

Notes

National Space Transportation System
FLIGHT DATA FILE

JSC-22939-29

Flight Plan (Crew Activity Plan)

STS-29

(Cycle 2R4 Trajectory)

**Mission Operations Directorate
Operations Division**

**Final, Rev A
February 17, 1989**

<u>EVENT</u>	<u>CST</u>		
Launch	07:04	Wed	Mar 15
TDRS Deploy	13:17	Wed	Mar 15
EDW Landing	08:11	Mon	Mar 20



National Aeronautics and
Space Administration

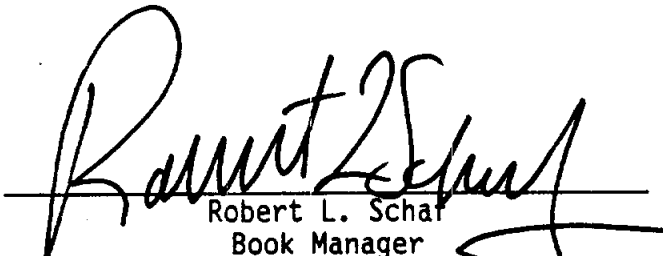
Lyndon B. Johnson Space Center
Houston, Texas

MISSION OPERATIONS DIRECTORATE

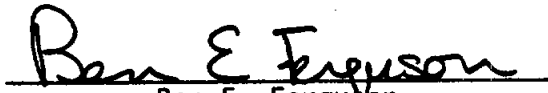
STS-29 FLIGHT PLAN


FINAL, REVISION A
February 17, 1989

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482#:	MULTI 57A	EXEMPTION#:	1
	MULTI 62		
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	FLT PLN 596		FLT PLN 599A(C)
	FLT PLN 600		
	FLT PLN 603		
	FLT PLN 604		
	FLT PLN 618		

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DH4/R. Schaf	483-4468
Nominal Timelines	DH4/J. Davis	483-4361
Pointing	DH4/D. Hord	483-4457

STS-29 FLIGHT PLAN

LIST OF EFFECTIVE PAGES

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REV A 02/17/89

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iii.....*	29/FIN A	4B-3.....	29/FIN A
iv.....*	29/FIN A	4B-4.....	29/FIN A
v.....*	29/FIN A	4C-1.....	29/FIN A
vi.....*	29/FIN A	4C-2.....	29/FIN A
vii.....	29/FIN A	4C-3.....	29/FIN A
viii.....	29/FIN A	4C-4.....	29/FIN A
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1-2.....	29/FIN A	4D-2.....	29/FIN A
1-3.....	29/FIN A	4D-3.....	29/FIN A
1-4.....	29/FIN A	4D-4.....	29/FIN A
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2-2.....	29/FIN A	4D-6.....	29/FIN A
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4A-3.....	29/FIN A		
4A-4.....	29/FIN A		

(*) - Omit from flight book

STS-29 FLIGHT PLAN CUE CARDS

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DAP A4.....	* 7-7	FLT PLN/29/0/FIN
A4.....	* 7-7	FLT PLN/29/0/FIN
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A5.....	* 7-7	FLT PLN/29/0/FIN
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A6.....	* 7-8	FLT PLN/29/0/FIN
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A11.....	* 7-10	FLT PLN/29/0/FIN
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DAP B3.....	* 7-13	FLT PLN/29/0/FIN
B3.....	* 7-13	FLT PLN/29/0/FIN
DAP B4.....	* 7-13	FLT PLN/29/0/FIN
B4.....	* 7-13	FLT PLN/29/0/FIN
DAP B5.....	* 7-14	FLT PLN/29/0/FIN
B5.....	* 7-14	FLT PLN/29/0/FIN
DAP B6.....	* 7-14	FLT PLN/29/0/FIN
B6.....	* 7-14	FLT PLN/29/0/FIN
DAP B7.....	* 7-15	FLT PLN/29/0/FIN
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INTRODUCTION

The STS-29 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-29 Flight Requirements Document. This Flight Plan, as part of the Flight Data File, meets the specifications of the Cycle 2R version of the STS-29 Flight Initialization Data Pack.

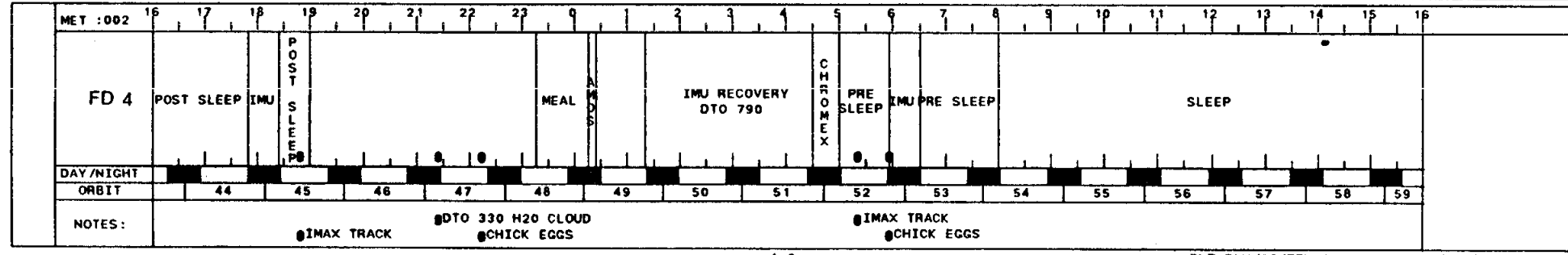
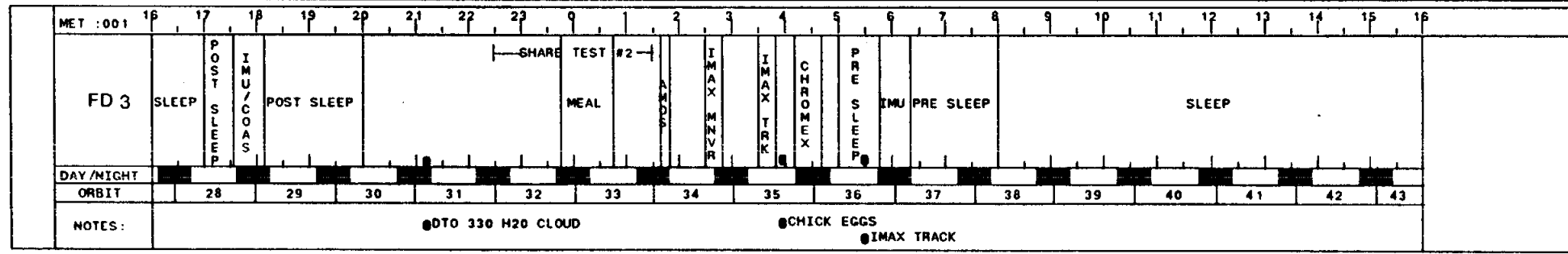
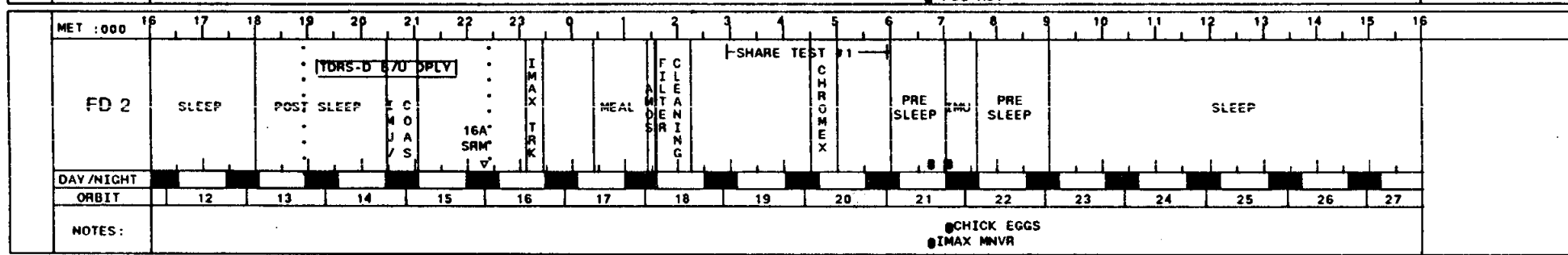
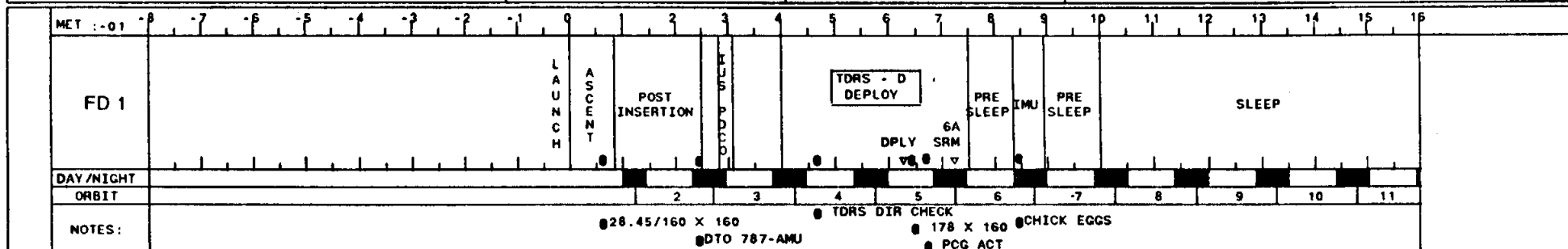
The flight profile used for this Flight Plan is for a launch date of March 15, 1989, at 07:04 CST. Orbiter inertial attitudes are expressed relative to a Mean of 1950 (M50) reference frame.

JSC-22354 Crew Scheduling Constraints (Appendix K, CPMP), Basic, March 1987, has been used to build the timelines contained in this Flight Plan. The Flight Day 2 unscheduled EVA plan in Section 4-D is specifically addressed in Exemption Request #1 to this document.

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STS-29 OVERVIEW

FLIGHT STS-29 EDITION FIN REV A PUB. DATE 2/17/89

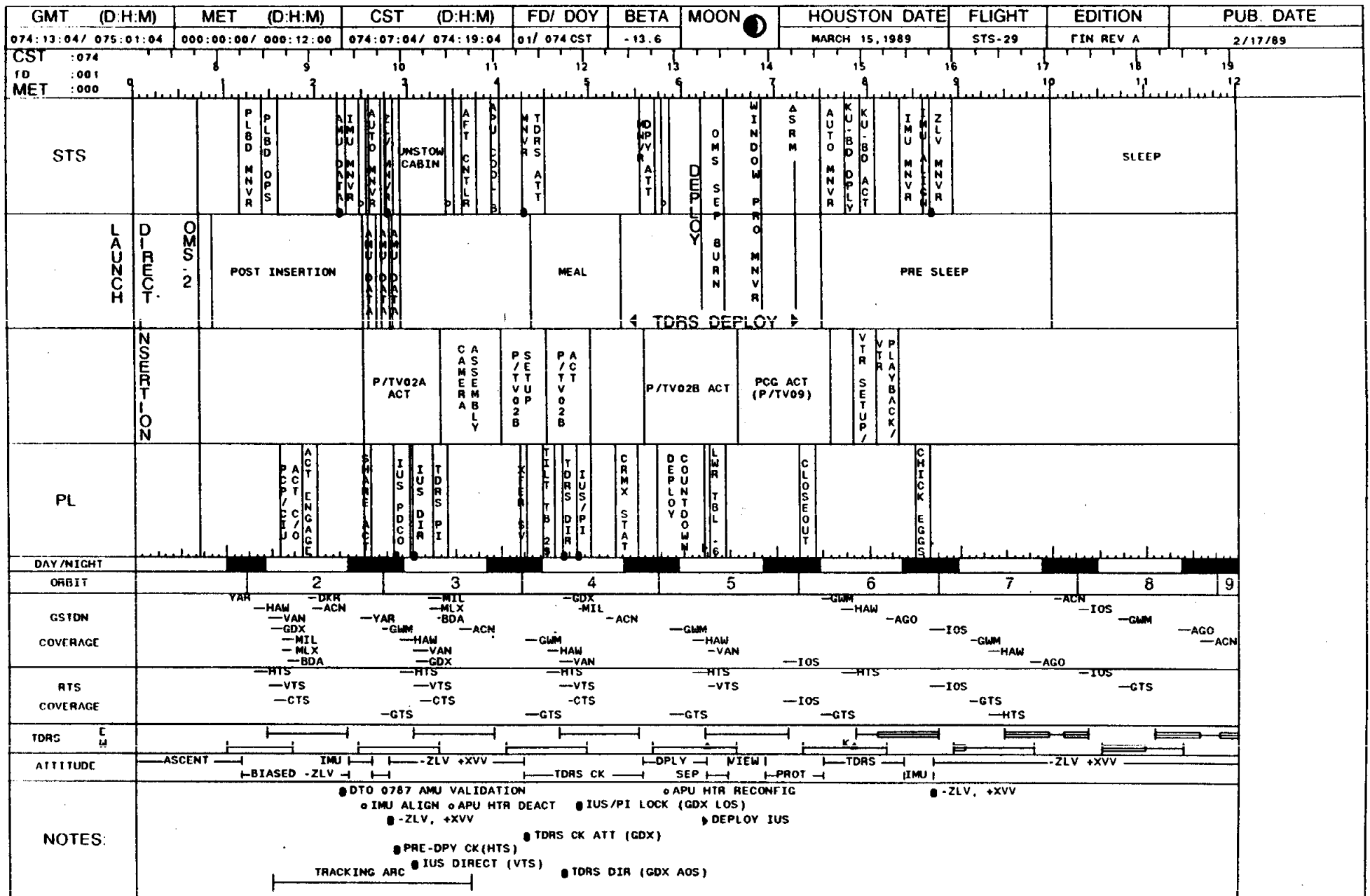


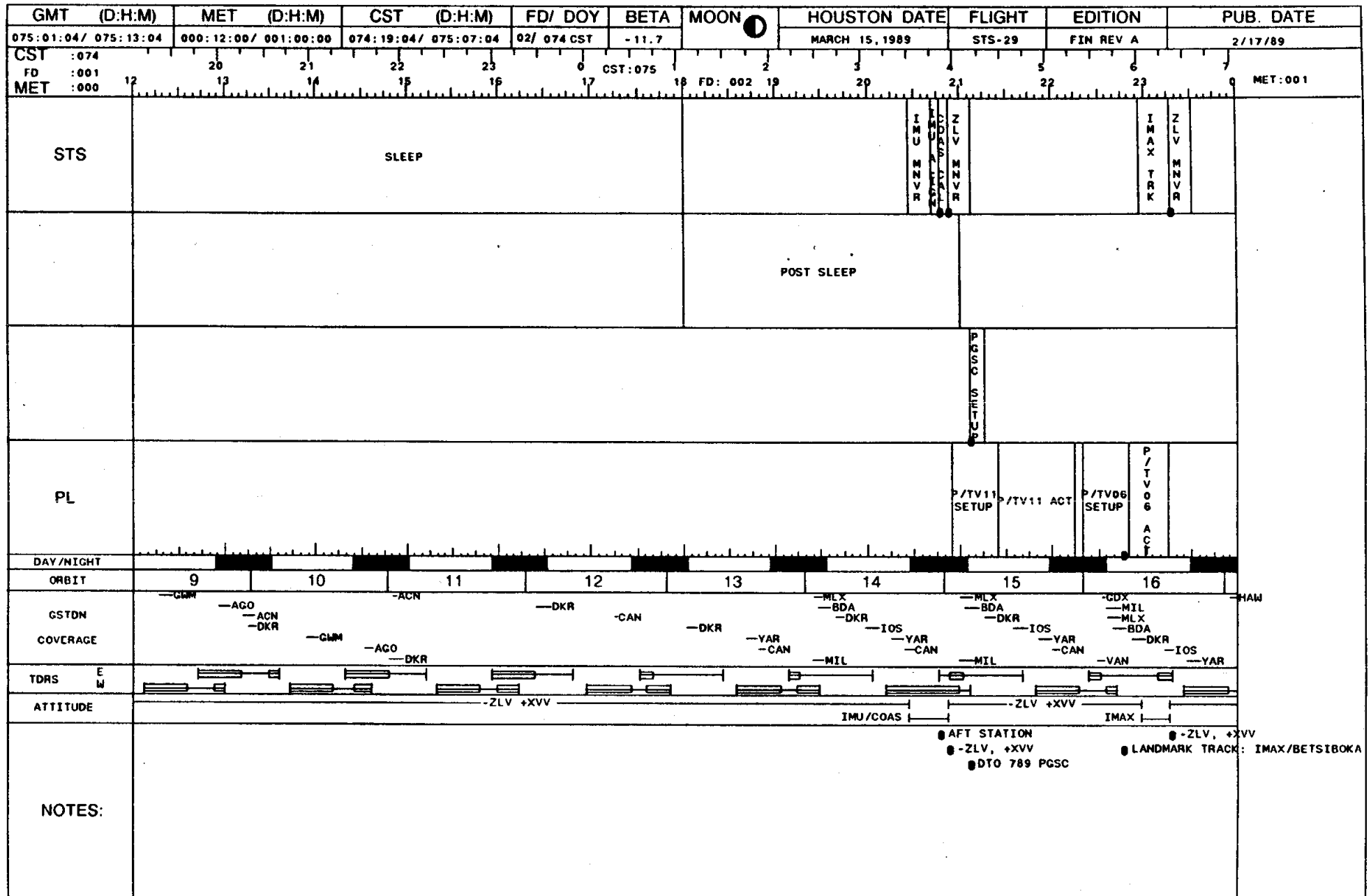
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FD5	POST SLEEP		IMU	FCS C/O	IMAX TRK	HD TRK	CREW CONF	IMAX TRK	SHARE MEAL	DEPRIME	CABIN STOW			PRE SLEEP	IMU	PRE SLEEP	SLEEP							
DAY/NIGHT	[Day/Night Cycle]																							
ORBIT	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75							
NOTES:	●OTO 790-IMU RECOVERY ●PCG DEACT ●CHICK EGGS ●CHROMEX																							
MET :004	16	17	18	19	20	21	22	23	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FD6	POST SLEEP		IMU	AD C/O	DEORBIT PREP	DEORBIT			DE ORBIT	EL D W N D I N G														
DAY/NIGHT	[Day/Night Cycle]																							
ORBIT	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90								
NOTES:	●SHARE COLD SOAK TEST ●CHICK EGGS																							

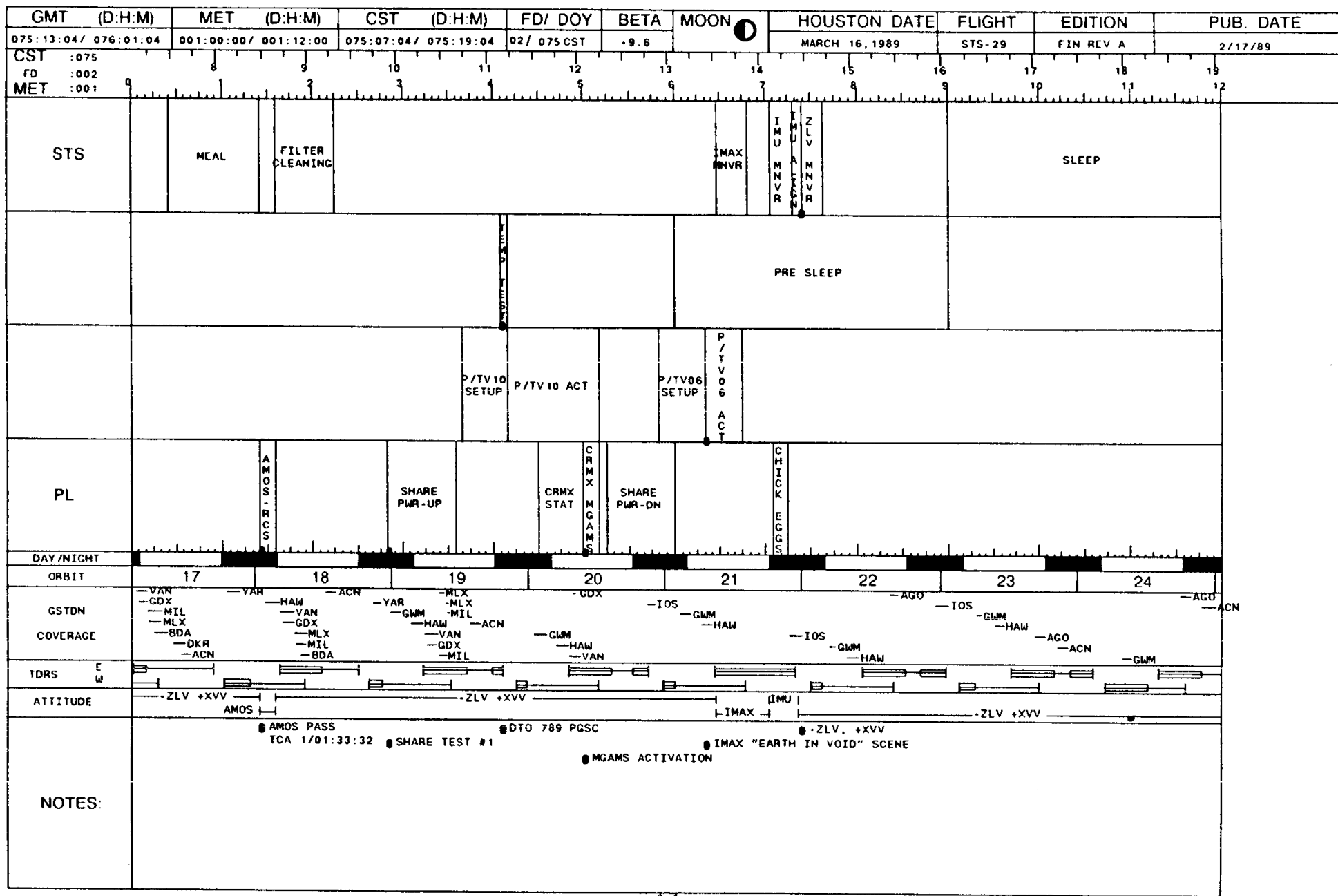
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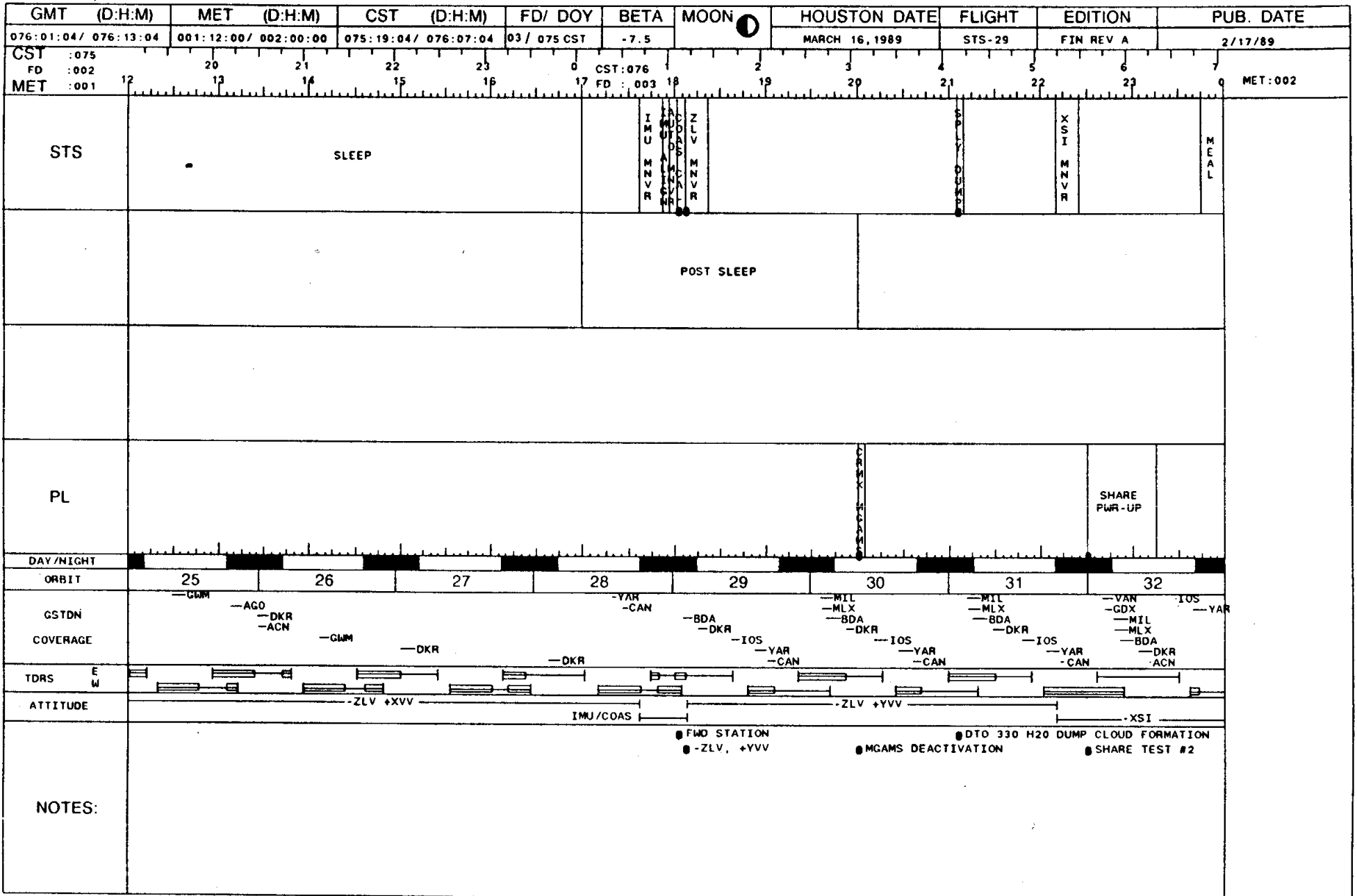
SUMMARY TIMELINE

SUMMARY TIMELINE









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076:13:04 / 077:01:04	002:00:00 / 002:12:00	076:07:04 / 076:19:04	03 / 076 CST	-5.4		MARCH 17, 1989	STS-29	FIN REV A	2/17/89	
CST :076										
FD :003										
MET :002										
STS	MEAL	ZLV MNV R	IMAX MNV R	ZLV MNV R	IMAX MNV R	AUTO MNV R	IMAX MNV R	IMU MNV R	ZLV MNV R	SLEEP
						P/TV11 SETUP	P/TV11 ACT			PRE SLEEP
		AMOS RCS			CHICK EGGS		CRM STAT			
PL	SHARE PWR-DN	P/T V06 ACT	P/T V06 ACT	P/T V06 ACT	P/T V06 ACT					
DAY/NIGHT										
ORBIT	33	34	35	36	37	38	39	40		
GSTDN COVERAGE	HAW -ACN VAN -GDX MIL -BDA -DKR	YAR -GWM HAW -ACN VAN -GDX MIL -BDA	MLX -BDA -ACN -GWM HAW -VAN GDX -MIL	MIL -MLX -ACN -GWM HAW -VAN GDX -MIL	-GWM HAW -VAN	-GWM HAW -VAN	-ACN -IOS -GWM HAW -AGO	-ACN -IOS -GWM HAW -AGO	ACN -GWM HAW -AGO	
TDRS										
ATTITUDE	-XSI -ZLV +XVV	IMAX -ZLV +XVV	IMAX -ZLV +XVV	IMAX -ZLV +XVV	IMU			-ZLV +XVV		
NOTES:	<ul style="list-style-type: none"> ● -ZLV, +XVV ● AMOS PASS ● TCA 2/01:45:52 ● IMAX "EARTH IN VOID" SCENE ● LANDMARK TRACK: IMAX/MASAYA VOLCANO ● LANDMARK TRACK: IMAX/RONDONIA 									

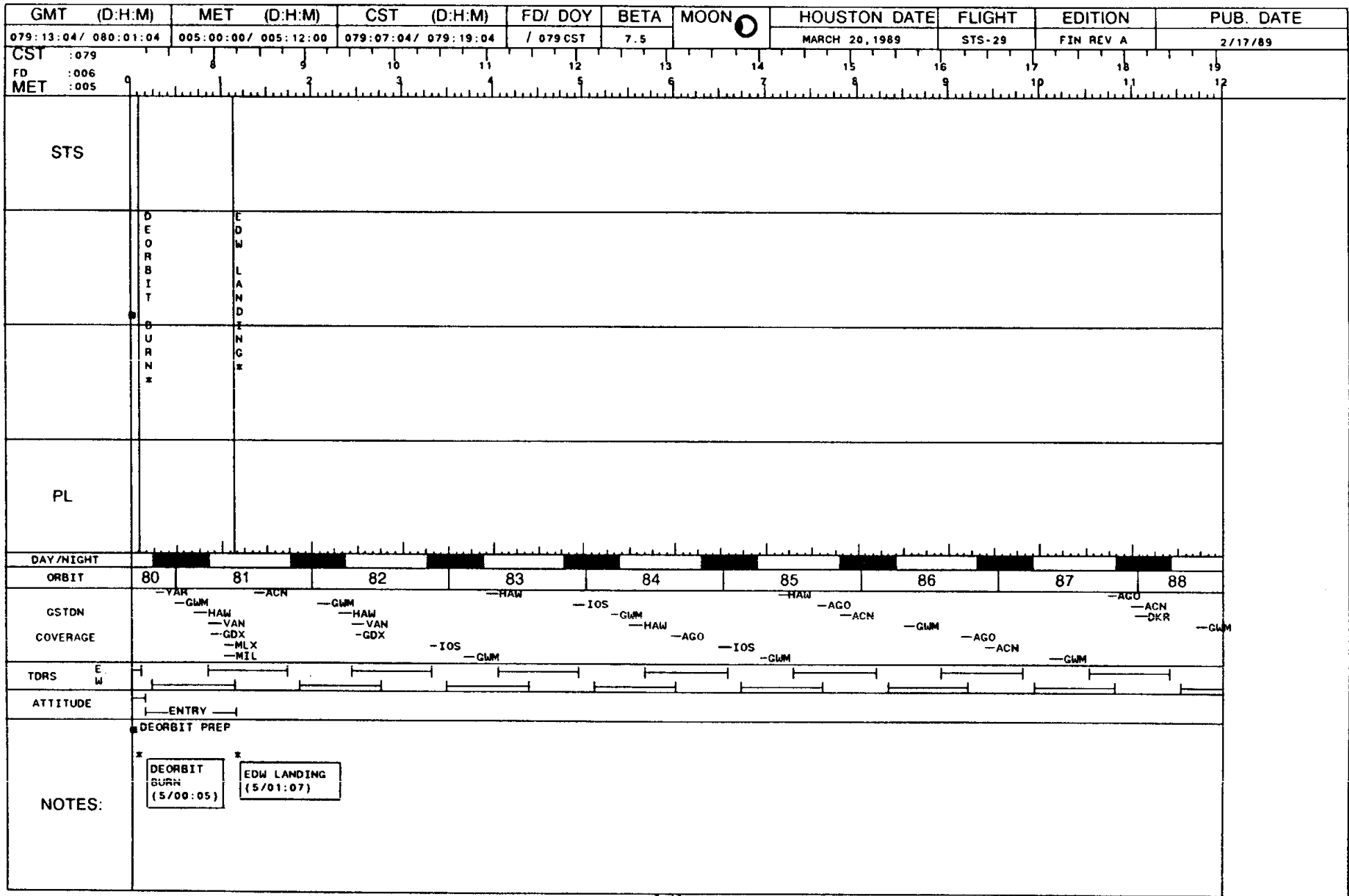
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CST :076										
FD :003										
MET :002									MET:003	
STS	SLEEP								MEAL	
PL										
DAY/NIGHT										
ORBIT	41	42	43	44	45	46	47	48		
GSTDN COVERAGE	ACN -DKR	GWM	AGO -DKR -ACN	CAN -DKR	YAR -CAN	MIL -MLX -BDA	DKR -IOS -YAR -CAN	BDA -DKR -IOS -YAR	MIL -MLX -BDA -DKR -ACN	YAR
TDRS										
ATTITUDE										
NOTES:										

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
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CST :077																
FD :004																
MET :003																
STS																
PL																
DAY/NIGHT																
ORBIT	49		50		51		52		53		54		55		56	
GSTDN COVERAGE																
TDRS																
ATTITUDE																
NOTES:	<p> ● DTO 790 IMU REF RECOVERY ○ MNVR TGT 1 ○ MNVR TGT 1 ○ MNVR TGT 2 ○ MNVR TGT 2 ● AMOS PASS TCA 3/00:21:57 ● -ZLV, +XVV ● -ZLV, +XVV ● -ZLV, +XVV ● -ZLV, +XVV ● DTO 790 IMU REF RECOVERY ● LANDMARK TRACK: IMAX/SAO PAULO </p>															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
078:01:04 / 078:13:04	003:12:00 / 004:00:00	077:19:04 / 078:07:04	05 / 077 CST	0.9	☉	MARCH 18, 1989	STS-29	FIN REV A	2/17/89
CST :077									
FD :004	20	21	22	23	0	CST:078	2	3	4
MET :003	12	13	14	15	16	FD :005	17	18	19
STS	SLEEP								
PL									
DAY/NIGHT									
ORBIT	57	58	59	60	61	62	63	64	
GSTDN COVERAGE	ACN DKR	GLM DKR		BDA DKR IOS YAR CAN	BDA DKR IOS YAR CAN	BDA DKR IOS YAR CAN	MIL MLX BDA DKR IOS YAR	VAN GDY MIL MLX BDA DKR ACN	
TDRS									
ATTITUDE									
NOTES:									

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
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CST :078																
FD :005																
MET :004																
STS					SLEEP											
	MEAL	CABIN STOW				PRE SLEEP										
	SHARE DEPRIME				PCG DEACT (P/TV09)											
PL	SHARE PWR-UP				CRMX STAT				CHICK EGGS							
DAY/NIGHT																
ORBIT	65		66		67		68		69		70		71		72	
GSTDN COVERAGE	YAR -GWM -HAW -VAN -GDX -MIL		BDA -ACN		YAR -GWM -HAW -VAN -GDX -MIL -ACN		-MIL -MLX -MIL		-IOS -GWM -HAW -AGO		-AGO -ACN -IOS -GWM		-GWM		-GWM	
TORS											E		W			
ATTITUDE	SHARE				ITEST 4				-ZLV +XVV				IMU		-ZLV +XVV	
NOTES:	<ul style="list-style-type: none"> ● DTO 790 IMU REF RECOVERY ● SHARE DEPRIME TEST ● SHARE SIMO PWR-DN ○ MNVR TGT 1 ● -ZLV, +XVV ● -ZLV, +XVV ● -ZLV, +XVV ● -ZLV, +XVV ● DTO 790 IMU REF RECOVERY ● MGAMS ACTIVATION 															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
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CST :078	20	21	22	23	0	CST:079	2	3	4	5	6	7			
FD :005	12	13	14	15	16	FD :006	17	18	19	20	21	22	23	0	MET:005
STS	SLEEP			POST SLEEP			DEORBIT PREP								
PL				SHARE COLD SOAK			DEACT								
DAY/NIGHT															
ORBIT	72	73	74	75	76	77	78	79	80						
GSTDN COVERAGE	-ACU -DKR -ACN	-GMM	-DKR	-CAN	-MIL -MLX -BDA -DKR	-CAN -YAR	-MIL -MLX -BDA -DKR	-CAN -YAR	-VAN -MIL -MLX -BDA -DKR	-IOS -YAR	-HAW -VAN -GDX -MIL -MLX	-BDA -DKR -ACN -YAR	-MIL -MLX -BDA -DKR	-ACN	
TDRS															
ATTITUDE	-ZLV +XVV														
NOTES:	 • MGAMS DEACTIVATION														

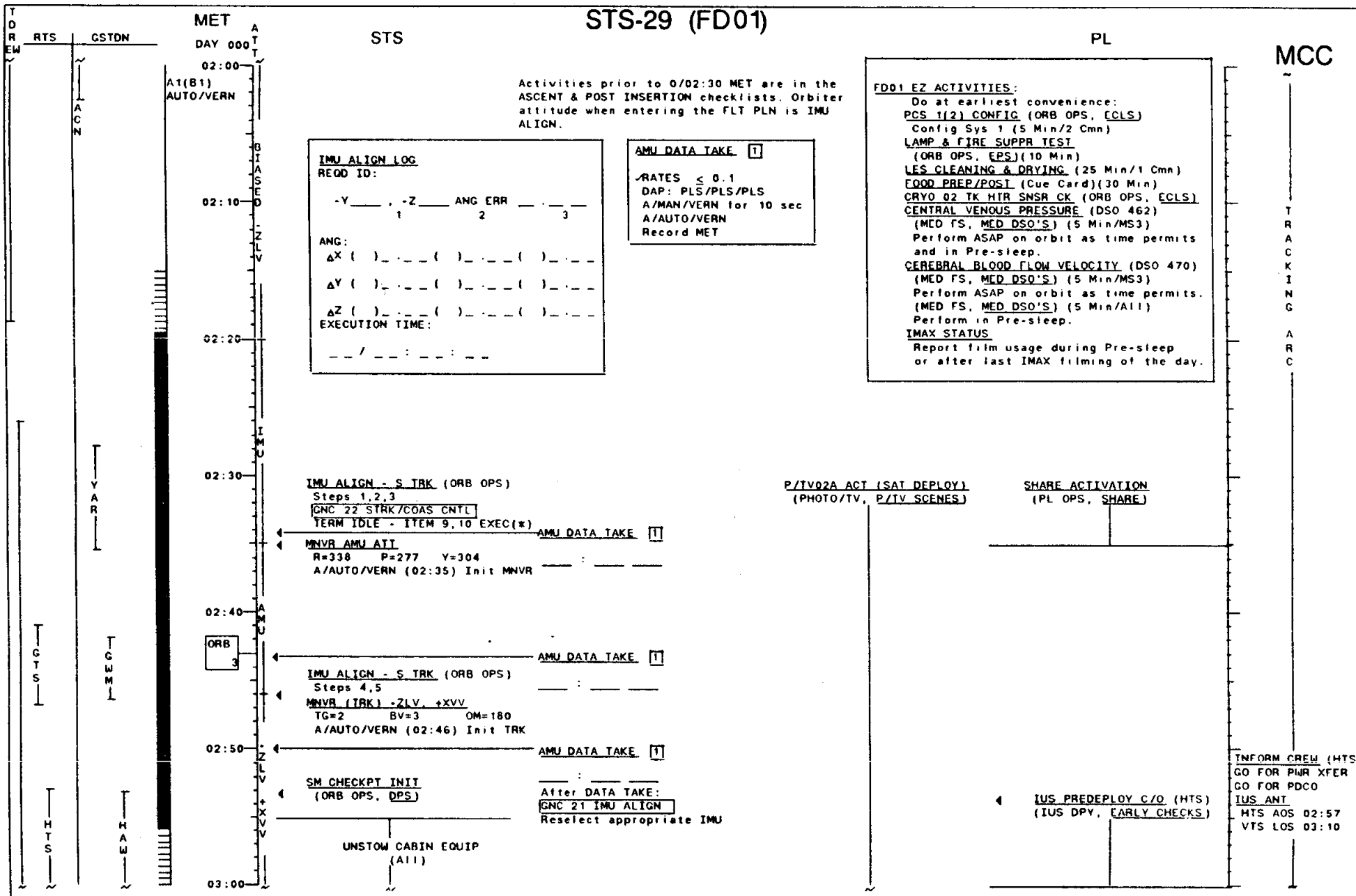


DETAILED TIMELINE

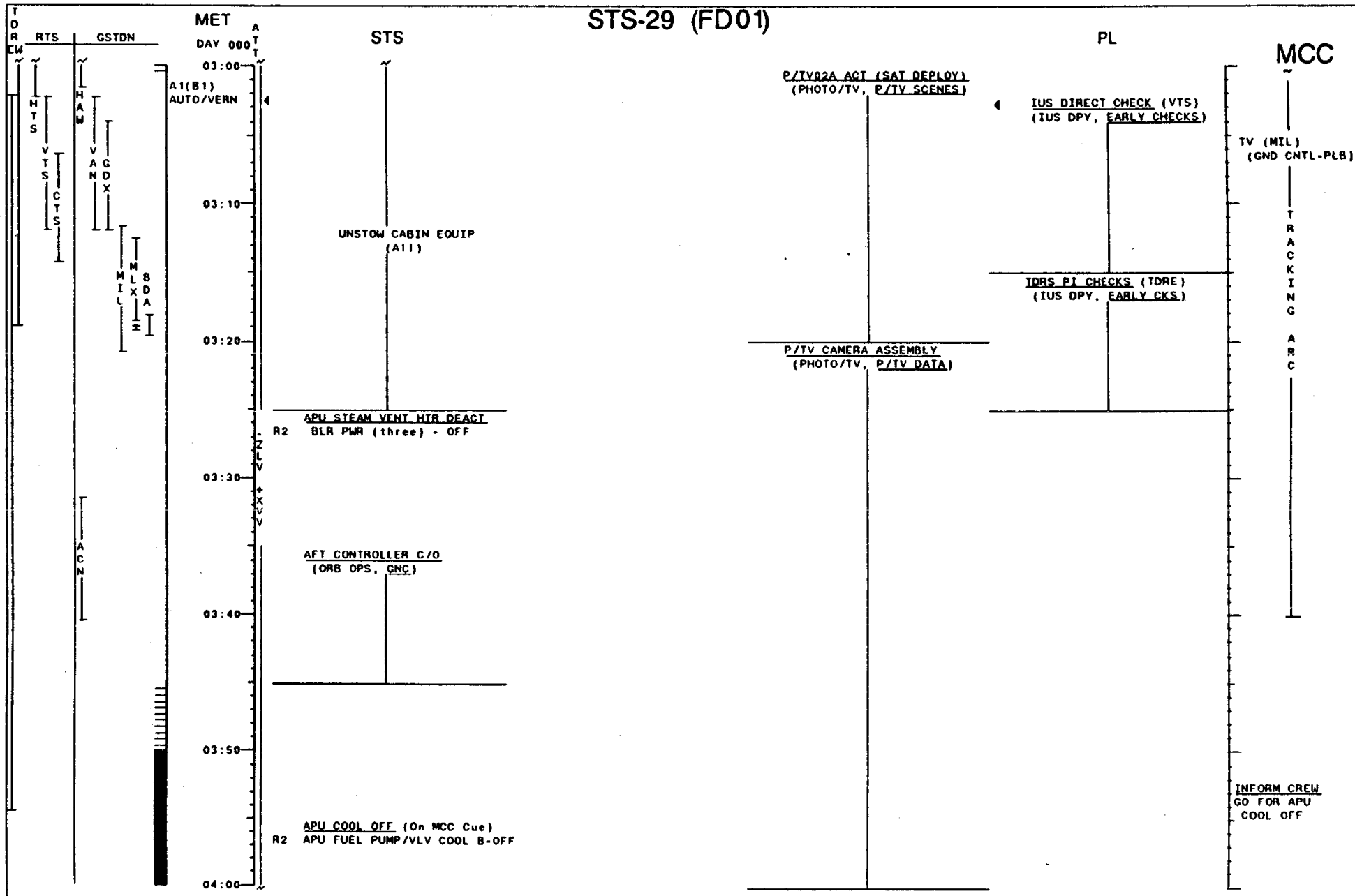
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TIMELINE**

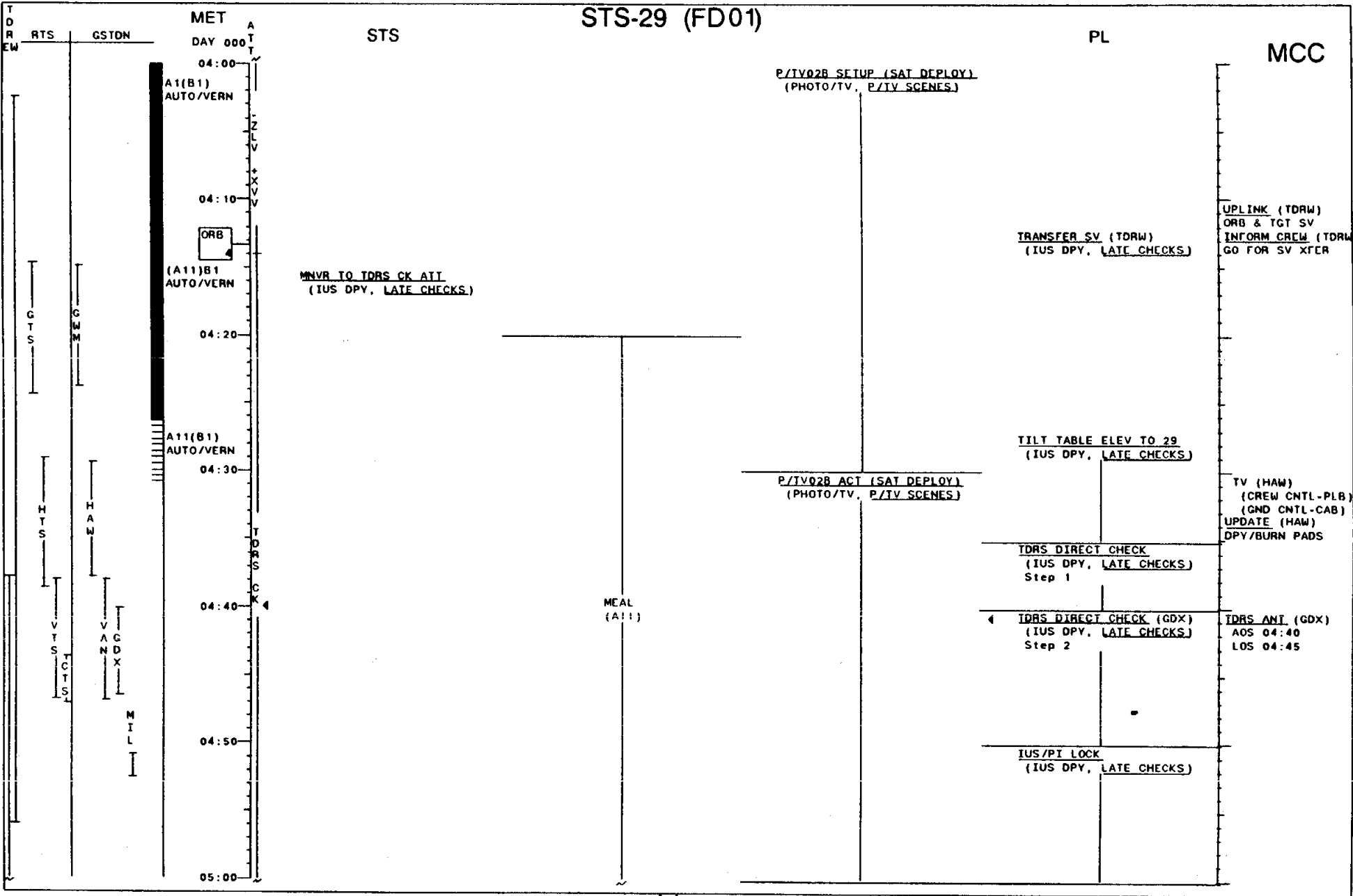
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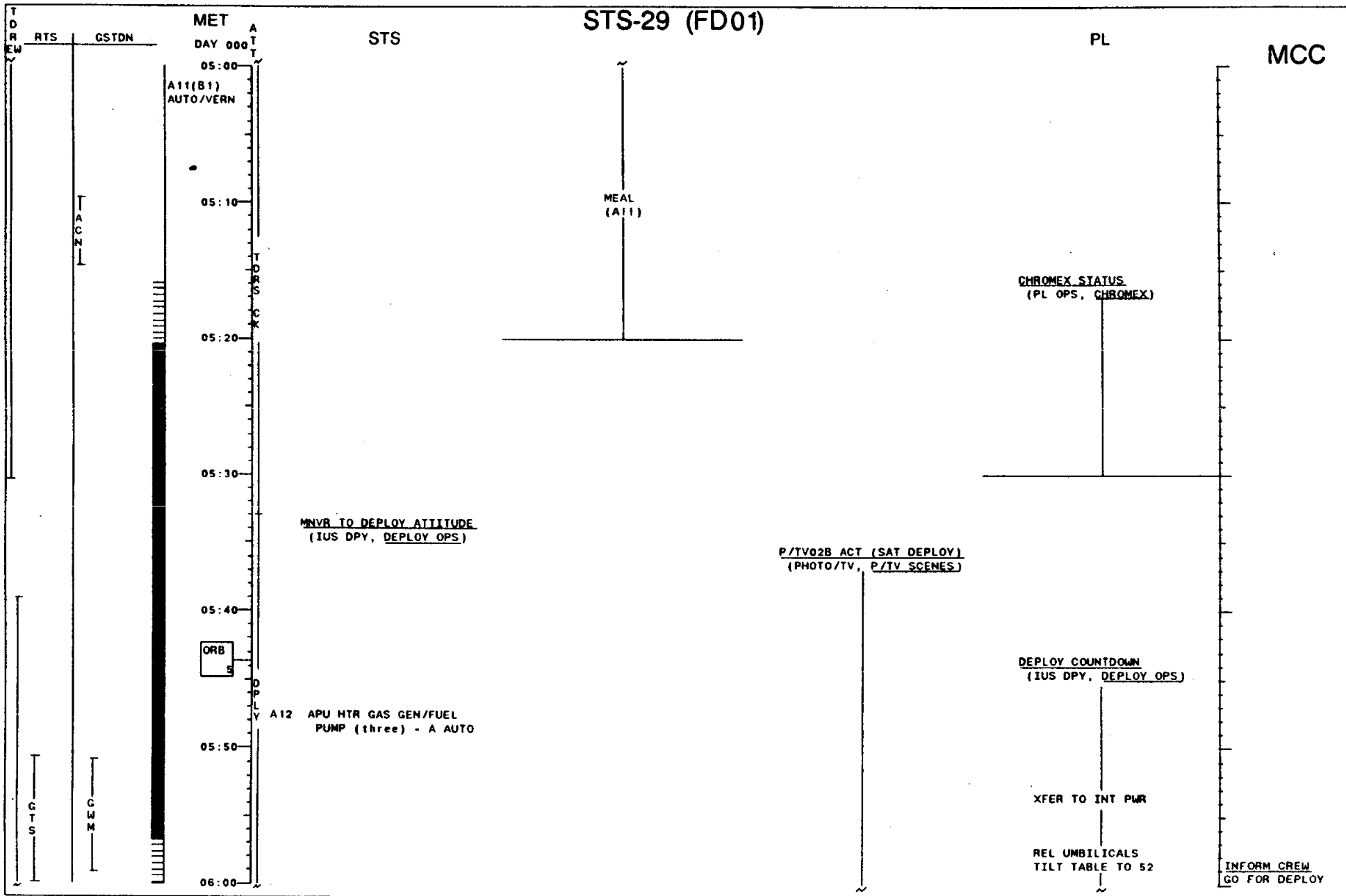
STS-29 (FD01)

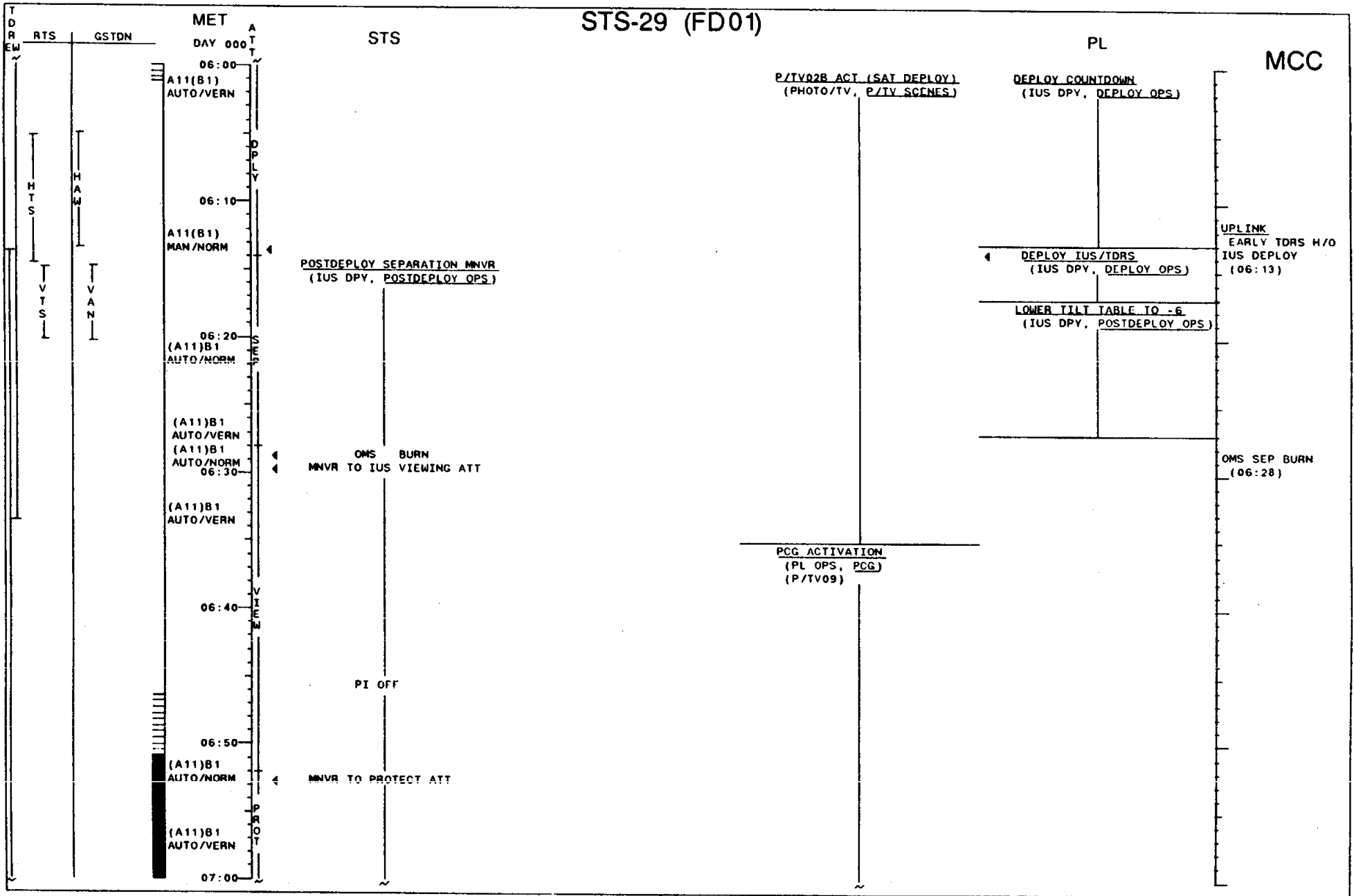


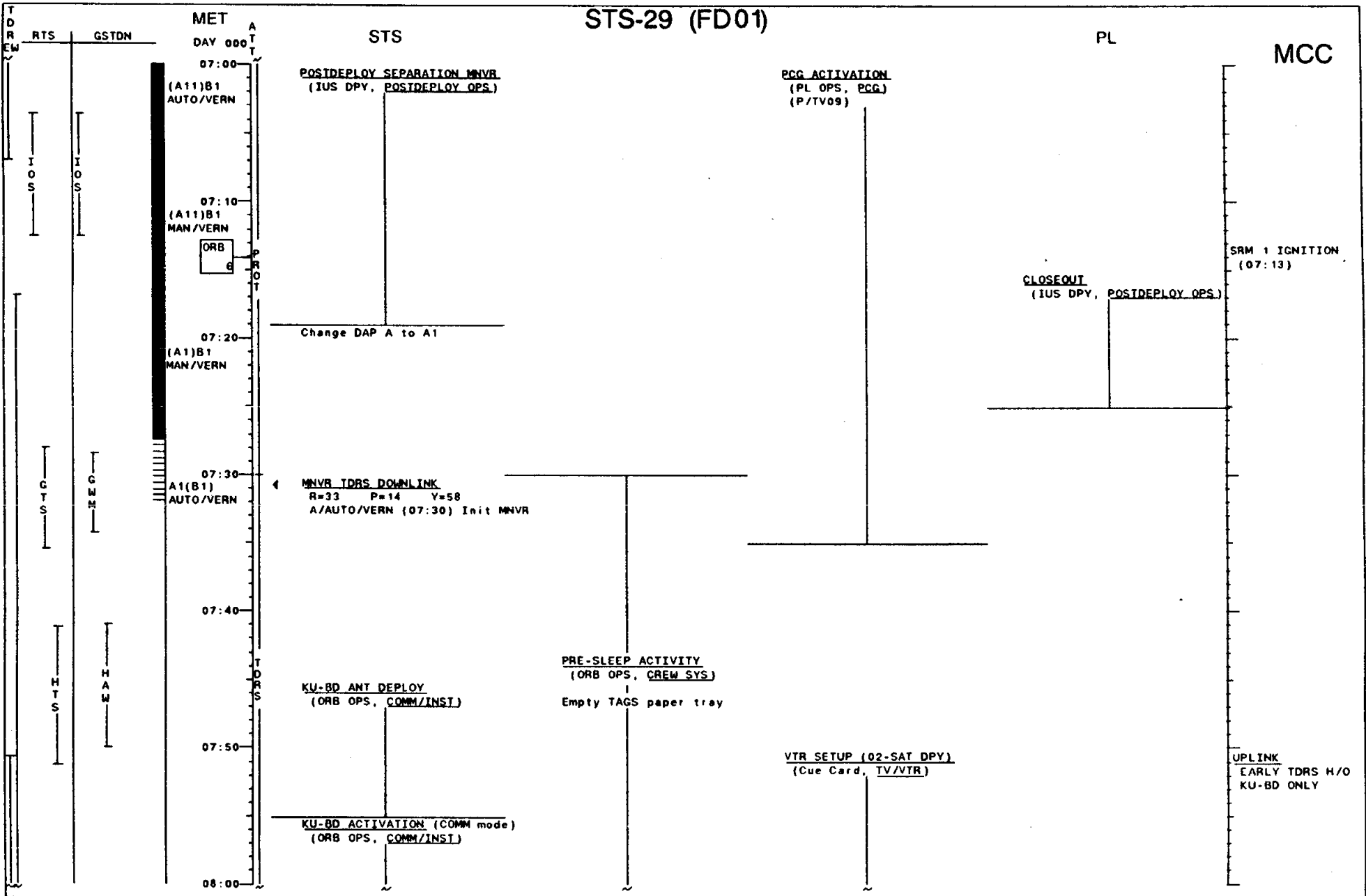
STS-29 (FD01)

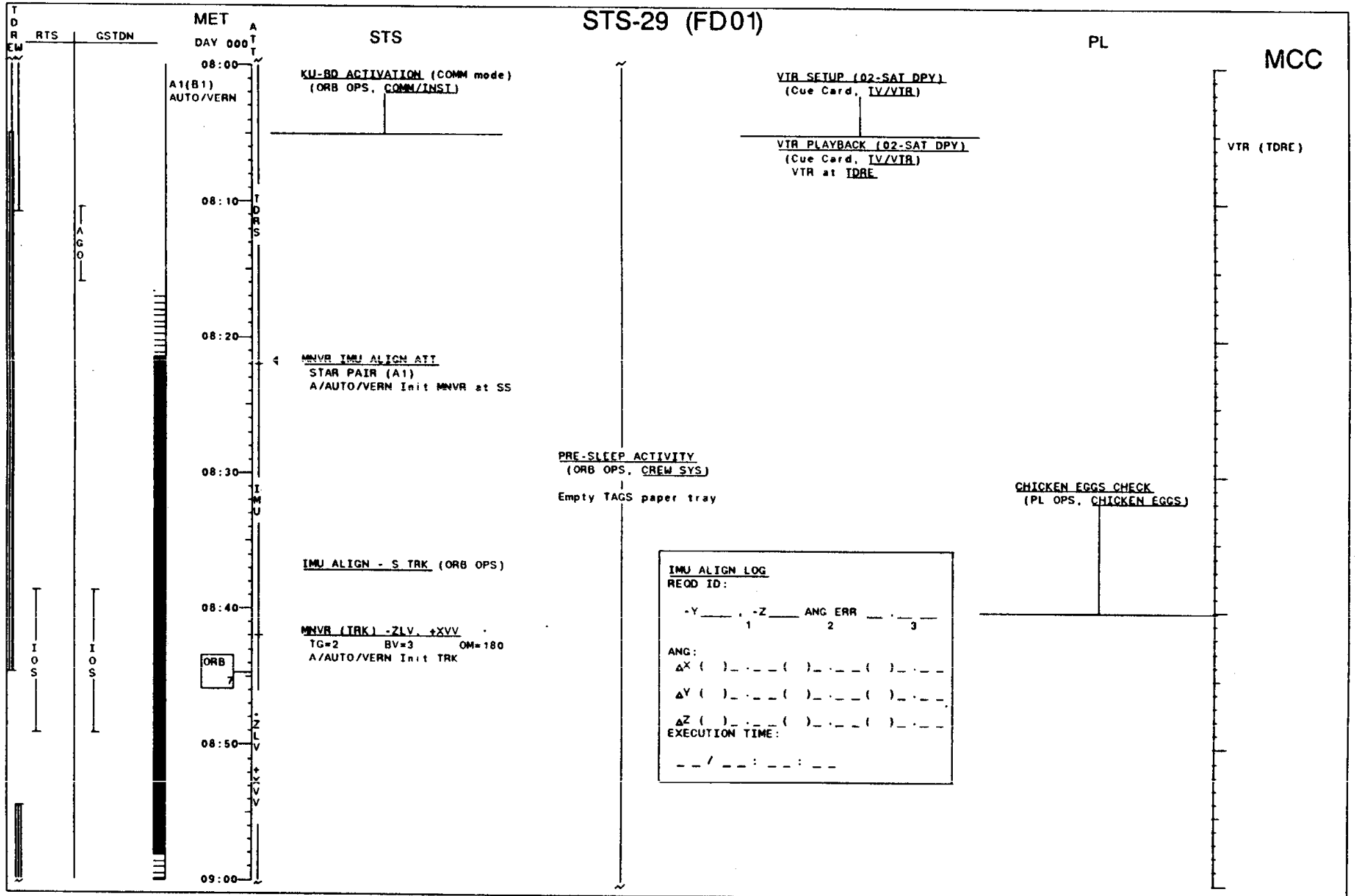




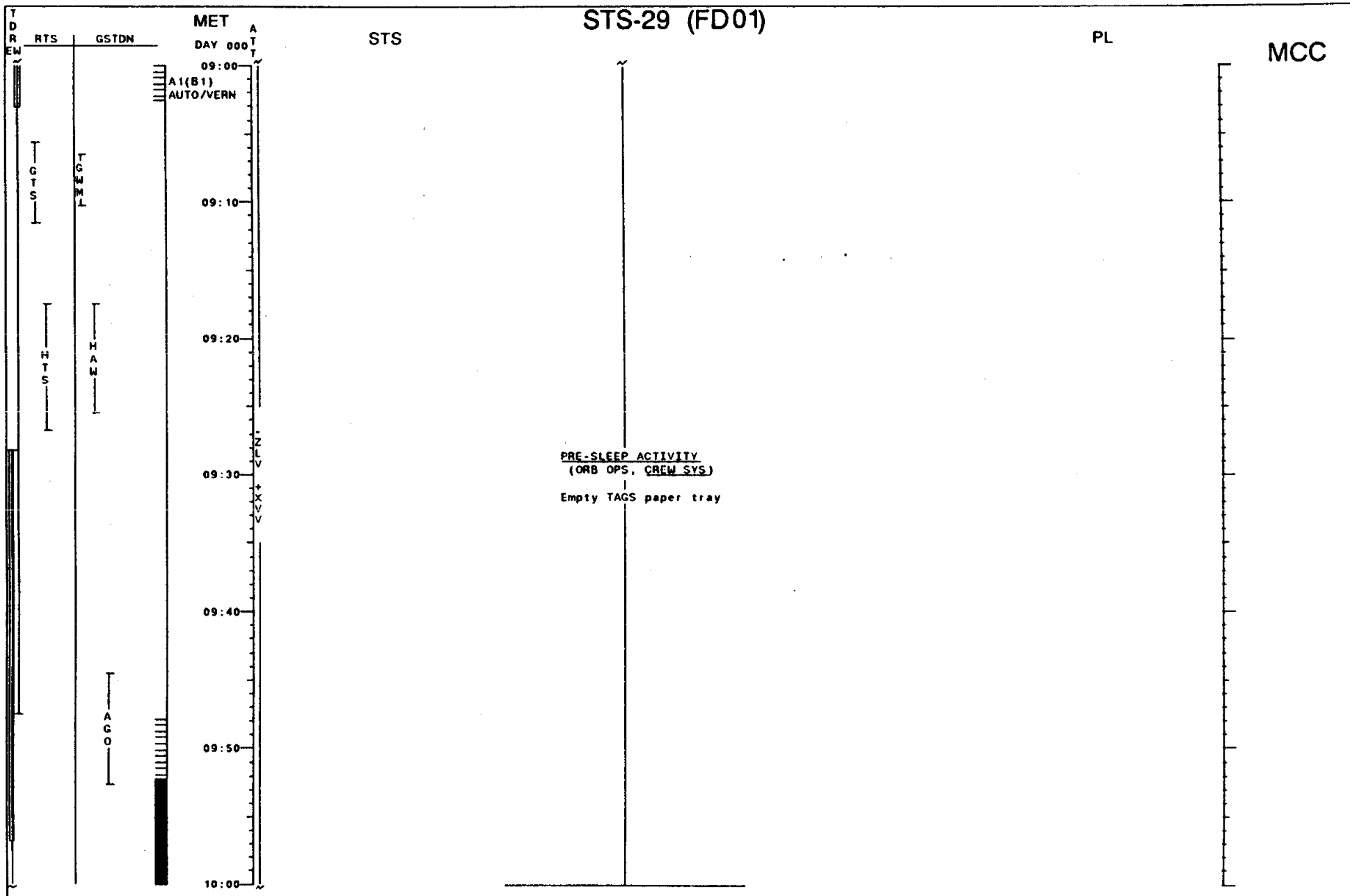




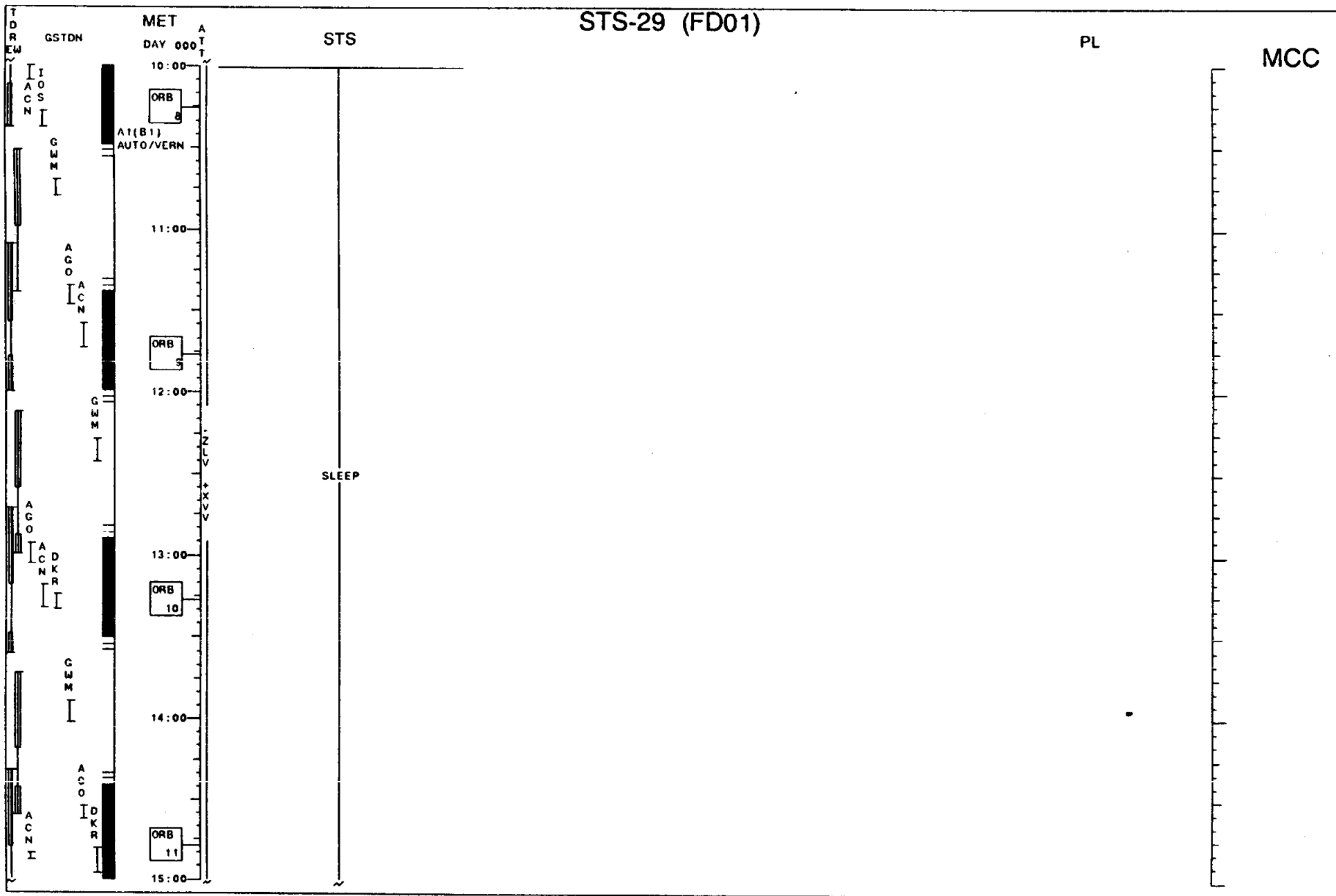




IMU ALIGN LOG			
READ ID:			
-Y	-Z	ANG ERR	
1	2	3	
ΔX ()	()	()	()
ΔY ()	()	()	()
ΔZ ()	()	()	()
EXECUTION TIME:			
- / - : - : -			



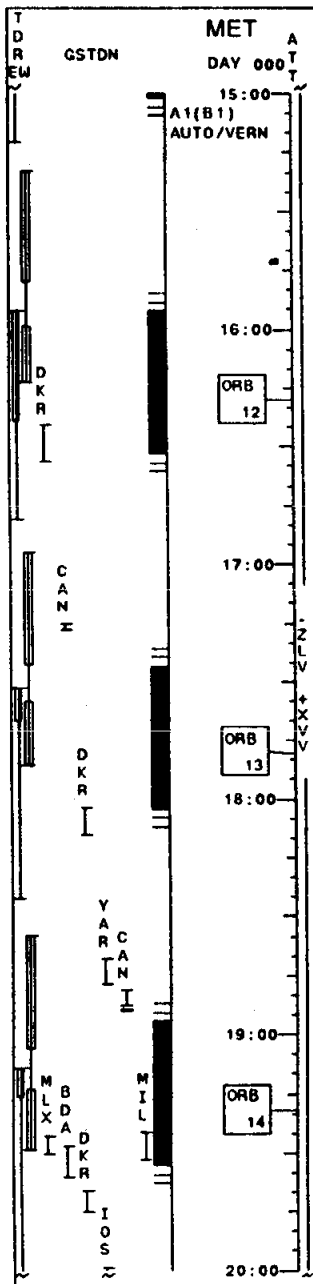
STS-29 (FD01)



STS-29 (FD02)

PL

MCC



FD02 FZ ACTIVITIES:

- EXERCISE (1 Hr/All)
- FOOD PREP/POST (Cue Card)(30 Min)
- SALIVARY SCOP/DEX KINETICS (DSO 457)
(MED FS, MED DSO's) (5 min/MS2)
Samples at 0, .5, 1, 2, 4, 6, 8, 10, 12, 18, 24, 36 hours post-dosing.
Prefer start at wake-up.
- SALIVARY TYLENOL KINETICS (DSO 458)
(MED FS, MED DSO's) (5 min/PLT,MS1,MS3)
Samples at 0, .25, .5, 1, 2, 3, 4, 5, 6, 8 hours post-dosing.
Prefer start at wake-up.
- CENTRAL VENOUS PRESSURE (DSO 462)
(MED FS, MED DSO's) (5 min/MS3)
Perform in Post-sleep and Pre-sleep.
- CEREBRAL BLOOD FLOW VELOCITY (DSO 470)
(MED FS, MED DSO's) (5 min/all)
Perform in Post-sleep.
- TAGS TEST-Paper loading (DTO 786)
(Cue card, TAGS) (30 min)
Unload and reload TAGS paper roll.
- IMAX STATUS
Report film usage during Pre-sleep or after last IMAX filming of the day.
- PGSC SYSTEM DISK TEST
(PGSC COMP, SYSTEM DISK TEST)
- PCG FAN INLET CLEANING

STS

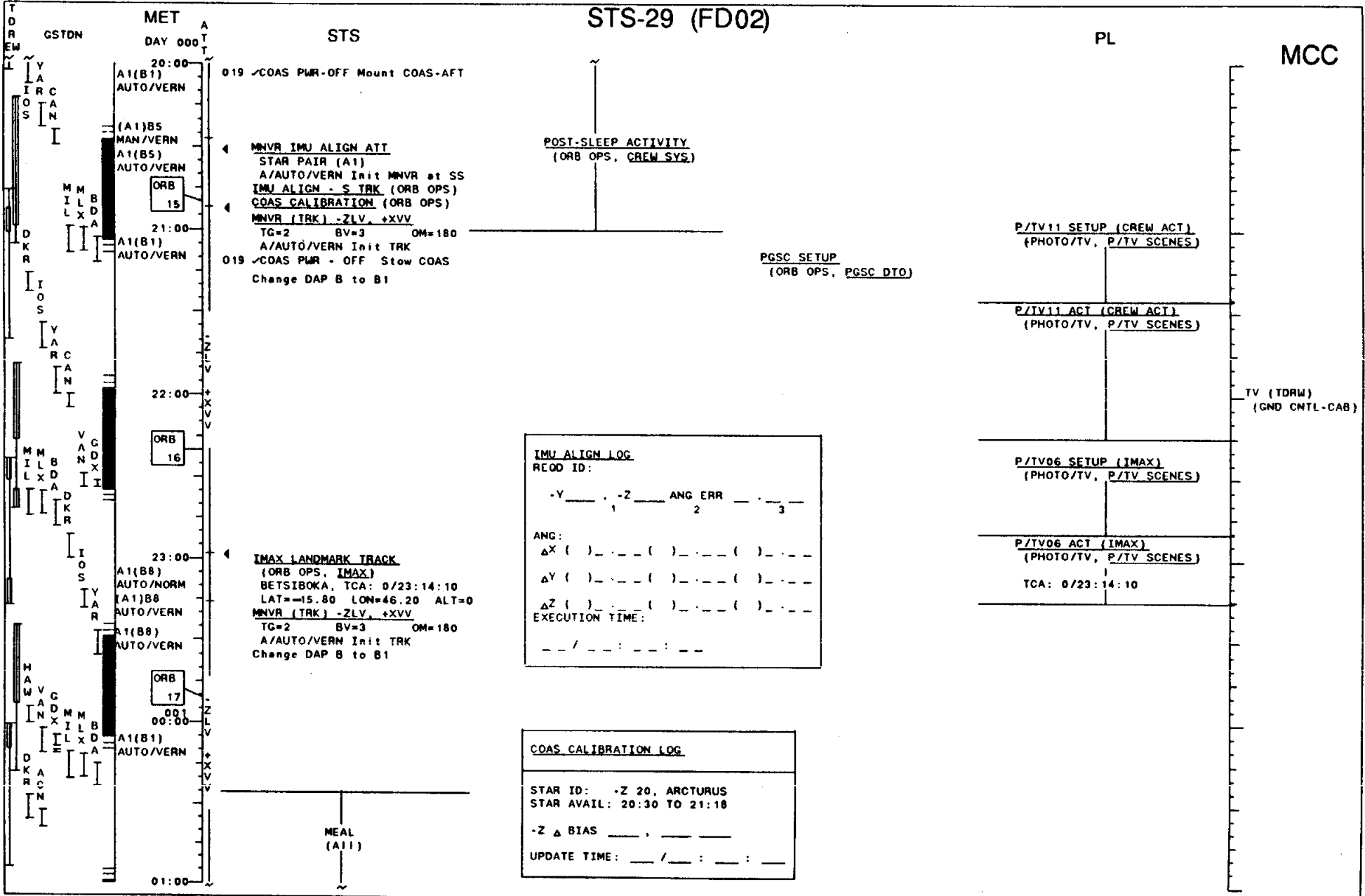
SLEEP

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

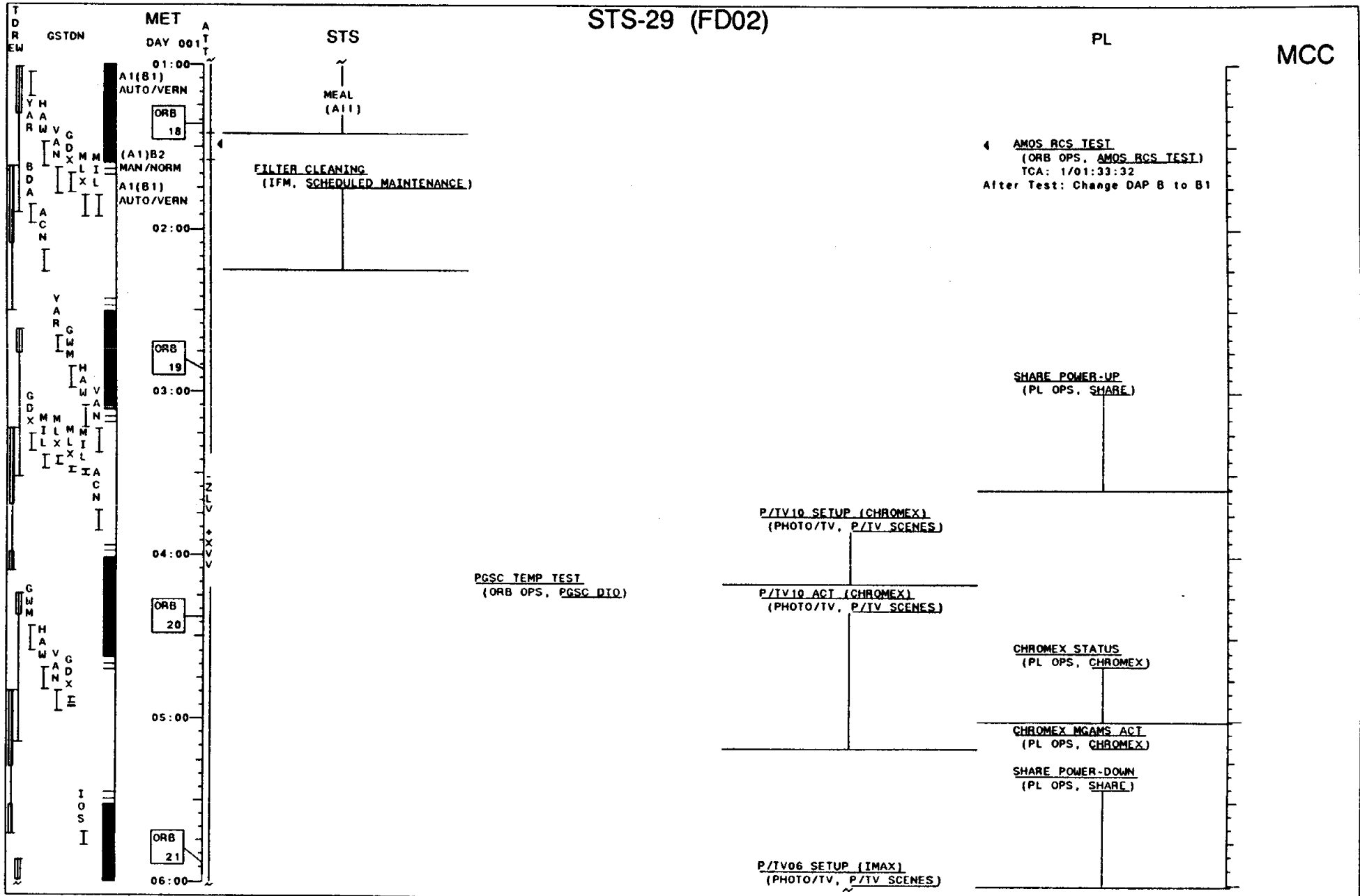
Use last TAGS message to sort crew messages from TAGS DTO pages

UPLINK
REFSMAT
NORMALIZAT'N

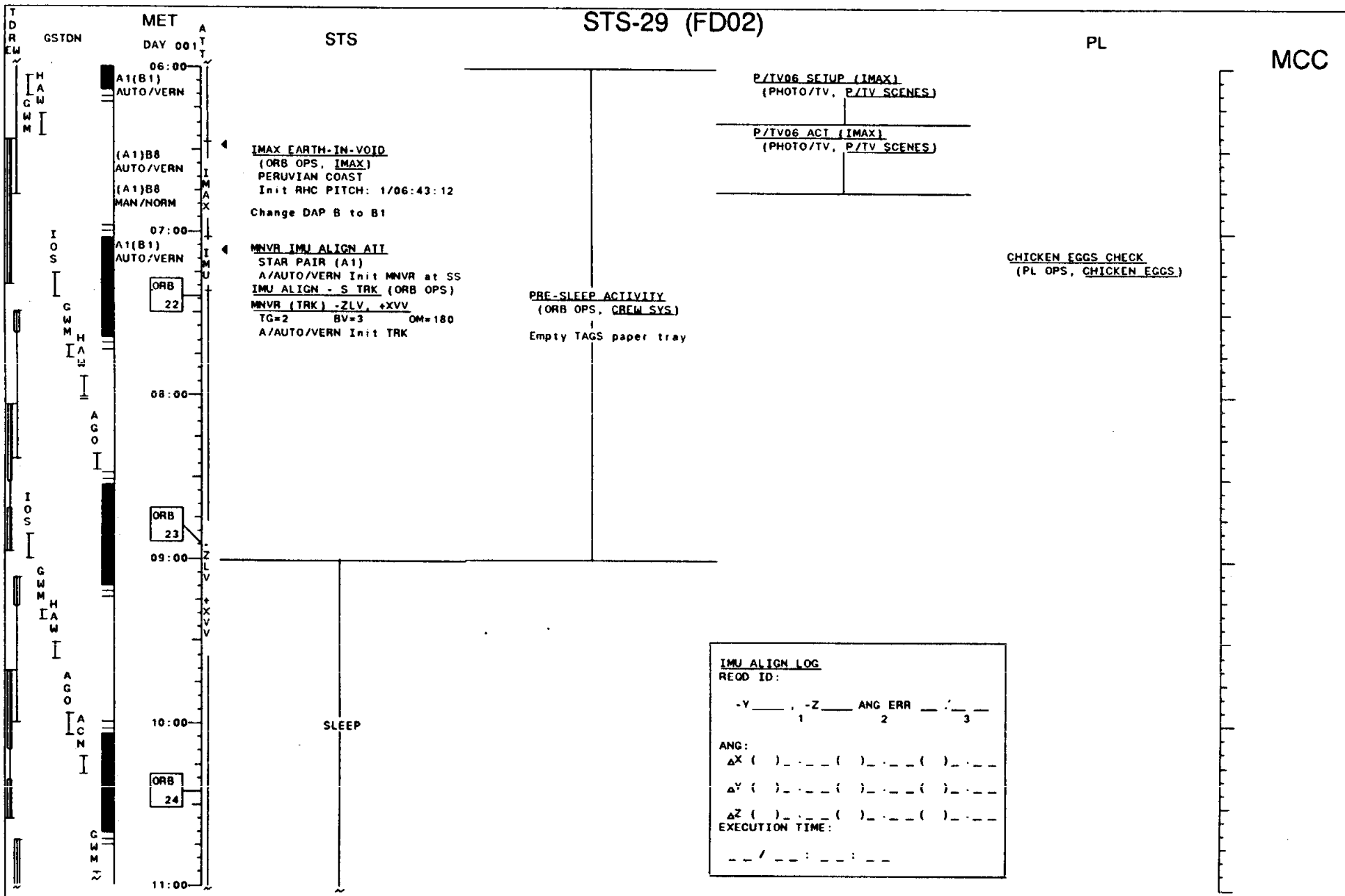
STS-29 (FD02)



STS-29 (FD02)



STS-29 (FD02)



MET DAY 001
 06:00
 A1(B1) AUTO/VERN
 (A1)B8 AUTO/VERN
 (A1)B8 MAN/NORM
 07:00
 A1(B1) AUTO/VERN
 ORB 22
 08:00
 ORB 23
 09:00
 ORB 24
 10:00
 11:00

IMAX EARTH-IN-VOID
 (ORB OPS, IMAX)
 PERUVIAN COAST
 Init RHC PITCH: 1/06:43:12
 Change DAP B to B1

MNVR IMU ALIGN ATTI
 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

PRE-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)
 Empty TAGS paper tray

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

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

CHICKEN EGGS CHECK
 (PL OPS, CHICKEN EGGS)

SLEEP

IMU ALIGN LOG

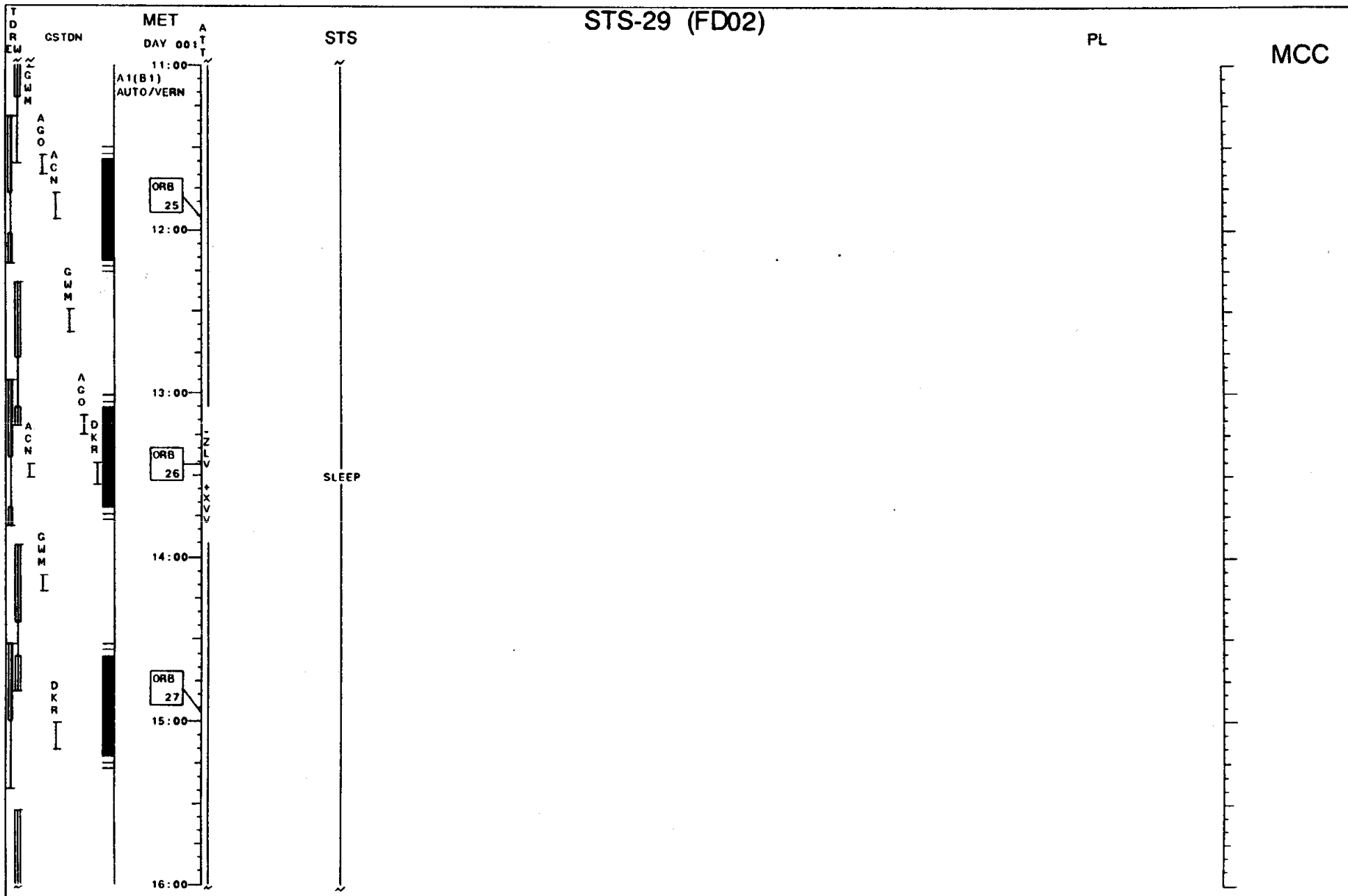
REQ ID: _____

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

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

EXECUTION TIME:
 ____/____:____:____

STS-29 (FD02)



STS-29 (FD03)

PL

MCC

MET
DAY 001

16:00
A1(B1)
AUTO/VERN

ORB 28

17:00

18:00
(A1)B5
MAN/VERN
A1(B5)
AUTO/VERN

ORB 29

19:00

20:00
A1(B1)
AUTO/VERN

ORB 30

21:00

ORB 31

Vertical axis labels: TDR, EW, DKR, YARR, CAN, I, BDA, DKR, IOS, YARR, CAN, I, MIL, X, BDA, DKR, IOS, YARR, CAN, I

STS

SLEEP

01 ✓COAS OFF Mount COAS - FWD

MNVR IMU ALIGN ATT
 STAR PAIR (A2)
 A/AUTO/VERN Init MNVR at SS
 IMU ALIGN - S TRK (ORB OPS)
 MNVR COAS CAL
 R=97 P=129 Y=305
 A/AUTO/VERN (17:57) Init MNVR
 COAS CALIBRATION (ORB OPS)
 MNVR TRK -ZLV +YVV
 TG=2 BV=3 OM=270
 A/AUTO/VERN Init TRK
 Change DAP B to B1

01 ✓COAS-OFF Stow COAS

POST-SLEEP ACTIVITY
 (ORB OPS, CREW SYS)

Use last TAGS message to
 sort crew messages from
 TAGS DTO pages

IMU ALIGN LOG
 REOD ID;
 -Y ____, -Z ____, ANG ERR ____, ____, ____,
 1 2 3

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

EXECUTION TIME:
 __ / __ : __ : __

COAS CALIBRATION LOG

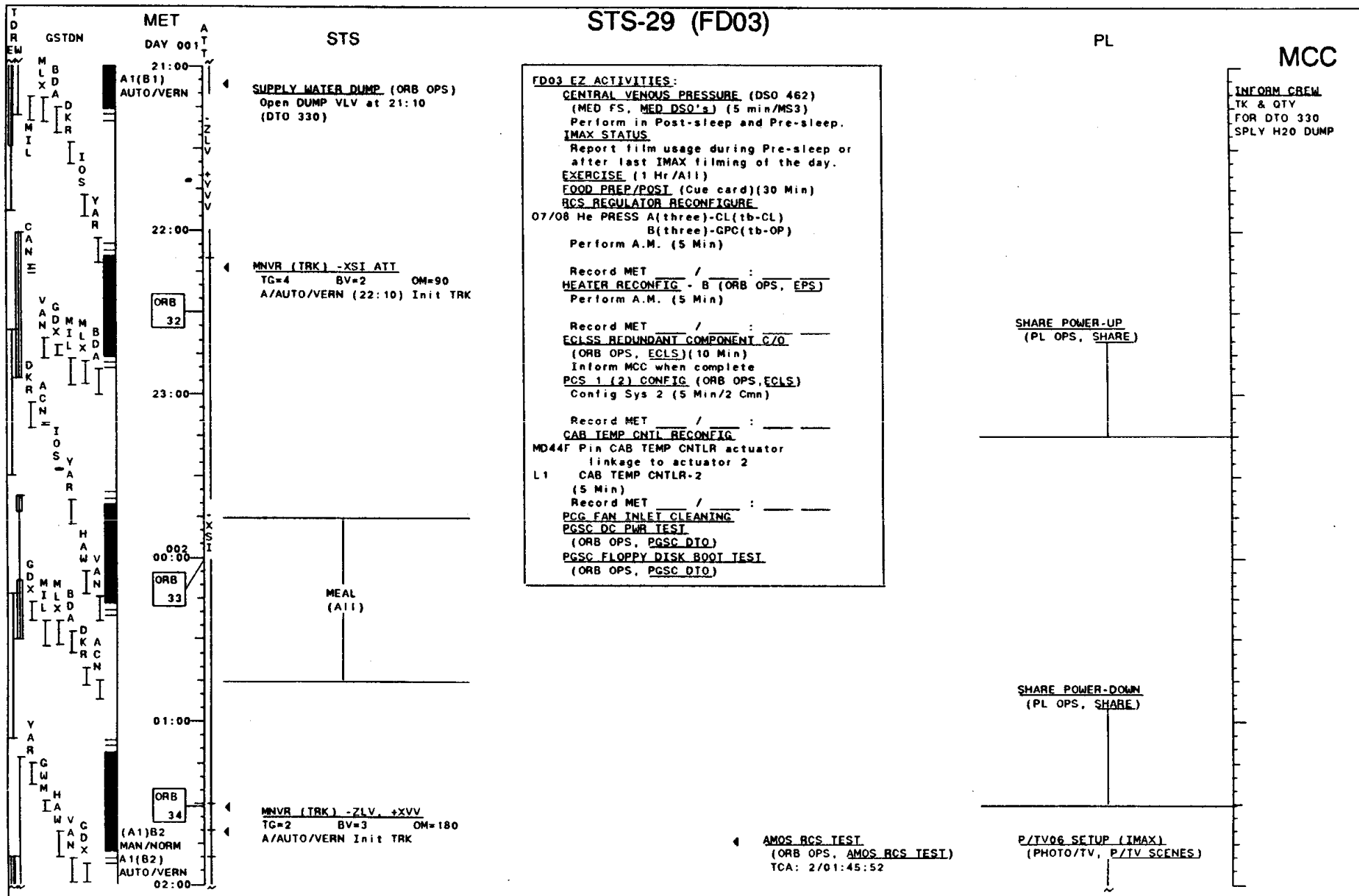
STAR ID: +X 30, ANTARES
 STAR AVAIL: 17:41 TO 18:31

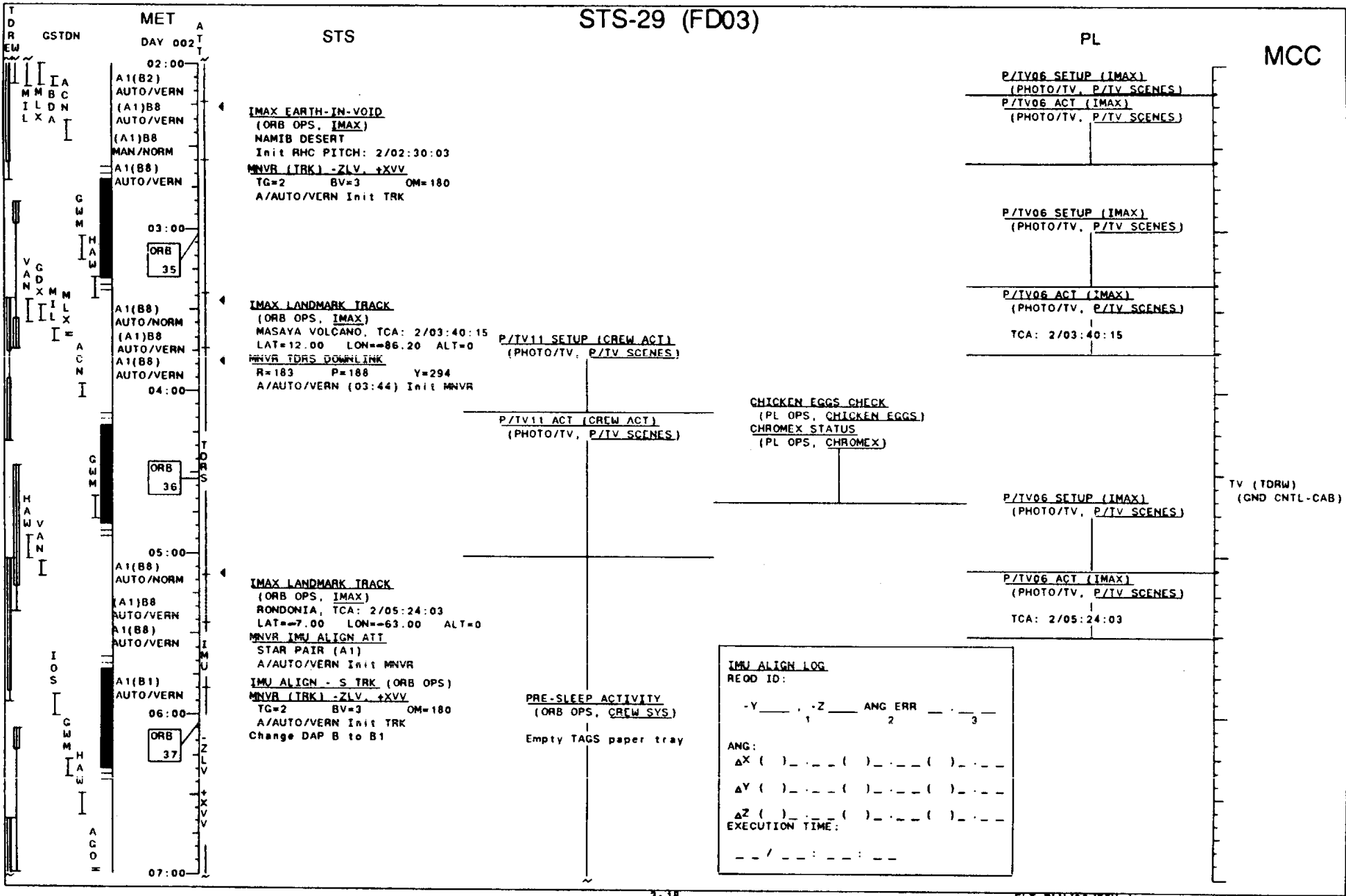
+X Δ BIAS ____ . ____

UPDATE TIME: __ / __ : __ : __

CHROMEX MGAMS DEACT
 (PL OPS, CHROMEX)

STS-29 (FD03)





STS-29 (FD03)

MET

STS

PL

MCC

DAY 002

02:00
A1(B2)
AUTO/VERN
(A1)B8
AUTO/VERN
(A1)B8
MAN/NORM
A1(B8)
AUTO/VERN
03:00
ORB 35
A1(B8)
AUTO/NORM
(A1)B8
AUTO/VERN
A1(B8)
AUTO/VERN
04:00
ORB 36
05:00
A1(B8)
AUTO/NORM
(A1)B8
AUTO/VERN
A1(B8)
AUTO/VERN
06:00
ORB 37
07:00

IMAX EARTH-IN-VOID
(ORB OPS, IMAX)
NAMIB DESERT
Init RHC PITCH: 2/02:30:03
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK

IMAX LANDMARK TRACK
(ORB OPS, IMAX)
MASAYA VOLCANO, TCA: 2/03:40:15
LAT=12.00 LON=-86.20 ALT=0
MNVR IDRS DOWNLINK
R=183 P=188 Y=294
A/AUTO/VERN (03:44) Init MNVR

IMAX LANDMARK TRACK
(ORB OPS, IMAX)
RONDONIA, TCA: 2/05:24:03
LAT=-7.00 LON=-63.00 ALT=0
IMU ALIGN - S TRK (ORB OPS)
STAR PAIR (A1)
A/AUTO/VERN Init MNVR
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK
Change DAP B to B1

P/TV11 SETUP (CREW ACT)
(PHOTO/TV, P/TV SCENES)

P/TV11 ACT (CREW ACT)
(PHOTO/TV, P/TV SCENES)

PRE-SLEEP ACTIVITY
(ORB OPS, CREW SYS)
Empty TAGS paper tray

CHICKEN EGGS CHECK
(PL OPS, CHICKEN EGGS)
CHROMEX STATUS
(PL OPS, CHROMEX)

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

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

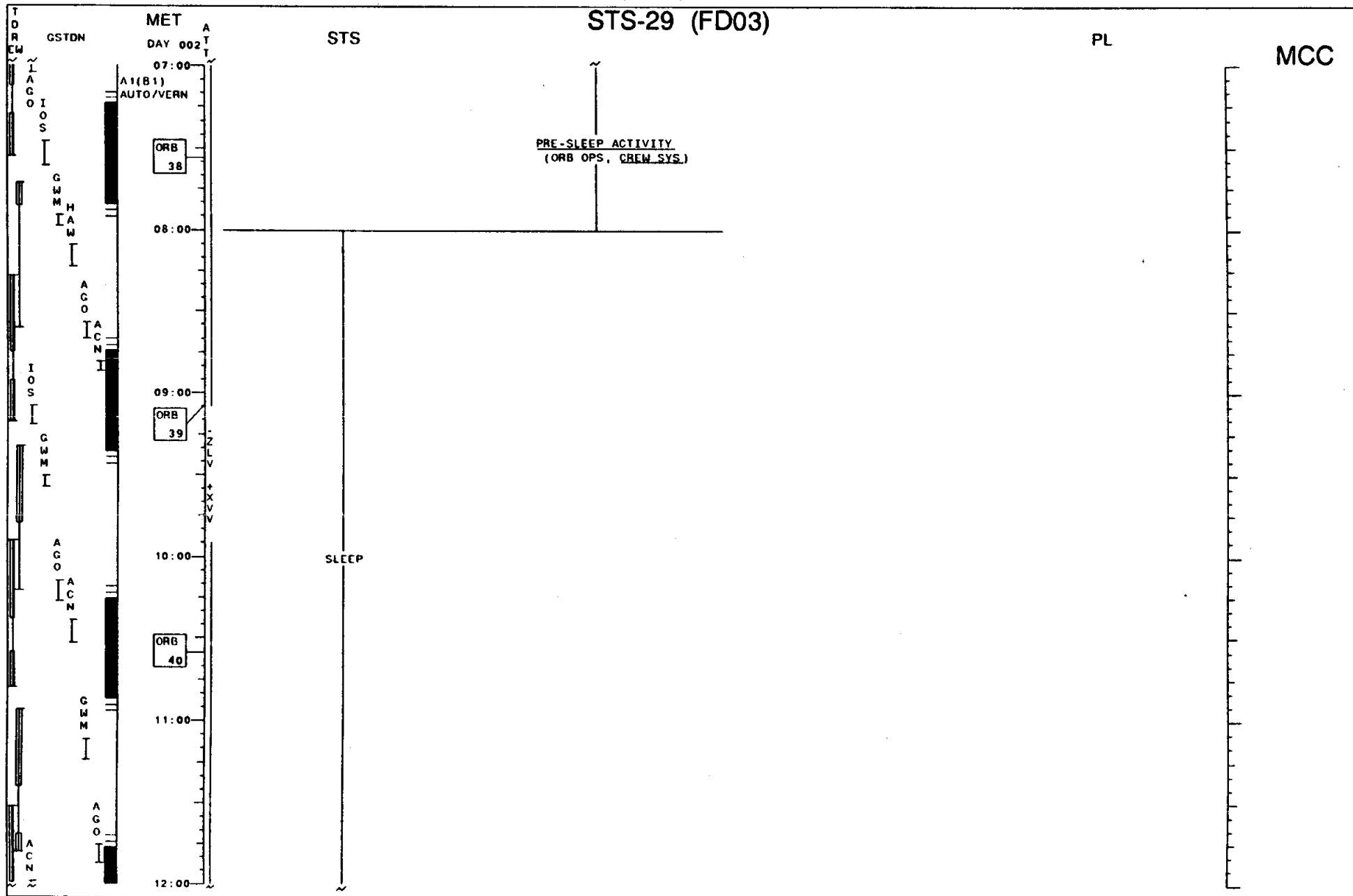
P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES)
TCA: 2/03:40:15

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

P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES)
TCA: 2/05:24:03

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

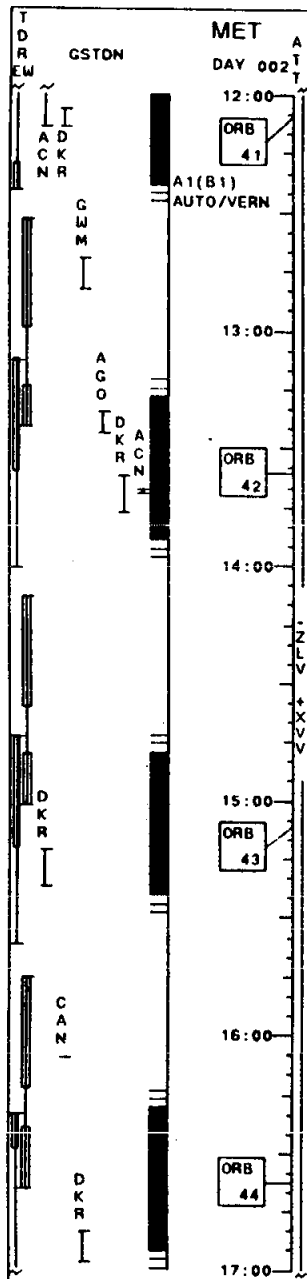
TV (TDRW)
(GND CNTL-CAB)



STS-29 (FD04)

PL

MCC



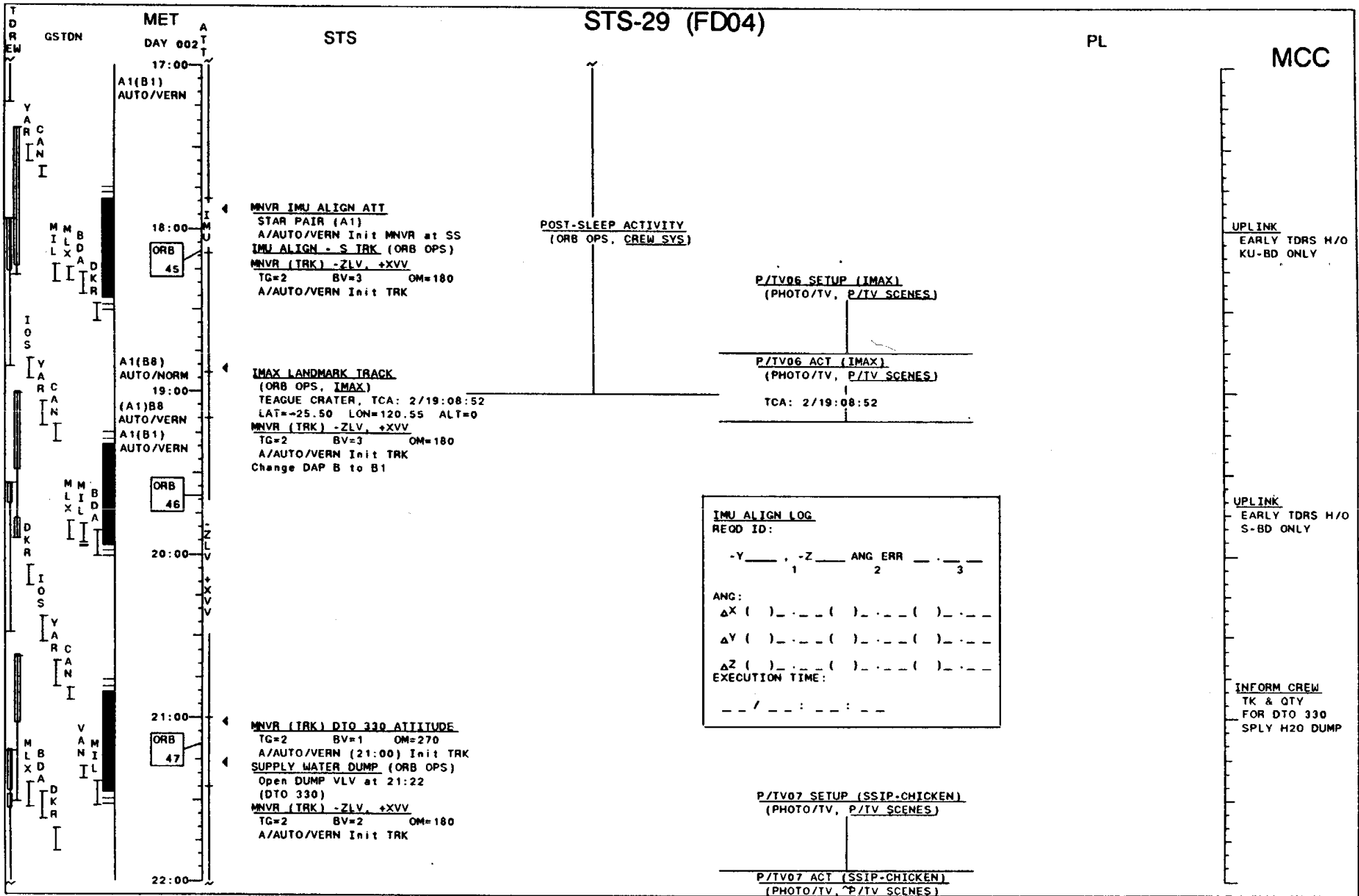
FD04 EZ ACTIVITIES:

- EXERCISE (1 Hr/All)
- FOOD PREP/POST (Cue Card)(30 Min)
- SALIVARY SCOP/DEX KINETICS (DSO 457)
(MED FS, MED DSO's) (5 min/MS2)
Samples at 0, .5, 1, 2, 4, 6, 8, 10, 12, 18, 24, 36 hours post-dosing.
Prefer start at wake-up.
- SALIVARY TYLENOL KINETICS (DSO 458)
(MED FS, MED DSO's) (5 min/PLT,MS1,MS3)
Samples at 0, .25, .5, 1, 2, 3, 4, 5, 6, 8 hours post-dosing.
Prefer start at wake-up.
- CENTRAL VENOUS PRESSURE (DSO 462)
(MED FS, MED DSO's) (5 min/MS3)
Perform in Post-sleep and Pre-sleep.
- P/TV08 SETUP (SSIP - RATS)
(PHOTO/TV, P/TV SCENES)
- P/TV 08 ACT(SSIP - RATS)
(PHOTO/TV, P/TV SCENES)
- IMAX STATUS
Report film usage during Pre-sleep or after last IMAX filming of the day.
- PCG FAN INLET CLEANING
- FDF/POINTING DEVICE TEST
(ORB OPS, PCSC DTO)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Use last TAGS message to sort crew messages from TAGS DTO pages

Do FC PURGE-MANUAL
(Cue Card)



STS-29 (FD04)

MET
DAY 002
17:00
A1(B1)
AUTO/VERN
18:00
ORB 45
A1(B8)
AUTO/NORM
19:00
(A1)B8
AUTO/VERN
A1(B1)
AUTO/VERN
20:00
ORB 46
21:00
ORB 47
22:00

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

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

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

IMAX LANDMARK TRACK
(ORB OPS, IMAX)
TEAGUE CRATER, TCA: 2/19:08:52
LAT=-25.50 LON=120.55 ALT=0
MNVR (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK
Change DAP B to B1

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

TCA: 2/19:08:52

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

MNVR (TRK) DTO 330 ALTITUDE
TG=2 BV=1 OM=270
A/AUTO/VERN (21:00) Init TRK
SUPPLY WATER DUMP (ORB OPS)
Open DUMP VLV at 21:22
(DTO 330)
MNVR (TRK) -ZLV, +XVV
TG=2 BV=2 OM=180
A/AUTO/VERN Init TRK

P/TV07 SETUP (SSIP-CHICKEN)
(PHOTO/TV, P/TV SCENES)

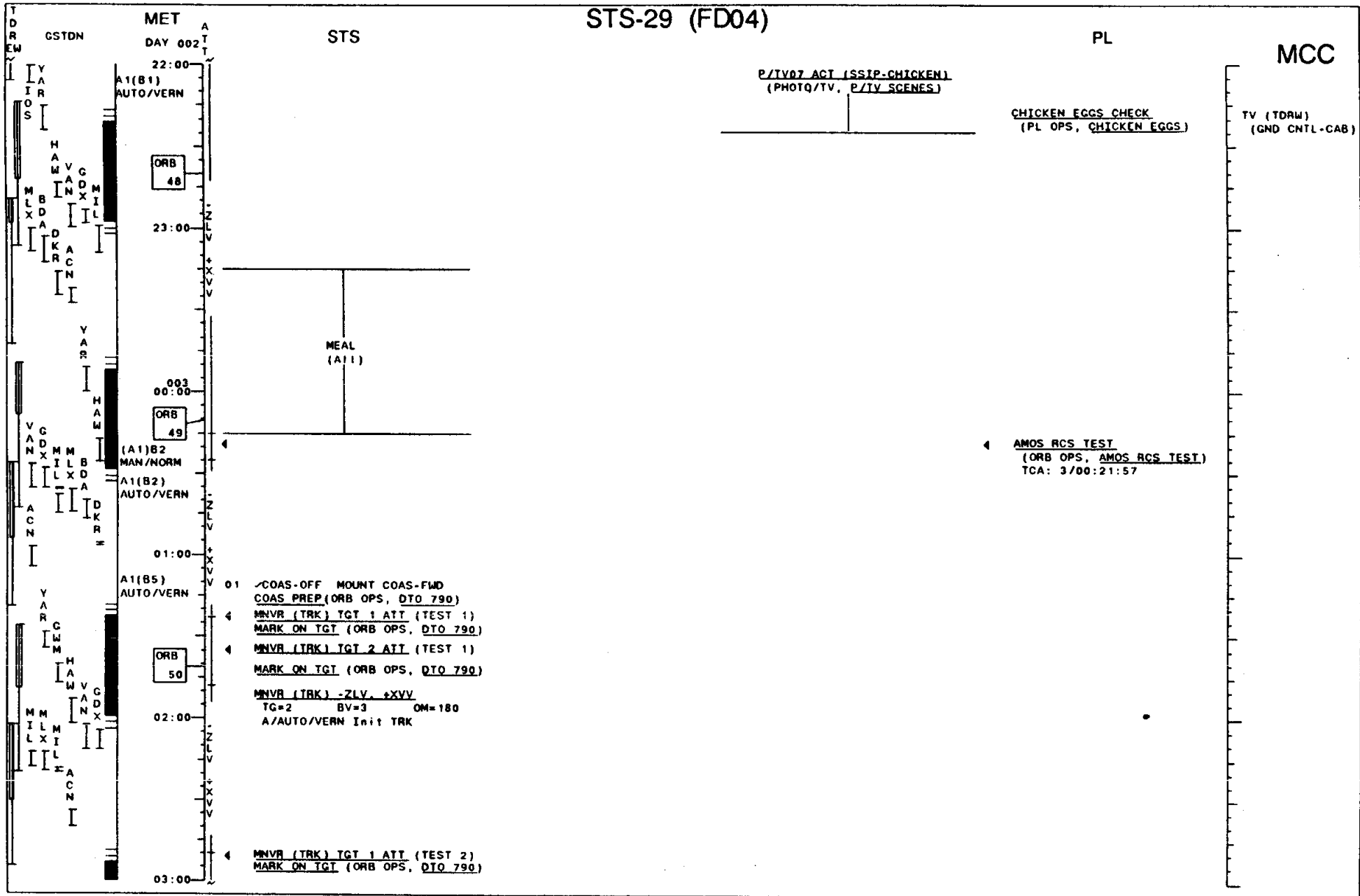
P/TV07 ACT (SSIP-CHICKEN)
(PHOTO/TV, P/TV SCENES)

UPLINK
EARLY TDRS H/O
KU-BD ONLY

UPLINK
EARLY TDRS H/O
S-BD ONLY

INFORM CREW
TK & QTY
FOR DTO 330
SPLY H2O DUMP

STS-29 (FD04)



STS-29 (FD04)

MET	STS	PL	MCC
<p>DAY 003</p> <p>03:00</p> <p>ORB 51</p> <p>A1(B5) AUTO/VERN</p> <p>04:00</p> <p>ORB 52</p> <p>05:00</p> <p>A1(B8) AUTO/NORM</p> <p>(A1)B8 AUTO/VERN</p> <p>06:00</p> <p>ORB 53</p> <p>A1(B1) AUTO/VERN</p> <p>07:00</p> <p>ORB 54</p> <p>08:00</p>	<p><u>MNVR (TRK) TGT 2 ATT (TEST 2)</u></p> <p>MARK ON TGT (ORB OPS, DTD 790)</p> <p>MNVR (TRK) -ZLV, +XVV</p> <p>TG=2 BV=3 OM=180</p> <p>A/AUTO/VERN Init TRK</p> <p>04:00</p> <p><u>MNVR (TRK) TGT 1 ATT (TEST 3)</u></p> <p>MARK ON TGT (ORB OPS, DTD 790)</p> <p><u>MNVR (TRK) TGT 2 ATT (TEST 3)</u></p> <p>MARK ON TGT (ORB OPS, DTD 790)</p> <p>MNVR (TRK) -ZLV, +XVV</p> <p>TG=2 BV=3 OM=180</p> <p>A/AUTO/VERN Init TRK</p> <p>05:00</p> <p>CLEAN UP (ORB OPS, DTD 790)</p> <p>01 ✓COAS-OFF Stow COAS</p> <p><u>IMAX LANDMARK TRACK</u></p> <p>(ORB OPS, IMAX)</p> <p>SAO PAULO, TCA: 3/05:41:42</p> <p>LAT=-23.60 LON=-47.00 ALT=0</p> <p><u>MNVR IMU ALIGN ATT</u></p> <p>STAR PAIR (A1)</p> <p>A/AUTO/VERN Init MNVR</p> <p>IMU ALIGN - S TRK (ORB OPS)</p> <p>MNVR (TRK) -ZLV, +XVV</p> <p>TG=2 BV=3 OM=180</p> <p>A/AUTO/VERN Init TRK</p> <p>Change DAP B to B1</p> <p>PRE-SLEEP ACTIVITY (ORB OPS, CREW SYS)</p> <p>Empty TAGS paper tray</p>	<p>CHROMEX STATUS (PL OPS, CHROMEX)</p> <p>P/TV06 SETUP (IMAX) (PHOTO/TV, P/TV SCENES)</p> <p>P/TV06 ACT (IMAX) (PHOTO/TV, P/TV SCENES)</p> <p>TCA: 3/05:41:42</p> <p>CHICKEN EGGS CHECK (PL OPS, CHICKEN EGGS)</p>	

IMU ALIGN LOG

READ ID:

-Y _____, -Z _____ ANG ERR _____

1 2 3

ANG:

ΔX () _ _ _ () _ _ _ () _ _ _

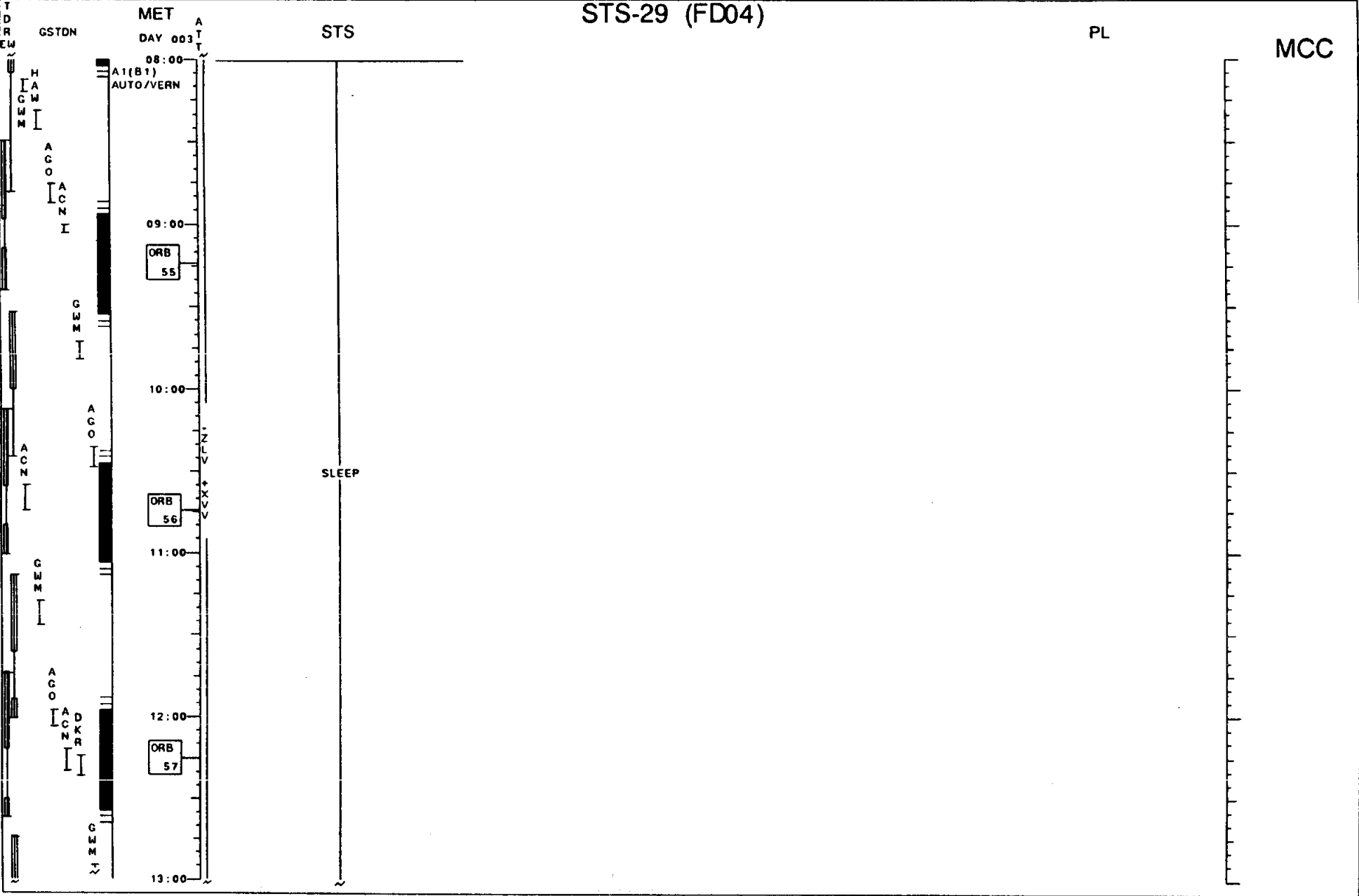
ΔY () _ _ _ () _ _ _ () _ _ _

ΔZ () _ _ _ () _ _ _ () _ _ _

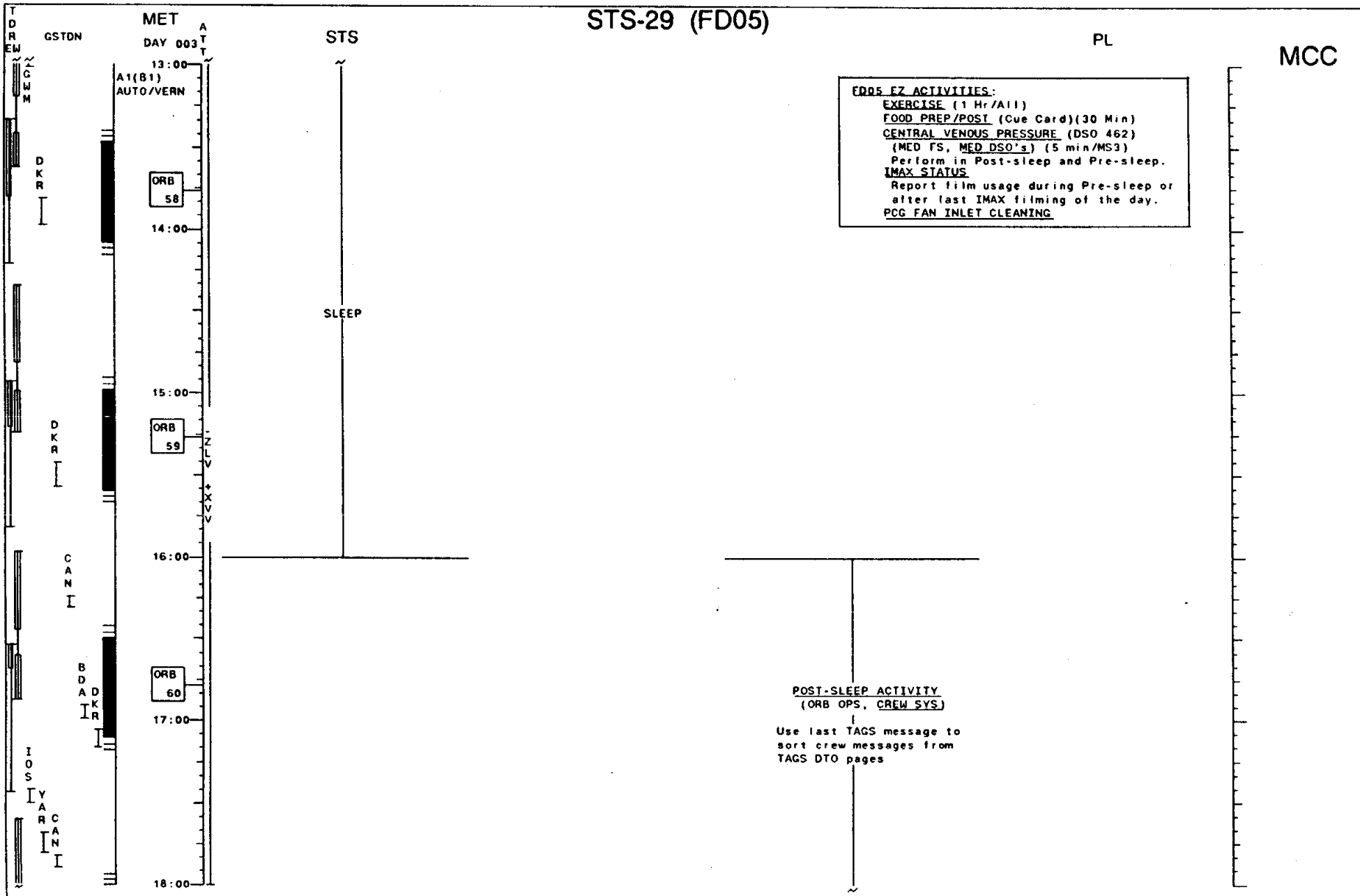
EXECUTION TIME:

___/___/___ : ___:___:___

STS-29 (FD04)



STS-29 (FD05)



STS-29 (FD05)

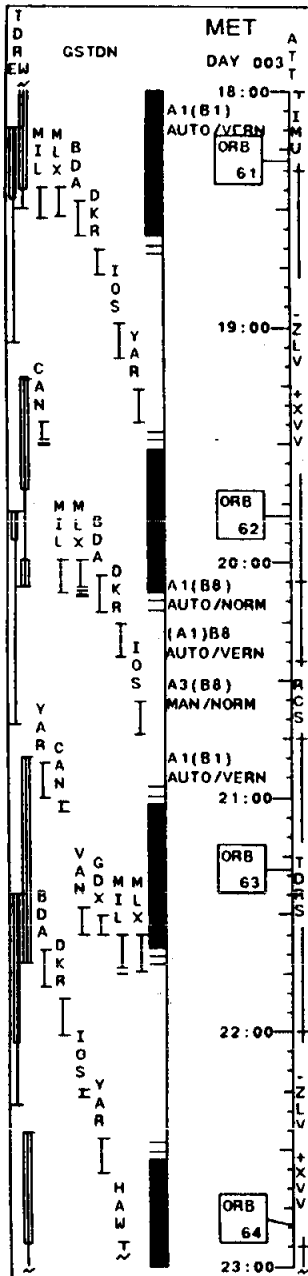
MET

DAY 003

STS

PL

MCC



18:00
A1(B1)
AUTO/VERN ORB 61
MNVN IMU ALIGN ATT
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS
IMU ALIGN - S TRK (ORB OPS)
MNVN (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK

R2 APU STEAM VENT HTR ACT
BLR CNTLR/HTR(three) -B
PWR (three) -ON
FCS CHECKOUT
(ORB OPS, GND)
(2 Cmn)

POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

19:00
A1(B8)
AUTO/NORM
(A1)B8
AUTO/VERN
A3(B8)
MAN/NORM

LOAD PCMMU FORMAT (ORB OPS)
Load 192/103

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

20:00
A1(B1)
AUTO/VERN ORB 62
IMAX LANDMARK TRACK
(ORB OPS, IMAX)
MAURITANIA, TCA: 3/20:20:55
LAT=21.00 LON=-11.50 ALT=0
RCS HOT FIRE TEST
(ORB OPS, RCS) (2 Cmn)

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

P/TV06 ACT (IMAX)
(PHOTO/TV, P/TV SCENES)
TCA: 3/20:20:55

Change DAP A, B to A1, B1
MNVN TDRS ATT
R=106 P=184 Y=304
A/AUTO/VERN Init MNVR

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

21:00
A1(B1)
AUTO/VERN ORB 63
APU COOL OFF (On MCC Cue)
R2 APU FUEL PUMP/VLV COOL A-OFF

CREW CONF
(All)

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

INFORM CREW
GO FOR APU
COOL OFF

22:00
MNVN (TRK) -ZLV, +XVV
TG=2 BV=3 OM=180
A/AUTO/VERN Init TRK

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

23:00
A1(B1)
AUTO/VERN ORB 64
IMAX LANDMARK TRACK
(ORB OPS, IMAX)
MIAMI, TCA: 3/23:16:22
LAT=26.20 LON=-80.60 ALT=0

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

TV (TDRE)
(GND CNTL-CAB)

STS-29 (FD05)

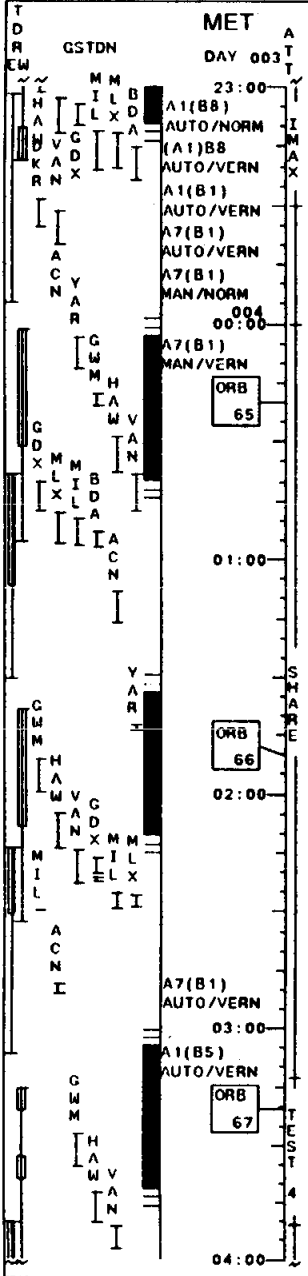
STS

PL

MCC

MET

DAY 003



IMAX LANDMARK TRACK
 (ORB OPS, IMAX)
 MIAMI, TCA: 3/23:16:22
 LAT=26.2 LON=-80.6 ALT=0

Change DAP B to B1

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

TCA: 3/23:16:22

SHARE DEPRIME TEST
 (PL OPS, SHARE)

MEAL
 (All)

SHARE POWER-UP
 (PL OPS, SHARE)

CABIN CONFIG/STOW
 (All)

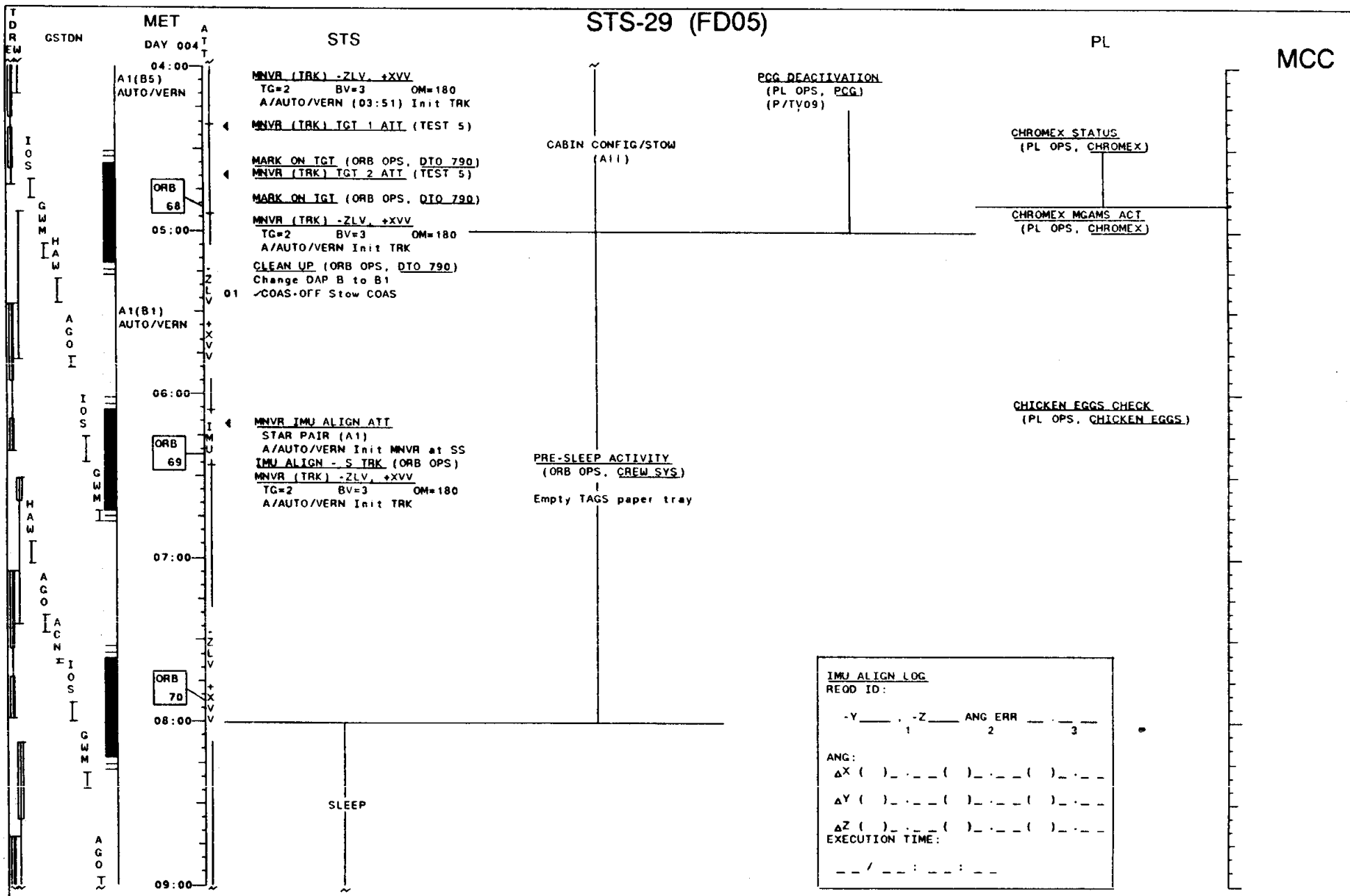
SHARE SIMO PWR-DN
 L12 HTR 1,2,3 PWR - OFF (tb-bp)
 cb SW PWR - op
 Log MET / : :
 Notify MCC

01 Change DAP A to A1
 ✓COAS-OFF MOUNT COAS-FWD
 COAS PREP (ORB OPS, DTO 790)
 MNVR (TRK) TGT 1 ATT (TEST 4)

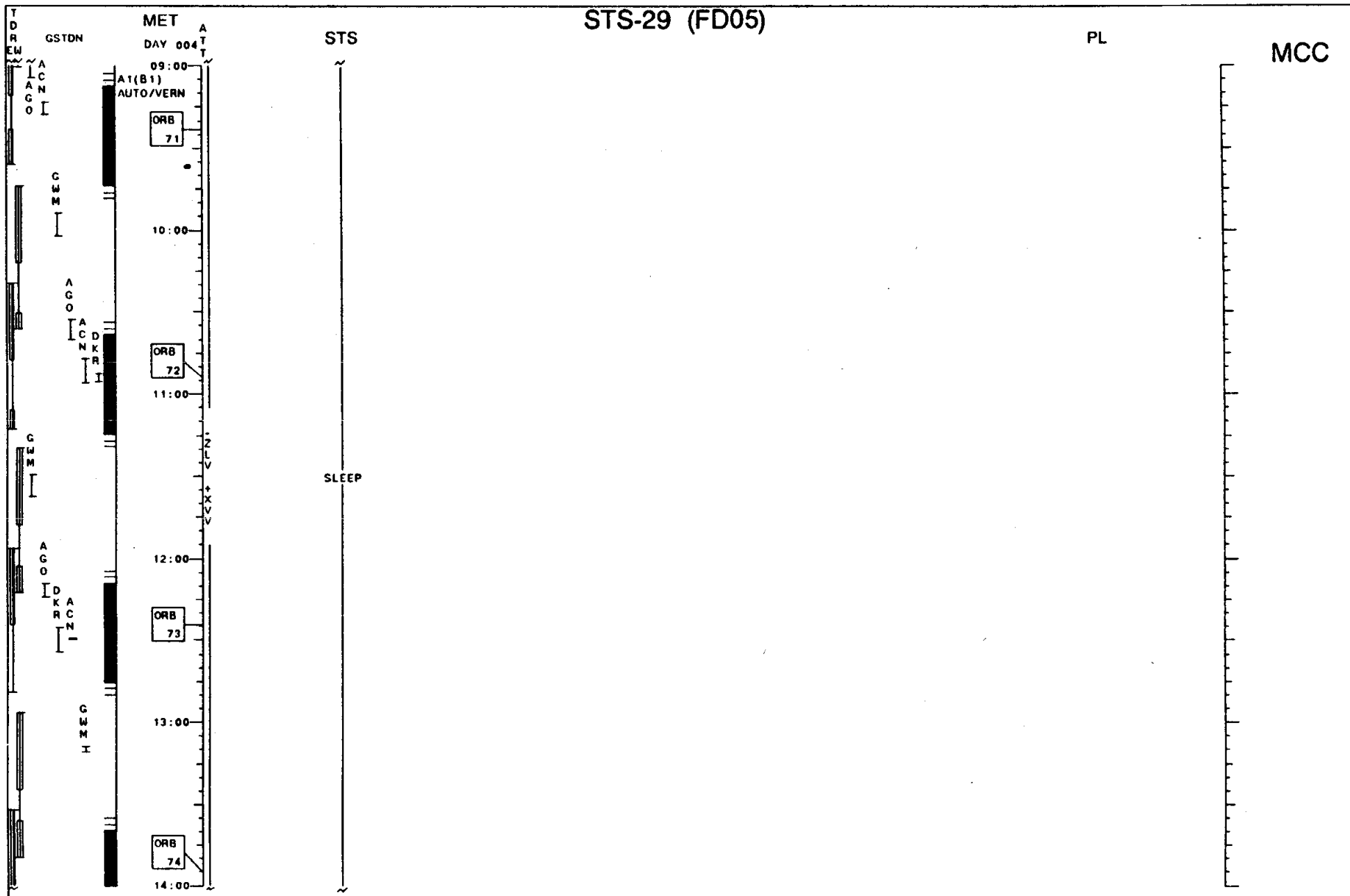
04 MARK ON TGT (ORB OPS, DTO 790)
 MNVR (TRK) TGT 2 ATT (TEST 4)

04 MARK ON TGT (ORB OPS, DTO 790)
 MNVR (TRK) -ZLV, +XV
 TC=2 BV=3 OM=180
 A/AUTO/VERN (03:51) Init TRK

STS-29 (FD05)



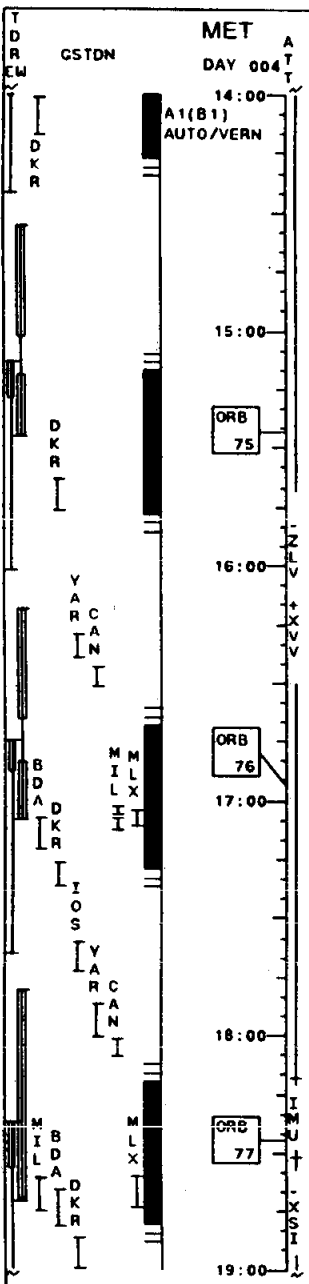
STS-29 (FD05)



STS-29 (FD06)

PL

MCC



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)
- CENTRAL VENOUS PRESSURE (DSO 462)
(MED FS, MED DSO's) (5 min/MS3)
Perform in Post-sleep

IMU ALIGN LOG

REQD ID:

-Y ____ -Z ____ ANG ERR ____

1 2 3

ANG:

ΔX () () ()

ΔY () () ()

ΔZ () () ()

EXECUTION TIME:

___/___:___:___

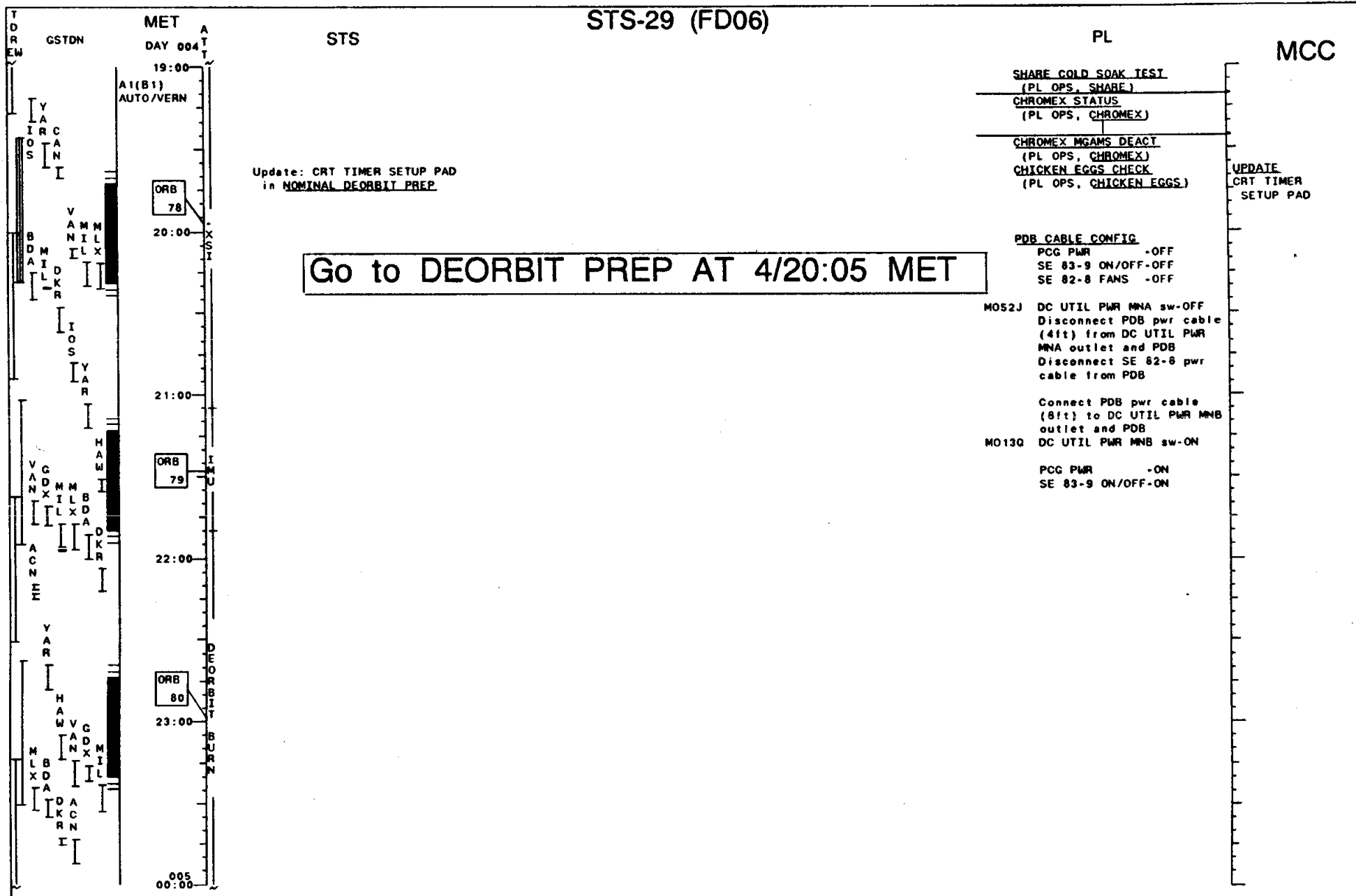
POST-SLEEP ACTIVITY
(ORB OPS, CREW SYS)

Use last TAGS message to sort crew messages from TAGS DTO pages

◀ **MNVR IMU ALIGN ATT**
STAR PAIR (A1)
A/AUTO/VERN Init MNVR at SS
IMU ALIGN - S TRK (ORB OPS)

◀ **MNVR (TRK) BIASED -XSI**
TG=4 BV=5
P=184 Y=0 OM=270
A/AUTO/VERN (18:31) Init TRK

SHARE COLD SOAK TEST
(PL OPS, SHARE)



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CONTINGENCY TIMELINES

7A TDRS INSERTION..... 4A-1
8D TDRS INSERTION..... 4B-1
16A TDRS INSERTION..... 4C-1
18A TDRS (EVA) INSERTION..... 4D-1

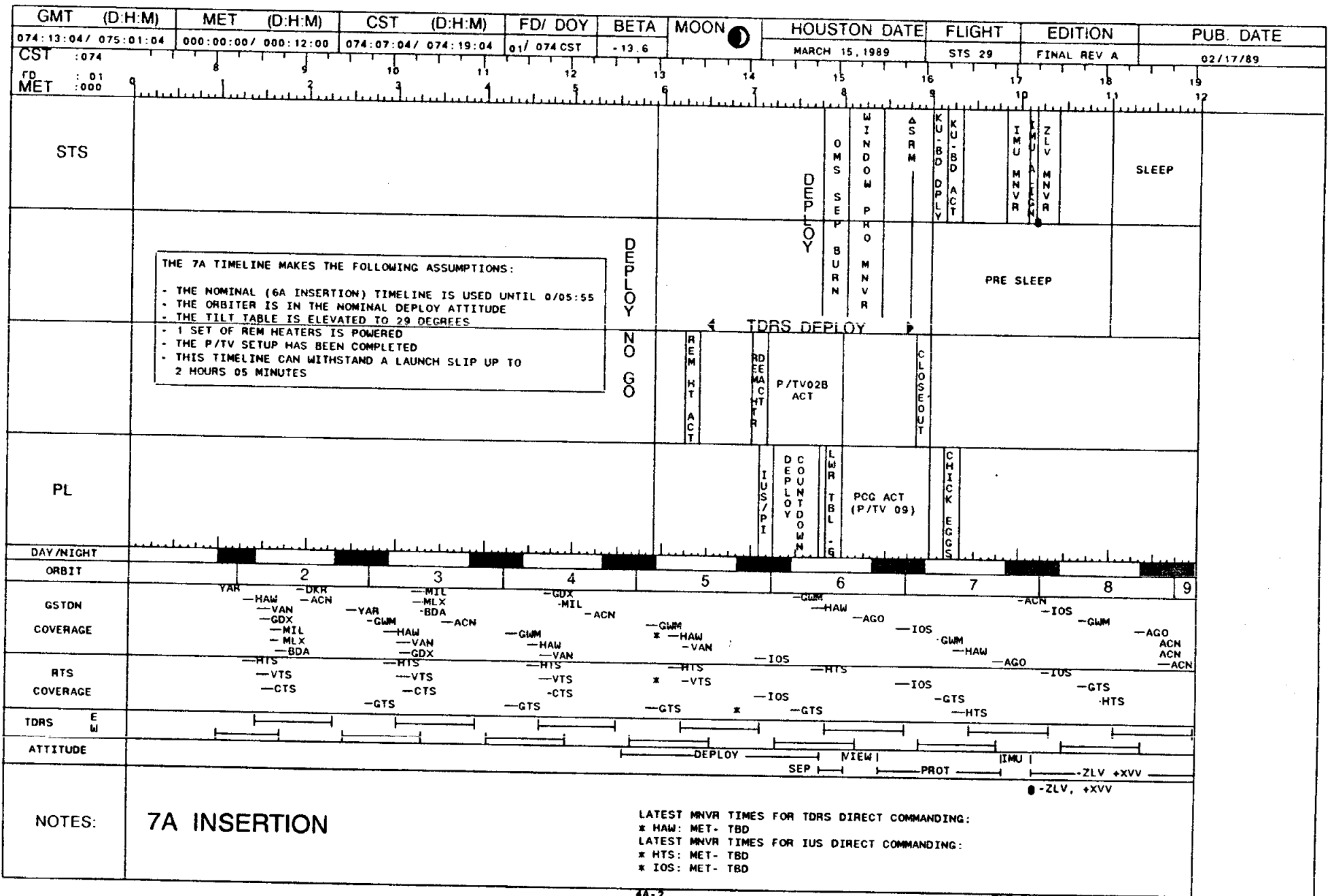
CONTINGENCY
TIMELINES

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7A TDRS INSERTION

The 7A Insertion Timeline is designed to accommodate delaying deployment of TDRS 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 2R4 OMS-2 insertion.

7A TDRS



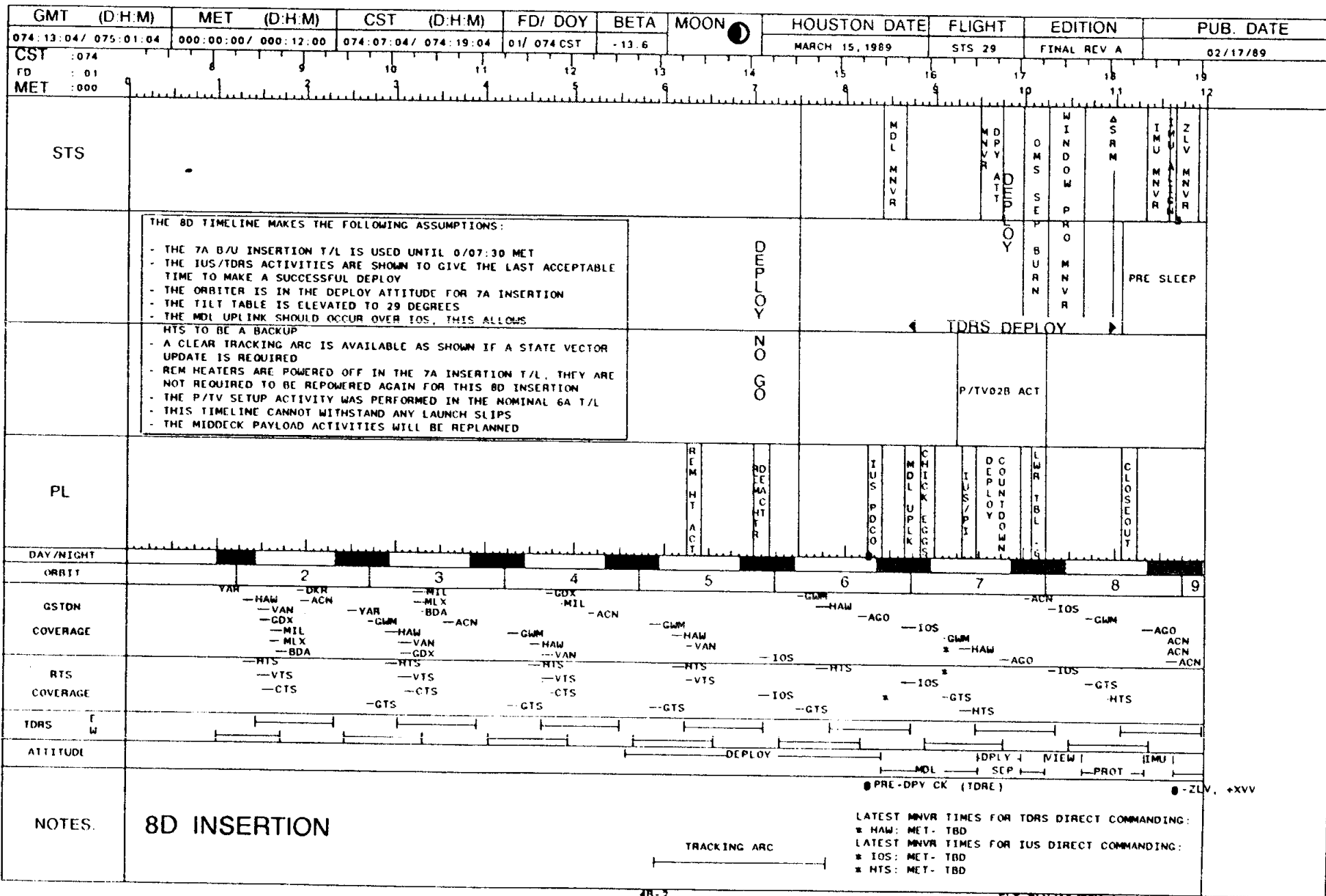
GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE		
075:01:04 / 075:13:04	000:12:00 / 001:00:00	074:19:04 / 075:07:04	02/ 074 CST	-11.7		MARCH 15, 1989	STS 29	FINAL REV A	02/17/89		
CST :074	20	21	22	23	0	CST:075	2	FD: 02	3		
FD :01	12	13	14	15	16	17	18	19	20		
MET :000											
STS	SLEEP						IMU RVN R	ZLV RVN R	BACK TO THE NOMINAL TIMELINE		
							POST SLEEP				
	RETURN TO THE NOMINAL TIMELINE AT 0/22:00 FOR REPLANNING. ALL CREW SLEEP PERIODS AND PRE/POST SLEEP ACTIVITIES WILL HAVE TO BE REPLANNED.										
PL											
DAY/NIGHT											
ORBIT	9	10	11	12	13	14	15	16			
GSTDN COVERAGE	-GWM	-AGO -ACN -DKR	-GWM	-DKR -MAX	-YAR -CAN	-BDA -DKR -MAX	-MIL -MLX -DKR	-DKR -IOS	-MIL -MLX -DKR	-IOS -YAR	VAN
RTS COVERAGE	-CTS	-CTS	-CTS					-IOS	-VAN -VTS -CTS	-IOS -YAR	HAW MTS VTS
TDRS E W											
ATTITUDE	-ZLV +XVV										
NOTES:	7A INSERTION										

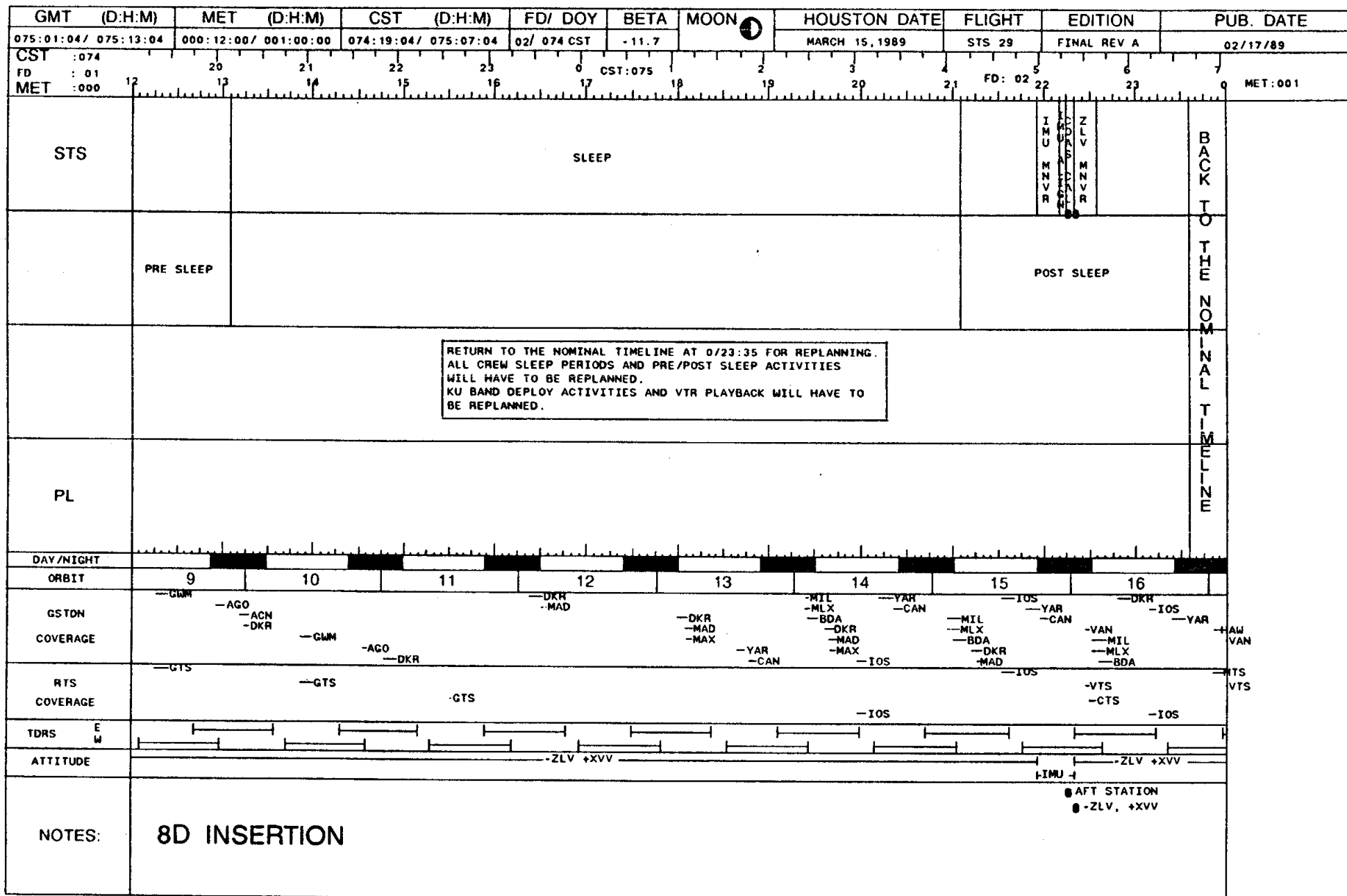
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8D TDRS INSERTION

The 8D Insertion Timeline is designed to accommodate delaying deployment of TDRS for the 8D insertion opportunity. The 7A insertion timeline is used up to the GO/NO-GO decision point in the deploy countdown. An 8D insertion will be considered if a high probability of deploying exists or if a 16A insertion cannot be accommodated due to orbiter or IUS/TDRS problems. Additional assumptions are shown on page 4B-2. The timeline is based on the nominal Cycle 2R4 OMS-2 insertion.

8D TDRS



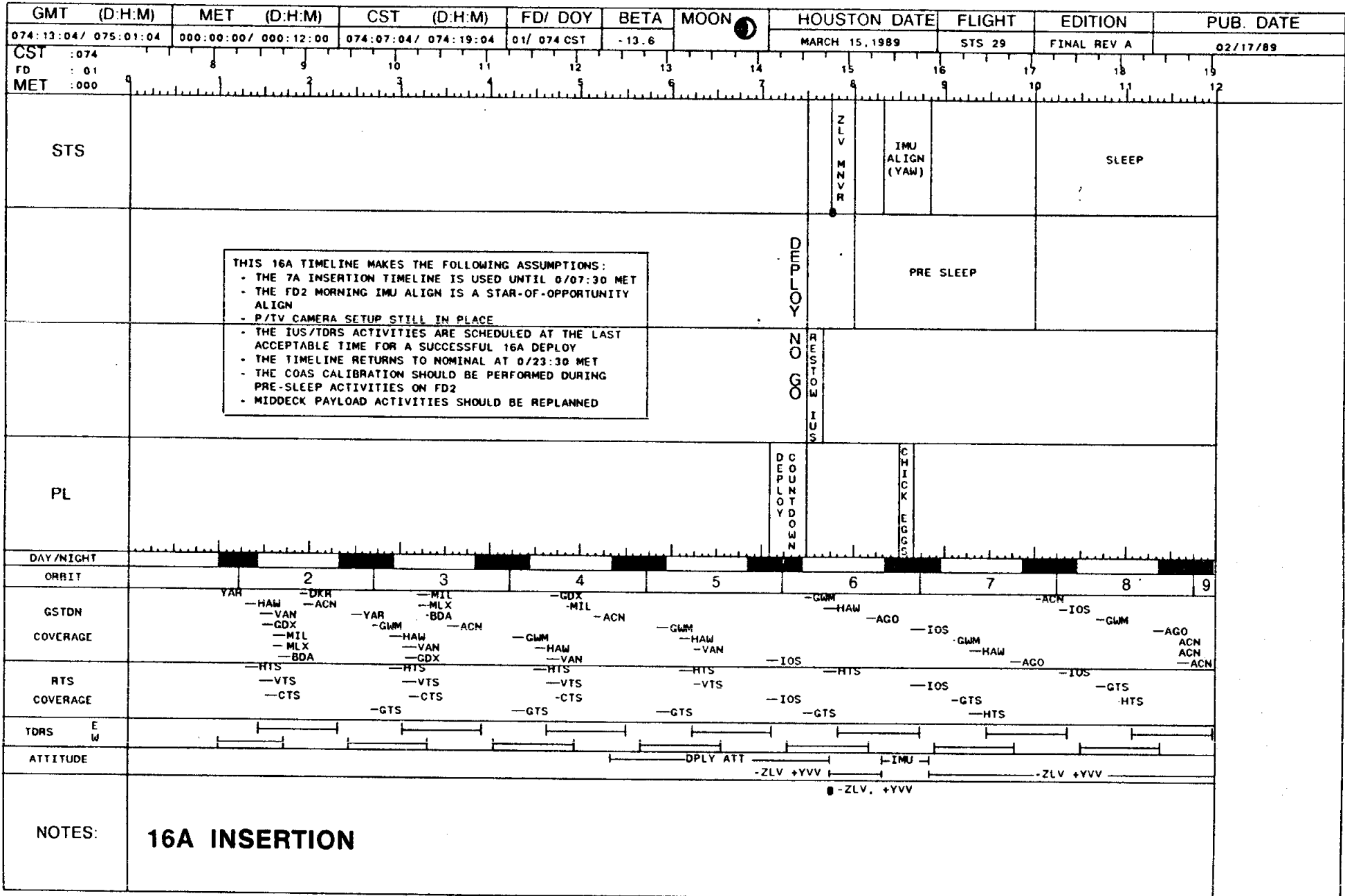


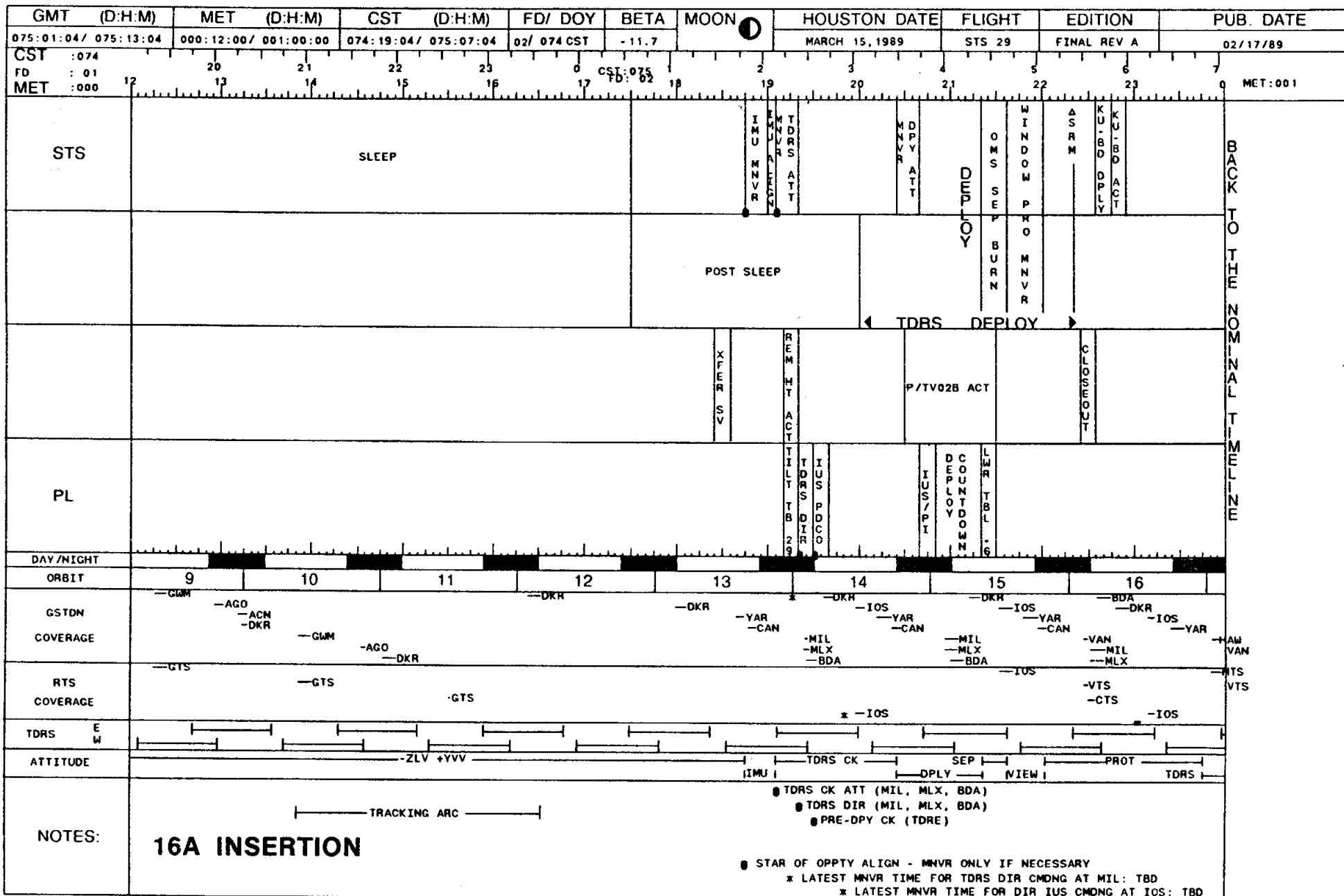
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16A TDRS INSERTION

The 16A Insertion Timeline is designed to accommodate delaying deployment of TDRS 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 post sleep and assumes the tilt table is stowed at 0°. Additional assumptions are shown on page 4C-2. The timeline is based on the nominal Cycle 2R4 OMS-2 insertion.

16A TDRS





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18A TDRS (EVA) INSERTION

The 18A Insertion Timeline is designed to accommodate delaying deployment of TDRS for the 18A insertion opportunity following an EVA to manually raise the tilt table. The decision to perform an EVA must be made by 0/05:00 MET in order to meet EVA preparation and equipment checkout constraints. The 10.2 psi cabin EVA protocol is used. There will be no Flight Day 1 EVA. The Contingency EVA Operations STS-29 Flight Supplement, Contingency EVA for Payload Failures Section, is the source document for the 18A insertion timeline. Additional assumptions are shown on pages 4D-2 and 4D-3. The timeline is based on the nominal Cycle 2R4 OMS-2 insertion.

18A TDRS

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
074:13:04 / 075:01:04	000:00:00 / 000:12:00	074:07:04 / 074:19:04	01 / 074 CST	-13.6		MARCH 15, 1989	STS 29	FINAL REV A	02/17/89
CST :074									
FD :01									
MET :000									
STS									
PL									
DAY/NIGHT									
ORBIT									
GSTDN COVERAGE									
RTS COVERAGE									
TDRS ATTITUDE									
NOTES:	<p>18A (EVA) INSERTION</p> <p>■ APU HTR RECONFIG ● IF NOT PREVIOUSLY OPERATED</p>								

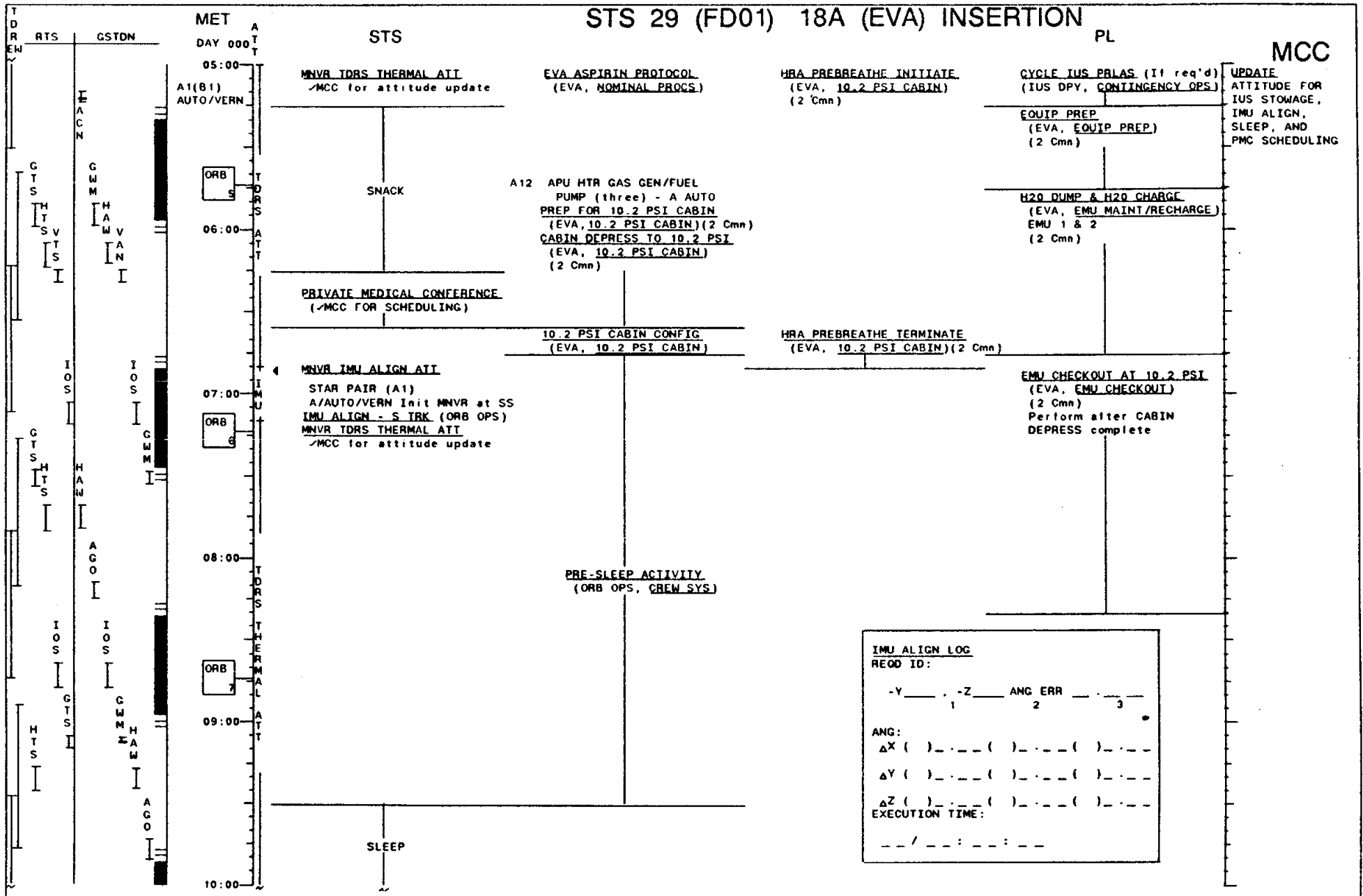
18A TIMELINE ASSUMPTIONS:
 - "GO FOR EVA" FOLLOWS TILT TABLE FAILURE DURING RAISING TO 29 DEG.
 - "LATEST DEPRESS START" IS THE LATEST TIME TO START A CABIN DEPRESS AND STILL MEET THE FD2 SCHEDULE.
 - "LATEST SLEEP START" WILL ALLOW AN 18A INSERTION WITH MINIMUM 6 HOURS CREW SLEEP.

PL SYS, PL MAL 1.10 PROCEDURE FOLLOWING TILT TABLE FAILURE IS UNSUCCESSFUL.
 - FLIGHT RULE A2-45 IS SATISFIED.
 - REFER TO FLIGHT RULE 13-11 FOR PREBREATHE PROTOCOL.

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE		
075:01:04 / 075:13:04	000:12:00 / 001:00:00	074:19:04 / 075:07:04	02/ 074 CST	-11.7	☉	MARCH 15, 1989	STS 29	FINAL REV A	02/17/89		
CST :074											
FD :01			FD: 02	CST:075							
MET :000									MET:001		
STS	SLEEP										
			POST SLEEP			PSETTUP 02B		P/TV02B ACT			
	<p>FD2 ASSUMPTIONS:</p> <ul style="list-style-type: none"> - IUS/TDRS IS THERMALLY DEPLOYABLE ON FD2. - ATTEMPTS WILL BE MADE TO RAISE THE IUS/TDRS PRIOR TO THE AIRLOCK DEPRESS. IF SUCCESSFUL THE EVA WILL NOT OCCUR AS SCHEDULED. - ATTEMPTS TO RAISE PAST 29 DEG PRIOR TO EVA (UMBILICALS DISCONNECTED) MUST WAIT UNTIL AFTER "16A BAT" TIME 					EVA PREP		EVA			
PL	<p>LIMIT ON IUS BATTERIES.</p> <ul style="list-style-type: none"> - TDRS DIRECT CHECK OPPORTUNITIES: MIL 15, CAN 15, MIL 16. - THE TIMELINE RETURNS TO NOMINAL AT 01/09:00. - MIDDECK PAYLOAD ACTIVITIES SHOULD BE REPLANNED. 							EVA SUPPORT			
DAY/NIGHT											
ORBIT	9	10	11	12	13	14	15	16			
GSTDN COVERAGE	-GWM	-AGO -ACN -DKR	-GWM	-DKR	-YAR -CAN	-DKR	-IOS -YAR -CAN	-DKR	-IOS -YAR -CAN	-BDA -DKR	-IOS -YAR
RTS COVERAGE	-GTS	-GTS	-GTS								
TDRS ATTITUDE											
NOTES:	18A (EVA) INSERTION										

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
075:13:04 / 076:01:04	001:00:00 / 001:12:00	075:07:04 / 075:19:04	02/ 075 CST	-9.8	☾	MARCH 16, 1989	STS 29	FINAL REV A	02/17/89	
CST :075										
FD :02										
MET :001										
STS	OMS SLEEP BURN	WINDOW PRO MNV	ASRM	AUTO MNV	KU-BD DPLY	MEAL	ZLV MNV	IMU	ZLV MNV	
	YOF	PRO	CLOS	SETUP/02	VT		PRE SLEEP	RETURN TO NOMINAL TIMELINE AT 01/09:00 MET		
	INGRESS	EVA	INGRESS	AREPRESS	POST EVA		WITH THE EXCEPTION OF THE FOLLOWING POST EVA ACTIVITIES: - EMU MAINTENANCE/RECHARGE - POST EVA ENTRY PREP - 14.7 CABIN REPRESS			
PL	DCO PLN OT VD ZEO	PLB PREP	EVA SUPPORT	PS OUP ST O ERT VA						
DAY/NIGHT	[Day/Night Cycle]									
ORBIT	17	18	19	20	21	22	23	24		
GSTDN	-GD -MIL -MLX -BDA	-HAW -VAN -GD -MIL -MLX -BDA	-YAR -GWM -HAW -VAN -GD -MLX	-ACN -GWM -HAW -VAN -GD -MLX	-HAW -GWM -HAW -VAN -GD	-IOS -GWM -HAW -AGO	-HAW -AGO -IOS -GWM	-AGO -ACN -GWM -AGO -ACN		
COVERAGE	-D -ACN	-YAR -ACN	-GTS -HTS -VTS -CTS	-GTS -HTS -VTS -CTS	-GTS -HTS -VTS -IOS	-GTS -HTS -IOS -GTS	-HTS -IOS -GTS -HTS	-GTS -HTS	-GTS	
RTS	-CTS	-HTS -VTS -CTS	-GTS -HTS -VTS -CTS	-GTS -HTS -VTS -IOS	-GTS -HTS -IOS -GTS	-HTS -IOS -GTS	-IOS -GTS -HTS	-GTS		
TDRS	E W	[TDRS Coverage]								
ATTITUDE	MIEW PROT	TDRS	-ZLV +XVV			IMU	-ZLV +XVV			
NOTES:	18A (EVA) INSERTION									

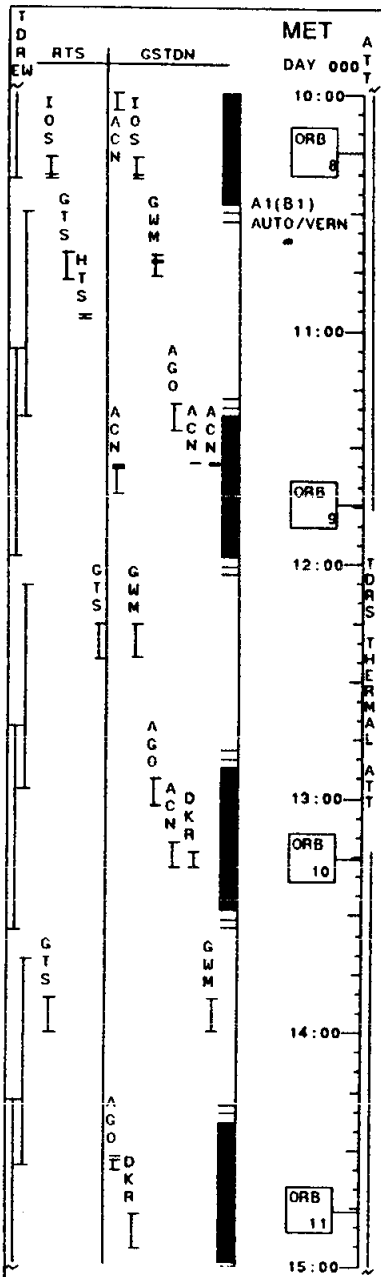
STS 29 (FD01) 18A (EVA) INSERTION



STS 29 (FD01) 18A (EVA) INSERTION

PL

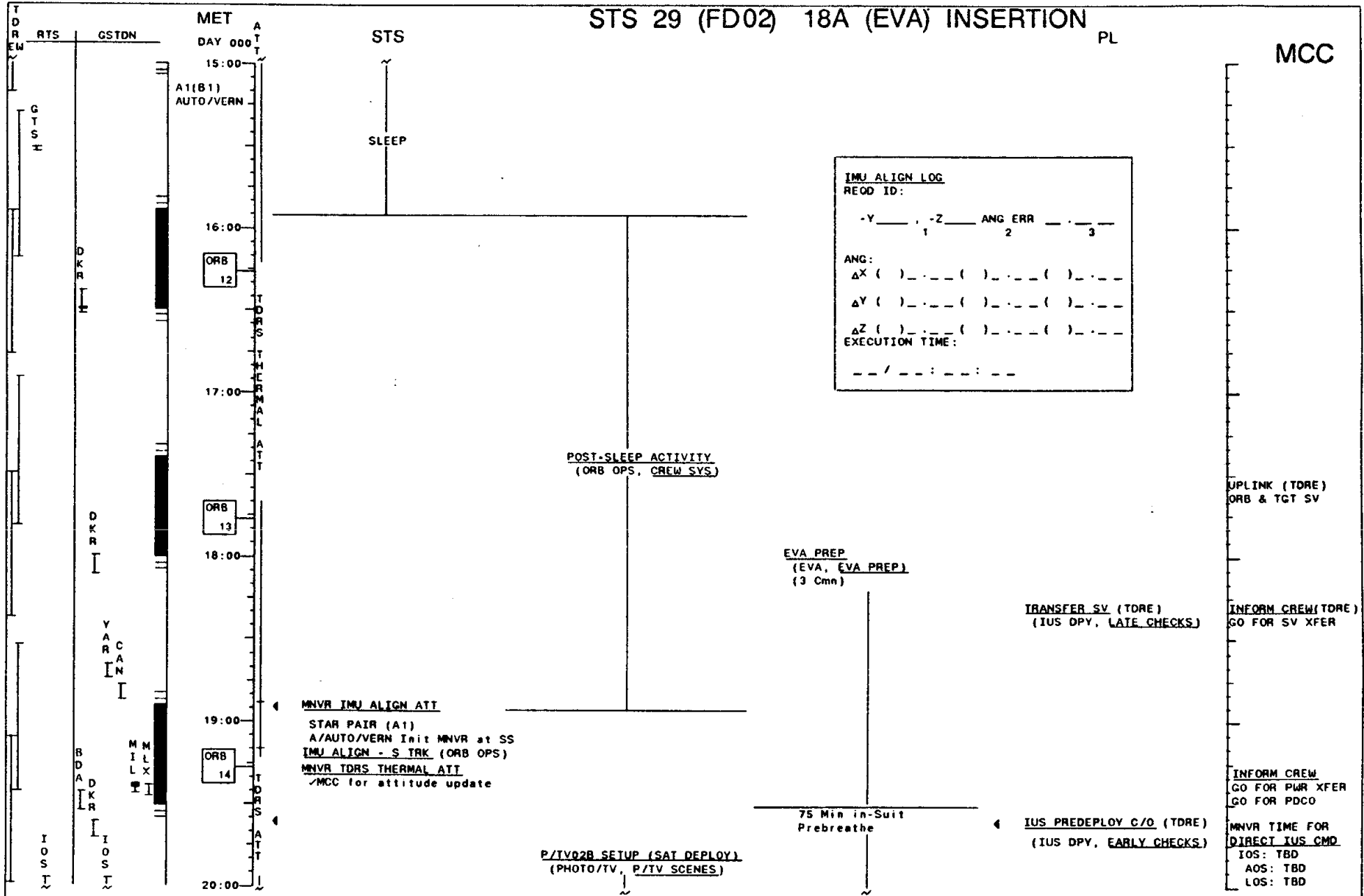
MCC



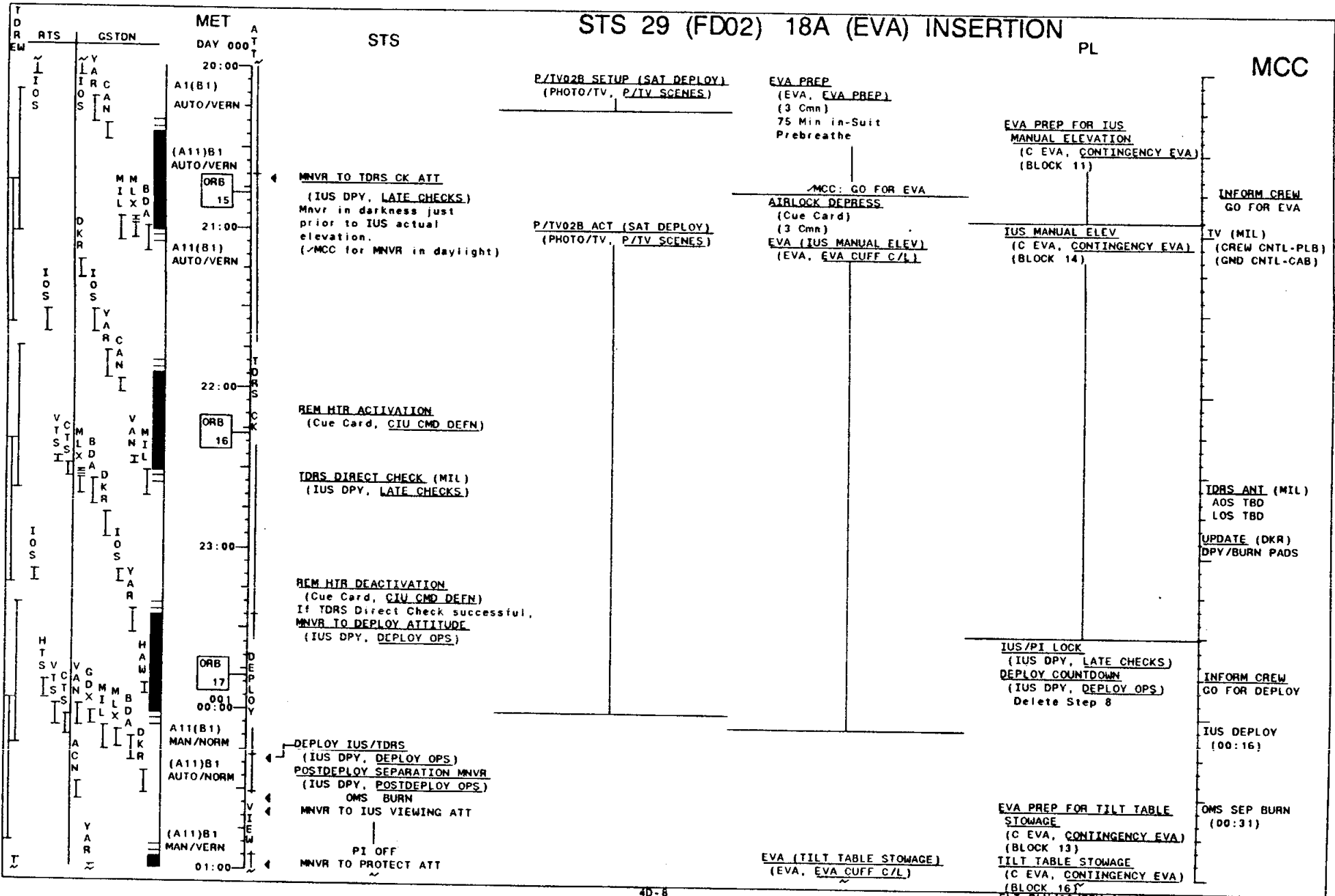
STS 29 (FD02) 18A (EVA) INSERTION

PL

MCC



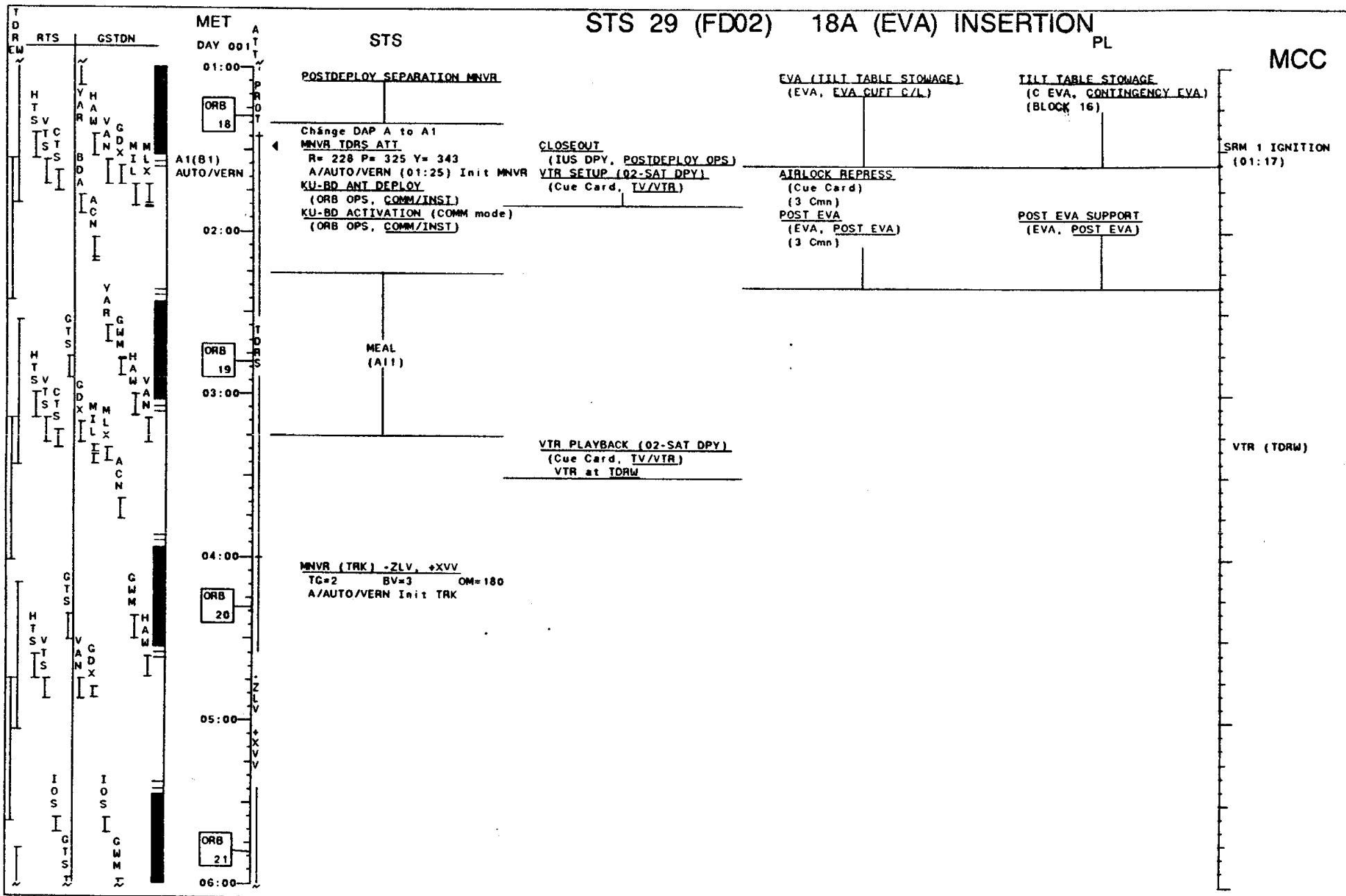
STS 29 (FD02) 18A (EVA) INSERTION

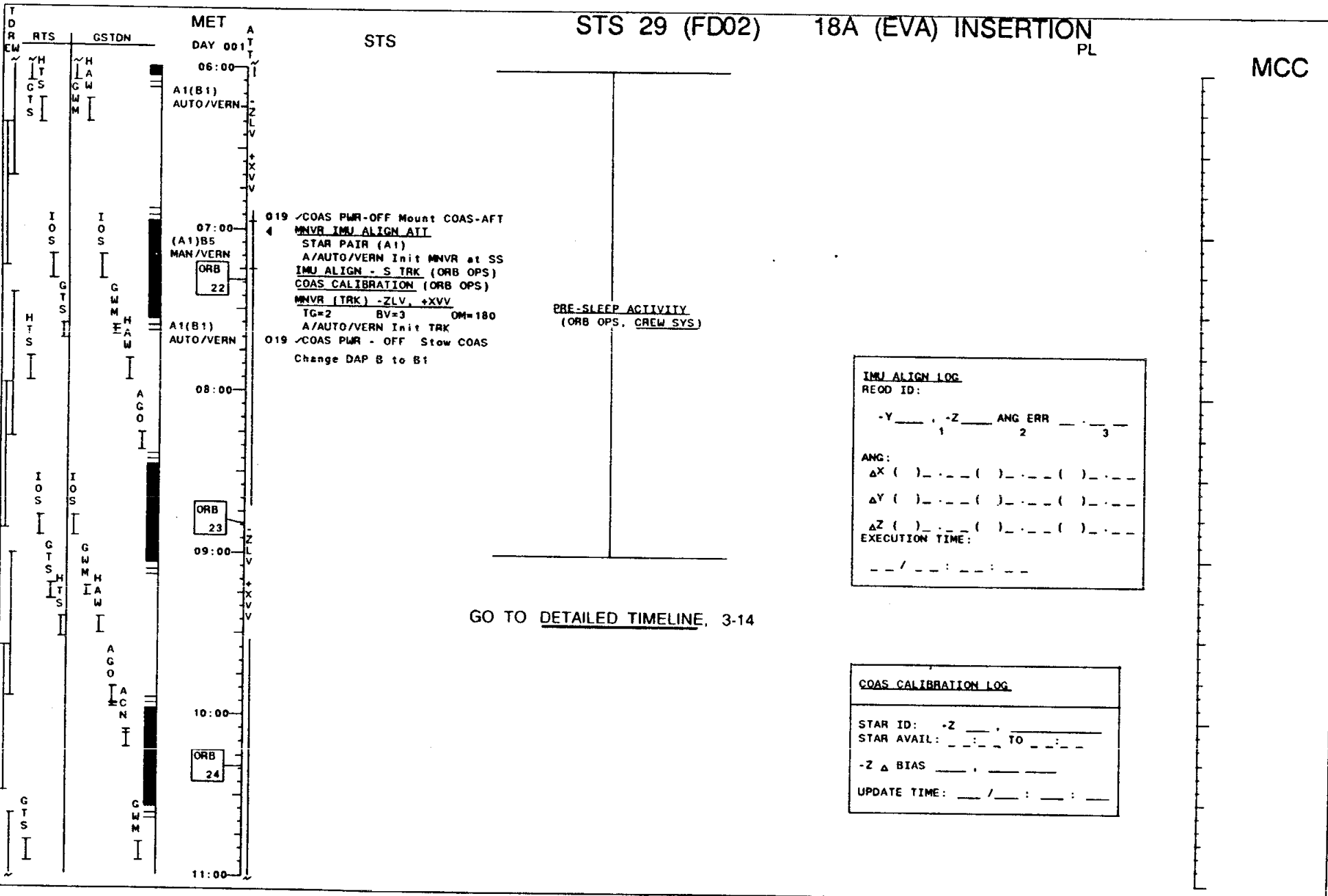


STS 29 (FD02) 18A (EVA) INSERTION

PL

MCC



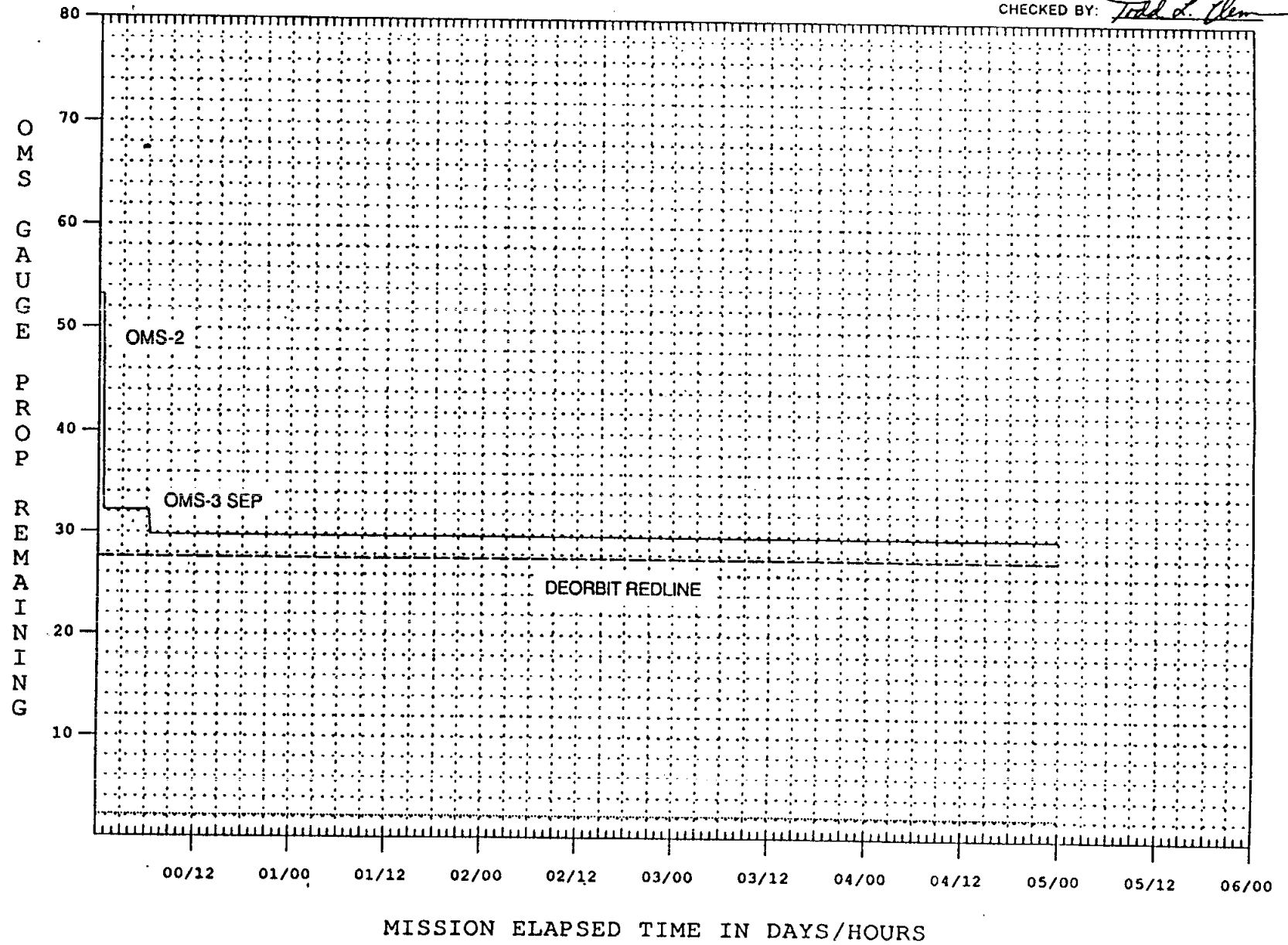


CONSUMABLES CURVES

CONSUMABLES
CURVES

PREPARED BY: ROBERT A. YOUNG
FIDP: CYCLE 2 (FDDD INPUTS)
CAP: JSC-22939-29, FINAL, REV-A (PRELIM)
ANALYSIS: 2/13/89
CHECKED BY: *Todd d. Glen*

STS-29 OMS PROP REMAINING (% GAUGE)

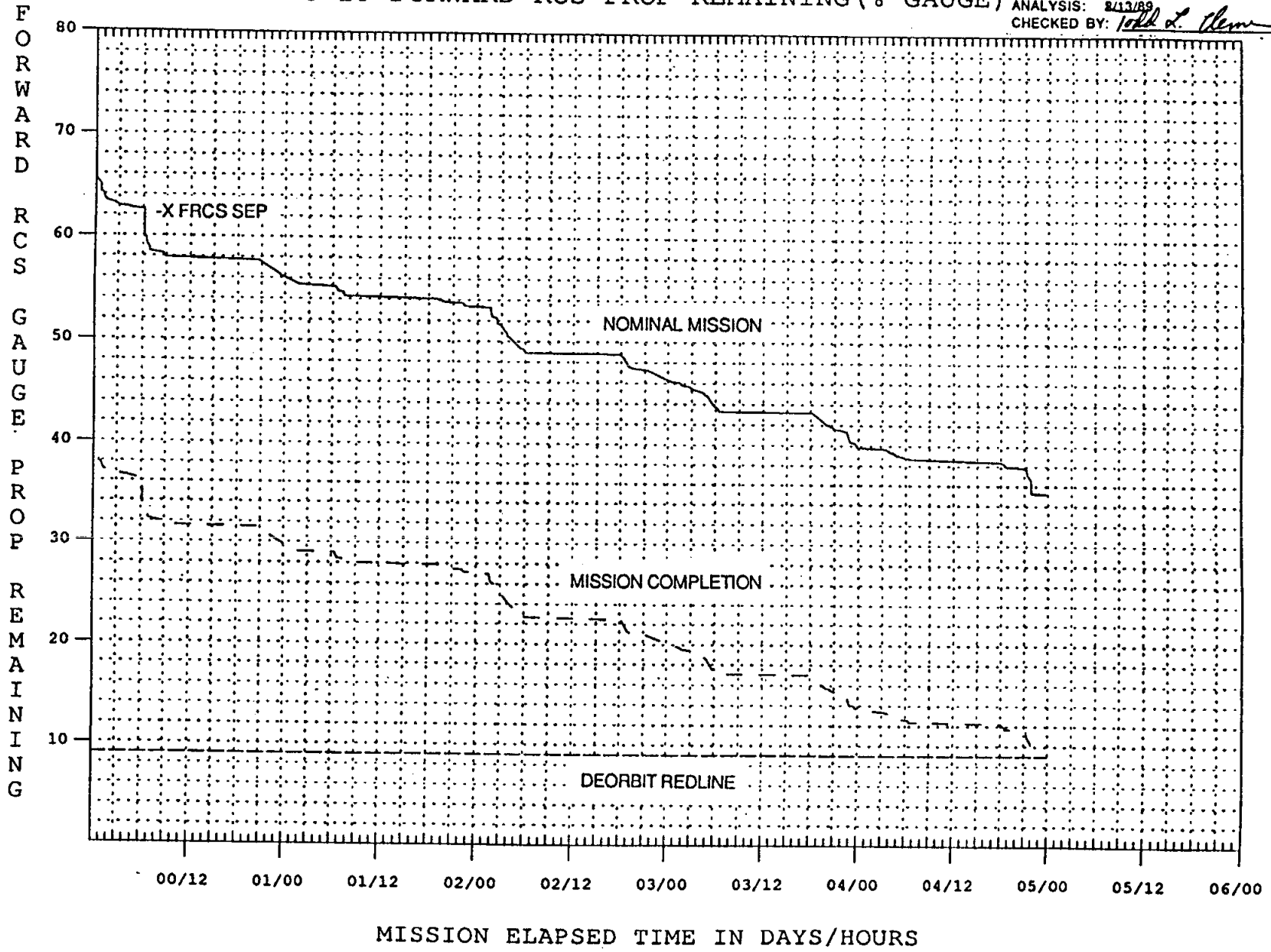


5-2

FLT PLN/29/FIN A

STS-29 FORWARD RCS PROP REMAINING (% GAUGE)

PREPARED BY: ROBERT A. YOUNG
 FIDP: CYCLE 2 (FDDO INPUTS)
 CAP: JSC-22939-29, FINAL, REV-A (PRELIM)
 ANALYSIS: 8/13/89
 CHECKED BY: *John A. Clem*

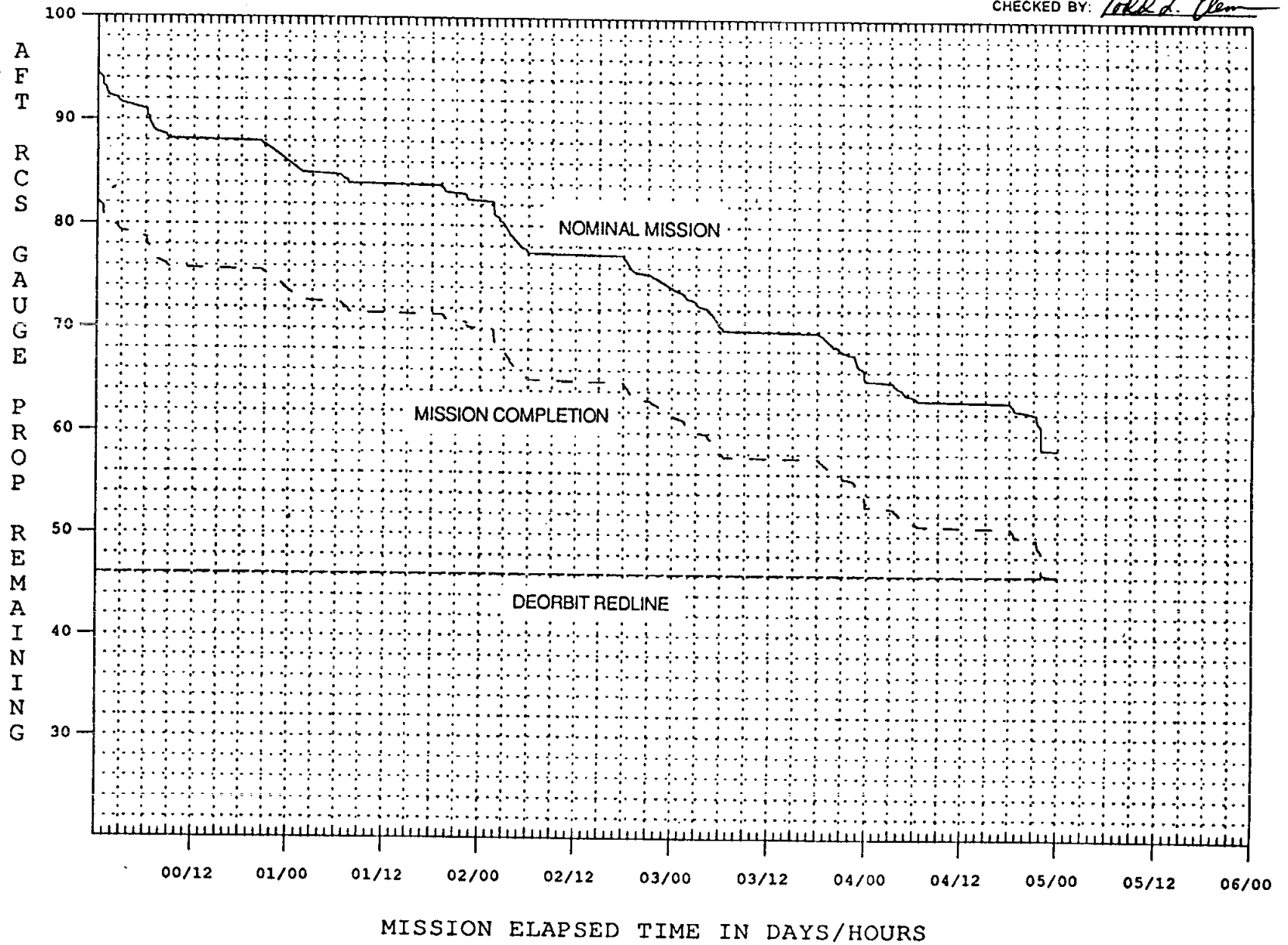


5-3

FLT PLN/29/FIN A

STS-29 AFT RCS PROP REMAINING (% GAUGE)

PREPARED BY: ROBERT A. YOUNG
FIDP: CYCLE 2 (FODD INPUTS)
CAP: JSC-22939-29, FINAL, REV-A (PRELIM)
ANALYSIS: 2/13/89
CHECKED BY: *Robert A. Young*



5-4

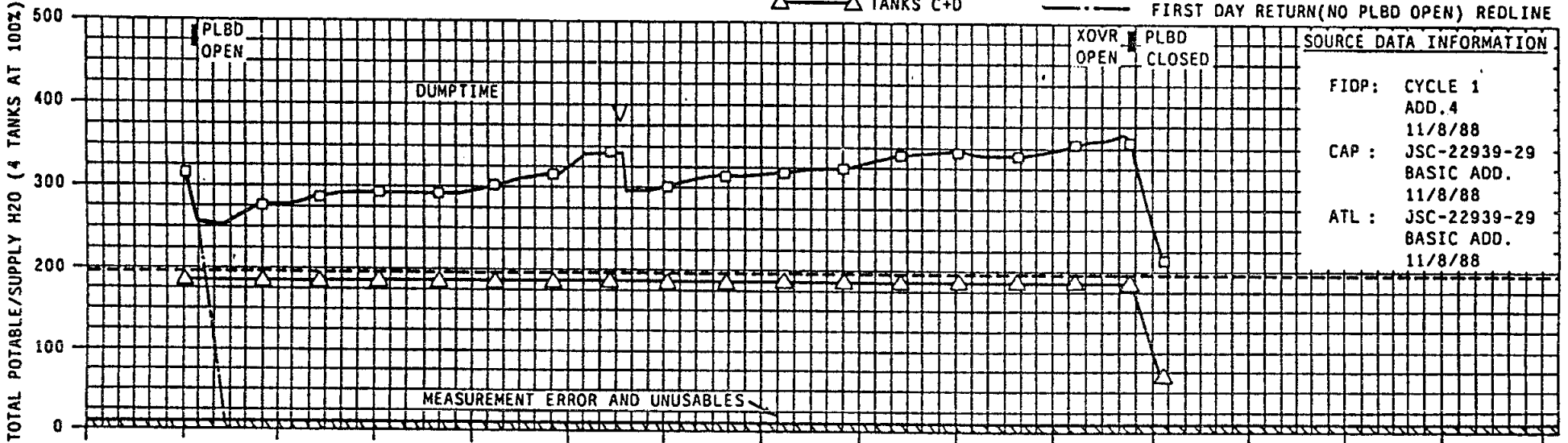
FLT PLN/29/FIN A

K.M. RAHMAN
 ANALYSIS DATE: 11/30/88
 TRAJECTORY: OFF CYCLE 2R

MISSION OPERATIONS DIRECTORATE
 SYSTEMS DIVISION

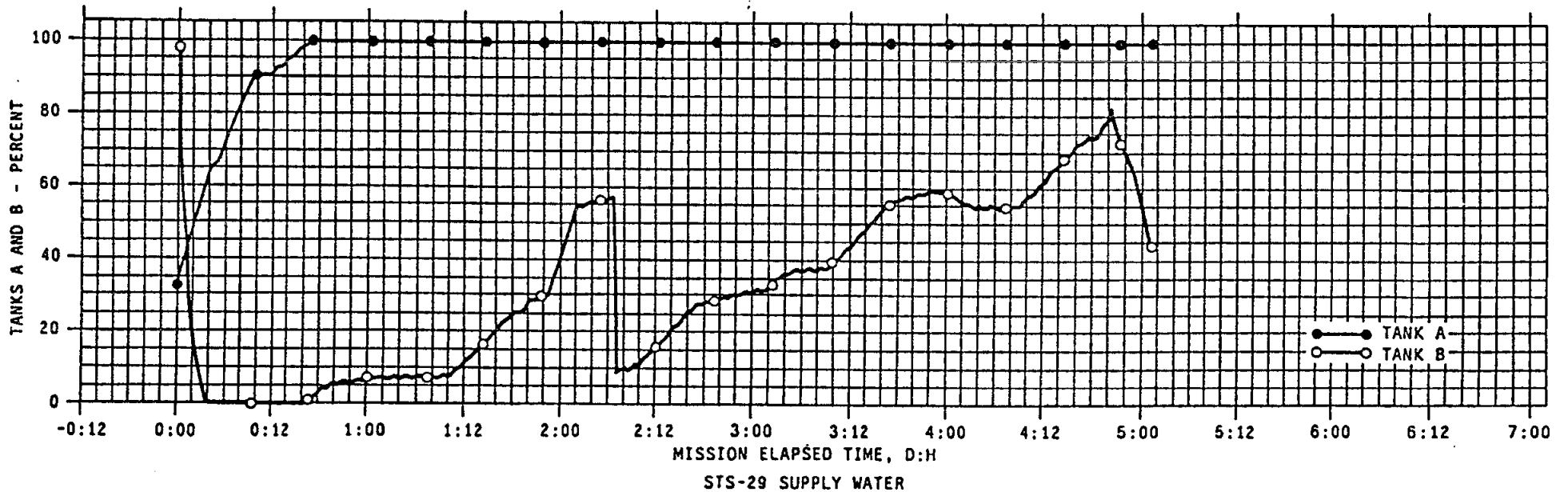
DATA CONFIRMED *Mrs. J. Langley*
 12/10/88

□ TANKS A-D - - - - DEORBIT REDLINE
 △ TANKS C+D - · - · FIRST DAY RETURN (NO PLBD OPEN) REDLINE



5-5

FLT PLN/29/FIN A

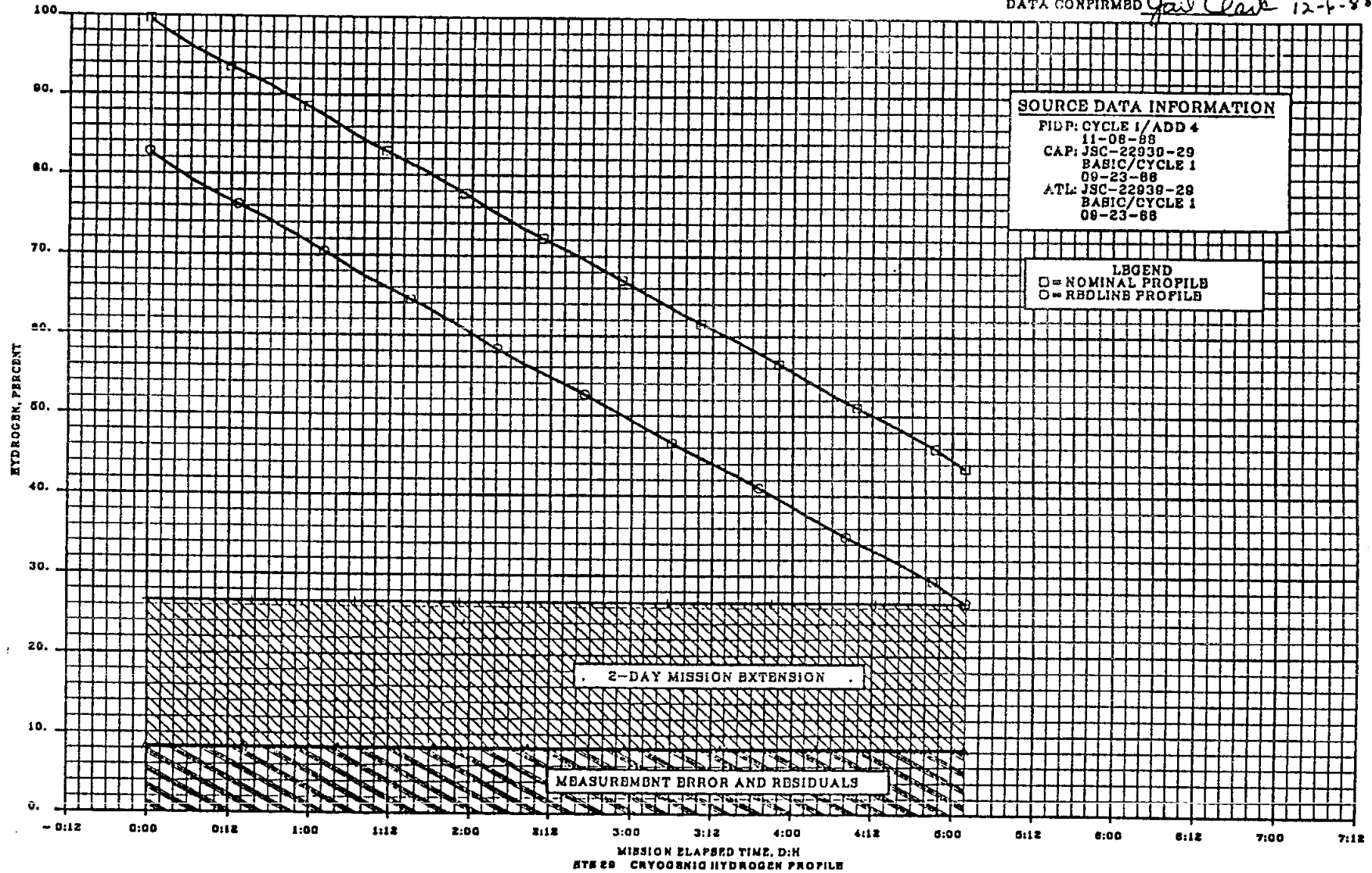


MISSION ELAPSED TIME, D:H
 STS-29 SUPPLY WATER

S. BAIG
 ANALYSIS DATE: 12-02-88
 TRAJ CYCLE: CYCLE 2

MISSION OPERATIONS DIRECTORATE
 SYSTEMS DIVISION

DATA CONFIRMED *Paul Clark* 12-4-88

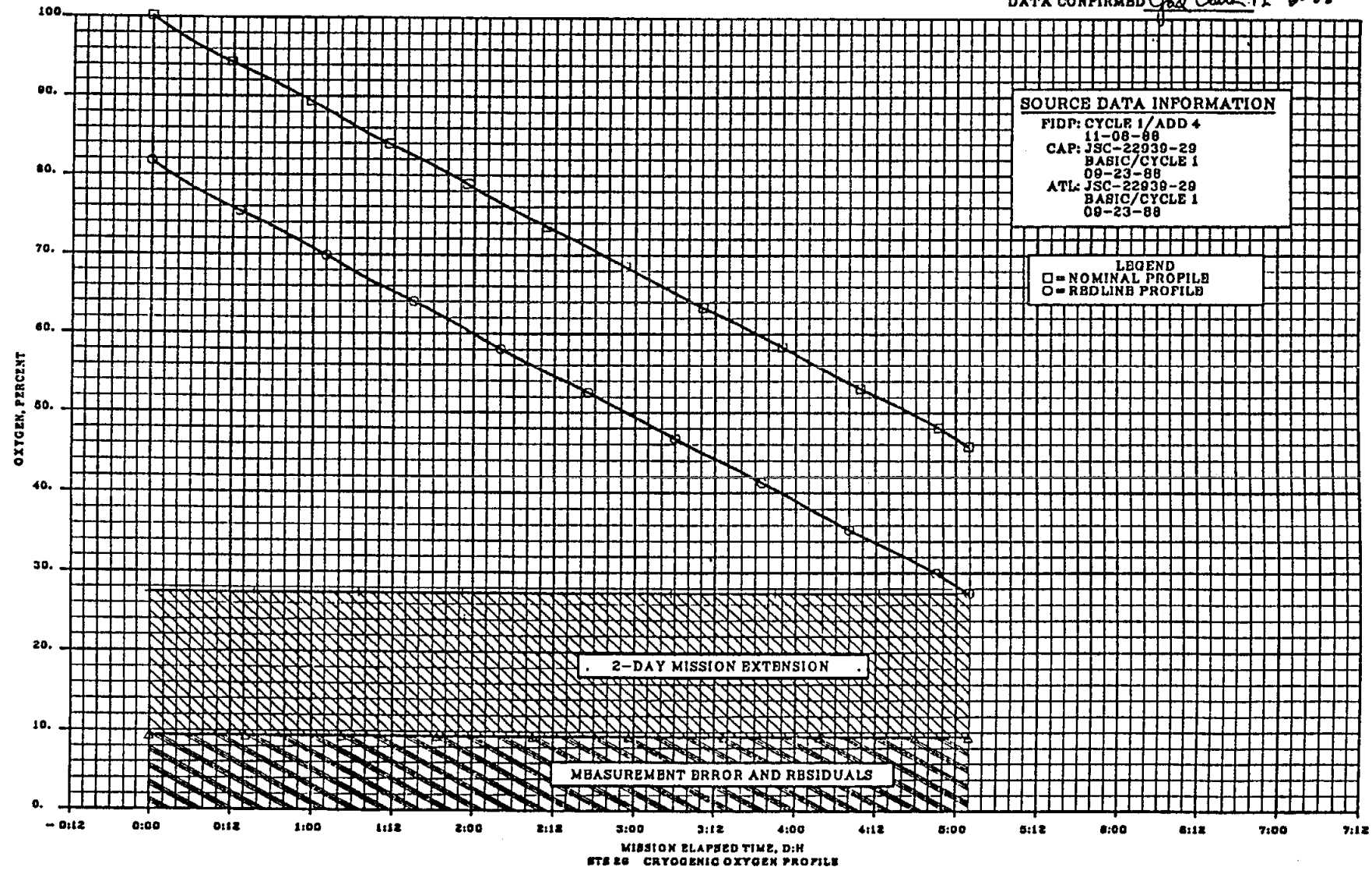


5-6

FLT PLN/29/FIN A

S. BA10
 ANALYSIS DATE: 12-02-88
 TRAJ CYCLE: CYCLB 2

MISSION OPERATIONS DIRECTORATE
 SYSTEMS DIVISION
 DATA CONFIRMED *Gas Clark 12-6-88*



5-7

FLT PLN/29/FIN A

MISSION ELAPSED TIME, D:H
 STS 28 CRYOGENIC OXYGEN PROFILE

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

FLIGHT PLAN NOTES
(CONSTRAINTS AND GUIDELINES)

FLT PLN NOTES

A. FLIGHT DESCRIPTION

The STS-29 (OV-103) launch from KSC on March 15, 1989 (Cycle 2R4) will be into a 160 nm orbit at an inclination of 28.45 degrees. The mission duration will be 5 days. Nominal landing occurs at EDW on March 20, 1989.

Landing opportunities are:

		<u>Landing Orbit No.</u>	<u>Site</u>	<u>Local Time</u>
Nominal	Primary	81	EDW	06:11 PST
	Backup	82	EDW	07:46 PST
	Weather Alt.	81	NOR	07:13 MST
1 Day Late	Primary	97	EDW	06:22 PST
	Weather Alt.	97	NOR	07:25 MST
2 Days Late	Primary	113	EDW	06:34 PST
	Weather Alt.	112	NOR	06:01 MST

MAJOR EVENTS

LAUNCH (KSC)
 MET (DD/HH:MM:SS) March 15, 1989
 Day of year 0/00:00:00
 CST/GMT 074
 07:04/13:04

OMS-2
 MET (DD/HH:MM:SS) 0/00:42:00
 DV (fps) 221.5
 ORBIT ha/hp (nm) 160/160

TDRS/IUS DEPLOY (6A INSERTION)
 MET (DD/HH:MM) 0/06:13

OMS SEPARATION BURN
 MET (DD/HH:MM) 0/06:28
 DV (fps) 31.0
 DT (MM:SS) 00:16
 ORBIT ha/hp (nm) 177/161

DEORBIT BURN
 MET (DD/HH:MM) 05/00:05

LANDING (EDW)
 MET (DD/HH:MM) 05/01:07
 Day of year 079
 CST/GMT 08:11/14:11

B. CREW

1. The crewmembers responsible for performing an EVA, should one become necessary, are: MS3 will be EV1, MS1 will be EV2, and PLT will be IV1
2. There will be 5 crewmembers flying this mission, with each specialist assigned to the following tasks:

CDR - Overall mission decisions, vehicle control, DPS, ECLSS, GNC, OASIS
 PLT - APU/HYD, EPS, MPS, OMS/RCS, SPOC/HP41, DTOs/DSOs, SSIP 83-9 (Chicken Embryo), IMAX
 MS1 - C&W, Earth Obs, IFM, Photo/TV, MECH (PLBD), IUS, PCG, PM
 MS2 - COMM/INST, SHARE
 MS3 - CCTV, Crew Equipment, Habitability, Medical, TDRS, CHROMEX, SSIP 82-8 (Bone Healing)

C. ORBITER SYSTEMS

1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink real-time commands (RTCs) coordinated with the crew.
- b. TDRS coverage is assumed to be supported by TDRS-E (41 degrees W) and TDRS-W (171 degrees W) and is the prime mode of communication coverage.
- c. Pre-TDRS deploy and from deorbit prep through landing, there are 12 GSTDN sites available for on-orbit coverage: CAN, GDY, MIL (MLX), BDA, HAW, GWM, AGO, ACN, YAR, DKR, IOS, and VAN. From Post-deploy to deorbit prep, there will normally be two GSTDN sites selected per rev as a TDRS backup and will be available on quick notice. All other GSTDN sites are available on a contingency call-up basis (90 minutes lead time required).
- d. TDRS Ku-band is the prime mode for real-time TV, however there are also 4 GSTDN sites available as backup: GDY, MIL (MLX), HAW, and VAN.
- e. There are 2 GSTDN sites available during ascent and entry for UHF voice only: YAR, IOS. These are available on a contingency call-up basis (90 minutes lead time required) throughout the rest of the flight.
- f. RTS sites are available for contingency support or when scheduled in advance (2 hour lead time required): HTS, GTS, VTS, CTS, and IOS.
- g. TDRS-W is assumed available to support Ku-band uplink (e.g., TAGS).
- h. HDR uplink (e.g., Teleprinter) is available through TDRS-E and TDRS-W.

2. Guidance and Navigation

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

3. Environmental Control and Life Support Subsystem (ECLSS)

- a. Two CO2 absorbers are installed prior to launch. On-orbit, the canisters are alternately replaced as required per the cue card.
- b. There are four supply water tanks and one waste water tank which are loaded for launch with volumes sufficient to meet an orbit 3 launch day deorbit with PLBDs failed closed. Normally two supply water dumps will occur per flight day. A real-time call will be made prior to each to inform the crew to what level each dump is made. Tanks A and B will be dumped to a level that will allow the tanks to be full prior to the next daily group of deorbit opportunities

4. DC Utility Power Usage

The following table is the DC Utility Power Outlet Schedule. This table shows the times of outlet reconfigurations during the mission.

MET OUTLET	PRELAUNCH	POST INSERTION	DEORBIT PREP	
			4/20:00	4/23:14
019	PLT*	--	--	PLT*
M052J	MS3*	PDB***	--	MS3*
F1	--	--	--	--
M013Q	PDB**	--	PDB**	PDB**
A11	MS1*,MS2*	--	--	MS1*,MS2*
A15	CDR*	TPR	TPR	CDR*
M030F	--	CHROMEX	CHROMEX	--

NOTES:

*Crewmember suit fan

**Power distribution box with PCG and SE 83-9

***Power distribution box with PCG, SE 83-9 and SE 82-8

If an outlet column is blank, the outlet is not in use

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. The TAGS system is operational with the operational status of TDRS-C in the 171 degree W position. This Flight Plan assumes TDRS-C is operational 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. TDRS (Tracking and Data Relay Satellite)

The TDRS-D is a communication satellite which is the third spacecraft launched in the process of assembling the Tracking and Data Relay Satellite System. The system will provide a high-capacity communication and data link with the STS as well as other spacecraft and launch vehicles. TDRS-D will replace TDRS-A in the 41 degrees W location. The nominal IUS/TDRS-D deployment opportunity occurs 60 minutes prior to node 6A (ascending) at 0/6:13 MET. Backup opportunities occur prior to 7A and 16A. A contingency opportunity occurs 60 minutes prior to 8D (descending).

2. IUS (Inertial Upper Stage)

The IUS is a two-stage solid rocket, inertially stabilized upper stage which will place TDRS-D in a geosynchronous orbit. The IUS ignites its first stage (SRM-1) for transfer orbit insertion 60 minutes after TDRS-D/IUS deployment. The second burn (SRM-2) occurs approximately 6 hours after deployment resulting in a 0 degree inclination, geosynchronous orbit at 41 degrees W longitude for the 6A deployment opportunity.

3. OASIS-I (Orbiter Experiments Autonomous Supporting Instrumentation System)

The OASIS-I payload will collect environmental data for Orbiter primary payloads. OASIS is capable of collecting a variety of environmental parameters based on specific transducer configurations for each flight. For STS-29, OASIS is configured to interface with TDRS-D/IUS. OASIS has transducers/sensors mounted on the forward and aft IUS ASE to measure thermal, acoustic, vibration, stress, and acceleration data.

4. SHARE (Space Station Heat Pipe Advanced Radiator Element)

The SHARE consists of two hardware assemblies: the Heat Pipe Radiator System (HPRS) and the Heat Pipe Instrumentation and Control System (HPICS). The HPRS is a 52-foot long assemblage that will be attached to the Orbiter via four mounting pedestals on the starboard sill. The HPICS consists of black boxes and a thermal shroud which are mounted in Bay 5 Forward on the starboard side. The heat pipe is a closed system for transferring large quantities of thermal energy, essentially isothermally, between a heat source and a heat sink. Two thermal testing periods of 2 revs each in specified attitudes are required. Thermal conditioning of 2 revs in a specified attitude is required prior to each test. There are also 2 optional tests that may be performed on this flight.

5. 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, a large percentage of the scenes for the IMAX camera will be Earth-viewing. Scene opportunities will be provided to the crew pre-flight and in real-time. In addition, a few opportunities utilizing special Orbiter attitudes/maneuvers may be scheduled in this Flight Plan.

6. CHICKEN EGGS (SSIP (Shuttle Student Involvement Project) 83-9: Chicken Embryo Development in Space)

The Chicken Eggs Student Experiment will study the effects of the space environment on the development of chicken embryos. The experiment is mostly self-sustaining and only requires periodic temperature and humidity checks by a crewmember.

7. PCG (Protein Crystal Growth)

The PCG payload is designed to conduct experiments which will supply information on the scientific methods and commercial potential for growing large, high-quality protein crystals in microgravity. The PCG will be installed and operated on the Orbiter middeck. The crew is required to activate the PCG and record the crystals' progress on film.

8. CHROMEX (Space Life Sciences Training Program-Chromosome and Plant Cell Division in Space)

The CHROMEX payload is designed to determine whether roots of oats, day lily and carrot can be initiated and undergo subsequent growth in microgravity at a level equivalent to that which occurs at 1 g on Earth. Activities consist of crew verification and logging of nominal operations each flight day during the experiment's day cycle. An accelerometer package will be flown in conjunction with the payload and will operate twice during the mission.

9. BONE HEALING (SSIP 82-8: The Effects of Weightlessness in Space Flight on the Healing of Bone Fractures)

The Bone Healing experiment consists of an Animal Enclosure Module (AEM) housing four rats, a Microgravity Rodent Bottle (MGRB) (water supply) and Ames Food Bars. The experiment is completely autonomous. The experimenter only requests visual observations and video taping when possible.

10. AIR FORCE MAUI OPTICAL SITE (AMOS) CALIBRATION TEST

The primary objectives of the AMOS activity are to use the Orbiter vehicle during cooperative overflights to obtain imagery and/or signature data to support the calibration of the AMOS ground-based sensors and to study plume phenomenology by observing the orbiter under a variety of attitude and lighting conditions. The tests are performed by the crew at selected high elevation overflights of the Maui Optical site.

G. ON-ORBIT DTOs

1. Water Dump Cloud Formation (DTO 330)

The purpose of this DTO is to define water dump plume formation and angular extent with respect to the Orbiter coordinate system and trajectory. Provided there are opportunities that satisfy the viewing constraints over a ground site, up to 3 observations will be made. When possible the Orbiter will be in specific attitudes and the water dumps initiated/terminated at specific times relative to the site AOS.

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

This DTO is designed to provide a significant confidence test and evaluation of TAGS under 0 g and to generate data for comparison with data from 1 g test conditions. Approximately 400 images will be sent, mostly during crew sleep. A second test is intended to validate paper loading techniques.

3. AMU Validation Update (DTO 787)

The purpose of this DTO is to test out a procedure needed to update the IUS attitude base to provide the required accuracy for the planetary missions (Magellan, Galileo, and Ulysses). The implementation of this DTO on STS-29 will nominally reflect data collection prior to and upon completion of two rotations of at least 90 degrees about axes approximately 90 degrees apart.

4. Payload and General Support Computer Evaluation (DTO 789)

The Payload and General Support Computer (PGSC) is a portable computer that provides a common crew interface for a variety of STS payloads. The PGSC will also be used to functionally replace the SPOC (Shuttle Portable Onboard Computer.) The PGSC is a GRID Case 1530 portable lap top computer. The purpose of this DTO is to evaluate the unique hardware aspects of the GRID Case 1530 as well as crew usage and interaction with the PGSC.

5. IMU Reference Recovery Techniques (DTO 790)

The crew performs activities on-orbit which consist of various techniques in support of IMU reference recovery after an unforeseen loss. The COAS and universal pointing software are used with celestial targets which are easily identified. The objective is to verify the operational feasibility of each technique.

H. ON-ORBIT DSOs

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. Salivary Acetaminophen Pharmacokinetics (DSO 458)

This DSO investigates the pharmacokinetics of Acetaminophen (Tylenol). This drug is used for evaluation because it distributes into the saliva with a ratio similar to blood plasma. The crew will take the Tylenol after an 8-hour fast and take salivary samples at specified intervals during the flight day.

3. Noninvasive Estimation of Central Venous Pressure During Spaceflight (DSO 462)

The objective of this investigation is to measure physiological adaptations to the headward fluid shift seen in microgravity. The noninvasive technique of determining central venous pressure (CVP) uses a mouthpiece instrument utilizing doppler flowmetry. The specified crewmember will take measurements as early as possible on flight day 1 and during pre- and post-sleep as time permits during the remainder of the flight.

4. Preflight Adaptation Training (DSO 468)

The purpose of this DSO is to obtain reactions to the stimulus rearrangement produced by a prototype trainer before and immediately following orbital flight. The bulk of this DSO is done on the ground. In-flight the crewmember(s) are asked to document (via cassette tape recorder) perceived self-motion/surround motion accompanying slow head motions during reentry and descent.

5. The Relationship of Space Adaptation 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 flow velocities; document the changes in cerebral and regional blood flows in the micro-gravity environment; and correlate these changes with the onset and severity of SAS. The measurement sessions will be performed as time permits on FD1 and in pre- and post-sleep on FD2.

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.

STS-29 DAP BOOK

DAP A CONFIGURATIONS

	A1*	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
<u>TRANSLATION</u>												
PULSE ft/sec	0.10	0.10	0.10	0.10	0.10	0.10	1.49	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	0.100	0.500	0.200	0.200	0.200	
VERN °/sec	0.200	0.400	0.200	0.008	0.200	0.200	0.100	0.200	0.200	0.200	0.200	
PULSE NORM °/sec	0.10	0.10	0.30	0.10	0.10	0.10	0.22	0.10	0.10	0.10	0.05	
VERN °/sec	0.010	0.010	0.010	0.010	0.050	0.010	0.093	0.010	0.010	0.010	0.010	
COMP NORM °/sec	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	
VERN °/sec	.000	.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	1.00	3.00	2.00	2.00	1.00	
VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000	1.00	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	0.20	
VERN °/sec	.020	.020	.020	.010	.020	.020	.010	.020	.020	.020	.010	
<u>JET OPT</u>												
P	1	1	3	1	1	3	2	1	1	1	1	
Y	1	1	3	3	1	3	3	1	1	1	1	
CNTL ACCEL	0	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	B9
<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	0.77	
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	
<u>CNTL ACCEL</u>									
	0	0	0	0	0	0	0	0	

*I-LOADED OPS-2 DAP Configuration

DAP BOOK

HOOK
VELCRO

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN

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 (-2° below +X)*
= 5	Optional
	Input P (0-359.99)
	Y (270-359.99, 0-90)
* input OM +	OM (0-359.99)
MON AXIS = 1	+X
2	-X
G20 DAP CONFIG	
CNTL ACCEL = 0	Orbiter alone
= 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 - SHARE DEPRIME
- A8 - PRE/POST DEPLOY
- A9 - RENDEZVOUS
- A10 - PROX OPS
- A11 - IUS DEPLOY
- A12 - (Blank)

FLT PLN/29/0/FIN A

A1

TOP

DAP A1

A1

PURPOSE:

NOMINAL
IMU ALIGN
LOSS OF VERN
(NOSE & TAIL)

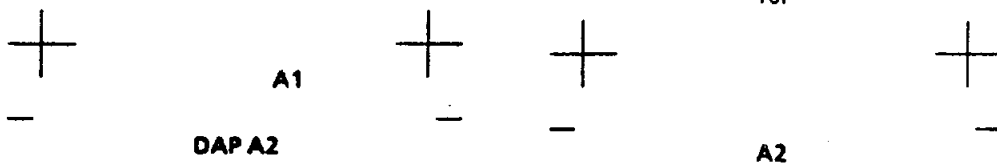
- | | | |
|---------|----|-------------------------|
| 0.1 0 | 1 | TRANSLATION
PULSE |
| 0.2 0 0 | 2 | ROTATION
DSC RT NORM |
| 0.2 0 0 | 3 | VERN |
| 0.1 0 0 | 4 | PULSE NORM |
| 0.0 1 0 | 5 | VERN |
| .0 0 0 | 6 | COMP NORM |
| .0 0 0 | 7 | VERN |
| 5.0 0 | 8 | DEADBAND
ATT NORM |
| 1.0 0 0 | 9 | VERN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

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN

A2

TOP



PURPOSE:
PTC

TRANSLATION
PULSE
0.1 0 1

ROTATION
DSC RT NORM
0.4 0 0 2
0.4 0 0 3
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
ATT NORM
1.0 0 0 8
1.0 0 0 9 VERN

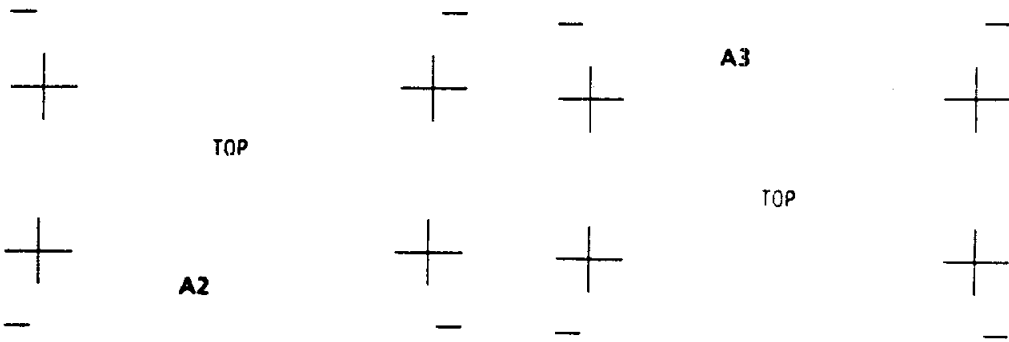
RATE NORM
0.2 0 10
0.2 0 11 VERN

JET OPT P
1 12
1 13 Y

Q 14 CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



PURPOSE:
RCS HOT FIRE

TRANSLATION
PULSE
0.1 0 1

ROTATION
DSC RT NORM
0.2 0 0 2
0.2 0 0 3 VERN
0.3 0 0 4 PULSE NCRM
0.0 1 0 5 VERN
.0 0 0 6 COMP NORM
.0 0 0 7 VERN

DEADBAND
ATT NORM
5.0 0 0 8
1.0 0 0 9 VERN

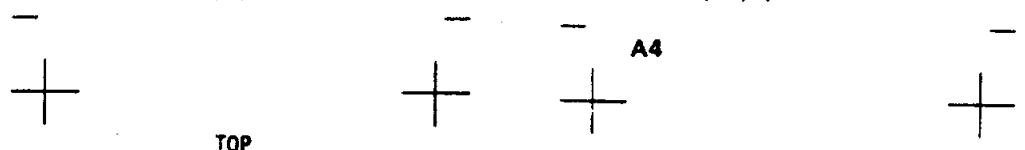
RATE NORM
0.2 0 10
0.2 0 11 VERN

JET OPT P
3 12
1 13 Y

Q 14 CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



(reduced copy)

TOP



A3

DAP A4

PURPOSE:

GG

A4

0.1 0

1 TRANSLATION PULSE

0.2 0 0

2 DSC RT NORM

0.0 0 8

3 VERN

0.1 0 0

4 PULSE NORM

0.0 1 0

5 VERN

.0 0 0

6 COMP NORM

.0 0 0

7 VERN

DEADBAND

1.0 0

8 ATT NORM

0.0 7 0

9 VERN

0.2 0

10 RATE NORM

.0 1 0

11 VERN

1

12 JET OPT P

3

13 Y

0

14 CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

A5

TOP



A4

DAP A5

PURPOSE:

IMU ROTATION

A5

0.1 0

1 TRANSLATION PULSE

0.2 0 0

2 DSC RT NORM

0.2 0 0

3 VERN

0.1 0 0

4 PULSE NORM

0.0 5 0

5 VERN

.0 0 0

6 COMP NORM

.0 0 0

7 VERN

DEADBAND

5.0 0

8 ATT NORM

1.0 0 0

9 VERN

0.2 0

10 RATE NORM

.0 2 0

11 VERN

1

12 JET OPT P

1

13 Y

0

14 CNTL ACCEL

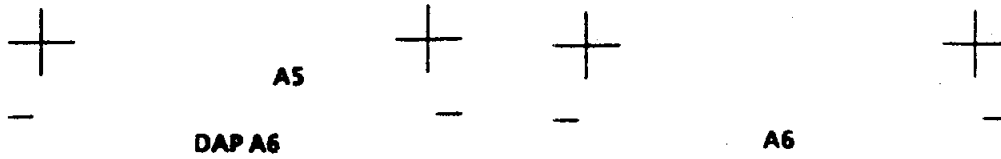
FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

A6



PURPOSE:

LOSS OF VERN
(TAIL ONLY)

0.1 0

1

TRANSLATION
PULSE

0.2 0 0

2

ROTATION
DSC RT NORM

0.2 0 0

3

VERN

0.1 0 0

4

PULSE NORM

0.0 1 0

5

VERN

.0 0 0

6

COMP NORM

.0 0 0

7

VERN

DEADBAND

5.0 0

8

ATT NORM

1.0 0 0

9

VERN

0.2 0

10

RATE NORM

.0 2 0

11

VERN

3

12

JET OPT P

3

13

Y

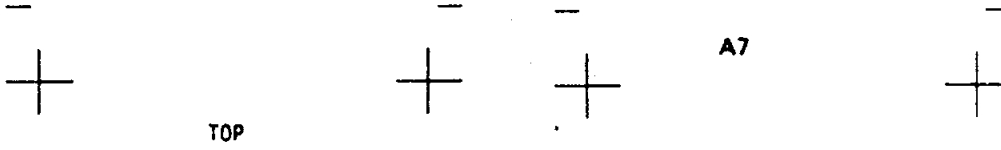
0

14

CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



PURPOSE:

SHARE DEPRIME

1.4 9

1

TRANSLATION
PULSE

0.1 0 0

2

ROTATION
DSC RT NORM

0.1 0 0

3

VERN

0.2 2 2

4

PULSE NORM

0.0 9 3

5

VERN

.0 0 0

6

COMP NORM

.0 0 0

7

VERN

DEADBAND

1.0 0

8

ATT NORM

1.0 0 0

9

VERN

0.2 0

10

RATE NORM

.0 1 0

11

VERN

2

12

JET OPT P

3

13

Y

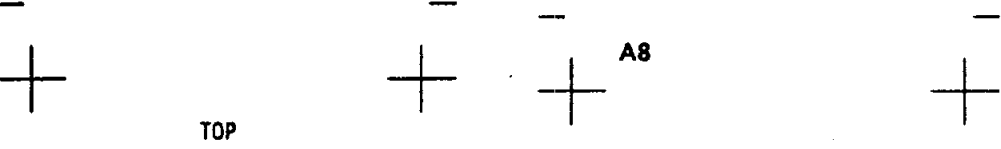
0

14

CNTL ACCEL

FLT PLN/29/0/FIN A

FLT PLN/29/0/FIN A



(reduced copy)



DAP A8

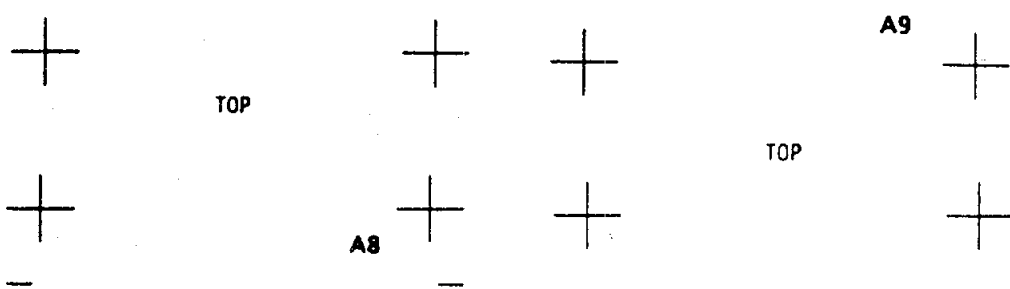
PURPOSE:
PRE/POST DEPLOY

A8

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

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

TOP

DAP A9

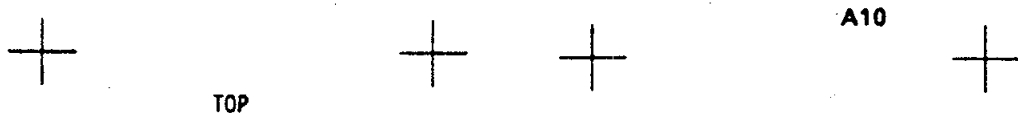
PURPOSE:
RENDEZVOUS

A9

- 0.1 0 1 TRANSLATION PULSE
- 0.2 0 0 2 ROTATION DSC RT NORM
- 0.2 0 0 3 VERN
- 0.1 0 0 4 PULSE NORM
- 0.0 1 0 5 VERN
- .0 0 0 6 COMP NORM
- .0 0 0 7 VERN
- 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
- 0 14 CNTL ACCEL

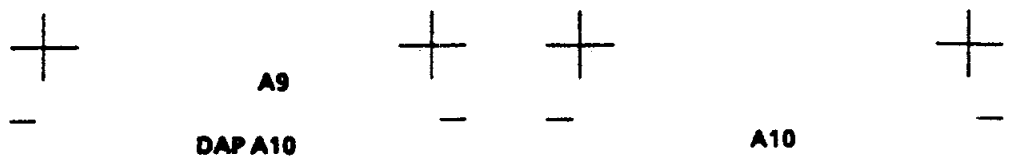
FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

A10

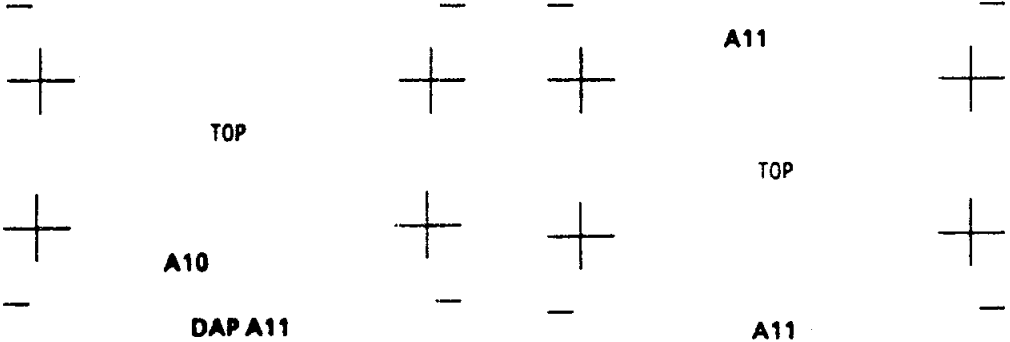


PURPOSE:
PROX OPS

0.0 5 1 TRANSLATION PULSE
 0.2 0 0 2 ROTATION DSC RT NORM
 0.2 0 0 3 VERN
 0.1 0 4 PULSE NORM
 0.0 1 0 5 VERN
 .0 0 0 6 COMP NORM
 .0 0 0 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
 0 14 CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



PURPOSE:
IUS DEPLOY

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
 1 12 JET OPT P
 1 13 Y
 0 14 CNTL ACCEL

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



+

A11

+

+

TOP

+

DAP A12

PURPOSE: (Blank)

A12

- TRANSLATION
- 1 PULSE
- ROTATION
- 2 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/29/0/FIN A

FLT PLN/29/0/FIN A

+

+

+

+

TOP

TOP

+

A12

+

+

+

- | <u>DAP</u> | <u>PURPOSE</u> |
|------------|--|
| 81 | - NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS |
| 82 | - LOSS OF VERN
(TAIL ONLY) |
| 83 | - LOSS OF VERN
(NOSE & TAIL)
GG MNVR |
| 84 | - SSUS DEPLOY |
| 85 | - COAS CAL |
| 86 | - RENDEZVOUS |
| 87 | - PROX OPS |
| 88 | - IMAX MNVR |
| 89 | - (Blank) |

FLT PLN/29/0/FIN A

FLT PLN/29/0/FIN

+

+

+

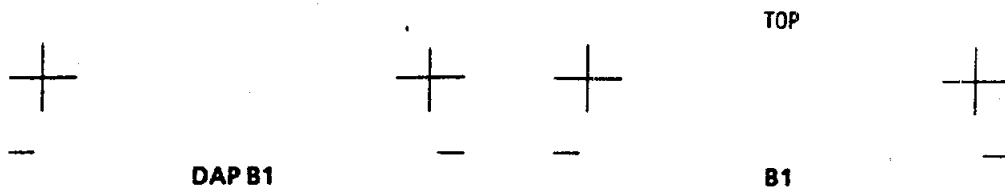
81

+

TOP

(reduced copy)

FLT PLN/29/FIN A



DAP B1

TOP

B1

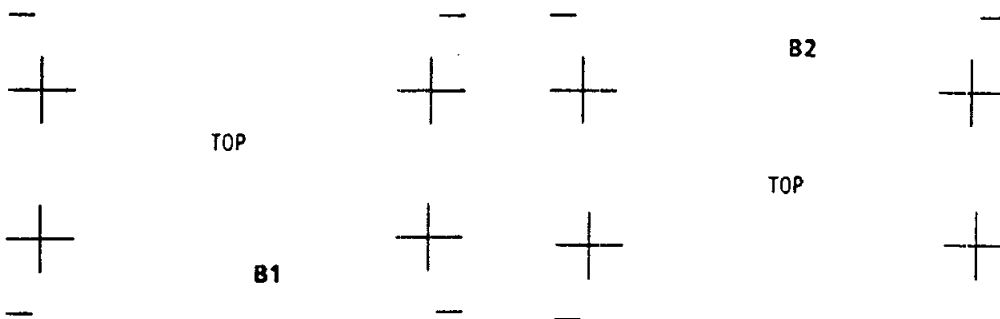
PURPOSE:

NOMINAL
PRCS IMU ALIGN
OMS & RCS BURNS

TRANSLATION				
PULSE	15	0.0	2	
ROTATION				
DSC RT	NORM 16	0.5	0 0	
	VERN 17	0.2	0 0	
PULSE	NORM 18	0.0	4	
	VERN 19	0.0	0 2	
COMP	NORM 20	.0	0 0	
	VERN 21	.0	0 0	
DEADBAND				
ATT	NORM 22	3.0	0 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/29/0/FIN

FLT PLN/29/0/FIN



TOP

B2

TOP

B1

DAP B2

B2

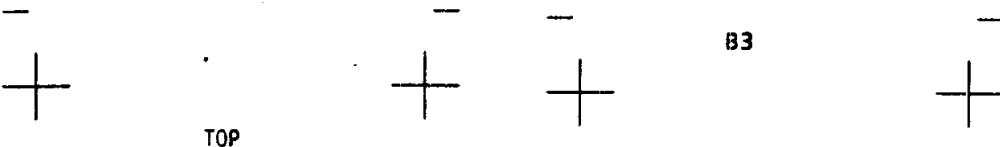
PURPOSE:

LOSS OF VERN
(TAIL ONLY)

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

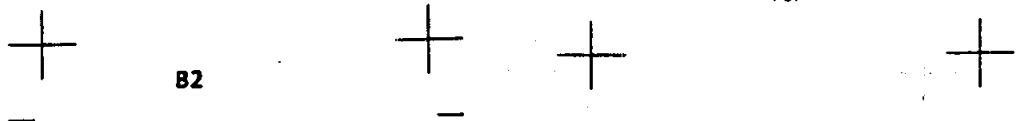
FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

B3



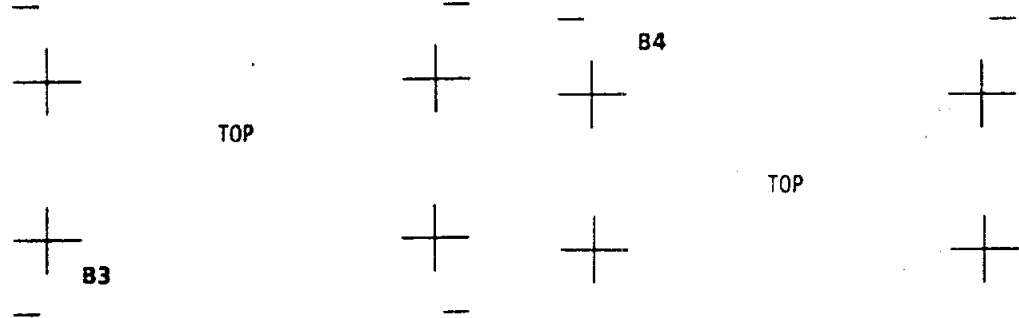
B2

DAP B3

PURPOSE:

LOSS OF VERN
(NOSE & TAIL)
GG MNVR

FLT PLN/29/0/FIN



TOP

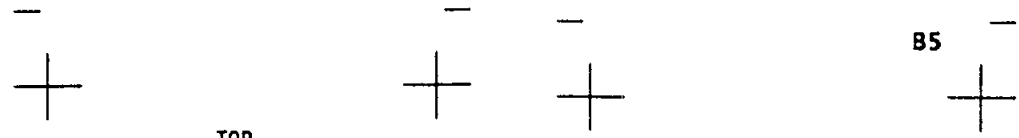
B3

DAP B4

PURPOSE:

SSUS DEPLOY

FLT PLN/29/0/FIN



TOP

TOP

B3

TRANSLATION
PULSE 15 0.0 2

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

DEADBAND
ATT NORM 22 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/29/0/FIN

B4

TOP

B4

TRANSLATION
PULSE 15 0.0 2

ROTATION
DSC RT NORM 16 0.2 0 0
VERN 17 0.0 0 8
PULSE NORM 18 0.0 0 4
VERN 19 0.0 0 2
COMP NORM 20 0.0 0 0
VERN 21 0.0 0 0

DEADBAND
ATT NORM 22 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/29/0/FIN

B5



B4

TOP

DAP B5

B5

PURPOSE:

COAS CAL

TRANSLATION
PULSE 15 0.0 2

ROTATION

DSC RT	NORM	16	0.2	0	0
	VERN	17	0.0	1	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	0.0	3	3

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

JET OPT	P	26		3	
	Y	27		3	

CNTL ACCEL 28 0

FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP

B6



B5

TOP

DAP B6

B6

PURPOSE:

RENDEZVOUS

TRANSLATION
PULSE 15 0.0 5

ROTATION

DSC RT	NORM	16	0.5	0	0
	VERN	17	0.2	0	0
PULSE	NORM	18	0.0	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/29/0/FIN

FLT PLN/29/0/FIN



TOP

B7

B6

DAP B7

PURPOSE:
PROX OPS

FLT PLN/29/0/FIN

TOP

B7

DAP B8

PURPOSE: IMAX MNVR

FLT PLN/29/0/FIN

TOP

(reduced copy)

B7

TRANSLATION
PULSE 15 0.0 1

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

DEADBAND
ATT NORM 22 2.0 0
VERN 23 1.0 0 0

RATE NORM 24 0.2 0
VERN 25 .0 2 0

JET OPT P 26 1
Y 27 1

CNTL ACCEL 28 0

FLT PLN/29/0/FIN

B8

TOP

B8

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 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/29/0/FIN A

B9

FLT PLN/29/FIN A



88



TOP



DAP 89

89

PURPOSE: (Blank)

TRANSLATION
PULSE 15

ROTATION
DSC RT NORM 16
VERN 17
PULSE NORM 18
VERN 19
COMP NORM 20
VERN 21

DEADBAND
ATT NORM 22
VERN 23

RATE NORM 24
VERN 25

JET OPT P 26
Y 27

CNTL ACCEL 28
FLT PLN/29/0/FIN

FLT PLN/29/0/FIN



TOP



89



FLT PLN/29/0/FIN



TOP

TOP
BACK COVER 'DAP BOOK'



HOOK
VELCRO

FLT PLN/29/0/FIN



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STS-29 ATTITUDE TIMELINE

ATTITUDE
TIMELINE

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT	
1 0/01:10:00 23:46	TRK TGT=2 BV=3(90.00, .00) OM= 20.00	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+340	BIASED -ZLV NOSE NORTH PLBD OPENING
2 0/02:20:00 30:24	MNVR R+ 2.00 P+ 27.00 Y+291.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 67 P 115	STAR PR A2	IMU ALIGN AMU #1 ATT
3 0/02:35:00 42:29	MNVR R+338.00 P+277.00 Y+304.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 83 P 24		AMU #2 ATT
4 0/02:46:00 49:49	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 IUS DIR CHECK
5 0/04:14:00 27:09	MNVR R+176.00 P+272.00 Y+ 1.00	B1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 90 P 180		TDRS DIRECT CHECK ATT
6 0/05:33:00 35:08	TRK TGT=4 BV=5(272.30, .00) OM=270.00 DEPLOY 0/06:12:56	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .01	SUN T 87 P 181	INRTL R+173 P+277 Y+ 26	TDRS DEPLOY ATTITUDE
7 0/06:13:56	ROT BV=5(.00,270.00)	A1 MAN NORM	DSC .420 DB AT 1.00 DB RT .20		ROT R+173 START P+277 ATT Y+ 26	-2.2 FPS SEP AND BEGIN -70 DEG PITCH
8 0/06:14:04	ROT BV=5(.00,270.00)	A1 MAN NORM	DSC .840 DB AT 1.00 DB RT .20		ROT R+171 START P+281 ATT Y+ 26	SEP CUTOFF CONTINUE -70 DEG PITCH
9 0/06:15:22	CANCEL	A1 MAN NORM	DSC .200 DB AT 1.00 DB RT .20	SUN T 19 P 183	INRTL R+153 P+345 Y+ 3	END OF -70 DEG PITCH
10 0/06:19:56 24:00	MNVR R+ 25.00 P+157.00 Y+ 58.00	B1 AUTO NORM	DSC .500 DB AT 3.00 DB RT .20	SUN T 123 P 95	TIG 0/06:27:56	OMS SEP ATTITUDE
11 0/06:28:23 32:10	TRK TGT=1 BV=3(90.00, .00) OM= .00	B1 AUTO NORM	DSC .500 DB AT 3.00 DB RT .20	EARTH T 178 P 190		IUS VIEWING ATTITUDE
12 0/06:51:56 56:51	TRK TGT=1 BV=5(310.00, .00) OM= 20.60	B1 AUTO NORM	DSC .500 DB AT 3.00 DB RT .20	SUN T 93 P 154		WINDOW PROTECT ATTITUDE

ATTITUDE
TIMELINE

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT	
1 0/07:12:56	CANCEL	B1 MAN VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 93 P 154	INRTL R+170 P+236 Y+282	INRTL HOLD
2 0/07:30:00 44:02	MNVR R+ 33.00 P+ 14.00 Y+ 58.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 63 P 223		KU-BAND ATT
3 0/08:22:00 29:29	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 129 P 158	STAR PR A1	IMU ALIGN
4 0/08:42:00 54:18	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 0/20:27:00 32:50	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 129 P 158	STAR PR A1 -Z COAS: 20 -Y ST: 17	IMU ALIGN COAS CAL
6 0/20:52:00 21:05:37	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 0/22:58:00 23:00:45	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 0/23:14:10	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 57 P 1		BETSIBOKA TRK LAT -15.8 LON +46.2 ALT +0.0
8 0/23:14:40	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 169 P 238	INRTL R+297 P+170 Y+ 5	INRTL HOLD
9 0/23:16:00 18:19	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
10 1/06:27:00 36:30	TRK TGT=2 BV=5(203.80, .00) OM=180.00	B8 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 156 P 180	LVLH R+180 P+114 Y+ 0	IMAX MNVR STARTING ATT
11 1/06:43:12	LVLH ROT FREE ROTATION ABOUT +Y AXIS RATE=1.000	B8 LVLH NORM	DSC 1.000 DB AT 2.00 DB RT .20		LVLH R+180 P+ 74 Y+ 0	IMAX MNVR
12 1/06:43:52	CANCEL	B8 MAN NORM	DSC .500 DB AT 2.00 DB RT .20	SUN T 50 P 191	INRTL R+ 51 P+ 23 Y+ 42	INRTL HOLD

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT
1 1/07:02:00 09:15	MNVR R+289.00 P+184.00 Y+ 55.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 128 P 158	STAR PR A1	IMU ALIGN
2 1/07:22:00 33:59	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
3 1/17:37:00 50:16	MNVR R+ 2.00 P+ 27.00 Y+291.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 68 P 116	STAR PR A2	IMU ALIGN
4 1/17:57:00 18:00:39	MNVR R+ 97.00 P+129.00 Y+305.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 108 P 117	+X COAS: 30	COAS CAL
5 1/18:07:00 13:36	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 DTO 330
6 1/22:10:00 21:07	TRK TGT=4 BV=2(180.00, .00) OM= 90.00	A1 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	SUN T 180 P 127	INRTL R+ 28 P+181 Y+ 3	-X SOLAR INERTIAL SHARE
7 2/01:30:00 39:52	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 2/02:14:00 23:30	TRK TGT=2 BV=5(203.80, .00) OM=180.00	B8 DSC .200 AUTO DB AT 1.00 VERN DB RT .02	EARTH T 156 P 180	LVLH R+180 P+114 Y+ 0	IMAX MNVR STARTING ATT
9 2/02:30:03	LVLH ROT FREE ROTATION ABOUT +Y AXIS RATE=1.000	B8 DSC 1.000 LVLH DB AT 2.00 NORM DB RT .20		LVLH R+180 P+ 74 Y+ 0	IMAX MNVR
10 2/02:30:43	CANCEL	B8 DSC .500 MAN DB AT 2.00 NORM DB RT .20	SUN T 79 P 185	INRTL R+ 21 P+ 64 Y+ 59	INRTL HOLD
11 2/02:35:00 42:35	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 2/03:24:00 26:57	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 2/03:40:15	A1 DSC .200 AUTO DB AT 5.00 NORM DB RT .20	EARTH T 57 P 13		MASAYA TRK LAT +12.0 LON -86.2 ALT +0.0

ALL ATTITUDES IN MEAN OF 1950

Attitude Timeline

MET	MNVR OPTION	DAP	E/S	REMARKS	EVENT	
1 2/03:40:45	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 103 P 197	INRTL R+325 P+113 Y+ 59	INRTL HOLD
2 2/03:44:00 58:11	MNVR R+183.00 P+188.00 Y+294.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 111 P 94		KU-BAND ATT
3 2/05:08:00 21:29	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 2/05:24:03	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 59 P 304		RONDONIA TRK LAT -7.0 LON -63.0 ALT +0.0
4 2/05:24:33	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 153 P 133	INRTL R+357 P+164 Y+ 24	INRTL HOLD
5 2/05:26:00 31:22	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 128 P 157	STAR PR A1	IMU ALIGN
6 2/05:50:00 57:55	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
7 2/17:49:00 54:48	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 127 P 157	STAR PR A1	IMU ALIGN
8 2/18:09:00 21:08	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 2/18:53:00 55:52	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 2/19:08:52	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 56 P 5		TEAGUE CRATER TRK LAT -25.5 LON+120.6 ALT +0.0
10 2/19:09:22	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 170 P 356	INRTL R+294 P+184 Y+353	INRTL HOLD
11 2/19:10:00 12:39	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
12 2/21:00:00 10:00	TRK TGT=2 BV=1(.00, .00) OM=270.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	EARTH T 0 P 0	LVLH R+270 P+270 Y+ 0	+XLV, +YVV DTO 330

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 2/21:25:00 35:00	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
2 3/01:23:00 24:46	TRK TGT=19 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 155 P 306	INRTL R+293 P+168 Y+340	DTO790 TEST 1 +X COAS: 19
3 3/01:35:00 37:46	TRK TGT=20 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 141 P 359	INRTL R+308 P+203 Y+329	+X COAS: 20
4 3/01:48:00 54:34	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 3/02:50:00 53:40	TRK TGT=5 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 138 P 123	INRTL R+292 P+203 Y+ 38	DTO790 TEST 2 +X COAS: MOON RA 139.57 DEC +17.97
6 3/03:05:00 10:45	TRK TGT=20 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 141 P 15	INRTL R+292 P+203 Y+329	+X COAS: 20
7 3/03:21:00 28:24	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
8 3/04:12:00 20:05	TRK TGT=5 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 62 P 159	INRTL R+151 P+326 Y+ 53	DTO790 TEST 3 +X: JUPITER RA 58.59 DEC +19.70
9 3/04:31:00 37:37	TRK TGT=12 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 94 P 140	INRTL R+ 39 P+ 94 Y+ 37	+X COAS: 12
10 3/04:47:00 05:00:12	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
11 3/05:25:00 27:51	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 3/05:41:42	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 56 P 357		SAO PAULO TRK LAT -23.6 LON -47.0 ALT +0.0
12 3/05:42:12	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 179 P 14	INRTL R+301 P+182 Y+ 1	INRTL HOLD

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 3/05:45:00 49:37	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 127 P 157	STAR PR A1	IMU ALIGN
2 3/06:05:00 14:01	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 3/18:00:00 05:37	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 126 P 157	STAR PR A1	IMU ALIGN
4 3/18:20:00 32:00	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 3/20:05:00 07:47	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 3/20:20:55	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 57 P 5		MAURITANIA TRK LAT +21.0 LON -11.5 ALT +0.0
6 3/20:21:25	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 69 P 182	INRTL R+ 32 P+ 52 Y+ 54	INRTL HOLD
7 3/20:45:00 58:07	MNVR R+106.00 P+184.00 Y+304.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 123 P 168		KU-BAND ATT CREW CONF
8 3/22:00:00 13:03	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 3/23:00:00 02:50	TRK TGT=3 BV=3(90.00, .00) OM=180.00 TCA 3/23:16:22	A1 AUTO NORM	DSC .200 DB AT 5.00 DB RT .20	EARTH T 59 P 14		MIAMI TRK LAT +26.2 LON -80.6 ALT +0.0
10 3/23:16:52	CANCEL	A1 MAN NORM	DSC .200 DB AT 5.00 DB RT .20	SUN T 44 P 189	INRTL R+ 41 P+ 27 Y+ 35	INRTL HOLD
11 3/23:30:00 37:31	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 SHARE DEPRIME
12 4/03:13:00 21:29	TRK TGT=14 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 83 P 317	INRTL R+ 51 P+281 Y+310	DT0790 TEST 4 +X COAS: 14

Attitude Timeline

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1 4/03:32:00 38:54	TRK TGT=5 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 1 P 72	INRTL R+ 95 P+ 1 Y+359	+X COAS: SUN RA 358.64 DEC -0.59
2 4/03:51:00 54:12	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 4/04:21:00 25:25	TRK TGT=12 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 93 P 188	INRTL R+350 P+ 94 Y+ 37	D/O790 TEST 5 +X COAS: 12
4 4/04:36:00 43:30	TRK TGT=19 BV=1(.00, .00)	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 156 P 262	INRTL R+336 P+168 Y+340	+X COAS: 19
5 4/04:54:00 05:02:07	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
6 4/06:06:00 11:42	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 126 P 156	STAR PR A1	IMU ALIGN
7 4/06:26:00 38:07	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
8 4/18:11:00 16:29	MNVR R+289.00 P+184.00 Y+ 55.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 125 P 156	STAR PR A1	IMU ALIGN
9 4/18:31:00 39:58	TRK TGT=4 BV=5(184.00, .00) OM= 90.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 176 P 188	INRTL R+ 28 P+177 Y+358	TAIL SUN COLD SOAK
10 4/21:05:00 16:03	MNVR R+ 81.00 P+ 40.00 Y+ 25.00	A1 AUTO VERN	DSC .200 DB AT 1.00 DB RT .02	SUN T 46 P 126	-Z ST: 21 -Y ST: 17	D/O IMU ALIGN
11 4/21:21:00 24:02	MNVR R+ 12.00 P+146.00 Y+ 29.00	B1 AUTO NORM	DSC .500 DB AT 3.00 DB RT .20	SUN T 137 P 133	-Z ST: 44 -Y ST: 48	IMU VERIF
12 4/21:50:00 55:57	MNVR R+243.00 P+ 5.00 Y+351.00	B1 AUTO NORM	DSC .500 DB AT 3.00 DB RT .20	SUN T 10 P 236	TIG 5/00:05:19	DEORBIT ATT

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