

Flight Data File Crew Activity Plan

STS-9

Cycle 4 Trajectory

Spacelab 1

Mission Operations Directorate
Operations Division

Final, Revision B
November 10, 1983

November 28 Launch Date
1 TDRS - 41° West



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

FLIGHT DATA FILE

CONTROL

Ascent Checklist
Post Insertion Book
Crew Activity Plan
Deorbit Preparation Book
Entry Checklist

SUPPORT

Cue Cards
EVA Checklist
Flight Maps and Charts
Orbit Operations Checklist
Payload Deploy Checklist*
Payload Operations Checklist*
PDRS Operations Checklist*
Photo/TV Checklist
Rendezvous/Proximity Operations Book*

OFF-NOMINAL

Ascent Pocket Checklist
Orbit Pocket Checklist
Entry Pocket Checklist
Ascent/Entry Systems Procedures
Contingency Deorbit Preparation Book
Contingency EVA Operations Book
In-Flight Maintenance Checklist
Medical Checklist
Payload Systems Data and Malfunction Procedures*
Systems Malfunction Procedures

REFERENCE

Data Processing System Dictionary
Reference Data
Systems Data Book

*If required

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MISSION OPERATIONS DIRECTORATE

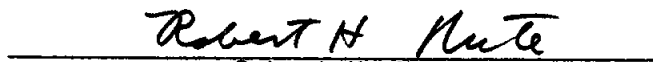
STS-9 CREW ACTIVITY PLAN
SPACELAB 1


FINAL, REVISION B
November 10, 1983

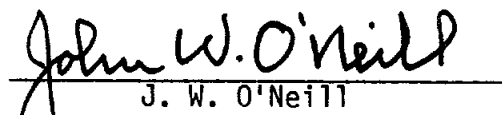
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STS-9 Crew Activity Plan

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FDF-292	FINAL, REVISION A	09/30/83	
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CAP(9)-105	FINAL, REVISION A	09/30/83	
CAP(9)-106	FINAL, REVISION A	09/30/83	
CAP(9)-107	FINAL, REVISION A	09/30/83	
CAP(9)-108	FINAL, REVISION A	09/30/83	
CAP(9)-109	FINAL, REVISION A	09/30/83	
CAP(9)-110	FINAL, REVISION A	09/30/83	
CAP(9)-111	FINAL, REVISION A	09/30/83	
CAP(9)-112	FINAL, REVISION A	09/30/83	
CAP(9)-113	FINAL, REVISION A	09/30/83	
CAP(9)-114	FINAL, REVISION A	09/30/83	
CAP(9)-115	FINAL, REVISION A	09/30/83	
CAP(9)-116	FINAL, REVISION A	09/30/83	
CAP(9)-117	FINAL, REVISION A	09/30/83	
CAP(9)-118	FINAL, REVISION A	09/30/83	
CAP(9)-119	FINAL, REVISION A	09/30/83	
CAP(9)-119A	FINAL, REVISION B	11/10/83	
CAP(9)-120	FINAL, REVISION B	11/10/83	
FDF-303 A	FINAL, REVISION B	11/10/83	
CAP(9)-121	FINAL, REVISION B	11/10/83	
CAP(9)-122	FINAL, REVISION B	11/10/83	
CAP(9)-123	FINAL, REVISION B	11/10/83	
CAP(9)-124	FINAL, REVISION B	11/10/83	
FDF(R)-278A	FINAL, REVISION B	11/10/83	

*482 changes incorporated into current edition only are identified by change bars.

STS-9 CREW ACTIVITY PLAN

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FINAL 07/22/83

REV B 11/10/83

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INTRODUCTION

The STS-9 Crew Activity Plan is the flight data file article that contains the on-orbit timeline. It does not contain the detailed timelines covered in the Ascent, Post Insertion, Deorbit Prep, and Entry checklists. For continuity, the entire flight is shown in the summary level timeline. Payload activities are referenced but not covered in detail. Detailed payload activities will be covered in the PCAP, published by the Marshall Space Flight Center.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive (Ref. 1) and the requirements of the STS-9 Flight Requirements Document Revision A, July 1983 (Ref 2).

The flight profile (Cycle 4 trajectory data, Ref. 3) used for this Crew Activity Plan is for a launch date of November 28, 1983.

The work/rest cycle guidelines are based on dividing the 6-man crew into two teams (RED and BLUE) with each team on duty for 12 hr then off duty for 12 hr. This is reflected in the way the timeline sections are constructed. The RED team is shown on the left-hand pages, the BLUE team on the right-hand pages.

There will be considerable ground commanding of the payloads during the entire flight. These commands are not included in the CAP.

The standard definition of Flight Day would be confusing if applied to a 2-shift/24-hr operations flight, as this one is. The following definition of Flight Day is used:

Launch day will be FD1 for both teams. When the RED team awakens after their first sleep period (0/11:30 MET), this will be the start of RED FLIGHT DAY 2 (RED FD2). When the BLUE team awakens at 0/22:00 MET, it will be the start of BLUE FLIGHT DAY 2 (BLUE FD2). This will continue through the flight for a total of 10 RED FDs and 10 BLUE FDs.

The communication coverage for this plan assumes one TDRS satellite located at 41 degrees west.

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TIMELINE FORMAT SYMBOL NOMENCLATURE

A. FORMAT SYMBOL NOMENCLATURE

1. Overview Timeline

The following letters (a-e) refer to those highlighted in Fig 1-1.

- a. **TIMESCALE** - The time referenced used on this format is cumulative Mission Elapsed Time (MET) expressed in days and hours. Met is referenced to liftoff, which occurs at 0/00:00:00 (days, hours, minutes, seconds).
- b. **ACTIVITY COLUMN** - This column presents an overview of activities scheduled during the flight. For clarity of presentation, only major activities are presented, and activity durations are sometimes lengthened.
- c. **ORBIT and DAY/NIGHT**
 - 1) **Orbit** - Indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the Orbiter crosses the Earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this column starting with Orbit 1 for launch.
 - 2) **Day/Night** - The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.
- d. **KU BAND** - Ku-Band coverage only is shown
- e. **ATT and DTO**
 - 1) **Attitude** - The major attitudes are shown. Some experiment attitudes are used for such a short time they cannot be reasonably shown.
 - 2) **Detailed Test Objectives** - The times when a test is performed are shown. An explanation of each test by number is included in section 9.

2. Summary Level Timeline (12-hr timespan)

The following letters (a-i) reference those highlighted in Figure 1-2.

- a. **TIMESCALE:** The MET (Mission Elapsed Time) timescale is referenced to liftoff beginning at 00/00:00 (days, hours minutes).
- b. **CREW TEAMS/CREWMEN:** (Red Team/Blue Team) The crew consists of six (6) personnel working on two (2) shifts. The crew has been divided into two teams in order to allow sequencing of the teams for a 24-hour operation. The Red Team consists of the commander (CDR), mission specialist 1 (MS1), and payload specialist 1 (PS1). The

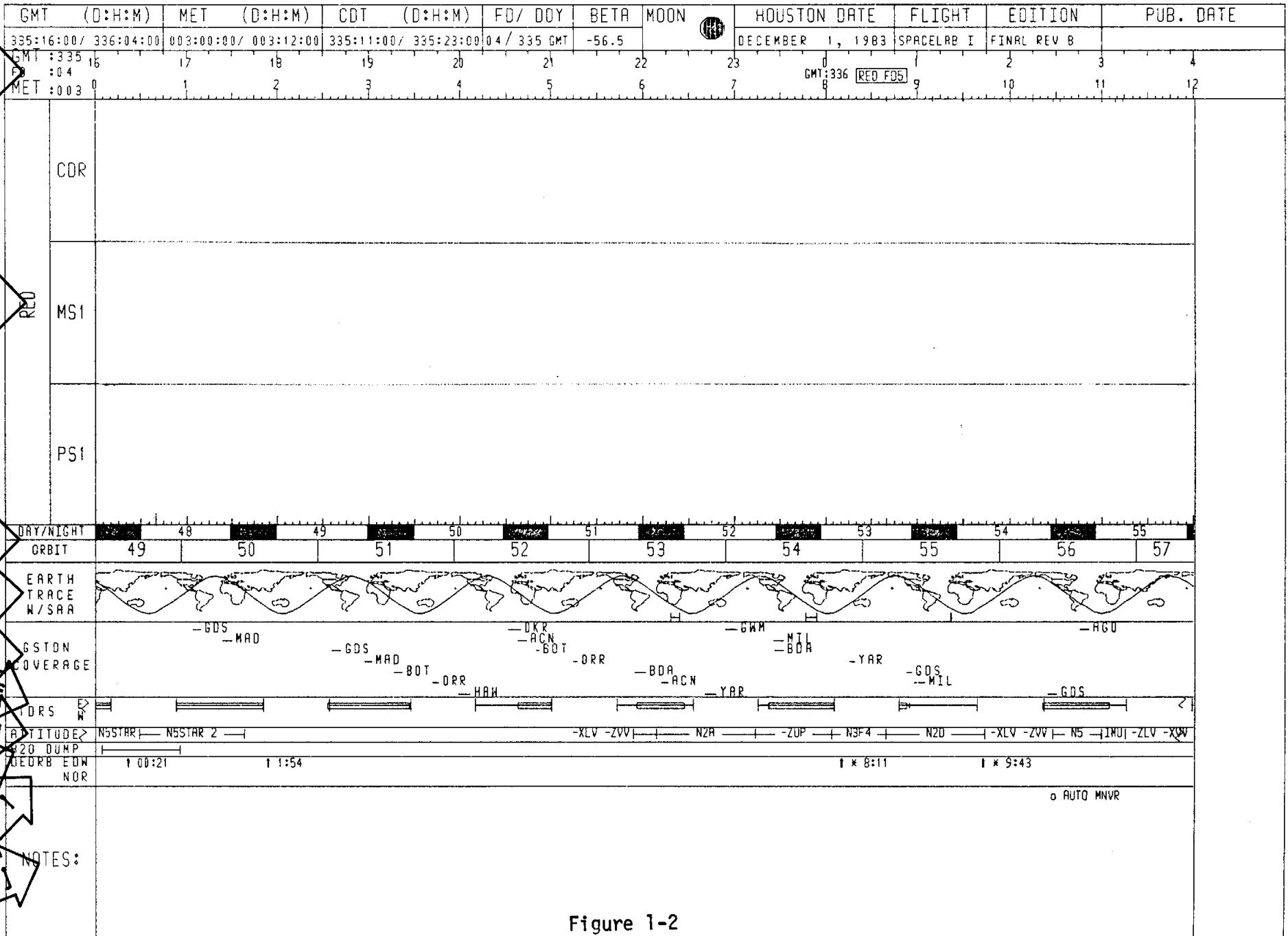


Figure 1-2
1-4

Blue Team consists of the pilot (PLT), mission specialist 2 (MS2), and payload specialist 2 (PS2). Each team member has a column of the format where his activities are scheduled.

c. DAY/NIGHT and ORBIT:

1) Day/Night - The orbital day/night intervals are delineated with black bars indicating when the Orbiter is in darkness.

2) Orbit - Indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the Orbiter crosses the Earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this column starting with Orbit 1 for launch.

d. EARTH TRACE W/SAA: This is a display of the ground track of the Orbiter and those time periods when it passes through the South Atlantic Anomaly (SAA). (Space has been provided for the SAA, but the current trajectory generator does not provide the SAA indication. SAA will be generated by the supertape provided by DSAD and will appear in subsequent CAP documents.)

e. GSTDN COVERAGE: S-Band coverage times are shown for each of the STDN sites.

f. TDRS E & W: The Tracking and Data Relay Satellite will be the primary method of spacecraft coverage, supplemented by some GSTDN coverage. This band indicates line of sight to the satellite with an enclosed bar indicating Ku-Band coverage.

g. ATTITUDE: The current attitude of the vehicle is identified in this area; details are in Table 11-5.

h. H2O DUMP: The water dumps will be identified in this area.

i. DEORBIT OPP: The time of ignition (TIG) for deorbit with landing at Edwards or Northrup. An asterisk signifies the landing would be in darkness.

j. NOTES AREA: Activity names and model numbers that cannot fit in the crew bands because of size limitations will drop into this band with an accompanying symbol to indicate which crewman the item is scheduled against. CAP notes will also go here.

3. Detailed Level Timeline (5-hr timespan)

The detailed pages have been established for each team; therefore, there will be two pages for each hour of time. When the CAP is opened, the Red Team will be displayed on the left page and the Blue Team will be displayed on the right page. Both pages will use the same format and the only difference will be the crewman identifiers at the top of each column. To eliminate confusion, the teams will always be displayed on the same page, either left or right.

The following letters (a-i) reference those highlighted in Figure 1-3.

- a. DAY/NIGHT CYCLE: In this column a solid bar indicates the period when the Orbiter and Earth are in darkness. A slashed line indicates when the Orbiter is in daylight but the Earth beneath the Orbiter is still in darkness (terminator).
- b. SOUTH ATLANTIC ANOMALY (SAA): This bar defines those periods when the Orbiter passes through the SAA. The SAA will appear in later CAP documents.
- c. MET TIMESCALE: This format is a 5-hour format with 5-minute tick marks on the vertical timescale referenced to Mission Elapsed Time (MET) with liftoff occurring at 00/00.00.00.
- d. ORBIT: Indicates which orbit the spacecraft is in by numerical sequence. Orbit 1 begins at liftoff and subsequent orbits start when the Orbiter crosses the equator at the ascending node.
- e. TDRS COVERAGE: This column indicates when the TDRS satellite is available for use. An enclosed bar indicates Ku-Band coverage.
- f. GSTDN: This column indicates the coverage times of the STDN sites.
- g. ATTITUDE: Orbiter attitude is shown here.
- h. CREWMAN COLUMNS: The activities for each crewman are scheduled in this area. Each team will have its own page. The page shown is for the RED team. A page for the BLUE team will be the same with only the crewmen's titles changed.
- i. MCC COLUMN: Any uplinks, commands, or updates required for Orbiter operations will be scheduled in this column at the appropriate time.

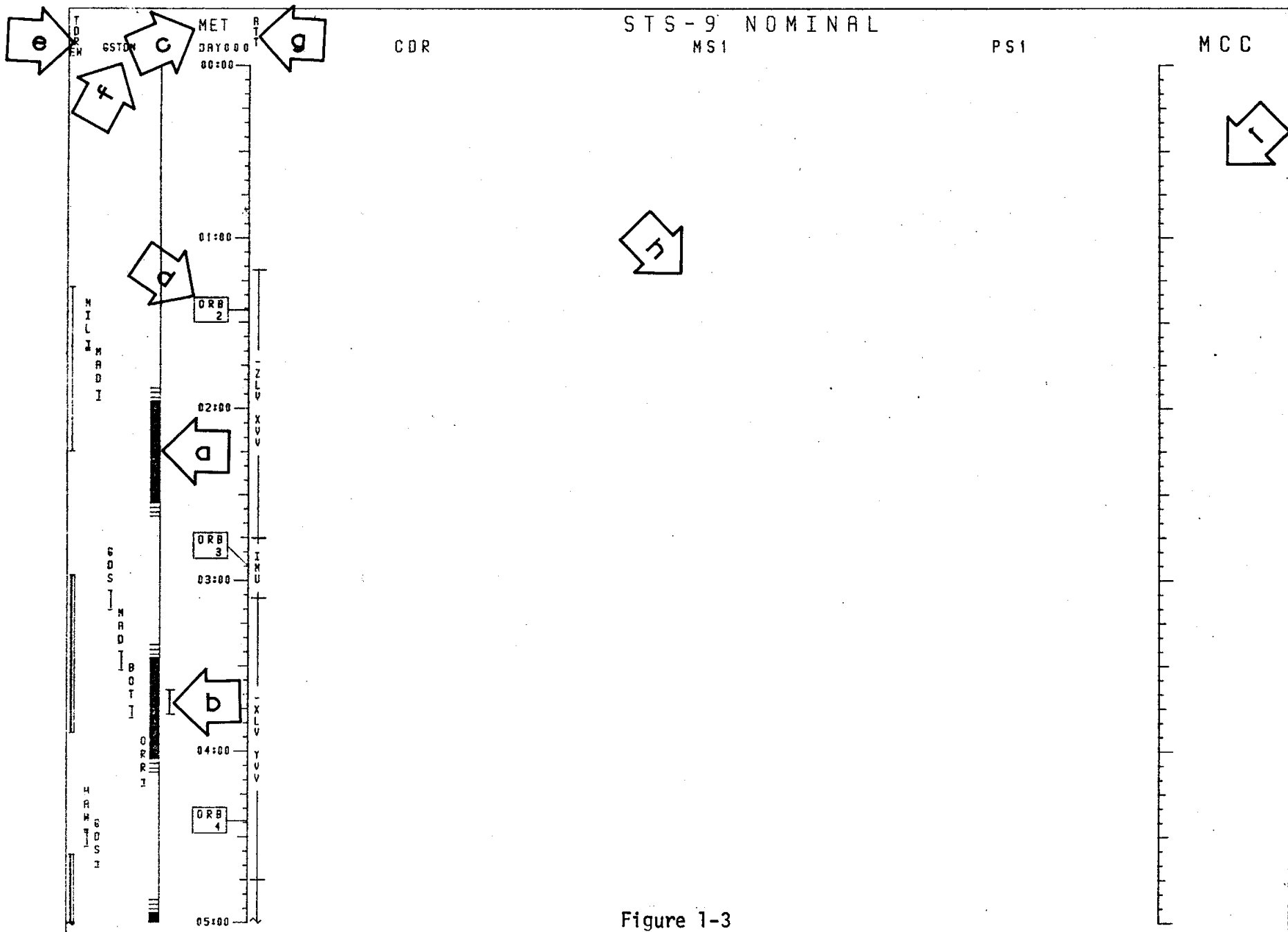


Figure 1-3

TABLE 1-1
DAP A CONFIGURATIONS

	A1	A2	A3	A4	A5	A6	A7	A8
<u>TRANSLATION</u>								
PULSE ft/sec	0.1	0.1	0.1	0.1	0.1	0.1	0.25	0.25
<u>ROTATION</u>								
DSC RT NORM °/sec	0.2	0.4	0.2	0.2	0.4	0.2	0.8	0.2
VERN °/sec	0.2	0.4	0.2	.008	0.2	0.2	0.25	0.2
PULSE NORM °/sec	0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.05
VERN °/sec	0.01	0.01	0.01	0.01	0.2	0.01	0.01	0.01
COMP NORM °/sec	0.0	0.0	0.0	0.0	0.0	0.0	0	0
VERN °/sec	0.0	0.0	0.0	0.0	0.0	0.0	0	0
<u>DEADBAND</u>								
ATT NORM ⁰	5.0	1.0	5.0	1.0	5.0	5.0	0.2	1.0
VERN ⁰	1.0	1.0	1.0	0.07	1.0	1.0	0.10	1.0
RATE NORM °/sec	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
VERN °/sec	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01
<u>JET OPT</u>								
P	1	1	3	1	1	3	1	1
Y	1	1	3	3	1	3	1	1
<u>CNTL ACCEL</u>								
	0	0	0	0	0	0	0	0

TABLE 1-2
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	0.02	0.02	0.02	0.02
<u>ROTATION</u>									
DSC RT									
NORM °/sec	0.5	0.2	0.2	0.16	0.2	0.5	TBS	0.2	0.067
VERN °/sec	0.2	0.2	0.2	0.008	0.16	TBS	0.075	0.016	0.067
PULSE									
NORM °/sec	0.04	0.04	0.04	0.04	0.04	0.8	0.04	0.04	0.04
VERN °/sec	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
COMP									
NORM °/sec	0.0	0.00	0.0	0.0	0.0	0	0	0	0
VERN °/sec	0.0	0.00	0.00	0.0	0.0	0	0	0	0
<u>DEADBAND</u>									
ATT									
NORM ⁰	3.0	3.0	3.0	0.3	3.0	3.0	10.0	3.0	3.0
VERN ⁰	1.0	1.0	1.0	0.1	0.033	2.5	0.1	0.03	1.0
RATE									
NORM °/sec	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
VERN °/sec	0.02	0.02	0.02	0.01	0.02	0.02	0.095	0.02	0.02
<u>JET OPT</u>									
P	1	3	1	1	3	1	1	1	1
Y	1	3	1	3	3	1	1	1	1
<u>CNTL ACCEL</u>									
	0	0	0	0	0	0	0	0	0

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SPACELAB 1 OVERVIEW

SPACELAB 1
OVERVIEW

FLIGHT STS-9										EDITION FINAL REV B										PUB. DATE 11/10/83									
MET:000										RED										BLU									
POST INSERTION										PSA										SLEEP									
PSA										SLEEP										PSA									
H/O										H/O										H/O									
13										11										101									
102										03										28									
201										PSA										PSA									
BLOOD										BLOOD										BLOOD									
DAY/NIGHT										DAY/NIGHT										DAY/NIGHT									
ORBIT										ORBIT										ORBIT									
KV BAND										KV BAND										KV BAND									
ATT										ATT										ATT									
MET:001										RED										BLU									
PSA										SLEEP										SLEEP									
PSA										SLEEP										SLEEP									
H/O										H/O										H/O									
D/P										D/P										D/P									
SAL										SAL										SAL									
11										02										101									
201										28										201									
300										PSA										PSA									
BLOOD										BLOOD										BLOOD									
DAY/NIGHT										DAY/NIGHT										DAY/NIGHT									
ORBIT										ORBIT										ORBIT									
KV BAND										KV BAND										KV BAND									
ATT										ATT										ATT									
MET:002										RED										BLU									
PSA										SLEEP										SLEEP									
PSA										SLEEP										SLEEP									
H/O										H/O										H/O									
D/P										D/P										D/P									
IMU										IMU										IMU									
02										02										03									
28										201										PSA									
BLOOD										BLOOD										BLOOD									
DAY/NIGHT										DAY/NIGHT										DAY/NIGHT									
ORBIT										ORBIT										ORBIT									
KV BAND										KV BAND										KV BAND									
ATT										ATT										ATT									
MET:003										RED										BLU									
PSA										SLEEP										SLEEP									
PSA										SLEEP										SLEEP									
H/O										H/O										H/O									
D/P										D/P										D/P									
IMU										IMU										IMU									
02										03										03									
102										329										25									
300										03										03									
03										PSA										PSA									
BLOOD										BLOOD										BLOOD									
DAY/NIGHT										DAY/NIGHT										DAY/NIGHT									
ORBIT										ORBIT										ORBIT									
KV BAND										KV BAND										KV BAND									
ATT										ATT										ATT									
MET:004										RED										BLU									
PSA										SLEEP										SLEEP									
PSA										SLEEP										SLEEP									
H/O										H/O										H/O									
D/P										D/P										D/P									
IMU										IMU										IMU									
33										11										329									
03										SAL										PSA									
BLOOD										BLOOD										BLOOD									
DAY/NIGHT										DAY/NIGHT										DAY/NIGHT									
ORBIT										ORBIT										ORBIT									
KV BAND										KV BAND										KV BAND									
ATT										ATT										ATT									

FLIGHT STS-9

EDITION FINAL REV B

PUB. DATE 11/10/83

MET:005	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23						
RED	PSA	SLEEP										PSA	H/O	SAL	I M U	SAL	201	SAL	28	02 03	101	300	SAL	300	SAL	03	H/O	PSA		
BLU	I M U	SAL	02 03	SAL	02 03	28	SAL	102	SAL				H/O	PSA	SLEEP										PSA	H/O	SAL	I M U	T R I M	05
DAY/NIGHT	[Timeline with day/night indicators]																													
DRBT	[Timeline with DRBT indicators]																													
KU BAND	[Timeline with KU BAND indicators]																													
ATT	[Timeline with ATT indicators]																													

MET:006	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
RED	PSA	SLEEP										PSA	H/O	D/P	05	I M U	102	300	22	28	339	339	07	101	H/O	102	PSA
BLU	SAL	02 03	3 2 3	102	104	02 03	3 2 3	H/O	PSA	PSA	SLEEP										PSA	H/O	102				
DAY/NIGHT	[Timeline with day/night indicators]																										
DRBT	[Timeline with DRBT indicators]																										
KU BAND	[Timeline with KU BAND indicators]																										
ATT	[Timeline with ATT indicators]																										

MET:007	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
RED	PSA	SLEEP										102	PSA	H/O	D/P	I M U	300	101	28	201	FCS C/O			I M U	119	12 03	
BLU	I M U	33	03 19	SAL	23			102	SAL	H/O	PSA	SLEEP										PSA	BLOOD	PSA			
DAY/NIGHT	[Timeline with day/night indicators]																										
DRBT	[Timeline with DRBT indicators]																										
KU BAND	[Timeline with KU BAND indicators]																										
ATT	[Timeline with ATT indicators]																										

MET:008	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
RED	H/O	PSA	SLEEP										PSA	H/O	P D R A C T	SL DEACT	MEAL	CABIN STON	DEORBIT PREP								
BLU	H/O	D/P	CABIN STON	28	23	CABIN STON			02 23	I M U	11 02	CABIN STON	H/O	PSA	SLEEP										PSA	MEAL	DEORBIT PREP
DAY/NIGHT	[Timeline with day/night indicators]																										
DRBT	[Timeline with DRBT indicators]																										
KU BAND	[Timeline with KU BAND indicators]																										
ATT	[Timeline with ATT indicators]																										

MET:009	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
RED	[Empty row]																										
BLU	[Empty row]																										
DAY/NIGHT	[Timeline with day/night indicators]																										
DRBT	[Timeline with DRBT indicators]																										
KU BAND	[Timeline with KU BAND indicators]																										
ATT	[Timeline with ATT indicators]																										

27
1130
12

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SUMMARY TIMELINE

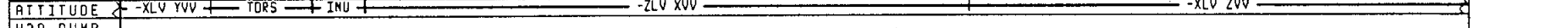
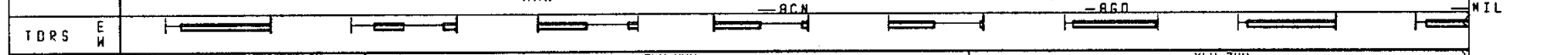
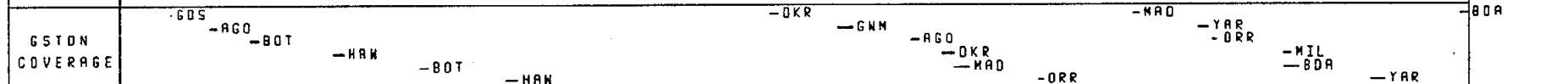
SUMMARY
TIMELINE

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
333:04:00 / 333:16:00	000:12:00 / 001:00:00	332:22:00 / 333:10:00	/ 333 GMT	-44.2	●	NOVEMBER 28, 1983	STS-9	FINAL REV B	11/10/83

GMT : 333	4	5	6	7	8	9	10	11	12	13	14	15	16
FD													
MET : 000	12	13	14	15	16	17	18	19	20	21	22	23	0

RED	CDR	MESSAGE REVIEW	H/O	AUTO MNRV R				25F1CREW		LUNCH		ECLISS C/O		AUTO MNRV R				MEAL PREP	H/O	EXERCISE		
	MS1	MESSAGE REVIEW	H/O	13F1-CAL	D/P	TV10	D/P	102-F03	N3MCFOT2	28-F1	TV11	201-DAY0	LUNCH	201-DAY0		201-DAY0	A/V TAPE	201-DAY0	BLOOD-MK	H/O	201-DAY0	EXERCISE
	PS1	MESSAGE REVIEW	H/O	D/P	102-F06B			N101	102-F03	N3MCFOT2	N1C/F0F01	28-F1	TV11	201-DAY0	LUNCH	201-DAY0	201-DAY0	201-DAY0	201-DAY0	3B-F1	BLOOD-MK	201-DAY0

DAY/NIGHT													
ORBIT	9	10	11	12	13	14	15	16					



H2O DUMP
DEORB EDM
NOR

NOTES:

- 332/333 ● AFT STATION
- N2BCHF16 ● CHANGEOUT

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
333:04:00/ 333:16:00	000:12:00/ 001:00:00	332:22:00/ 333:10:00	/ 333 GMT	-44.2	●	NOVEMBER 28, 1983	STS-9	FINAL REV 8	11/10/83						
GMT : 333	4	5	6	7	8	9	10	11	12	13	14	15	16		
FD											BLUE FD2				
MET : 000	12	13	14	15	16	17	18	19	20	21	22	23	0		
BLUE	PLT	PSA	H/O	MEAL	SR RPT URST	MEAL	PSA	SLEEP				ME S I R E M	L U N A R H P R E P	B R E A K F A S T	H/O
	MS2	PSA	H/O	MEAL	SR RPT URST	MEAL	PSA	SLEEP				PSA	BLOOD-WK	H/O	BLOOD-WK
	PS2	PSA	H/O	MEAL	SR RPT URST	MEAL	PSA	SLEEP				PSA	BLOOD-WK		
DAY/NIGHT	[Day/Night Cycle]														
ORBIT	9 10 11 12 13 14 15 16														
EARTH TRACE	[Earth Trace Diagram]														
GSTDN COVERAGE	-GDS -AGO -BOT -HAW -BOT -HAW -DCR -GWN -AGO -DKR -MAD -YAR -ORR -MIL -BOR -YAR														
TDRS E W	[TDRS Coverage Diagram]														
ATTITUDE	-XLV YVV -TDRS -INU -ZLV XVV -XLV ZVV														
H2O DUMP															
DEDRB EDW NOR															
NOTES:															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
333:16:00 / 334:04:00	001:00:00 / 001:12:00	333:10:00 / 333:22:00	/ 333 GMT	-46.6	●	NOVEMBER 29, 1983	STS-9	FINAL REV B	11/10/83						
GMT : 333 16	17	18	19	20	21	22	23	0	1	2	3	4			
FD								GMT: 334		RED FD3					
MET : 001 0	1	2	3	4	5	6	7	8	9	10	11	12			
RED	CDR	EXERCISES STEP TOUR ST	MEAL	PSA	SLEEP				MESSAGE REVIEW	LUNCH PREP	BOOKING HOURS	H/O	AR UD TT O M N V R	1 6 M M S E T U P	S A M P L E S
	MSI	EXERCISES STEP TOUR ST	MEAL	PSA	SLEEP				MESSAGE REVIEW	LUNCH PREP	BOOKING HOURS	H/O	D/P	SAL OPS	
	PSI	PSA STEP TOUR ST	MEAL	PSA	SLEEP				MESSAGE REVIEW	LUNCH PREP	BOOKING HOURS	H/O	D/P	G A S S A M P L E S	
DAY/NIGHT	[Day/Night Cycle: Day, Night, Day, Night, Day, Night, Day, Night, Day, Night, Day, Night, Day]														
ORBIT	17	18	19	20	21	22	23	24							
EARTH TRACE	[Earth Trace Map]														
GSTON COVERAGE	MIL -BDA	-GDS -MAD	-GDS -MAD	-ORR -HAW	-DKR -RCN	-DKR -RCN	-YAR -GWN	-GWN -GDS -MIL	-BDA -MIL	-GDS -AGO					
TDRS	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]	[TDRS Coverage]			
ATTITUDE	-XLV ZVV	WAKE			-ZLV -XVV		TDRS		-ZLV -XVV		IMU	COLD TEST			
H2O DUMP															
DEDRB EDW	! 00:40	! 2:17													
NOR	! 00:41	! 2:14													
NOTES:															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
333:16:00 / 334:04:00	001:00:00 / 001:12:00	333:10:00 / 333:22:00	/ 333 GMT	-46.6	☉	NOVEMBER 29, 1983	STS-9	FINAL REV B	11/10/83				
GMT : 333	16	17	18	19	20	21	22	23	0	1	2	3	4
FD									GMT: 334				
MET : 001	0	1	2	3	4	5	6	7	8	9	10	11	12
BLUE	PLT	GEN SSKA				LUNCH					MEAL PREP 35MM CAMR	AUTO MNVR	H/O EXERCISE
	MS2	BLOOD-WK	MEAL	D/P	N104	N104	102-F05	LUNCH	102-F03	N3F04C	TEMP MERS	102-F04	H/O EXERCISE
	PS2	BLOOD-WK	MEAL	D/P	N104	R/V TAPE	N104	102-F05	R/V TAPE	LUNCH	102-F03	102-F04	H/O PSR
DAY/NIGHT													
ORBIT	17	18	19	20	21	22	23	24					
EARTH TRACE													
GSTDN COVERAGE	MIL -BDA	-GDS -NAD		-GDS -MAD	-ORR -HAW	-DKR -ACN -BOT	-ORR	-DKR -ACN	-YAR -GWM	-GWM -GOS -MIL			-GDS -AGO
TORS													
ATTITUDE	-XLV ZVV	WAKE				-ZLV -XVV			TORS		-ZLV -XVV		IMU - COLD TEST
H2O DUMP													
DECRB EDW	↑ 00:40		↑ 2:17									↑ * 10:02	
NOR	↑ 00:41		↑ 2:14							↑ * 8:32		↑ * 10:04	
NOTES:	<ul style="list-style-type: none"> • VFI RCDR OFF • AUTO MNVR • DTD 1003 • DTD 1003 • AUTO MNVR • DTD 1003 • IMU ALIGN • AUTO MNVR • IECM • DTD 0775 • DTD 1007 • DTD 1003 • DTD 0775 												

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE						
334:04:00 / 334:16:00	001:12:00 / 002:00:00	333:22:00 / 334:10:00	/ 334 GMT	-49.1	☉	NOVEMBER 29, 1983	STS-9	FINAL REV B	11/10/83						
GMT : 334	4	5	6	7	8	9	10	11	12	13	14	15	16		
FD	12	13	14	15	16	17	18	19	20	21	22	23	0		
MET : 001										BLUE FD3					
BLUE	PLT	EXERCISE STAP URST	MEAL	PSR	SLEEP				MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O			
	MS2	EXERCISE STAP URST	MEAL	PSR	SLEEP				102-F04	MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	102-F03
	PS2	PSR STAP URST	MEAL	PSR	SLEEP				102-F04	MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	102-F03
DAY/NIGHT	[Day/Night Cycle]														
ORBIT	25	26	27	28	29	30	31	32	33						
EARTH TRACE	[Earth Trace Map]														
GSTON COVERAGE	-AGO -BOT -HAW -BOT -HAW -ACN -ACN -DOKR -MAD -GMM -AGO -DOKR -MAD -ORR -AGO -MAD -YAR ORR -MIL -80R														
TORS E H	[TORS E H Diagram]														
ATTITUDE	COLD TEST														
H2O DUMP	[H2O DUMP Diagram]														
DEORB EDW NOR	[DEORB EDW NOR Diagram]														
NOTES:															

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE							
335:04:00 / 335:16:00	002:12:00 / 003:00:00	334:22:00 / 335:10:00	/ 335 GMT	-54.0		NOVEMBER 30, 1983	STS-9	FINAL REV B	11/10/83							
GMT : 335	5	6	7	8	9	10	11	12	13	14	15	16				
FD																
MET : 002	12	13	14	15	16	17	18	19	20	21	22	23				
CDR	AUTO MNVR		DRB TAPE	LUNCH	AUTO MNVR	HTR CONFIG	AUTO MNVR	AUTO MNVR	DRB TAPE	MEAL PREP	AUTO MNVR	MEAL	STP TOURIST			
MS1	N2E1F02	N2F5AB/6	N2F07/7	N3F01B	307A	N2F0C	28-F1	TV11	201-DY23	A/V TAPE	TV19	H/O	EXERCISE	TV24	STP TOURIST	
PS1	GRS SEEP N2 N3 OUTT03 314	N3F4B/4B	N3F4B/4B	315A	A/V TAPE	TV10	N101	N3F06	28-F1	201-DY23	301	301F1	H/O	PSA	TV24	STP TOURIST
DAY/NIGHT	DRBIT		41	42	43	44	45	46	47	48	49					
EARTH TRACE																
GSTDN COVERAGE	-BOT -HRN -BOT -ACN -ACN -DKR -MAN -GMH -AGO -OKR -MAD -ORR -AGO -MAN -YAR -MIL -BDR -YAR -MIL -MIL -BDR															
TORS E M																
ATTITUDE	N2A N2A 2 N3F1B E13 N2H N5STAR E13 N5STAR INU N5STAR															
H2O DUMP																
DEORB EOW NOR																
NOTES:	<ul style="list-style-type: none"> ○ AUTO MNVR ● N28CHF16 ■ CHANGEOUT 															

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
335:16:00 / 336:04:00		003:00:00 / 003:12:00		335:10:00 / 335:22:00		/ 335 GMT	-56.5		DECEMBER 1, 1983	STS-9	FINAL REV B	11/10/83			
GMT : 335		16	17	18	19	20	21	22	23	0	1	2	3	4	
FD										GMT:336	RF05				
MET : 003		0	1	2	3	4	5	6	7	8	9	10	11	12	
RED	CDR	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	AUTO MNVR	
	MS1	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	
	PS1	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	3078
DAY/NIGHT	ORBIT		49	50	51	52	53	54	55	56	57				
EARTH TRACE															
GSTDN COVERAGE	-GDS -HAD -GDS -KAD -BOT -DKR -ACN -BOT -ORR -BDA -ACN -YAR -GDS -MIL -GWN -MIL -BDA -YAR -GDS -AGD														
TORS E W															
ATTITUDE	N5STAR - N5STAR 2 - E23STAR - N2A - E23STAR - ZUP 4 - N2A - N2A 2 - N2A 3 - XLV - ZVV - N5STAR IMU - ZLV - XVV														
H2O OUMP															
DEDRB EDW	↑ 00:21		↑ 1:54						↑ 8:11		↑ 9:43				
NOR	↑ 00:23								↑ 8:13		↑ 9:41				
NOTES:	○ AUTO MNVR ▲ 33F1/4IN ▲ NSF1CREW														

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
395:16:00 / 336:04:00	003:00:00 / 003:12:00	335:10:00 / 335:22:00	/ 335 GMT	-56.5		DECEMBER 1, 1983	STS-9	FINAL REV B	11/10/83								
GMT : 335 16	17	18	19	20	21	22	23	0	1	2	3	4					
FD								GMT:336									
MET : 003 0	1	2	3	4	5	6	7	8	9	10	11	12					
PLT	AUTO MNVVR	AUTO MNVVR	AUTO MNVVR	AUTO MNVVR	AUTO MNVVR	AUTO MNVVR	LUNCH	AUTO MNVVR	AUTO MNVVR	AUTO MNVVR	ORBIT TAPE	H/O	EXERCISE	MEAL			
MS2	D/P	N55CREW	LUNCH	N2E82F04	A/V TAPE	20F6N3ZU	A/V TAPE	LUNCH	N2F06/5B	N2F9A/8M	N2F8A	A/V TAPE	H/O	EXERCISE	MEAL		
PS2	D/P	3006	N33HST06	311B	N2E82F04	311F1	N3F2E/2E	31-F1	N3F04B	313B	N3F2A/2B	315B	N3F06	319	H/O	PSA	MEAL
DRY/NIGHT																	
ORBIT	49	50	51	52	53	54	55	56	57								
EARTH TRACE																	
GSTON COVERAGE	-GDS -MAD -GDS -MAD -BOT -ORR -HAW -BDR -ACN -YAP -GDS -MIL -BDR -ORR -GDS -MIL -GDS																
TDRS E H	[Timeline of TDRS coverage]																
ATTITUDE	NSSTAR NSSTAR 2 E23STAR N2A E23STAR -ZUP 4 N2A N2A 2 N2A 3 -XLV -ZVV NSSTAR IMU -ZLV -XVV																
H2O DUMP	[Timeline of H2O dump events]																
DEORB EDW NOR	[Timeline of deorbit events]																
NOTES:	<ul style="list-style-type: none"> • N3TCF04 • N5MCREW • N2BCHF16 • N2BCHF16 																

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE												
336:16:00 / 337:04:00	004:00:00 / 004:12:00	336:10:00 / 336:22:00	/ 336 GMT	-61.3		DECEMBER 2, 1983	STS-9	FINAL REV B	11/10/83												
GMT: 336 16	17	18	19	20	21	22	23	0	1	2	3	4									
FD								GMT: 337	RED FDG												
MET: 004	0	1	2	3	4	5	6	7	8	9	10	11	12								
RED	CDR	MEAL	PSR	SLEEP				MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	AUTO	
	MSI	MEAL	PSR	SLEEP				MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	D/P									
	PSI	MEAL	PSR	SLEEP				MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	D/P									
DAY/NIGHT	[Day/Night Cycle]																				
ORBIT	65	66	67	68	69	70	71	72	73												
EARTH TRACE	[Earth Trace Diagram]																				
GSTON COVERAGE	-GDS -MAD -HAW -DOKR -ACN -YAR -GMM -MIL -BDA -GDS -AGO																				
TDRS	[TDRS Coverage Diagram]																				
ATTITUDE	TDRS IMU -XLV ZVV + -XLV -ZVV N2A TDRS -ZON N32F 2 N2A NTF014 N5STAR N5STAR NTF013 N5STAR IMU -ZLV -XV																				
H2O DUMP	[H2O Dump Diagram]																				
DEORB EDW	↑ 00:11 1 1:44 ↑ * 8:01 ↑ * 9:33																				
NOR	↑ 00:13 ↑ * 8:03 ↑ * 09:35																				
NOTES:	<p>▲ N2F013A ● 33F1/4IN</p> <p>▲ N2F013A</p>																				

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
336:16:00 / 337:04:00	004:00:00 / 004:12:00	336:10:00 / 336:22:00	/ 336 GMT	-61.3	☉	DECEMBER 2, 1983	STS-9	FINAL REV B	11/10/83			
GMT : 336 16	17	18	19	20	21	22	23	0	1	2	3	4
FD								GMT:337				
MET : 004 0	1	2	3	4	5	6	7	8	9	10	11	12
PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT	PLT
MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2	MS2
PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2	PS2
DRY/NIGHT												
ORBIT	65	66	67	68	69	70	71	72	73			
EARTH TRACE												
GSTON COVERAGE	-GDS -MAD -HAW -GDS -MAD -BOT -ORR -HAW -DKR -RCN -YAR -ORR -BDA -RCN -YAR -GMM -MIL -BDA -GDS -MIL -BDA -GDS -MIL -BDA											
TDRS E M												
ATTITUDE	TDRS IMU -XLV ZVV -XLV -ZVV N2A TDRS -ZDN N32F 2 N2A N1F014 N5STAR N5STAR N1F013 N5STAR IMU -ZLV -XVV											
H2O DUMP												
DEORB EDW NOR	↑ 00:11 ↑ 00:13 ↑ 00:14 ↑ 00:15 ↑ 00:16 ↑ 00:17 ↑ 00:18 ↑ 00:19 ↑ 00:20 ↑ 00:21 ↑ 00:22 ↑ 00:23 ↑ 00:24 ↑ 00:25 ↑ 00:26 ↑ 00:27 ↑ 00:28 ↑ 00:29 ↑ 00:30 ↑ 00:31 ↑ 00:32 ↑ 00:33 ↑ 00:34 ↑ 00:35											
NOTES:	<p style="text-align: center;">▲ NSF1CREW ▲ NSF1CREW</p>											

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE																
337:04:00 / 337:16:00	004:12:00 / 005:00:00	336:22:00 / 337:10:00	/ 337 GMT	-63.7		DECEMBER 2, 1983	STS-9	FINAL REV B	11/10/83																
GMT : 337	5	6	7	8	9	10	11	12	13	14	15	16													
FD																									
MET : 004	12	13	14	15	16	17	18	19	20	21	22	23	0												
RED	CDR	AUTO MNRVR	AUTO MNRVR	AUTO MNRVR	RRRRR	RRRRR	RRRRR	RRRRR	LUNCH	AUTO MNRVR	AUTO MNRVR	AIR SASS	S	S	S	MEAL PREP	16MM SETUP	16MM	H/O	EXERCISE	MEAL	SRTPT/URST	MEAL		
	MS1	300-5000	300-5000	300-5000	300-5000	300-5000	300-5000	300-5000	300-5000	16MM/35MM								16MM/35MM	H/O	EXERCISE	MEAL	SRTPT/URST	MEAL		
	PS1																								
DAY/NIGHT																									
ORBIT	73	74	75	76	77	78	79	80	81																
EARTH TRACE																									
GSTON COVERAGE	-BOT	-HAN		-ACN	-GMM		-AGD	-MAD		-ORR	-BDA		-YAR		-MIL	-MAD									
TDRS E M																									
ATTITUDE	-ZLV TDRS	-ZLV -XVV		-ZLV -XVV		-ZLV TDRS																		N2B	
H2O DUMP																									
DEDRB EDW NOR																								22:30	
NOTES:	▲ N28CHF16 ● DTO 602 ▲ 340 ▲ 321A ○ CONFIG FOR PCS																								

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE					
337:04:00 / 337:16:00	004:12:00 / 005:00:00	336:22:00 / 337:10:00	/ 337 GMT	-63.7	☾	DECEMBER 2, 1983	STS-9	FINAL REV B	11/10/83					
GMT : 337	5	6	7	8	9	10	11	12	13	14	15	16		
FD									BLUE FDG					
MET : 004	12	13	14	15	16	17	18	19	20	21	22	23	0	
BLUE	PLT	M E A L S T R A P P S S A	SLEEP					MESSAGE R E V I E W	L U N C H P R E P	B R E A K F A S T	H / O	S L C O D E A B S	A U T O M N V R	A U T O M N V R
	MS2	M E A L S T R A P P S S A	SLEEP					MESSAGE R E V I E W	L U N C H P R E P	B R E A K F A S T	H / O D / P	N 2 S U N F 9 C	N 2 F 1 0 / 1 2	
	PS2	M E A L S T R A P P S S A	SLEEP					MESSAGE R E V I E W	L U N C H P R E P	B R E A K F A S T	H / O D / P	3 2 0 T V I 3	N 3 F 3 / 2 0	
DAY/NIGHT	[Day/Night Cycle]													
ORBIT	73	74	75	76	77	78	79	80	81					
EARTH TRACE	[Earth Trace Map]													
GSTON COVERAGE	-BOT -HRH -ACN -GMM -RGD -MAD -ORR -BDA -YAR -MIL -MAD													
TDRS E H	[TDRS Coverage]													
ATTITUDE	-ZLV TDRS -ZLV -XVV -ZLV -XVV -ZLV TDRS -ZLV -XVV N2B													
H2O DUMP	[H2O Dump]													
DEORB EDW NOR	[Deorb Edw Nor]													
NOTES:	I 22:30 • N2BCH16 • CHANGEOUT Δ 33F1/4IN													

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE													
337:16:00 / 338:04:00		005:00:00 / 005:12:00		337:10:00 / 337:22:00		/ 337 GMT	-66.1		DECEMBER 3, 1983	STS-9	FINAL REV B	11/10/83													
GMT: 337 16		17		18		19		20		21		22		23		0		2		3		4			
FD																GMT: 338		RED FDZ							
MET: 005 0		1		2		3		4		5		6		7		8		9		10		11		12	
RED	CDR	MEAL	PSA	SLEEP												MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	AUTO MNR	TV ACT	AUTO MNR	AUTO MNR	AUTO MNR	
	MSI	MEAL	PSA	SLEEP												MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	SAL OPS	D/P				
	PSI	MEAL	PSA	SLEEP												MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	300-IGHT	SAL OPS			
DAY/NIGHT																									
ORBIT		81		82		83		84		85		86		87		88		89							
EARTH TRACE																									
GSTON COVERAGE		-GDS -MAD -HAW -GDS -MAD -DKR -BOT -ORR -HAW -DKR -ACN -YAR -BDA -YAR -GMM -MIL -BDA -GOS -MIL -AGO -AGO HAW																							
TDRS E M																									
ATTITUDE		IMU N2A N2A E23 E22 N1F013 E22 N1F014 E22 E22 2 E23 E22 IMU N5																							
H2O DUMP																									
DEORB EDW NOR		00:01 1:34												x 7:50		x 9:22						x 9:52			
NOTES:																									

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FO/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE											
337:16:00 / 338:04:00	005:00:00 / 005:12:00	337:10:00 / 337:22:00	/ 337 GMT	-66.1		DECEMBER 3, 1983	STS-9	FINAL REV B	11/10/83											
GMT: 337 16	17	18	19	20	21	22	23	0	1	2	3	4								
FD								GMT:338												
MET: 005 0	1	2	3	4	5	6	7	8	9	10	11	12								
BLUE	PLT	AUTO MNVR	AUTO MNVR	LUNCH	AUTO MNVR	AUTO MNVR	AUTO MNVR	AUTO MNVR	TV ACT	AUTO MNVR	MEAL PREP	TV SETUP	AUTO MNVR	H/O	EXERCISE	MEAL	STP	TURST		
	MS2	N2F10/12	SAL OPS	SAL OPS	N2F09B	SAL OPS	N2F05A	28-F2	A/V TAPE	LUNCH	102-F03	SAL OPS	SAL OPS	SAL OPS	SAL OPS	H/O	EXERCISE	MEAL	STP	TURST
	PS2	N3F3/20	SAL OPS	SAL OPS	N3F2A/B	LUNCH	N3F1B/4B	LUNCH	28-F2	SAL OPS	102-F03	324A	327B	324A	327B	H/O	PSA	MEAL	STP	TURST
DAY/NIGHT	DRBIT	81	82	83	84	85	86	87	88	89										
EARTH TRACE																				
GSTON COVERAGE	--GDS --MAD --HAW --GDS --MAD --DKR --ORR --HAW --DKR --ACN --YAR --BDA --YAR --GDS --MIL --BDA --GDS --MIL --AGO --HAW																			
TDRS E H																				
ATTITUDE	IMU N2A N2A E23 E22 N1F013 E22 N1F014 E22 E22 2 E23 E22 IMU N5																			
H2O DUMP	DEDRB EDW 00:01 11:34 17:50 19:22 NOR 00:03 19:52																			
NOTES:	AUTO MNVR • N2BCHF16 ▲ 324A																			

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETR	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
338:04:00 / 338:16:00	005:12:00 / 006:00:00	337:22:00 / 338:10:00	/ 338 GMT	-68.4	●	DECEMBER 3, 1983	STS-9	FINAL REV B	11/10/83				
GMT : 338	4	5	6	7	8	9	10	11	12	13	14	15	16
FD													
MET : 005	12	13	14	15	16	17	18	19	20	21	22	23	0
COR													
RED													
MSI													
PSI													
DAY/NIGHT													
ORBIT	89	90	91	92	93	94	95	96	97				
EARTH TRACE													
GSTON COVERAGE	-BOT -HAM -RCN -GWM -AGO -MAD -ORR -BDA -YAR -MIL -MAD												
TDRS	E W												
ATTITUDE	N5 E22 E22 2 TDRS N2A E34 N5 E34 E22 E22 E22 IMU TRIM N5												
H2O DUMP													
DEORB EDW													
NOR													
NOTES:	○ AUTO MNVR ● N2BCHF16 ○ AUTO MNVR ● N2BCHF16 ▲ 321B ⊙ CHANGEOUT												

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE											
338:04:00/ 338:16:00		005:12:00/ 006:00:00		337:22:00/ 338:10:00		/ 338 GMT	-68.4	●	DECEMBER 3, 1983	STS-9	FINAL REV B	11/10/83											
GMT : 338	4	5	6	7	8	9	10	11	12	13	14	15	16										
FD																							
MET : 005	12	13	14	15	16	17	18	19	20	21	22	23	0										
BLUE	PLT	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O DIRECT	PWR UP GR B	AUTO MNVR	TRIM BURN	AUTO MNVR	PWR ON GR B					
	MS2	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O		D/P	TRIM BURN							
	PS2	MEAL	PSA	SLEEP						MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	SAL OPS	D/P	TRIM BURN							
DAY/NIGHT													ORBIT		89	90	91	92	93	94	95	96	97
EARTH TRACE																							
GSTDN COVERAGE													--BOT --HAW --ACN --GWM --AGD --MAD --ORR --BDA --YAR --MIL --MAD --AGD --DKR --HAW --BDA --YAR --MTI										
TDRS													E H =====										
ATTITUDE													N5 E22 E22 21 TDRS N2A E34 N5 E34 E22 E22 E22 IMU TRIM N5										
H2O DUMP													=====										
DEORB EDW													23:50#										
NOR													↑ 22:19 23:52#										
NOTES:													▲ 3248										

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE										
338:16:00 / 339:04:00		006:00:00 / 006:12:00		338:10:00 / 338:22:00		/ 338 GMT	-70.6	●	DECEMBER 4, 1983	STS-9	FINAL REV B	11/10/83										
GMT : 338	16	17	18	19	20	21	22	23	0	1	2	3	4									
FD									GMT: 339	RED FDR												
MET : 006	0	1	2	3	4	5	6	7	8	9	10	11	12									
RED	CDR	MEAL	PSA	SLEEP					MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	AUTO MNUVR	ROTOR	TV ACT	TV 02	AUTO MNUVR	TV 02	AUTO MNUVR	TV 02	AUTO MNUVR	
	MS1	MEAL	PSA	SLEEP					MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	D/P	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02
	PS1	MEAL	PSA	SLEEP					MESSAGE REVIEW	LUNCH	BREAKFAST	H/O	D/P	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02	TV 02
DAY/NIGHT																						
ORBIT	97	98	99	100	101	102	103	104	105													
EARTH TRACE																						
GSTDN COVERAGE																						
TDRS																						
ATTITUDE	N5	E34	E22	E23	N2A	E23	N5	E23	N2C 2	N2C 4	E23	N5	N1F013	N5								
H2O DUMP																						
QEDRB EDW																						
NOR																						
NOTES:	<p>• DTO 1010</p> <p>• DTO 1010</p> <p>• 33F1/4IN</p>																					

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
338:16:00 / 339:04:00	006:00:00 / 006:12:00	338:10:00 / 338:22:00	/ 338 GMT	-70.6		DECEMBER 4, 1983	STS-9	FINAL REV B	11/10/83								
GMT : 338	16	17	18	19	20	21	22	23	GMT:339	0	1	2	3	4			
FD																	
MET : 006	0	1	2	3	4	5	6	7	8	9	10	11	12				
PLT	AUTO MNVR	AUTO MNVR	AUTO MNVR	LUNCH	AUTO MNVR	LUNCH	AUTO MNVR	AUTO MNVR	ORBIT TAPE	TV SETUP	AUTO MNVR	MEAL PREP	AUTO MNVR	H/O	EXERCISE	MEAL	STAPTORST
MS2			LUNCH	N2F09A	TVDB9	102-F05	N104	N2F011			N3F020		H/O	EXERCISE	MEAL	EGRESS TEST	STAPTORST
PS2	3248	SAL OPS		N3F2A/B	323	102-F05	N104	N3F020	A/V TAPE		N2F011		H/O	MEAL	EGRESS TEST	MEAL	TV99
DAY/NIGHT																	
ORBIT	97	98	99	100	101	102	103	104	105								
EARTH TRACE																	
GSTDN COVERAGE	-GDS -MAD -ORR -HAW -GDS -MAD -DKR -ACN -YAR -GWM -BDA -MIL -YAR -GWM -MIL -BDA -GDS -AGO -BOT -HAW																
TORS	E W																
ATTITUDE	N5	E34	E22	E23	N2A	E23	N5	E23	N2C 2	N2C 4	E23	N5	N1F013	N5			
H2O DUMP																	
DEORB EDW	↑ 1:23																
NOR	↑ 6:09 ↑ 7:39 ↑ 7:41 ↑ 9:11																
NOTES:	<ul style="list-style-type: none"> • N2BCHF16 ○ AUTO MNVR • N2F013A • N2BCHF16 ○ AUTO MNVR • N2F013A • DTG 1010 • DTG 1010 																

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE														
339:04:00 / 339:16:00		006:12:00 / 007:00:00		338:22:00 / 339:10:00		/ 339 GMT	-72.7		DECEMBER 4, 1983	STS-9	FINAL REV 8	11/10/83														
GMT : 339		5		6		7		8		9		10		11		12		13		14		15		16		
FD		13		14		15		16		17		18		19		20		21		22		23		0		
MET : 006		12		13		14		15		16		17		18		19		20		21		22		23		
BLUE	PLT	MEAL	PSR	SLEEP										MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	AUTO MNVR								
	MS2	MEAL	PSR	SLEEP										MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	102-F03							
	PS2	MEAL	PSR	SLEEP										MESSAGE REVIEW	LUNCH PREP	BREAKFAST	H/O	D/P	102-F03							
DAY/NIGHT	[Day/Night Cycle]																									
ORBIT	106		107		108		109		110		111		112		113											
EARTH TRACE	[Earth Trace Map]																									
GSTDN COVERAGE	-BOT -HAM -ACN -GMM -AGO -MAD -ORR -BDA -MIL -MAD																									
TDRS E H	-BOT -HAM -ACN -GMM -AGO -MAD -ORR -BDA -MIL -MAD																									
ATTITUDE	IMU -ZLV-XVV TDRS -ZLV-XVV TDRS																									
H2O DUMP																										
DEORB EDW NOR																							23:39		23:41	
NOTES:																										

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
340:04:00 / 340:16:00		007:12:00 / 008:00:00		339:22:00 / 340:10:00		/ 340 GMT	-76.5	●	DECEMBER 5, 1983	STS-9	FINAL REV B	11/10/83			
GMT : 340	4	5	6	7	8	9	10	11	12	13	14	15	16		
FD										BLUE FD9					
MET : 007	12	13	14	15	16	17	18	19	20	21	22	23	24		
BLUE	PLT	MEAL	PSR	SLEEP						PSA	FCS C/D		BREAKFAST	LUNCH PREP	REVIEW
	MS2	MEAL	PSR	SLEEP						PSA	BLOOD-WK	35MM CAMR	BLOOD-WK	BREAKFAST	REVIEW
	PS2	MEAL	PSR	SLEEP						PSA	BLOOD-WK		LUNCH PREP	REVIEW	
DAY/NIGHT															
ORBIT	122	123	124	125	126	127	128	129							
EARTH TRACE															
GSTON COVERAGE	BOT -HAN -ACN -DKR -GWN -AGO -DKR -MAD -ORR -AGO -MAD -YAR -ORR -AAA -MIL -BOR GDS NIL -MAD														
TDRS E M															
ATTITUDE	COOL DOWN IMU -Z SUN IMU -ZDN 2 -N3F4														
H2O DUMP															
DEORB EDW NOR											21:55	23:27			
											21:56	23:29			
NOTES:															

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
340:16:00 / 341:04:00		008:00:00 / 008:12:00		340:10:00 / 340:22:00		/ 340 GMT	-78.0		DECEMBER 6, 1983	STS-9	FINAL REV B	11/10/83			
GMT : 340	16	17	18	19	20	21	22	23	0	1	2	3	4		
FD									GMT:341						
MET : 008	0	1	2	3	4	5	6	7	8	9	10	11	12		
BLUE	PLT	H/O	AUTO MNRV	DRB TAPE	S/LV DATA	AUTO MNRV	AUTO MNRV	DRB TAPE	AUTO MNRV	AUTO MNRV	DRB TAPE	AUTO MNRV	AUTO MNRV	CABIN STOW	MEAL PREP
	MS2	H/O	D/P	CABIN STOW		28-F2		LUNCH	CABIN STOW	A/V TAPE				CZCS DATA	CZCS DATA
	PS2	H/O	D/P	CABIN STOW		28-F2		LUNCH	CABIN STOW	322	A/V TAPE			CABIN STOW	
DAY/NIGHT															
ORBIT		130		131		132		133		134		135		136	137
EARTH TRACE															
GSTON COVERAGE	-GDS -MAD -BOT -DRR -HAN -DKR -BOT -ORR -HAN -BDA -MIL -YAR -GMM -GDS -MIL -BDA -MIL -YAR -GMM -GDS -MIL -RGO -BOT -HAN -BOT														
TDRS E M															
ATTITUDE	E34 — E23 — E34 — E23 — E23 2 — N1F013 — E23 — IMU — TDRS														
H2O DUMP															
DEORB EDW NOR															
NOTES:	5:45 7:16 x 7:18 • N2F013A • N2CFRF15 • N2F013A • N2CFRF15 ▲ N3TCF014														

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FO/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE				
341:04:00 / 341:16:00	008:12:00 / 009:00:00	340:22:00 / 341:10:00	/ 341 GMT	-79.0	☉	DECEMBER 6, 1983	STS-9	FINAL REV B	11/10/83				
GMT : 341	4	5	6	7	8	9	10	11	12	13	14	15	16
FD													
MET : 008	12	13	14	15	16	17	18	19	20	21	22	23	0
RED	CDR	LUNCH PREP BREAKFAST H/O AUTO MNR RD TV ACT	CABIN STOW	CABIN STOW	TV DEACT KUBO STOW	LUNCH	AUTO MNR RAD BY P MEAL PREP	PWR UP GR FCC STORAGE	DEORBIT PREP	ENTRY			
	MS1	LUNCH PREP BREAKFAST H/O PL-DACT	SOUND OPS	SL DEACT	ORBIT TAPE SL DEACT	LUNCH	CABIN STOW	DEORBIT PREP	ENTRY				
	PS1	LUNCH PREP BREAKFAST H/O D/P	TV25 35MM CAMR	SL DEACT	LUNCH	1021 F06 B	CABIN STOW	DEORBIT PREP	ENTRY				
DAY/NIGHT													
ORBIT	138	139	140	141	142	143	144	145					
EARTH TRACE													
GSTON COVERAGE	-HAM -ACN -DKR -GMM -AGO -DKR -MAD -ORR -AGO -MAD -YAR -MIL -BDR -GDS -MAD -MIL -BDR -GOS												
TORS													
ATTITUDE	TORS PTC TRAIL SUN TOP SUN												
H2O DUMP													
DEORB EDM	1 x 21:43 23:15												
NOR	21:44 23:17												
NOTES:	• VFT-6.2 • VFT-6.4 △ N101 ○ SL FIRE SMOKE TEST # DTG 1010 ○ HI LOAD HTR ON ● FES CNTLR CHECK												

GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
341:04:00 / 341:16:00		008:12:00 / 009:00:00		340:22:00 / 341:10:00		/ 341 GMT	-79.0	☉	DECEMBER 6, 1983	STS-9	FINAL REV B	11/10/83	
GMT : 341	4	5	6	7	8	9	10	11	12	13	14	15	16
FD									BLUE FD10				
MET : 008	12	13	14	15	16	17	18	19	20	21	22	23	0
BLUE	PLT	T V S U P P	H/O	PSR	SLEEP				PSR	B R E A K F A S T	MESSAGE REVIEW	DEORBIT PREP	ENTRY
	MS2		H/O	PSR	SLEEP				PSR	B R E A K F A S T	CLEANUP	DEORBIT PREP	ENTRY
	PS2		H/O	PSR	SLEEP				PSR	B R E A K F A S T	MESSAGE REVIEW	DEORBIT PREP	ENTRY
<p style="text-align: center;"><i>9:00</i> <i>8:14</i> <i>10</i></p>													
DAY/NIGHT													
ORBIT	138	139	140	141	142	143	144	145					
EARTH TRACE													
GSTON COVERAGE	-HAW -ACN -ORR -AGO -YAR -MIL -DKR -MAD -BDA -GWM -YAR -GDS -AGO -ORR -NAD -DKR -MIL -BDA -MAD -BDA												
TDRS													
ATTITUDE	TDRS PTC TAIL SUN TOP SUN												
H2O DUMP													
DEORB EDW													
NOR	* 21:43 † 23:15 † 21:44 † 23:17												
NOTES:													

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FO/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
341:16:00 / 342:04:00	009:00:00 / 009:12:00	341:10:00 / 341:22:00	/ 341 GMT	-79.5	●	DECEMBER 7, 1983	STS-9	FINAL REV B	11/10/83
GMT : 341 16	17	18	19	20	21	22	23	0	1
FO								GMT:342	2
MET : 009 0	1	2	3	4	5	6	7	8	9
									10
									11
									12
RED	CDR	LANDING @ 9/00:11							
	MS1								
	PS1								
DAY/NIGHT									
ORBIT	146	147	148	149	150	151	152	153	
EARTH TRACE									
GSTON COVERAGE	GDS -MRO -BOT -ORR -HAW -OKR -ACN	-BOT -ORR	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN	-BDR -MIL -YAR -GNN
TORS	E								
ATTITUDE									
H2O DUMP									
DEORB EDW					↑ 5:30	↑ 7:03			
NOR					↑ 5:33	↑ * 7:05			
NOTES:									

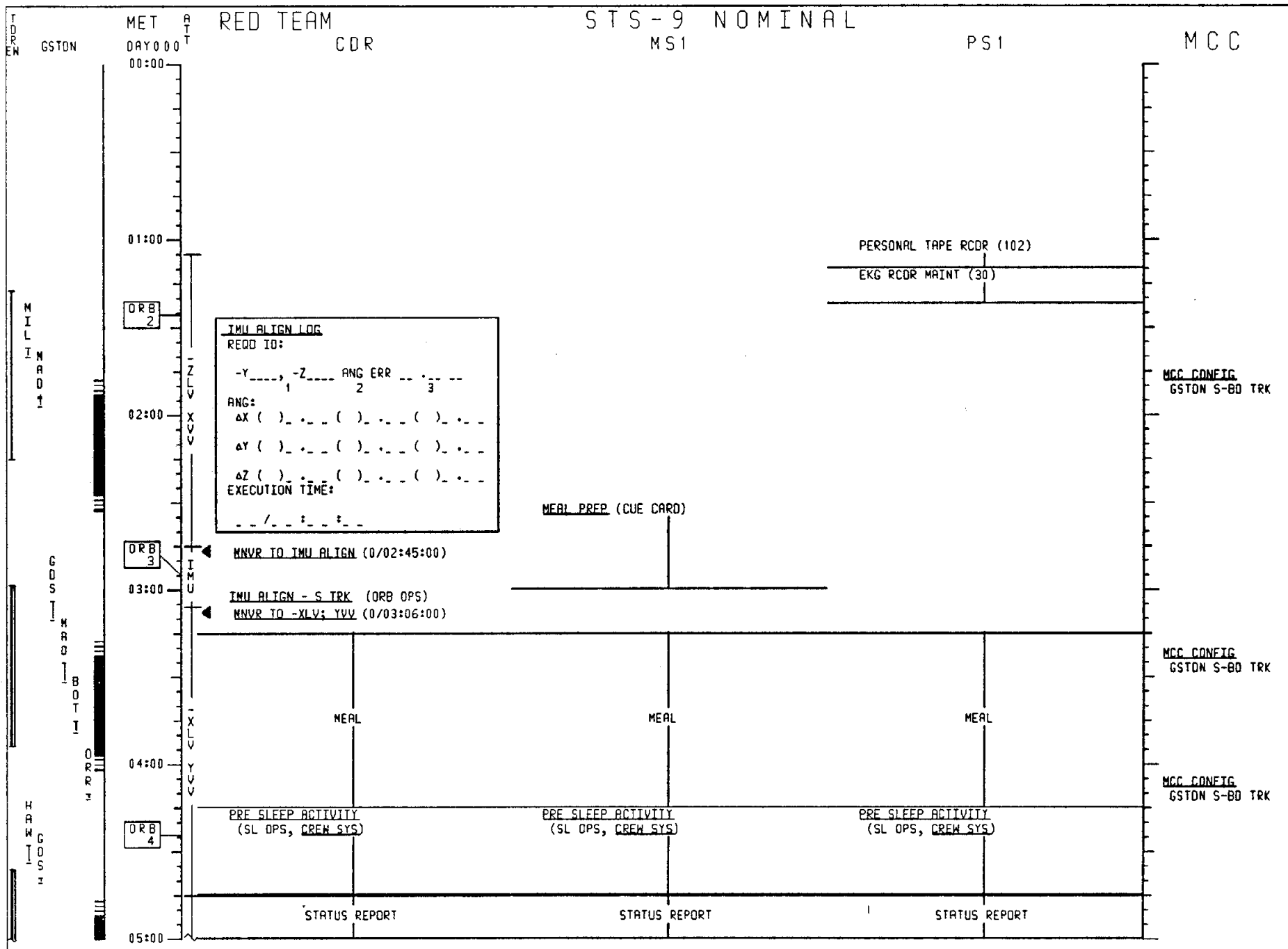
GMT (D:H:M)		MET (D:H:M)		CST (D:H:M)		FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE	
341:16:00 / 342:04:00		009:00:00 / 009:12:00		341:10:00 / 341:22:00		/ 341 GMT	-79.5		DECEMBER 7, 1983	STS-9	FINAL REV B	11/10/83	
GMT : 341 16		17		18		19		20		21		22	
FB													
MET : 009 0		1		2		3		4		5		6	
BLUE	PLT	LANDING @ 9/00:11											
	MS2												
	PS2												
DAY/NIGHT													
ORBIT		146		147		148		149		150		151	
EARTH TRACE													
GSDN COVERAGE		-GDS -MAD -BOT -ORR -ORR -BDA -MIL -YAR -GWN -RGO -BOT -HAW -BOT -ORR -HAW -DKR -ACN -YAR -GWN -GDS -MIL -GDS											
TDRS E W													
ATTITUDE													
H2O DUMP													
DEORB EDW NOR		† 5:30 † 7:03 † 5:33 † 7:05											
NOTES:													

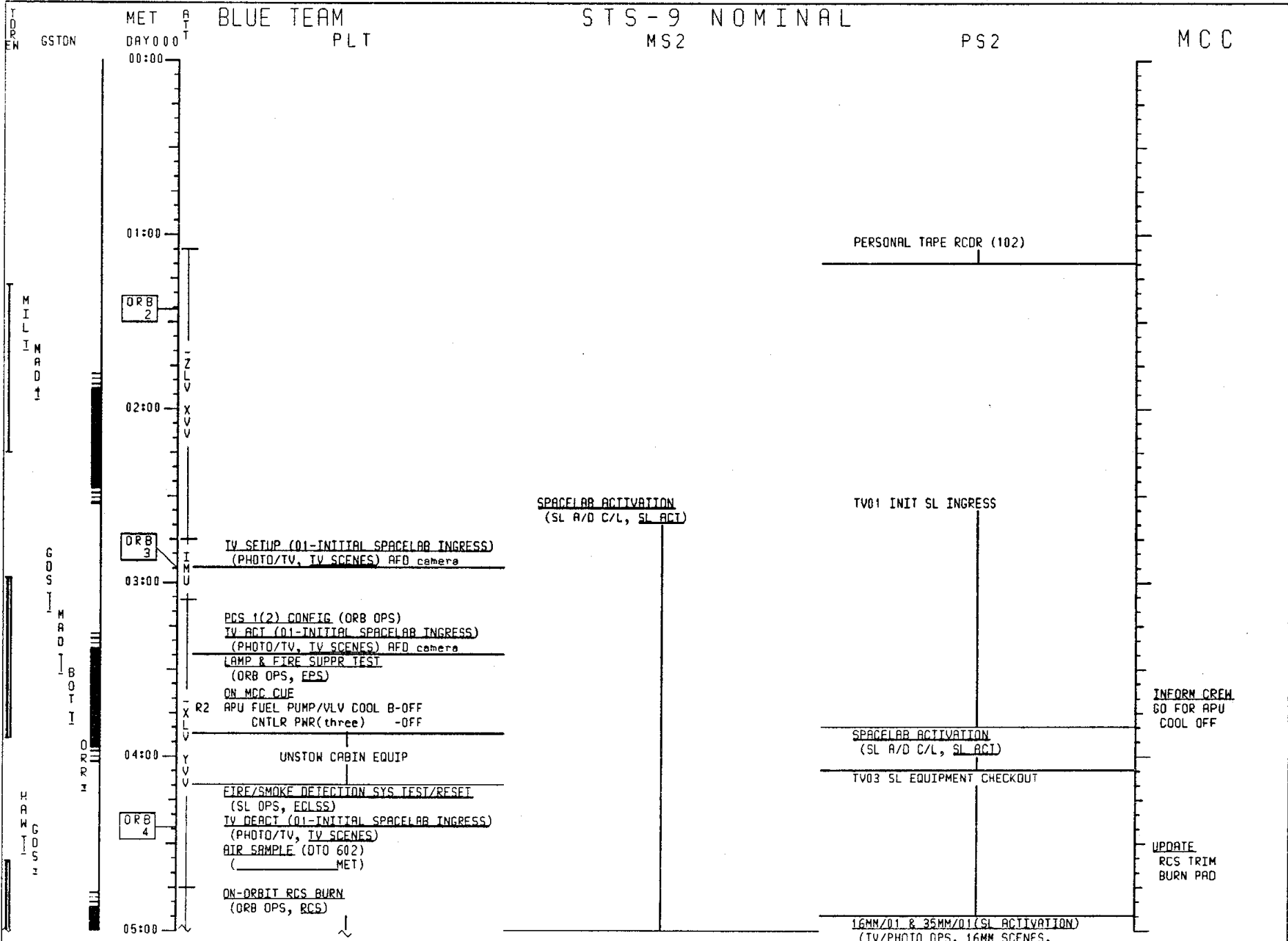
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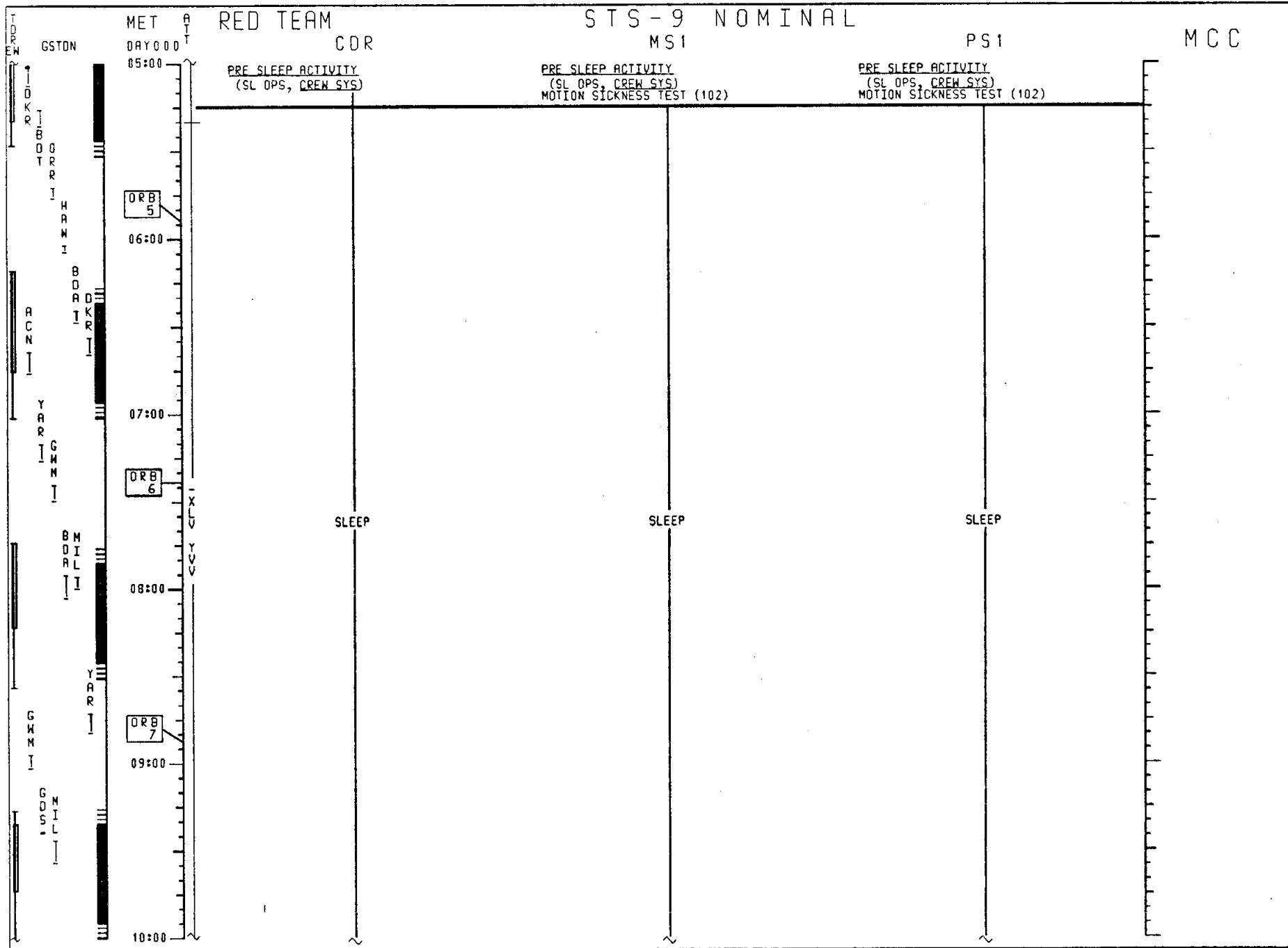
DETAILED TIMELINE

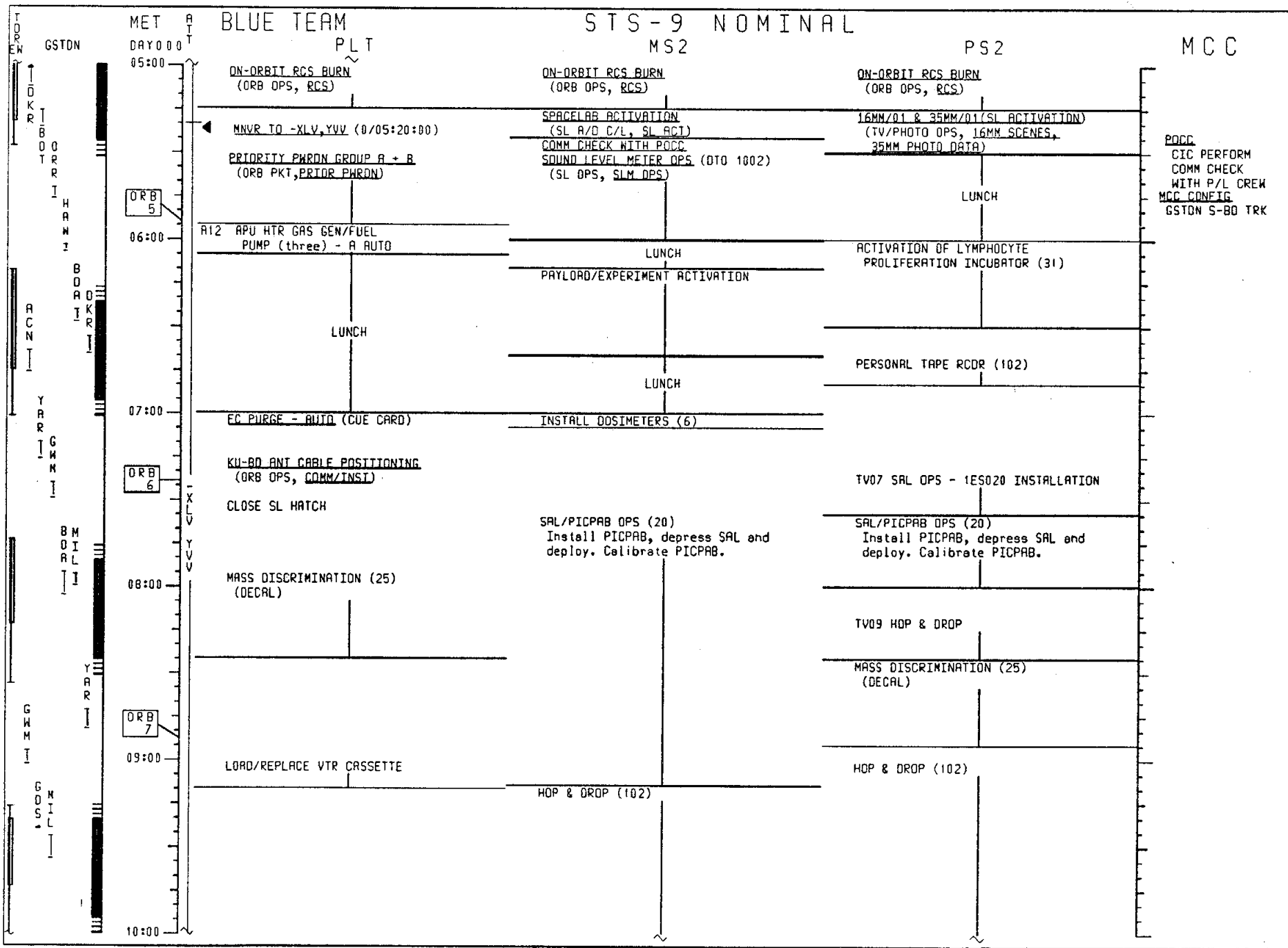
DETAILED
TIMELINE

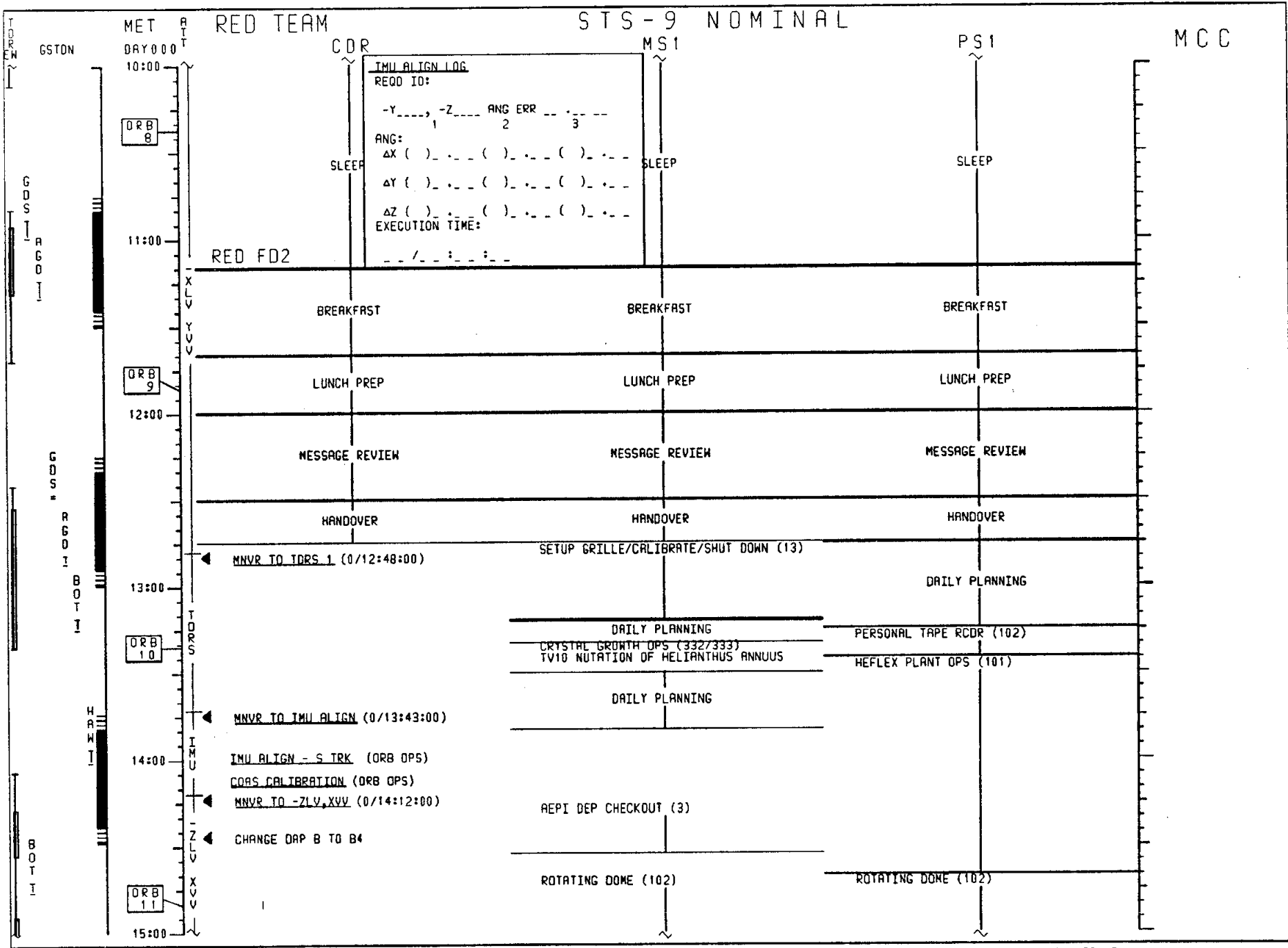
DETAILED
TIMELINE

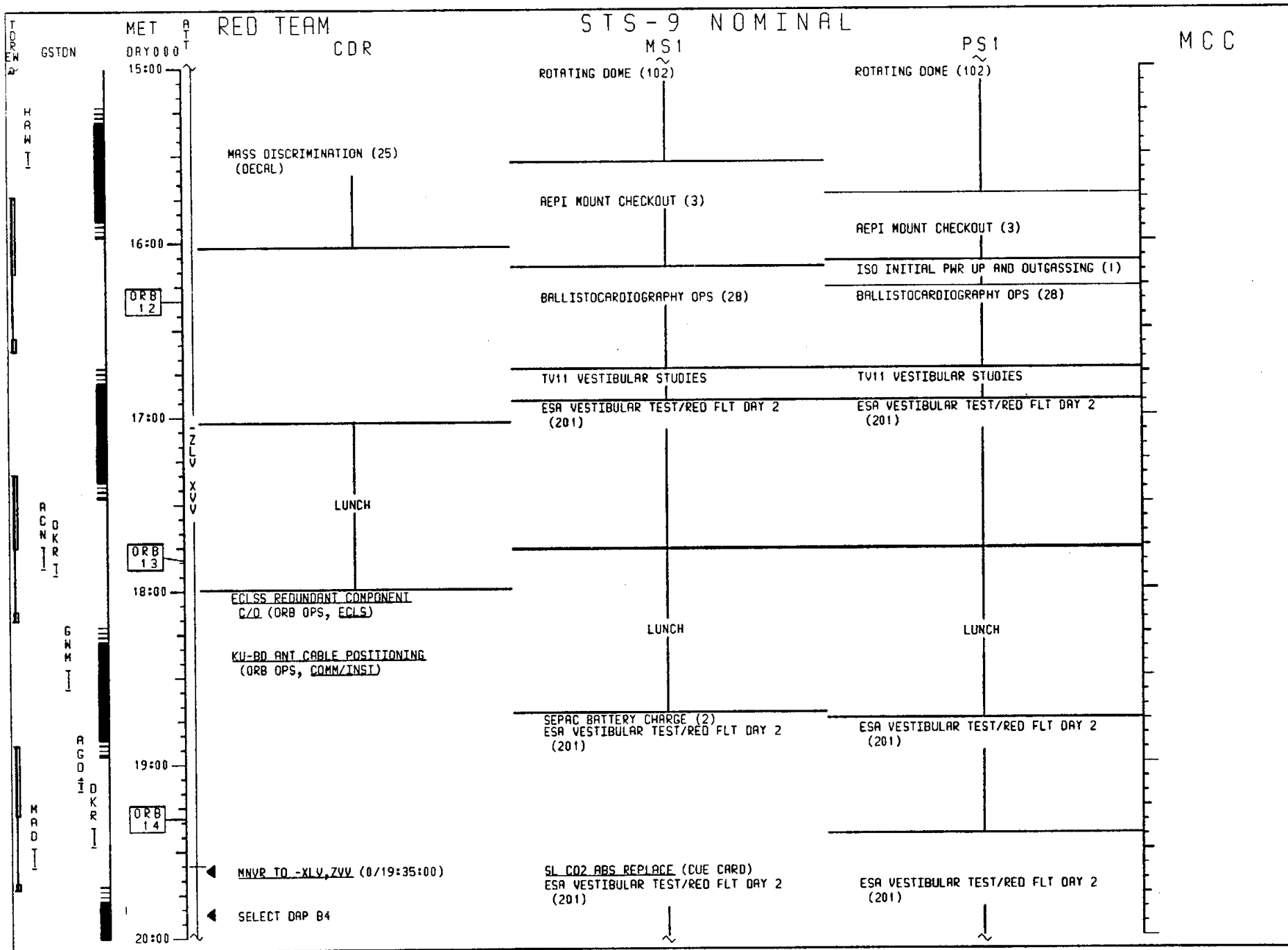


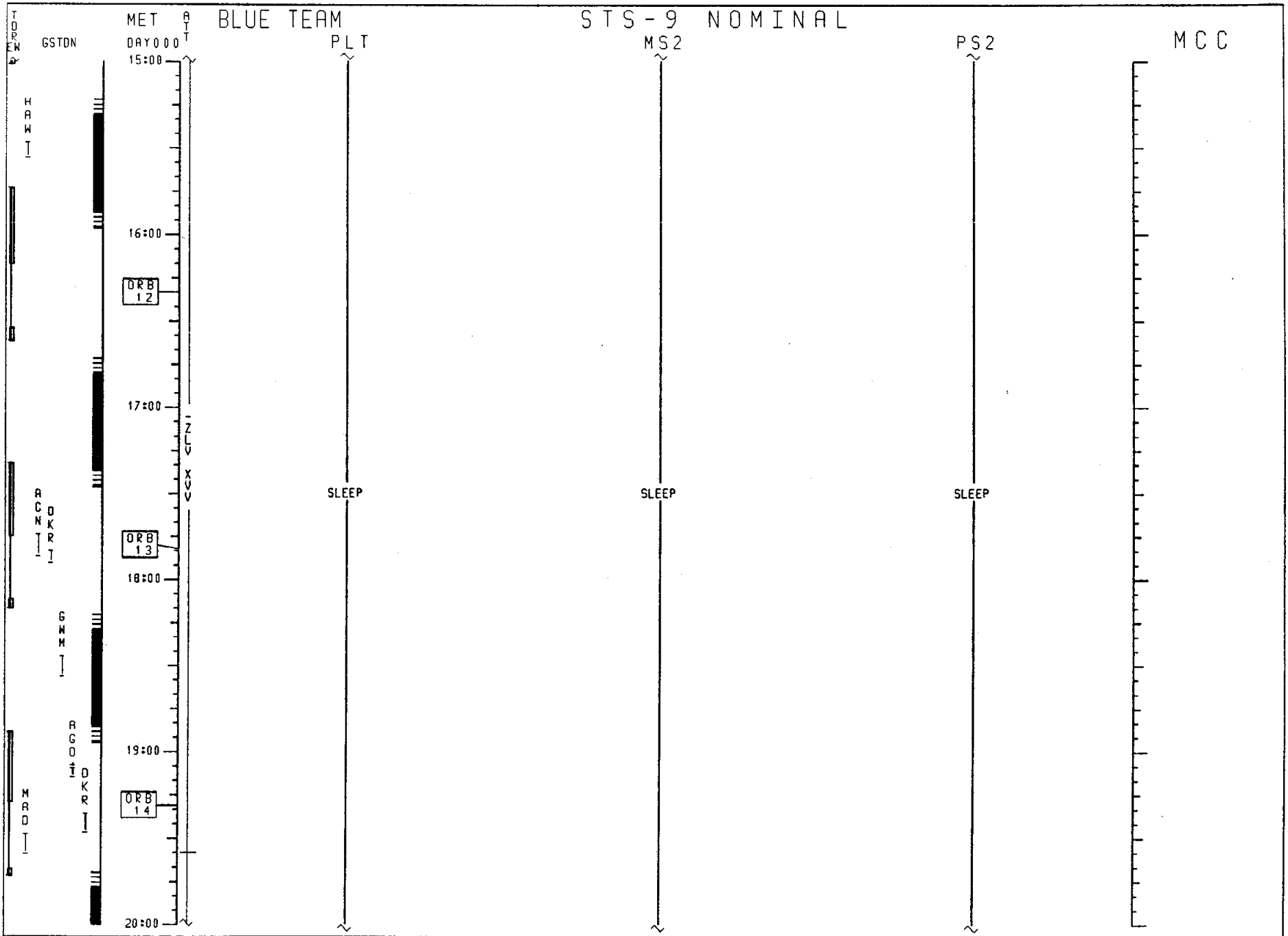


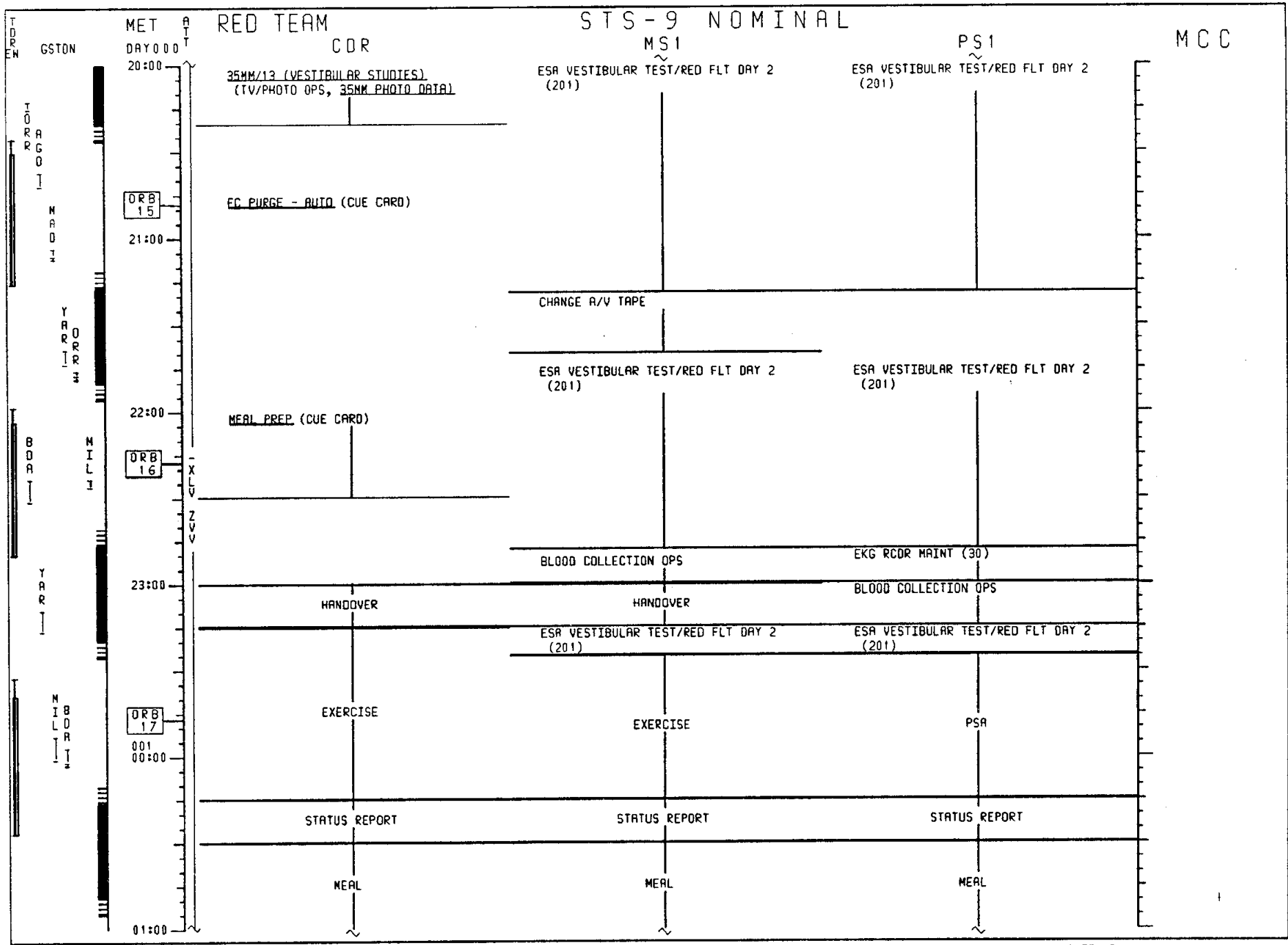


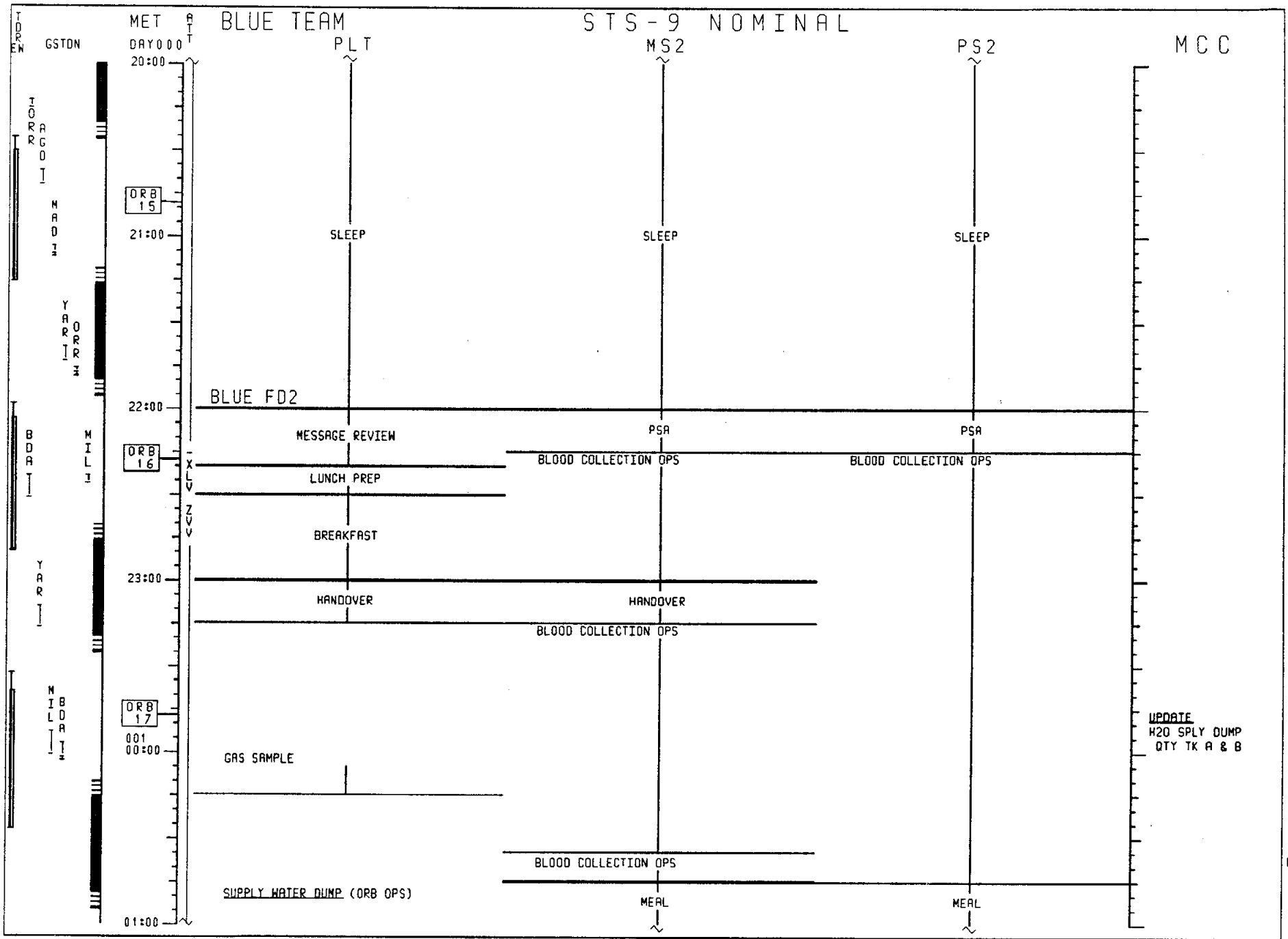


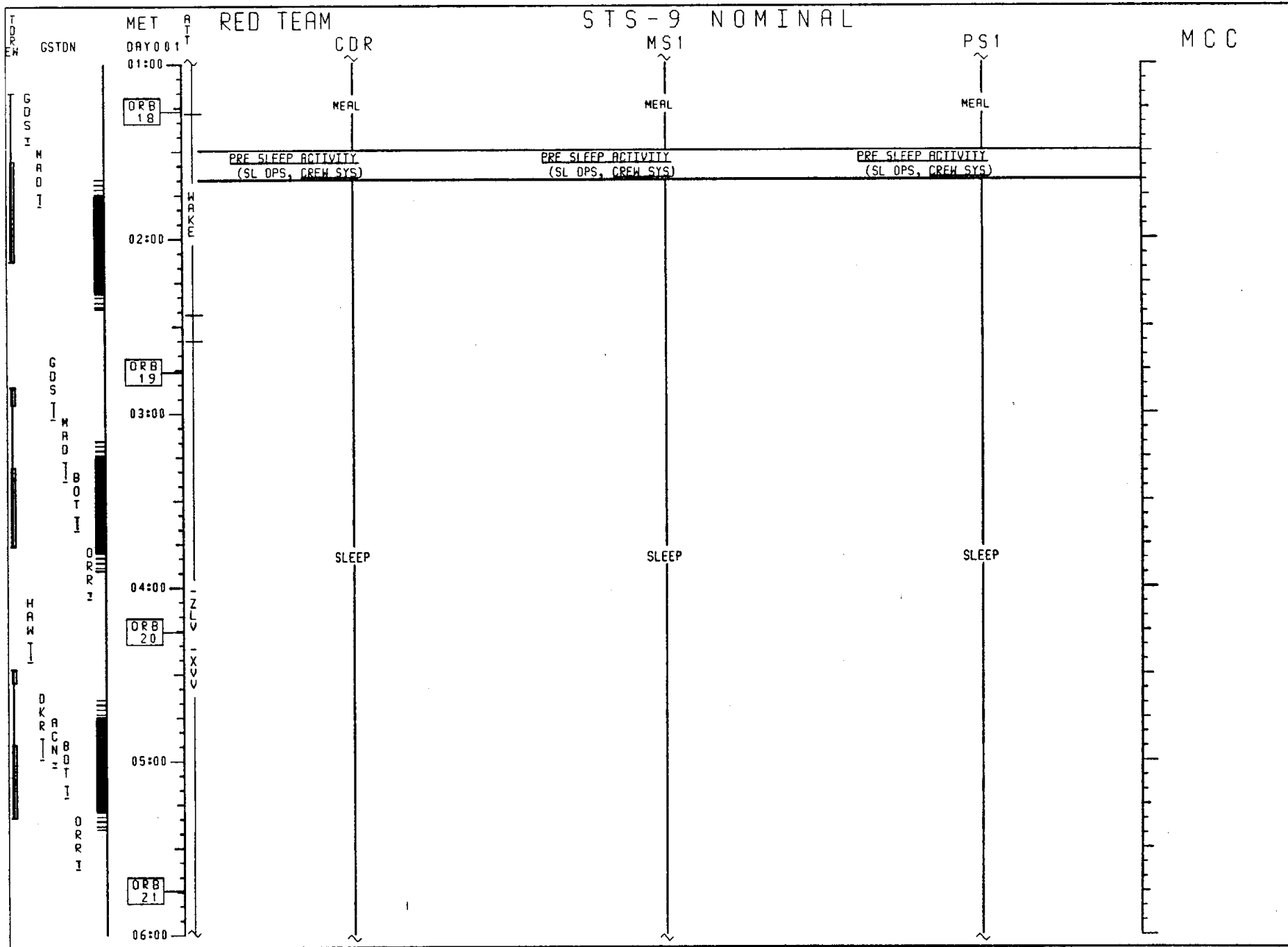


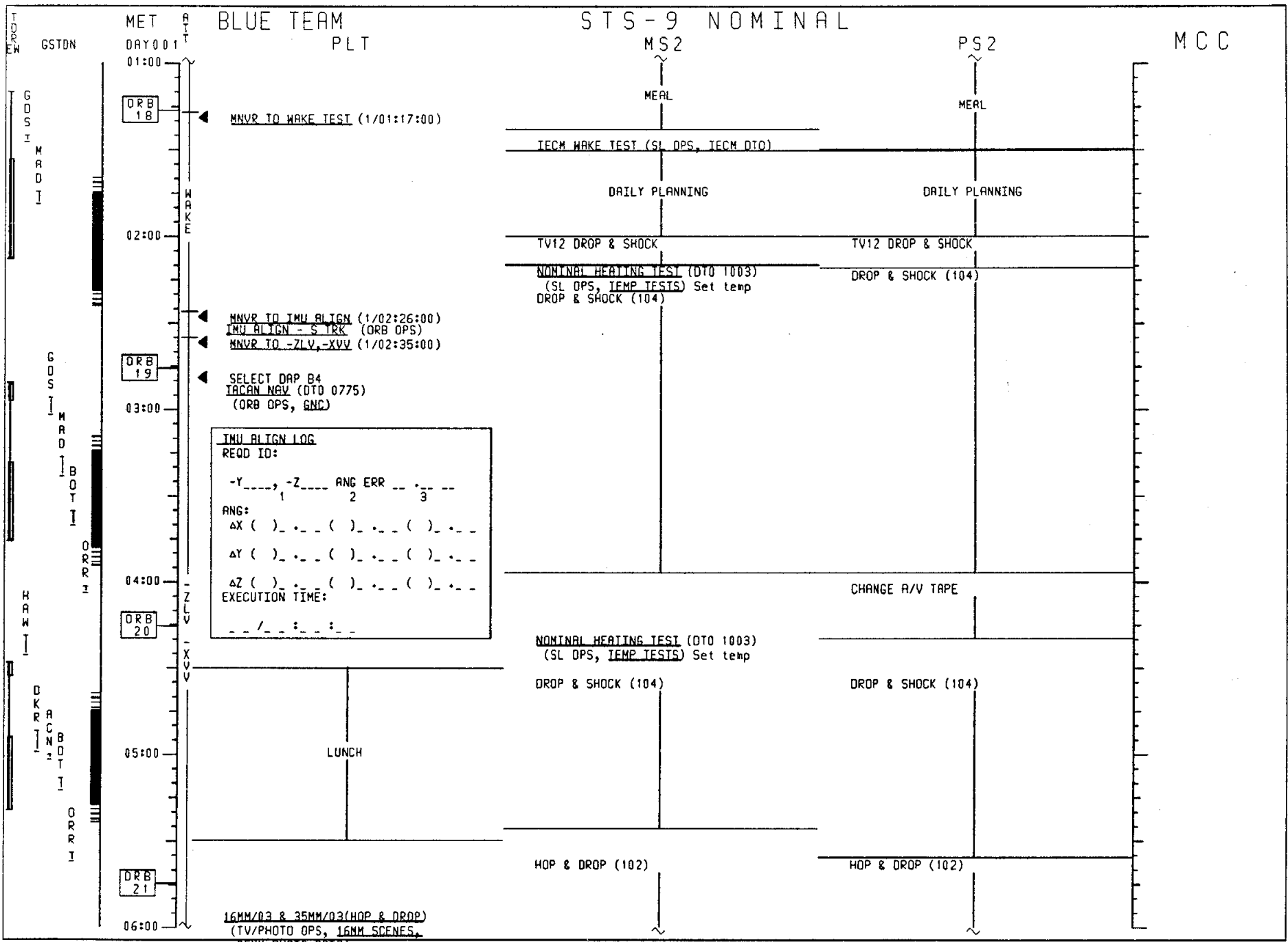


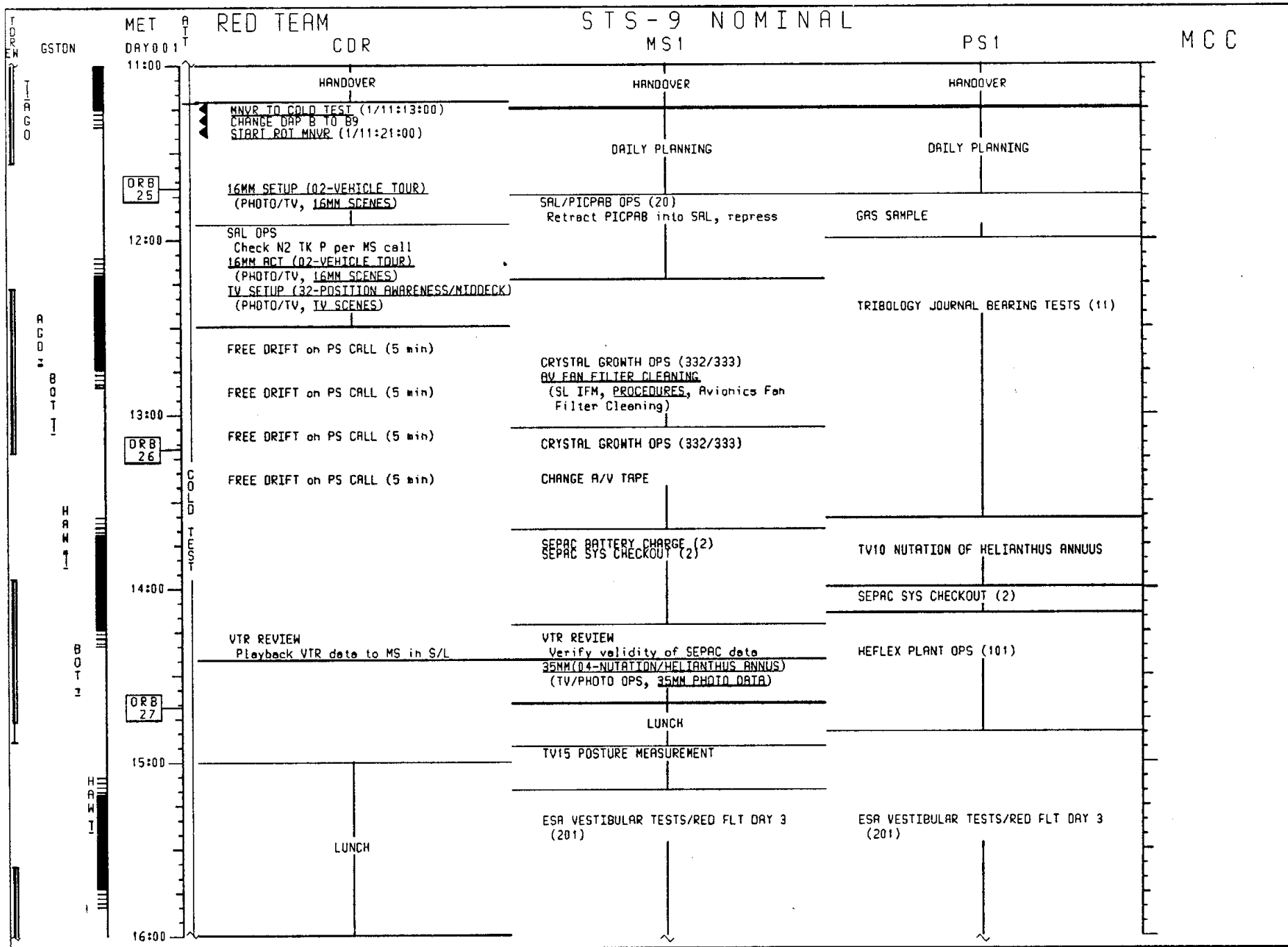


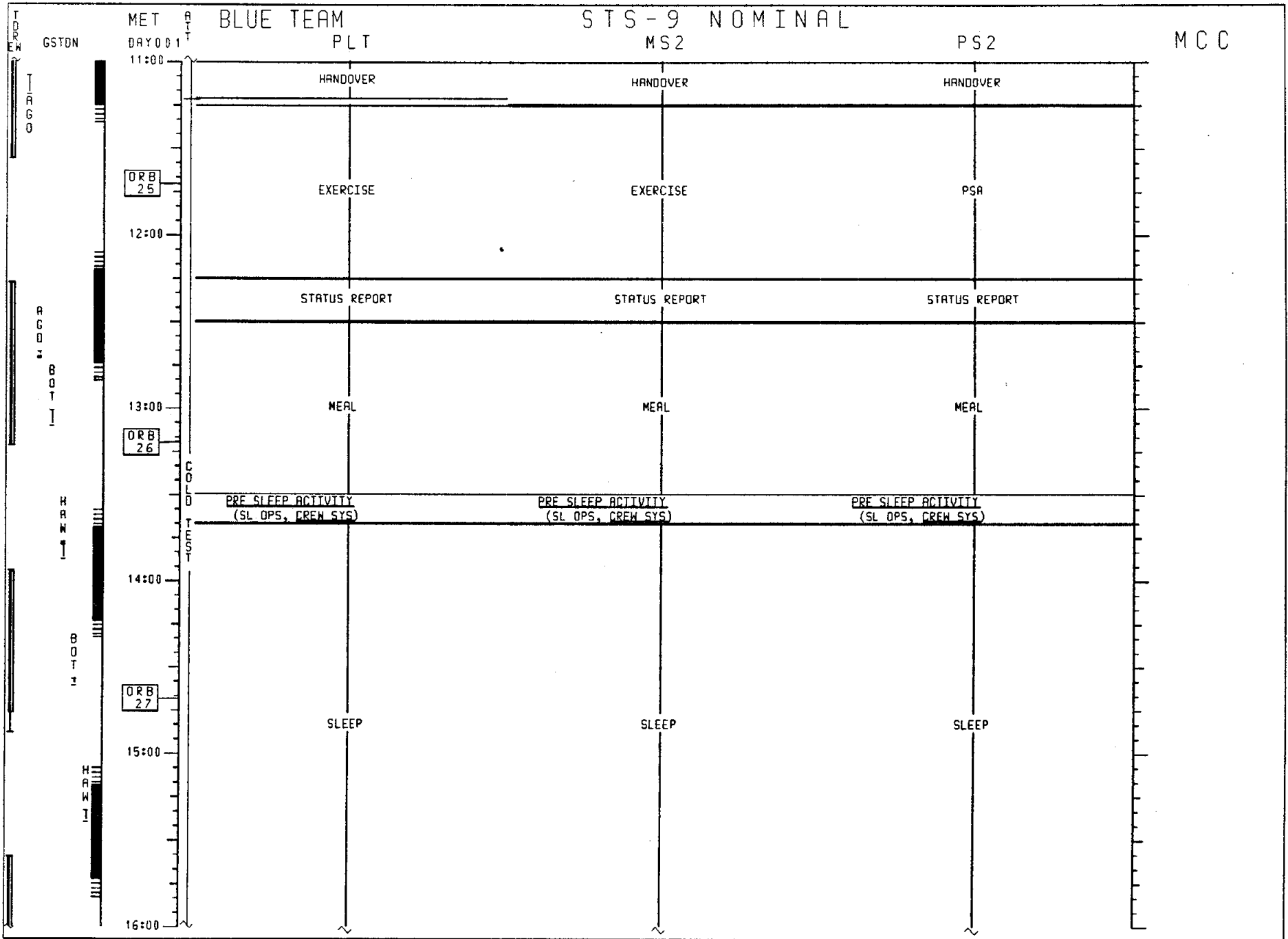


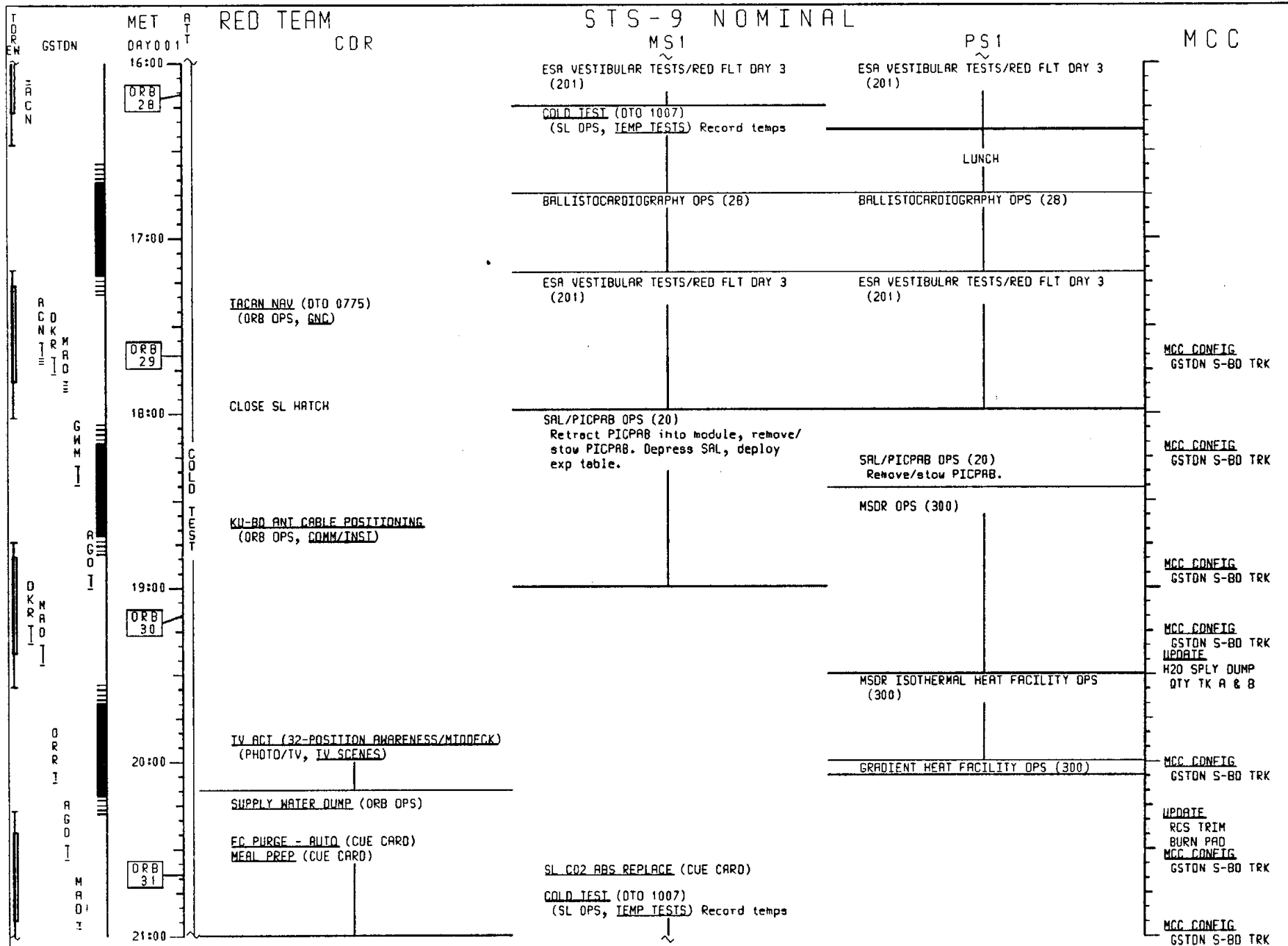


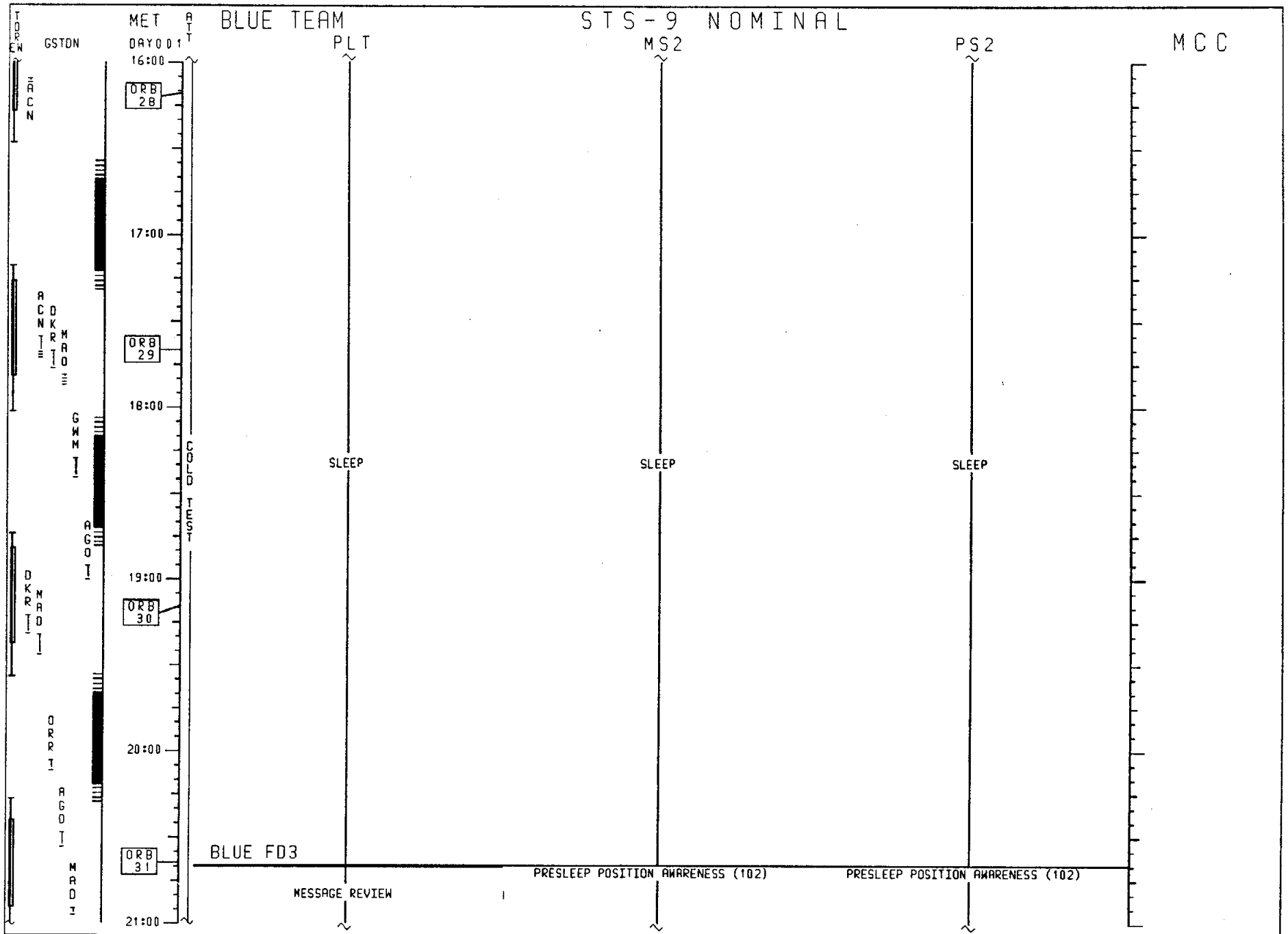


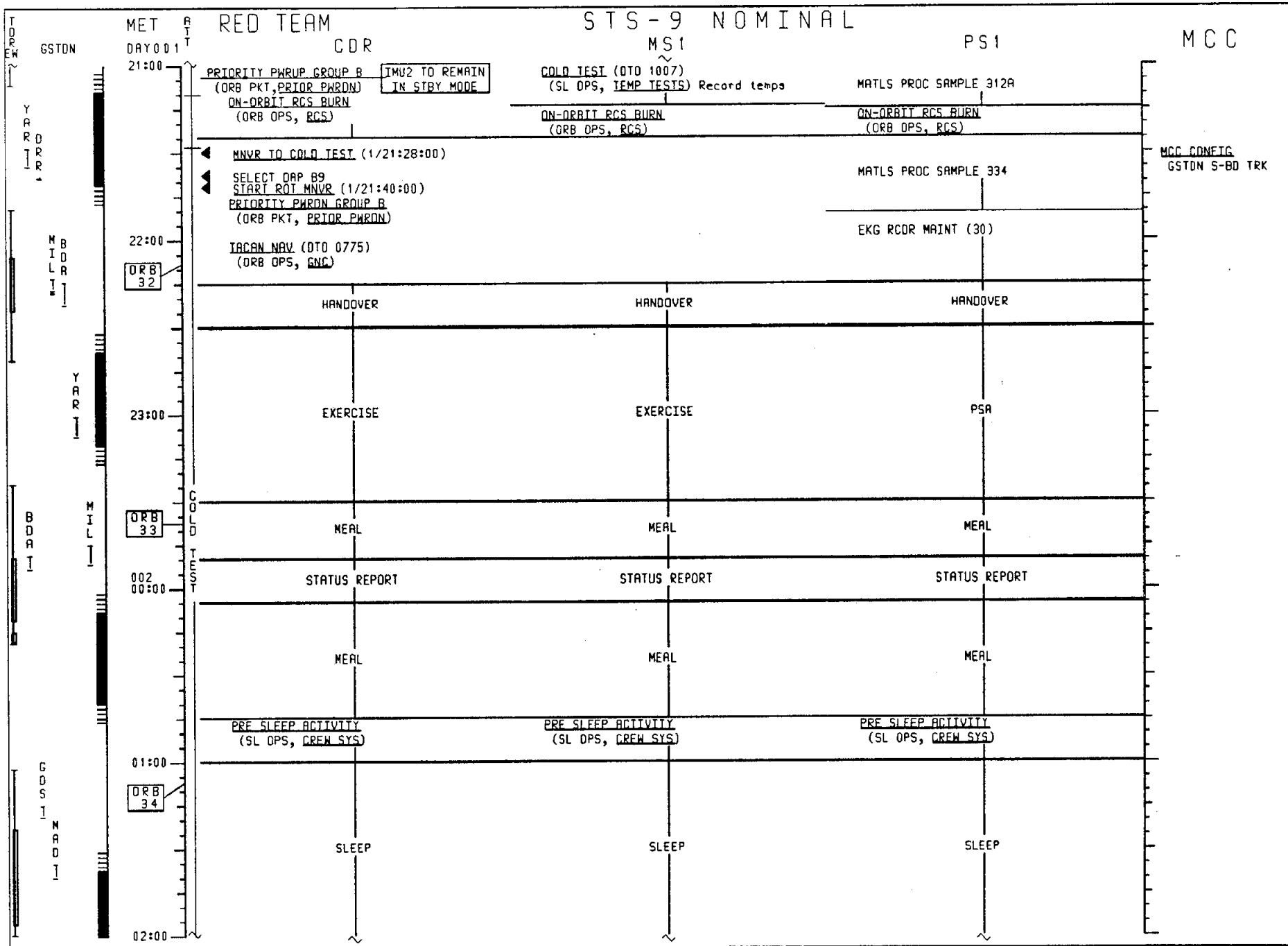


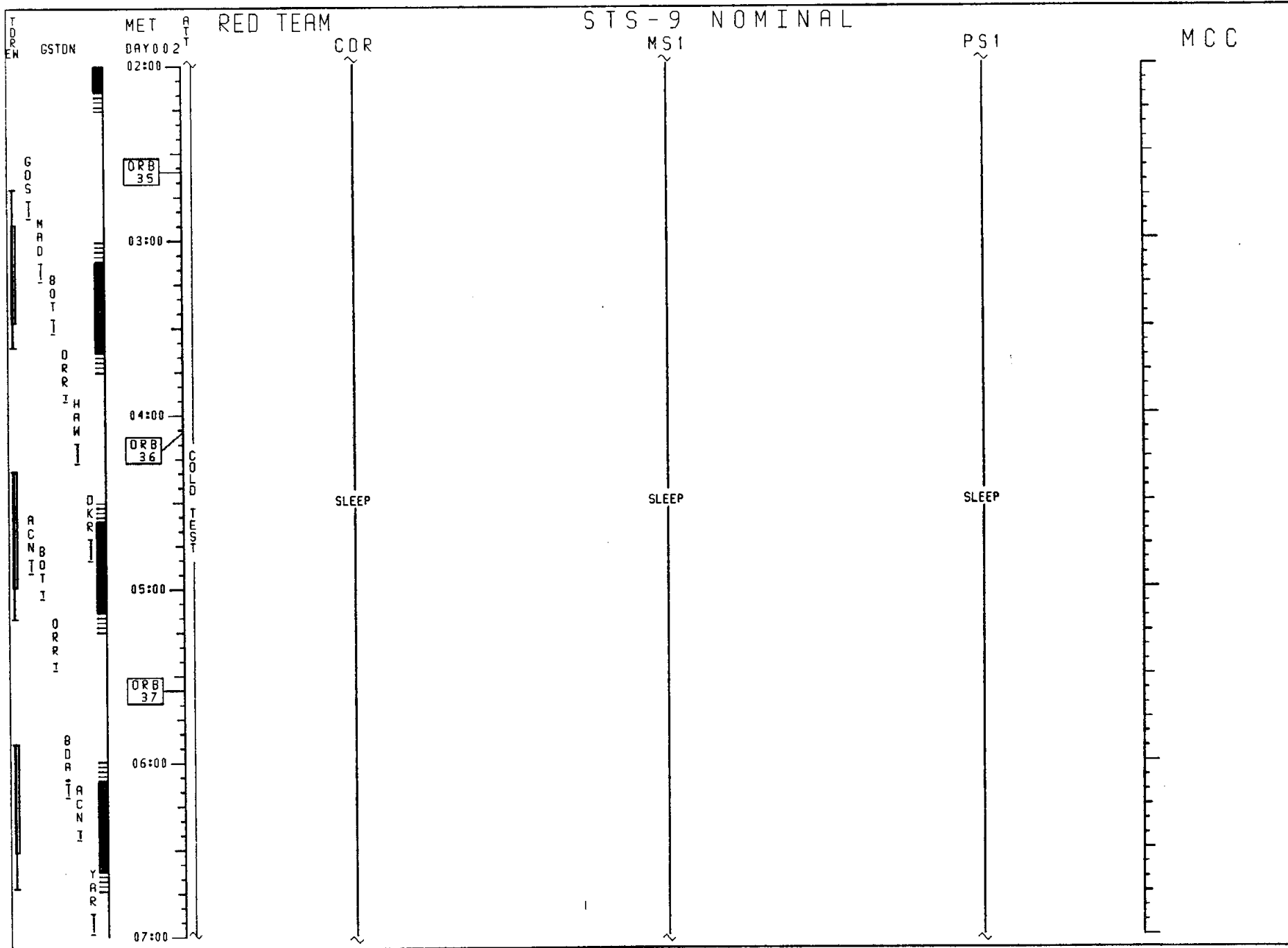


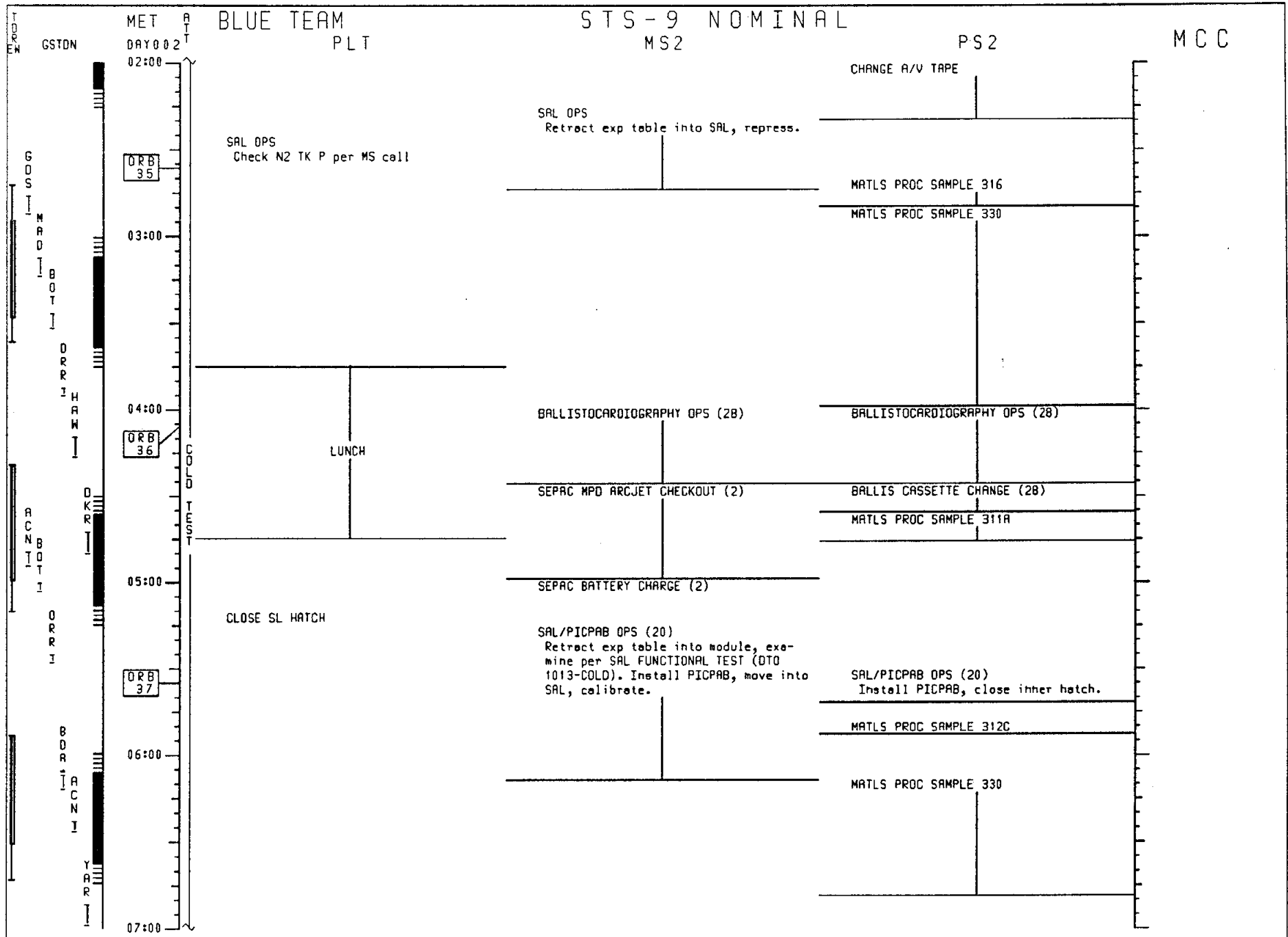


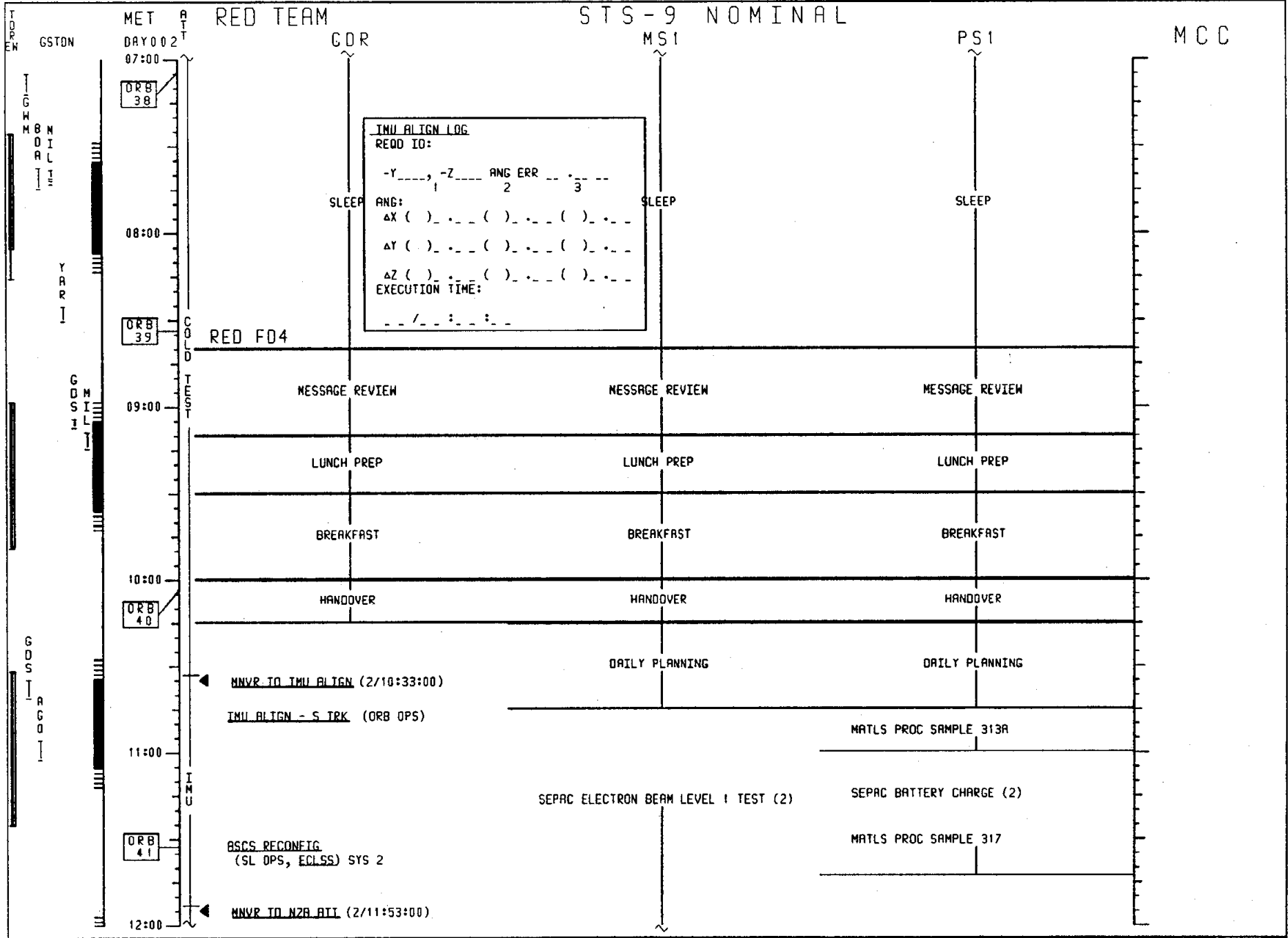


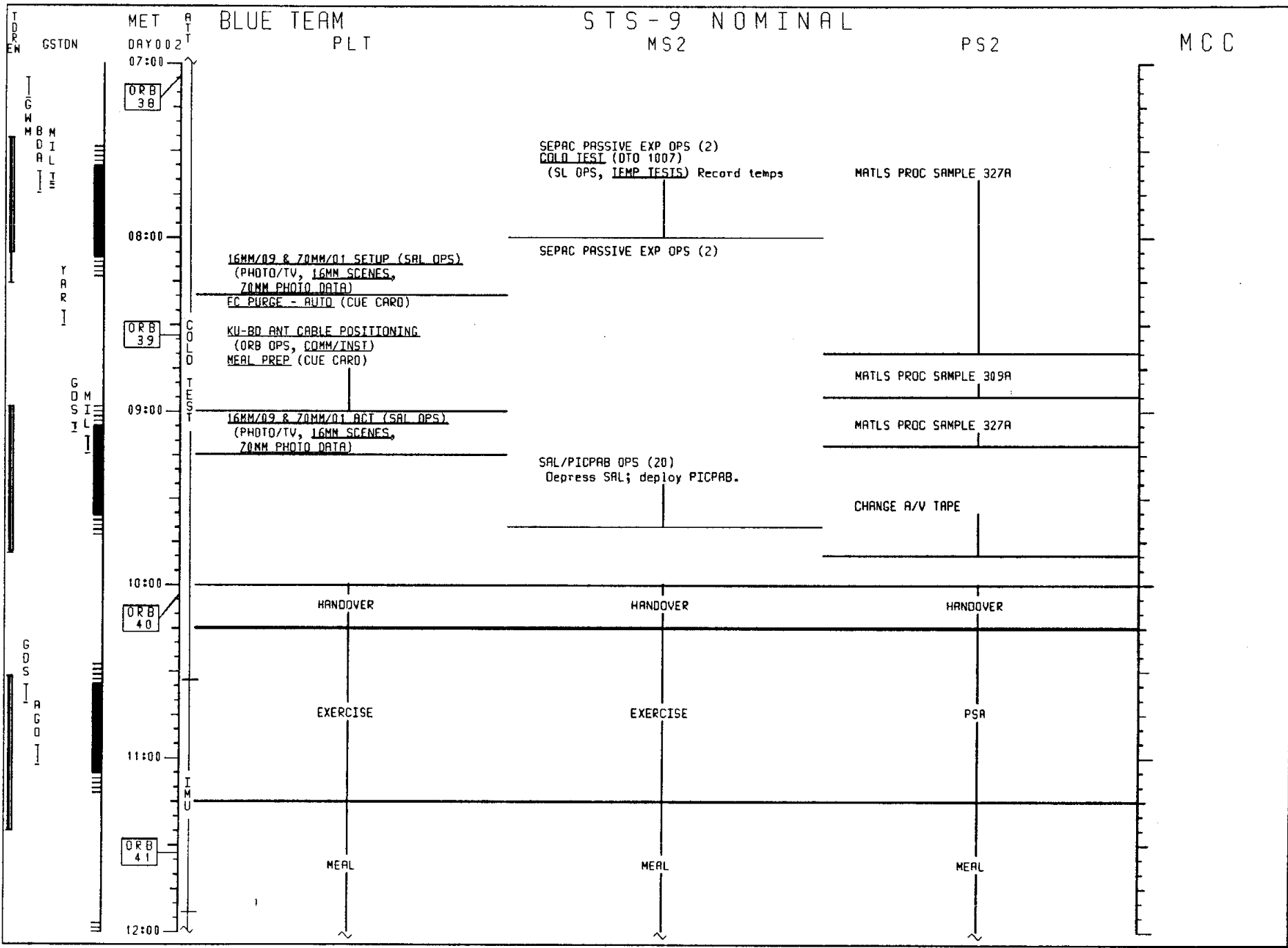


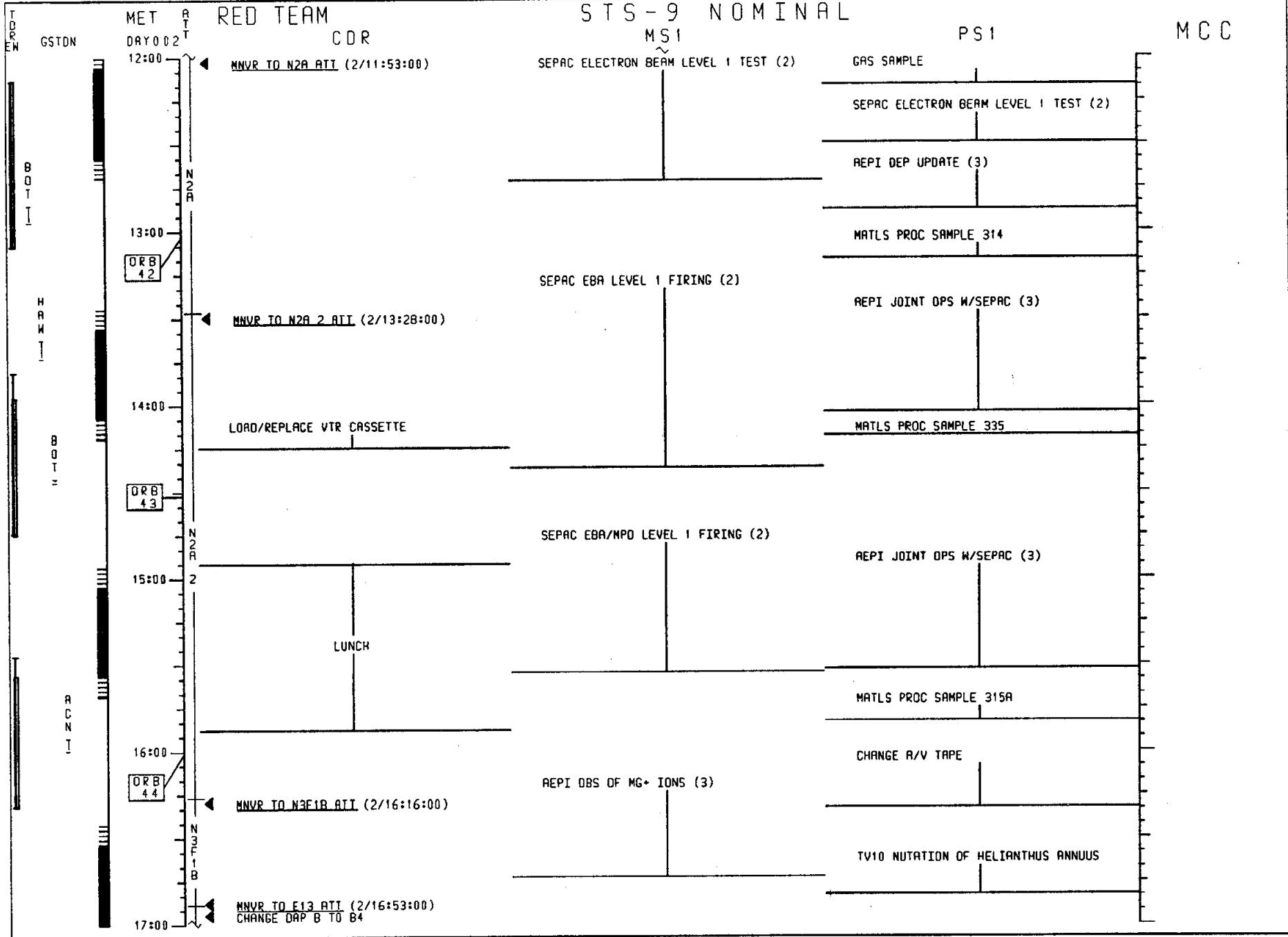












MET
DAY 002
12:00
13:00
14:00
15:00
16:00
17:00

RED TEAM
CDR

STS-9 NOMINAL
MS1

PS1

MCC

MNVR TO N2A ATT (2/11:53:00)

SEPC ELECTRON BEAM LEVEL 1 TEST (2)

GAS SAMPLE

SEPC ELECTRON BEAM LEVEL 1 TEST (2)

REPI DEP UPDATE (3)

MATLS PROC SAMPLE 314

ORB 42

SEPC EBA LEVEL 1 FIRING (2)

REPI JOINT OPS W/SEPC (3)

MNVR TO N2A 2 ATT (2/13:28:00)

LOAD/REPLACE VTR CASSETTE

MATLS PROC SAMPLE 335

ORB 43

SEPC EBA/MPO LEVEL 1 FIRING (2)

REPI JOINT OPS W/SEPC (3)

LUNCH

MATLS PROC SAMPLE 315A

ORB 44

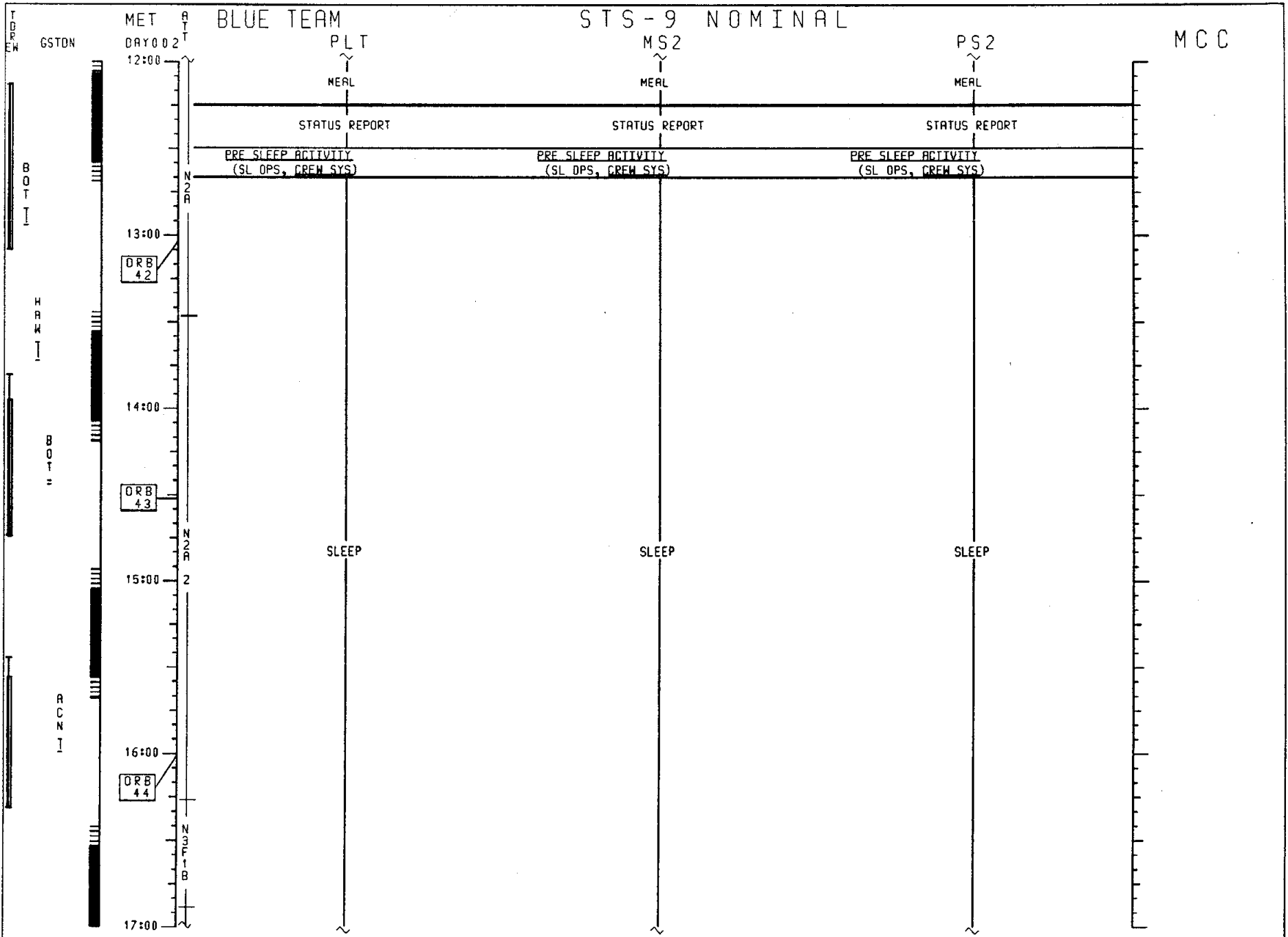
MNVR TO N2F1B ATT (2/16:16:00)

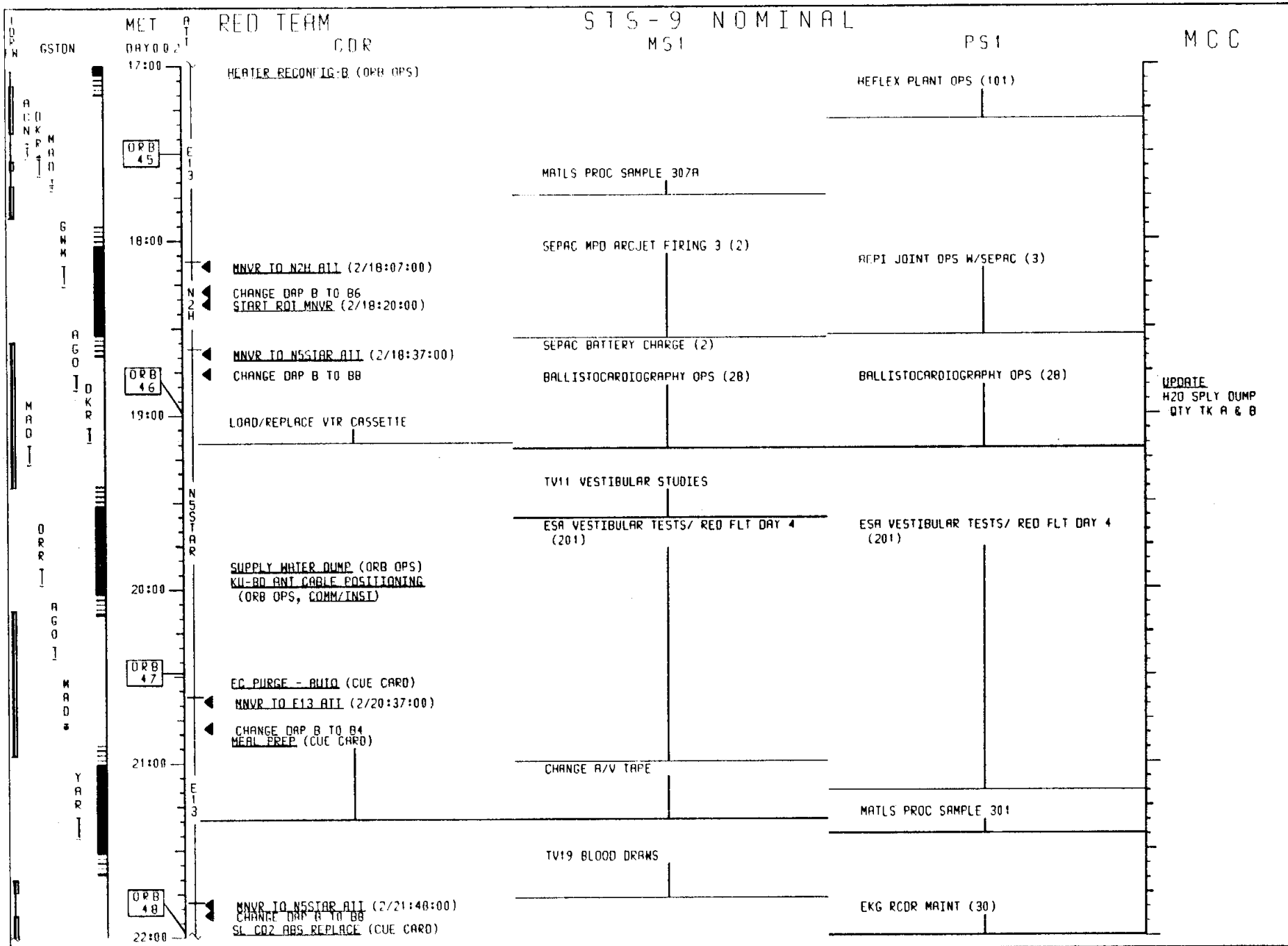
REPI OBS OF MG+ IONS (3)

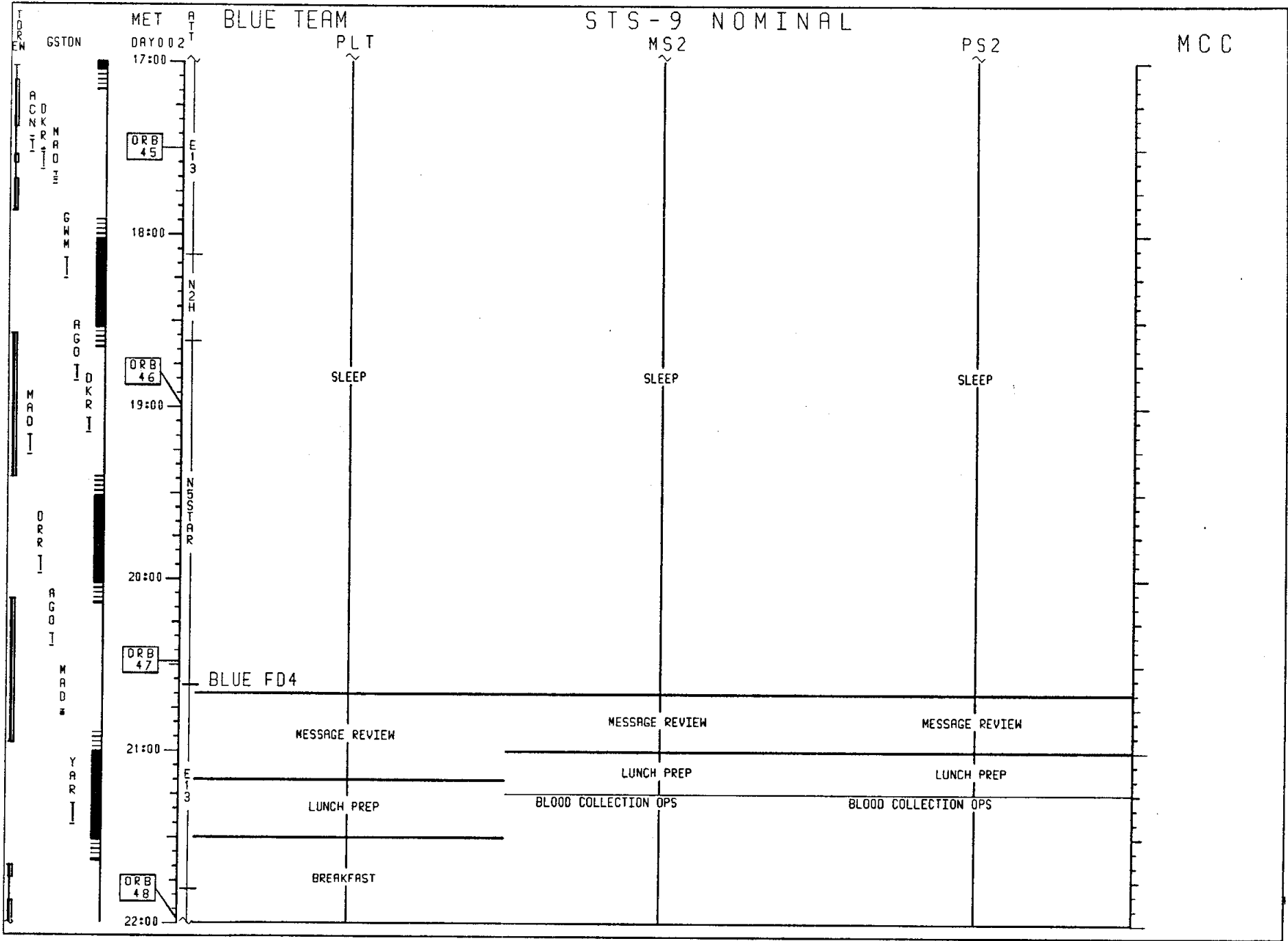
CHANGE R/V TAPE

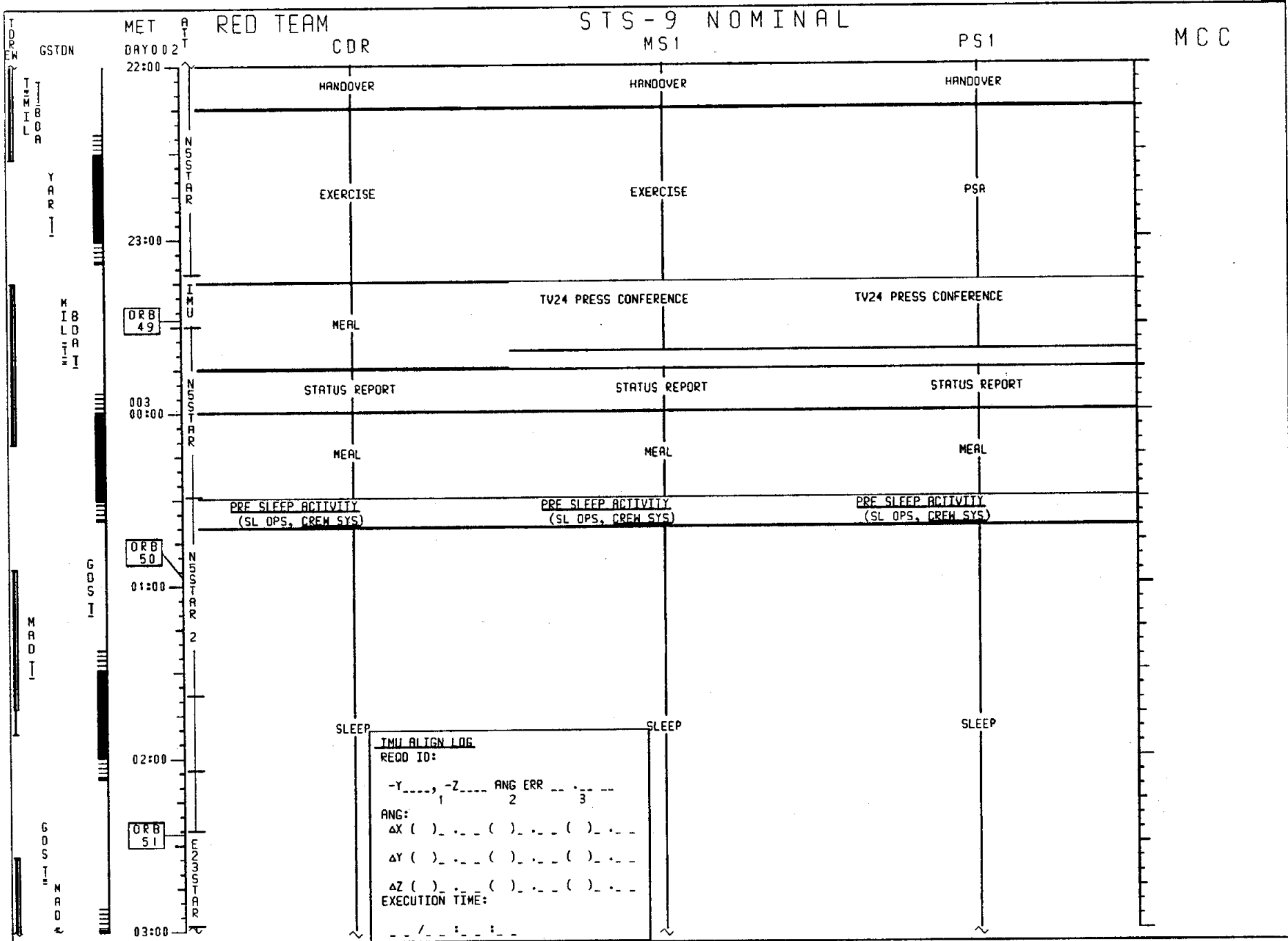
TV10 MUTATION OF HELIANTHUS ANNUUS

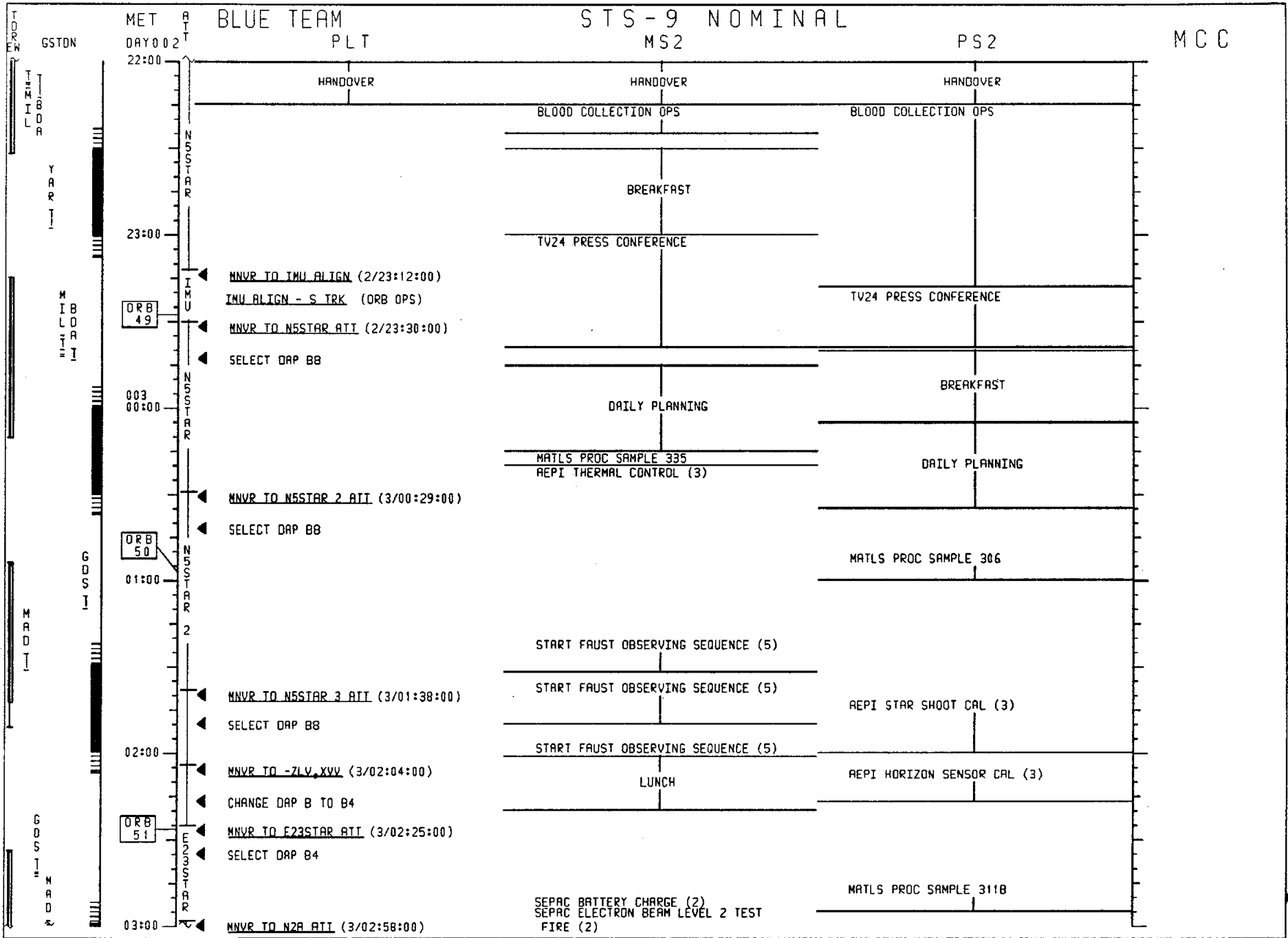
MNVR TO F13 ATT (2/16:53:00)
CHANGE DAP B TO B4

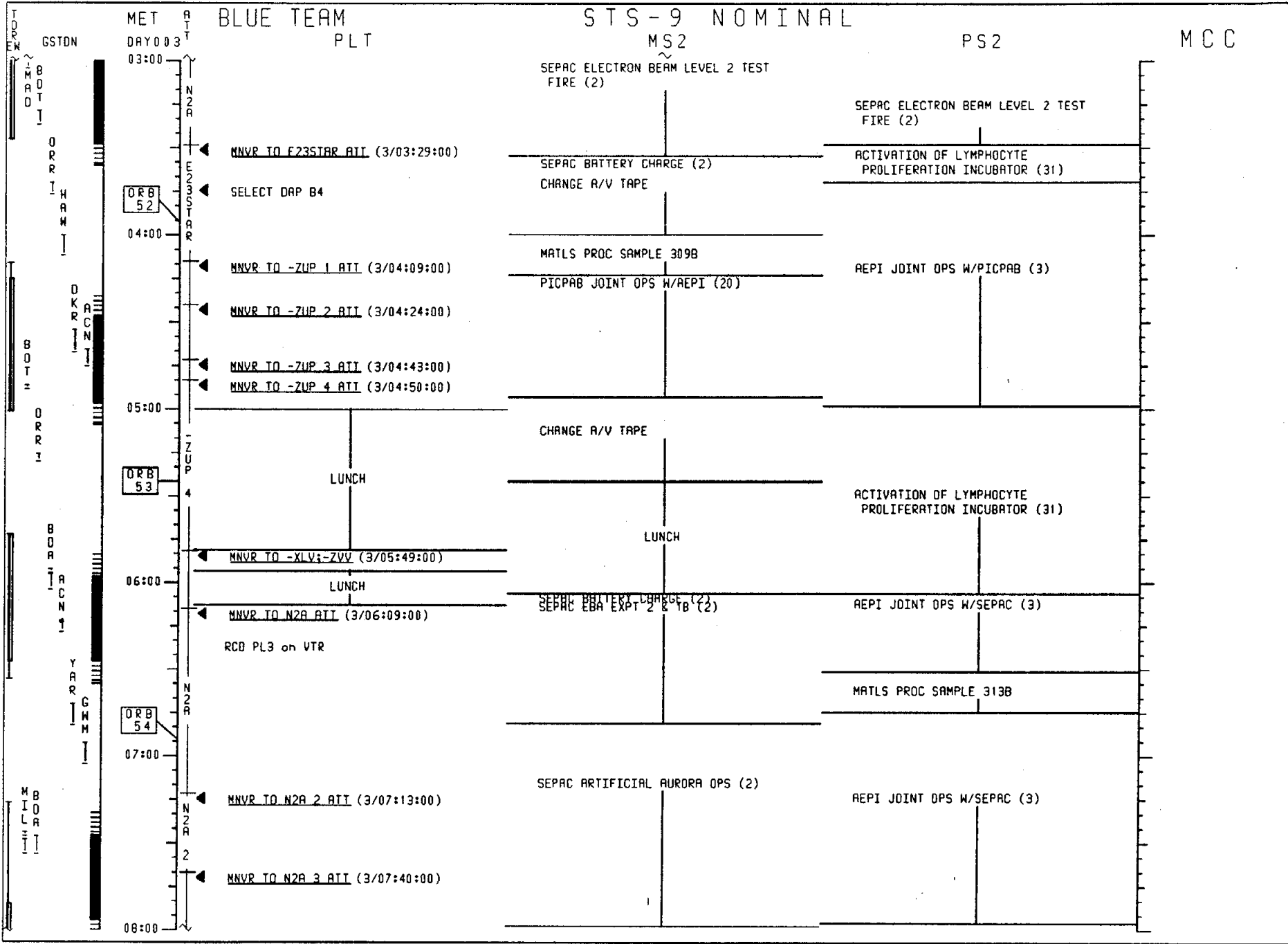


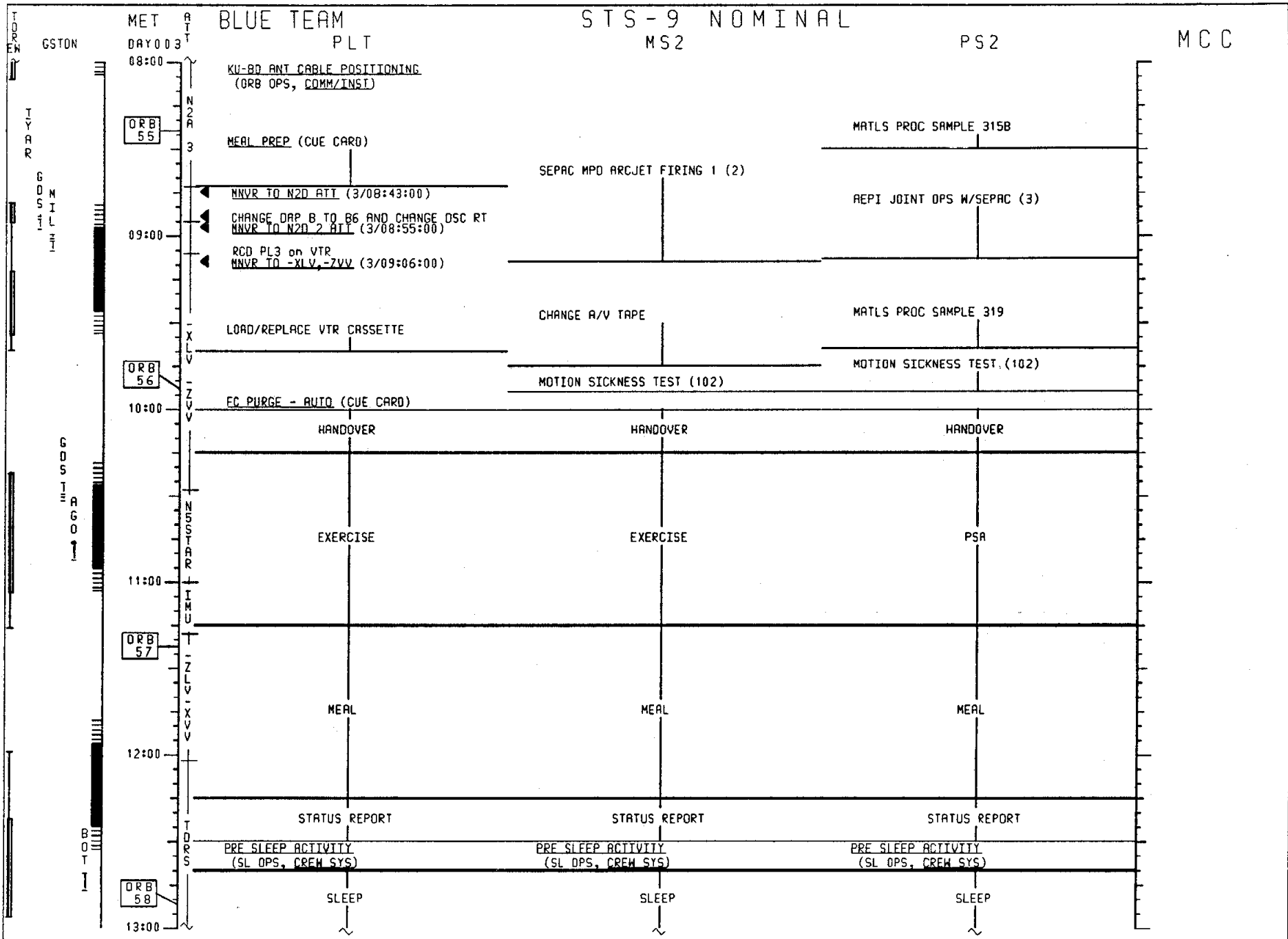


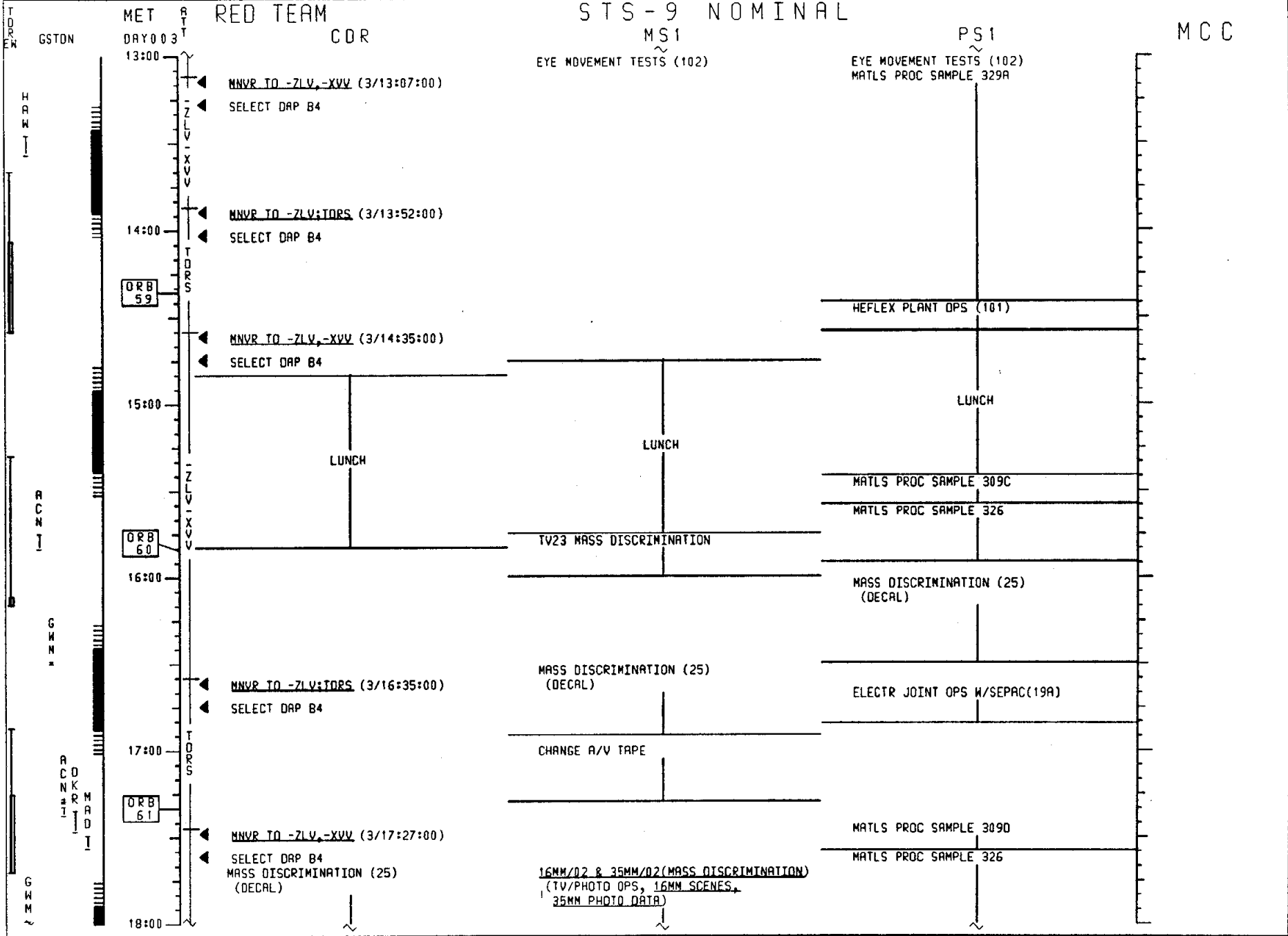


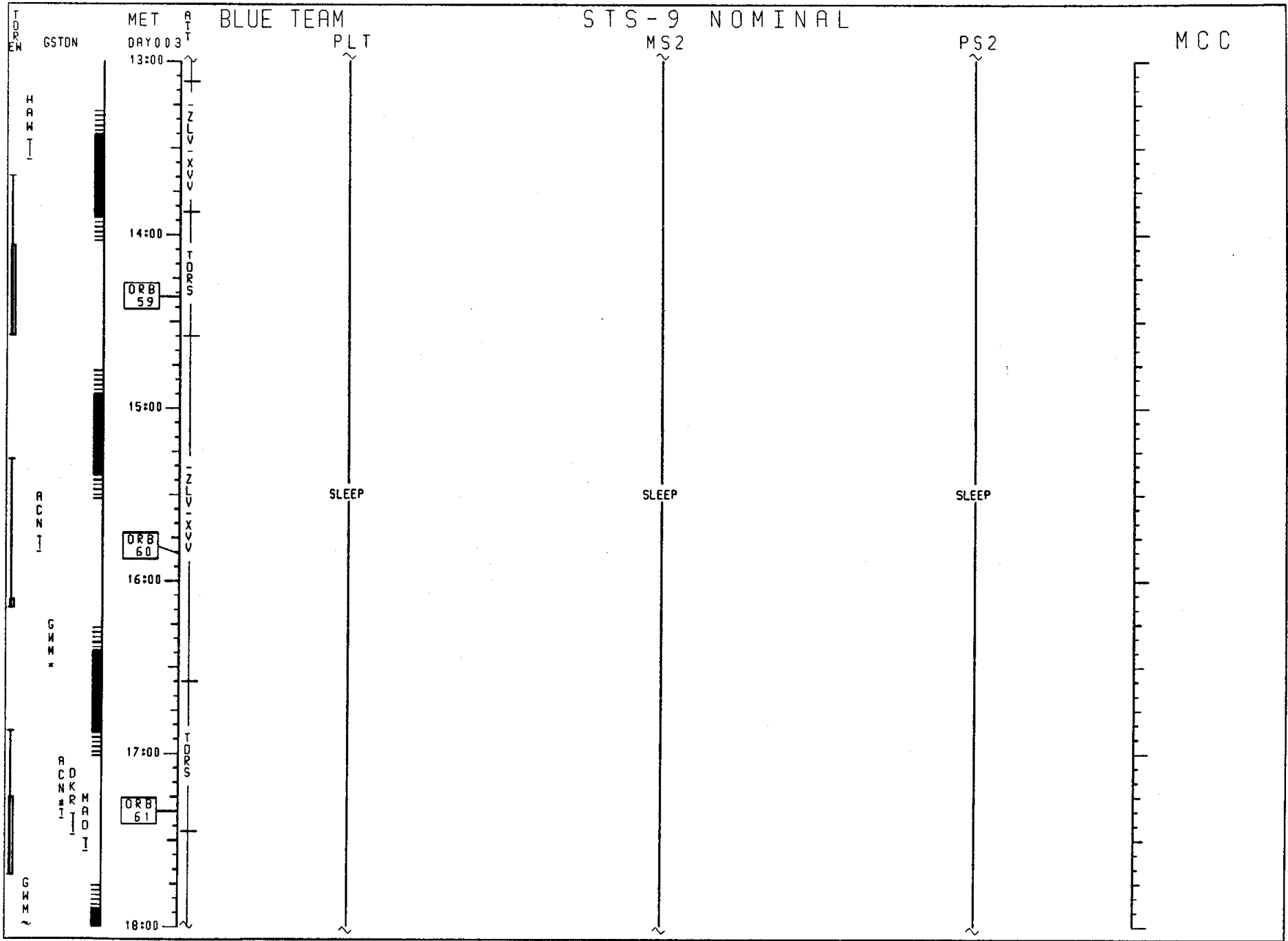


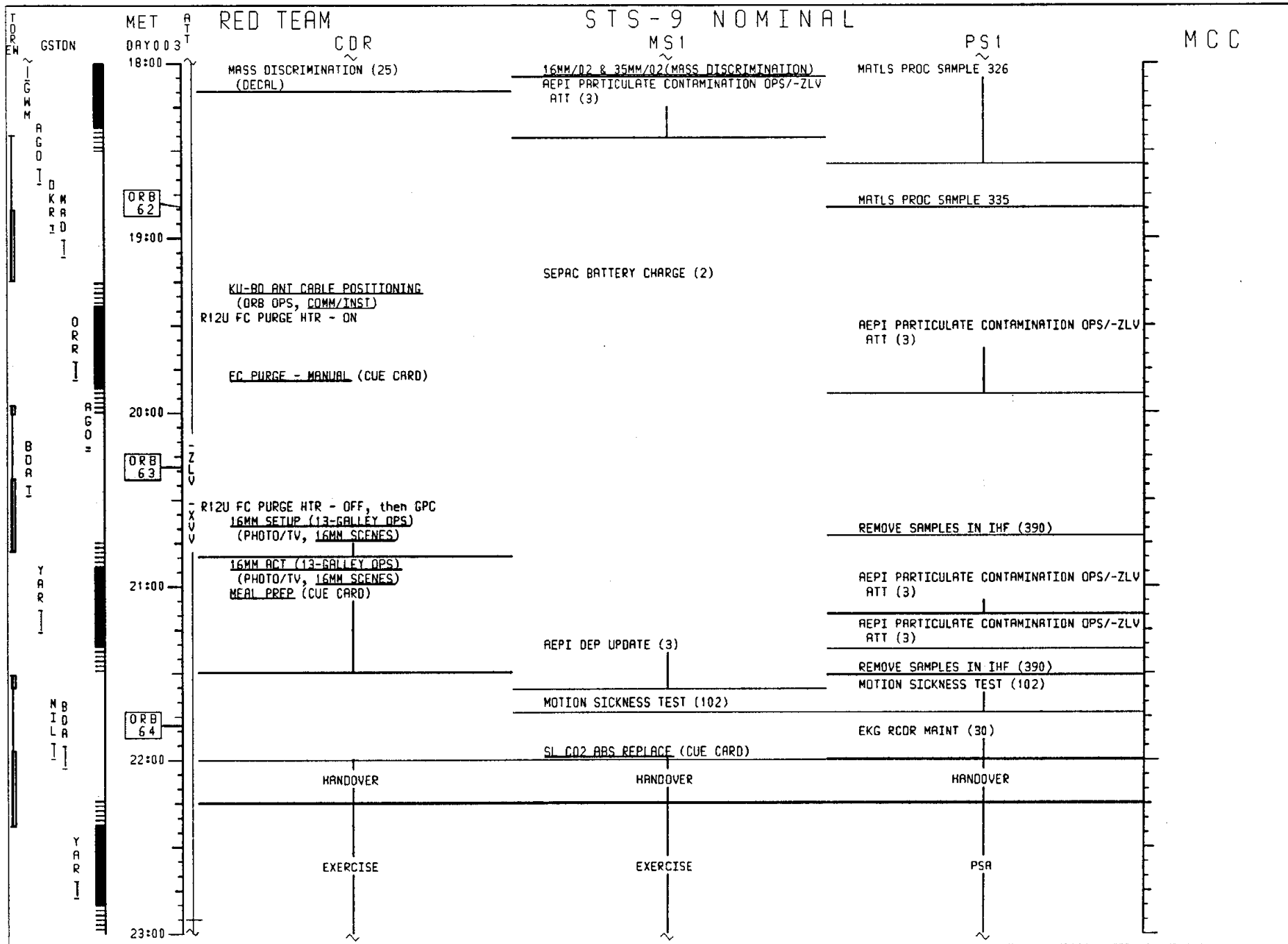


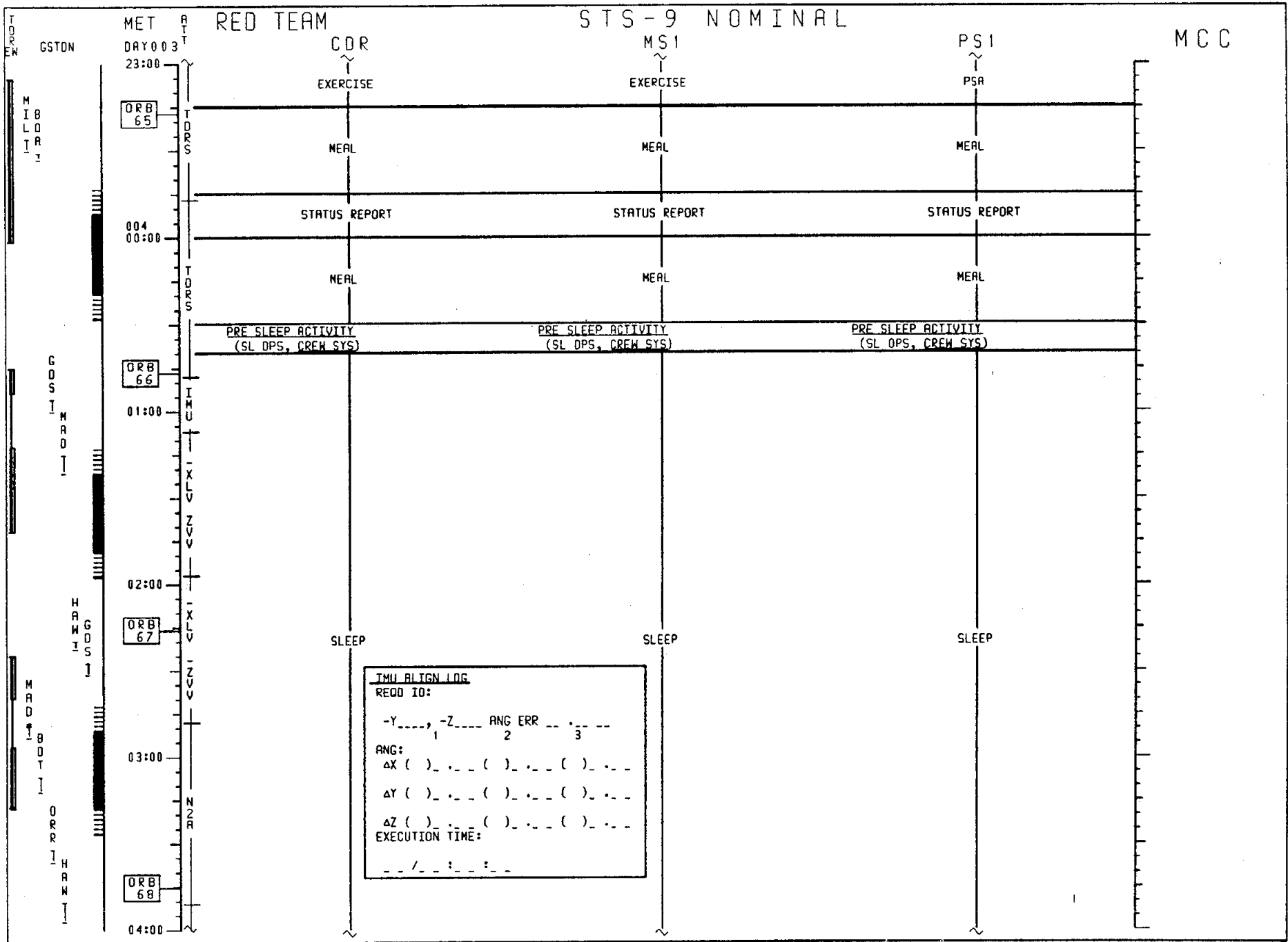


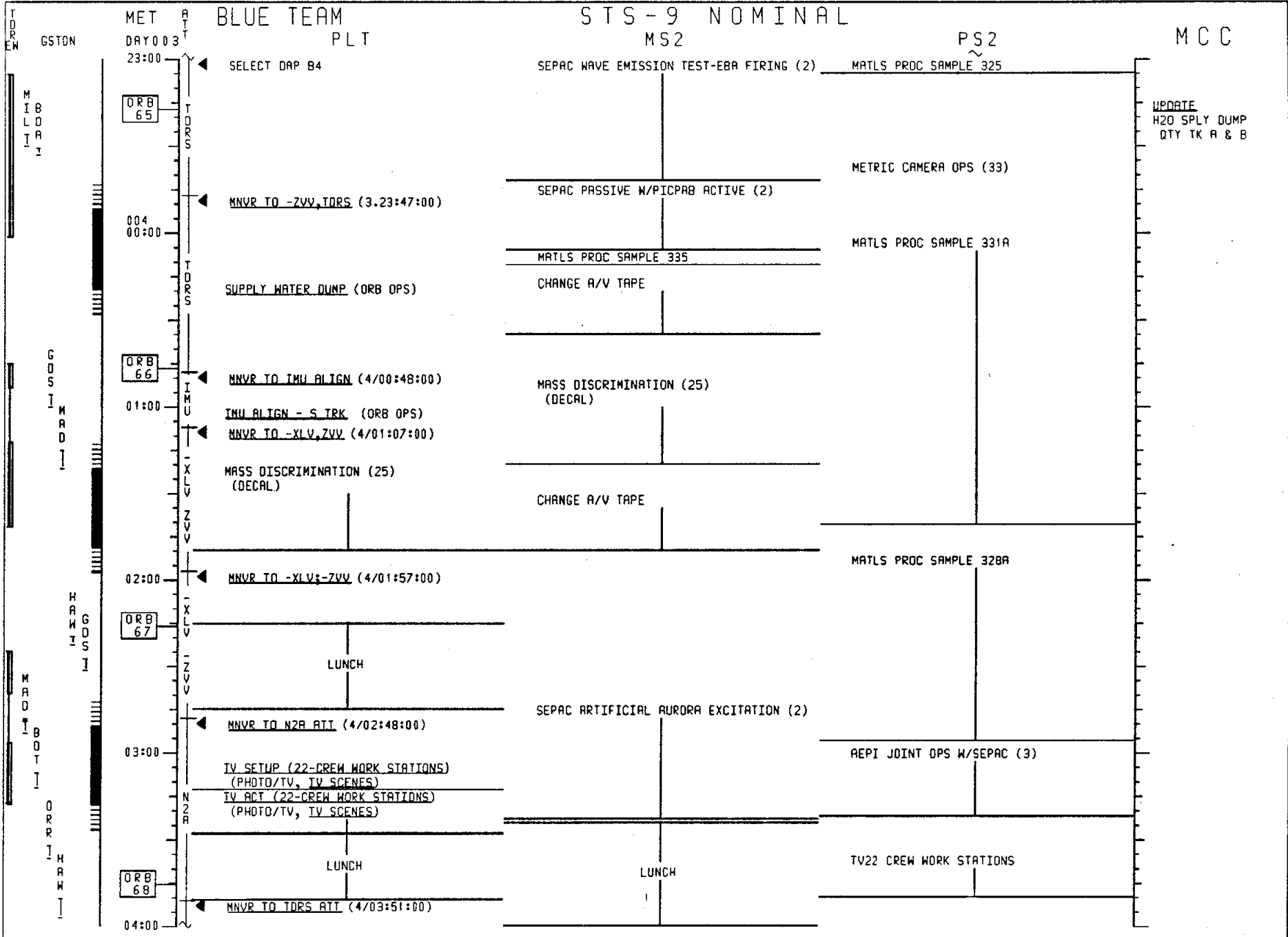


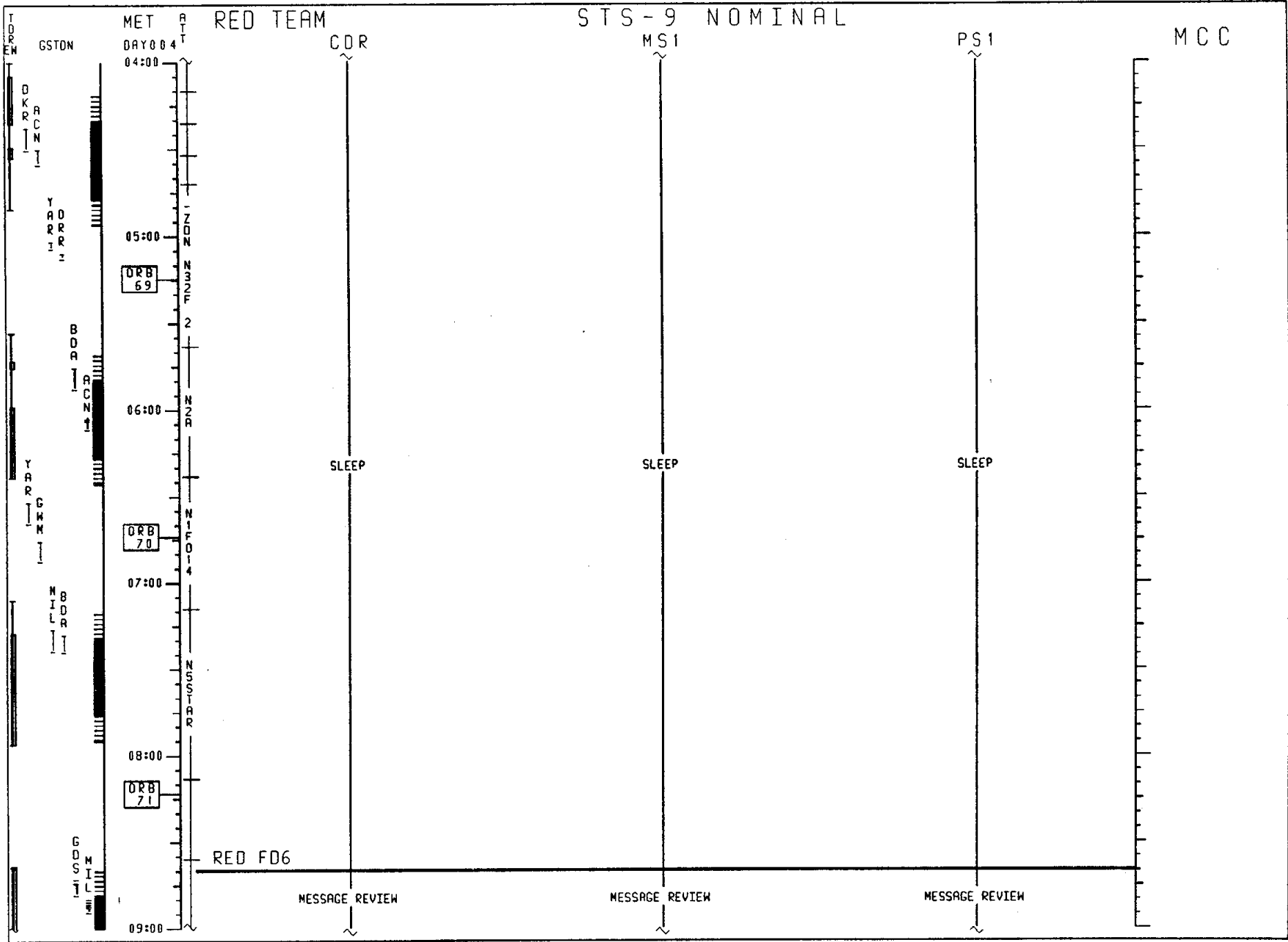


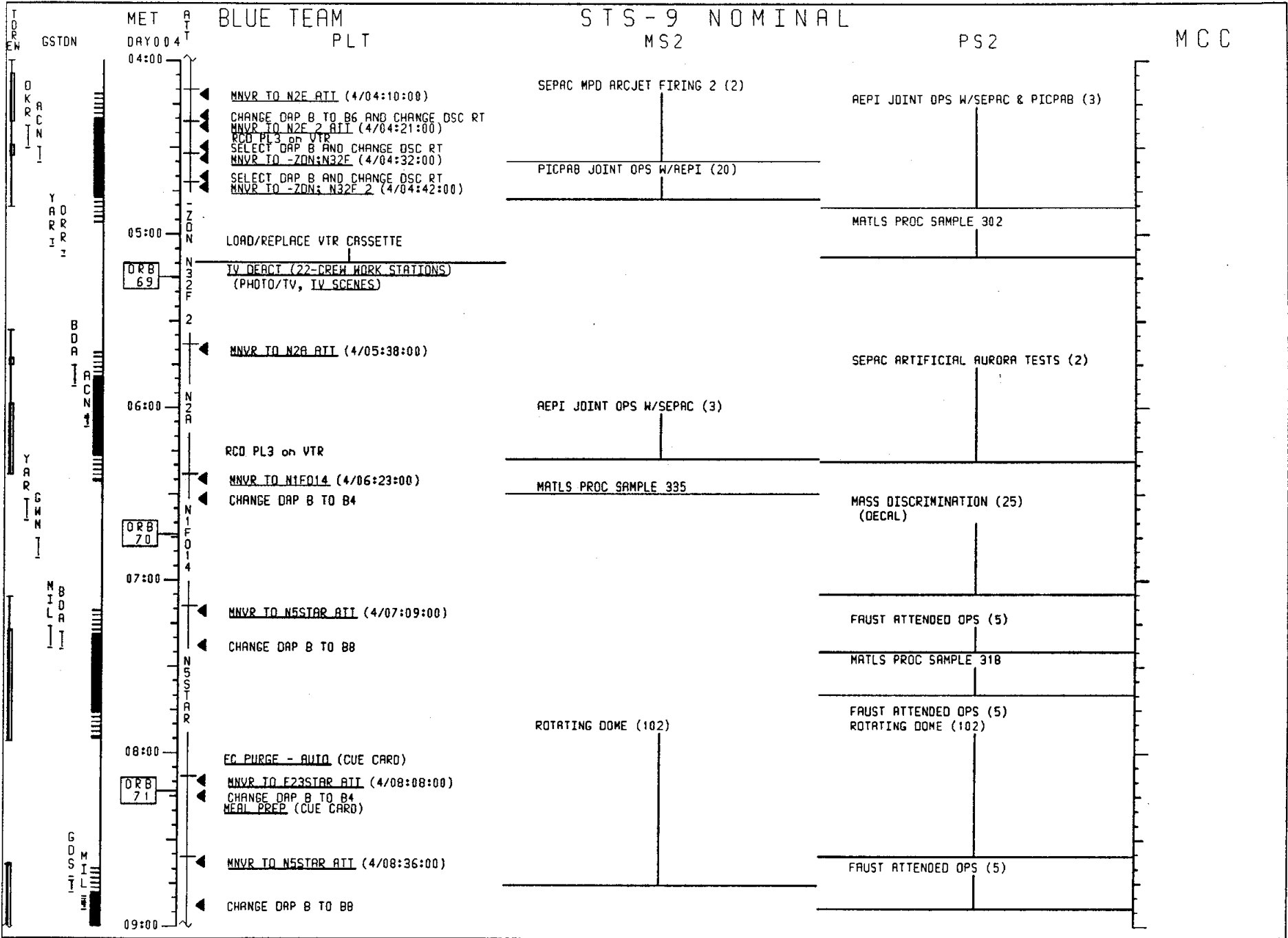


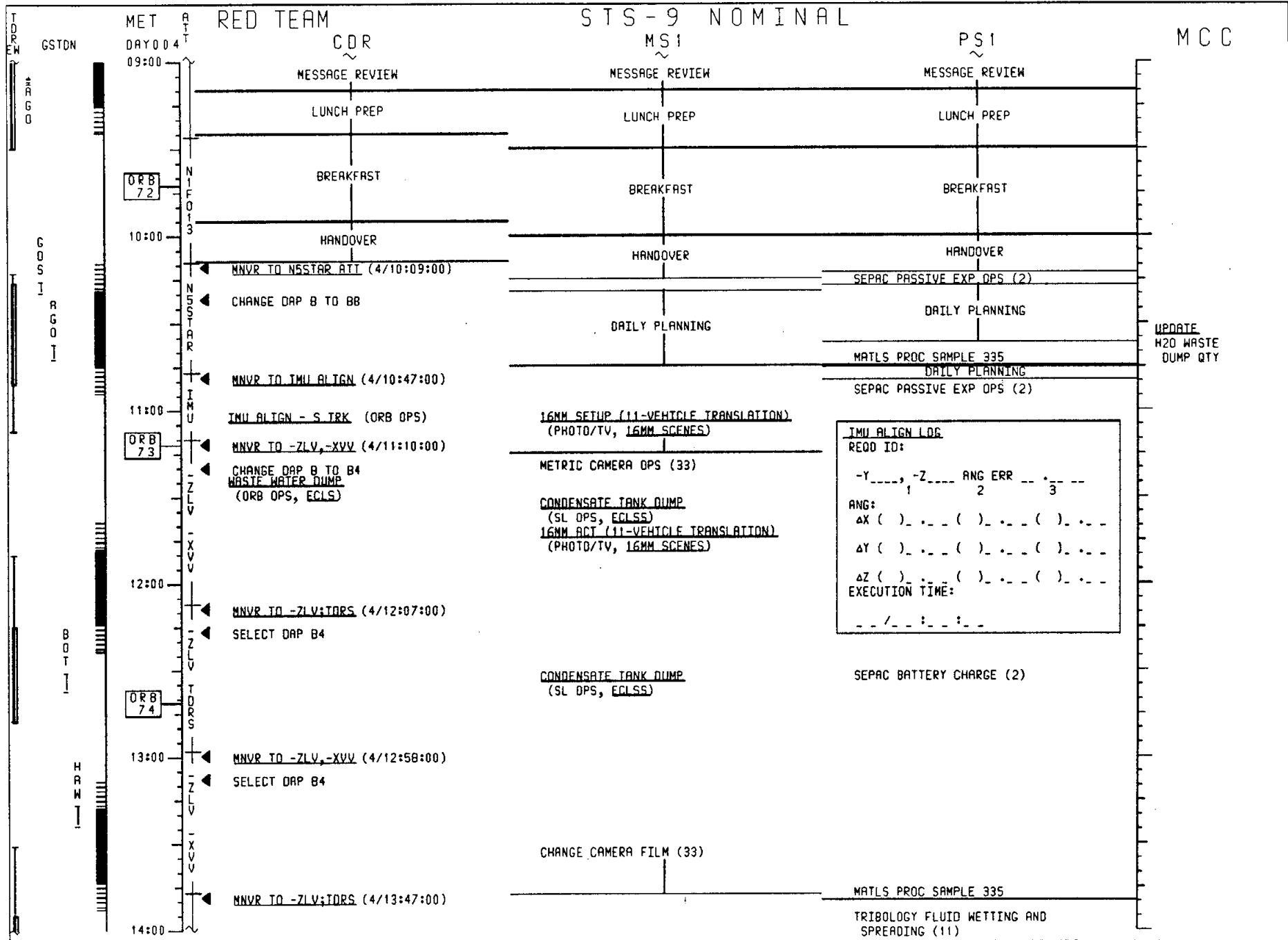


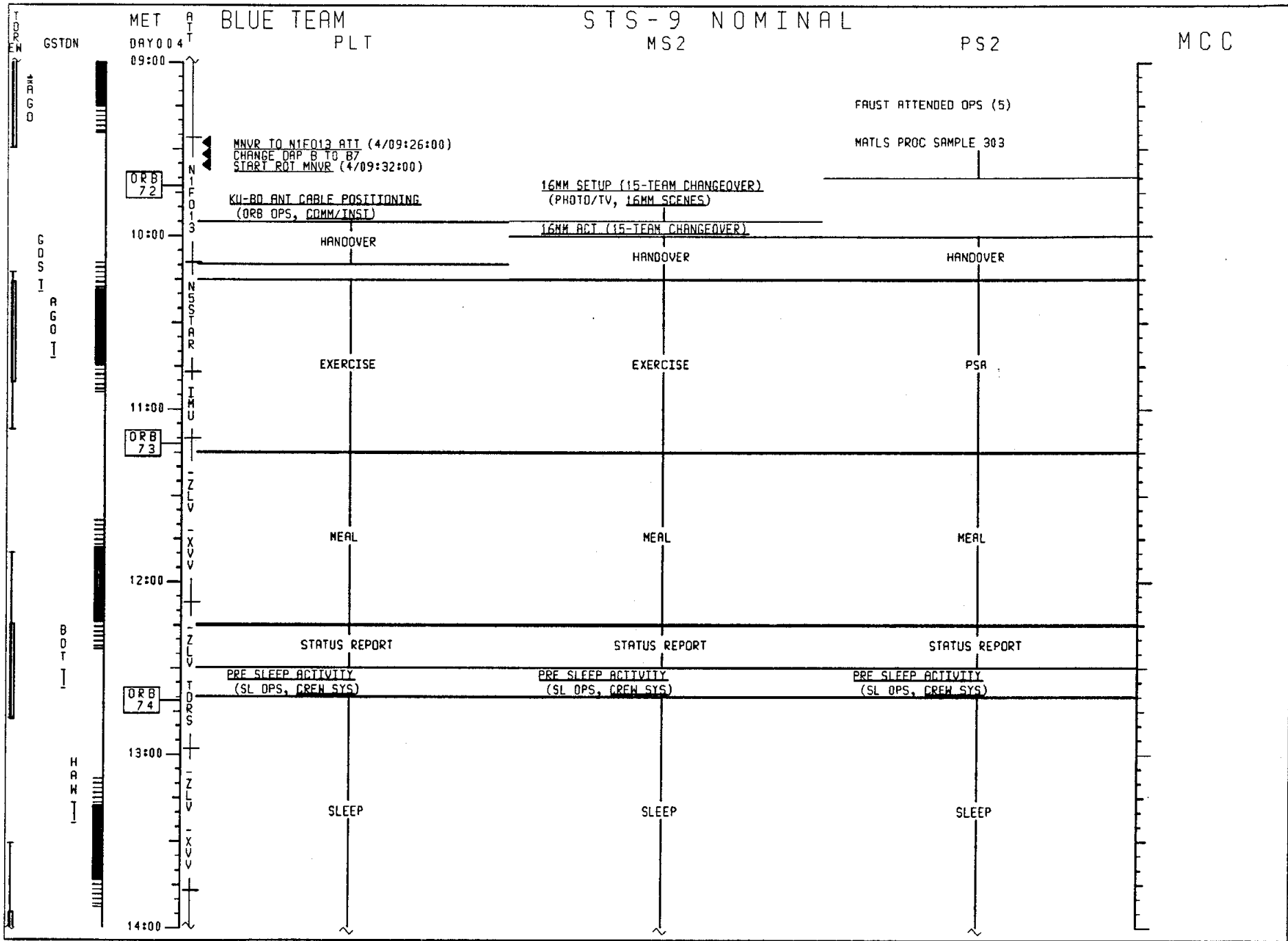


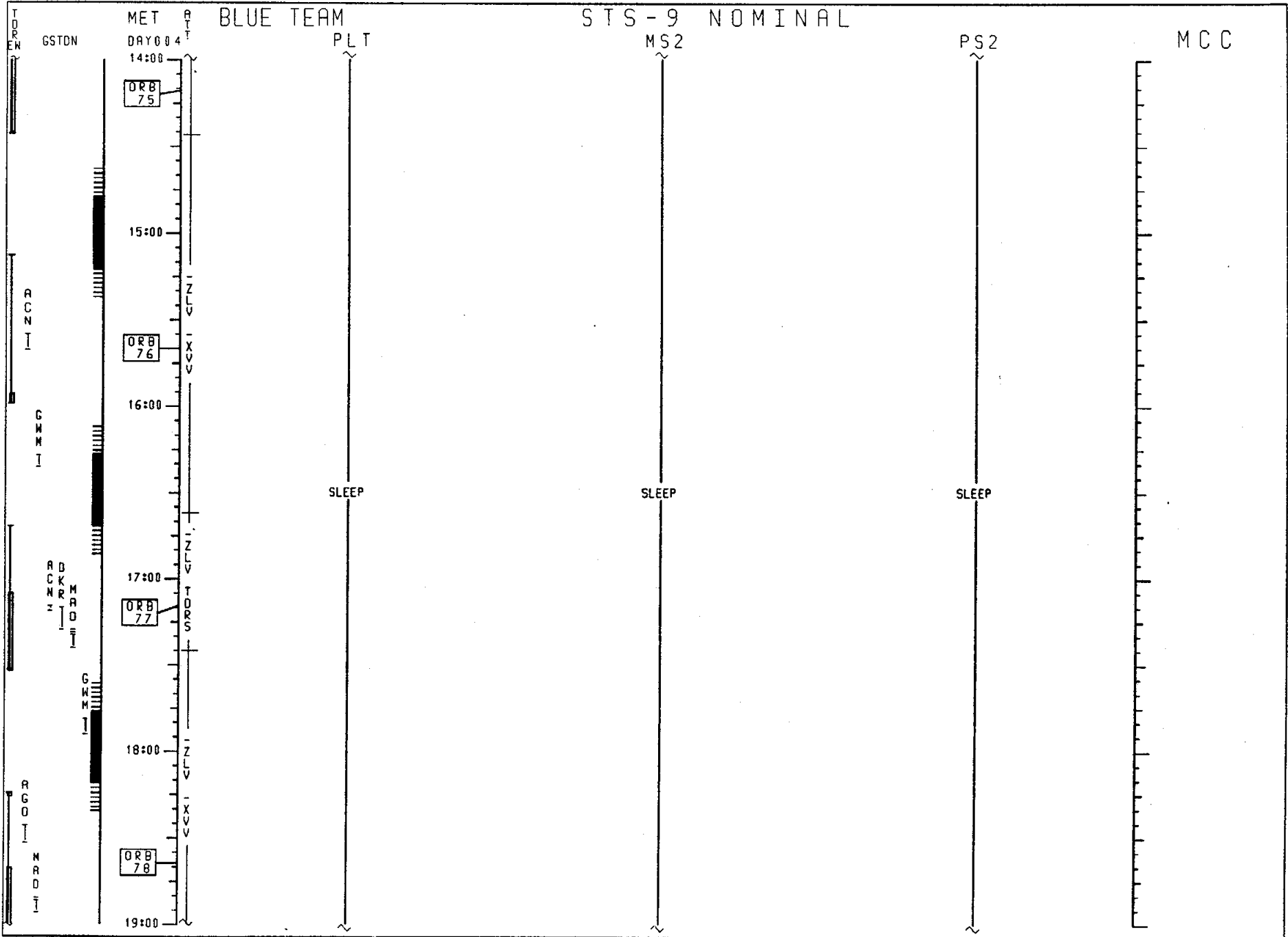


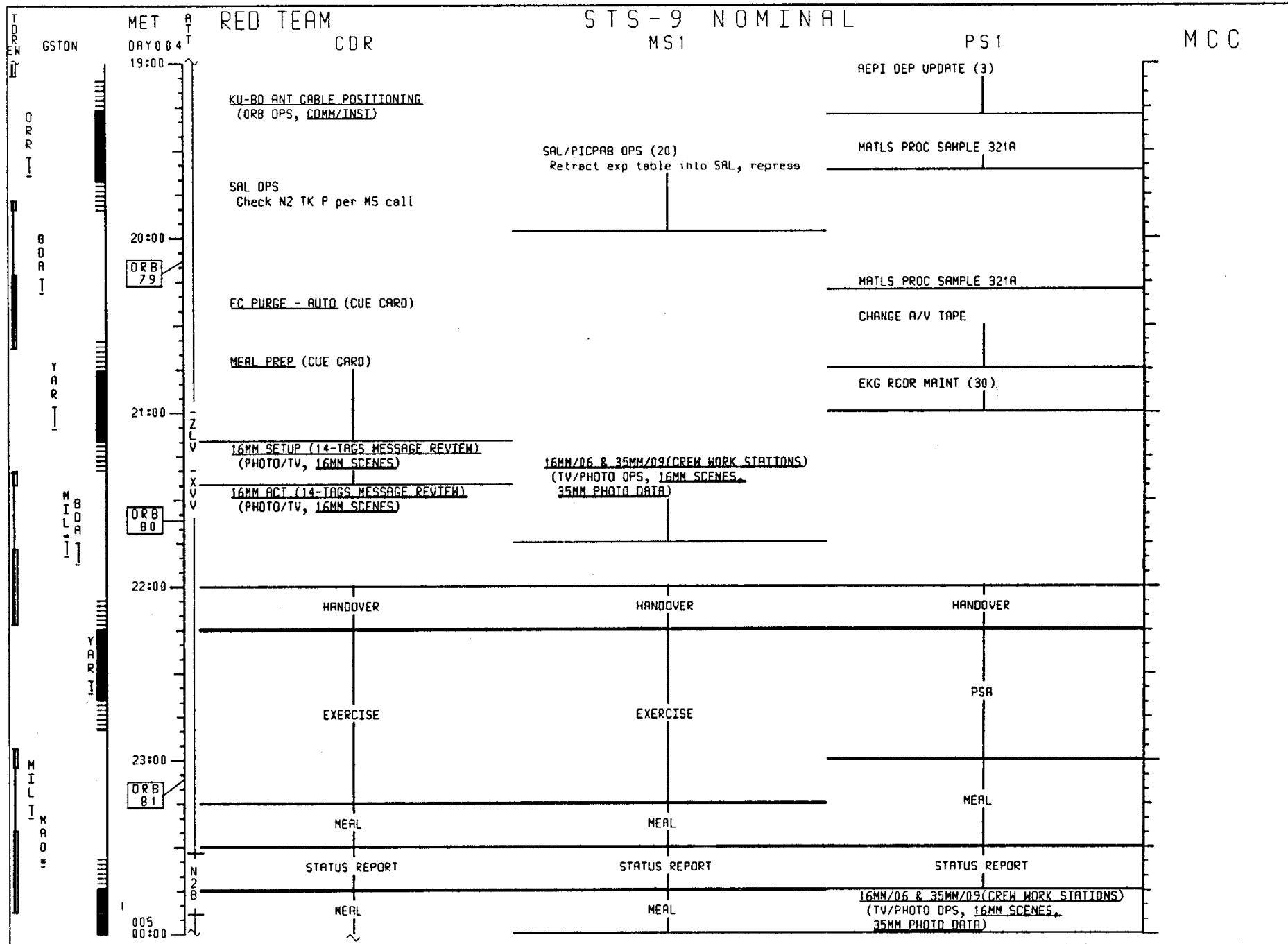


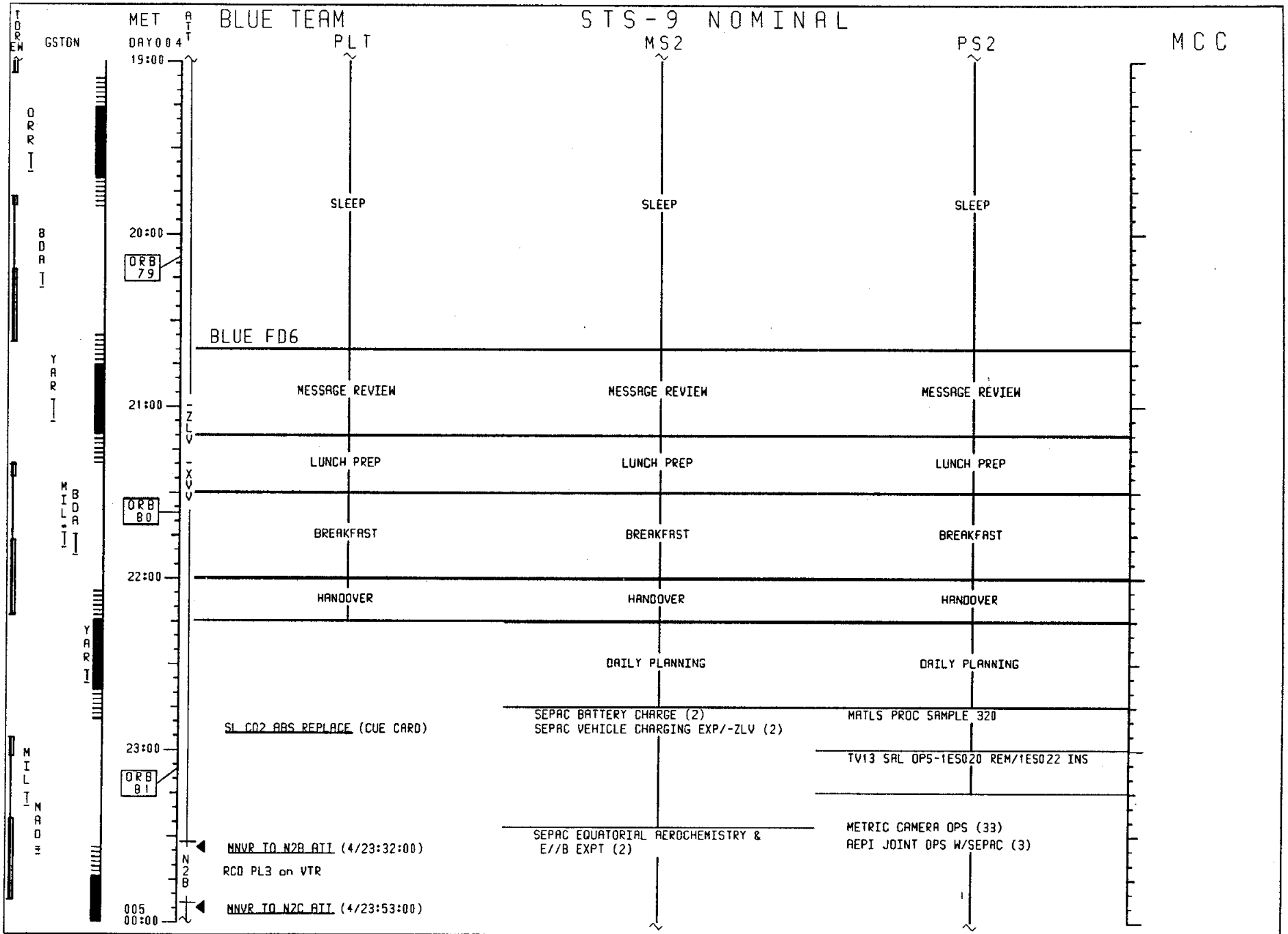


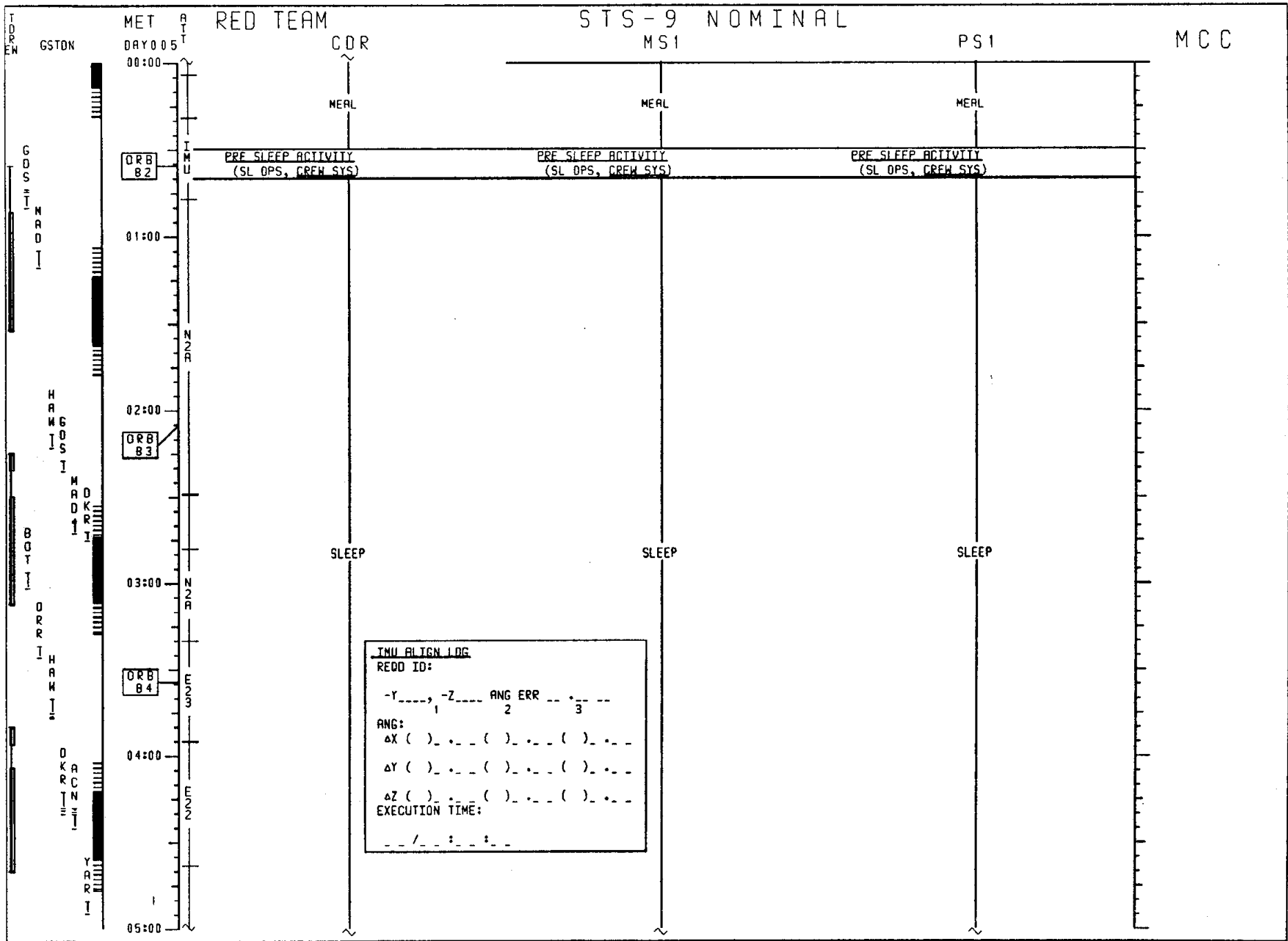


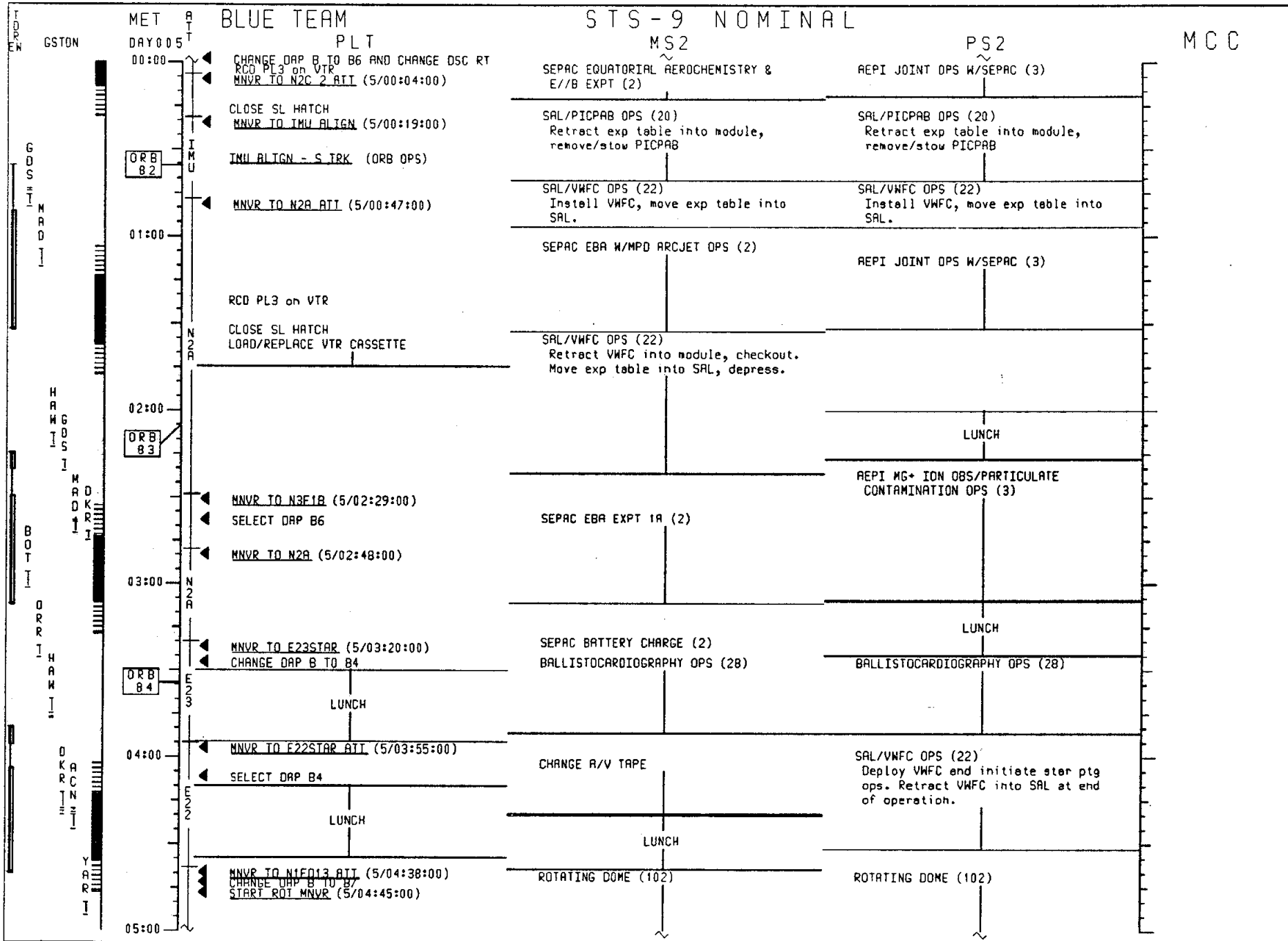


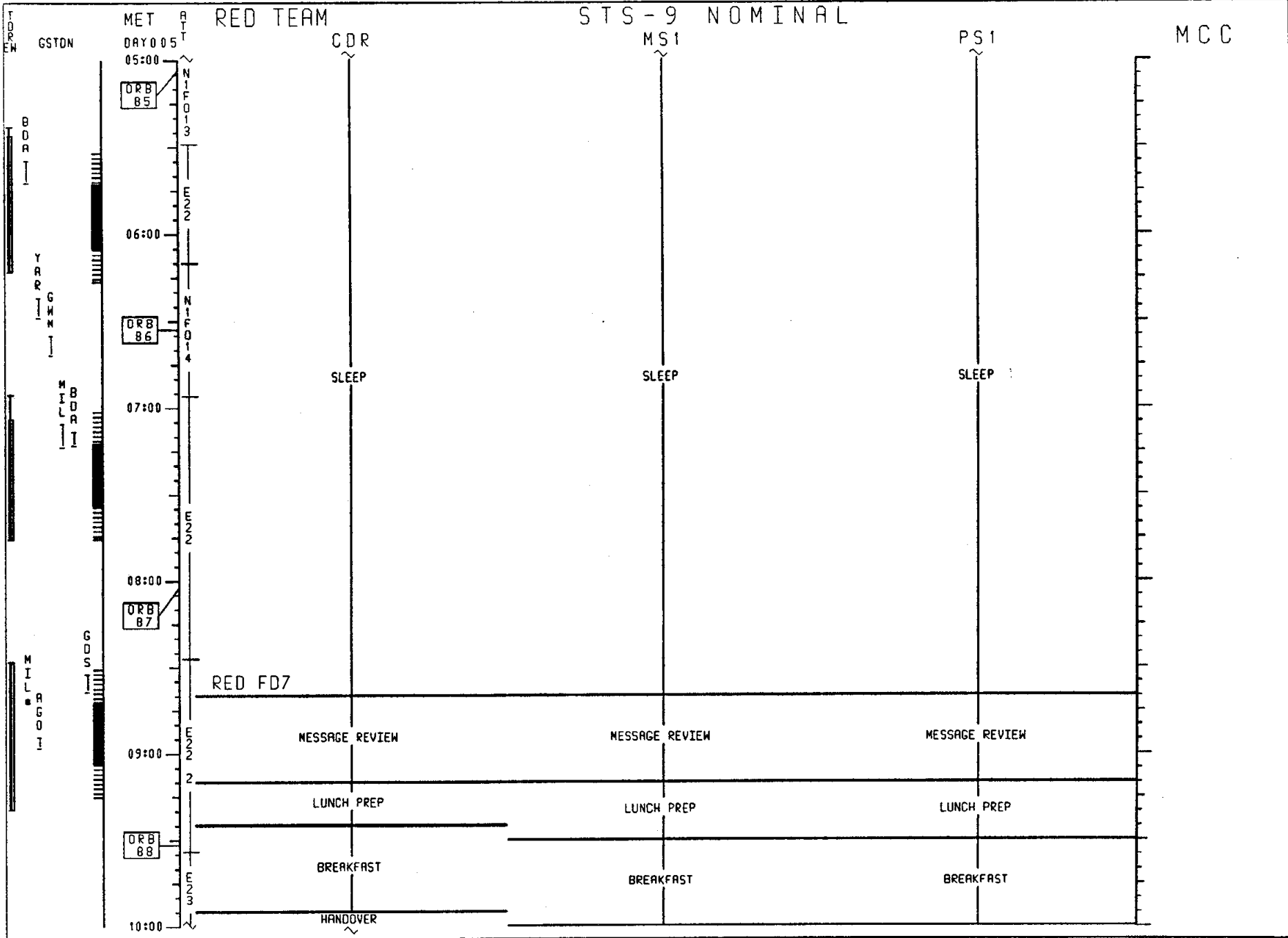


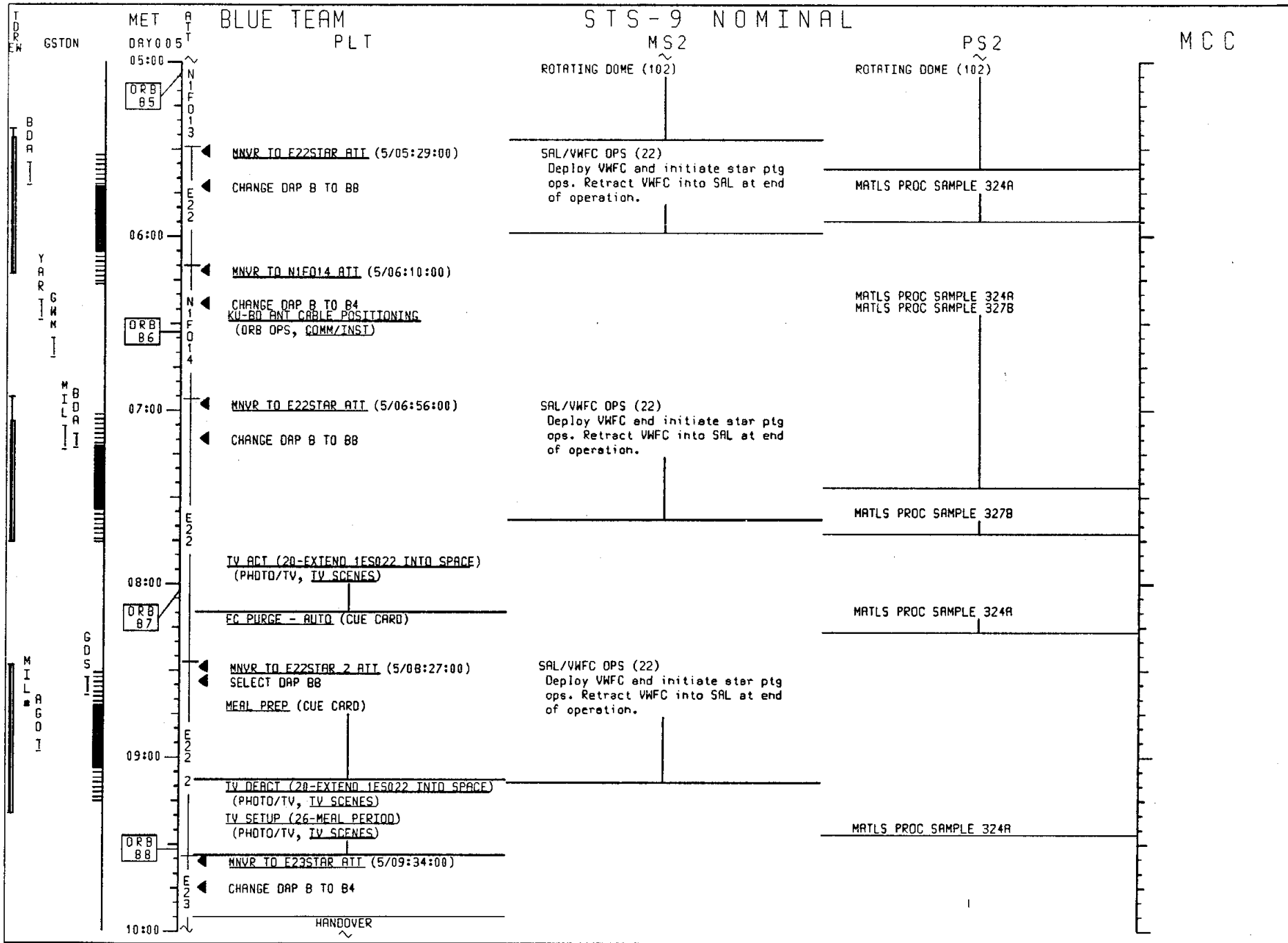


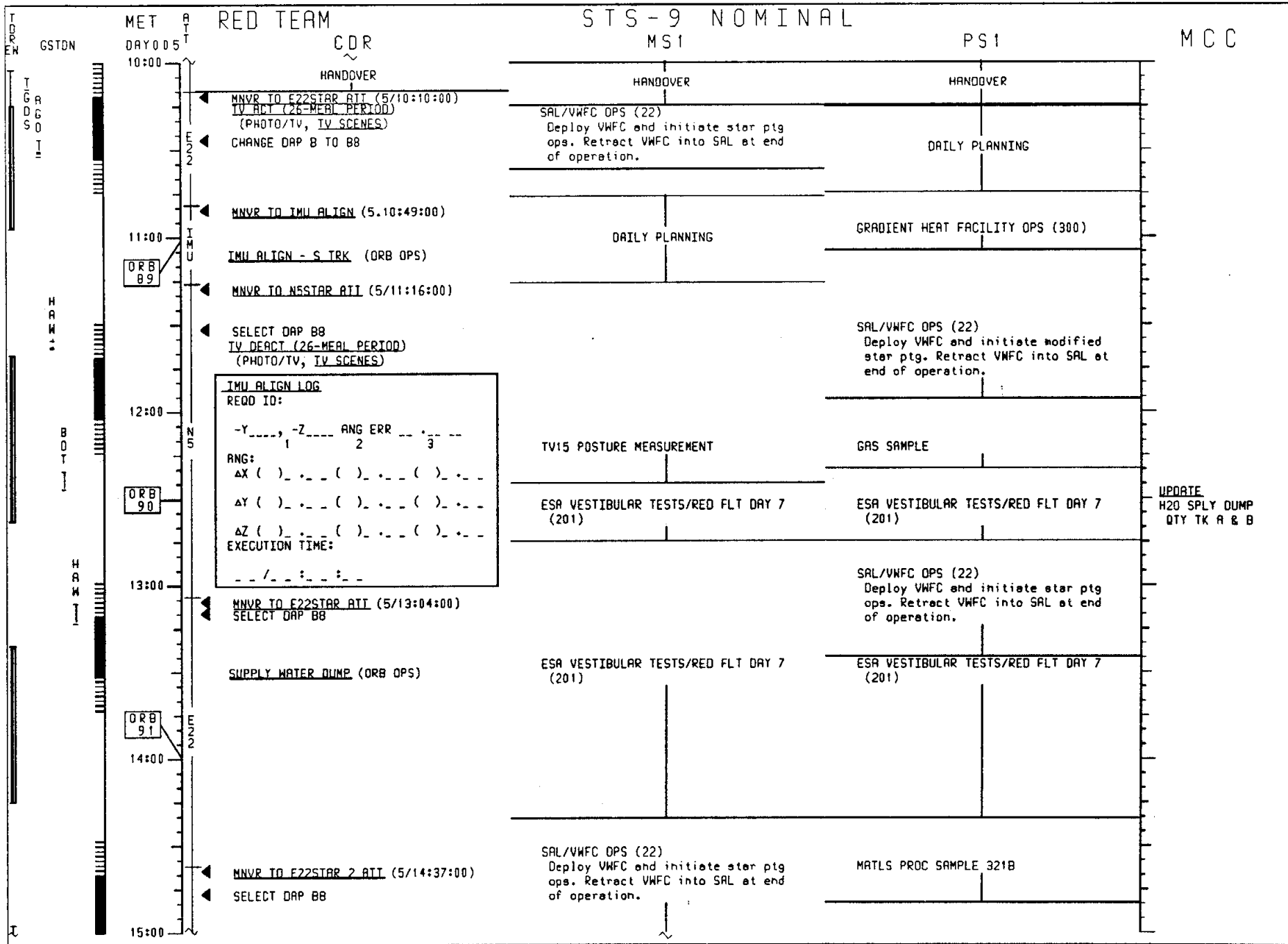


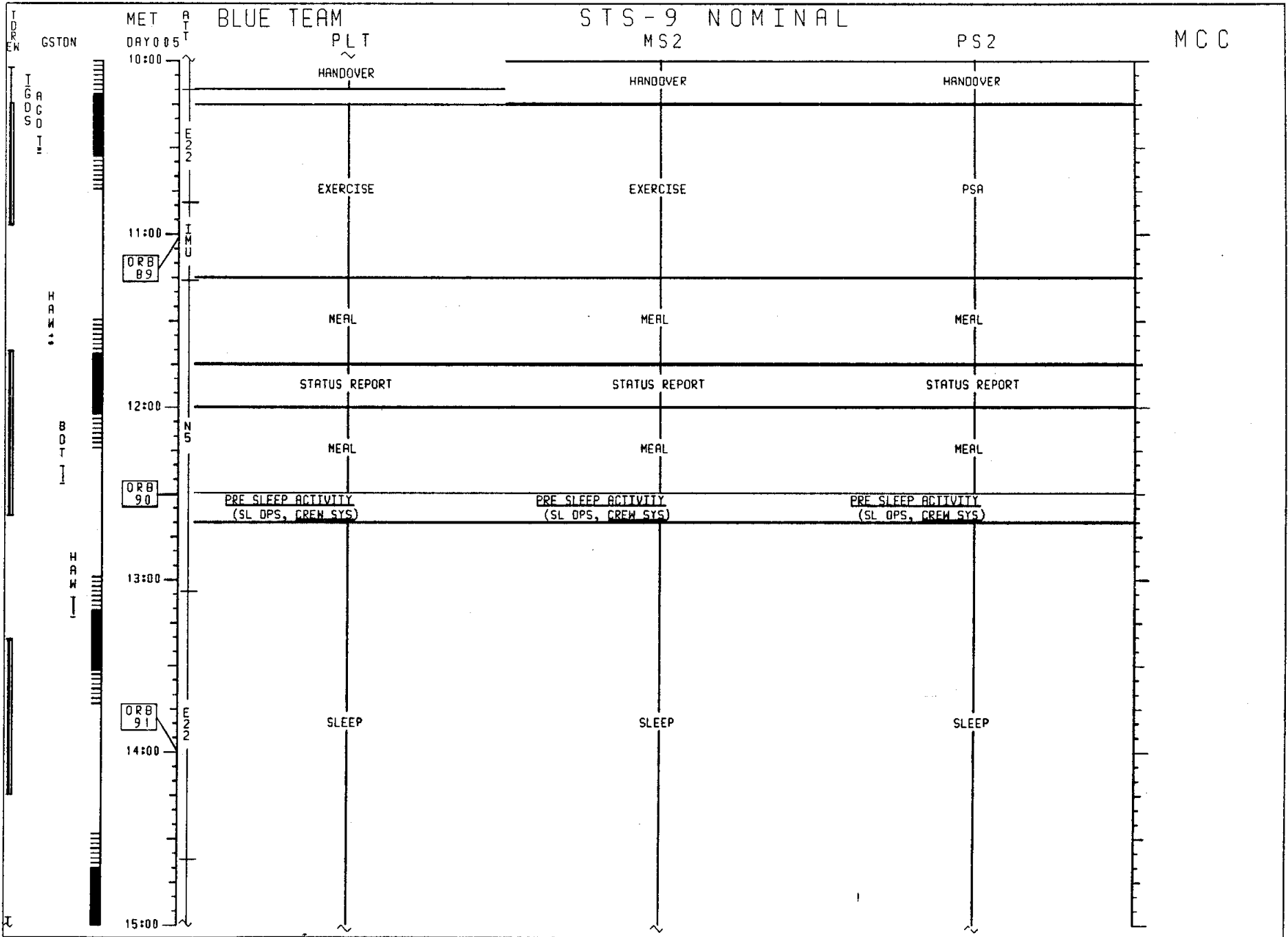


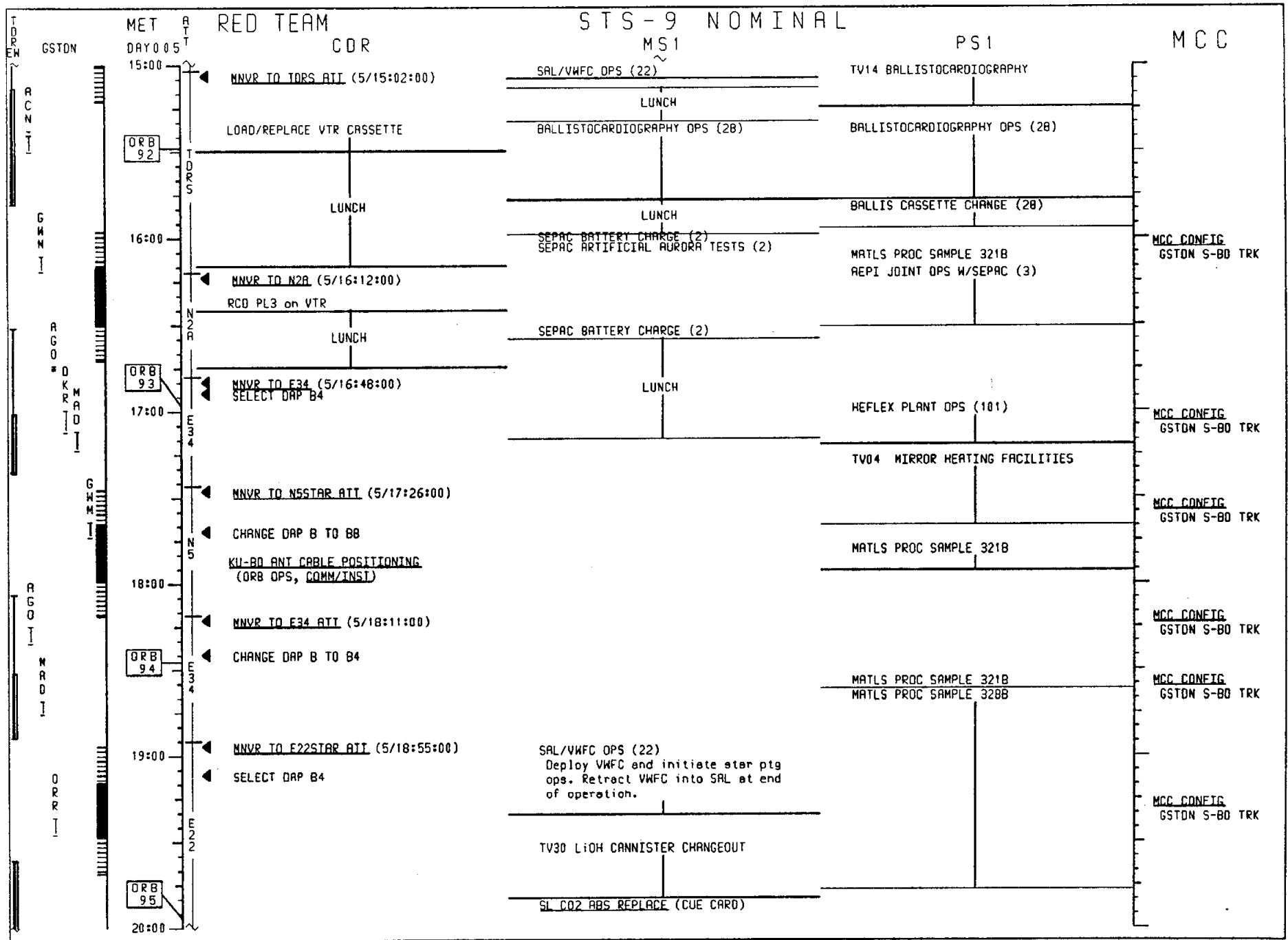


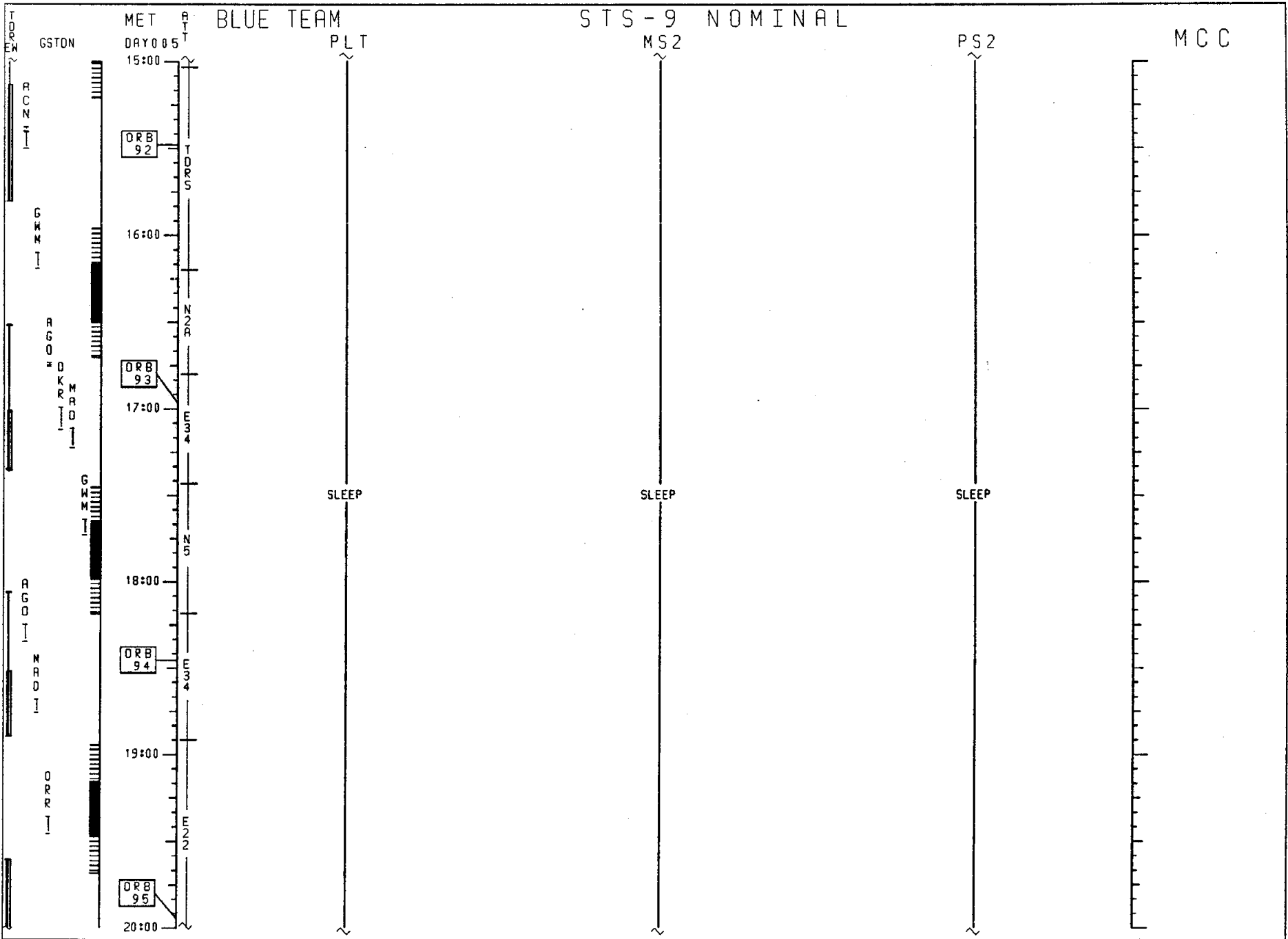


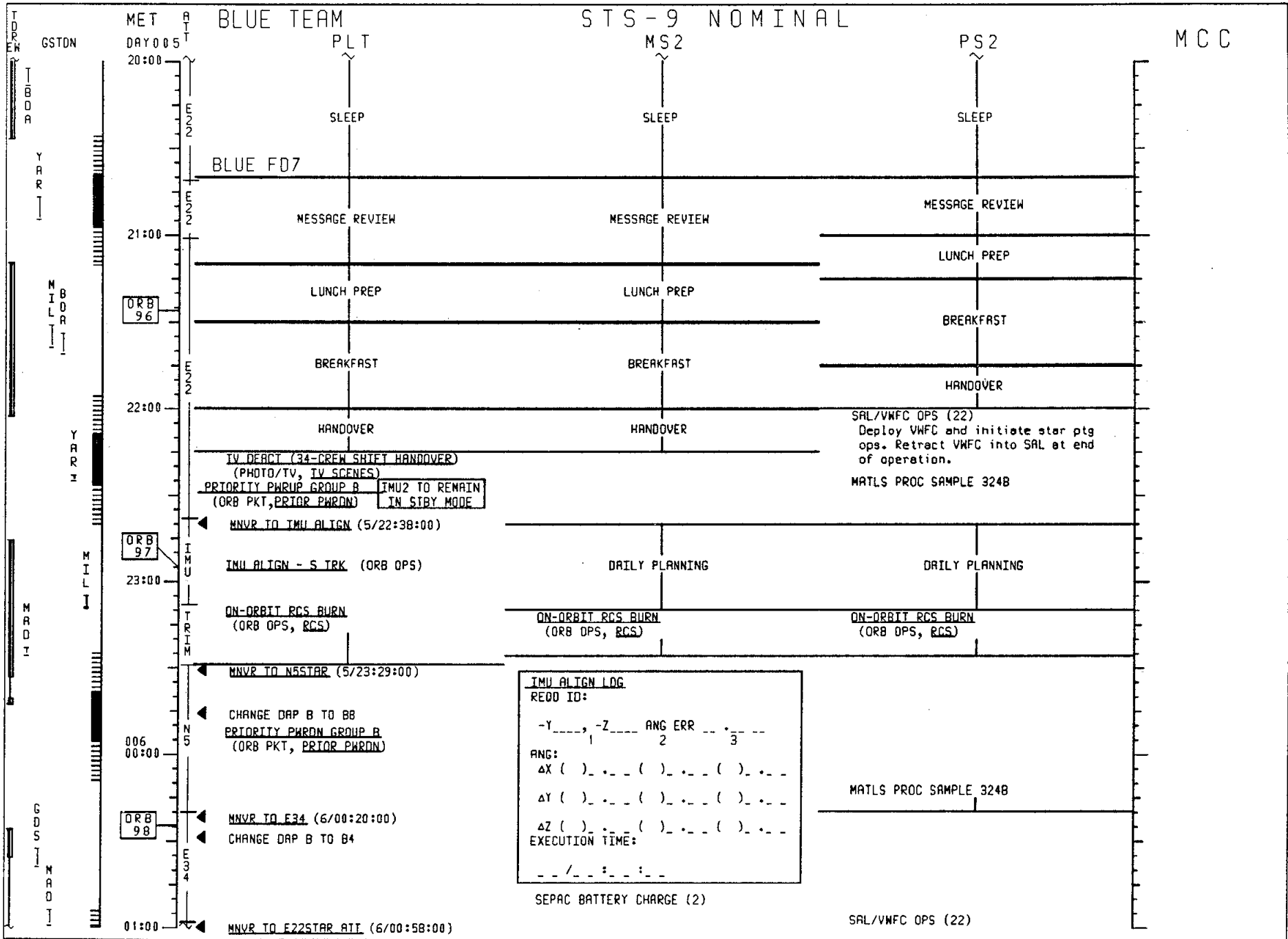


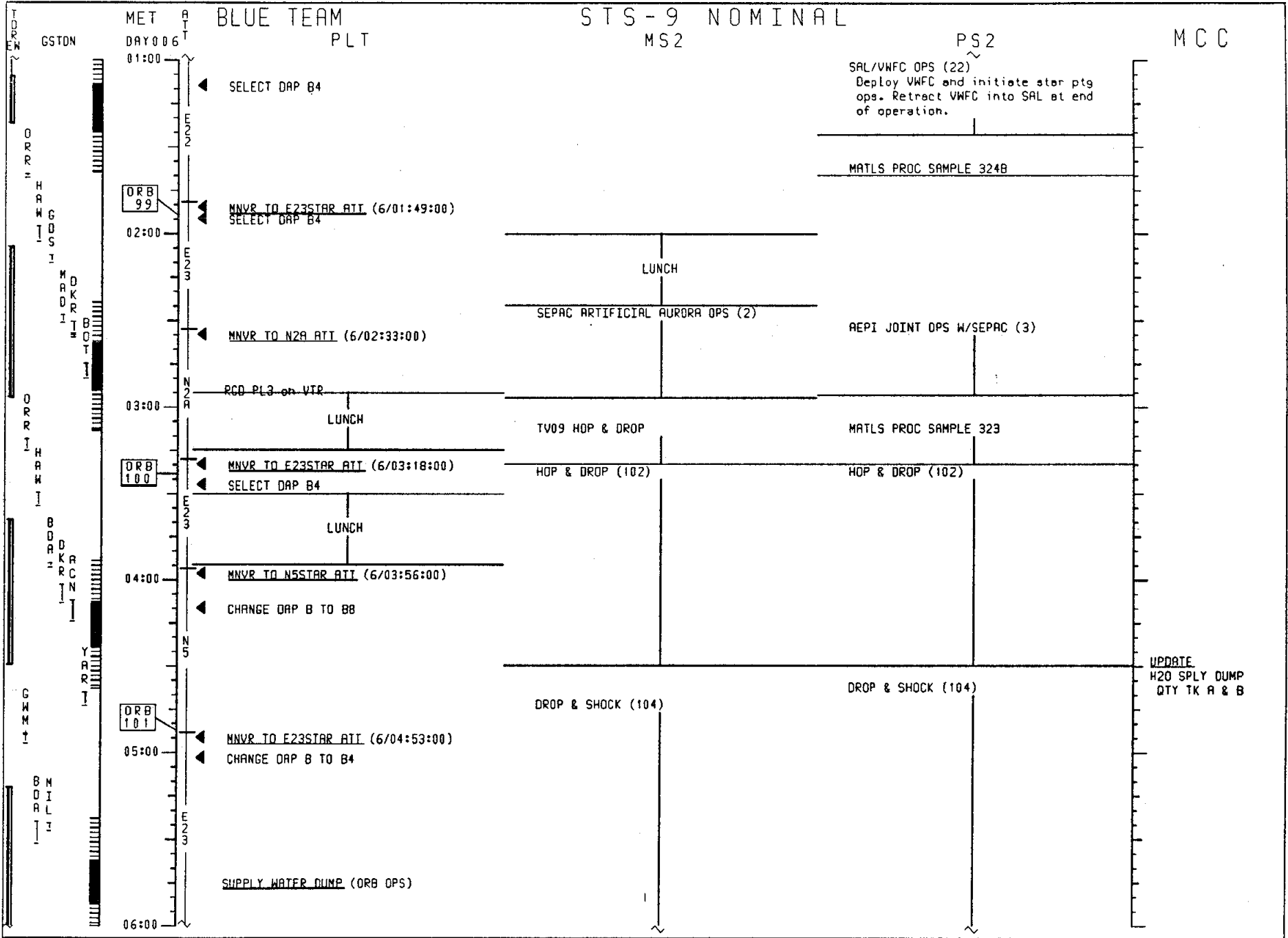


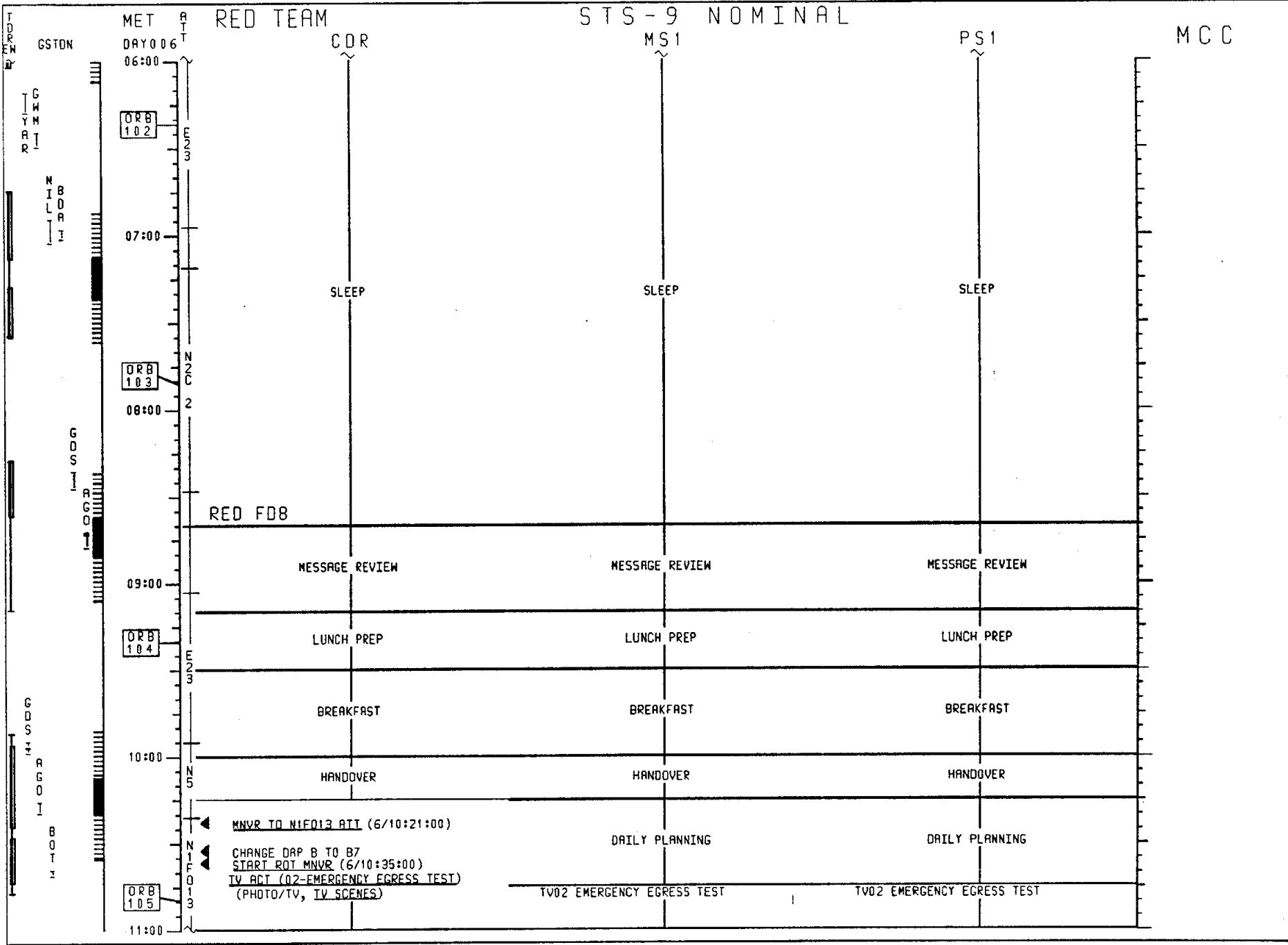


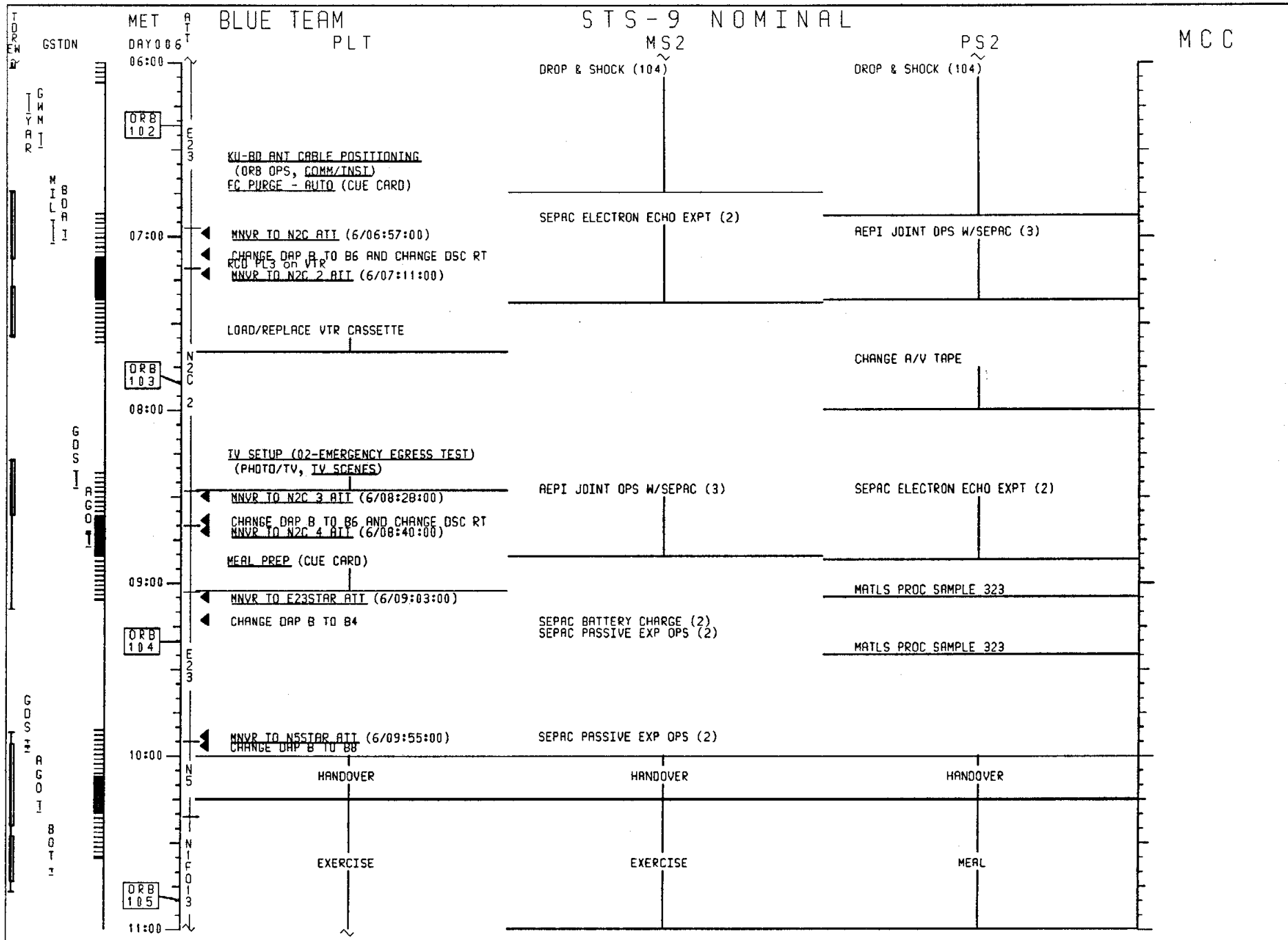


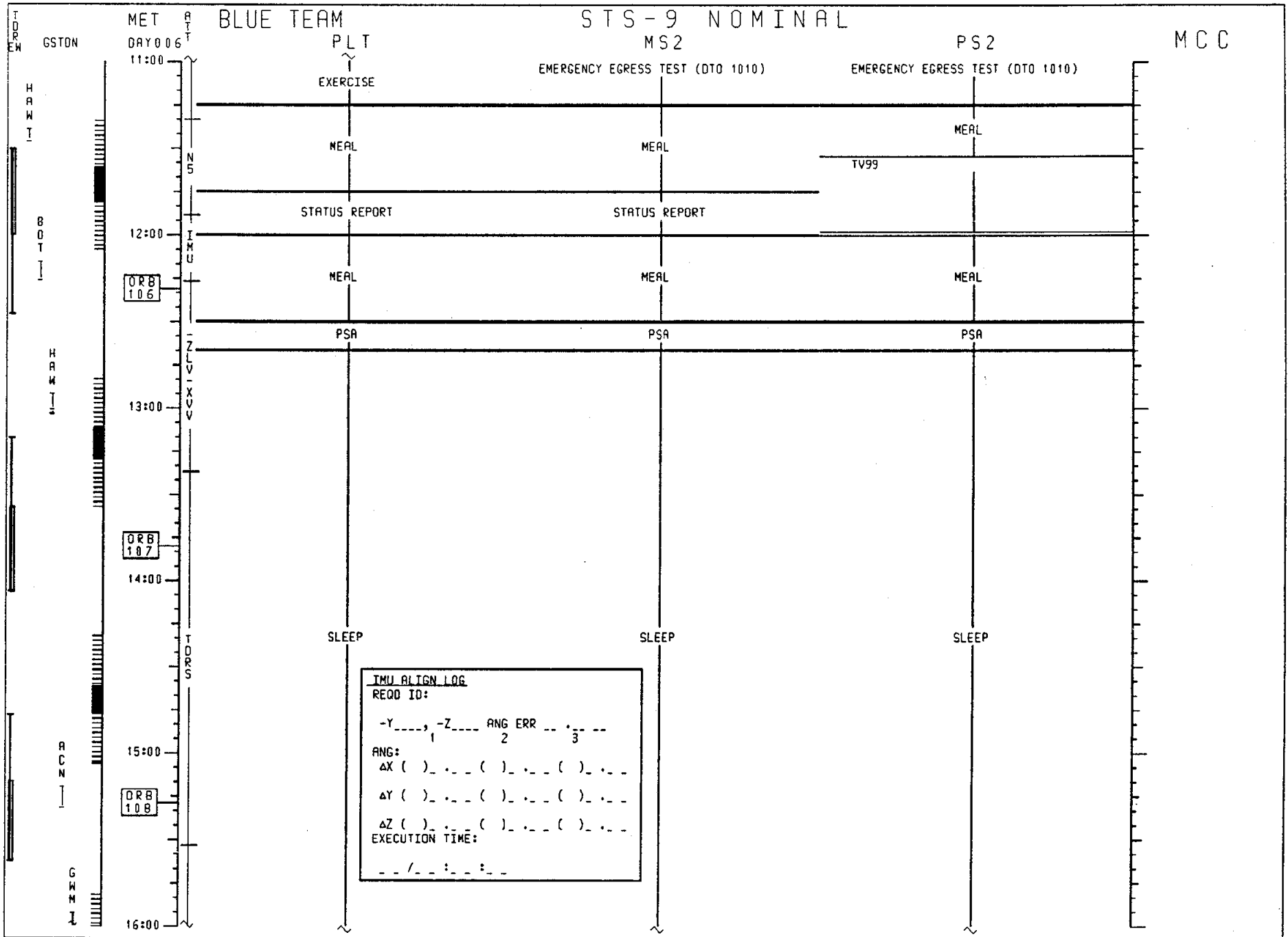


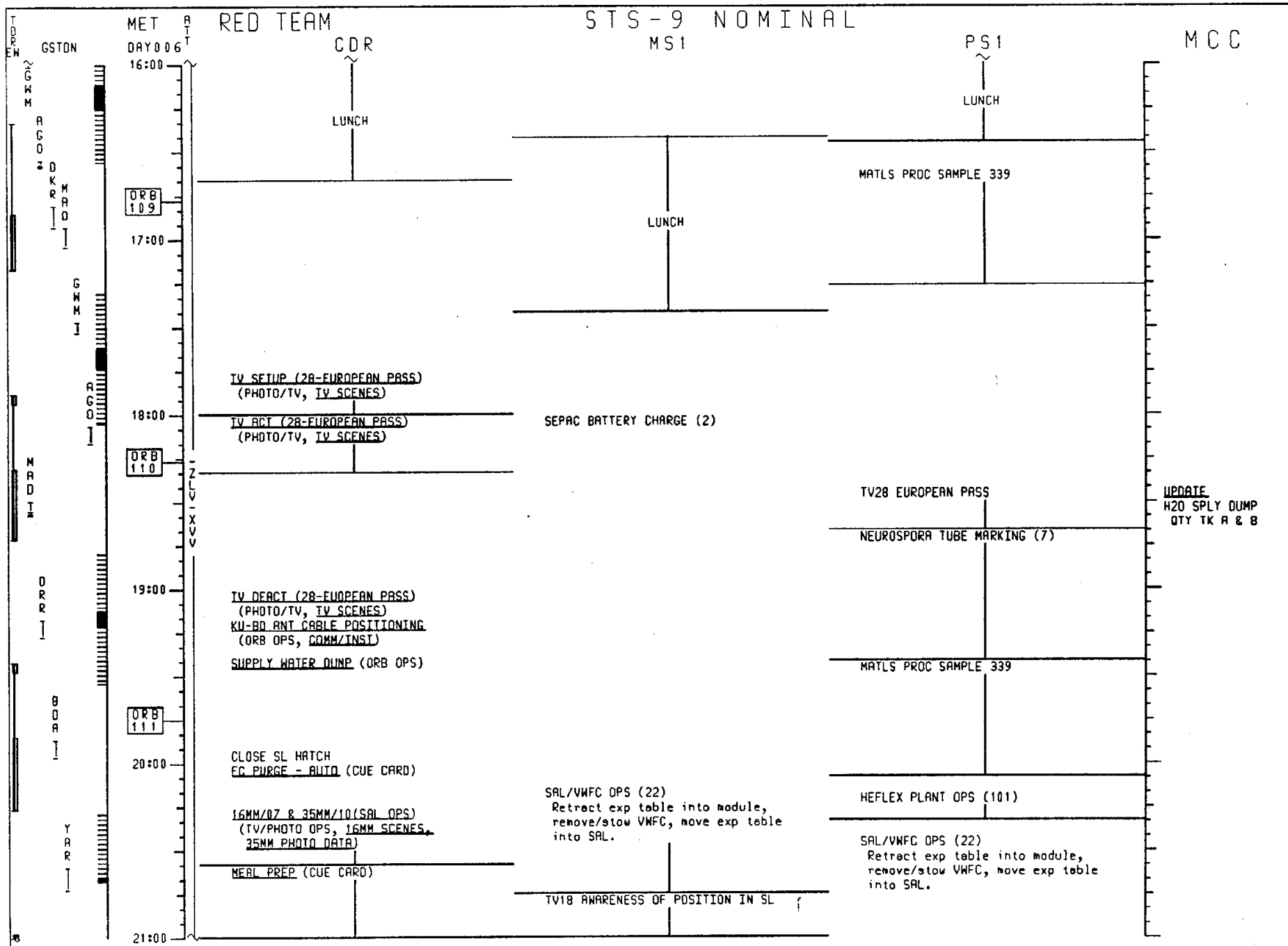


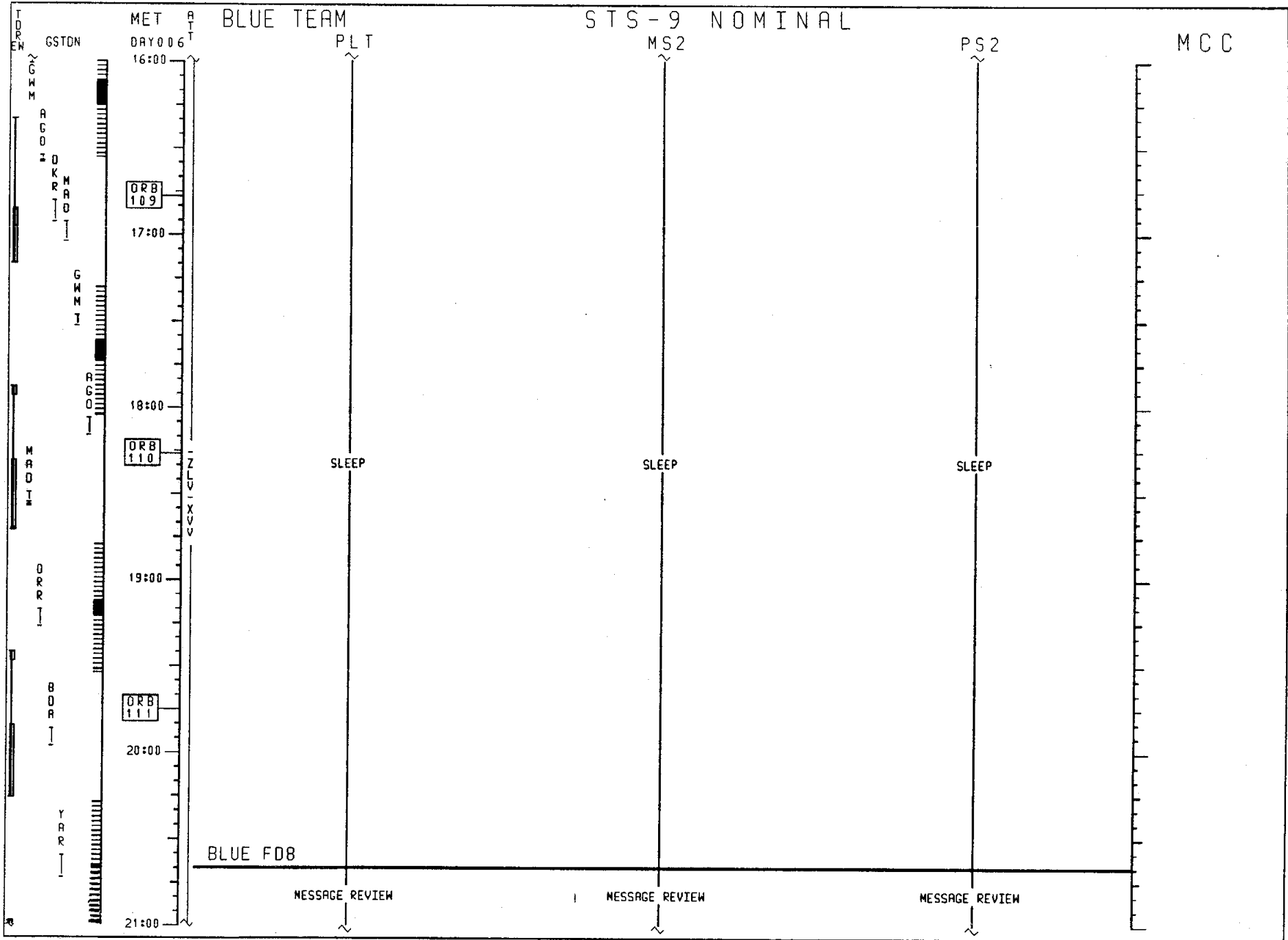


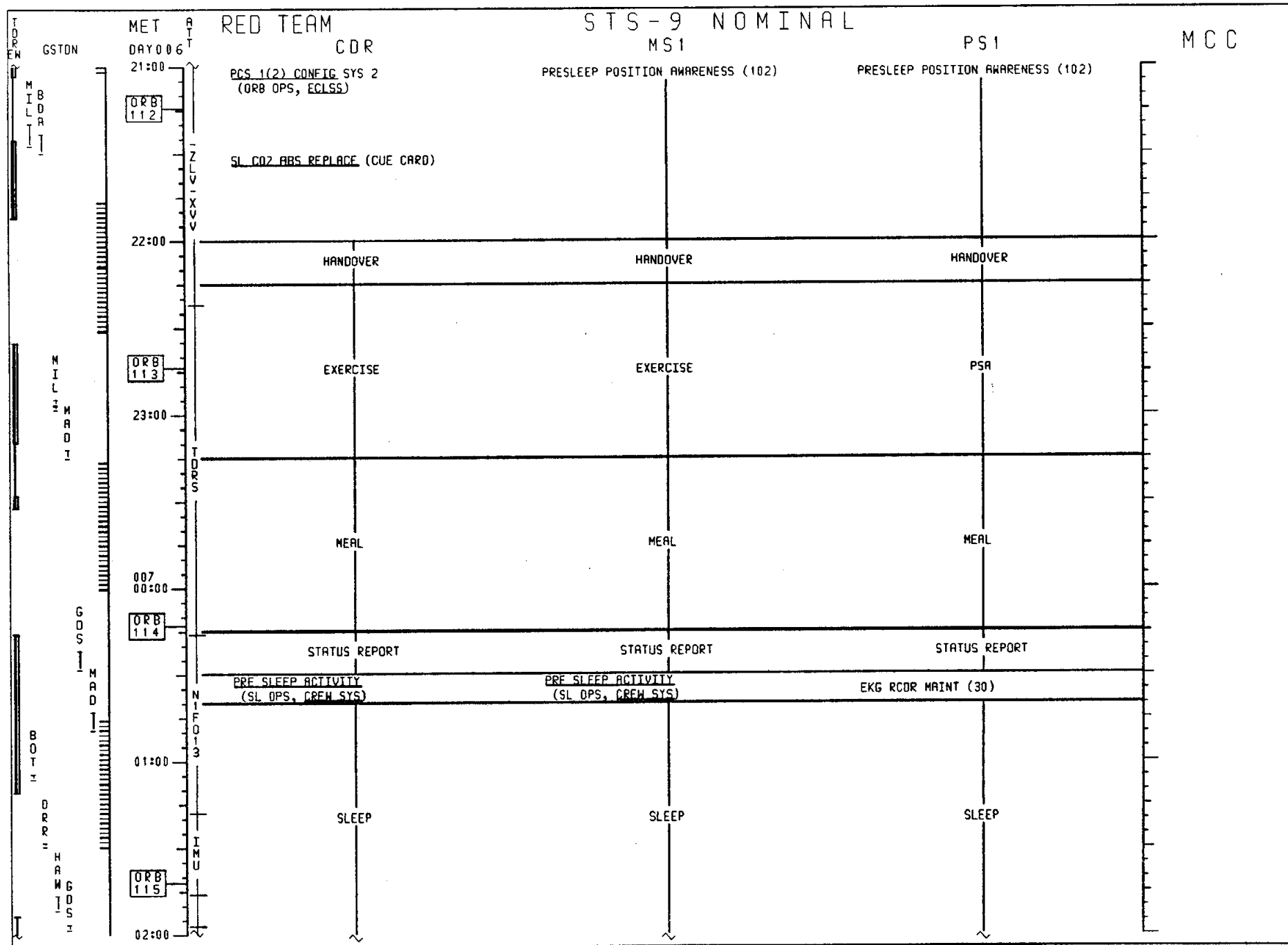


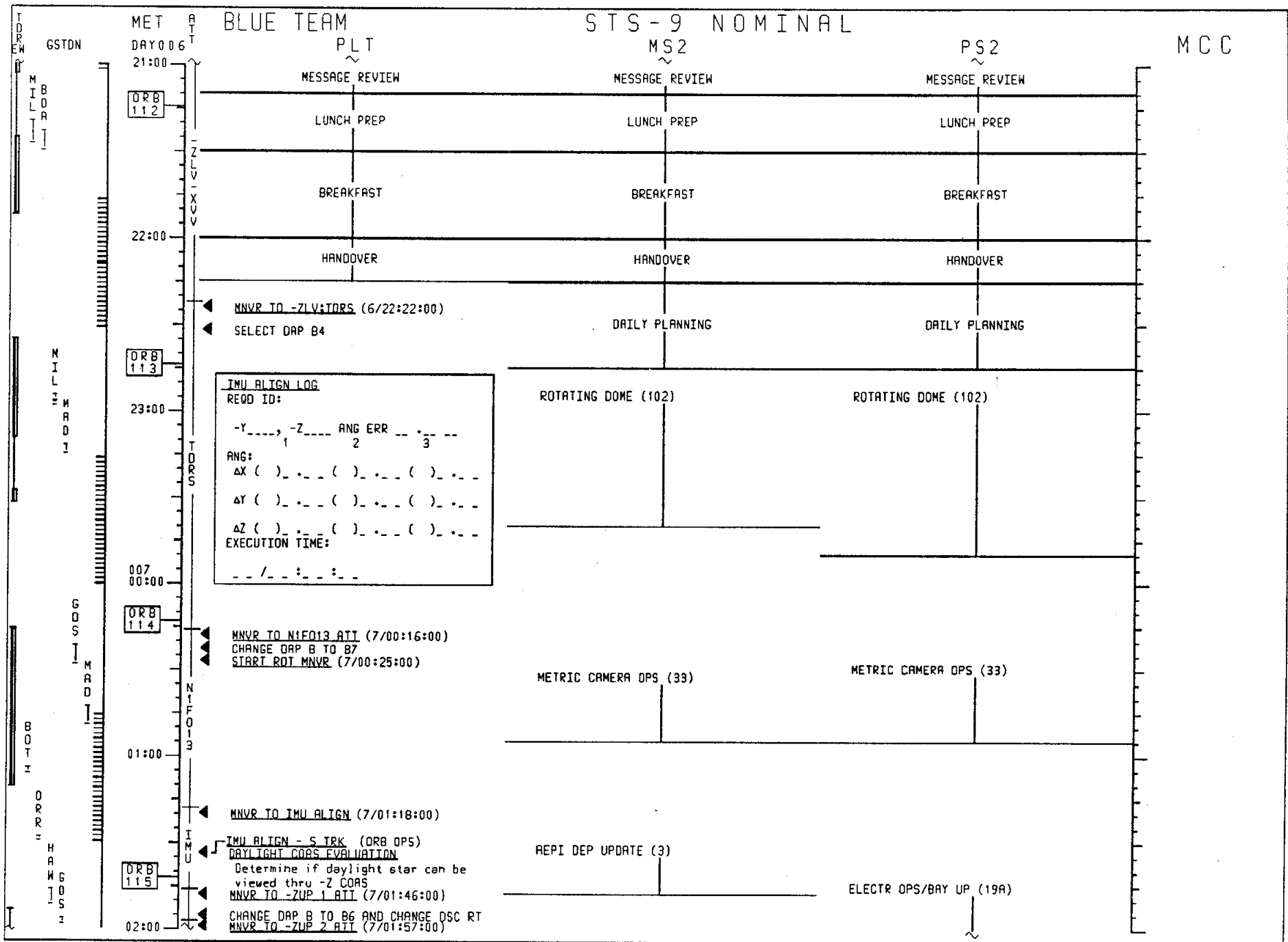


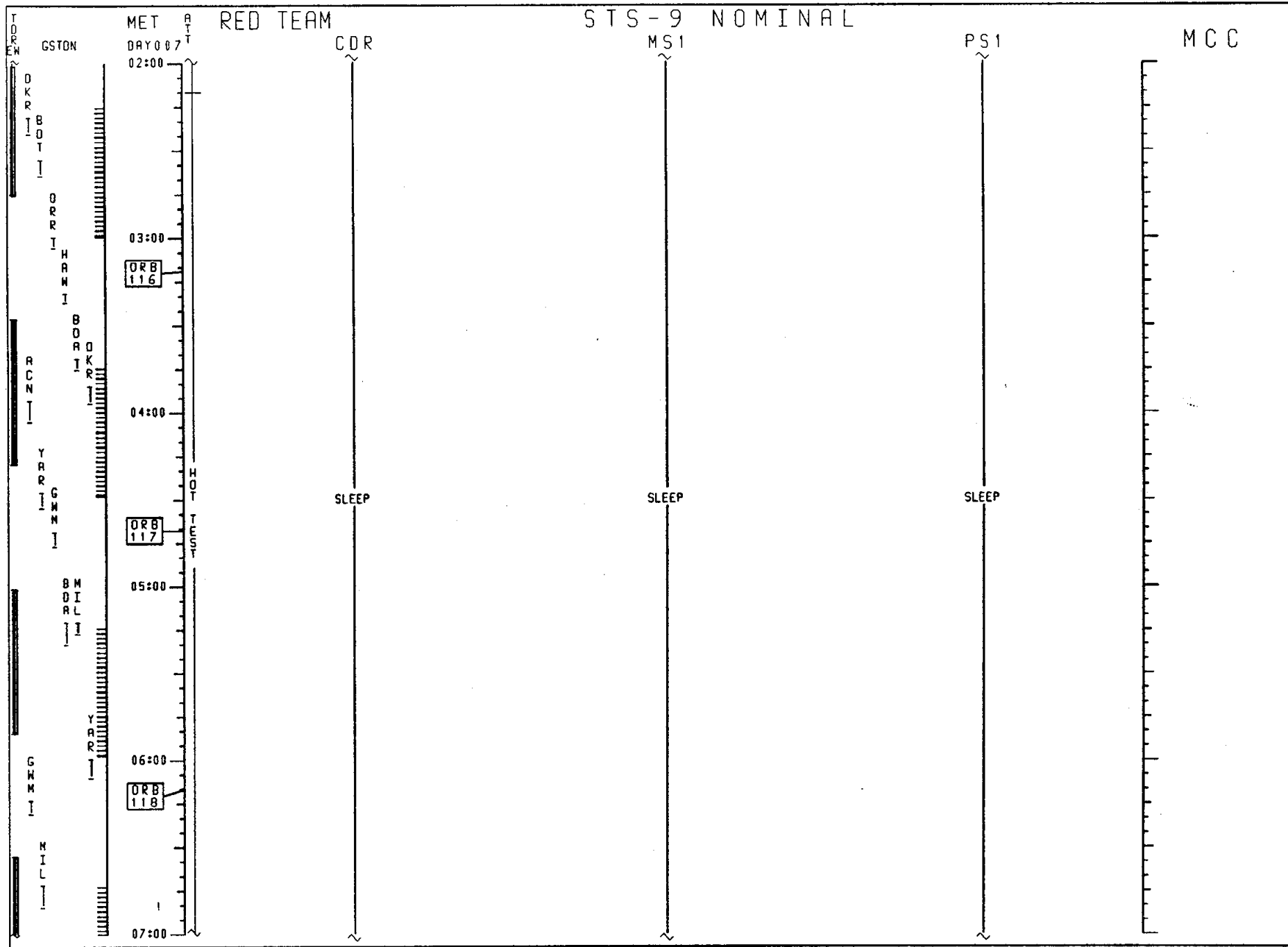


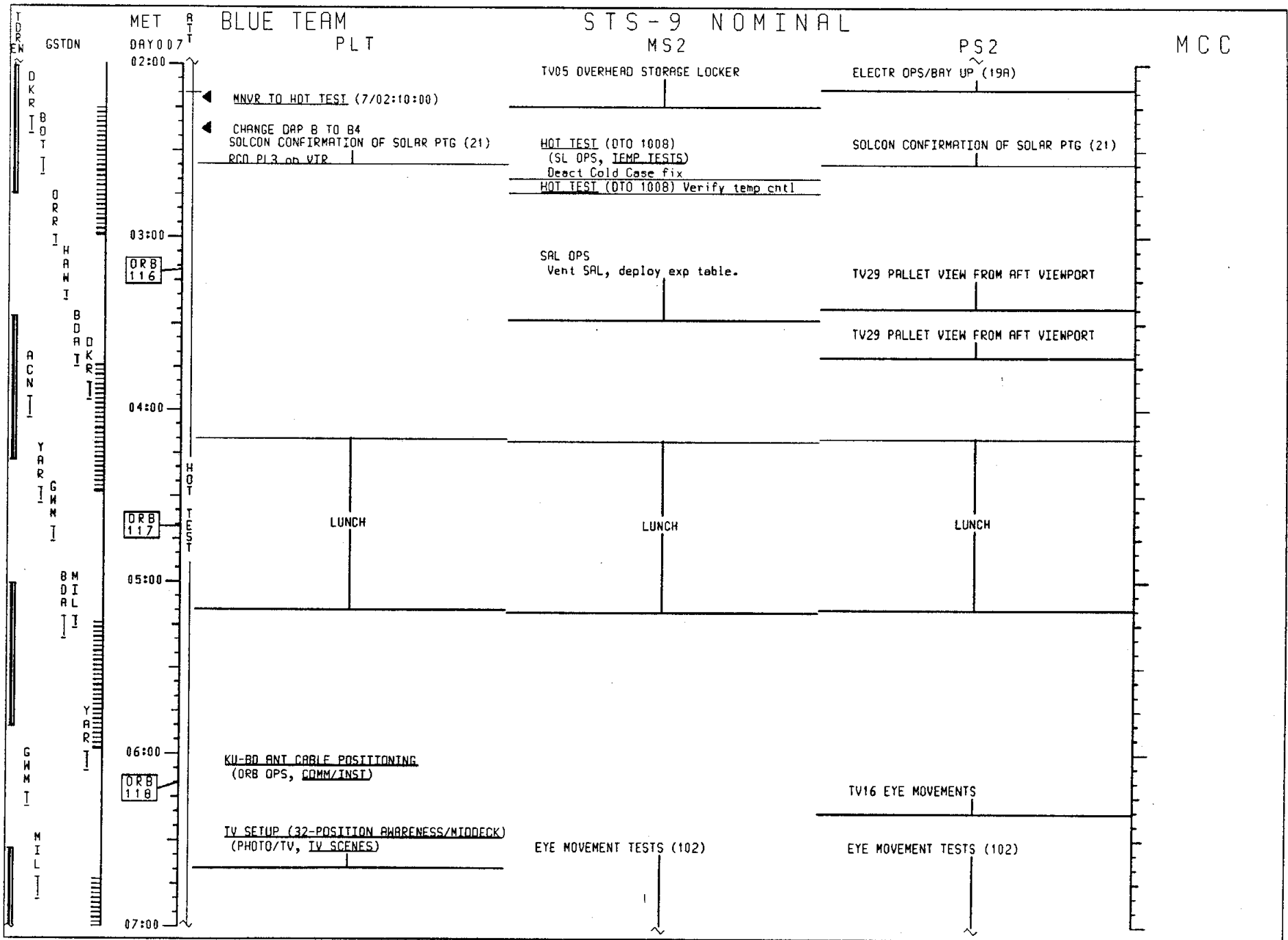


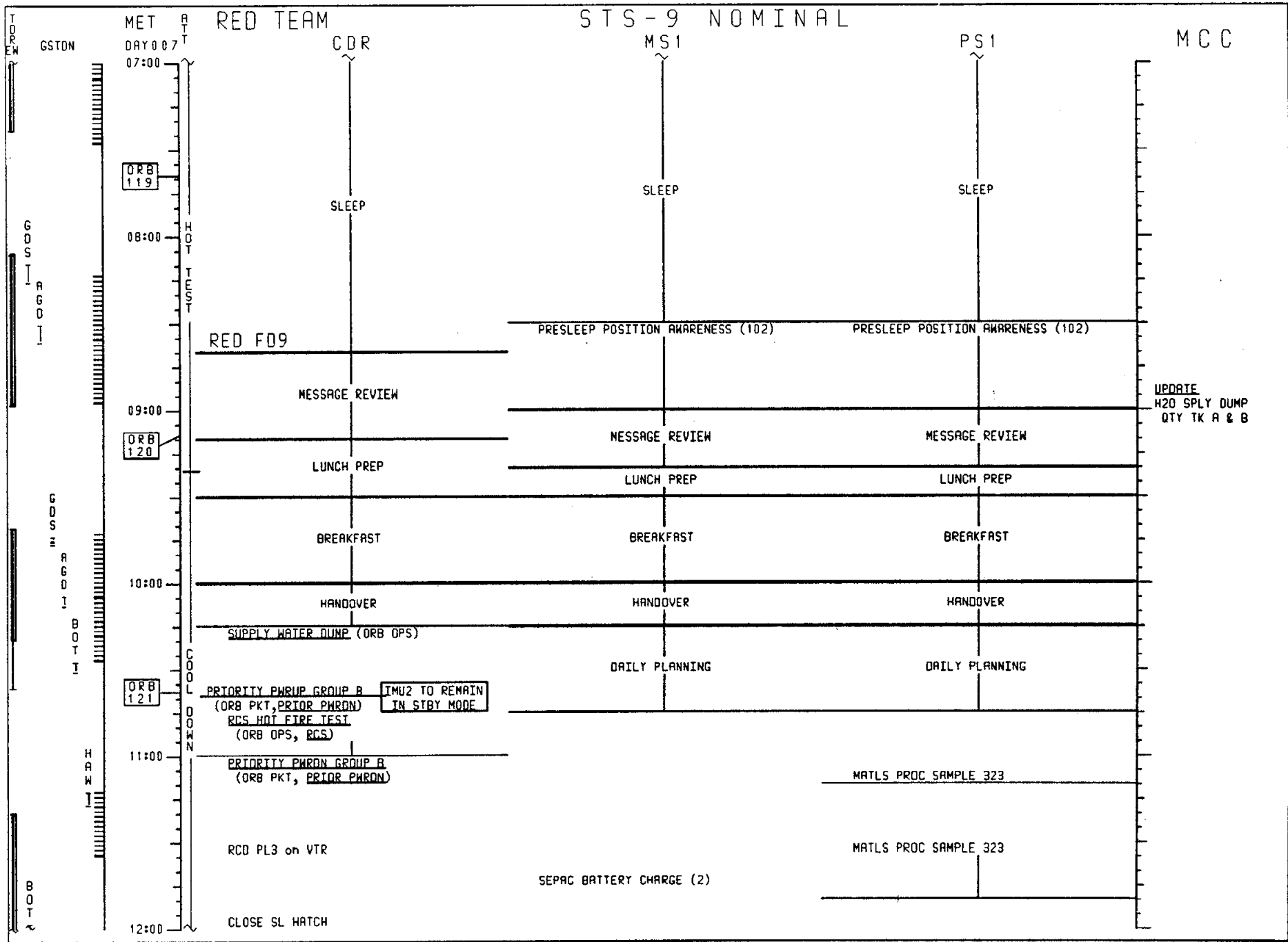


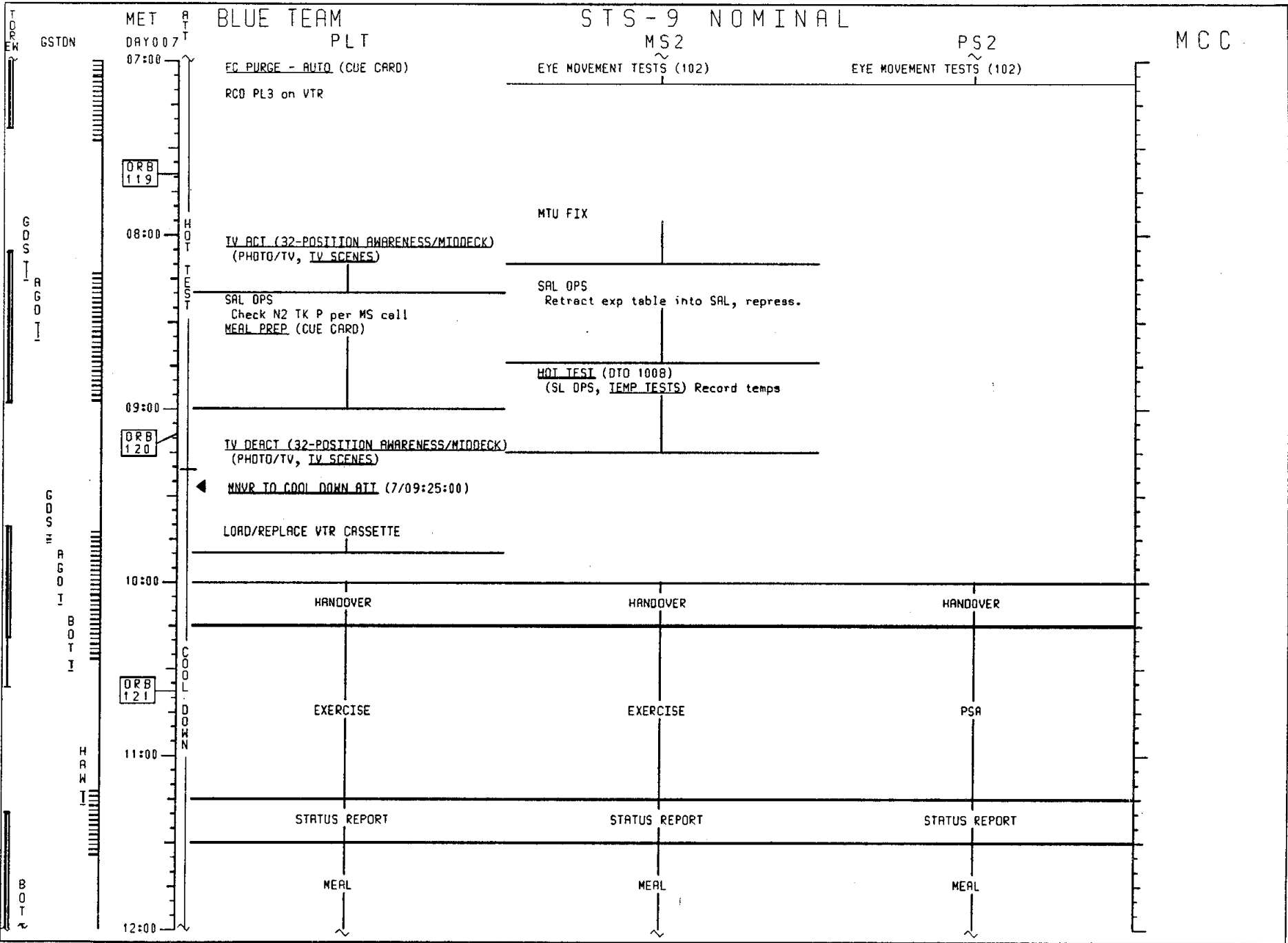


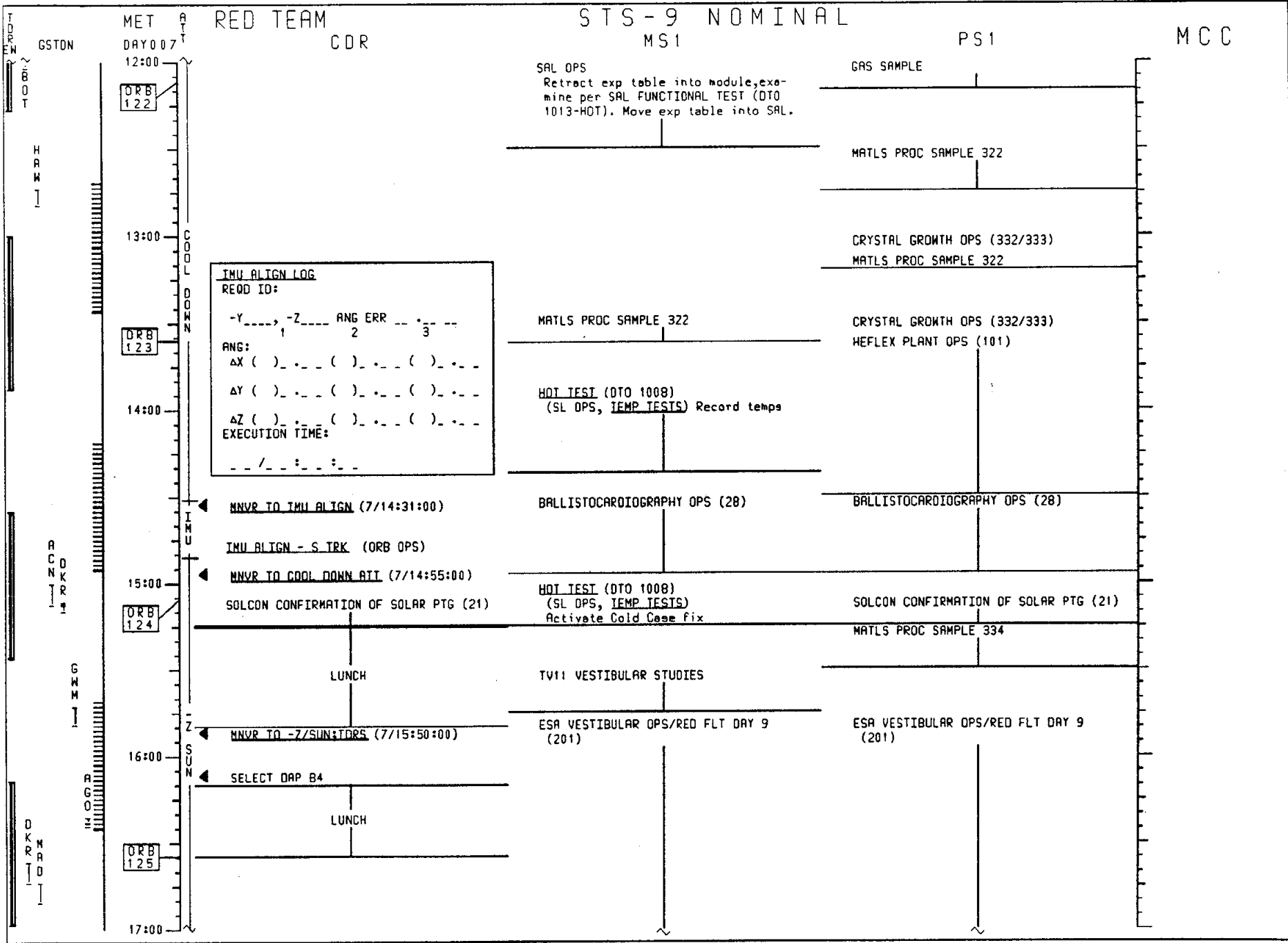


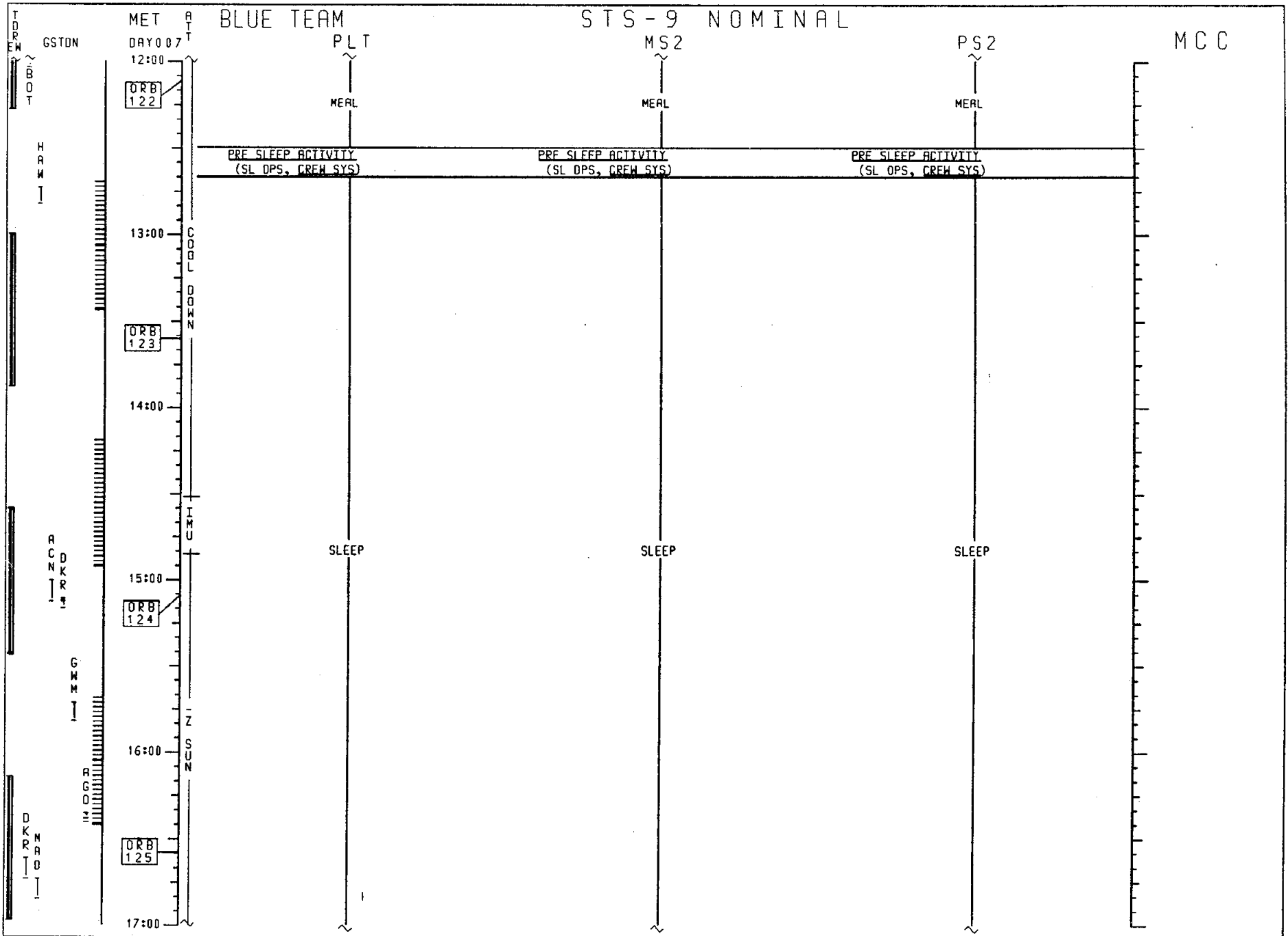


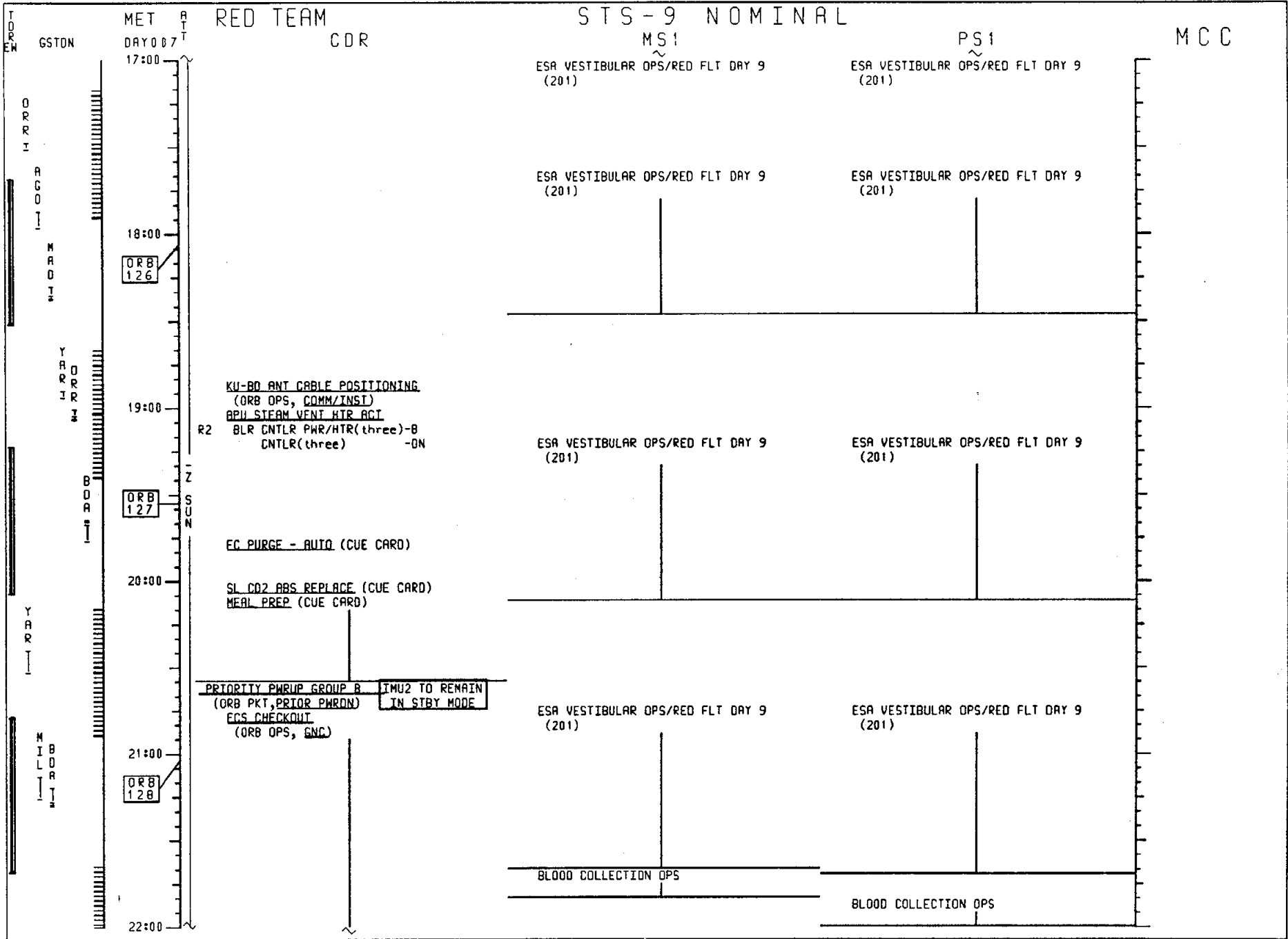


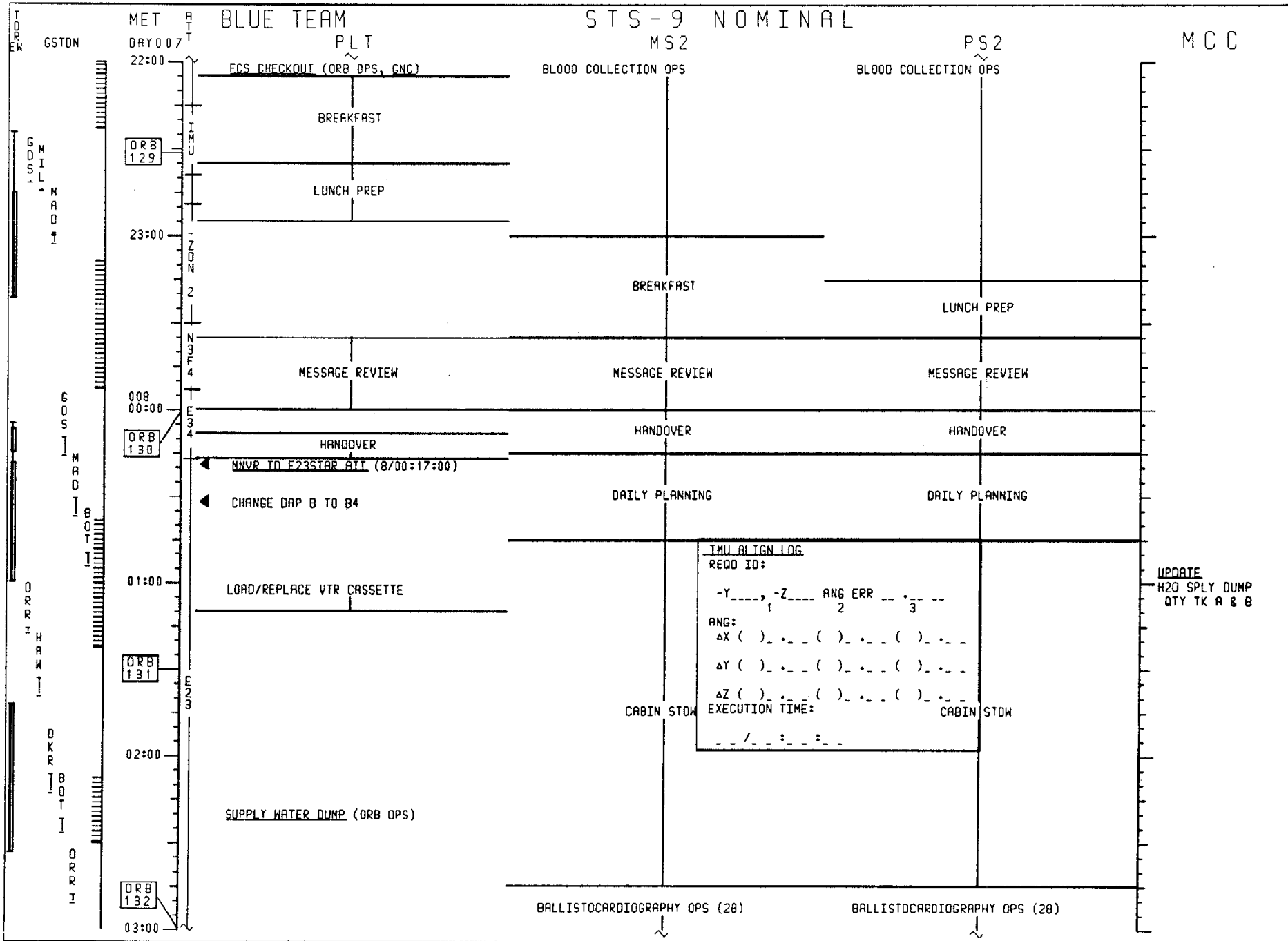


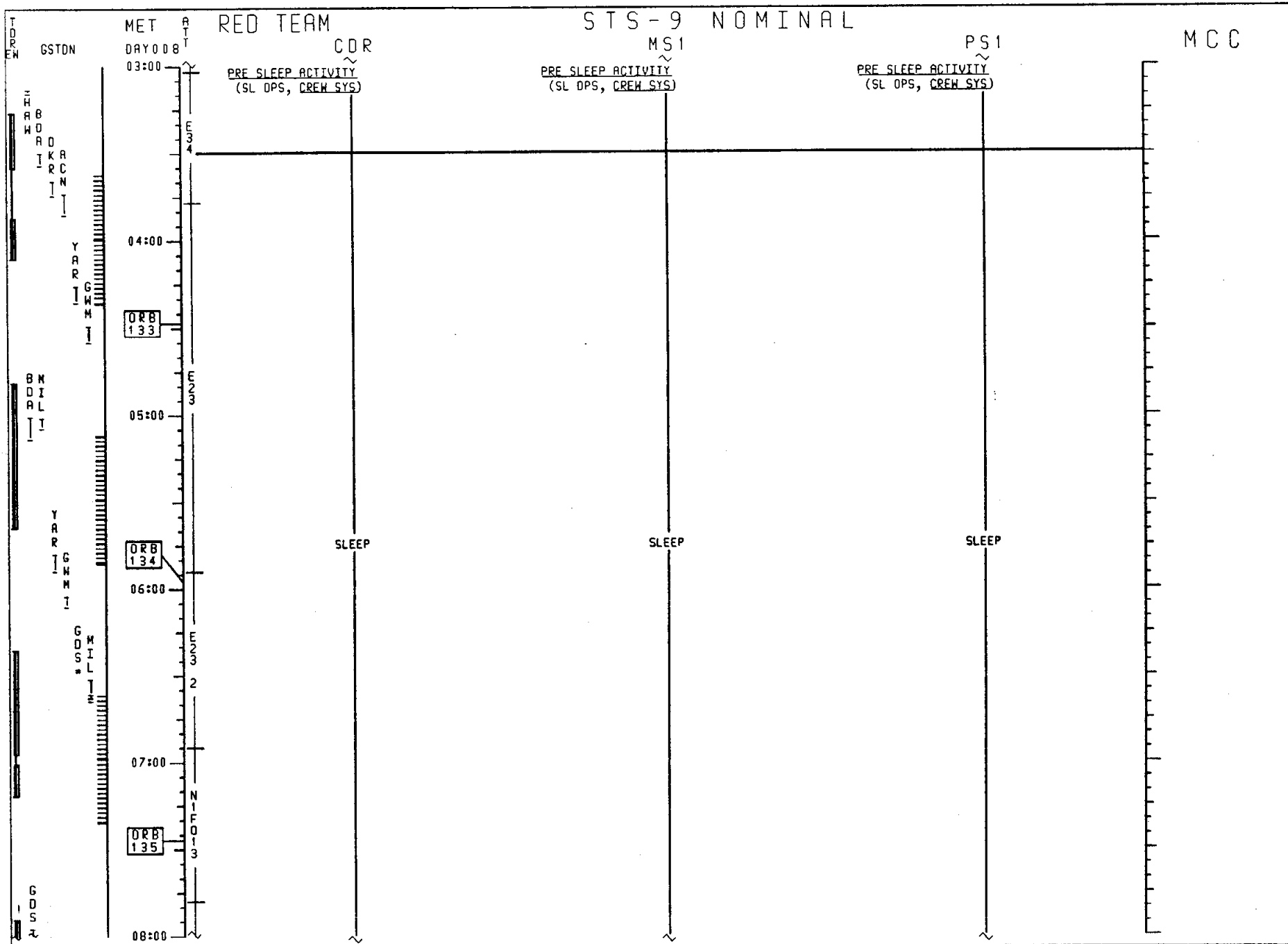


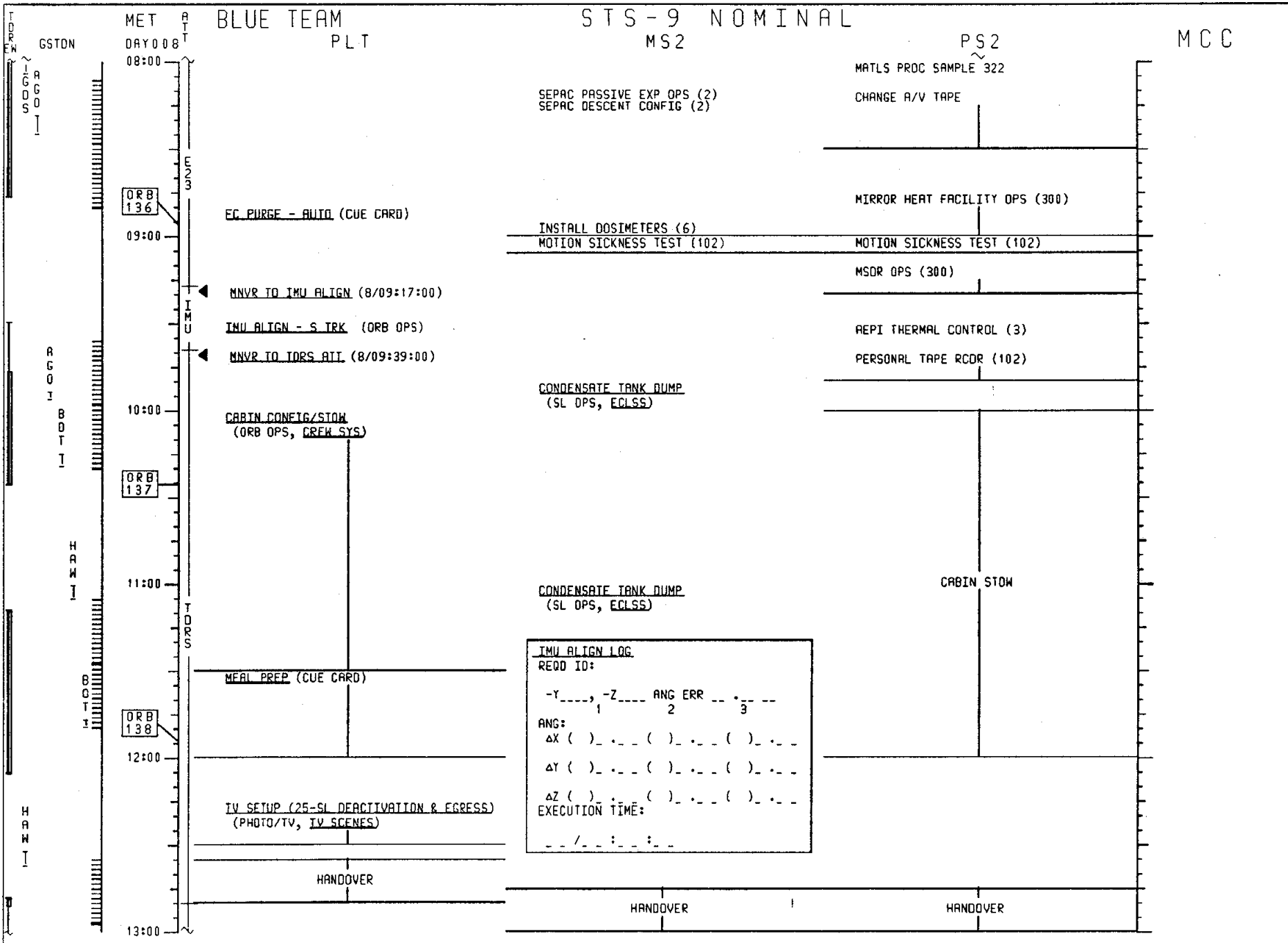


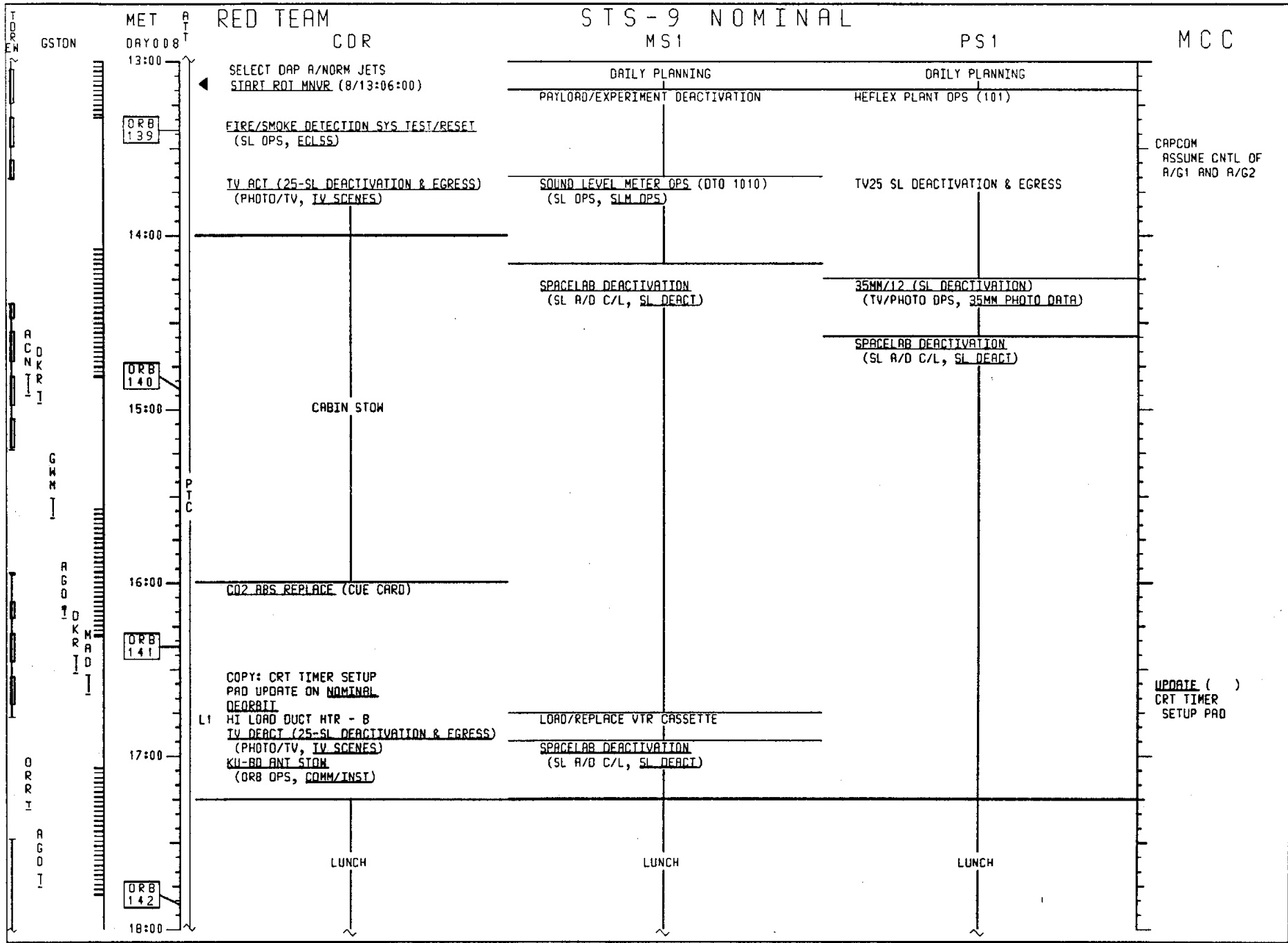


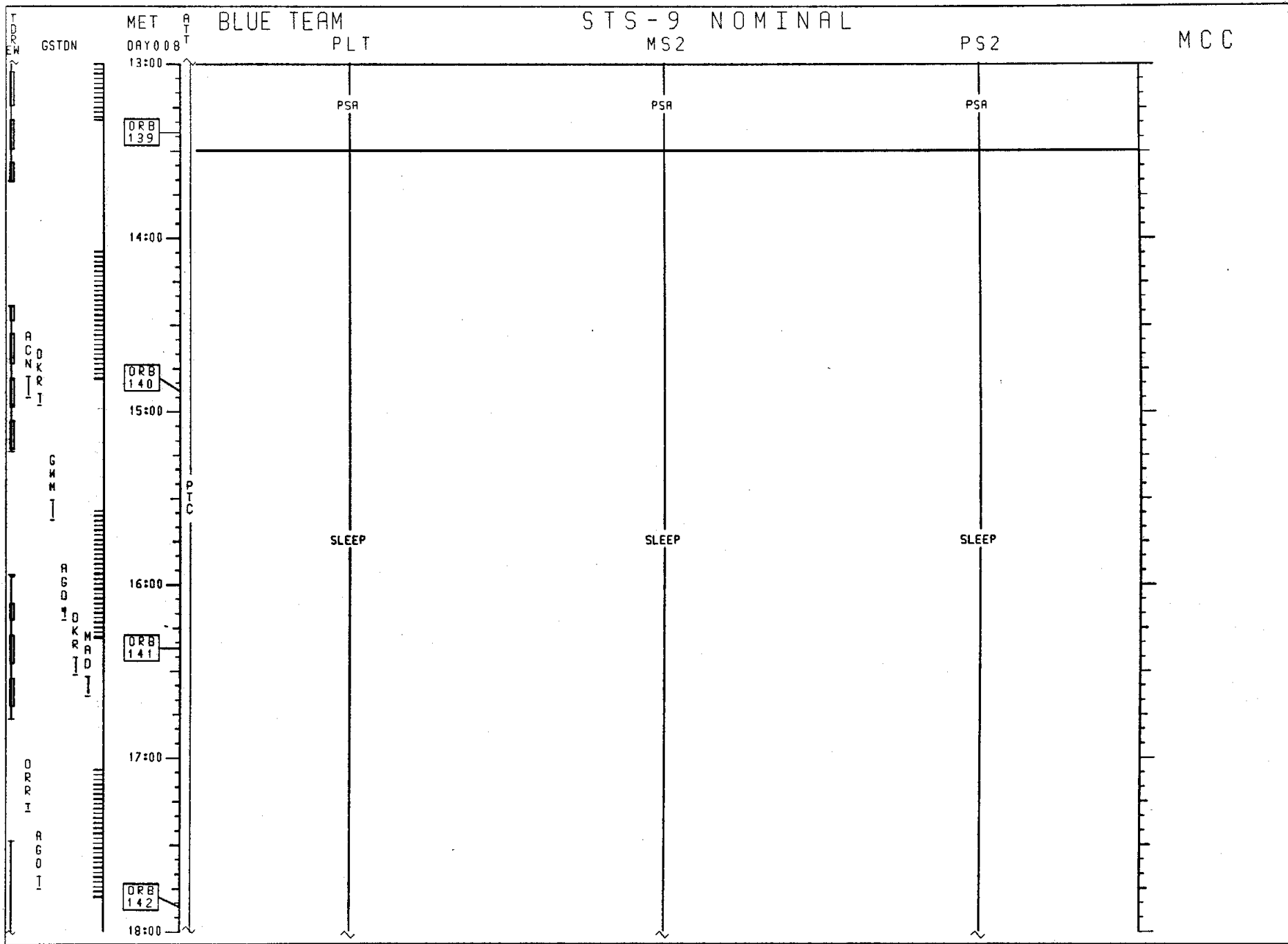












STS-9 NOMINAL

RED TEAM

MET DAY 008
18:00
19:00
20:00
21:00
22:00
23:00

CDR
LUNCH

MS1
LUNCH

PS1

MCC

LUNCH
PERSONAL TAPE RCDR (102)

MNVR TO TAIL SUN (8/18:18:00)

RAD BYPASS/FES C/D
(ORB OPS, ECLS)

MEAL PREP (CUE CARD)

CABIN STOW

CABIN STOW

ORB 143

L2 O2 EMER - OP (tb-OP)
PRIORITY PURUP GROUP B
(ORB PKT, PRIOR PHRON)
RAD STOW/DEPLOY
(ORB OPS, ECLS)
EC PURGE - AUTO (CUE CARD)

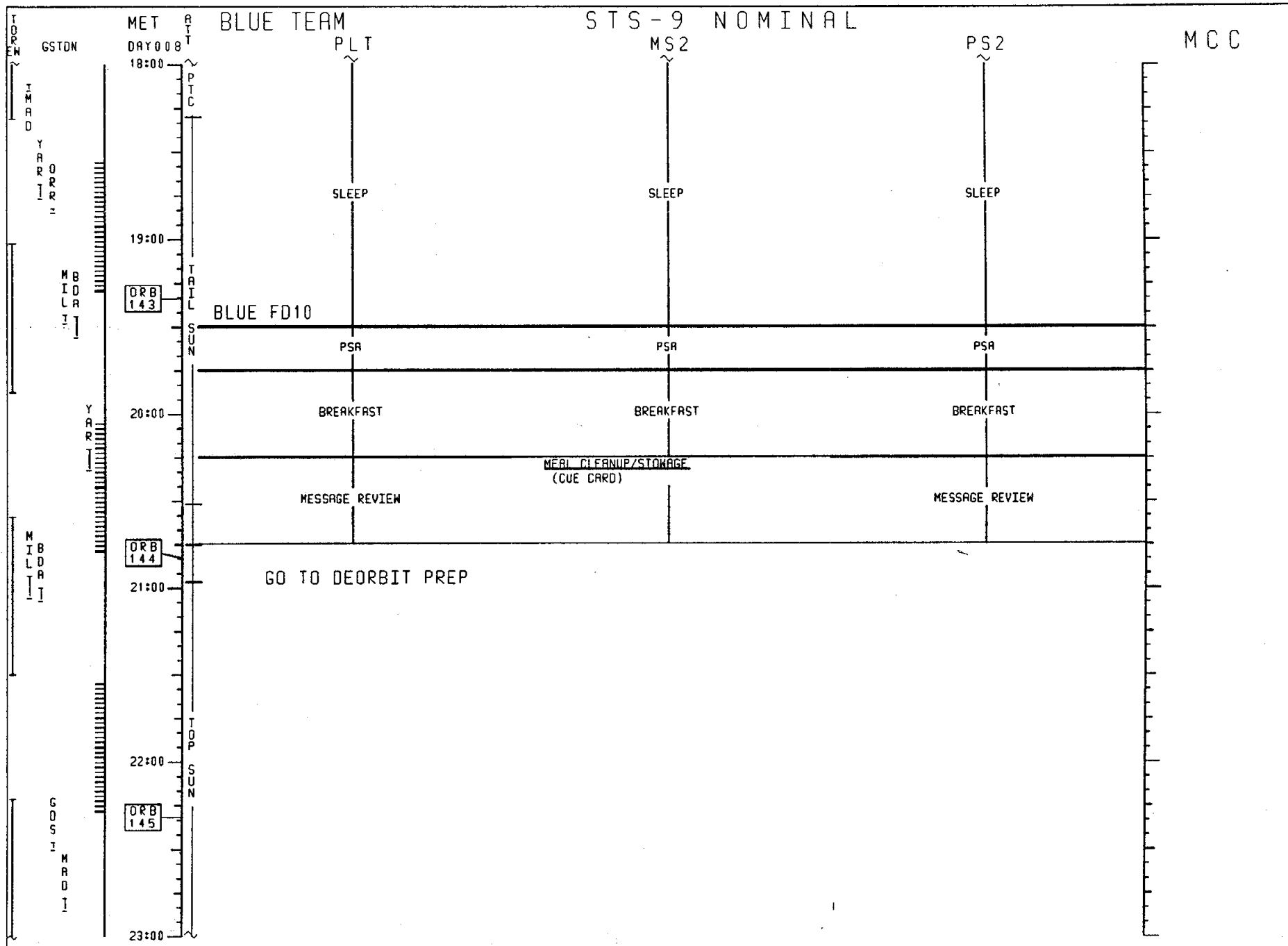
UPLINK (BOR)
GO FOR PLBD
CLOSING

GO TO DEORBIT PREP

ORB 144

ORB 145

FROM ORDN
Y ORRN
MIDL
RY
MIDL
GOS
MADD



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ATTITUDE TIMELINE

**ATTITUDE
TIMELINE**

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
0/00:08:43	MNVR R+310.00 P+ 2.00 Y+ 32.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 124 P 235		MECO
0/00:09:00 10:07	MNVR R+303.00 P+ 23.00 Y+ 5.00	* MAN *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 137 P 263		OMS 1
0/00:20:00 23:43	MNVR R+ 22.00 P+143.00 Y+306.00	* MAN *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 79 P 317		OMS 2
0/01:05:00 11:50	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	A1 AUTO NORM	DSC 0.200 DB AT 5.00 DB RT 0.20	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV, XVV
0/02:45:00 57:15	MNVR R+169.00 P+ 1.00 Y+ 43.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 124 P 10	-YST:44 -ZST:43 02:47-03:33	IMU ALIGN
0/03:06:00 14:02	TRK TGT=2 BV=2(180.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 90 P+ 90 Y+ 0	-XLV, YVV
0/04:45:00	MNVR TO RCS BURN ATT PER REAL TIME PAD	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			ORBIT ADJUST (IF REQUIRED)
0/05:20:00	TRK TGT=2 BV=2(180.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 90 P+ 90 Y+ 0	-XLV, YVV
0/12:48:00 59:15	TRK TGT=2 BV=2(180.00, 0.00) OM=135.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+225 P+ 90 Y+ 0	TDRS 1
0/13:43:00 56:32	MNVR R+252.00 P+162.00 Y+332.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 74 P 92	-YST:23 -ZST:16 13:53-14:36	IMU ALIGN -2 COAS
0/14:12:00 24:13	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV, XVV
0/14:25:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

ATTITUDE
TIMELINE

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
0/19:35:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
0/19:35:00 50:00	TRK TGT=2 BV=2(180.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 0 P+ 90 Y+ 0	-XLV,ZVV
0/19:50:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
1/01:17:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
1/01:17:00 17:09	MNVR R+237.00 P+204.00 Y+ 3.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 47 P 90		WAKE TEST IECM
1/02:26:00 29:05	MNVR R+268.00 P+195.00 Y+ 25.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 67 P 53	-YST:21 -ZST:17 02:05-02:45	IMU ALIGN
1/02:35:00 48:07	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV,-XVV E 17
1/02:49:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
1/07:58:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
1/07:58:00 59:40	TRK TGT=2 BV=3(90.00, 0.00) OM= 20.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+340	-ZLV;TDRS
1/08:28:00 29:40	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV,-XVV E 17
1/08:30:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
1/10:43:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
1/10:43:00 55:58	MNVR R+ 11.00 P+358.00 Y+ 19.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 117 P 184	-YST:16 -ZST:23 10:46-11:29	IMU ALIGN
1/11:13:00 19:30	MNVR R+296.00 P+ 66.00 Y+ 22.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 179 P 111		COLD TEST
1/11:20:00	CHANGE DAP B TO B9 AND SELECT DAP B	B9 AUTO VERN	DSC 0.067 DB AT 1.00 DB RT 0.02			
1/11:21:00	ROT BV=1(0.00, 0.00)	B9 AUTO VERN	DSC 0.067 DB AT 1.00 DB RT 0.02		ROT R+296 START P+ 66 ATT Y+ 22	COLD TEST ROTR VFT TEST
1/21:10:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
1/21:10:00	MNVR TO RCS BURN ATT PER REAL TIME PAD	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			ORBIT ADJUST (IF REQUIRED)
1/21:28:00 32:14	MNVR R+267.00 P+ 66.00 Y+ 22.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 180 P 183		COLD TEST
1/21:39:00	SELECT DAP B9	B9 AUTO VERN	DSC 0.067 DB AT 1.00 DB RT 0.02			
1/21:40:00	ROT BV=1(0.00, 0.00)	B9 AUTO VERN	DSC 0.067 DB AT 1.00 DB RT 0.02		ROT R+267 START P+ 66 ATT Y+ 22	COLD TEST ROTR VFT TEST
2/10:33:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/10:33:00 45:53	MNVR R+ 11.00 P+358.00 Y+ 19.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 116 P 184	-YST:16 -ZST:23 10:36-11:21	IMU ALIGN

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
2/11:53:00 12:03:49	TRK TGT=2 BV=5(346.00, 16.00) OM=224.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 21 P 129	LVLH R+226 P+249 Y+ 2	N2A ATT
2/13:28:00 34:50	TRK TGT=2 BV=5(270.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 180	LVLH R+180 P+180 Y+ 0	N2A 2 ATT
2/16:16:00 28:40	TRK TGT=2 BV=5(166.00, 0.00) OM=313.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 165 P 1	LVLH R+ 46 P+100 Y+ 11	N3F1B ATT
2/16:53:00 54:35	TRK TGT=2 BV=2(180.00, 0.00) OM=325.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 35 P+ 90 Y+ 0	E13 ATT
2/16:55:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
2/18:05:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/18:07:00 18:07	TRK TGT=2 BV=5(0.00,311.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 49 P 270	LVLH R+180 P+270 Y+311	N2H ATT
2/18:19:00	CHANGE DAP B TO B6 SELECT DAP B FLT CNTLR PWR ON NORM JETS	B6 LVLH NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		ROLL=PULSE PITCH=DSC YAW=DSC	
2/18:20:00	INITIATE ROT FLT CNTLR PWR OFF	B6 LVLH NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		RHC + ROLL RATE ~ 2.1 (3 PULSES)	N2H ROTR
2/18:36:00	TERMINATE ROT	B6 LVLH NORM	DSC 0.500 DB AT 3.00 DB RT 0.20		ROLL=DSC PITCH=DSC YAW=DSC	
2/18:37:00	SELECT DAP A1 AND VERN	A1 LVLH VERN	DSC 0.200 DB AT 1.00 DB RT 0.02		ROLL=PULSE PITCH=PULSE YAW=PULSE	
2/18:37:00	MNVR R+140.60 P+168.30 Y+ 58.90	A1 LVLH VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 103 P 198		N5STAR ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
ASAP	SELECT AUTO DAP	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/18:52:00	CHANGE DAP B TO B8 AND SELECT DAP B WHEN IN ATTITUDE	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
2/20:37:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/20:37:00 48:19	TRK TGT=2 BV=3(90.00, 0.00) OM=345.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 15	E13 ATT
2/20:49:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
2/21:48:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/21:48:00 54:28	MNVR R+270.10 P+193.60 Y+305.90	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 51 P 107		N5STAR ATT
2/21:55:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
2/23:12:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
2/23:12:00 19:26	MNVR R+261.00 P+235.00 Y+ 25.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 48 P 24	-YST:25 -ZST:15 23:04-23:35	IMU ALIGN
2/23:30:00 40:38	MNVR R+358.60 P+309.10 Y+350.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 60 P 201		N5STAR ATT
2/23:41:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/00:29:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/00:29:00 39:40	MNVR R+125.40 P+300.30 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 56 P 81		N5STAR 2 ATT
3/00:40:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
3/01:38:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/01:38:00 47:13	MNVR R+198.70 P+242.90 Y+321.50	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 17 P 237		N5STAR 3 ATT
3/01:48:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
3/02:04:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/02:04:00 14:57	TRK TGT=2 BV=3(90.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+180 P+ 0 Y+ 0	-ZLV;XVV
3/02:15:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/02:25:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/02:25:00 32:05	MNVR R+ 42.10 P+255.30 Y+336.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 8 P 129		E23STAR ATT
3/02:33:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/02:58:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/02:58:00 03:12:38	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	N2A ATT
3/03:29:00 42:21	MNVR R+320.00 P+ 45.30 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 149 P 267		E23STAR ATT
3/03:43:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/04:09:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/04:09:00 22:52	MNVR R+ 31.00 P+255.00 Y+342.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 8 P 178		-ZUP 1 ATT
3/04:23:00	CHANGE DAP B TO B6 AND DSC RT TO 0.163 SELECT DAP B	B6 AUTO VERN	DSC 0.163 DB AT 2.50 DB RT 0.02			
3/04:24:00 35:26	MNVR R+286.00 P+276.00 Y+348.00	B6 AUTO VERN	DSC 0.163 DB AT 2.50 DB RT 0.02	SUN T 29 P 278		-ZUP 2 ATT
3/04:43:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/04:43:00 48:18	MNVR R+352.00 P+294.00 Y+341.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 44 P 200		-ZUP 3 ATT
3/04:49:00	SELECT DAP B6 AND CHANGE DSC RT TO 0.068	B6 AUTO VERN	DSC 0.068 DB AT 2.50 DB RT 0.02			
3/04:50:00 55:36	MNVR R+333.00 P+301.00 Y+337.00	B6 AUTO VERN	DSC 0.068 DB AT 2.50 DB RT 0.02	SUN T 49 P 217		-ZUP 4 ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/05:49:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/05:49:00 55:43	TRK TGT=2 BV=2(180.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+180 P+ 90 Y+ 0	-XLV; -ZVV
3/06:09:00 19:32	TRK TGT=2 BV=5(293.00, 344.00) OM=230.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 68 P 196	LVLH R+193 P+216 Y+309	N2A ATT
3/07:13:00 26:47	TRK TGT=2 BV=5(90.00, 15.00) OM=325.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 15	LVLH R+345 P+180 Y+ 35	N2A 2 ATT
3/07:40:00 46:06	TRK TGT=2 BV=5(45.00, 0.00) OM= 17.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 45 P 0	LVLH R+ 12 P+226 Y+348	N2A 3 ATT
3/08:43:00 53:29	MNVR R+223.00 P+264.00 Y+312.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 29 P 259		N2D ATT
3/08:54:00	SELECT DAP B6 AND CHANGE DSC RT TO 0.078	B6 AUTO VERN	DSC 0.078 DB AT 2.50 DB RT 0.02			
3/08:55:00 09:04:35	MNVR R+167.00 P+234.00 Y+327.00	B6 AUTO VERN	DSC 0.078 DB AT 2.50 DB RT 0.02	SUN T 16 P 232		N2D 2 ATT
3/09:06:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/09:06:00 17:50	TRK TGT=2 BV=2(180.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+180 P+ 90 Y+ 0	-XLV; -ZVV
3/10:28:00 31:58	MNVR R+325.30 P+309.30 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 64 P 239		N5STAR ATT
3/10:32:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/11:00:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/11:00:00 08:44	MNVR R+283.00 P+218.00 Y+ 16.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 48 P 25	-YST:55 -ZST:51 10:47-11:24	IMU ALIGN
3/11:18:00 29:21	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV;-XVV
3/11:30:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/12:02:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/12:02:00 09:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV;TDRS
3/12:10:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/13:07:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/13:07:00 14:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV;-XVV
3/13:15:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/13:52:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/13:52:00 59:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV;TDRS

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/14:00:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/14:35:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/14:35:00 42:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV, -XVV
3/14:43:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/16:35:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/16:35:00 42:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV; TDRS
3/16:43:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/17:27:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/17:27:00 34:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV, -XVV
3/17:35:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
3/22:55:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/22:55:00 59:10	TRK TGT=2 BV=3(90.00, 0.00) OM=310.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 50	-ZLV; TDRS

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
3/23:00:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01	T P		
3/23:47:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
3/23:47:00 54:30	TRK TGT=2 BV=5(0.00,310.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 50 P 270	LVLH R+ 0 P+270 Y+ 50	-ZVV; TDRS
4/00:48:00 59:00	MNVR R+109.00 P+192.00 Y+332.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 51 P 244	-YST:43 -ZST:44 00:44-01:19	IMU ALIGN
4/01:07:00 18:30	TRK TGT=2 BV=2(180.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 0 P+ 90 Y+ 0	-XLV, ZVV
4/01:57:00 02:12:00	TRK TGT=2 BV=2(180.00, 0.00) OM=180.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+180 P+ 90 Y+ 0	-XLV; -ZVV
4/02:48:00 03:03:00	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	N2A ATT
4/03:51:00 59:12	TRK TGT=2 BV=2(180.00, 0.00) OM=315.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+ 45 P+ 90 Y+ 0	TDRS ATT
4/04:10:00 19:05	MNVR R+197.00 P+249.00 Y+315.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 23 P 254		N2E ATT
4/04:20:00	CHANGE DAP B TO B6 AND DSC RT TO 0.238 SELECT DAP B	B6 AUTO VERN	DSC 0.238 DB AT 2.50 DB RT 0.02			
4/04:21:00 30:31	MNVR R+170.00 P+124.00 Y+ 32.00	B6 AUTO VERN	DSC 0.238 DB AT 2.50 DB RT 0.02	SUN T 130 P 187		N2E 2 ATT
4/04:31:00	SELECT DAP B6 AND CHANGE DSC RT TO 0.315	B6 AUTO VERN	DSC 0.315 DB AT 2.50 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
4/04:32:00 40:58	MNVR R+164.00 P+293.00 Y+341.00	B6 AUTO VERN	DSC 0.315 DB AT 2.50 DB RT 0.02	SUN T 42 P 28		-ZDN;N32F
4/04:41:00	SELECT DAP B6 AND CHANGE DSC RT TO 0.088	B6 AUTO VERN	DSC 0.088 DB AT 2.50 DB RT 0.02			
4/04:42:00 47:25	MNVR R+142.00 P+305.00 Y+338.00	B6 AUTO VERN	DSC 0.088 DB AT 2.50 DB RT 0.02	SUN T 52 P 49		-ZDN;N32F 2
4/05:38:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/05:38:00 50:22	TRK TGT=2 BV=3(90.00, 0.00) OM=350.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 10	N2A ATT
4/06:23:00 29:32	TRK TGT=2 BV=5(167.80, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 168 P 0	LVLH R+ 0 P+102 Y+ 0	N1F014
4/06:30:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/07:09:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/07:09:00 20:54	MNVR R+ 90.00 P+ 10.00 Y+311.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 92 P 128		N5STAR ATT
4/07:21:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
4/08:08:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/08:08:00 14:58	MNVR R+144.60 P+344.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 95 P 57		E23STAR ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
4/08:15:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/08:36:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/08:36:00 50:59	MNVR R+324.40 P+322.20 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 75 P 238		N5STAR ATT
4/08:51:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
4/09:26:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/09:26:00 31:03	TRK TGT=2 BV=5(0.00, 90.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+ 90	N1F013 ATT
4/09:31:00	CHANGE DAP B TO B7 AND SELECT DAP B	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10			
4/09:32:00	ROT BV=1(0.00, 0.00)	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10		ROT R+313 START P+276 ATT Y+327	N1F013 ROTR
4/10:09:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/10:09:00 19:10	MNVR R+ 6.00 P+294.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 49 P 204		N5STAR ATT
4/10:20:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
4/10:47:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
4/10:47:00 59:10	MNVR R+268.00 P+195.00 Y+ 25.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 70 P 55	-YST:21 -ZST:17 10:32-11:18	IMU ALIGN
4/11:10:00 20:38	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV;-XVV
4/11:21:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/12:07:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/12:07:00 14:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV;TDRS
4/12:15:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/12:58:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/12:58:00 13:05:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV;-XVV
4/13:06:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/13:47:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/13:47:00 54:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV;TDRS
4/14:26:00 33:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV;-XVV

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
4/14:34:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/16:37:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/16:37:00 44:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV; TDRS
4/17:25:00 32:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV, -XVV
4/17:33:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
4/23:32:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
4/23:32:00 39:35	TRK TGT=2 BV=2(180.00, 0.00) OM= 15.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 180 P 0	LVLH R+345 P+ 90 Y+ 0	N2B ATT
4/23:53:00 5/00:01:02	MNVR R+109.00 P+ 96.00 Y+ 35.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 153 P 273		N2C ATT
5/00:01:00	CHANGE DAP B TO B6 AND DSC RT TO 0.129 SELECT DAP B	B6 AUTO VERN	DSC 0.129 DB AT 2.50 DB RT 0.02			
5/00:04:00 13:28	MNVR R+184.00 P+ 93.00 Y+ 38.00	B6 AUTO VERN	DSC 0.129 DB AT 2.50 DB RT 0.02	SUN T 154 P 207		N2C 2 ATT
5/00:19:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/00:19:00 30:03	MNVR R+ 73.00 P+ 88.00 Y+307.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 103 P 215	-YST:47 -ZST:31 00:18-00:53	IMU ALIGN

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/00:47:00 55:40	TRK TGT=2 BV=3(90.00, 0.00) OM=330.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 30	N2A ATT
5/02:29:00 35:26	TRK TGT=2 BV=5(166.00, 360.00) OM=313.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 166 P 360	LVLH R+ 46 P+100 Y+ 11	N3F1B ATT
5/02:36:00	CHANGE DAP B TO B6 AND SELECT DAP B	B6 AUTO VERN	DSC 0.150 DB AT 2.50 DB RT 0.02			
5/02:48:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/02:48:00 55:15	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	N2A ATT
5/03:20:00 28:40	MNVR R+151.70 P+287.70 Y+ 8.80	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 49 P 68		E23STAR ATT
5/03:29:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/03:55:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/03:55:00 04:06:30	MNVR R+ 14.20 P+337.80 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 88 P 188		E22STAR ATT
5/04:07:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/04:38:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/04:38:00 44:03	TRK TGT=2 BV=5(0.00, 90.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+ 90	N1F013 ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/04:44:00	CHANGE DAP B TO B7 AND SELECT DAP B	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10			
5/04:45:00	ROT BV=1(0.00, 0.00)	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10		ROT R+345 START P+272 ATT Y+327	N1F013 ROTR
5/05:29:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/05:29:00 40:51	MNVR R+285.20 P+343.30 Y+ 48.90	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 109 P 267		E22STAR ATT
5/05:41:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/06:10:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/06:10:00 23:15	TRK TGT=2 BV=5(168.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 168 P 0	LVLH R+ 0 P+102 Y+ 0	N1F014 ATT
5/06:24:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/06:56:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/06:56:00 07:07:19	MNVR R+257.20 P+153.60 Y+314.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 78 P 83		E22STAR ATT
5/07:08:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/08:27:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/08:27:00 31:22	MNVR R+306.90 P+235.10 Y+304.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 35 P 119		E22STAR 2 ATT
5/08:32:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/09:34:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/09:34:00 42:37	MNVR R+129.40 P+ 4.50 Y+327.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 97 P 83		E23STAR ATT
5/09:43:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/10:10:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/10:10:00 24:33	MNVR R+318.80 P+ 27.00 Y+310.90	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 99 P 272		E22STAR ATT
5/10:25:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/10:49:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/10:49:00 11:03:44	MNVR R+143.00 P+338.00 Y+ 62.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 109 P 49	-YST:31 -ZST:20 10:49-11:20	IMU ALIGN
5/11:16:00 29:56	MNVR R+338.10 P+343.50 Y+336.70	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 85 P 224		N5STAR ATT
5/11:30:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/13:04:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/13:04:00 07:15	MNVR R+354.10 P+319.40 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 71 P 209		E22STAR ATT
5/13:08:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/14:37:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/14:37:00 44:16	MNVR R+270.00 P+258.80 Y+308.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 31 P 196		E22STAR 2 ATT
5/14:45:00	SELECT DAP B8	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/15:02:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/15:02:00 09:29	MNVR R+218.00 P+169.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 82 P 120		TDRS ATT
5/16:12:00 19:47	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	N2A ATT
5/16:48:00 50:57	TRK TGT=2 BV=5(90.00, 10.00) OM= 34.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 10	LVLH R+350 P+180 Y+326	E34 ATT
5/16:52:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/17:26:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/17:26:00 39:31	MNVR R+354.00 P+318.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 70 P 210		NSSTAR ATT
5/17:40:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
5/18:11:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/18:11:00 22:44	TRK TGT=2 BV=5< 90.00, 10.00> OM= 34.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 10	LVLH R+350 P+180 Y+326	E34 ATT
5/18:24:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/18:55:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/18:55:00 19:04:52	MNVR R+ 61.30 P+241.20 Y+ 64.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 87 P 217		E22STAR ATT
5/19:05:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/20:41:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/20:41:00 47:59	MNVR R+183.80 P+141.20 Y+ 21.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 115 P 161		E22STAR ATT
5/20:48:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/21:01:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
5/21:01:00 11:59	MNVR R+ 47.00 P+258.80 Y+ 10.70	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 34 P 209		E22STAR 2 ATT
5/21:12:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
5/22:38:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
5/22:38:00 51:43	MNVR R+223.00 P+238.00 Y+ 58.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 81 P 59	-YST:31 -ZST:47 22:38-23:13	IMU ALIGN
5/23:08:00	MNVR TO RCS BURN ATT PER REAL TIME PAD	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			ORBIT ADJUST (IF REQUIRED)
5/23:29:00 43:28	MNVR R+ 0.00 P+328.80 Y+350.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 76 P 201		N5STAR ATT
5/23:39:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
6/00:20:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/00:20:00 26:47	TRK TGT=2 BV=5(90.00, 10.00) OM=214.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 10	LVLH R+170 P+ 0 Y+ 34	E34 ATT
6/00:28:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/00:58:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/00:58:00 01:06:59	MNVR R+355.70 P+319.20 Y+357.40	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 69 P 207		E22STAR ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
6/01:07:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/01:49:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/01:49:00 52:47	MNVR R+ 41.10 P+319.70 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 71 P 163		E23STAR ATT
6/01:53:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/02:33:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/02:33:00 44:27	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	N2A ATT
6/03:18:00 24:50	MNVR R+144.60 P+344.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 93 P 58		E23STAR ATT
6/03:25:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/03:56:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/03:56:00 04:07:04	MNVR R+ 9.20 P+317.00 Y+340.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 62 P 186		N5STAR ATT
6/04:07:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
6/04:53:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
6/04:53:00 59:22	MNVR R+ 95.00 P+ 0.00 Y+328.90	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 94 P 114		E23STAR ATT
6/05:00:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/06:57:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/06:57:00 07:09:29	MNVR R+ 19.00 P+138.00 Y+ 36.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 121 P 335		N2C ATT
6/07:10:00	CHANGE DAP B TO B6 AND DSC RT TO 0.133 SELECT DAP B	B6 AUTO VERN	DSC 0.133 DB AT 2.50 DB RT 0.02			
6/07:11:00 20:35	MNVR R+114.00 P+105.00 Y+ 50.00	B6 AUTO VERN	DSC 0.133 DB AT 2.50 DB RT 0.02	SUN T 141 P 279		N2C 2 ATT
6/08:28:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/08:28:00 38:11	MNVR R+170.00 P+352.00 Y+337.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 91 P 35		N2C 3 ATT
6/08:39:00	CHANGE DAP B TO B6 AND DSC RT TO 0.125 SELECT DAP B	B6 AUTO VERN	DSC 0.125 DB AT 2.50 DB RT 0.02			
6/08:40:00 49:31	MNVR R+ 81.00 P+298.00 Y+303.00	B6 AUTO VERN	DSC 0.125 DB AT 2.50 DB RT 0.02	SUN T 49 P 74		N2C 4 ATT
6/09:03:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/09:03:00 10:35	MNVR R+143.00 P+ 29.90 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 134 P 69		E23STAR ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
6/09:14:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/09:55:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/09:55:00 57:27	MNVR R+147.90 P+ 52.70 Y+ 17.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 162 P 52		N5STAR ATT
6/09:58:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
6/10:21:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/10:21:00 33:41	TRK TGT=2 BV=5(0.00, 90.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+ 90	N1F013
6/10:34:00	CHANGE DAP B TO B7 AND SELECT DAP B	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10			
6/10:35:00	ROT BV=1(0.00, 0.00)	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10		ROT R+328 START P+266 ATT Y+327	N1F013 ROTR
6/11:20:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/11:20:00 32:24	MNVR R+149.60 P+112.80 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 134 P 179		N5STAR ATT
6/11:33:00	CHANGE DAP B TO B8 AND SELECT DAP B	B8 AUTO VERN	DSC 0.016 DB AT 0.03 DB RT 0.02			
6/11:53:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
6/11:53:00 12:03:42	MNVR R+257.00 P+181.00 Y+ 13.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 77 P 76	-YST:39 -ZST:34 11:37-12:21	IMU ALIGN
6/12:16:00 25:41	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV,-XVV E17
6/12:26:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/13:22:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/13:22:00 29:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+270	-ZLV;TDRS
6/13:30:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/15:32:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/15:32:00 39:30	TRK TGT=2 BV=3(90.00, 0.00) OM= 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 0	LVLH R+ 0 P+180 Y+ 0	-ZLV,-XVV
6/15:40:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
6/22:22:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
6/22:22:00 29:30	TRK TGT=2 BV=3(90.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 360	LVLH R+ 0 P+180 Y+ 90	-ZLV;TDRS
6/22:30:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
7/00:16:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
7/00:16:00 23:30	TRK TGT=2 BV=5(0.00, 90.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+ 90	N1F013 ATT
7/00:24:00	CHANGE DAP B TO B7 AND SELECT DAP B	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10			
7/00:25:00	ROT BV=1(0.00, 0.00)	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10		ROT R+221 START P+263 ATT Y+327	N1F013 ROTR
7/01:18:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
7/01:18:00 32:42	MNVR R+268.00 P+195.00 Y+ 25.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 73 P 56	-YST:21 -ZST:17 01:13-01:48	IMU ALIGN
7/01:46:00 55:41	MNVR R+ 31.00 P+117.00 Y+ 9.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 135 P 306		-ZUP 1 ATT
7/01:56:00	CHANGE DAP B TO B6 AND DSC RT TO 0.179 SELECT DAP B	B6 AUTO VERN	DSC 0.179 DB AT 2.50 DB RT 0.02			
7/01:57:00 02:07:30	MNVR R+ 41.00 P+228.00 Y+340.00	B6 AUTO VERN	DSC 0.179 DB AT 2.50 DB RT 0.02	SUN T 22 P 309		-ZUP 2 ATT
7/02:10:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
7/02:10:00 23:25	MNVR R+202.70 P+338.10 Y+ 9.20	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 360		HOT TEST
7/02:25:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
7/09:25:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	T P		
7/09:25:00 39:09	MNVR R+158.00 P+173.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 80 P 179		COOL DOWN ATT
7/14:31:00 43:44	MNVR R+ 13.00 P+ 5.00 Y+335.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 99 P 197	-YST:34 -ZST:23 14:28-15:07	IMU ALIGN
7/14:55:00 15:07:44	MNVR R+158.00 P+173.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 80 P 179		COOL DOWN ATT
7/15:50:00 16:04:45	MNVR R+331.70 P+144.60 Y+323.60	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 0		-Z/SUN;TDRS
7/16:05:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
7/22:15:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
7/22:15:00 27:09	MNVR R+ 73.00 P+ 88.00 Y+307.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 103 P 212	-YST:47 -ZST:31 22:14-22:50	IMU ALIGN
7/22:39:00 48:12	MNVR R+226.00 P+171.00 Y+336.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 74 P 116		-ZDN;N32F
7/22:48:00	CHANGE DAP B TO B6 AND DSC RT TO 0.110 SELECT DAP B	B6 AUTO VERN	DSC 0.110 DB AT 2.50 DB RT 0.02			
7/22:49:00 53:28	MNVR R+222.00 P+198.00 Y+343.00	B6 AUTO VERN	DSC 0.110 DB AT 2.50 DB RT 0.02	SUN T 51 P 122		-ZDN;N32F 2
7/23:30:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
7/23:30:00 42:06	MNVR R+301.00 P+ 68.00 Y+ 14.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 170 P 302		N3F4 ATT
7/23:44:00	CHANGE DAP B TO B6 AND DSC RT TO 0.067 SELECT DAP B	B6 AUTO VERN	DSC 0.067 DB AT 2.50 DB RT 0.02			
7/23:45:00	ROT BV=1(0.00, 0.00)	B6 AUTO VERN	DSC 0.067 DB AT 2.50 DB RT 0.02		ROT R+301 START P+ 68 ATT Y+ 14	N3F4 ROTR
7/23:53:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
7/23:53:00 8/00:07:44	TRK TGT=2 BV=5(90.00, 10.00) OM=214.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 10	LVLH R+170 P+ 0 Y+ 34	E34 ATT
8/00:08:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
8/00:17:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/00:17:00 29:44	MNVR R+ 90.00 P+307.90 Y+310.90	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 51 P 79		E23STAR ATT
8/00:30:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
8/03:02:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/03:02:00 12:00	TRK TGT=2 BV=5(90.00, 10.00) OM=214.10	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 10	LVLH R+170 P+ 0 Y+ 34	E34 ATT
8/03:12:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
8/03:47:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/03:47:00 59:11	MNVR R+ 22.00 P+353.00 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 99 P 181		E23STAR ATT
8/04:00:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
8/05:54:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/05:54:00 06:06:46	MNVR R+175.00 P+ 9.40 Y+ 0.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 114 P 30		E23STAR 2 ATT
8/06:07:00	SELECT DAP B4	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
8/06:55:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/06:55:00 07:05:55	TRK TGT=2 BV=5(0.00, 90.00) OM= 90.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	EARTH T 90 P 90	LVLH R+ 90 P+ 0 Y+ 90	N1F013 ATT
8/07:07:00	CHANGE DAP B TO B7 AND SELECT DAP B	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10			
8/07:08:00	ROT BV=1(0.00, 0.00)	B7 AUTO VERN	DSC 0.075 DB AT 0.10 DB RT 0.10		ROT R+345 START P+257 ATT Y+327	N1F013 ROTR
8/07:48:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/07:48:00 56:10	MNVR R+281.90 P+ 11.60 Y+330.50	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 101 P 292		E23STAR ATT

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
8/07:56:00	CHANGE DAP B TO B4 AND SELECT DAP B	B4 AUTO VERN	DSC 0.008 DB AT 0.10 DB RT 0.01			
8/09:17:00	SELECT DAP A1	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/09:17:00 27:00	MNVR R+163.00 P+ 11.00 Y+306.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 87 P 52	-YST:52 -ZST:22 09:21-09:51	IMU ALIGN
8/09:39:00 43:41	MNVR R+233.00 P+ 31.00 Y+313.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 101 P 358		TDRS
8/12:50:00 52:48	MNVR R+280.00 P+ 84.00 Y+293.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 90 P 360		PTC ATT
8/13:05:00	CHANGE DAP A TO A2 AND SELECT DAP A NORM JETS	A2 AUTO NORM	DSC 0.400 DB AT 1.00 DB RT 0.20			
8/13:06:00	ROT BV=1(0.00, 0.00)	A2 AUTO NORM	DSC 0.400 DB AT 1.00 DB RT 0.20		ROT R+280 START P+ 84 ATT Y+293	PTC ROTR
8/13:07:00	SELECT VERN JETS	A2 AUTO VERN	DSC 0.400 DB AT 1.00 DB RT 0.02			
8/18:17:00	CHANGE DAP A TO A1 SELECT DAP A	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02			
8/18:18:00 26:57	TRK TGT=4 BV=5(184.00, 0.00) OM=270.00	A1 AUTO VERN	DSC 0.200 DB AT 1.00 DB RT 0.02	SUN T 176 P 181	INRTL R+262 P+ 74 Y+ 27	TAIL SUN
8/18:45:00	CHANGE DAP B TO B1 AND SELECT DAP B NORM JETS	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20			RAD BYPASS/ FES C/O
8/20:31:00 34:01	MNVR R+285.00 P+153.00 Y+ 21.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 107 P 57	-YST:13 -ZST:17 20:15-20:49	IMU ALIGN

TABLE 5-1 STS-9 ATTITUDE TIMELINE

MET	MNVR OPTION		DAP	E/S	REMARKS	EVENT
8/20:45:00 46:47	MNVR R+241.00 P+196.00 Y+ 9.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 65 P 89	-YST:31 -ZST:50 20:32-20:54	IMU VERIF
8/20:58:21 21:02:19	MNVR R+210.00 P+322.00 Y+ 29.00	B1 AUTO NORM	DSC 0.500 DB AT 3.00 DB RT 0.20	SUN T 84 P 0		TOP SUN
8/23:13:21 16:03	MNVR R+129.00 P+322.00 Y+ 29.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 84 P 81		D/O BURN ATT
8/23:18:21	OMS IGNITION	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30		DT=2:19 DV=236.6	DEORBIT BURN
8/23:23:21 27:59	MNVR R+238.01 P+165.90 Y+ 5.00	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	SUN T 90 P 99		EI-5 ATT
8/23:36:35	LVLH	* AUTO *	DSC 0.500 DB AT 3.50 DB RT 0.30	EARTH T 94 P 179	LVLH R+ 1 P+ 39 Y+359	EI-5

CONTINGENCY TIMELINES

HIGH PRIORITY MISSION..... 6A-1
WAVE OFF (1 DAY LATE ENTRY)..... 6B-1
WAVE OFF TIMELINE..... 6B-2

CONTINGENCY
TIMELINES

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HIGH PRIORITY MISSION

The High Priority Mission has been deleted for the Spacelab 1 Mission. In the event that a need arises or a decision is made to terminate the flight at a time earlier than the nominal end of mission, the following criteria will be followed:

1. The landing will be planned for the primary landing site at Edwards Air Force Base. Weather alternate, Northrup Strip.
2. A 26-hour (minimum) landing sequence will be established that will allow:
 - a. Establishment of a satisfactory crew work/rest cycle before the landing, and nominal entry thermal conditioning.
 - b. The Red Team to be the primary Deactivation Team. (The team that has been trained to perform the Spacelab close-out and preparation for landing.)
 - c. Sufficient time to prepare for a safe Deorbit and Landing Activity.

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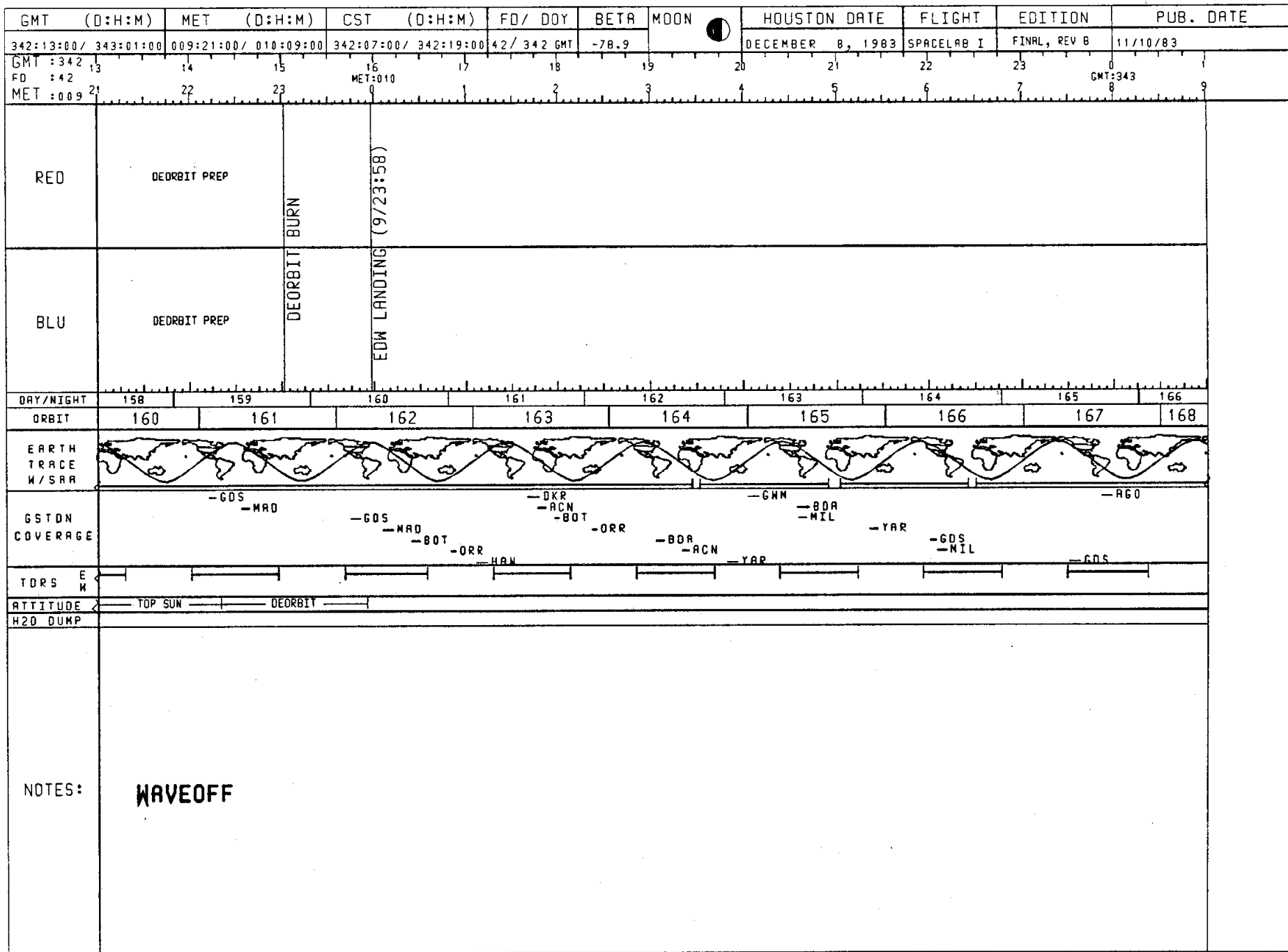
WAVE OFF (1 DAY LATE ENTRY)

The Timeline provided in this section is designed to follow a Deorbit Prep Backout on FD 9. It therefore assumes that the nominal timeline has already been accomplished.

Note that only basic STS activities are indicated for the Red and Blue teams. Extra time is available to accommodate reconfiguration, troubleshooting, or any additional desired activities.

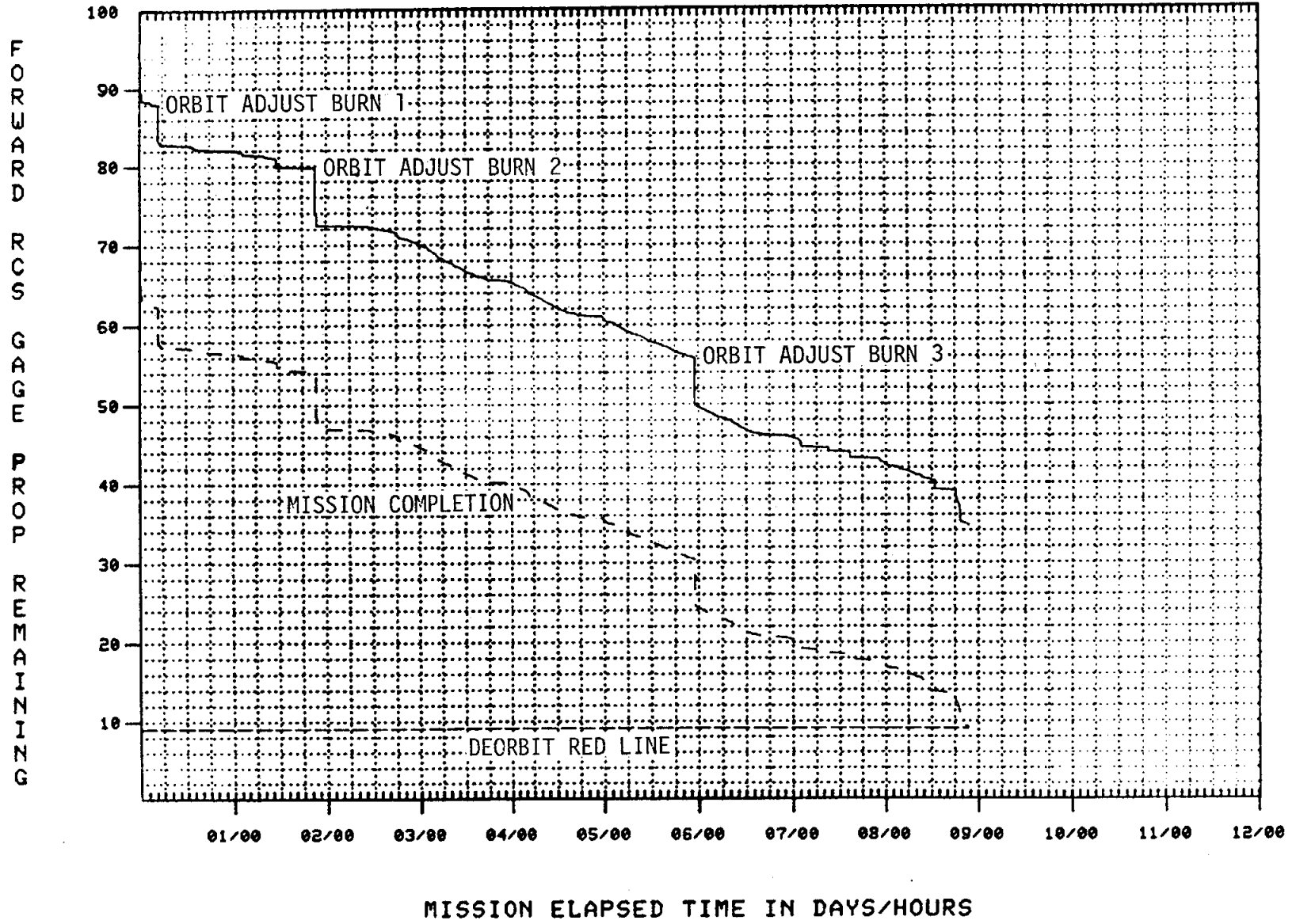
GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE			
341:13:00/ 342:01:00	008:21:00/ 009:09:00	341:07:00/ 341:19:00	41/ 341 GMT	-79.5	☾	DECEMBER 7, 1983	SPACELAB I	FINAL, REV B	11/10/83			
GMT : 341 13	14	15	16	17	18	19	20	21	22	23	0	1
FD : 41			MET:009								GMT:342	8
MET : 008 21	22	23	0	1	2	3	4	5	6	7	8	9
RED	DEORBIT PREP	BACKOUT	MEAL	PSA	SLEEP							
BLU	DEORBIT PREP	BACKOUT	MEAL	UNSTOW CABIN	SLEEP							
DRY/NIGHT	142	143	144	145	146	147	148	149	150	151	152	
ORBIT	144	145	146	147	148	149	150	151	152	153	154	
EARTH TRACE W/SAR												
GSTON COVERAGE	MIL BDA	-GDS -MAD	-GDS -MAD	-ORR -HAW	-DKR -RCN -BOT	-ORR	-DKR -RCN	-YAR -GWN	-GWN -GDS -MIL	-GDS -MIL	-GDS -MIL	
TORS E M	[Timeline of events with markers for BDA, MAD, BOT, ORR, HAW, RCN, YAR, GWN, MIL, RGO]											
ATTITUDE	TOP SUN DEORBIT PTC											
H2O DUMP												
NOTES:	WAVEOFF											

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE								
342:01:00 / 342:13:00	009:09:00 / 009:21:00	341:19:00 / 342:07:00	41 / 342 GMT	-79.5	●	DECEMBER 7, 1983	SPACELAB I	FINAL, REV B	11/10/83								
GMT :342	2	3	4	5	6	7	8	9	10	11	12	13					
FD :41										FD:42							
MET :009	9	10	11	12	13	14	15	16	17	18	19	20	21				
RED	SLEEP	H/O	MEAL			CABIN STOW		MEAL		RADIO BYPASS	DEORBIT PREP	PLBD OPS	DEORBIT PREP				
BLU	MEAL	AUTO MNRV H/O				SLEEP				PSA	CABIN STOW	MEAL	DEORBIT PREP				
DAY/NIGHT	150	151	152	153	154	155	156	157	158	159							
ORBIT	152	153	154	155	156	157	158	159									
EARTH TRACE W/SAR																	
GSTDN COVERAGE	-AGO	-BOT	-HAN	-BOT	-HAN	-RCN	-RCN	-AGO	-DKR	-MAD	-GMM	-AGO	-MAD	-YAR	ORR	-MIL	-BDA
TDRS E M																	
ATTITUDE H2O DUMP	PTC												TAIL SUN	[IMU]			
NOTES:	WAVEOFF												o HI LOAD HTR ON	* SL ACT/DEACT C/L	B FES CNTLR CHECK		

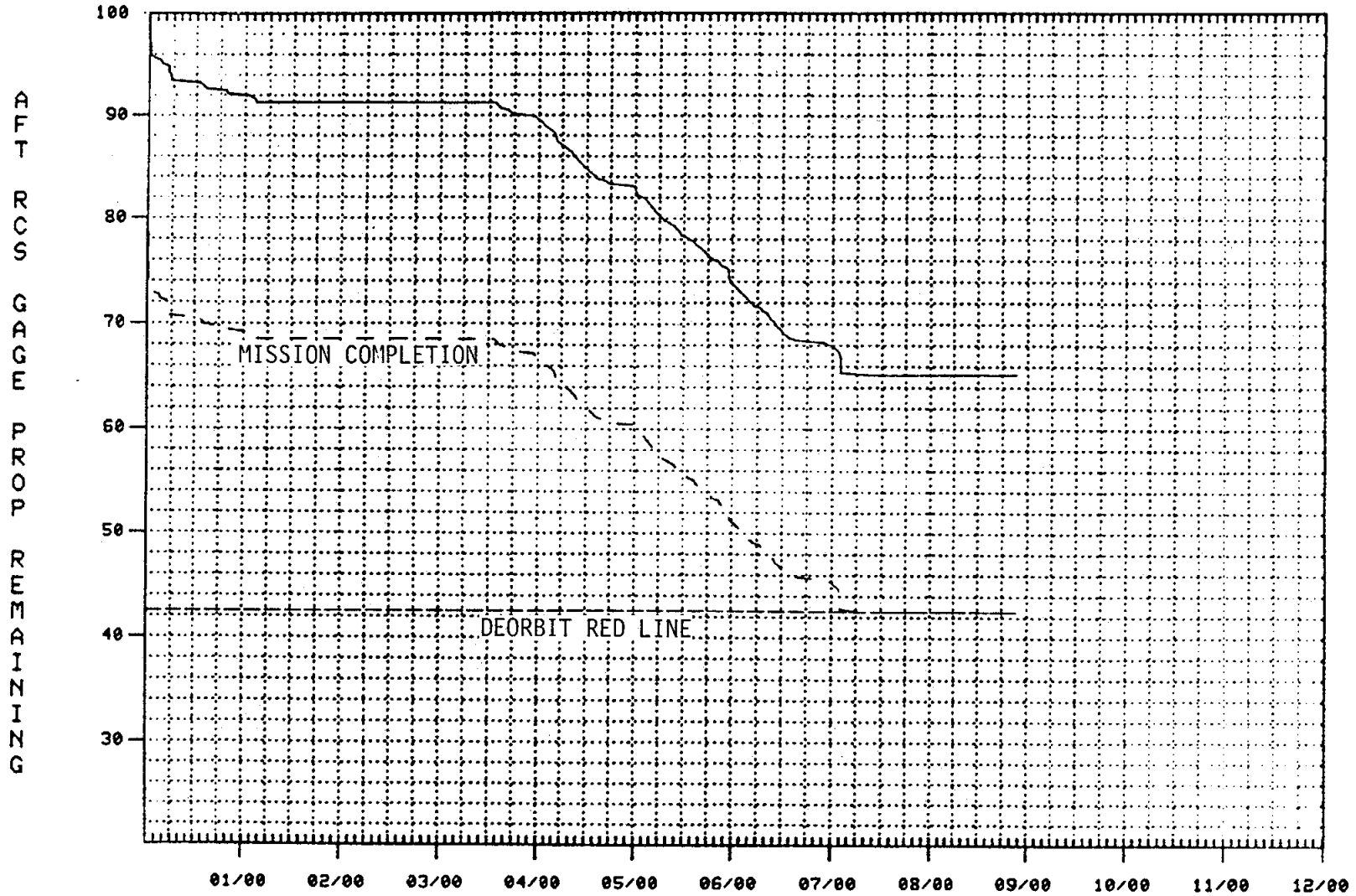


CONSUMABLES CURVES

STS-9 FORWARD RCS PROP REMAINING(% GAGE)

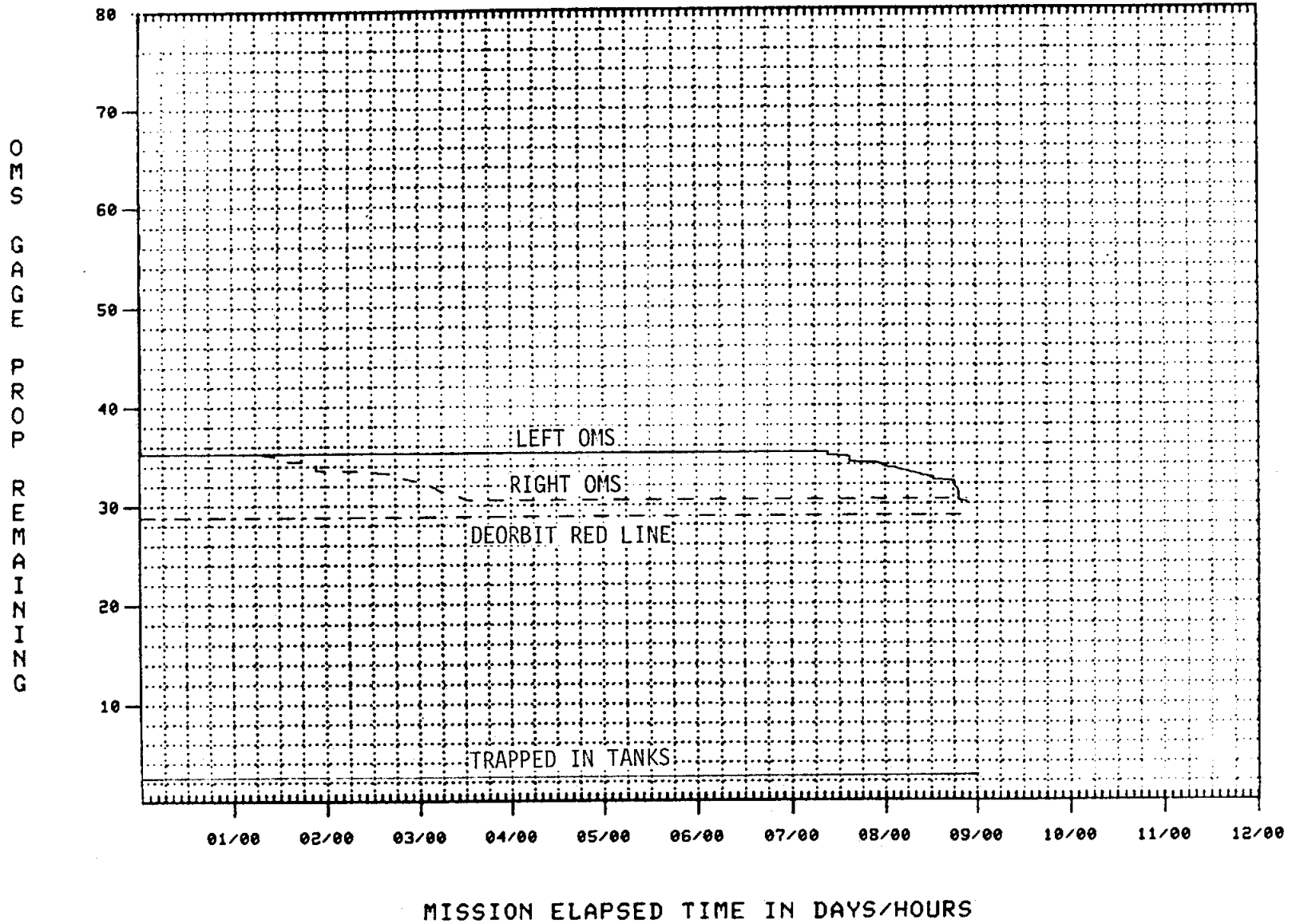


STS-9 AFT RCS PROP REMAINING(% GAGE)



MISSION ELAPSED TIME IN DAYS/HOURS

STS-9 OMS PROP REMAINING(% GAGE)



RESERVED
FOR
STS-9 SUPPLY WATER

RESERVED
FOR
STS-9 CRYOGENIC OXYGEN PROFILE

RESERVED
FOR
STS-9 CRYOGENIC HYDROGEN PROFILE

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

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CAP NOTES

NOTES

A. FLIGHT DESCRIPTION

STS-9 will launch from KSC on November 28, 1983, into a 135nm orbit at an inclination of 57°. The flight duration will be 9 days (~216 hrs). Nominal landing occurs at Edwards on December 7, 1983.

Landing opportunities are:

		<u>LANDING ORBIT NO.</u>	<u>SITE</u>	<u>LOCAL TIME</u>
Nominal	Primary	146	EDW	8:11 PST
	Weather Alt	146	NOR	9:13 MST
1 Day Late	Primary	162	EDW	7:59 PST
	Weather Alt	161	NOR	7:27 MST

MAJOR EVENTS

<u>LAUNCH (KSC)</u>	November 28, 1983
MET (DD/HH:MM:SS)	0/00:00:00
Day of Year	332
CST/GMT	1000/1600

<u>MECO</u>	
MET (DD/HH:MM:SS)	0/00:08:23

<u>OMS-1</u>	
MET (DD/HH:MM:SS)	0/00:10:23
ΔV (fps)	110.7
ΔT (MM:SS)	01:09
ORBIT ha/hp (nm)	135/44

<u>OMS-2</u>	
MET (DD/HH:MM:SS)	0/00:40:31
ΔV (fps)	163.7
ΔT (MM:SS)	01:45
ORBIT ha/hp (nm)	135/135

<u>TRIM BURN #1</u>	
MET(DD/HH:MM:SS)	0/05:15:00
ΔV (fps)	TBD

<u>TRIM BURN #2</u>	
MET(DD/HH:MM:SS)	1/21:40:00
ΔV (fps)	TBD

<u>TRIM BURN #3</u>	
MET(DD/HH:MM:SS)	5/23:15:00
ΔV (fps)	TBD

DEORBIT BURN

MET (DD/HH:MM:SS)	8/23:18:21
ΔV (fps)	242.4
ΔT (MM:SS)	02:25
ORBIT ha/hp (nm)	130/-3

LANDING (EDW)

MET (DD/HH:MM:SS)	9/00:11:17
Day of Year	341
CST (HH:MM)	10:11

B. FLIGHT OBJECTIVES/PAYLOADS

1. Verification Flight Test (VFT)

The objective of VFT is to gather data on the Spacelab systems, to verify the Orbiter/Spacelab/experiment interface compatibilities, and to measure the induced environment.

The data is acquired from the Orbiter and Spacelab Operational Instrumentation (OI) and the Verification Flight Instrumentation (VFI). The test is divided into seven basic Functional Objectives (FOs) covering various parts of the flight.

FO-1	Ascent Test
FO-2	Activation Transition Test
FO-3	On-Orbit Test/Special Vehicle Control
FO-4	On-Orbit Test/Thermal Cycling
FO-5	On-Orbit Test/Existing Vehicle Conditions
FO-6	Deactivation Transition Test
FO-7	Descent Test

The VFT is the primary objective of SL-1. It will require a certain amount of crew time, some vehicle systems use, several specific vehicle attitudes, and some data downlink to the ground. For a detailed breakdown of the requirements and operations for each of the seven FOs, see section 9. JSC is responsible for scheduling the VFT ops in the CAP. However, some of these are so closely tied to payload ops that it is expedient for MSFC to schedule them as part of the payload CAP. A breakdown of the scheduling responsibilities is contained in section 9.

2. Experiments

SL-1 has a multidisciplinary payload of 73 experiments.

Thirty-eight of these are various materials science sample types that are processed in one of 5 different processing devices. The other 35 experiments fit into one of 7 science disciplines: atmospheric physics, space plasma physics, astronomy, solar physics, Earth observations, technology, and life sciences. The SL-1 payload is a joint NASA/European Space Agency (ESA) venture; as such, ESA provides roughly one half the experiments and NASA the other half. A complete listing of experiments by name with a short summary of the objectives of each is in section 10.

3. Detailed Test Objectives (DTOs)

The Flight Requirements Document (7/83) lists 24 DTOs to be performed on this flight. Of these, 15 are really the VFT reordered into more operationally-oriented groupings. Of the other 9, 5 are non crew-related ascent/entry performance tests, 2 are ground-performed TDRS tests, 1 is a crew-performed air sample collection, and 1 is a crew-performed navigation test.

C. CREW

1. There are 6 crewmen onboard, divided into 3-man teams. They will operate in 2 shifts for continuous 24-hr payload operations. The teams have been designated RED and BLUE for purpose of identification.
2. Each team is on duty for 12 hr each day. Scheduling ground rules allow for the MS and the PS to conduct payload ops 8 hr and 10 hr, respectively, per shift. The remaining time is allotted to contingency ops, lunch, handover, and daily planning with the ground.
3. The work/rest cycle presents several scheduling challenges. All crewmembers must be awake and alert on launch and entry days, yet the 12-hr work day for payload ops requires alternating sleep periods for each team. Since the flight is only 9 days long, there is little time for transition from launch day to the standard 2-shift day then back again for entry. The approach taken for SL-1 is to have all crewmen establish a circadian rhythm several days before launch that approximates their in-flight schedule beginning on Day 2, then do a two-day shift as required to satisfy launch day criteria. This should minimize their in-flight adjustment.
4. Launch and entry seating

The CDR and PLT will occupy their normal flight deck seats. One MS will assume the role of Flight Engineer and sit on the flight deck behind and between the CDR and PLT. The other MS and the PSs will sit in the middeck area. The Flight Engineer will assist during ascent and entry and will operate some VFT controls on panels R7 and R15. The four MS and PS seats are removable inflight and will be stowed out of the way.

D. ORBITER SYSTEMS

1. Electrical Power System

Fuel cells will be purged every 12 hr optimally. An Orbiter crewman initiates each purge sequence.

2. Communications and Instrumentation

- a. The primary means of communication with the Orbiter will be through the TDRS satellite, located at 41° W. The full complement of STDN network stations will also be available.
- b. Ku-Band coverage is dependent on vehicle attitude because of the location of the single Ku-Band antenna in the right front of the payload bay. Since the Ku-Band can operate only when the payload bay doors are open, S-band and UHF coverage will be used during ascent and entry. Ku-Band coverage estimate for the present attitude timeline is 32%.
- c. There are 3 data channels for Ku-Band downlink. Channel 1 is used strictly for Orbiter ops data (192 KBPS). Channels 2 and 3 are shareable by various Orbiter and Spacelab output streams. Channel 2 will primarily be shared between the ops recorders (1.024 MBPS) and the High Rate Multiplexer (HRM) in the Spacelab on low rate (2 MPBS). Another potential source of the Channel 2 data is the Payload Recorder in the Orbiter, which is planned to operate only during entry to get backup VFT data. Channel 3 will be switched between the high rate HRM output (48 MBPS), the Orbiter CCTV, and the Spacelab TV/Analog output.
- d. Commands to the Spacelab will be sent using one of two modes: through-put and two-stage. The through-put mode allows commands to go through the Orbiter system to the Spacelab with little time delay. The two-stage commands are held in the Orbiter computer while being echoed to the ground for confirmation, then are forwarded to the Spacelab by a second command. The two-stage are more reliable but require significantly more transmit time.
- e. The control of the Verification Flight Test (VFT) system will be shared among the crew, the ground, and the Experiment Computer. Prior to launch, the crew selects the Ascent mode using switches on panels R7 and R15. This mode will cause VFT data to be recorded on the VFT Recorder at 60 ips from T-1 min to 10 min 30 sec into the flight. At 15 min MET the crew selects the Ascent Transition mode. Data is recorded at 30 ips for 10 sec every 15 min until 4 hr into the flight. Also, selected EPDS transients are recorded manually through crew operation of the R7 and R15 controls. Then the On-Orbit/CDMS mode is selected. This

puts the VFT under control of the Spacelab Experiment Computer. The crew can make item entries on the VFT displays to perform various functions. Data is gathered periodically during the on-orbit phase, along with experiment data, either realtime through the HRM or by dumping the High Data Rate Recorder (HRRR). There are programmed VFT tests during which data will be gathered: hot case, cold case, contamination monitoring, acceleration tests. Also, during the on-orbit phase the VFT tape recorder must be dumped of the ascent and activation data so it is ready for the next phases, deactivation and entry. At landing minus 8 hr the crew selects Descent Transition mode and data is recorded just as it was during the Ascent Transition mode. To preclude exhausting the tape before entry is complete, the manual mode will not be used during this phase. Prior to seat ingress for entry the crew selects 'R7/DESCENT' on panel R15. This enables the Descent mode. The crew manually operates the VFT Recorder to record selected portions of the entry through rollout.

- f. The Text and Graphics System (TAGS) will be used on this flight to transmit data to the crew that cannot be easily or conveniently voiced. It uses a dedicated Ku-Band data channel to uplink facsimile type information from a ground scanner in the MCC and produces 8 x 10-1/2 inch hardcopies onboard. It can transmit in four modes: high or low resolution, with or without gray shades. Transmission times vary from about 1 min 20 sec for most text to over 17 min for high-resolution gray scale images. Various procedure changes, timelines, and flight notes will be uplinked as required. The crew can insert these copies directly into their checklists if desired.

3. Guidance and Navigation

IMU alignments are scheduled every 12 hr. The guideline for time required to do the alignment is 36 min including a maneuver to and from the align attitude.

4. Propulsion

Orbit adjustment burns will be planned preflight to account for insertion errors and drag uncertainties, with the intent being to keep the preflight times of orbital events such as sunrise/sunset that were loaded into the master timeline in the Experiment Computer close to the actual times. If the delta between the real and the predicted times becomes too large, the master timeline will have to be reloaded inflight which will require excessive command time to do and will jeopardize some of the experiment data. The burns are planned at 0/5:00, 1/21:25, and 5/23:00 MET. The first burn will correct for insertion errors and drag model errors caused by increased/decreased solar activity. The other burns take out the inaccuracies of the first burn and fine tunes the thrust/drag models based on venting, vehicle attitudes, and solar activity.

5. Environmental Control and Life Support Subsystem (ECLS)

- a. The Orbiter is launched with no LiOH canisters installed for CO₂ absorption. (The spacelab module has 2 canisters installed at launch.) Two are installed at about 3 hr MET. Thereafter, one is changed out every 12 hr during each team's presleep activities.
- b. There will be 4 supply tanks and 1 waste water tank for this flight. The dumps are shown on the summary T/L. The waste tank will be dumped once during the flight simultaneously with a supply tank dump. The Flash Evaporator System will not be constrained by the payloads and can flash as required. The steam from the FES is not considered a significant contamination source. (Table 8-2 has the dump schedule.)

6. Television

The Orbiter Closed Circuit TV (CCTV) System will utilize 4 cameras and a Video Tape Recorder (VTR). The cameras are positioned as follows:

- 1 - on flight deck
- 1 - on middeck
- 2 - in P/L bay on the forward bulkhead

One of the bay cameras will utilize the STBD RMS port for control and data routing. The aft bulkhead cameras will be removed to prevent blocking any pallet instrument's FOV.

Television data will be downlinked on Ku-Band channel 3 and this channel must be shared between the Orbiter CCTV system and the Spacelab TV/Analog output (as well as HRM high rate data).

7. DPS

- a. The on-orbit GPC configuration will be:

- 1 - GNC
- 1 - SM
- 3 - off

One machine each for the 2 major functions will be adequate for vehicle control and management of the systems.

- b. Activation and deactivation of the Spacelab will be done under control of the SM GPC. Eleven on-orbit displays have been defined for control of the various SL systems. There will be no act/deact displays which combine all the necessary actions on a single display, but rather the crewman will have to cycle through the various system displays to perform the act/deact.

E. SPACELAB SYSTEMS

1. Electrical Power Distribution System (EPDS)

The Spacelab is provided power via Orbiter fuel cells 2 and 3 through the Orbiter PRI P/L BUS to the SL MAIN BUS. The Ascent and Entry power level is $\leq 1.5\text{KW}$. The on-orbit power level is 7-KW continuous and 12-KW peak. For a Fuel Cell failure on-orbit the power level will be 5KW continuous and 8KW peak.

2. Communications and Instrumentation

- a. The HRM receives data from 24 separate input sources: 16 experiment channels, the HDRR, the Payload Recorder, the S/S and Experiment Computers, the 3 SL voice circuits (pre-multiplexed), and a GMT time signal. It multiplexes the various inputs it receives at any time and sends the data either to the KUSP for downlink, or back to the HDRR or PL RCDR. These inputs transmit data at many different data rates. In order for the HRM to know how to multiplex the data and for the ground to configure the data-receiving equipment properly, a series of formats have been identified for the HRM using various combinations of the possible inputs. The HRM format is switched by the Subsystem Computer through either a Stored Program Command (SPC) or a Real-Time Command (RTC) from the INCO.
- b. The HDRR is located in the Control Center rack of the SL. The tape could be changed manually by the crew. However, the time required to change tapes is very long, and it is much more efficient to dump to the ground than to reload. Consequently, no tape changes are planned. The recorder operates at 1 to 32 MBPS; it dumps in reverse order at 2,4,8,12,16,24, or 32 MBPS. At a rate of 32 MBPS a tape runs for 20 min. The HDRR and PL RCDR can direct dump to the KUSP or can be dumped through the HRM. (The PL RCDR is not planned to be used on this flight, so the HDRR will handle all payload data recording.)
- c. The SL Intercomm System is tied to the Orbiter system and operates in 4 modes: air-to-ground, air-to-air (for EVA), IC with Orbiter, IC internal. The master station (ICMS) is located at the Control Center rack with a remote at the Work Bench. Additional units can be put in racks 4, 7, and 10. A paging speaker is mounted in the end cone.

3. Environmental Control and Life Support (ECLS)

The two LiOH canisters in the module are good for about 48 hr each, assuming two crewmen are in the module most of the time. A changeout schedule has been established whereby one of the two is changed approx. every 24 hr. (Table 11-3)

4. Command and Data Management (CMDS)

- a. There are 3 computers in the Spacelab module: the Subsystems Computer (SSC), the Experiment Computer (EXC), and a

Backup Computer (BUC). The BUC is loaded with SSC software because losing the SSC is more critical than losing the EXC, and a timely recovery is necessary. One Mass Memory Unit (MMU) services all 3 computers and contains a copy of both the SSC and EXC software. Data is collected and transmitted to and from the computers to the systems and payload hardware by 7 Remote Acquisition Units (RAUs), the Spacelab equivalent of the Orbiter MDMs. The crewman interfaces each computer through a Data Display Unit (DDU) which is made up of a video display and keyboard. There will be one DDU in the Control Center rack R2K and one in experiment rack location L6K in the module.

b. The SSC performs 3 basic functions with the systems hardware:

- (1) Sends commands to the H/W
- (2) Monitors data from the H/W and transfers selected pieces to the Orbiter PCMMU for downlink
- (3) Detects and annunciates faults

The crewman can monitor the systems using either the SSC displays in the module or the GPC displays in the AFD.

c. The EXC performs similar functions to the SSC with the payload hardware plus several additional functions:

- (1) Performs a checkout of payloads
- (2) Controls payload operations through the use of automatic timelines (see item d below)
- (3) Processes payload data for feedback to the H/W, display to the crew, or transmission to the ground through the HRM

d. The Experiment Computer Operating System (ECOS) uses master and subordinate timelines to control payload operations. At any time there can be one master T/L and up to 6 subordinates active in the computer. Other T/Ls are stored on the MMU for later use. The ECOS Timeline Monitor display is used to load T/Ls from the MMU, to start the T/Ls counting, and to display to the crewman which T/Ls are currently loaded. He can display up to 10 items from any T/L and watch as they get executed by the EXC at the corresponding GMT time. The Timeline Maintenance display is used to modify timelines before they are activated. The crewman can add, delete, or replace entries, or replace the execution time of entries. Timelines are called from the MMU into a Work Buffer (separate from the active timeline buffer), modified, then returned to the MMU.

5. Scientific Air Lock (SAL)

The SAL is located in the ceiling of the experiment section of the module. Two experiments will alternate occupying this SAL: ES020 and ES022. The MS and PS jointly operate these SAL experiments. There is provision for EVA to clear the SAL for PLBD closing in case of a jam. (See Table 11-5 for a summary of all the SAL ops planned for the flight.)

STS
DETAILED TEST OBJECTIVES (DTOs)

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TABLE 9-2 - DTOs and VFT FOs CROSS REFERENCE..... 9-4
TABLE 9-3 - VERIFICATION FLIGHT TEST FOs..... 9-5
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STS DTOs

INTRODUCTION

This section enumerates the STS objectives for this flight. The list of DTOs (Table 9-1) is from the 7/83 Flight Requirements Document, with details of each test contained in the Flight Test and Supplementary Objectives Document, JSC-16725. The first 16 tests (1000 series) are a repackaging of the VFT objectives to make them easier to track for accomplishment in real time. Table 9-2 is a cross-correlation of DTOs and VFT FOs. The summary and detailed T/Ls contain DTO nos., and specific details of each test can be found by cross-correlating in this table and then looking at Table 9-3. The responsibility for scheduling the DTO/VFT activities is divided between JSC and MSFC as listed in Table 9-4.

TABLE 9-1 - ORBITER DTOs

DTO NUMBER	TITLE
DTO 1001	Spacelab Ascent Environment
DTO 1002	Spacelab Activation/Transition Test
DTO 1003	Nominal Spacelab Heating Test
DTO 1004	Spacelab Controlled Contamination Monitoring, Deep Space
DTO 1005	Spacelab Controlled Half Orbit Contamination Monitoring
DTO 1007	Spacelab Cold Case Thermal Attitude
DTO 1008	Spacelab Hot Thermal Attitude Tests
DTO 1009	Spacelab Command and Data Management Systems Tests
DTO 1010	Spacelab Habitability Subsystems Test
DTO 1011	Spacelab Environment Test
DTO 1012	Spacelab Electrical Power System Validation
DTO 1013	Spacelab Scientific Airlock Functional Test
DTO 1014	Spacelab Deactivation/Transition Verification
DTO 1015	Spacelab Entry Conditions Response
DTO 1016	Spacelab On-orbit Environment Test
DTO 0205	Entry Aerodynamic Test
DTO 0219	ET and SRB Ascent Heating
DTO 0303	TPS Entry Heating Evaluation
DTO 0312	ET Performance TPS
DTO 0313	SRB Recovery
DTO 0602	Cabin Atmosphere Verification
DTO 0704	TDRS Navigation Test
DTO 0711	Ku-Band Communication Link Performance Number 3
DTO 0775	On-orbit TACAN Navigation

TABLE 9-2 - DTOs and VFT FOs CROSS REFERENCE

DTO NUMBER	FO NUMBERS
1001	1.1 thru 1.5, 2.1, 2.2
1002	2.3.1, 2.4, 2.5
1003	3.1.1 thru 3.1.3
1004	3.2
1005	3.3
1007	4.1.1 thru 4.1.3
1008	4.2.1 thru 4.2.4, 4.2.6
1009	2.3.2.2, 2.3.2.3, 5.1, 5.2, 5.4.1 thru 5.4.8
1010	5.5.1 thru 5.5.4, 6.1
1011	5.6
1012	---
1013	4.1.5, 4.2.5
1014	6.2, 6.3.1 thru 6.3.3, 6.4
1015	7.1 thru 7.7
1016	---
1017	---

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
1.	ASCENT TEST		
1.1	Configure SL for Ascent	Prelaunch	Must occur prior to liftoff and prior to FOs 1.2 and 1.3
1.2	Configure for Ascent Control	Prelaunch	SL pwr on - prior to crew securing for liftoff
1.3	Activate VFI for Ascent	~T-6 min	
1.4	Configure IECM for Ascent	~T-90 sec	No later than T-60
1.5	Record VFI Ascent Data	~T-45 sec	No sooner than T-60. Max tape usage 11.5 min
2.	ACTIVATION TRANSITION TEST		
2.1	VFI Ascent Transition Mode and IECM On-Orbit Mode	00/00:10 00/00:16	
2.2	Record VFI Ascent Transition Data	00/00:11	Auto recording at 15 min intervals for a max of 4 hr
2.3	SL Activation VFT	00/02:30 00/05:15	

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
2.3.1	Record EPDS Transients	Throughout SL Act	Integrated with activation of the various subsystem elements
2.3.2	CDMS Activation		
2.3.2.1	CDMS Activation from AFD	00/02:40 (SS) 00/03:15 (EX)	Subsystem and expt CDMS act. are scheduled separately
2.3.2.2	HRM/HDRR Initial Test	GROUND (00/02:55)	
2.3.2.3	PL Recorder Test	GROUND (00/03:00)	
2.3.3	ECS Activation		
2.3.3.1	Activate SL Freon Loop	00/01:50	Must occur within 2 hr of insertion. Can be ground commanded
2.3.3.2	Cabin Air Loop Activation	00/03:00	
2.3.3.3	Rack Reconfiguration	00/04:30	
2.3.3.4	Avionics Air Loop Reconfiguration	00/03:10 00/04:35	The two steps to this procedure are scheduled separately. First, the avionics fan is switched to high speed, then the loop is configured for on-orbit operations
2.4	Reconfigure VFI to On-Orbit Mode	00/05:15	Scheduled as part of SL Activation; must occur after 2.3.1, 2.3.2.1, and 2.3.2.2
2.5	Habitability Acoustics Test	00/05:30	After SL Activation and prior to any PL equipment activation

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
3.	ON-ORBIT TEST/SPECIAL VEHICLE CONTROL		
3.1	Nominal Vehicle Heating Test		Preferred prior to 4.1 and 4.2
3.1.1	Acquire/Downlink VFI Data at Req'd Vehicle Attitude	01/02:35 (init.) 01/10:45 (term.)	-Z/LV for 8 hr. No crew activities required
3.1.2	Verify Cabin Temperature Control	01/02:12 01/04:18 01/06:53	Scheduled at 0 hr, 2 hr, and 4 hr after start of test
3.1.3	Temp Measurements and Condensation Checks	01/09:30	Scheduled 1 hr to 1/2 hr before end of test. Must be completed prior to vehicle reorientation
3.2	Controlled Contamination Monitoring/Deep Space Attitude		-Z axis (PL bay) pointed away from sun and Earth 60°. Scheduled coincident with Cold Test
3.3	Controlled Half-Orbit Contamination Monitoring	01/01:26	-Z axis pointed $\pm 50^\circ$ of vehicle wake vector at sunrise, inertial hold for one-half orbit. Can be scheduled any time after 24 hr into mission

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
4.	ON-ORBIT TEST/THERMAL CYCLING		
4.1	Cold Test		
4.1.1	Acquire/Downlink VFI Data in Cold Test Vehicle Attitude	01/11:15 (init.) 02/10:45 (term.)	-X at sun, -Z away from Earth for 24 hr. 360° roll about X per orbit to keep PL bay away from Earth. No crew activities required
4.1.2	Verify Cabin Temperature Control	01/10:55	Scheduled at start of test
4.1.3	Temp Measurements and Condensation Checks	01/16:15 01/20:44 02/01:30 02/07:30	Scheduled at 5 hr, 10 hr, 15 hr, and 21.5 hr after start of test. Must start ±30 min of scheduled times
4.1.5	SAL Functional Test		Refer to Table 8-5, SAL OPS
4.2	Hot Test		Must immediately follow 4.1
4.2.1	Acquire/Downlink VFI Data in Hot Test Vehicle Attitude	07/02:10 (init.) 07/14:30 (term.)	-Z at sun for 12 hr. No crew activities required
4.2.2	Deactivate Cold Case Fix	07/02:25	Scheduled at start of test

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
4.2.3	Verify Cabin Temperature Control	07/02:40	Scheduled at start of test
4.2.4	Internal Temperature Measurements	07/08:45 07/13:52	Scheduled at 6 hr and 11.5 hr after start of test. Performances must start ± 30 min of scheduled times. Final performance must be completed before vehicle reorientation from Hot Test attitude
4.2.5	SAL Functional Test		Table 8-5
4.2.6	Activate Cold Case Fix	07/15:00	Scheduled immediately after completion of test
5.	ON-ORBIT TEST/EXISTING VEHICLE CONDITIONS		
5.1	Downlink Recorded Ascent and Ascent Transition VFI Data		Scheduled by MSFC
5.2	Acquire/Downlink VFI On-Orbit Data		No crew activities required
5.3	ECS Records		
5.4	CDMS Tests		
5.4.1	CCTV		

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
5.4.2	Concurrent Use of Resources		Scheduled by MSFC
5.4.3	ECAS and DEP Loading		Scheduled by MSFC (Experiments NS002 and ES300)
5.4.4	POCC Experiment Control		Scheduled by MSFC
5.4.5	GPC/MDM Link Test		Scheduled by MSFC
5.4.6	Time Link Test		Scheduled by MSFC (Exp NT011)
5.4.7	High Rate Payload Data		Scheduled by MSFC (Exp NS001)
5.4.8	RAU/HRM Link Test		Scheduled by MSFC
5.4.9	Controls and Displays Evaluation	POSTFLIGHT	No special in-flight test
5.5	Habitability Subsystem Tests		
5.5.1	Spacelab Stowage	07/02:00	Requires CCTV
5.5.2	General Purpose Work Station		Requires CCTV. This DTO will not be called out separately as it will be accomplished in daily activities somewhere during the flight
5.5.3	Internal Crew Aids	POSTFLIGHT	No special in-flight test

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
5.5.4	Crew Emergency Egress Test	06/11:00	Requires 4 crewmen
5.6	Low Frequency Level Acceleration Test	00/11:10	
6.	DEACTIVATION TRANSITION TEST		
6.1	Habitability Subsystem Acoustics Test	08/13:40	Must occur after PL equipment deact and prior to SL deact
6.2	Deactivate VFI On-Orbit Mode	08/14:45	As late as possible prior to SL deact
6.3	Spacelab Deactivation VFT		To preclude a data void between VFT FOs 5 and 6, SL deact should be as late in flight as possible
6.3.2	ECS Deactivation Tests		
6.3.2.1	Condensate Tank Dump	08/09:50	
6.3.2.2	Avionics Air Loop Reconfiguration	08/15:35 08/16:10	First time is configuring loop for descent; second time is putting fan to low speed

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
6.3.2.3	Rack Reconfiguration	08/15:35	Must not occur more than 2 hr prior to start of reentry. May be by ground command Integrated with deact of SL subsystems. VFT recorder operated manually As soon as possible after FO 6.2 but no sooner than 8 hr before reentry
6.3.2.4	Cabin Air Loop Deact	08/16:10	
6.3.2.5	Freon Loop Deact	08/19:45	
6.3.3	Record EPDS Transients	Throughout SL Deact	
6.4	Record Descent Transition Data	08/14:45	
7.	DESCENT TEST	08/14:45	Requires precise ± 10 sec timing of start for correlation of air samples Terminates 6.4 Scheduled at start of reentry
7.1	Configure IECM switch for Descent Control		
7.2	IECM Descent Mode Operation		
7.3	Configure for Descent Control		
7.4	VFI Descent Operation		

TABLE 9-3 - VERIFICATION FLIGHT TEST FUNCTIONAL OBJECTIVES

FO NUMBER	TITLE	SCHEDULED (D/HH:MM) (MET)	SCHEDULING REMARKS
7.5	Record VFI Descent Data		Only 18.5 min of tape available for 37 min descent. Therefore, recording will be broken into 2 parts to include reentry and landing
7.6	Deactivate VFI	POSTLANDING	
7.7	IECM Post-Landing Data Acquisition	POSTLANDING	

TABLE 9-4 - VFT SCHEDULING RESPONSIBILITIES
 Group 1 - Scheduled by JSC

FO NUMBER	TITLE
1.1	Configure SL for Ascent
1.2	Configure for Ascent Control
1.3	Activate VFI for Ascent
1.4	Configure IECM for Ascent
1.5	Record VFI Ascent Data
2.1	VFI Ascent Transition Mode and IECM On-Orbit Mode
2.2	Record VFI Ascent Transition Data
2.3.1	Record EPDS Transients
2.3.2.1	CDMS Activation from AFD
2.3.2.2	HRM/HDRR Initial Test
2.3.2.3	Payload Recorder Test
2.3.3.1	Activate SL Freon Loop
2.3.3.2	Cabin Air Loop Activation
2.3.3.3	Rack Reconfiguration

FO NUMBER	TITLE
2.3.3.4	Avionics Air Loop Reconfiguration
2.4	Reconfigure VFI to On-Orbit Mode
2.5	Habitability Acoustics Test
3.1.1	Acquire/Downlink VFI Data at Required Vehicle Attitude
3.1.2	Verify Cabin Temperature Control
3.1.3	Temp Measurements and Condensation Checks
*3.3	Controlled Half-Orbit Contamination Monitoring
4.1.1	Acquire/Downlink VFI Data in Cold Test Vehicle Attitude
4.1.2	Verify Cabin Temperature Control
4.1.3	Temp Measurements and Condensation Checks
4.1.4	Activate Cold Case Fix
4.2.1	Acquire/Downlink VFI Data in Hot Test Vehicle Attitude
4.2.3	Verify Cabin Temperature Control
4.2.4	Internal Temperature Measurements

*Requires other center concurrence.

FO NUMBER	TITLE
4.2.6	Activate Cold Case Fix
**5.2	Acquire/Downlink VFI On-Orbit Data
5.3	ECS Records
**5.4.1	CCTV
**5.4.9	Controls and Displays Evaluation
6.1	Habitability Subsystem Acoustics Test
6.2	Deactivate VFI On-Orbit Mode
6.3	Spacelab Deactivation VFT
6.3.1	CDMS Deactivation Tests
6.3.2.1	Condensate Tank Dump
6.3.2.2	Avionics Air Loop Reconfiguration
6.3.2.3	Rack Reconfiguration
6.3.2.4	Cabin Air Loop Deactivation

**Scheduled as part of standard operations.

FO NUMBER	TITLE
6.3.2.5	Freon Loop Deactivation
6.3.3	Record EPDS Transients
6.4	Record Descent Transition Data
7.1	Configure IECM Switch for Descent Control
7.2	IECM Descent MODE Operation
7.3	Configure VFI Switch for Descent Control
7.4	VFI Descent Operation
7.5	Record VFI Descent Data
7.6	Deactivate VFI
7.7	IECM Post-Landing Data Acquisition

Group 2 - Scheduled by MSFC

FO NUMBER	TITLE
*3.1	Nominal Vehicle Heating Test
*3.2	Controlled Contamination Monitoring - Deep Space
*4.1	Cold Test
4.1.5	SAL Function Test
*4.2	Hot Test
4.2.5	SAL Function Test
5.1	Downlink Recorded Ascent and Ascent Transition VFI Data
5.4.2	Concurrent Use of Resources
5.4.3	ECAS and DEP Loading
5.4.4	POCC Experiment Control
5.4.5	GPC/MDM Link Test
5.4.6	Time Link Test
5.4.7	High Rate Payload Data

*Requires other center concurrence.

FO NUMBER	TITLE
5.4.8	RAU/HRM Link Test
*5.5.1	Spacelab Stowage
*5.5.2	General Purpose Work Station
**5.5.3	Internal Crew Aids
*5.5.4	Crew Emergency Egress Test
*5.6	Low Frequency Level Acceleration Test

*Requires other center concurrence.

**Scheduled as part of standard operations.

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EXPERIMENT SUMMARIES

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EXPERIMENT
SUMMARIES

INTRODUCTION

Table 10-1 gives a summary of the Spacelab experiments and experiment objectives. The first letter of the experiment number in the table indicates whether it is a NASA or a European Space Agency (ESA) sponsored experiment. The letter N is for NASA, the letter E is for ESA. The second letter of the experiment number tells whether it is a scientific, technological, or applications investigation, indicated by the letter S, T, or A. The last three identifying numbers of the experiment number are assigned arbitrarily. Sometimes there is a number one (1) before the letter of the normally 5-character experiment number which indicates it is the first Spacelab Mission, i.e., 1NS001. The title for each SL experiment number is also given in the table.

The experiments are grouped by discipline.

TABLE 10-1 - SPACELAB 1 - EXPERIMENTS AND OBJECTIVES
 Official Experiment Numbers And Titles Are Followed By Those Used In The Timeline

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ATMOSPHERIC PHYSICS		
NS001	An Imaging Spectrometric Observatory	<ul style="list-style-type: none"> ● To produce the first daytime spectrum (200-12000A, 3-6A resolution) emissions of: <ul style="list-style-type: none"> - Atmospheric metastable species - Atmospheric molecular nitrogen systems - Mesosphere and lower thermosphere trace constituents - Atmospheric helium and hydrogen ● To monitor the Shuttle-induced contamination ● Serve as the precursor for future Shuttle observing programs using this observatory
(1)	Isothermal Initial Pwr Up and Outgassing ISO Day glow/NIFD13 Att ISO Day glow and Joint Ops w/FAUST ISO Joint Ops w/FAUST	
ES013	Grille Spectrometer	<ul style="list-style-type: none"> ● The determination of vertical distribution profiles of trace constituents in the stratosphere, mesosphere, and thermosphere in order to study the chemical and dynamical atmospheric processes ● To monitor, on a long term basis, man-made and natural alterations of the near-Earth environment
(13)	Setup Grille/Calibrate/Shut Down	

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES014	Waves in the OH Emissive Layer	<ul style="list-style-type: none"> ● To study the large-scale structure of the atmospheric OH emission ● To investigate possible relations between OH emission structure and orography or meteorological phenomena
*(14)		
ES017	Investigation on Atmosphere H & D through the Measurement of their Lyman- α Emission	<ul style="list-style-type: none"> ● To use a Lyman-alpha photometer equipped with H and D absorption cells to measure deuterium (1214.33A) emission to: <ul style="list-style-type: none"> - Obtain the vertical distribution of D above 100km - Derive the atmospheric temperature - Derive the eddy diffusion coefficient K - Attempt to map K on the day side of the Earth - Estimate the escape flux from the upper atmosphere ● Observe proton precipitation in the auroral and equatorial zones ● To use a hydrogen (1214.66A) absorption cell as a technique to eliminate the interplanetary Lyman-alpha background which affects astronomical measurements ● To observe the SEPAC proton gun interaction with the STS/Spacelab environment ● Attempt to measure atmospheric hydrogen Lyman-alpha emissions
*(17)		
SPACE PLASMA PHYSICS		
NS002	Space Experiments with Particle Accelerators	<p>To use an electron beam accelerator and a magneto plasma dynamic arcjet to study:</p> <ul style="list-style-type: none"> ● Aurora production in upper atmosphere ● Ionospheric parameters such as anomalous resistivity ● Plasma coupling processes ● Electric and magnetic field morphology ● Vehicle charge neutralization ● Shuttle/Spacelab induced environments

*Ground controlled, not referenced in the timeline (Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
NS002 (Cont)		<ul style="list-style-type: none"> ● Electron beam/neutral plume interaction ● The coupling between the Earth's atmosphere and magnetosphere ● The effects of particle interactions on atmospheric dynamics
(2)	<p>SEPAC Battery Charge SEPAC Sys Checkout SEPAC MPD Arcjet Checkout SEPAC Passive Exp Ops SEPAC Electron Beam Level 1 Test Fire SEPAC EBA Expt 2 & 1B SEPAC MPD Arcjet Firing 1 SEPAC Wave Emission Test - EBA Firing SEPAC Electron Beam Level 2 Test Fire SEPAC MPD Arcjet Firing 2 SEPAC Artificial Aurora Tests SEPAC Vehicle Charging Exp/-ZLV SEPAC Equatorial Aerochemistry & E//B Expt SEPAC EBA w/MPD Arcjet Ops SEPAC EBA Exp 1A SEPAC Electron Echo Expt SEPAC Artificial Aurora Excitation SEPAC MPD Arcjet Firing 3 SEPAC Descent Config SEPAC EBA Level 1 Firing SEPAC Artificial Aurora Ops SEPAC EBA/MPD Level 1 Firing SEPAC Passive w/PICPAB Ops</p>	

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
NS003	Atmospheric Emissions Photometric Imaging	<ul style="list-style-type: none"> ● Investigation of upper atmospheric transport processes through the measurement of resonant scattered emissions from Mg ions ● Measurement of excitation cross sections of upper atmospheric constituents using injected particle beams and detection of the resulting emissions ● Investigation of atmospheric composition and energy budget through observations of natural aurorae ● Observation of large- and small-scale auroral morphology and comparison of ultraviolet and visible aurora features ● Support of the electron accelerator in conducting electron bounce measurements of magnetospheric electric fields ● Measurement of the small particulate contamination around the Shuttle/Spacelab
(3)	AEPI Dep Checkout AEPI Mount Checkout AEPI Thermal Control AEPI Dep Update AEPI Star Shoot Cal AEPI Horizon Sensor Cal AEPI Joint Ops w/SEPAC AEPI Particulate Contamination Ops/-ZLV Att AEPI Joint Ops w/SEPAC & PICPAB AEPI MG + Ion Obs/Particulate Contamination Ops AEPI Obs of MG + Ions AEPI Particulate Contamination Ops/N3F4 Att AEPI Joint Ops w/PICPAB	

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
NS019	Study of Low-Energy Electron Flux and its Reaction to Active Experimentation on Spacelab	<p>To fly a 160° field-of-view electrostatic analyser and a 3-axis magnetometer to measure:</p> <ul style="list-style-type: none"> ● Natural electron fluxes in the 0.1 to 12.0 KeV range to study precipitation process in auroral emission ● Effects of the electron accelerator operations on the natural electron fluxes ● Influence of the Shuttle/Spacelab-generated atmosphere on the natural electron flux ● Study natural electron fluxes as a sensitive probe of the surface charge on the STS/Spacelab ● To study the magnetospheric electric fields ● To measure the magnetic field in and around the Shuttle
(19A)	ELECTR Joint Ops w/SEPAC ELECTR Ops/Bay Up ELECTR Ops/Bay Down	
ES020	Phenomena Induced by Charged Particle Beams	<p>To use an electron and ion beam gun (up to 10 KeV), an associated wave receiver (up to 100 MHz), electron temperature probe, and 3 particle detectors to:</p> <ul style="list-style-type: none"> ● Study ionospheric neutralization processes by <ul style="list-style-type: none"> - Studying the stability of the electronic potential of the gun with respect to the plasma - Studying the intensity and time variation of the return current - Studying ion beam neutralization by injecting an electron beam at the exit of the ion gun ● Study plasma instabilities by measuring electrical (up to 100 MHz) and magnetic (200 Hz up to 20 MHz) wave components ● Use the shuttle motion to perform ion bounce experiments ● Study the D⁺ interaction with the neutral atmosphere (in conjunction with any other Spacelab photometric experiment)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES020 (Cont)	Phenomena Induced by Charged Particle Beams	<ul style="list-style-type: none"> ● Monitor the secondary electron flux (0 to 200 eV, up to 50 ms after pulse)
(20)	PICPAB Joint Ops w/AEPI PICPAB OPs Install PICPAB into SAL/Calibrate/Deploy	
ES024 *(24)	Isotope Stack - Measurement of Heavy Cosmic Ray Isotopes	To use a stack of plastic sheets to measure heavy cosmic ray nuclei (charge Z=3, 50Mev/nucleon to 2Gev/nucleon) such as ²⁶ Al, ³⁶ Ce, ⁴⁴ Ti, ⁴⁹ V, ⁵¹ Cr, ⁵³ Mn, and ⁶⁰ Fe to determine the source, acceleration, propagation, and age of cosmic rays
ASTRONOMY		
NS005	Far Ultraviolet Astronomy - Observations Using the FAUST Telescope	<ul style="list-style-type: none"> ● UV (1100-2500A) broadband imaging and low resolution (20-200A) spectroscopy of: <ul style="list-style-type: none"> - Globular clusters - Galactic clusters - Quasi-stellar objects - Nearby galaxies - UV stars - Extended sources - Geocorona - Spacelab 1 contaminants
(5)	Start FAUST Observing Sequence FAUST Attended Ops FAUST Unattended Ops	

*Ground controlled, not referenced in the timeline (Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES022	Very Wide Field Galactic Camera	<p>Wide field (60°) ultraviolet (130-240 nm) bandpass ($\Delta\lambda = 15$ nm) and spectrographic ($\Delta\lambda = 4$ nm, 10° X 36' field) photography to study the:</p> <ul style="list-style-type: none"> ● Extended galactic objects (clouds, nebulae, etc.) ● Sky background ● Continuum light and emission lines in HII regions ● Extension of galactic and extragalactic material ● Stars and star-like objects ($V_m = 14.5$, resolution = 3') ● Bright UV objects ● Dust contamination around Spacelab ● Emission and morphology studies of atmospheric constituents (i.e., MgII) ● Zodiacal light and gegenschein
(22)	SAL/VWFC Ops Install VWFC in Ops	
ES023	Astronomical X-Ray Spectroscopy Using A Gas Scintillation Proportional Counter	<ul style="list-style-type: none"> ● To use a gas scintillation proportional counter (1.5-50 KeV, 5° FOV, < 10% resolution at 6 KeV) to measure (during Spacelab cold tests, Earth pointing tests, and specific target pointing) spectral features of: <ul style="list-style-type: none"> - Galactic X-ray sources such as binary stars and supernova remnants - The diffuse X-ray background - Clusters of galaxies - The X-ray fluorescence from the earth atmosphere ● To test out the operational ability of the gas scintillation counter's capability to reject charged particle background radiation whose energy is near that of weak X-ray sources
**(23)		

**Crew time required for attitude maneuvers only, not referenced in the timeline by experiment number (SL Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
SOLAR PHYSICS		
NA008	Active Cavity Radiometer Solar Irradiance Monitor	<ul style="list-style-type: none"> ● Measure the total solar irradiance ● Measure the magnitude and direction changes in the total solar irradiance ● Long term correlation and calibration with satellite, rocket, and future Shuttle flights
*(8)		
ES016	Measurement of the Solar Spectrum from 190 nm to 400 nm	<ul style="list-style-type: none"> ● To measure the solar spectral irradiance with accuracy of 0.1% in order to determine: <ul style="list-style-type: none"> - Solar constant - Variations in solar constant with solar cycle using Spacelab/STS flights over 10-year period - Variations of irradiance within each spectral region
*(16)		
ES021	Absolute Measurement of the Solar Constant	<ul style="list-style-type: none"> ● To use a self-calibrating radiometer to: <ul style="list-style-type: none"> - Measure the absolute value of the solar constant - Measure any long-term variations in the solar constant (with measurements on Spacelab 1 as first in a series)
(21)	Solcon Confirmation of Solar PTG	

*Ground controlled, not referenced in the timeline (Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
EARTH OBSERVATIONS		
ES033	Metric Camera Facility	Experiments to be performed with Metric Camera: 12 European proposals with different targets and scientific objectives. Main topics are: <ul style="list-style-type: none"> - Analytical measurements for control extension - Topographic mapping - Orthophotomapping - Resolution experiment - Thematic mapping and interpretation
(33)	Metric Camera Ops Change Camera Film	
ES034	Microwave Remote Sensing Facility	<ul style="list-style-type: none"> ● Development of all weather remote sensing methods ● Measurement of the ocean wave spectrum by the two-frequency technique to demonstrate its technical and operational feasibility for further automatic satellites ● Delivery of some high-resolution radar-imagery to study the influence of SL orbit and distortion of different sensor parameters and data processing techniques ● Generation of MW data over land and water surfaces for Earth science investigation ● Correlation and comparison of satellite radar data within other sensors and platforms ● MW-Radiometer Mode to get additional information on atmospheric effects
**(34)		

**Crew time required for attitude maneuvers only, not referenced in the timeline by experiment number (SL Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
TECHNOLOGY		
NT011	Tribological Experiments in Zero Gravity	<ul style="list-style-type: none"> ● To observe fluid flow, dynamic instabilities, and hydrodynamic fluid formation in journal bearings operating in zero gravity ● To study fluid-surface interactions under static conditions using selected commercial lubricants and solid surfaces
(11)	Tribology Journal Bearing Tests Tribology Fluid Wetting and Spreading	
LIFE SCIENCES		
ES201	Effects of Rectilinear Accelerations, Optokinetics and Caloric Stimulations on Human Vestibular Reactions and Sensations in Space (SLED Experiments)	<ul style="list-style-type: none"> ● To use the SLED to study the visuo-vestibular coordination and the integration of multisensory stimuli within the orientation centers of the brain by subjecting that subject to: <ul style="list-style-type: none"> - Short periods of linear acceleration <p>In conjunction with:</p> <ul style="list-style-type: none"> - Optokinetic stimulation - Caloric stimulation - To investigate the pathogenesis of space sickness and its physical presentation
(201)	ESA Vestibular Test/Red Flt Day 2 ESA Vestibular Test/Red Flt Day 3 ESA Vestibular Test/Red Flt Day 4 ESA Vestibular Test/Red Flt Day 7 ESA Vestibular Ops/Red Flt Day 9	

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
NS102	Vestibular Experiments	<ul style="list-style-type: none"> ● To investigate if otolith sensitivity changes are involved in space motion sickness and postflight postural disturbances
(102)	Personal Tape Rcdr Hop & Drop Rotating Dome Motion Sickness Test Presleep Position Awareness Eye Movement Tests	
NS104	Vestibulo-Spinal Reflex Mechanisms	<ul style="list-style-type: none"> ● To use the ESA SLED to determine if the vestibulo-spinal reflex measurement technique (H-Reflex) is suitable as an effective predictor of susceptibility to space motion sickness ● Study the relationship between motion sickness sensitivity on the Earth with changes in postural reflexes observed in flight
(104)	Drop and Shock	
NS103	Influence of Space Flight on Erythrokinetics in Man	<ul style="list-style-type: none"> ● To obtain new and specific information pertaining to the mechanism and site of action relative to the red blood cell mass and plasma volume changes observed during space flight
†(103)		

†Referenced in the timeline as Blood Collection Ops

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES026 †(26)	Measurement of (Central) Venous pressure by Puncturing an Arm Vein	<ul style="list-style-type: none"> ● To procure absolute data that the adaptation of mineral and water metabolism to the weightless condition is initiated by the engorgement of the cephalad circulation
ES032 †(32)	Collection of Blood Samples for the Determination of A.D.II. Aldosterone and Other Hormones	<ul style="list-style-type: none"> ● Confirmation and completion of similar work in the Skylab flights. Attempt to find connection with circulatory parameters
NS105 †(105)	Effects of Prolonged Weightlessness on the Humoral Immune Response of Humans	<ul style="list-style-type: none"> ● An evaluation of prolonged weightlessness as a stress factor effect on the immune response of humans, by analyzing sera for: <ul style="list-style-type: none"> - The levels of five classes of immunoglobulins - Antibody titers to blood group - Pre and post flight bacterial and viral antigens ● Establish the capability of humans to respond immunologically to potential foreign pathogens during future sustained space flight
ES031 (31)	Lymphocyte Proliferation in Weightlessness Activation of Lymphocyte Proliferation Incubator	To gain further information on the triggering of the immunoresponse and on the mechanism of eucaryotic cell differentiation during long duration space flights

†Referenced in the timeline as Blood Collection Ops

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES028	Ballistocardiographic Research in Weightlessness	<ul style="list-style-type: none"> ● To record a three-dimensional ballistocardiogram in resting weightless man and compare it with similar tracings recorded on the same subject in ground conditions ● Possibly to find BCG modifications in relation to cardiovascular adaptations to weightlessness, also after physical exercise or drug administration or LBNP application ● To record other body accelerations in relation to diaphragm dynamics during spontaneous breathing, hyperventilation, cough, etc.
(28)	Ballistocardiography Ops Ballis Cassette Change	
ES030	Electro-Physiological Tape Recorder	To study acclimatization of astronauts to zero gravity by means of an electrocardiograph (E.C G.), electroencephalogram (E.E.G.), electro-oculogram (E.O.G.), and possibly electromyogram (E.M.G) on a continuous basis by a miniature tape recorder attached to the crewmember
(30)	EKG Rcdr Maint	
ES025	Mass Discrimination During Weightlessness	To compare mass discrimination when both the observer and the test objects are weightless, with weight discrimination under normal gravity
(25)	Mass Discrimination	
NS101	Nutation of <u>Helianthus Annuus</u> in a Microgravity Environment	<ul style="list-style-type: none"> ● To determine quantitatively whether the condition of sustained weightlessness produces the same damping or inhibiting effect on plant nutation as does rotation on a horizontal clinostat on Earth

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
NS101 (Cont)	Nutation of <u>Helianthus Annuus</u> in a Microgravity Environment	<ul style="list-style-type: none"> ● To measure the period and amplitude of any nutational oscillations by the seedlings which may be observed under the conditions of sustained weightlessness ● To gain experience in the conduct of a plant physiological experiment in a multidisciplinary space laboratory in which diverse facilities are to be shared
(101)	HEFLEX Plant Ops	
NS007	Characterization of Persisting Circadian Rhythms During Spaceflight	<ul style="list-style-type: none"> ● Test if circadian rhythms persist outside the Earth's environment, and to determine if the circadian timing system is exogenous or endogenous ● Examine the influence of the space environment on the circadian of neurospora
(7)	Neurospora Tube Marking	
ES029	Micro-Organisms and Biomolecules in the Space Environment	<ul style="list-style-type: none"> ● To measure quantitatively the effects of space parameters (vacuum, solar UV - radiation) on microbial bacterial spores, bacterial vegetative cells, bacteriophages and enzymes ● To understand the effects on these samples ● To evaluate the consequence of genetic and response alterations ● To compare the results with simulation experiments (i.e., ultrahigh vacuum) performed in the laboratory
*(29)		
ES027	Advanced Biostack Experiment	<ul style="list-style-type: none"> ● Increase the knowledge of HZE particles effect on biological specimens ● To assess quantitatively the interference of HZE particles with other biological studies in space

*Ground controlled, not referenced in the timeline (Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
ES027 (Cont)	Advanced Biostack Experiment	<ul style="list-style-type: none"> ● To determine the distribution of HZE particles at different locations in the module and on the pallet ● Establish radiation protection guidelines for man and biological experiments in future space flights
*(27)		
NS006	HZE - Particle Dosimetry Radiation Environment Mapping	<ul style="list-style-type: none"> ● To provide baseline data for evaluation of radiation risk from HZE particles to man on this and future Spacelab missions ● To continue a program of documentation of HZE-particle radiation inside manned spacecraft which has included Apollo, Skylab, and ASTP missions
(6)	Install Dosimeters	
MATERIAL SCIENCE		
ES300	Space Processing Laboratory	<p>The system equipment is interface or control equipment and supplies; which are needed to handle, to house, to operate the various experiment instrumentation</p> <p>The Material Sciences instrumentation includes general purpose facilities and special equipment</p> <p>The Material Sciences experiments will be performed in the area of metallurgy, composites, fluid physics, crystal growth, nonmetallic technology, and materials properties. The experiments are numbered ES301 thru 335, 338 thru 340, 390</p>
(3XX)	Crystal Growth Ops MSDR Ops	

*Ground controlled, not referenced in the timeline (Crew Contingency Ops only)

EXP. NO.	EXPERIMENT TITLE	EXPERIMENT OBJECTIVES SUMMARY
(3XX) (Cont)	Mirror Heat Facility Ops Gradient Heat Facility Ops Matls Proc Sample MSDR Isothermal Heat Facility Ops Remove Samples in IHF	

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TABLES

TABLE 11-1
ORBITER FUEL CELL PURGES

APPROX MET (D/HH:MM)	FUEL CELL PURGE	
	NO.	Δt (HH:MM)
0/02:00	01	
0/07:00	02	5:00
0/20:45	03	13:45
1/08:45	04	12:00
1/21:25	05	12:40
2/08:20	06	10:55
2/20:30	07	12:10
3/09:55	08	13:25
3/20:15	09	10:20
4/08:00	10	11:45
4/20:20	11	12:20
5/08:10	12	11:50
5/20:35	13	12:25
6/06:40	14	10:55
6/20:00	15	13:20
7/07:00	16	11:00
7/19:45	17	12:45
8/08:50	18	13:20
8/19:45	19	10:55

TABLES

TABLE 11-2
ORBITER WATER DUMPS (WASTE & SUPPLY)

APPROX MET (D/HH:MM)	WASTE H2O		SUPPLY H2O	
	NO.	Δt (HH:MM)	NO.	Δt (HH:MM)
1/03:40			1	01:04
1/20:12			2	02:00
2/19:50			3	02:00
4/02:17			4	00:48
4/11:21	1	10:10		
4/18:54			5	01:20
5/13:28			6	00:57
6/05:43			7	01:08
6/19:23			8	02:00
7/02:20			9	01:00

Note: Following each dump there is a 30-min period of contamination during which contamination-sensitive payload operations will be curtailed.

Note: The delta time indicates the amount of time required by the Orbiter to perform the water dump activity (Dump Rate = 150 lb/hr).

TABLE 11-3
CO2 ABSORBER REPLACEMENT

APPROX MET (D/HH:MM)	SL CO2 ABSORBER REPLACEMENT		
	CHANGE NO.	POSITION*	Δt (HH:MM)
0/04:15	1	Activate C&D	per canister
0/19:35	2	C	15:20
1/20:35	3	D	40:20
2/21:55	4	C	50:20
3/21:55	5	D	49:20
4/22:50	6	C	48:55
5/19:50	7	D	47:45
6/21:30	8	C	46:40
7/20:00	9	D	46:20

*There are two canister locations in the Orbiter (A and B) and two in the Spacelab (C and D). Two canisters will be installed at launch in both the Orbiter and the Spacelab. The Spacelab cabin air system will be activated at 04:15 MET. Thereafter, the canisters in the Orbiter will be alternately changed every 12 hr during each team's presleep and the Spacelab canisters every 24 hr as shown in table above.

TABLE 11-4
CREW STATUS REPORTS

APPROX MET (D/HH:MM)	CREW STATUS REPORTS	
	NUMBER	TEAM
0/04:45	1	RED
0/13:05	2	BLUE
1/00:15	3	RED
1/12:15	4	BLUE
1/23:50	5	RED
2/12:15	6	BLUE
2/23:45	7	RED
3/12:15	8	BLUE
3/23:45	9	RED
4/12:15	10	BLUE
4/23:30	11	RED
5/11:45	12	BLUE
5/23:15	13	RED
6/11:45	14	BLUE
7/00:15	15	RED
7/11:15	16	BLUE
8/2:15	17	RED

NOTE: These status reports are a part of the normal presleep activities for the shift that has just come off duty. It is placed about 1 hr into the presleep, after the meal, depending on AOS/LOS coverage. This allows the ground time to develop an outline of the events for this team's next work shift and the crew can then discuss this outline with the ground.

TABLE 11-5
SAL OPS

MET D/HH:MM	TITLE	OPERATION
00/07:35-0/09:09	PICPAB(20)	INSTALL ES020 - EXTEND TO SPACE
1/11:45-1/12:14	PICPAB(20)	RETRACT TO SAL - PRESSURIZE SAL
1/18:00-1/18:26	SAL OPS	RETRACT TO MOD. - REMOVE ES020
1/18:26-2/02:44	COLD TEST	EXTEND TO SPACE - RETRACT TO SAL
2/05:15-2/06:02	SAL OPS	RETRACT TO MOD. - INSTALL ES020 - EXTEND TO SAL
2/06:02-2/06:09	SAL OPS	CLOSE HATCH
2/09:15-2/09:40	SAL OPS	EXTEND TO SPACE
4/19:28-4/19:58	SAL OPS	RETRACT TO SAL - PRESSURIZE
5/00:16-5/00:41	SAL OPS	RETRACT TO MOD. - REMOVE/STOW S020
5/00:41-5/00:57	SAL/VWFC	INSTALL ES022 - EXTEND TO SAL - CL HATCH
5/01:33-5/01:53	SAL/VWFC	OPEN HATCH - RETRACT TO MODULE
5/01:53-5/02:22	SAL/VWFC	EXTEND TO SAL - VENT SAL
5/03:57-5/04:32	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/05:29-5/05:59	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/06:56-5/07:38	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/08:26-5/09:09	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/10:23-5/10:37	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/11:29-5/11:56	22MSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/12:54-5/13:25	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/14:30-5/15:05	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/18:56-5/19:21	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/20:38-5/21:01	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
5/22:00-5/22:17	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
6/00:55-6/01:26	22FSTAR	EXTEND TO SPACE - RETRACT TO SAL
6/14:20-6/14:43	SAL OPS	PRESSURIZE SAL
6/20:15-6/20:35	SAL OPS	RETRACT TO MOD. - REMOVE/STOW ES022
6/20:35-6/20:45	SAL OPS	EXTEND TO SAL - CLOSE HATCH
7/03:04-7/08:44	HOT TEST	EXTEND TO SPACE - RETRACT/PRESSURIZE
7/12:00-7/12:15	HOT TEST	RETRACT TO MOD
7/12:15-7/12:30	SAL OPS	EXTEND TO SAL - CLOSE HATCH

ABBREVIATIONS/ACRONYMS

More complete compilations of abbreviations and acronyms are available in the Acronyms and Abbreviations Dictionary.

ABBREVIATIONS/ACRONYMS

A	ANGSTROM
ABSB	ABSORBER
ACT	ACTIVATION
ADJ	ADJUST
AFD	AFT FLIGHT DECK
A/G	AIR TO GROUND
AOS	ACQUISITION OF SIGNAL
ATT	ATTITUDE
BDA	BERMUDA
BL	BLOOD
BUC	BACKUP COMPUTER; BUCKHORN
CAL	CALIBRATION
CAP	CREW ACTIVITY PLAN
CCTV	CLOSED CIRCUIT TELEVISION
CDMS	COMMAND AND DATA MANAGEMENT SYSTEM
CDR	COMMANDER
CDT	CENTRAL DAYLIGHT TIME
CNTLS	CONTROLS
COAS	CREW OPTICAL ALIGNMENT SIGHT
C&W	CAUTION AND WARNING
DDU	DATA DISPLAY UNIT
DEU	DISPLAY ELECTRONICS UNIT
DOY	DAY OF YEAR
D/P	DAILY PLANNING
DPLY	DEPLOY
DTO	DETAILED TEST OBJECTIVE

ECLS	ENVIRONMENTAL CONTROL AND LIFE SUPPORT
ECOS	EXPERIMENT COMPUTER OPERATING SYSTEM
EPDS	ELECTRICAL POWER DISTRIBUTION SYSTEM
ESA	EUROPEAN SPACE AGENCY
EVA	EXTRAVEHICULAR ACTIVITY
EXC	EXPERIMENT COMPUTER
EXP	EXPERIMENT
FAO	FLIGHT ACTIVITIES OFFICER
FC	FUEL CELL
FD	FLIGHT DAY; FLIGHT DIRECTOR
FDF	FLIGHT DATA FILE
FO	FUNCTIONAL OBJECTIVE
FOD	FLIGHT OPERATIONS DIRECTORATE
FWD	FORWARD
GMT	GREENWICH MEAN TIME
GNC	GUIDANCE, NAVIGATION, AND CONTROL
GPC	GENERAL PURPOSE COMPUTER
HDRR	HIGH DATA RATE RECORDER
H/O	HANDOVER
HRM	HIGH RATE MULTIPLEXER
IC	INTERCOM
ICMS	INTERCOM MASTER STATION
IECM	INDUCED ENVIRONMENT CONTAMINATION MONITOR
IMU	INERTIAL MEASUREMENT UNIT
INCO	INSTRUMENTATION AND COMMUNICATIONS OFFICER
JSC	JOHNSON SPACE CENTER

KBPS	KILOBITS PER SECOND
KSC	KENNEDY SPACE CENTER
KUSP	KU-BAND SIGNAL PROCESSOR
KW	KILOWATT
L10H	LITHIUM HYDROXIDE
LOS	LOSS OF SIGNAL
LVLH	LOCAL VERTICAL/LOCAL HORIZONTAL
MBPS	MEGABITS PER SECOND
MCC	MISSION CONTROL CENTER
MDM	MULTIPLEXER/DEMULTIPLEXER
MET	MISSION ELAPSED TIME
MIL	MERRITT ISLAND TRACKING STATION
MIPS	MISSION IMPLEMENTATION PLANNING SYSTEM
MMU	MASS MEMORY UNIT
MNVR	MANEUVER
MS	MISSION SPECIALIST
MSFC	MARSHALL SPACE FLIGHT CENTER
NAD	NADIR
OC	ORBITER CREWMAN
OI	OPERATIONAL INSTRUMENTATION
OMS	ORBITAL MANEUVERING SYSTEM
OPS	OPERATIONS
ORB	ORBIT
PAO	PUBLIC AFFAIRS OFFICE
PCMMU	PULSE CODE MODULATION MASTER UNIT
PL	PAYLOAD
PLBD	PAYLOAD BAY DOORS

PLT	PILOT
POCC	PAYLOAD OPERATIONS CONTROL CENTER
POP	PERPENDICULAR TO ORBIT PLANE
PRCS	PRIMARY RCS
PS	PAYLOAD SPECIALIST
PSA	PRE/POST SLEEP ACTIVITY
PTC	PASSIVE THERMAL CONTROL
PWR	POWER
RAD	RADIATOR
RAU	REMOTE ACQUISITION UNIT
RCS	REACTION CONTROL SYSTEM
RMS	REMOTE MANIPULATOR SYSTEM
RTC	REALTIME COMMAND
SAA	SOUTH ATLANTIC ANOMALY
SAL	SCIENTIFIC AIRLOCK
SCOS	SUBSYSTEMS COMPUTER OPERATING SYSTEM
SL	SPACELAB
SM	SYSTEMS MONITORING
SPC	STORED PROGRAM COMMAND
SSC	SUBSYSTEMS COMPUTER
ST	STAR TRACKER
STBD	STARBOARD
STDN	SPACECRAFT TRACKING AND DATA NETWORK
STS	SPACE TRANSPORTATION SYSTEM
SW	SWITCH
S/W	SOFTWARE
SYS	SYSTEM

TAGS	TEXT AND GRAPHICS SYSTEM
TDRS	TRACKING AND DATA RELAY SATELLITE
TIG	TIME OF IGNITION
T/L	TIMELINE
UV	ULTRAVIOLET
VFI	VERIFICATION FLIGHT INSTRUMENTATION
VFT	VERIFICATION FLIGHT TEST
VRCS	VERNIER RCS
VTR	VIDEO TAPE RECORDER
VV	VELOCITY VECTOR
WCS	WASTE COLLECTION SYSTEM
XFER	TRANSFER

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JM6/Branch Copy
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Dep. Mgr.

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LA3/Manager
LA5/Manager
LA6/Manager

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LE/Manager
LF/Manager
LG/Manager
LJ/Manager
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