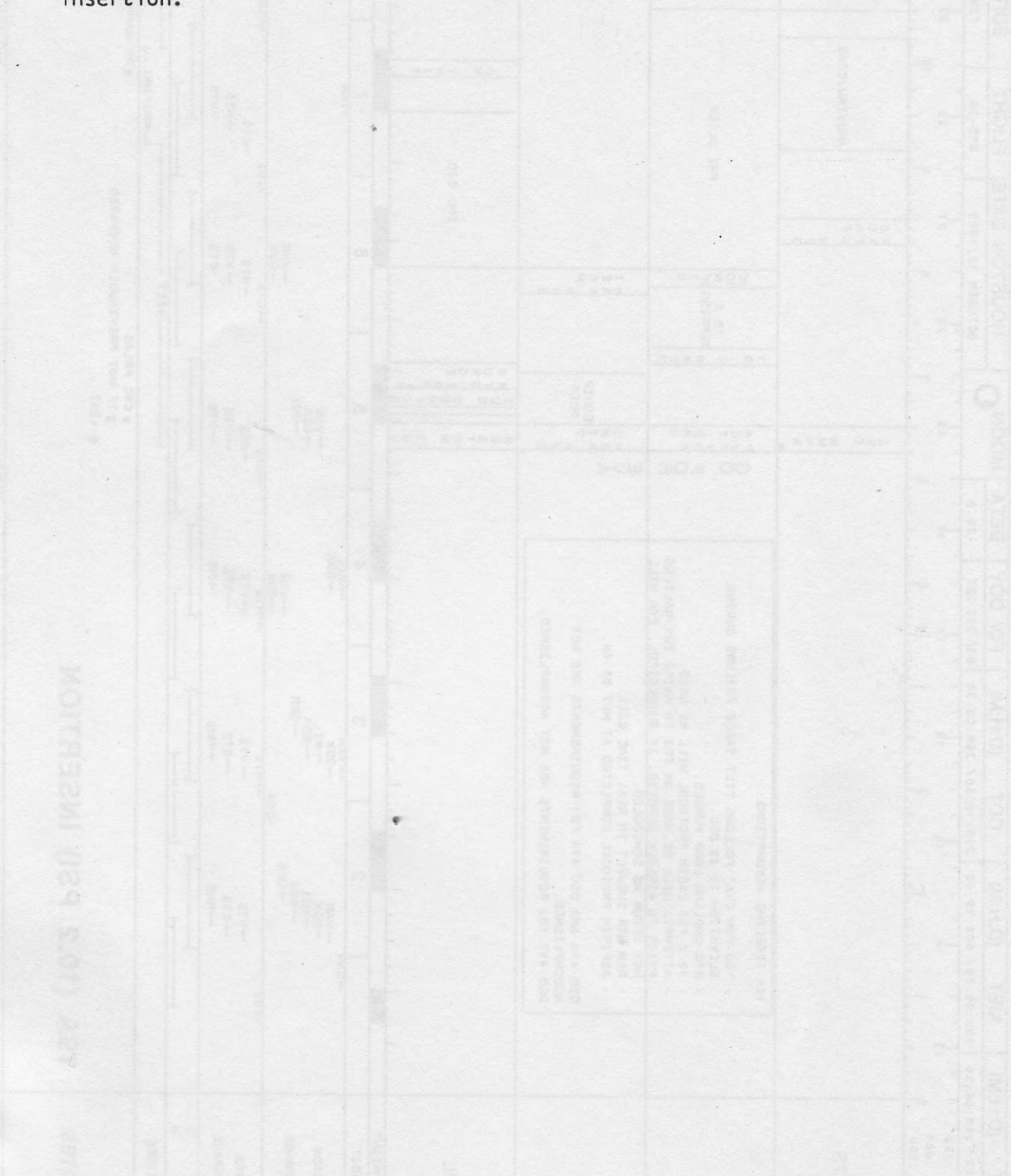
16A INSERTION

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
286:05:30 / 286:17:30	000:12:00 / 001:00:00	286:00:30 / 286:12:30	02 / 286 CDT	-32.6		OCTOBER 13, 1989	STS-34	FINAL	09/07/89
CDT :286									
FD :001									
MET :000									
STS	<p>SLEEP</p> <p>AMU/TMU SEQ</p> <p>POST SLEEP</p> <p>DEPLOY</p> <p>W I N D O W P R O M N V R</p> <p>A S R M N V R & INIT GG</p> <p>LOAD PCMMU</p> <p>GALILEO DEPLOY</p> <p>P/TVO2 ACT DPY</p> <p>VPLA VTR SETUP</p> <p>VT R Y B A C K</p> <p>P M I N I T</p> <p>C L O S E O U T</p> <p>J U R L O T B L</p> <p>D E P L O T D O I U S</p> <p>T I L T O T B 2 P I U S</p> <p>I U S / P I S A P I U S</p> <p>S T E X C A L</p> <p>X F E E R S V</p> <p>I U S P D C O</p> <p>P A T T V D 2 P Y</p> <p>P R O T I</p> <p>S E P I V I E W I</p> <p>AMU/IMU</p> <p>SEP</p> <p>PROT I</p> <p>XIV YV GG</p> <p>D T O 8 1 6 G R A V I T Y G R A D I E N T A T T I T U D E C O N T R O L</p> <p>I U S / P I L O C K (T D R W)</p> <p>P M S A M P L E # 4, 5, 6</p>								
PL	<p>RETURN TO THE NOMINAL TIMELINE AT 1/00:00 EXCEPT:</p> <ul style="list-style-type: none"> - MAINTAIN GG ATTITUDE UNTIL IMU ALIGN IN PRESLEEP. DELETE GG DTO ON FD5. - BEGIN SSBV OUTGAS IN PRESLEEP. RESCHEDULE ALL OTHER SSBV ACTIVITIES. - DELETE IMAX AND DSO 457 ACTIVITIES ON FD2. - RESCHEDULE PM SAMPLES. - ADD -Z COAS CAL TO THE EVENING IMU ALIGN. 								
DAY/NIGHT	<p>9 10 11 12 13 14 15 16</p> <p>ORBIT</p> <p>—DKR</p> <p>—BDA —MAD</p> <p>—DKR —MAD</p> <p>—CAN —MIL —BDA —MAD</p> <p>—CAN —MIL —IUS</p> <p>—NHS —IOS</p>								
GSTDN COVERAGE	<p>—HTS</p> <p>—GTS</p> <p>—GTS</p> <p>—GTS</p> <p>—DKR —MAD</p> <p>—CAN —MIL —BDA —MAD</p> <p>—CAN</p>								
RTS COVERAGE	<p>—HTS</p> <p>—GTS</p> <p>—GTS</p> <p>—GTS</p> <p>—DKR —MAD</p> <p>—CAN —MIL —BDA —MAD</p> <p>—CAN</p>								
TDRS E W	<p>—HTS</p> <p>—GTS</p> <p>—GTS</p> <p>—GTS</p> <p>—DKR —MAD</p> <p>—CAN —MIL —BDA —MAD</p> <p>—CAN</p>								
ATTITUDE	<p>—HTS</p> <p>—GTS</p> <p>—GTS</p> <p>—GTS</p> <p>—DKR —MAD</p> <p>—CAN —MIL —BDA —MAD</p> <p>—CAN</p>								
NOTES:	<p>16A INSERTION</p> <p>TRACKING ARC</p>								

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19A GALILEO (10.2 PSIA EVA) INSERTION

The 19A Insertion Timeline is designed to accommodate delaying deployment of Galileo for the 19A insertion opportunity following an EVA to manually raise the tilt table. The decision to perform an EVA must be made by 0/6:15 MET in order to meet EVA preparation and equipment checkout constraints. The 10.2 psi cabin EVA protocol is used. There will be no Flight Day 1 EVA. The Contingency EVA Operations STS-34 Flight Supplement, Contingency EVA for Payload Failures Section, is the source document for the 19A insertion timeline. Additional assumptions are shown on page 4D-2. The timeline is based on the nominal Cycle 2 OMS-2 insertion.



19A
GALILEO

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
285:17:30 / 286:05:30	000:00:00 / 000:12:00	285:12:30 / 286:00:30	01 / 285 CDT	-30.9	☉	OCTOBER 12, 1989	STS-34	FINAL	09/07/89
CDT :285									
FD :001									
MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN									
COVERAGE									
RTS									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p>19A TIMELINE ASSUMPTIONS:</p> <ul style="list-style-type: none"> "GO FOR EVA" FOLLOWS TILT TABLE FAILURE DURING ELEVATION TO 29 DEG. RIG COOLING LOOP PURGED. 10.2 PSI CABIN PROTOCOL WILL BE USED. ATTEMPTS WILL BE MADE ON FD2 TO RAISE IUS/GALILEO PRIOR TO AIRLOCK DEPRESS. IF SUCCESSFUL, EVA WILL NOT OCCUR AS SCHEDULED. REM HTR SUBJECT TO REAL TIME CALL. ASPIRIN PROTOCOL COMPLETED AT MET 05:45. <p>DSO 470 AND DSO 474 FD1 REQUIREMENTS ARE NOT ACCOMPLISHED.</p> <p>DSO 457 FD2 REQUIREMENTS ARE NOT ACCOMPLISHED.</p>								

19A (10.2 PSI) INSERTION

- ☐ CYC PRLAS
- IF NOT PREVIOUSLY OPERATED
- *ZSI

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
286:17:30 / 287:05:30	001:00:00 / 001:12:00	286:12:30 / 287:00:30	02 / 286 CDT	-34.2	☉	OCTOBER 13, 1989	STS-34	FINAL	09/07/89
CDT :286									
FD :002									
MET :001									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN									
COVERAGE									
RTS									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p>19A (10.2 PSI) INSERTION</p> <ul style="list-style-type: none"> ● PM SAMPLES #5,6,7,8,9 ● -ZLV, +XVV ● AFT STATION ● -ZLV, +XVV ● SSBV SYSTEM VERIFICATION ● SSBV OUTGAS INIT ● P/TV04 ACT FLT DK 								

RETURN TO NOMINAL TIMELINE

RETURN TO NOMINAL TIMELINE AT 01:11:00 MET WITH THE EXCEPTION OF THE FOLLOWING ACTIVITIES:

- COMPLETE ASPIRIN PROTOCOL
- RESCHEDULE SSBV, PM, ICE CRYSTALS ACTIVITIES
- POST EVA ENTRY PREP

STS-34 (FD 01) 19A (EVA) INSERTION

MET DAY 000
05:00
06:00
07:00
08:00
09:00
10:00

PL
MCC

See page 4D-2 for 19A TIMELINE Assumptions.

COAS CALIBRATION LOG
STAR ID: -Z 37, ALPHERATZ
STAR AVAIL: 09:18 TO 10:04
-Z Δ BIAS
UPDATE TIME: / /

Change DAP A to A1
MNVR +ZSI ALL V=2
R=162 P=83
A/AUTO/VERN (06:15) Init MNVR

P/TV02 ACT (SAT DEPLOY)
(PHOTO/TV, P/TV SCENES)

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

RESTOW IUS (UMBIL ATTACHED)
(IUS DPV, CONT OPS)
CYCLE IUS PRLAS (I req'd)
(IUS DPV, CONT OPS)
IUS OVERNIGHT CONFIGURATION
(IUS DPV, CONT OPS)
RIG EARLY PURGE
(IUS DPV, CONT OPS)

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

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

10.2 PSI CABIN CONFIG
(EVA, 10.2 PSI CABIN)

EMU CHECKOUT AT 10.2 PSI
(EVA, EMU CHECKOUT)
(2 Cmn)

IMU ALIGN LOG
REC'D ID: -V 1 -Z ANG ERR 2 3
ANG: ΔX () () () () () () () ()
ΔY () () () () () () () ()
ΔZ () () () () () () () ()
EXECUTION TIME: / /

PRIVATE MEDICAL CONFERENCE

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Do not perform
SUPPLY WATER DUMP

019 COAS PWR-OFF Mount COAS-AFT

AMU/IMU SEQUENCE
(IUS DPV, PRE DPY CHECKS)

NOTE: AFTER IMU ALIGN.
PERFORM COAS CAL AT AFT
STATION.

IOSSH

GTS

HTSV

IS

(A1)B5
MAN/VERN

PM SEQUENCE INIT Samp # 1, 2, 3, 4
(PL OPS, PM)

09/07/78

4D-5

FLY PLN/347FIN

STS-34 (FD 01) 19A (EVA) INSERTION

MCC

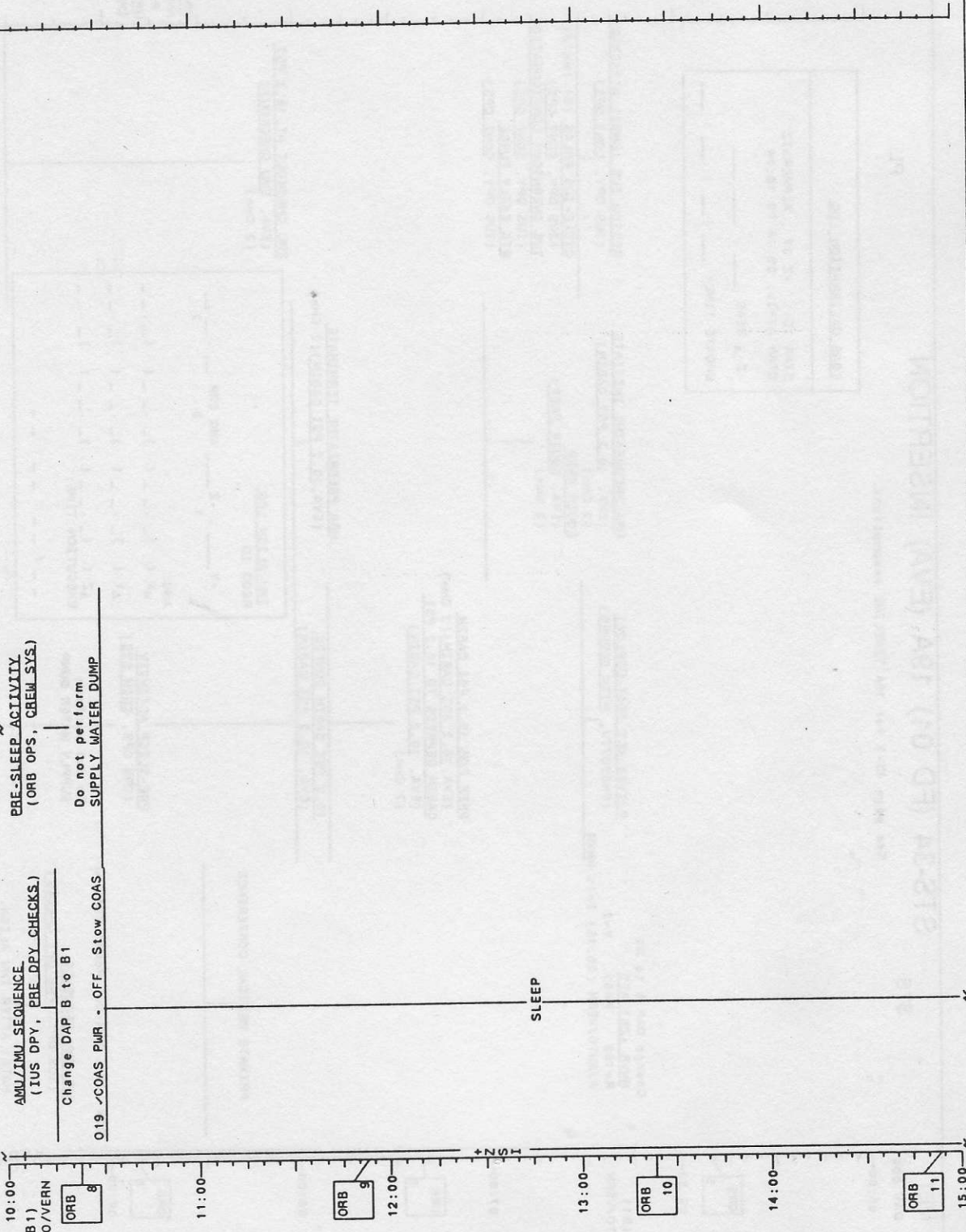
PL

STS

MET

DAY 000

GSTDN

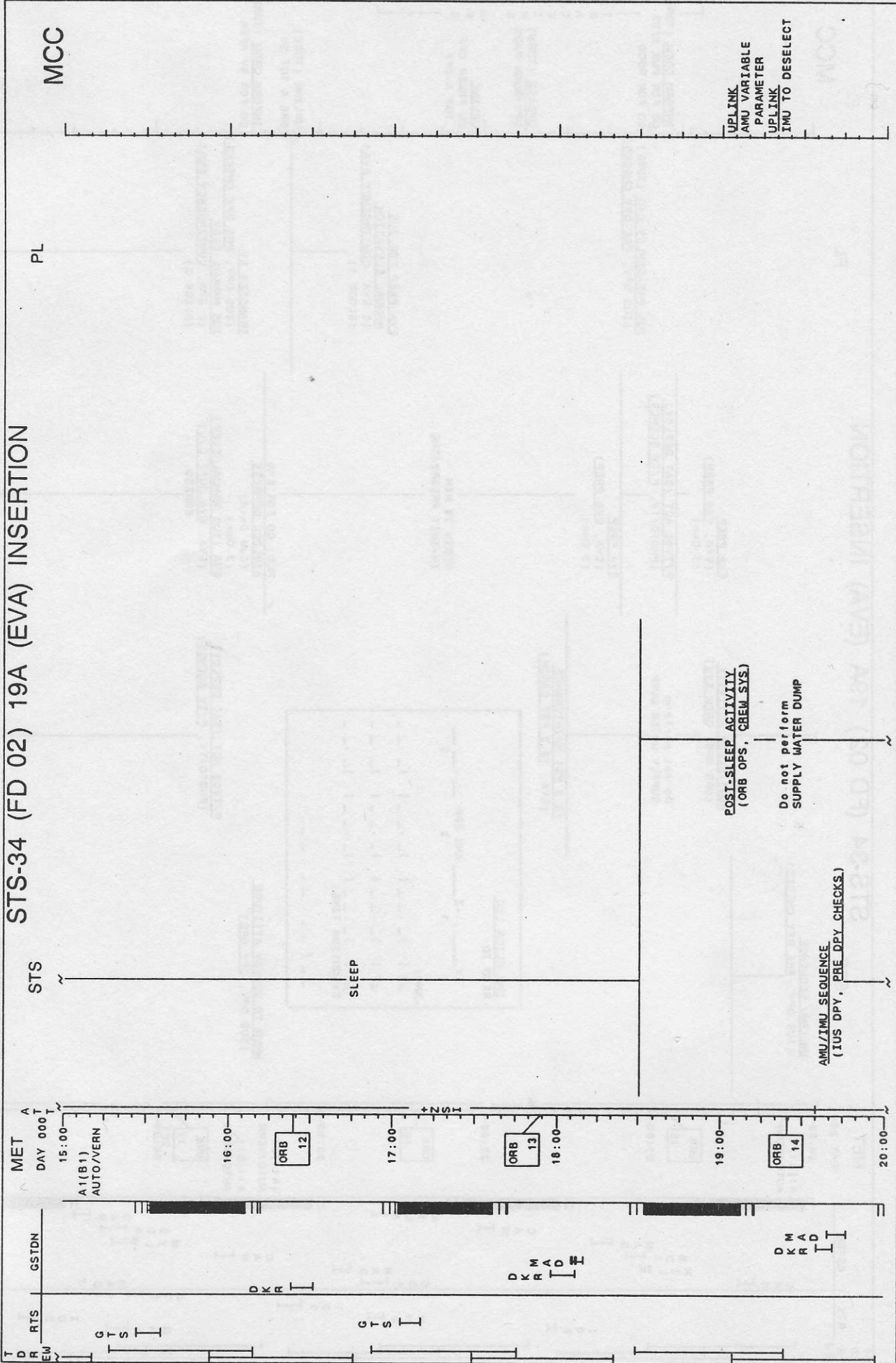


09/07/89

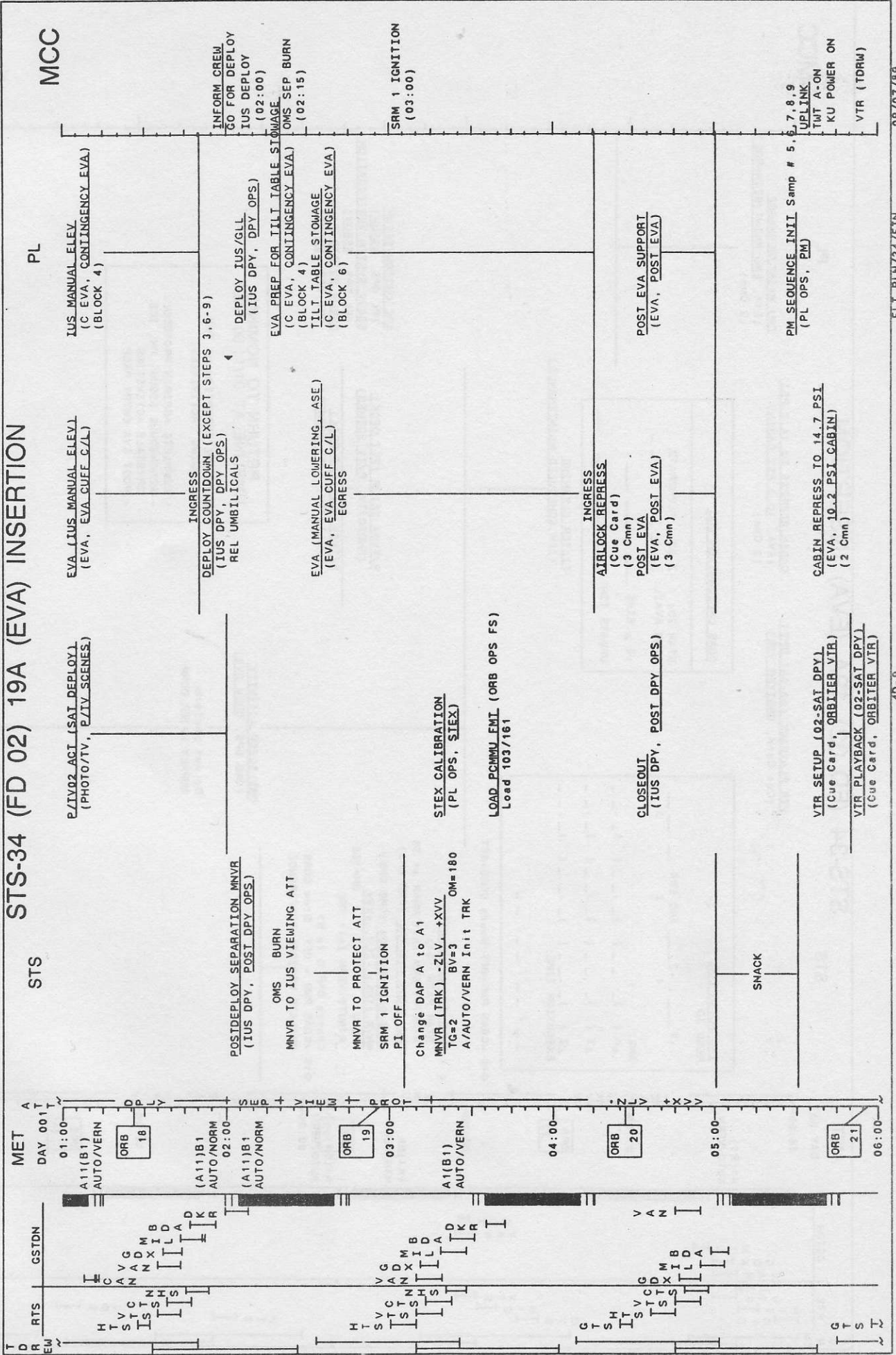
PLT PLN/34/FIN

40-6

STS-34 (FD 02) 19A (EVA) INSERTION



STS-34 (FD 02) 19A (EVA) INSERTION



20A GALILEO (14.7 PSIA EVA) INSERTION

The 20A Insertion Timeline is designed to accommodate delaying deployment of Galileo until the 20A insertion opportunity following an EVA to manually raise the tilt table. The decision to perform an EVA must be made by 0/6:15 MET in order to meet EVA preparation and equipment checkout constraints. Analysis shows that supply water will rapidly be used during RTG cooling. The FES will be turned off prior to crew sleep on FD1 in order to increase supply water quantities. The FES will be turned back on at the beginning of FD2. RTG cooling continues until deploy on 20A. As a result, 14.7 psi cabin EVA protocol is used. There will be no FD1 EVA. The Contingency EVA Operations STS-34 Flight Supplement, Contingency EVA for Payload Failures Section, is the source document for the 20A insertion timeline. Additional assumptions are shown on page 4E-2. The timeline is based on the nominal Cycle 2 OMS-2 insertion.

20A
GALILEO

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
286:05:30 / 286:17:30	000:12:00 / 001:00:00	286:00:30 / 286:12:30	02 / 286 CDT	-32.6		OCTOBER 13, 1989	STS-34	FINAL	09/07/89
CDT :286									
FD :002									
MET :000									MET:001
STS	SLEEP					ANMU/IMU SEQ			
						POST SLEEP			
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS EW									
ATTITUDE									
NOTES:	20A (14.7 PSI EVA) INSERTION								

● PRE-DPY CK (TDRE)

TRACKING ARC

09/07/89

FLY PLN/34/FIN

4E-3

GMT (D:H:M)	MET (D:H:M)	CDT (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
286:17:30 / 287:05:30	001:00:00 / 001:12:00	286:12:30 / 287:00:30	02 / 286 CDT	-34.2	☉	OCTOBER 13, 1989	STS-34	FINAL	09/07/89
CDT :286									
FD :002									
MET :001									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN									
COVERAGE									
RTS									
COVERAGE									
TDRS									
ATTITUDE									
NOTES:	<p>20A (14.7 PSI EVA) INSERTION</p> <p>TRACKING ARC</p>								

RETURN TO NOMINAL TIMELINE

RETURN TO NOMINAL TIMELINE AT 01/11:00 MET WITH THE EXCEPTION OF THE FOLLOWING ACTIVITIES:

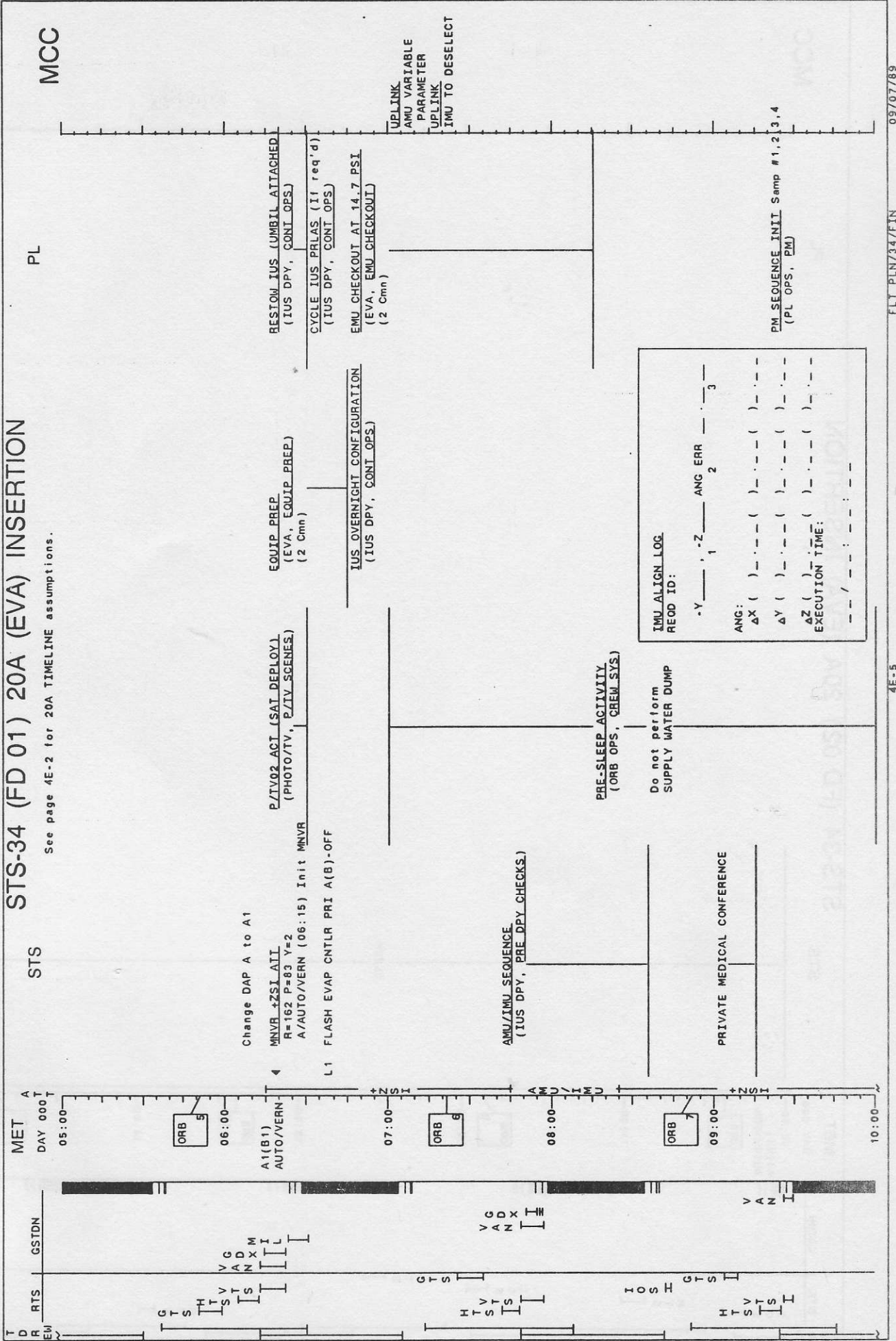
- COMPLETE ASPIRIN PROTOCOL
- RESCHEDULE SSBUV, PM, ICE CRYSTALS ACTIVITIES
- POST EVA ENTRY PREP

20A (14.7 PSI EVA) INSERTION

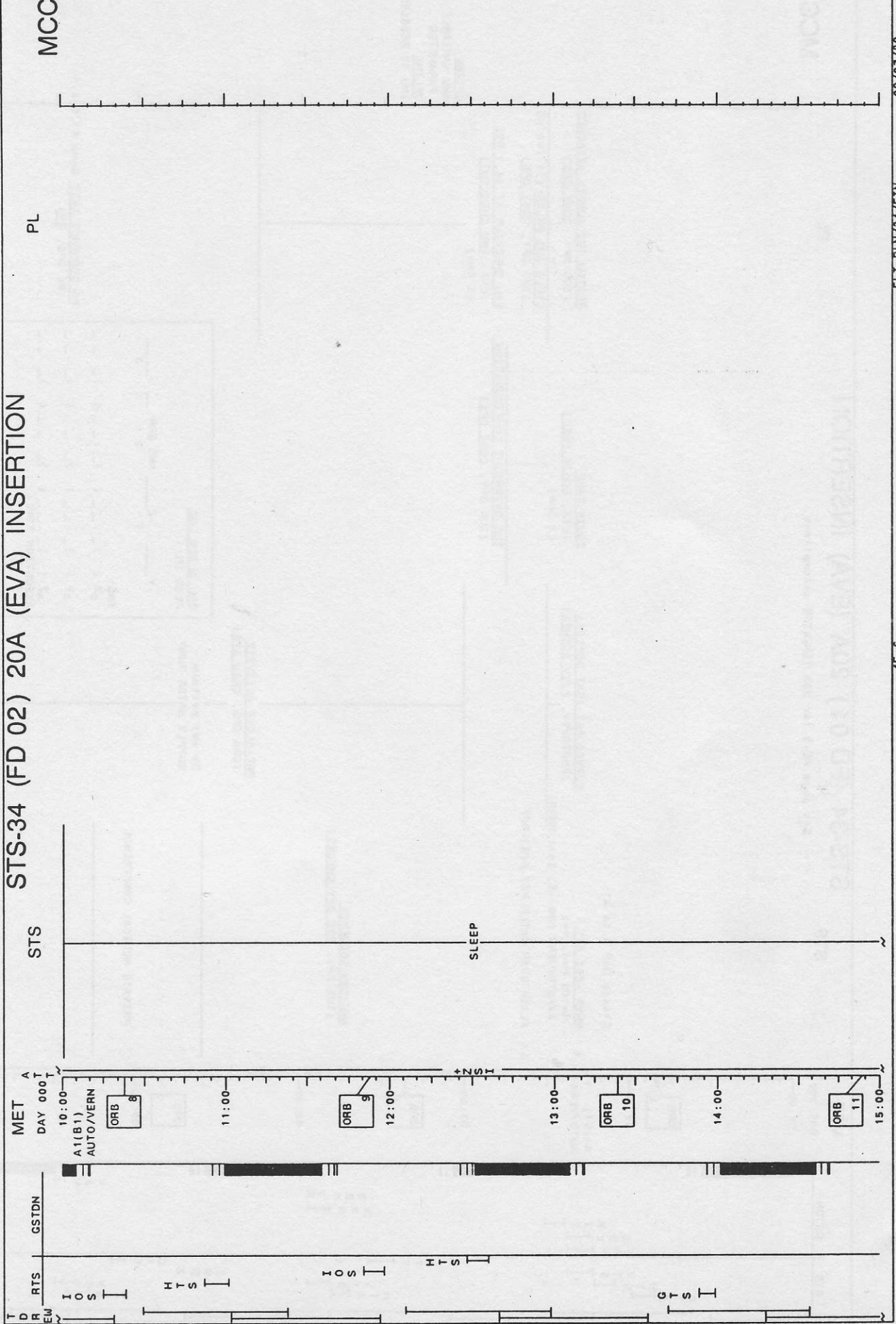
TRACKING ARC

STS-34 (FD 01) 20A (EVA) INSERTION

See page 4E-2 for 20A TIMELINE assumptions.



STS-34 (FD 02) 20A (EVA) INSERTION

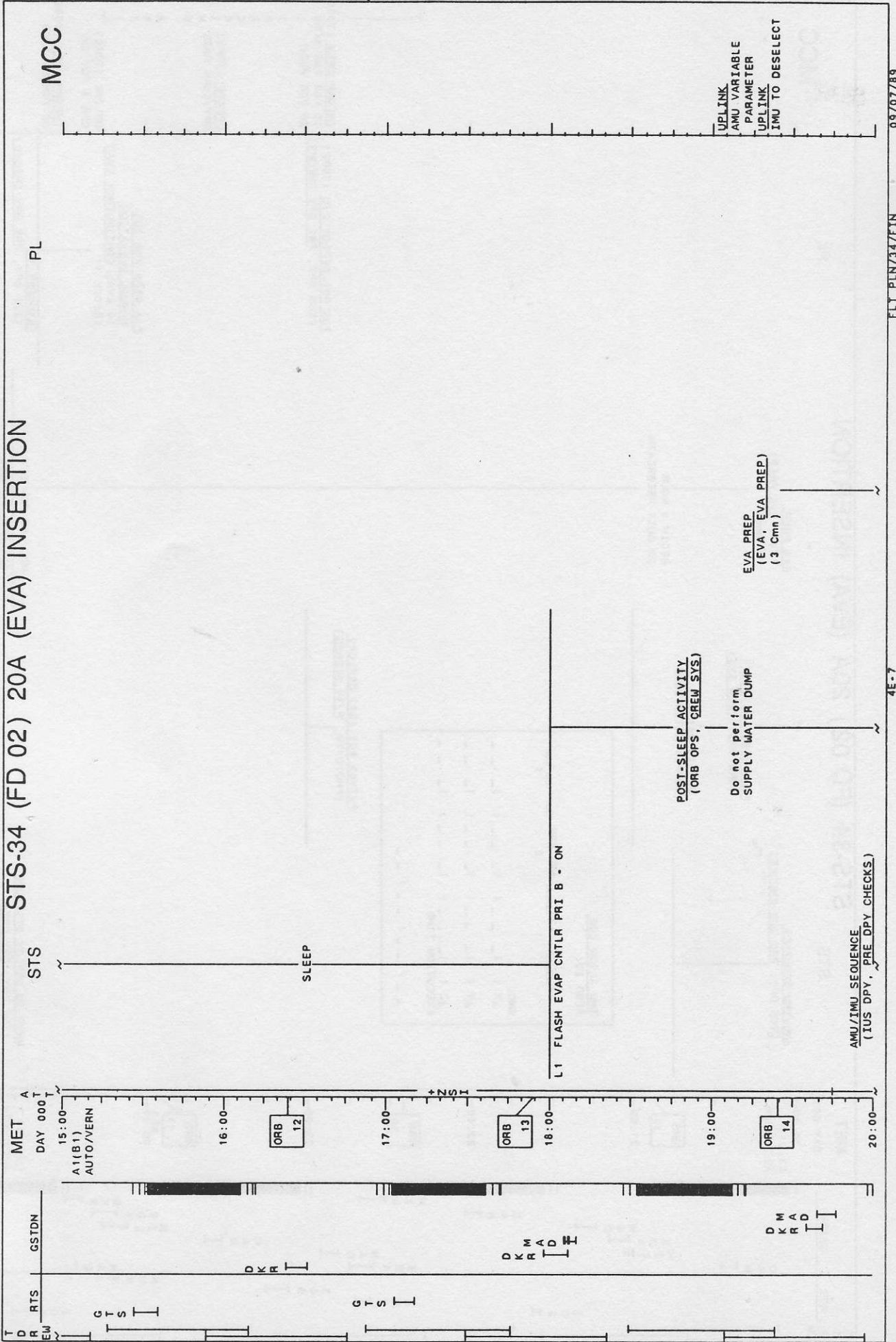


09/07/89

FLY PLN/347/FIN

4E-6

STS-34 (FD 02) 20A (EVA) INSERTION



STS-34 (FD 02) 20A (EVA) INSERTION

MCC

PL

STS

MET

GSTDN

RTS

EW

DAY 001 T

06:00

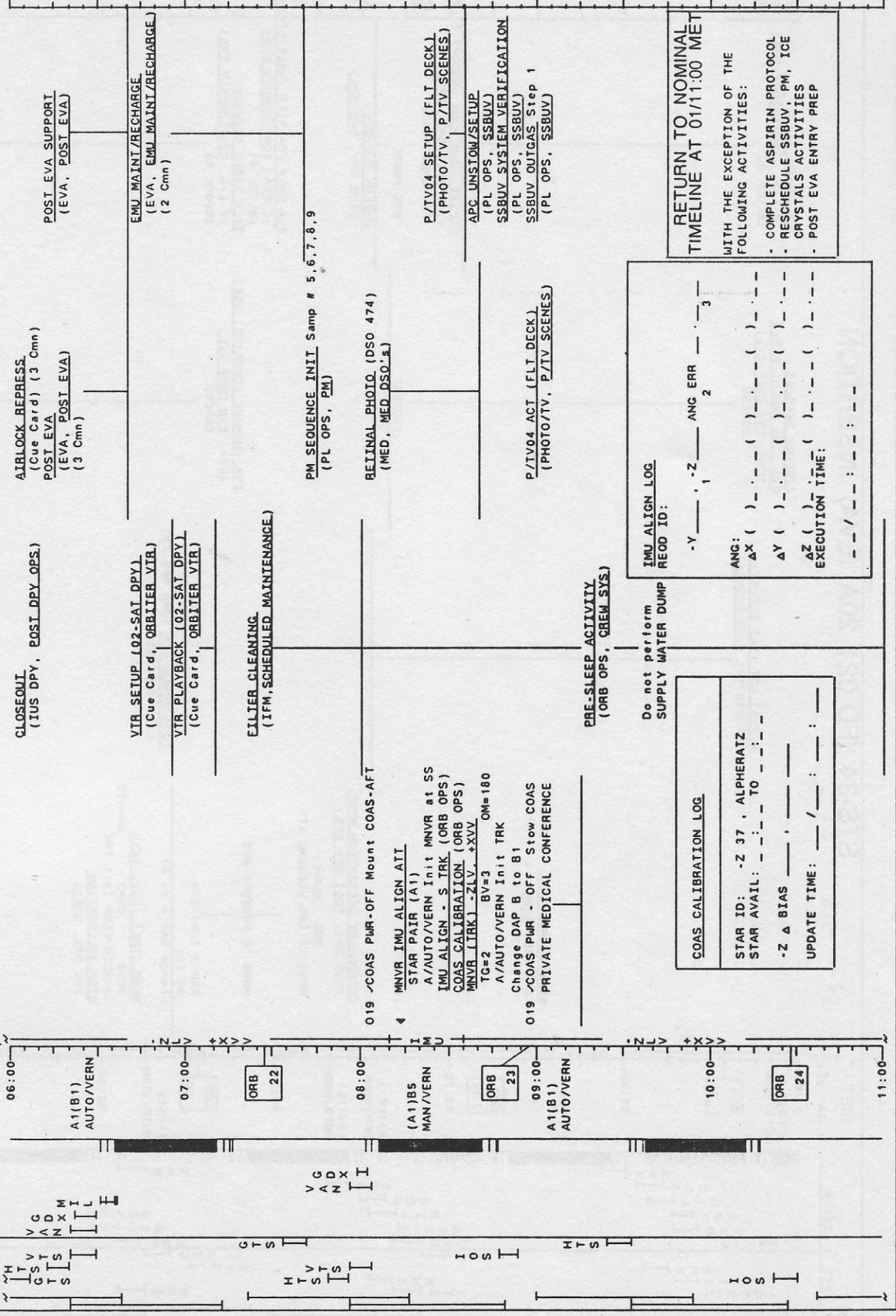
07:00

08:00

09:00

10:00

11:00



09/07/89

FLT PLN/34/FIN

4E-10

IMAX OPPORTUNITIES

LINE	ITEM	QTY	UNIT	PRICE	TOTAL	DATE	STATUS	REMARKS
14	1001-00-00	1	EA	100.00	100.00	08/01/00	OK	
15	1001-00-01	1	EA	100.00	100.00	08/01/00	OK	
16	1001-00-02	1	EA	100.00	100.00	08/01/00	OK	
17	1001-00-03	1	EA	100.00	100.00	08/01/00	OK	
18	1001-00-04	1	EA	100.00	100.00	08/01/00	OK	
19	1001-00-05	1	EA	100.00	100.00	08/01/00	OK	
20	1001-00-06	1	EA	100.00	100.00	08/01/00	OK	
21	1001-00-07	1	EA	100.00	100.00	08/01/00	OK	
22	1001-00-08	1	EA	100.00	100.00	08/01/00	OK	
23	1001-00-09	1	EA	100.00	100.00	08/01/00	OK	
24	1001-00-10	1	EA	100.00	100.00	08/01/00	OK	
25	1001-00-11	1	EA	100.00	100.00	08/01/00	OK	
26	1001-00-12	1	EA	100.00	100.00	08/01/00	OK	
27	1001-00-13	1	EA	100.00	100.00	08/01/00	OK	
28	1001-00-14	1	EA	100.00	100.00	08/01/00	OK	
29	1001-00-15	1	EA	100.00	100.00	08/01/00	OK	
30	1001-00-16	1	EA	100.00	100.00	08/01/00	OK	
31	1001-00-17	1	EA	100.00	100.00	08/01/00	OK	
32	1001-00-18	1	EA	100.00	100.00	08/01/00	OK	
33	1001-00-19	1	EA	100.00	100.00	08/01/00	OK	
34	1001-00-20	1	EA	100.00	100.00	08/01/00	OK	
35	1001-00-21	1	EA	100.00	100.00	08/01/00	OK	
36	1001-00-22	1	EA	100.00	100.00	08/01/00	OK	
37	1001-00-23	1	EA	100.00	100.00	08/01/00	OK	
38	1001-00-24	1	EA	100.00	100.00	08/01/00	OK	
39	1001-00-25	1	EA	100.00	100.00	08/01/00	OK	
40	1001-00-26	1	EA	100.00	100.00	08/01/00	OK	
41	1001-00-27	1	EA	100.00	100.00	08/01/00	OK	
42	1001-00-28	1	EA	100.00	100.00	08/01/00	OK	
43	1001-00-29	1	EA	100.00	100.00	08/01/00	OK	
44	1001-00-30	1	EA	100.00	100.00	08/01/00	OK	
45	1001-00-31	1	EA	100.00	100.00	08/01/00	OK	
46	1001-00-32	1	EA	100.00	100.00	08/01/00	OK	
47	1001-00-33	1	EA	100.00	100.00	08/01/00	OK	
48	1001-00-34	1	EA	100.00	100.00	08/01/00	OK	
49	1001-00-35	1	EA	100.00	100.00	08/01/00	OK	
50	1001-00-36	1	EA	100.00	100.00	08/01/00	OK	
51	1001-00-37	1	EA	100.00	100.00	08/01/00	OK	
52	1001-00-38	1	EA	100.00	100.00	08/01/00	OK	
53	1001-00-39	1	EA	100.00	100.00	08/01/00	OK	
54	1001-00-40	1	EA	100.00	100.00	08/01/00	OK	
55	1001-00-41	1	EA	100.00	100.00	08/01/00	OK	
56	1001-00-42	1	EA	100.00	100.00	08/01/00	OK	
57	1001-00-43	1	EA	100.00	100.00	08/01/00	OK	
58	1001-00-44	1	EA	100.00	100.00	08/01/00	OK	
59	1001-00-45	1	EA	100.00	100.00	08/01/00	OK	
60	1001-00-46	1	EA	100.00	100.00	08/01/00	OK	
61	1001-00-47	1	EA	100.00	100.00	08/01/00	OK	
62	1001-00-48	1	EA	100.00	100.00	08/01/00	OK	
63	1001-00-49	1	EA	100.00	100.00	08/01/00	OK	
64	1001-00-50	1	EA	100.00	100.00	08/01/00	OK	
65	1001-00-51	1	EA	100.00	100.00	08/01/00	OK	
66	1001-00-52	1	EA	100.00	100.00	08/01/00	OK	
67	1001-00-53	1	EA	100.00	100.00	08/01/00	OK	
68	1001-00-54	1	EA	100.00	100.00	08/01/00	OK	
69	1001-00-55	1	EA	100.00	100.00	08/01/00	OK	
70	1001-00-56	1	EA	100.00	100.00	08/01/00	OK	
71	1001-00-57	1	EA	100.00	100.00	08/01/00	OK	
72	1001-00-58	1	EA	100.00	100.00	08/01/00	OK	
73	1001-00-59	1	EA	100.00	100.00	08/01/00	OK	
74	1001-00-60	1	EA	100.00	100.00	08/01/00	OK	
75	1001-00-61	1	EA	100.00	100.00	08/01/00	OK	
76	1001-00-62	1	EA	100.00	100.00	08/01/00	OK	
77	1001-00-63	1	EA	100.00	100.00	08/01/00	OK	
78	1001-00-64	1	EA	100.00	100.00	08/01/00	OK	
79	1001-00-65	1	EA	100.00	100.00	08/01/00	OK	
80	1001-00-66	1	EA	100.00	100.00	08/01/00	OK	
81	1001-00-67	1	EA	100.00	100.00	08/01/00	OK	
82	1001-00-68	1	EA	100.00	100.00	08/01/00	OK	
83	1001-00-69	1	EA	100.00	100.00	08/01/00	OK	
84	1001-00-70	1	EA	100.00	100.00	08/01/00	OK	
85	1001-00-71	1	EA	100.00	100.00	08/01/00	OK	
86	1001-00-72	1	EA	100.00	100.00	08/01/00	OK	
87	1001-00-73	1	EA	100.00	100.00	08/01/00	OK	
88	1001-00-74	1	EA	100.00	100.00	08/01/00	OK	
89	1001-00-75	1	EA	100.00	100.00	08/01/00	OK	
90	1001-00-76	1	EA	100.00	100.00	08/01/00	OK	
91	1001-00-77	1	EA	100.00	100.00	08/01/00	OK	
92	1001-00-78	1	EA	100.00	100.00	08/01/00	OK	
93	1001-00-79	1	EA	100.00	100.00	08/01/00	OK	
94	1001-00-80	1	EA	100.00	100.00	08/01/00	OK	
95	1001-00-81	1	EA	100.00	100.00	08/01/00	OK	
96	1001-00-82	1	EA	100.00	100.00	08/01/00	OK	
97	1001-00-83	1	EA	100.00	100.00	08/01/00	OK	
98	1001-00-84	1	EA	100.00	100.00	08/01/00	OK	
99	1001-00-85	1	EA	100.00	100.00	08/01/00	OK	
100	1001-00-86	1	EA	100.00	100.00	08/01/00	OK	

IMAX EARTH SCENE OPPORTUNITIES

SITE #	TCA (MET)**	SITE OR AREA	PRIORITY	ORBIT #	PREFERRED METHOD	LENS	ORBIT # OF NEXT OPP	COMMENTS
1	0/19:49:43	Malta/Sicily/Italy	H	14	OBL	40	45	
2	0/19:51:27	Greece/Turkey	H	14	OBL	40	45	
3	0/21:22:49	Gibraltar/Mediterranean Sea	H	15	OBL	40	30,45,46,61,62	
4	0/21:30:35	Dead Sea/Gulf of Aqaba from South	H	15	OBL	40	46,62	
5	0/21:30:51	Aswan/Lake Nasser from North	H	15	OBL	40	46	
6	1/00:30:50	Canary Islands	L	17	OBL	40	32,48,63	
7	1/01:47:24 *	Oil Fields/Midland/Odessa	L	18	OBL	60	20,49,51	Scheduled in ZLV
8	1/01:48:40 *	Dallas/Ft. Worth	L	18	-ZLV	60	35,49	
9	1/01:49:21 *	Fall Color in Ouashita Mtns	H	18	OBL	60	19,34,49,50,65,66	Scheduled in ZLV
10	1/01:52:51 *	Chesapeake Bay/East Coast of U.S	H	18	OBL	60	33,34,49,64,65	Scheduled in ZLV
11	1/03:20:49 *	Grand Canyon/Lake Mead/Lake Powell	H	19	OBL	40/60	20,35,50,51,66	Scheduled in ZLV
12	1/03:25:04 *	Fall Color in Ouashita Mtns	H	19	OBL	40/60	34,49,50,65,66	Scheduled in ZLV
13	1/04:56:29 *	Grand Canyon	H	20	OBL	40/60	35,50,51,66	Scheduled in ZLV
14	1/04:59:06 *	Oilfields/Midland/Odessa	L	20	OBL	40/60	49,51	Scheduled in ZLV

* Scheduled in Flt Pln

** TCA is time of closest approach to ground point or most southwest corner of area.

IMAX EARTH SCENE OPPORTUNITIES (CONT'D)

SITE #	TCA (MET)**	SITE OR AREA	PRIORITY	ORBIT #	PREFERRED METHOD	LENS	ORBIT # OF NEXT OPP	COMMENTS
15	1/05:57:09 *	Indonesian Volcanoes	H	20	OBL	60	36	Scheduled in ZLV
16	1/09:15:30	Taipei/Taiwan	H	23	-ZLV	40	54	Orbit 54 is Prime Opp
17	1/09:17:44	SW Japan/Kyushu/Osaka/Nagoya	H	23	OBL	40	39,54,55	
18	1/10:43:40	Mouths of the Ganges River	H	24	OBL	40	55	
19	1/10:50:20	Yangtze River	H	24	-ZLV	40	39,55	
20	1/10:52:33	North & South Korea	H	24	OBL	40		
21	1/10:55:43	Mt. Fuji/Tokyo	H	24	TRACK	100	39,55	
22	1/19:59:40	Gibraltar/Mediterranean Sea	H	30	OBL	40	45,46,61,62	
23	1/23:07:38 *	Canary Islands	L	32	OBL	40	48,63	Scheduled in ZLV
24	2/00:29:29 *	Chesapeake Bay/East Coast of U.S.	H	33	OBL	40	34,39,64,65	Scheduled in ZLV
25	2/02:01:57 *	Fall Color in Ouashita Mtns	H	34	OBL	60	49,50,65,66	Scheduled in ZLV
26	2/02:05:23 *	Chesapeake Bay/East Coast of U.S.	H	34	OBL	60	49,64,65	Scheduled in ZLV
27	2/03:32:21 *	Los Angeles 34.0 N X 118.2 W	H	35	TRACK	100	36,50,66,67	
28	2/03:33:24	Grand Canyon	H	35	OBL	60	50,51,66	

* Scheduled in Flt Pln

** TCA is time of closest approach to ground point or most southwest corner of area.

IMAX EARTH SCENE OPPORTUNITIES (CONT'D)

SITE #	TCA (MET)**	SITE OR AREA	PRIORITY	ORBIT #	PREFERRED METHOD	LENS	ORBIT # OF NEXT OPP	COMMENTS
29	2/03:37:08	Dallas/Ft. Worth	L	35	-ZLV	60	49	
30	2/04:33:55	Indonesian Volcanoes	H	36	OBL	60		
31	2/05:08:06	Los Angeles 34.0 N X 118.2 W	H	36	TRACK	100	50,66,67	
32	2/09:20:58	Mouths of Irrawaddy River	L	39	-ZLV	40		
33	2/09:27:11	Yangtze River	H	39	OBL	40	55	
34	2/09:30:19	SW Japan/Kyushu/Osaka/ Nagoya	L	39	OBL	40	54,55	Alternate if volcano no go
35	2/09:30:44	Sakurajima Volcano	H	39	-ZLV	100		Only if smoking
36	2/09:32:38	Mt. Fuji/Tokyo	H	39	TRACK	100	55	
37	2/18:36:32	Gibraltar/Mediterranean Sea	H	45	OBL	40	46,61,62	
38	2/18:39:12	Malta/Sicily/Italy	H	45	OBL	40		
39	2/18:40:56	Greece/Turkey	H	45	OBL	40		
40	2/20:12:18	Gibraltar/Mediterranean Sea	H	46	OBL	40	61,62	
41	2/20:20:06	Dead Sea/Gulf of Aqaba from South	H	46	OBL	40	62	
42	2/20:20:21	Aswan/Lake Nasser from North	H	46	OBL	40		
43	2/23:20:19 *	Canary Islands	L	48	OBL	40	63	Scheduled in ZLV
44	3/00:36:52 *	Oilfields/Midland/Odessa	L	49	-ZLV	60	51	
45	3/00:38:08 *	Dallas/Ft. Worth	L	49	-ZLV	60		

* Scheduled in Flt Pln

** TCA is time of closest approach to ground point or most southwest corner of area.

IMAX EARTH SCENE OPPORTUNITIES (CONT'D)

SITE #	TCA (MET)**	SITE OR AREA	PRIORITY	ORBIT #	PREFERRED METHOD	LENS	ORBIT # OF NEXT OPP	COMMENTS
46	3/00:38:50 *	Fall Color in Ouashita Mtns	H	49	OBL	60	50,65,66	Scheduled in ZLV
47	3/00:42:21 *	Chesapeake Bay/East Coast of U.S.	H	49	OBL	60	64,65	Scheduled in ZLV
48	3/02:09:14 *	Los Angeles 34.0 N X 118.2 W	H	50	TRACK	100	66,67	Scheduled in ZLV
49	3/02:10:19 *	Grand Canyon	H	50	OBL	40/60	51,66	Scheduled in ZLV
50	3/02:14:33 *	Fall Color in Ouashita Mtns	H	50	OBL	40/60	65,66	Scheduled in ZLV
51	3/03:45:49	Grand Canyon	H	51	OBL	40/60	66	
52	3/03:48:35	OilFields/Midland/Odessa	L	51	OBL	40/60		
53	3/08:04:17 *	Taiwan/Taipai	H	54	-ZLV	40		Prime Opp.
54	3/08:07:13 *	SW Japan/Kyushu/Osaka/ Nagoya	H	54	OBL	40	55	Scheduled in ZLV
55	3/09:33:08	Mouths of Ganges River	H	55	OBL	40		
56	3/09:39:48	Yangtze River	H	55	OBL	40		
57	3/09:42:58	SW Japan/Kyushu/Osaka/ Nagoya	L	55	OBL	40		
58	3/09:45:12	Mt. Fuji/Tokoyo	H	55	TRACK	100		
59	3/18:49:09	Gibraltar/Mediterranean Sea	H	61	OBL	40	62	
60	3/20:24:54	Gibraltar/Mediterranean Sea	H	62	OBL	40		
61	3/20:32:36	Dead Sea/Gulf of Aqaba from South	H	62	OBL	40		

* Scheduled in Flt Pln

** TCA is time of closest approach to ground point or most southwest corner of area.

IMAX EARTH SCENE OPPORTUNITIES (CONT'D)

SITE #	TCA (MET)**	SITE OR AREA	PRIORITY	ORBIT #	PREFERRED METHOD	LENS	ORBIT # OF NEXT OPP	COMMENTS
62	3/21:57:05	Canary Islands	L	63	OBL	40		
63	3/23:19:18	Chesapeake Bay/East Coast of U.S.	H	64	OBL	60	65	
64	4/00:51:25	Fall Color in Ouashita Mtns	H	65	OBL	60	66	
65	4/00:54:53	Chesapeake Bay/East Coast of U.S.	H	65	OBL	60		
66	4/02:21:50	Los Angeles 34.0 N X 118.2 W	H	66	TRACK	100	67	
67	4/02:22:53	Grand Canyon	H	66	OBL	40/60		
68	4/02:27:09	Fall Color in Ouashita Mtns	H	66	OBL	40/60		
69	4/03:57:35	Los Angeles 34.0 N X 118.2 W	H	67	TRACK	100		

* Scheduled in Flt Pln

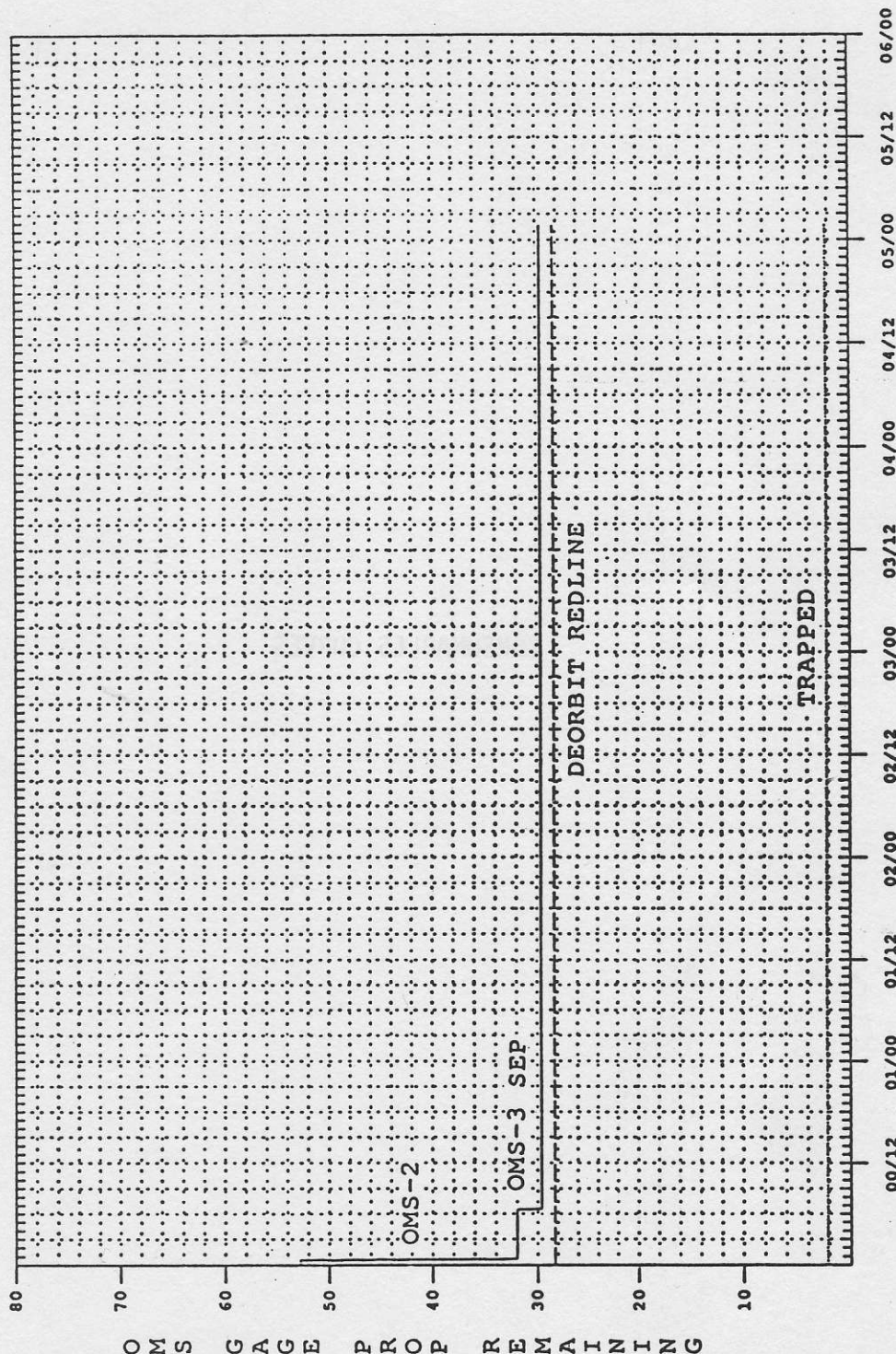
** TCA is time of closest approach to ground point or most southwest corner of area.

CONSUMABLES CURVES

PLATE OF CONSUMABLES CURVES
SERIES CONSUMABLES CURVES
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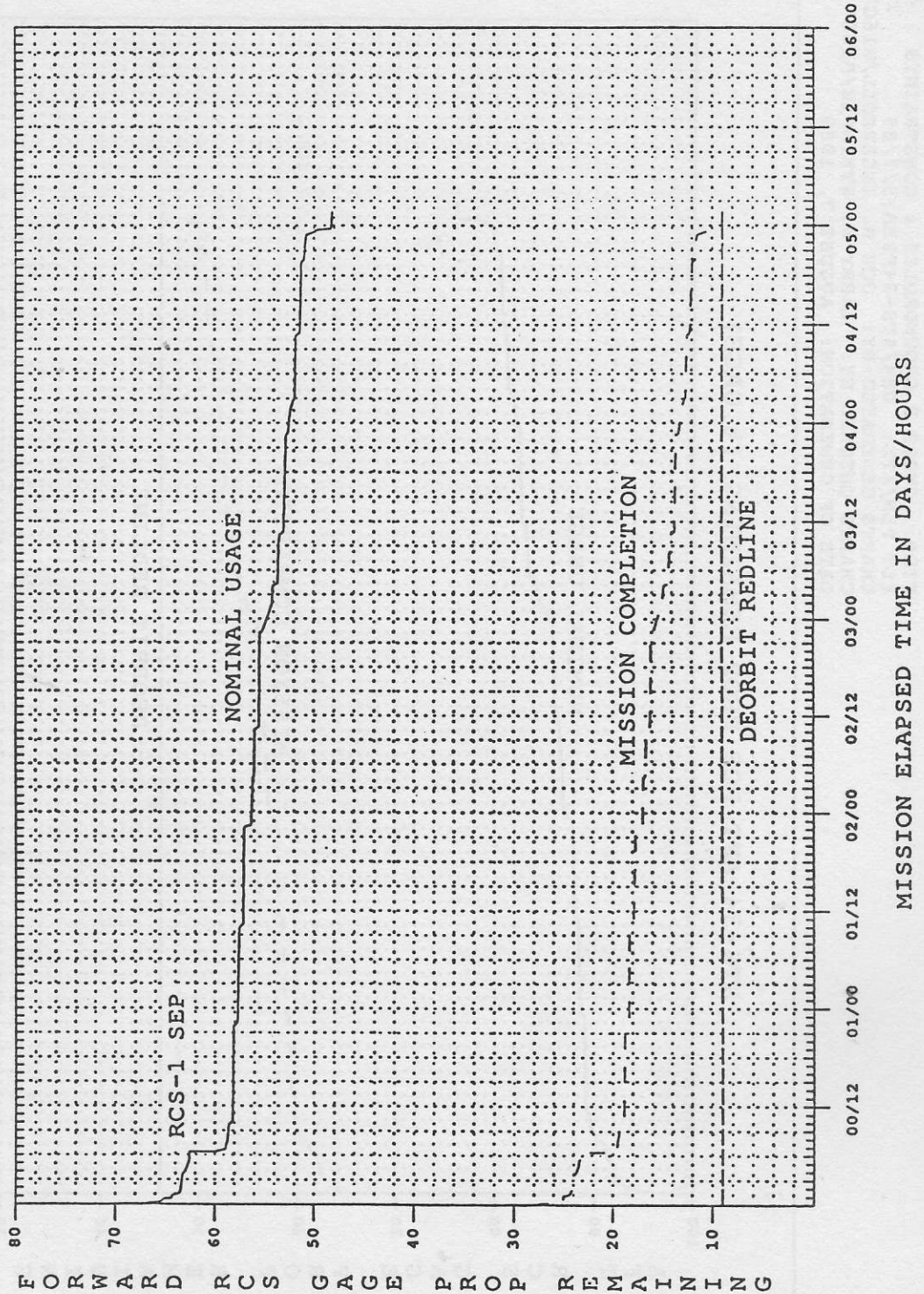
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FLT PLN/ATL: DH4/STS-34FPSR:3/7/89
CHARTS GENERATED BY: JOE R. INGERSOLL/R16G
CHARTS CHECKED BY: LARRY W. STRIMPLE/R16G
DATE OF GENERATION: AUGUST 7, 1989

STS-34 OMS PROP REMAINING (% GAGE)



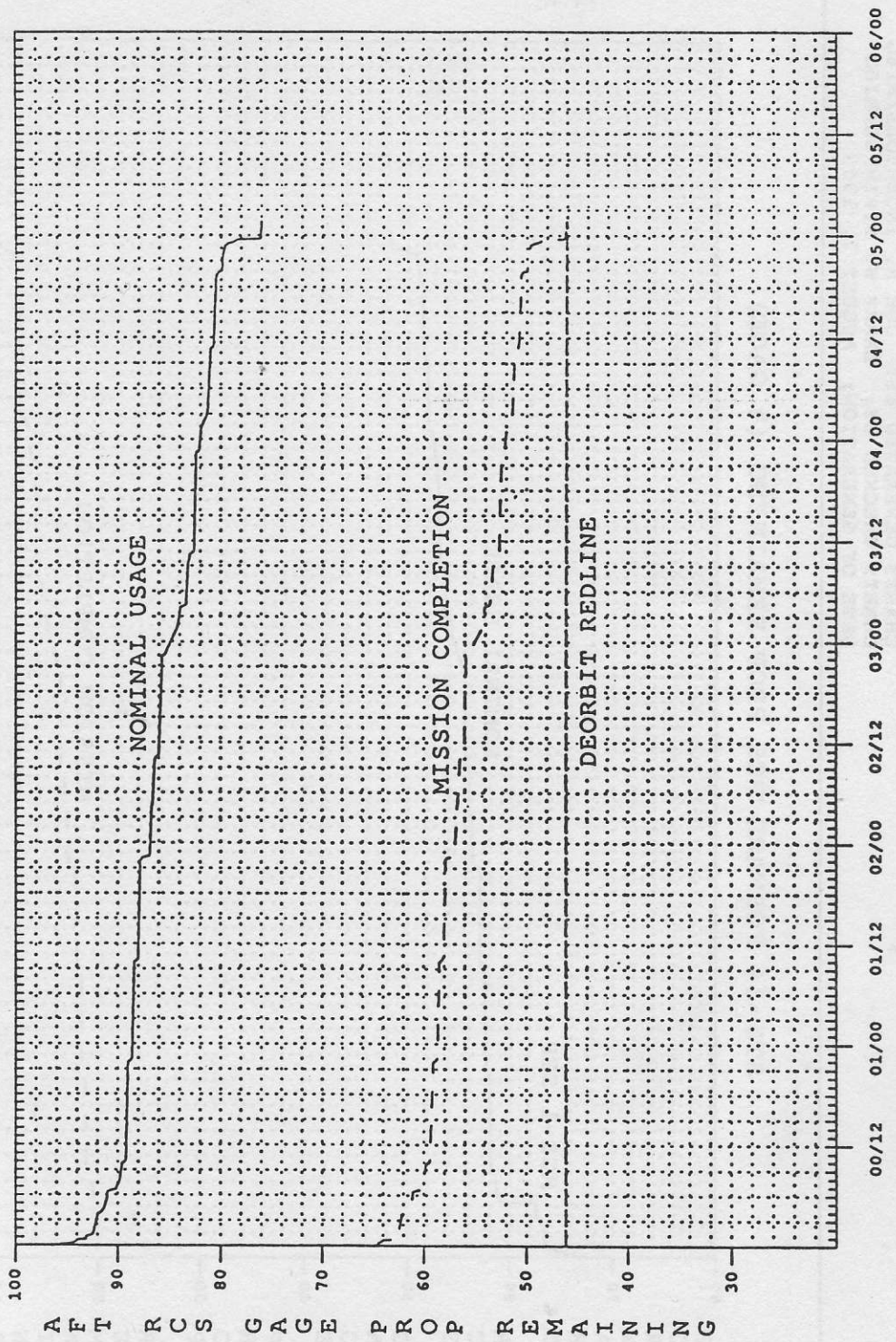
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FLT PLN/ATL: DH4/STS-34FPSR: 3/7/89
CHARTS GENERATED BY: JOE R. INGERSOLL/R16G
CHARTS CHECKED BY: LARRY W. STRIMPLE/R16G
DATE OF GENERATION: AUGUST 7, 1989

STS-34 FORWARD RCS PROP REMAINING (% GAGE)



FIDP: CYCLE 2 GROUNDRULES & CONSTRAINTS
 FLT PLN/ATL: DH4/STS-34FFSR:3/7/89
 CHARTS GENERATED BY: JOE R. INGERSOLL/R16G
 CHARTS CHECKED BY: LARRY W. STRIMPLE/R16G
 DATE OF GENERATION: AUGUST 7, 1989

STS-34 AFT RCS PROP REMAINING (% GAGE)



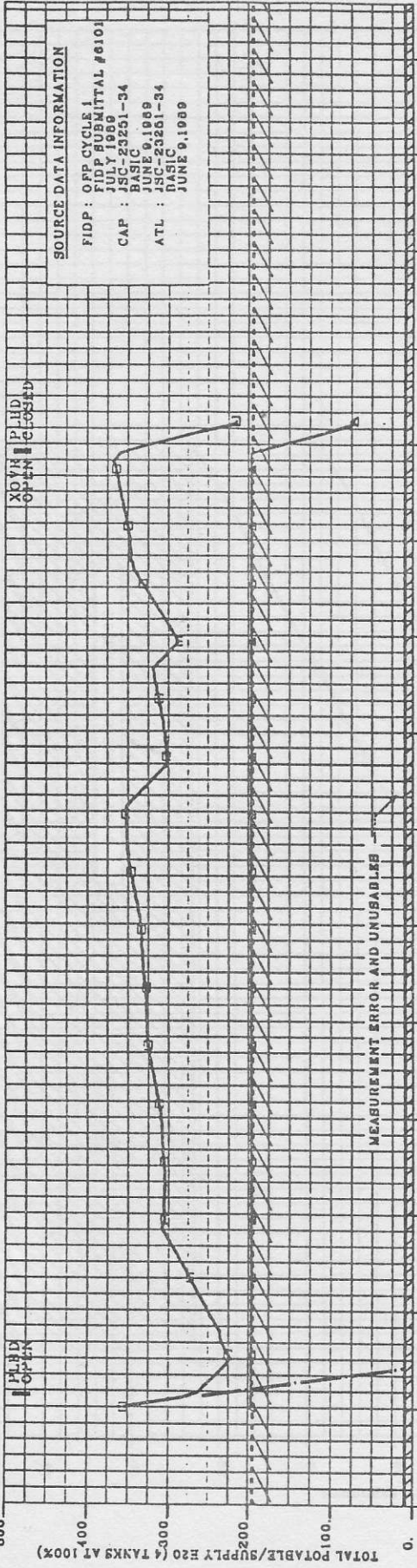
MISSION OPERATIONS DIRECTORATE
SYSTEMS DIVISION

PHILIP C. LANCZYK
ANALYSIS DATE: 08/11/89
TRAJECTORY: OFF CYCLE 2

DATA CONFIRMED *mm* 8/15/89

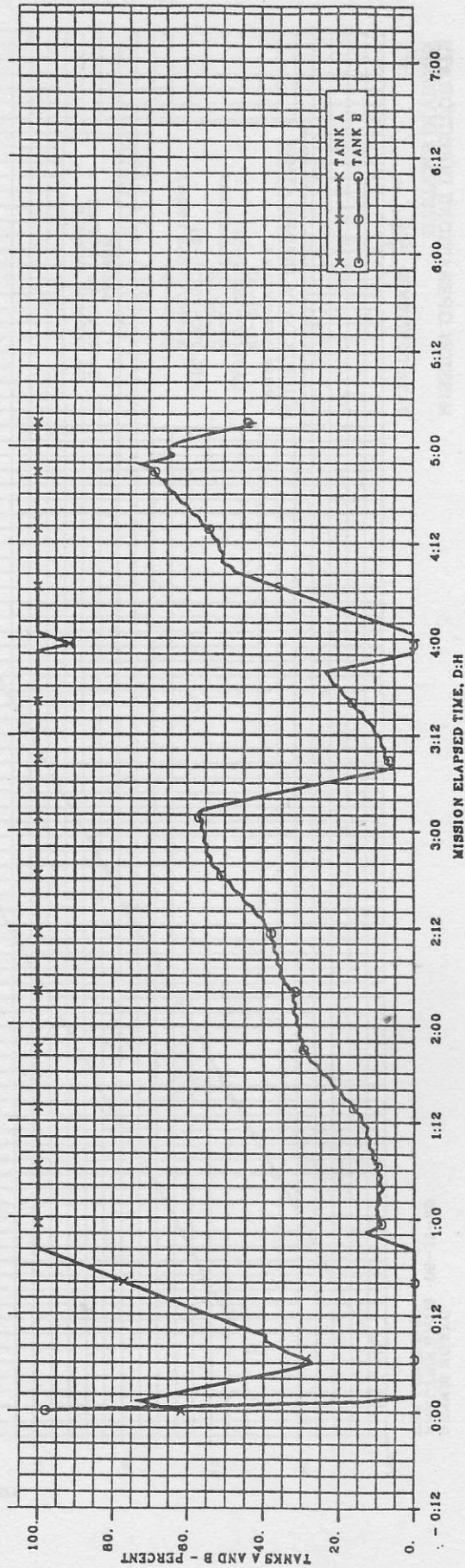
DATA CONFIRMED
DEORBIT REDLINE
FIRST DAY RETURN (NO PLBD OPEN) REDLINE

□ TANKS A-D
△ TANKS C+D



SOURCE DATA INFORMATION

FIDP : OFF CYCLE 1
JULY 1989
CAP : JSC-23251-34
ATL : JSC-23251-34
BASIC
JUNE 9, 1989
BASIC
JUNE 9, 1989

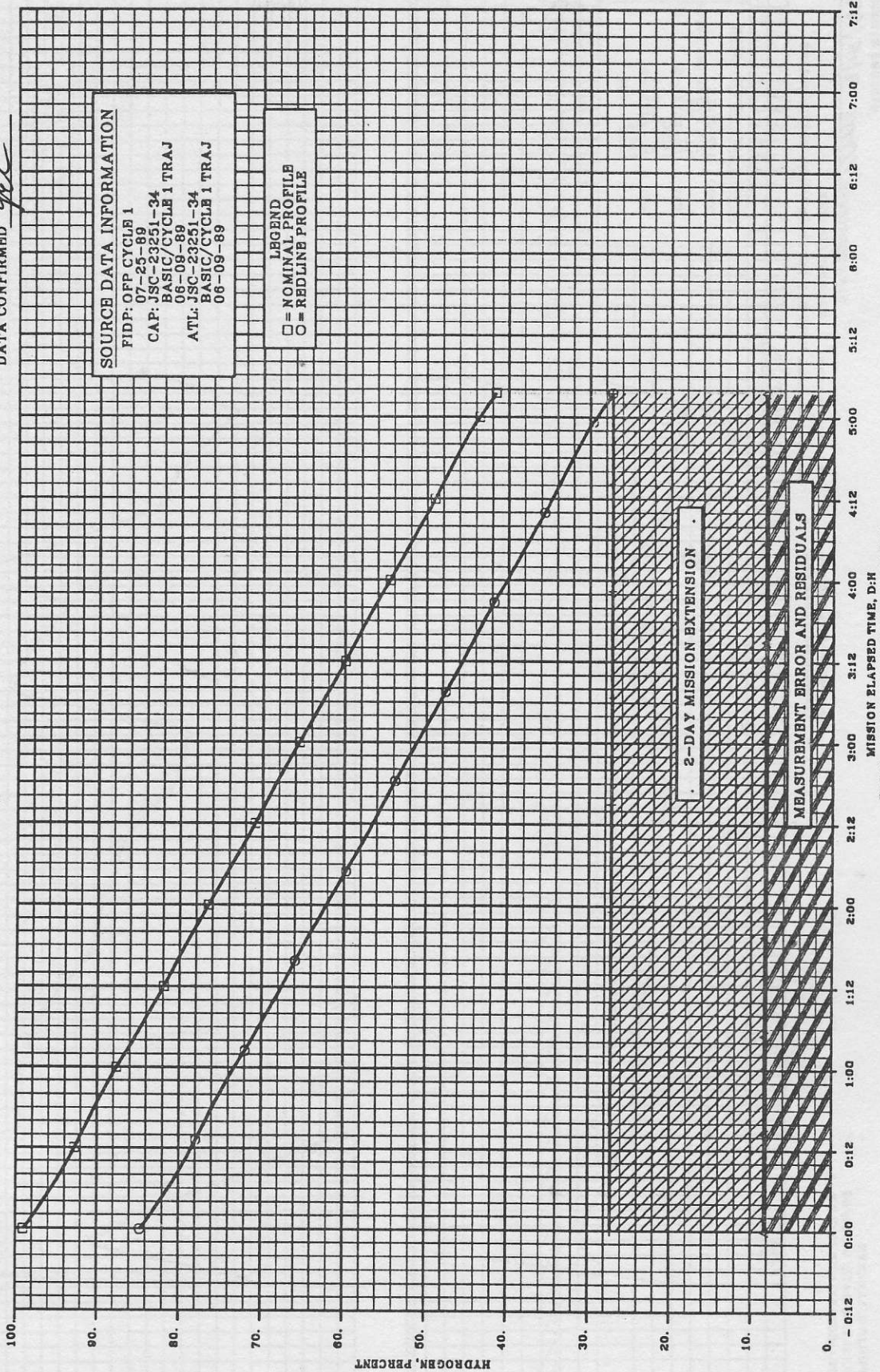


878-34 SUPPLY WATER

DENNIS HOANG
 ANALYSIS DATE: 08-17-89
 TRAJ CYCLE: 2

MISSION OPERATIONS DIRECTORATE
 SYSTEMS DIVISION

DATA CONFIRMED *gfc*



SOURCE DATA INFORMATION
 FIDP: OPP CYCLE# 1
 07-25-89
 CAP: JSC-23251-34
 BASIC/CYCLE 1 TRAJ
 06-09-89
 ATL: JSC-23251-34
 BASIC/CYCLE 1 TRAJ
 06-09-89

LEGEND
 □ = NOMINAL PROFILE
 ○ = REDLINE PROFILE

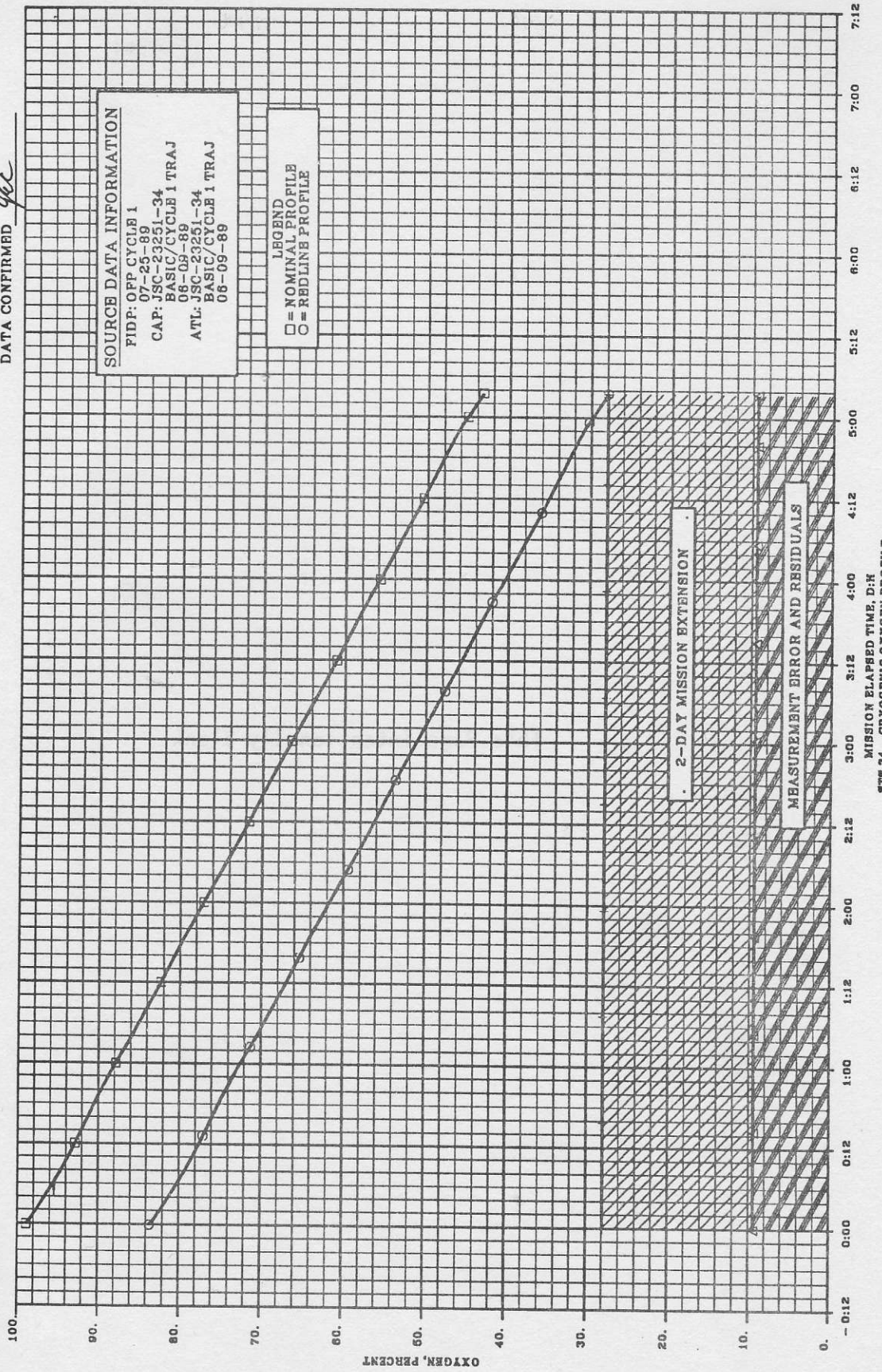
2-DAY MISSION EXTENSION
 MEASUREMENT ERROR AND RESIDUALS

STS 34 CRYOGENIC HYDROGEN PROFILE

DENNIS HOANG
 ANALYSIS DATE: 08-17-89
 TRAJ CYCLE: 2

MISSION OPERATIONS DIRECTORATE
 SYSTEMS DIVISION

DATA CONFIRMED *gkc*



STS 34 CRYOGENIC OXYGEN PROFILE

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STS-34
ATTITUDE TIMELINE

TIME	DESCRIPTION	ROLL (DEG)	PITCH (DEG)	YAW (DEG)
00:00:00	Launch	0.0	0.0	0.0
00:05:00	Roll 10 deg	10.0	0.0	0.0
00:10:00	Pitch 5 deg	0.0	5.0	0.0
00:15:00	Yaw 15 deg	0.0	0.0	15.0
00:20:00	Roll 20 deg	20.0	0.0	0.0
00:25:00	Pitch 10 deg	0.0	10.0	0.0
00:30:00	Yaw 30 deg	0.0	0.0	30.0
00:35:00	Roll 30 deg	30.0	0.0	0.0
00:40:00	Pitch 15 deg	0.0	15.0	0.0
00:45:00	Yaw 45 deg	0.0	0.0	45.0
00:50:00	Roll 40 deg	40.0	0.0	0.0
00:55:00	Pitch 20 deg	0.0	20.0	0.0
01:00:00	Yaw 60 deg	0.0	0.0	60.0
01:05:00	Roll 50 deg	50.0	0.0	0.0
01:10:00	Pitch 25 deg	0.0	25.0	0.0
01:15:00	Yaw 75 deg	0.0	0.0	75.0
01:20:00	Roll 60 deg	60.0	0.0	0.0
01:25:00	Pitch 30 deg	0.0	30.0	0.0
01:30:00	Yaw 90 deg	0.0	0.0	90.0
01:35:00	Roll 70 deg	70.0	0.0	0.0
01:40:00	Pitch 35 deg	0.0	35.0	0.0
01:45:00	Yaw 105 deg	0.0	0.0	105.0
01:50:00	Roll 80 deg	80.0	0.0	0.0
01:55:00	Pitch 40 deg	0.0	40.0	0.0
02:00:00	Yaw 120 deg	0.0	0.0	120.0
02:05:00	Roll 90 deg	90.0	0.0	0.0
02:10:00	Pitch 45 deg	0.0	45.0	0.0
02:15:00	Yaw 135 deg	0.0	0.0	135.0
02:20:00	Roll 100 deg	100.0	0.0	0.0
02:25:00	Pitch 50 deg	0.0	50.0	0.0
02:30:00	Yaw 150 deg	0.0	0.0	150.0
02:35:00	Roll 110 deg	110.0	0.0	0.0
02:40:00	Pitch 55 deg	0.0	55.0	0.0
02:45:00	Yaw 165 deg	0.0	0.0	165.0
02:50:00	Roll 120 deg	120.0	0.0	0.0
02:55:00	Pitch 60 deg	0.0	60.0	0.0
03:00:00	Yaw 180 deg	0.0	0.0	180.0
03:05:00	Roll 130 deg	130.0	0.0	0.0
03:10:00	Pitch 65 deg	0.0	65.0	0.0
03:15:00	Yaw 195 deg	0.0	0.0	195.0
03:20:00	Roll 140 deg	140.0	0.0	0.0
03:25:00	Pitch 70 deg	0.0	70.0	0.0
03:30:00	Yaw 210 deg	0.0	0.0	210.0
03:35:00	Roll 150 deg	150.0	0.0	0.0
03:40:00	Pitch 75 deg	0.0	75.0	0.0
03:45:00	Yaw 225 deg	0.0	0.0	225.0
03:50:00	Roll 160 deg	160.0	0.0	0.0
03:55:00	Pitch 80 deg	0.0	80.0	0.0
04:00:00	Yaw 240 deg	0.0	0.0	240.0
04:05:00	Roll 170 deg	170.0	0.0	0.0
04:10:00	Pitch 85 deg	0.0	85.0	0.0
04:15:00	Yaw 255 deg	0.0	0.0	255.0
04:20:00	Roll 180 deg	180.0	0.0	0.0
04:25:00	Pitch 90 deg	0.0	90.0	0.0
04:30:00	Yaw 270 deg	0.0	0.0	270.0
04:35:00	Roll 190 deg	190.0	0.0	0.0
04:40:00	Pitch 95 deg	0.0	95.0	0.0
04:45:00	Yaw 285 deg	0.0	0.0	285.0
04:50:00	Roll 200 deg	200.0	0.0	0.0
04:55:00	Pitch 100 deg	0.0	100.0	0.0
05:00:00	Yaw 300 deg	0.0	0.0	300.0
05:05:00	Roll 210 deg	210.0	0.0	0.0
05:10:00	Pitch 105 deg	0.0	105.0	0.0
05:15:00	Yaw 315 deg	0.0	0.0	315.0
05:20:00	Roll 220 deg	220.0	0.0	0.0
05:25:00	Pitch 110 deg	0.0	110.0	0.0
05:30:00	Yaw 330 deg	0.0	0.0	330.0
05:35:00	Roll 230 deg	230.0	0.0	0.0
05:40:00	Pitch 115 deg	0.0	115.0	0.0
05:45:00	Yaw 345 deg	0.0	0.0	345.0
05:50:00	Roll 240 deg	240.0	0.0	0.0
05:55:00	Pitch 120 deg	0.0	120.0	0.0
06:00:00	Yaw 360 deg	0.0	0.0	360.0

Attitude Timeline

ATTITUDE
TIMELINE

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT
1 0/01:10:00 15:36	MNVR R+162.00 P+ 83.00 Y+ 2.00	A1 DSC .200 AUTO DB AT 5.00 NORM DB RT .20	SUN T 90 P 180		+ZSI POST INSERT
2 0/03:15:00 25:00	MNVR R+ 35.00 P+293.00 Y+303.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 91 P 180		AMU ATT #2
3 0/03:27:00 37:00	MNVR R+155.00 P+293.00 Y+303.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 91 P 60		AMU ATT #3
4 0/03:39:00 47:43	MNVR R+173.00 P+ 53.00 Y+293.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 84 P 154	STAR PR A2	IMU ALIGN
5 0/03:55:00 04:01:28	MNVR R+162.00 P+ 83.00 Y+ 2.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 90 P 180		+ZSI
6 0/05:15:00 27:52	TRK TGT=4 BV=5(253.60, .00) OM=270.00 DEPLOY 0/06:21:33	B1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 107 P 180	INRTL R+ 12 P+272 Y+ 27	DEPLOY ATT
7 0/06:22:33	ROT BV=0(.00,270.00)	B1 DSC .430 MAN DB AT 3.00 NORM DB RT .20		ROT R+ 12 START P+272 ATT Y+ 27	-2.2 FPS SEP BEGIN -70 DEG PITCH
8 0/06:22:41	ROT BV=0(.00,270.00)	B1 DSC .860 MAN DB AT 3.00 NORM DB RT .20		ROT R+ 14 START P+268 ATT Y+ 26	SEP CUTOFF CONTINUE -70 DEG PITCH
9 0/06:24:01	CANCEL END OF -70 DEG PITCH	B1 DSC .500 MAN DB AT 3.00 NORM DB RT .20	SUN T 35 P 180	INRTL R+ 29 P+203 Y+358	END OF -70 DEG PITCH
10 0/06:28:33 32:24	MNVR R+142.07 P+ 48.66 Y+ 66.42	B1 DSC .500 AUTO DB AT 3.00 NORM DB RT .20	SUN T 119 P 242		OMS SEP ATT
11 0/06:36:59 38:29	TRK TGT=1 BV=3(90.00, .00) OM= .00	B1 DSC .500 AUTO DB AT 3.00 NORM DB RT .20	SUN T 130 P 274		IUS VIEWING ATT
12 0/07:06:33 11:50	TRK TGT=1 BV=5(320.00, .00) OM= .00	B1 DSC .500 AUTO DB AT 3.00 NORM DB RT .20	SUN T 46 P 48		WINDOW PROTECT ATT

ALL ATTITUDES IN MEAN OF 1950

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT
1 0/07:21:33	CANCEL	B1 DSC .500 MAN DB AT 3.00 NORM DB RT .20	SUN T 46 P 48	INRTL R+125 P+220 Y+327	INRTL HOLD
2 0/08:00:00 09:54	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 113 P 114	STAR PR A1	IMU ALIGN
3 0/08:20:00 32:08	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
4 0/21:35:00 45:07	MNVR R+173.00 P+ 53.00 Y+293.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 83 P 154	STAR PR A2 -Z: 37	IMU ALIGN -Z COAS CAL
5 0/22:00:00 13:14	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
6 0/23:30:00 33:10	TRK TGT=4 BV=3(90.00, .00) OM= (BLANK)	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 90 P 359	INRTL R+308 P+132 Y+ 66	SSBUV SOLAR VIEW ATT
7 1/00:20:00 32:15	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
8 1/08:10:00 20:37	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 114 P 114	STAR PR A1	IMU ALIGN
9 1/08:30:00 42:04	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
10 1/20:15:00 25:45	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 114 P 114	STAR PR A1 +X: 23	IMU ALIGN +X COAS CAL
11 1/20:40:00 52:37	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
12 2/01:25:00 32:30	TRK TGT=2 BV=3(90.00, .00) OM=270.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	WATER DUMP -ZLV NOSE SOUTH

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 2/03:16:00 25:09 ~ TCA-16:00	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 2/03:32:03	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 161 P 0	WHEN IN ATTITUDE GO TO DAP B8	IMAX L.A. TRK LAT 34 N LON 118.25 W ALT 0
2 2/03:40:00 45:55	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
3 2/04:10:00 13:14	TRK TGT=4 BV=3(90.00, .00) OM= (BLANK)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 90 P 0	INRTL R+307 P+131 Y+ 65	SSBUV SOLAR VIEW ATT
4 2/05:00:00 13:40	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
5 2/08:25:00 36:01	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 114 P 113	STAR PR A1	IMU ALIGN
6 2/08:45:00 57:35	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
7 2/20:30:00 41:08	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 115 P 113	STAR PR A1	IMU ALIGN
8 2/20:50:00 21:02:33	TRK TGT=2 BV=3(90.00, .00) OM=180.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV NOSE FWD
9 3/05:55:00 58:23	TRK TGT=4 BV=3(90.00, .00) OM= (BLANK)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 90 P 359	INRTL R+290 P+150 Y+ 68	SSBUV SOLAR VIEW ATT
10 3/06:45:00 58:53	TRK TGT=2 BV=3(90.00, .00) OM=270.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	-ZLV NOSE SOUTH
11 3/08:40:00 54:06	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 115 P 113	STAR PR A1	IMU ALIGN
12 3/09:00:00 12:51	TRK TGT=2 BV=3(90.00, .00) OM=270.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	-ZLV NOSE SOUTH

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT
1 3/19:15:00 29:00	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 116 P 113	STAR PR A1	IMU ALIGN
2 3/19:35:00 43:37	MNVR R+334.00 P+ 96.00 Y+ 61.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 101 P 2		TDRS ATT
3 3/22:05:00 17:10	TRK TGT=2 BV=3(90.00, .00) OM=270.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	-ZLV NOSE SOUTH
4 4/00:00:00 13:44	TRK TGT=2 BV=5(356.00,358.50) OM=114.00	B3 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 4 P 201	LVLH R+114 P+267 Y+ 3	GG ATTITUDE +XLV PLBD SOUTH
5 4/08:35:00 42:10	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 116 P 113	STAR PR A1	IMU ALIGN
6 4/08:55:00 09:09:29	TRK TGT=2 BV=3(90.00, .00) OM=270.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 90	-ZLV NOSE SOUTH
7 4/20:55:00 21:08:28	MNVR R+ 50.00 P+283.00 Y+ 76.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 117 P 113	STAR PR A1	IMU ALIGN
8 4/21:15:00 20:13	TRK TGT=4 BV=5(184.00, .00) OM=270.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 176 P 181	INRTL R+ 1 P+346 Y+ 22	COLD SOAK TAIL SUN ATT
9 4/22:45:00 54:40	MNVR R+103.00 P+ 27.00 Y+357.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 136 P 220	-Z: 24 -Y: 34	D/O IMU ALIGN ATT
10 4/23:05:00 08:10	MNVR R+ 82.00 P+117.00 Y+ 49.00	B1 DSC .500 AUTO DB AT 3.00 NORM DB RT .20	SUN T 85 P 236	-Z: 18 -Y: 41	IMU VERIF ATT
11 5/01:30:00 35:47	MNVR R+232.00 P+356.00 Y+294.00 TIG 5/01:44:54	B1 DSC .500 AUTO DB AT 3.00 NORM DB RT .20	SUN T 92 P 44		D/O BURN ATT

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will not be included in flight copies.

B. CREW

1. The 5 crewmembers flying this mission are:

CDR - Donald E. Williams
PLT - Michael J. McCulley
MS1 - Shannon W. Lucid
MS2 - Franklin R. Chang-Diaz
MS3 - Ellen S. Baker

2. The crewmembers responsible for performing an EVA, should one become necessary, are: MS2 will be EV1, MS3 will be EV2, and CDR will be IV1.

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink real-time commands (RTCs) coordinated with the crew.
- b. TDRS coverage is supported by TDRS-E (41 degrees W) and TDRS-W (171 degrees W) and is the prime mode of communication coverage.
- c. TDRS Ku-band is the prime mode of real-time TV. There are also three GSTDN sites available as backup for TV (90 minute lead time required): GDS(GDX), MIL(MLX), and VAN.
- d. TDRS-E and TDRS-W are available to support Ku-band uplink (e.g., TAGS).
- e. HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.
- f. GSTDN sites available during the first 25 minutes of the mission are MIL(MLX), BDA, and IOS. IOS can be used for UHF voice during ascent.
- g. There are eight GSTDN sites available on-orbit through Galileo deploy, and also for deorbit: VAN, GDS(GDX), MIL(MLX), BDA(BDX), CAN, MAD, DKR, and DFR. (Note: DFR is not shown in the FLT PLN).
- h. After Galileo deploy, there are six GSTDN sites available to support as bailout sites: VAN, GDS (GDX), MIL (MLX), BDA (BDX), DKR, and DFR. One GSTDN site will be available per orbit. (Note: DFR is not shown in the FLT PLN).
- i. RTS sites are available predeploy to support IUS activities. They are also available for contingency support or when scheduled in advance (2 hours of lead time required). HTS, NHS, GTS, VTS, and IOS are certified for orbiter support; CTS is available only for direct communication to the IUS.

2. Guidance and Navigation

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

3. Environmental Control and Life Support Subsystem (ECLSS)

- a. Two CO2 absorbers are installed prior to launch. On-orbit, the canisters are alternately replaced as required per the cue card.
- b. There are four supply water tanks and one waste water tank which are loaded for launch with volumes sufficient to meet a launch day deorbit opportunity with payload bay doors (PLBDs) failed closed. Analysis shows supply water will rapidly be used by the FES during RTG cooling operations on FD1, so no evening dump is planned. Beginning FD2, the FES will be managed to minimize the need for supply water dumps and protect SSBUV constraints. A waste water dump is scheduled on FD3.

4. Utility Power Usage

The following tables are the DC and AC Utility Power Outlet Schedules. These tables show the times of outlet reconfiguration during the mission.

STS-34 DC UTILITY POWER OUTLET SCHEDULE

OUTLET \ MET		PRELAUNCH	POST INSERTION	ON-ORBIT		DEORBIT PREP
			0/1:46	0/3:45	0/8:45	
MNA	019 M052J	PLT* MS3*	-- --	-- PM	-- PM	PLT* MS3*
MNB	F1 M013Q	-- --	-- --	-- PM	-- PM	--
MNC	A11 A15 M030F	MS1*,MS2* CDR* --	-- TPR --	-- TPR --	-- TPR DSO 470	MS1*,MS2* CDR* --
MNA or MNB	L15	--	--	IMAX	IMAX	--

NOTES: * Crewmember suit fan

STS-34 AC UTILITY POWER OUTLET SCHEDULE

OUTLET \ MET		PRELAUNCH	POST INSERTION	ON-ORBIT		DEORBIT PREP
			0/1:46	1/2:00	1/8:30	
AC1	M052J	--	--	ICE CRYSTALS	--	--
	F1	--	SPOC	SPOC	SPOC	--
AC3	M013Q	--	--	--	--	--
	A15	--	--	--	--	--

NOTE: Intermittent AC outlets are needed for the vacuum cleaner and the photo floodlight.

D. TEXT UPLINK SYSTEM

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

E. TELEVISION/PHOTOGRAPHY

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

F. PAYLOADS

1. Galileo

Galileo is an interplanetary spacecraft designed to study Jupiter's atmosphere, its satellites, and its magnetosphere. The spacecraft consists of two parts, a Probe and an Orbiter, and is powered by two radioisotopic thermoelectric generators (RTGs). The nominal IUS/Galileo deployment opportunity occurs approximately 60 minutes prior to node 6A (ascending). Backup opportunities are available for injections on 7A, 8A, and 16A-20A.

2. IUS (Inertial Upper Stage)

The IUS is a two-stage solid rocket, inertially stabilized upper stage. The IUS ignites its first stage (SRM-1) 60 minutes after IUS/Galileo deployment. The two IUS stages burn in quick succession to insert Galileo into a Venus-Earth-Earth gravity assist (VEEGA) trajectory to Jupiter.

3. SSBUV (Shuttle Solar Backscatter Ultraviolet)

The SSBUV program is designed to provide calibration of backscatter ultraviolet (UV) instruments being flown currently on free-flying satellites. The payload configuration consists of two canisters interconnected by cables mounted on a Get Away Special (GAS) adapter beam. The canister containing the SSBUV spectrometer is equipped with a Motorized Door Assembly (MDA). The adjacent support canister contains data, command, and power systems. Crew interface is through a GAS Autonomous Payload Controller (GAPC) on the aft flight deck. After an outgassing period, the instrument will operate in three modes: Earth view, Solar view and calibration.

4. IMAX

The IMAX payload is a 70mm motion picture camera system. The camera and supporting equipment are stowed in the middeck and are for in-cabin use. On this flight, IMAX will be used to photograph Galileo deploy and various Earth features.

5. SE-82-15 (Zero Gravity Growth of Ice Crystals from Supercooled Water with Relation to Temperature)

This experiment will observe the formation of ice crystals at various supercooled temperatures below zero deg C in a gravity-free environment. Absence of gravity will allow for a better understanding of relationships between water vapor saturation and crystal geometry. The results of this experiment could aid in the design of radiator cooling and cryogenic systems and will provide data on crystal growth for high altitude meteorology.

6. GHCD (Effects of Microgravity on Growth Hormone Concentration and distribution in Plants)

The GHCD is designed to determine the effects of microgravity on the concentration, turnover properties, and behavior of plant growth hormone (Auxin) in corn shoot tissue. The experiment consists of four plant canisters. Two of the canisters will be placed into a gaseous nitrogen freezer. Two canisters will not be disturbed.

7. PM-1 (Polymer Morphology)

The PM payload is a self-contained, middeck experiment which examines the effects of microgravity on the processing of polymers. Once a sample is initiated, the control and monitoring of the PM payload is essentially autonomous. However, the crew is required to initiate each processing cycle and periodically monitor the status and operational progress of the payload. A Graphic Retrieval and Information Display (GRID) computer (PGSC) is included for crew interaction.

8. STEX (Sensor Technology Experiment)

The STEX is a dosimetry experiment consisting of a self-contained, battery powered, automated sensor with an internal solid state memory. The experiment will investigate natural background radiation and the radiation from the Radioisotope Thermoelectric Generators (RTGs).

9. MLE (Mesoscale Lightning Experiment)

The MLE objectives are to observe and record the visual characteristics of large scale lightning as seen from space using the onboard cargo bay TV and 35mm cameras. The MLE payload consists of the standard Orbiter cargo bay Television (TV) camera system and a dedicated STS standard orbiter 35mm camera body with hr-min-sec data back and 85mm lens.

10. AMOS (Air Force Maui Optical Site)

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

G. ON-ORBIT DTOs

1. TDRS to TDRS Handover Demonstration (DTO 703)

The DTO will perform demonstrations of S-Band and Ku-Band TDRS to TDRS handover capabilities. The handovers are ground commanded. Following each handover, the crew will record any changes in voice quality.

2. Text and Graphics System (TAGS) Test (DTO 786)

This DTO is designed to provide a significant confidence test and evaluation of TAGS under zero-g and to generate data for comparison with data from 1-g test conditions. Approximately 400 images will be sent.

3. Gravity Gradient Attitude Control (DTO 816)

Data collected during this DTO will help refine the computer models used to predict stable gravity gradient attitudes. On STS-34, only long duration tests (8-12 hours) will be done. The long duration tests will help determine the amplitude of steady state attitude oscillations and the sensitivity of these oscillations to attitude and rate errors at attitude initiation.

4. Camcorder Demonstration

This DTO will evaluate the unique hardware aspects of a camcorder, as well as crew usage and interaction. Various features affecting camera performance will be evaluated including low light level operation, macro zoom capability, and fiber optics accessories.

H. ON-ORBIT DSO'S

1. Inflight Salivary Pharmacokinetics of Scopolamine and Dextroamphetamine (DSO 457)

The purpose of this DSO is to investigate the pharmacokinetics of anti-motion sickness agents during space flight and predict the resultant therapeutic consequences. The crewmember will take the drug after an 8-hour fast, and take salivary samples at required intervals during the flight day.

2. The Relationship of Space Adaption Syndrome to Middle Cerebral Artery Blood Velocity Measured Inflight by Doppler (DSO 470)

The objectives of this DSO are to explore inflight use of a small, lightweight, portable instrument capable of measuring blood flows in the micro-gravity environment; and correlate these changes with the onset and severity of Space Adaption Syndrome (SAS). The measurement sessions will be performed on FD1 and in post-sleep on FD2.

3. Delayed-type Hypersensitivity (DSO 473)

The purpose of this DSO is to detect immunological alterations in the human system resulting from spaceflight. Delayed-Type Hypersensitivity will also assess the impairment of in-vivo cell mediated immunity and the medical significance of immune dysfunction events.

4. Retinal Photography (DSO 474)

The objective of this DSO is to analyze retinal photographs obtained inflight and determine if micro-gravity induced cephalad fluid shifts elevate intracranial pressure (ICP). Evidence of increased ICP and the development of SAS will be conducted.

I. TIMELINE FORMATS

1. The timeline formats used in this Flight Plan are based on JSC document 19933: Timeline Format Definitions and Standard Notes, Revision B, May 25, 1987.

1. THE LINE FORMATS
The following formats used in this report are based on 420
October 1981: The line format definitions and drawing notes
Revision 2, May 23, 1981

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ST-34 DAP BOOK

UNIT WEIGHT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEMO (sec)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MEMO (min)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MEMO (hr)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
MEMO (day)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
MEMO (week)	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
MEMO (month)	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
MEMO (year)	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00	365.00

ST-34 DAP BOOK

ST-34 DAP BOOK

DAP A CONFIGURATIONS

	A1*	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11
<u>TRANSLATION</u>											
PULSE ft/sec	0.10	0.10	0.10	0.10	0.10	0.10		0.10	0.10	0.05	0.25
<u>ROTATION</u>											
DSC RT NORM °/sec	0.200	0.400	0.200	0.200	0.200	0.200		0.500	0.200	0.200	0.200
VERN °/sec	0.200	0.400	0.200	0.008	0.200	0.200		0.200	0.200	0.200	0.200
PULSE NORM °/sec	0.10	0.10	0.30	0.10	0.10	0.10		0.10	0.10	0.10	0.05
VERN °/sec	0.010	0.010	0.010	0.010	0.050	0.010		0.010	0.010	0.010	0.010
COMP NORM °/sec	.00	.00	.00	.00	.00	.00		.00	.00	.00	.00
VERN °/sec	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
<u>DEADBAND</u>											
ATT NORM (deg)	5.00	1.00	5.00	1.00	5.00	5.00		3.00	2.00	2.00	1.00
VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000		1.000	1.000	1.000	1.000
RATE NORM °/sec	0.20	0.20	0.20	0.20	0.20	0.20		0.20	0.20	0.20	0.20
VERN °/sec	.020	.020	.020	.010	.020	.020		.020	.020	.020	.010
<u>JET OPT</u>											
P	1	1	3	1	1	3		1	1	1	3
Y	1	1	3	3	1	3		1	1	1	3
CNTL ACCEL	0	0	0	0	0	0		0	0	0	0

*I-LOADED OPS-2 DAP Configuration

DAP B CONFIGURATIONS

	B1*	B2	B3	B4	B5	B6	B7	B8
<u>TRANSLATION</u>								
PULSE ft/sec	0.02	0.02	0.02	0.02	0.02	0.05	0.01	0.02
<u>ROTATION</u>								
DSC RT NORM °/sec	0.500	0.200	0.200	0.200	0.200	0.500	0.200	0.500
VERN °/sec	0.200	0.200	0.200	0.008	0.016	0.200	0.200	0.200
PULSE NORM °/sec	0.04	0.04	0.04	0.04	0.04	0.04	0.04	.77
VERN °/sec	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
COMP NORM °/sec	.00	.00	.00	.00	.00	.00	.00	.00
VERN °/sec	.000	.000	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>								
ATT NORM (deg)	3.00	3.00	3.00	0.30	3.00	2.00	2.00	2.00
VERN (deg)	1.000	1.000	1.000	0.100	0.033	1.000	1.000	1.000
RATE NORM °/sec	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
VERN °/sec	.020	.020	.020	.010	.020	.020	.020	.020
<u>JET OPT</u>								
P	1	3	1	3	3	1	1	1
Y	1	3	1	3	3	1	1	1
CNTL ACCEL	0	0	0	0	0	0	0	0

*I-LOADED OPS-2 DAP Configuration

DAP BOOK

**HOOK
VELCRO**

FLT PLN/34/0/BAS

UNIV PTG	
TGT ID = 1	Orbiting Vehicle
= 2	Earth ctr
= 3	Earth tgt
	Input LAT (± 90)
	LON (± 180 , + = East)
	ALT (-3444.0 to 20000.0 nm)
= 4	Sun ctr
= 5	Celestial tgt
	Input RA (0-359.99)
	DEC (± 90)
= 11-110	Nav Stars
BODY VECT = 1	+X*
= 2	-X*
= 3	-Z*
= 4	PTC ($\sim 2^\circ$ below +X)*
= 5	Optional
	Input P (0-359.99)
	Y (270-359.99, 0-90)
* input OM \rightarrow	OM (0-359.99)
MON AXIS = 1	+X
= 2	-X

G20 DAP CONFIG	
CNTL ACCEL = 0	Orbiter alone
= 1	thru 5 not used
JET OPT = 1	Normal
= 2	Nose only
= 3	Tail only

TOP

DAP PURPOSE

- A1 - NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)
- A2 - PTC
- A3 - RCS HOT FIRE
- A4 - GG
- A5 - IMU ROTATION
- A6 - LOSS OF VERN
(TAIL ONLY)
- A7 - (Blank)
- A8 - PRE/POST DEPLOY
- A9 - RENDEZVOUS
- A10 - PROX OPS
- A11 - IUS

FLT PLN/34/0/BAS :

A1

DAP A1

PURPOSE:

NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)

FLT PLN/34/0/BAS

TOP

(reduced copy)

TOP

A1

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

FLT PLN/34/0/BAS

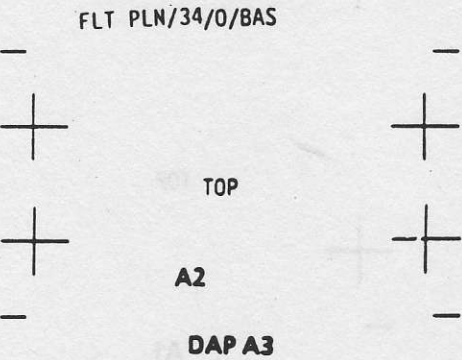
A2

FLT PLN/34/FIN

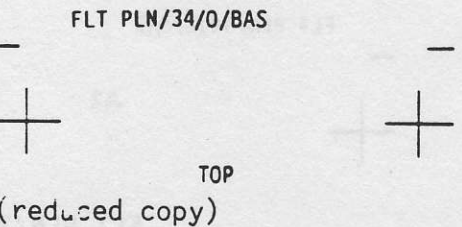


DAP A2

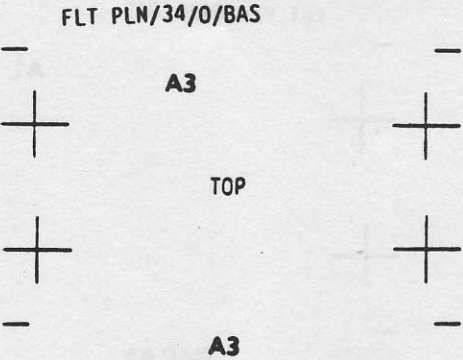
PURPOSE:
PTC



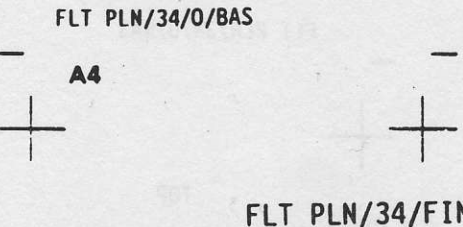
PURPOSE:
RCS HOT FIRE



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



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



FLT PLN/34/FIN



A3

DAP A4

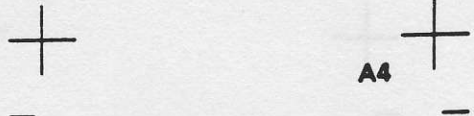
PURPOSE:

GG

FLT PLN/34/0/BAS



TOP



A4

DAP A5

PURPOSE:

IMU ROTATION

FLT PLN/34/0/BAS



TOP

(reduced copy)



TOP

A4

0.1 0 1 TRANSLATION PULSE

0.2 0 0 2 ROTATION DSC RT NORM
 0.0 0 0 3 VERN
 0.1 0 0 4 PULSE NORM
 0.0 1 0 5 VERN
 .0 0 0 6 COMP NORM
 .0 0 0 7 VERN

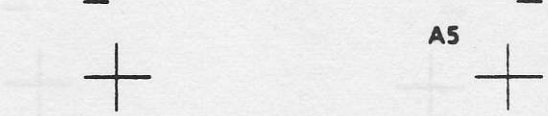
1.0 0 8 DEADBAND ATT NORM
 0.0 7 0 9 VERN

0.2 0 10 RATE NORM
 0.0 1 0 11 VERN

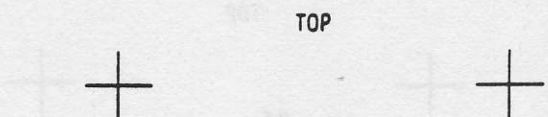
1 12 JET OPT P
 1 13 Y

0 14 CNTL ACCEL

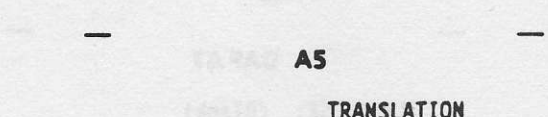
FLT PLN/34/0/BAS



A5



TOP



A5

0.1 0 1 TRANSLATION PULSE

0.2 0 0 2 ROTATION DSC RT NORM
 0.2 0 0 3 VERN
 0.1 0 0 4 PULSE NORM
 0.0 5 0 5 VERN
 .0 0 0 6 COMP NORM
 .0 0 0 7 VERN

5.0 0 8 DEADBAND ATT NORM
 1.0 0 0 9 VERN

0.2 0 10 RATE NORM
 0.0 2 0 11 VERN

1 12 JET OPT P
 1 13 Y

0 14 CNTL ACCEL

FLT PLN/34/0/BAS



A6

FLT PLN/34/FIN

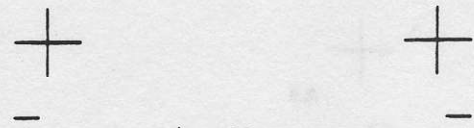


A5

DAP A6

PURPOSE:

LOSS OF VERN
(TAIL ONLY)



TOP

A6

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

FLT PLN/34/0/BAS

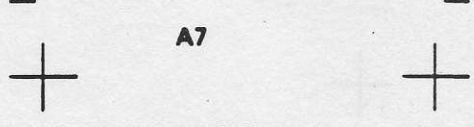


TOP

A6

DAP A7

PURPOSE: (Blank)



A7

TOP

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

FLT PLN/34/0/BAS



TOP

(reduced copy)



A8

FLT PLN/34/FIN

+

A7

-

DAP A8

PURPOSE:

PRE/POST DEPLOY

FLT PLN/34/0/BAS

+

TOP

+

A8

DAP A9

PURPOSE:

RENDEZVOUS

FLT PLN/34/0/BAS

+

TOP

(reduced copy)

+

+

+

TOP

A8

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

FLT PLN/34/0/BAS

+

TOP

+

A9

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

FLT PLN/34/0/BAS

+

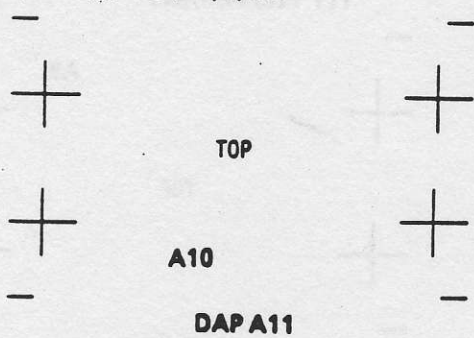
A10

FLT PLN/34/FIN



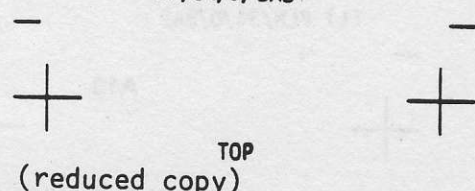
PURPOSE:
PROX OPS

FLT PLN/34/O/BAS



PURPOSE:
IUS

FLT PLN/34/O/BAS



0.0 5 1 TRANSLATION PULSE

0.2 0 0 2 ROTATION DSC RT NORM
0.2 0 0 3 VERN
0.1 0 0 4 PULSE NORM
0.0 1 0 5 VERN
.0 0 0 6 COMP NORM
.0 0 0 7 VERN

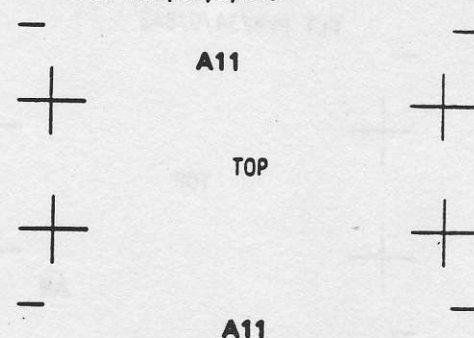
2.0 0 8 DEADBAND ATT NORM
1.0 0 0 9 VERN

0.2 0 10 RATE NORM
.0 2 0 11 VERN

1 12 JET OPT P
1 13 Y

Q 14 CNTL ACCEL

FLT PLN/34/O/BAS



0.2 5 1 TRANSLATION PULSE

0.2 0 0 2 ROTATION DSC RT NORM
0.2 0 0 3 VERN
0.0 5 4 PULSE NORM
0.0 1 0 5 VERN
.0 0 0 6 COMP NORM
.0 0 0 7 VERN

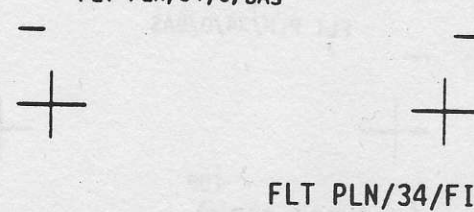
1.0 0 8 DEADBAND ATT NORM
1.0 0 0 9 VERN

0.2 0 10 RATE NORM
.0 1 0 11 VERN

3 12 JET OPT P
3 13 Y

Q 14 CNTL ACCEL

FLT PLN/34/O/BAS



TOP

A11

DAP PURPOSE

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

FLT PLN/34/0/BAS

FLT PLN/34/0/BAS

TOP

TOP

B1

DAP B1

B1

PURPOSE:

NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

TRANSLATION
PULSE 15 0.0 2

ROTATION
DSC RT NORM 16 0.5 0 0
 VERN 17 0.2 0 0 0
PULSE NORM 18 0.0 0 4
 VERN 19 0.0 0 0 2
COMP NORM 20 .0 0 0 0
 VERN 21 .0 0 0 0

DEADBAND
ATT NORM 22 3.0 0
 VERN 23 1.0 0 0

RATE NORM 24 0.2 0
 VERN 25 .0 2 0

JET OPT P 26 1
 Y 27 1

CNTL ACCEL 28 0

FLT PLN/34/0/BAS

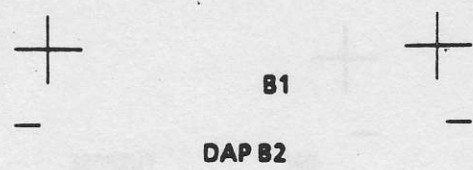
FLT PLN/34/0/BAS

TOP

B2

(reduced copy)

FLT PLN/34/FIN



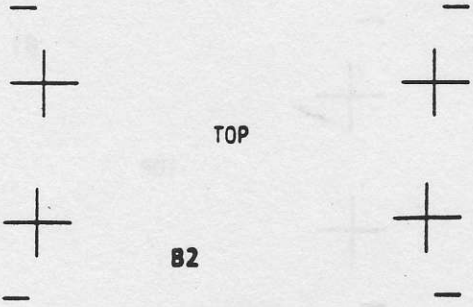
81

DAP B2

PURPOSE:

LOSS OF VERN
(TAIL ONLY)

FLT PLN/34/0/BAS



TOP

82

DAP B3

PURPOSE:

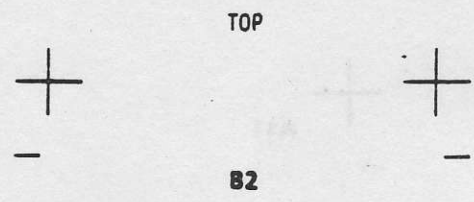
LOSS OF VERN
(NOSE & TAIL)
GG MNVR

FLT PLN/34/0/BAS



TOP

(reduced copy)



TOP

82

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	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	0
	VERN	23	1.0	0	0

RATE

NORM	24	0.2	0
VERN	25	.0	2

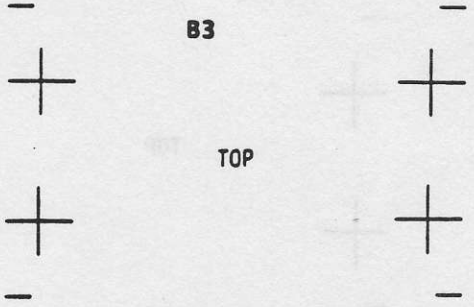
JET OPT

P	26	3
Y	27	3

CNTL ACCEL

28 0

FLT PLN/34/0/BAS



83

TOP

83

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	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	0
	VERN	23	1.0	0	0

RATE

NORM	24	0.2	0
VERN	25	.0	2

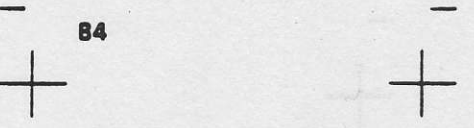
JET OPT

P	26	1
Y	27	1

CNTL ACCEL

28 0

FLT PLN/34/0/BAS



84

FLT PLN/34/FIN



B3

DAP B4

PURPOSE:
SSUS DEPLOY

FLT PLN/34/0/BAS



TOP

B4

DAP B5

PURPOSE:
COAS CAL

FLT PLN/34/0/BAS



TOP

(reduced copy)



TOP

B4

TRANSLATION			
PULSE	15	0.0	2
ROTATION			
DSC RT	NORM 16	0.2	0 0
	VERN 17	0.0	0 0 8
PULSE	NORM 18	0.0	0 4
	VERN 19	0.0	0 2
COMP	NORM 20	0.0	0 0
	VERN 21	.0	0 0
DEADBAND			
ATT	NORM 22	0.3	0
	VERN 23	0.1	0 0
RATE			
	NORM 24	0.2	0
	VERN 25	.0	1 0
JET OPT			
	P 26		3
	Y 27		3
CNTL ACCEL 28 0			
FLT PLN/34/0/BAS			



B5

TOP

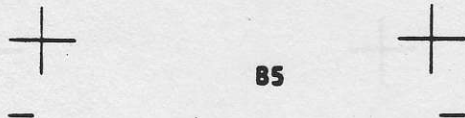
B5

TRANSLATION			
PULSE	15	0.0	2
ROTATION			
DSC RT	NORM 16	0.2	0 0
	VERN 17	0.0	1 0 6
PULSE	NORM 18	0.0	0 4
	VERN 19	0.0	0 2
COMP	NORM 20	0.0	0 0
	VERN 21	.0	0 0
DEADBAND			
ATT	NORM 22	3.0	0
	VERN 23	0.0	3 3
RATE			
	NORM 24	0.2	0
	VERN 25	.0	2 0
JET OPT			
	P 26		3
	Y 27		3
CNTL ACCEL 28 0			
FLT PLN/34/0/BAS			



B6

FLT PLN/34/FIN



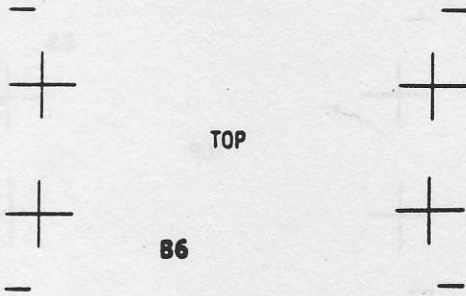
85

DAP 86

PURPOSE:

RENDEZVOUS

FLT PLN/34/0/BAS



TOP

86

DAP 87

PURPOSE:

PROX OPS

FLT PLN/34/0/BAS



TOP

(reduced copy)

TOP



86

TRANSLATION
PULSE

15 0.0 5

ROTATION

DSC RT	NORM	16	0.5	0	0
	VERN	17	0.2	0	0
PULSE	NORM	18	0.0	0	4
	VERN	19	0.0	0	2
COMP	NORM	20	.0	0	0
	VERN	21	.0	0	0

DEADBAND

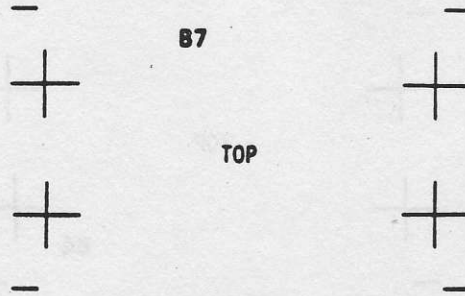
ATT	NORM	22	2.0	0	0
	VERN	23	1.0	0	0

RATE	NORM	24	0.2	0	0
	VERN	25	.0	2	0

JET OPT	P	26		1	
	Y	27		1	

CNTL ACCEL 28 0

FLT PLN/34/0/BAS



87

TOP

87

TRANSLATION
PULSE

15 0.0 1

ROTATION

DSC RT	NORM	16	0.2	0	0
	VERN	17	0.2	0	0
PULSE	NORM	18	0.0	0	4
	VERN	19	0.0	0	2
COMP	NORM	20	.0	0	0
	VERN	21	.0	0	0

DEADBAND

ATT	NORM	22	2.0	0	0
	VERN	23	1.0	0	0

RATE	NORM	24	0.2	0	0
	VERN	25	.0	2	0

JET OPT	P	26		1	
	Y	27		1	

CNTL ACCEL 28 0

FLT PLN/34/0/BAS



88

FLT PLN/34/FIN

87

+

+

+

TOP

DAP 88

88

PURPOSE: IMAX MNVR

TRANSLATION			
PULSE	15	0.0	2

ROTATION			
DSC RT NORM	16	0.5	0 0
VERN	17	0.2	0 0
PULSE NORM	18	0.7	7
VERN	19	0.0	0 2
COMP NORM	20	.0	0
VERN	21	.0	0 0

DEADBAND			
ATT NORM	22	2.0	0
VERN	23	1.0	0 0

RATE NORM	24	0.2	0
VERN	25	.0	2 0

JET OPT P	26	1	
Y	27	1	

CNTL ACCEL 28 0

FLT PLN/34/O/BAS

FLT PLN/34/O/BAS

+

+

+

+

TOP

+

+

88

FLT PLN/34/O/BAS

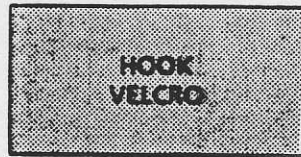
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FLT PLN/34/FIN

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BACK COVER 'DAP BOOK'



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9-16

FLT PLN/34/FIN

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