

**CREW ACTIVITY**

**PLAN**

**FINAL PCN-1**

# Flight Data File Crew Activity Plan

## STS 51-B

Spacelab 3

Mission Operations Directorate  
Operations Division

Final PCN-1  
April 16, 1985

EVENT:	COT		
Launch	11:00	Mon	Apr 29
Press Conference	21:45	Thu	May 2
MUSAT Deploy	20:50	Sun	May 5
GLOMR Deploy	21:10	Sun	May 5
Landing	07:59	Mon	May 6

# NASA

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

PAGE CHANGE NOTICE

JSC-19466

Incorporates 482  
No: CAP-319  
CAP-332  
CAP-340  
CAP-342  
CAP-344

STS 51-B CREW ACTIVITY PLAN  
FINAL 03/19/85  
PCN-1 04/16/85  
Sheet 1 of 1

Replace the following:

1. Cover
2. Pages i and ii
3. Pages 1-3 and 1-4
4. Pages 2-3 thru 2-6 and 2-25 thru 2-30
5. Pages 3-5 thru 3-10 and 3-21 thru 3-24 and 3-61 thru 3-66
6. Pages 6-1 thru 6-4

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

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Branch

Encl: 34 pages



STS 51-B CREW ACTIVITY PLAN

LIST OF EFFECTIVE PAGES

FINAL 03/19/85

PCN-1 04/16/85

I.....	CAP/51-B/FIN 1	3-8.....	CAP/51-B/FIN 1
II.....	CAP/51-B/FIN 1	3-9.....	CAP/51-B/FIN 1
III.....	CAP/51-B/FIN 1	3-10.....	CAP/51-B/FIN 1
IV.....	CAP/51-B/FIN 1	3-11.....	CAP/51-B/FIN 1
V.....	CAP/51-B/FIN 1	3-12.....	CAP/51-B/FIN 1
VI.....	CAP/51-B/FIN 1	3-13.....	CAP/51-B/FIN 1
VII.....	CAP/51-B/FIN 1	3-14.....	CAP/51-B/FIN 1
VIII.....	CAP/51-B/FIN 1	3-15.....	CAP/51-B/FIN 1
1-1.....	CAP/51-B/FIN 1	3-16.....	CAP/51-B/FIN 1
1-2.....	CAP/51-B/FIN 1	3-17.....	CAP/51-B/FIN 1
1-3.....	CAP/51-B/FIN 1	3-18.....	CAP/51-B/FIN 1
1-4.....	CAP/51-B/FIN 1	3-19.....	CAP/51-B/FIN 1
2-1.....	CAP/51-B/FIN 1	3-20.....	CAP/51-B/FIN 1
2-2.....	CAP/51-B/FIN 1	3-21.....	CAP/51-B/FIN 1
2-3.....	CAP/51-B/FIN 1	3-22.....	CAP/51-B/FIN 1
2-4.....	CAP/51-B/FIN 1	3-23.....	CAP/51-B/FIN 1
2-5.....	CAP/51-B/FIN 1	3-24.....	CAP/51-B/FIN 1
2-6.....	CAP/51-B/FIN 1	3-25.....	CAP/51-B/FIN 1
2-7.....	CAP/51-B/FIN 1	3-26.....	CAP/51-B/FIN 1
2-8.....	CAP/51-B/FIN 1	3-27.....	CAP/51-B/FIN 1
2-9.....	CAP/51-B/FIN 1	3-28.....	CAP/51-B/FIN 1
2-10.....	CAP/51-B/FIN 1	3-29.....	CAP/51-B/FIN 1
2-11.....	CAP/51-B/FIN 1	3-30.....	CAP/51-B/FIN 1
2-12.....	CAP/51-B/FIN 1	3-31.....	CAP/51-B/FIN 1
2-13.....	CAP/51-B/FIN 1	3-32.....	CAP/51-B/FIN 1
2-14.....	CAP/51-B/FIN 1	3-33.....	CAP/51-B/FIN 1
2-15.....	CAP/51-B/FIN 1	3-34.....	CAP/51-B/FIN 1
2-16.....	CAP/51-B/FIN 1	3-35.....	CAP/51-B/FIN 1
2-17.....	CAP/51-B/FIN 1	3-36.....	CAP/51-B/FIN 1
2-18.....	CAP/51-B/FIN 1	3-37.....	CAP/51-B/FIN 1
2-19.....	CAP/51-B/FIN 1	3-38.....	CAP/51-B/FIN 1
2-20.....	CAP/51-B/FIN 1	3-39.....	CAP/51-B/FIN 1
2-21.....	CAP/51-B/FIN 1	3-40.....	CAP/51-B/FIN 1
2-22.....	CAP/51-B/FIN 1	3-41.....	CAP/51-B/FIN 1
2-23.....	CAP/51-B/FIN 1	3-42.....	CAP/51-B/FIN 1
2-24.....	CAP/51-B/FIN 1	3-43.....	CAP/51-B/FIN 1
2-25.....	CAP/51-B/FIN 1	3-44.....	CAP/51-B/FIN 1
2-26.....	CAP/51-B/FIN 1	3-45.....	CAP/51-B/FIN 1
2-27.....	CAP/51-B/FIN 1	3-46.....	CAP/51-B/FIN 1
2-28.....	CAP/51-B/FIN 1	3-47.....	CAP/51-B/FIN 1
2-29.....	CAP/51-B/FIN 1	3-48.....	CAP/51-B/FIN 1
2-30.....	CAP/51-B/FIN 1	3-49.....	CAP/51-B/FIN 1
3-1.....	CAP/51-B/FIN 1	3-50.....	CAP/51-B/FIN 1
3-2.....	CAP/51-B/FIN 1	3-51.....	CAP/51-B/FIN 1
3-3.....	CAP/51-B/FIN 1	3-52.....	CAP/51-B/FIN 1
3-4.....	CAP/51-B/FIN 1	3-53.....	CAP/51-B/FIN 1
3-5.....	CAP/51-B/FIN 1	3-54.....	CAP/51-B/FIN 1
3-6.....	CAP/51-B/FIN 1	3-55.....	CAP/51-B/FIN 1
3-7.....	CAP/51-B/FIN 1	3-56.....	CAP/51-B/FIN 1

3-57.....CAP/51-B/FIN  
3-58.....CAP/51-B/FIN  
3-59.....CAP/51-B/FIN  
3-60.....CAP/51-B/FIN  
3-61.....CAP/51-B/FIN  
3-62.....CAP/51-B/FIN  
3-63.....CAP/51-B/FIN  
3-64.....CAP/51-B/FIN  
3-65.....CAP/51-B/FIN  
3-66.....CAP/51-B/FIN  
3-67.....CAP/51-B/FIN  
3-68.....CAP/51-B/FIN  
4-1.....CAP/51-B/FIN  
4-2.....CAP/51-B/FIN  
4-3.....CAP/51-B/FIN  
4-4.....CAP/51-B/FIN  
4-5.....CAP/51-B/FIN  
4-6.....CAP/51-B/FIN  
4-7.....CAP/51-B/FIN  
4-8.....CAP/51-B/FIN  
5-1.....CAP/51-B/FIN  
5-2.....CAP/51-B/FIN  
5-3.....CAP/51-B/FIN  
5-14.....CAP/51-B/FIN  
6-1.....CAP/51-B/FIN  
6-2.....CAP/51-B/FIN  
6-3.....CAP/51-B/FIN  
6-4.....CAP/51-B/FIN  
7-1.....CAP/51-B/FIN  
7-2.....CAP/51-B/FIN  
7-3.....CAP/51-B/FIN  
7-4.....CAP/51-B/FIN  
7-5.....CAP/51-B/FIN  
7-6.....CAP/51-B/FIN

FLIGHT		574-51-0		EDITION		FINAL, PC-11		PUR. DATE		4/24/65		
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP (2)				PER	0	PER	SLEEP
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP				PER	0	PER	SLEEP
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP (1)				PER	0	PER	SLEEP
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP (1)				PER	0	PER	SLEEP
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP (1)				PER	0	PER	SLEEP
SILV	SLEEP	PER	0	PER	0	SLEEP DATA SHEET				PER	SLEEP	
GOLD	SLEEP DATA SHEET ACTIVITIES COMPLETE		PER	0	SLEEP (1)				PER	0	PER	SLEEP

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GMT	(DINIM)	NET	(DINIM)	CDT	(DINIM)	FD/BDY	HTR	MOON	HOUSTON DATE	FLIGHT	COTTON	PUB. DATE
GMT 1965									MAY 5, 1965	115-118	118	1965
NET 1965												
SILVER	PL1		LUNCH									
	MS2		LUNCH		MS-CL						NO SLEEP NET	
	DSM	PES-1		LUNCH								
DEPTH	TRACED	WAS										
65% COVERAGE												
PODS												
TO FOREST												
NOTICE												

GMT	(DMM)	NET	(DMM)	CDT	(DMM)	FDZ	DOY	AFIR	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
NET	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
COLD	CDP	RUMOR PTV	RUMOR PTV	LUNCH	RUMOR PTV	RUMOR PTV	RUMOR PTV	RUMOR PTV	RUMOR PTV	FES C/D PART 2	FES C/D PART 1		
	MS1			LUNCH						FES-3	FES-3	POE SLEEP AC1	SLEEP
	MS3	TVB		LUNCH			CABIN STOW				POE SLEEP AC1		
	PSF	DOE-OYE		LUNCH			CABIN STOW	TVB					
DATE	00	01	02	03	04	05	06	07	08	09	10	11	12
ERR	00	01	02	03	04	05	06	07	08	09	10	11	12
ESTD													
EDV													
EVENT													
NOTES:													







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WORLD TEAM  
COM

SIS ST-R OFFICER  
M53

PGP

MCC

REVIEW/IMP PLAN/ M53

MANAGE-SEC OPS/IMP, CP/IMP

WFC DATA TIME

REVIEW/IMP PLAN/ M53  
REVIEW/IMP PLAN/ M53  
REVIEW/IMP PLAN/ M53

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

WFC DATA TIME

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)

STATUS WPT (M60)

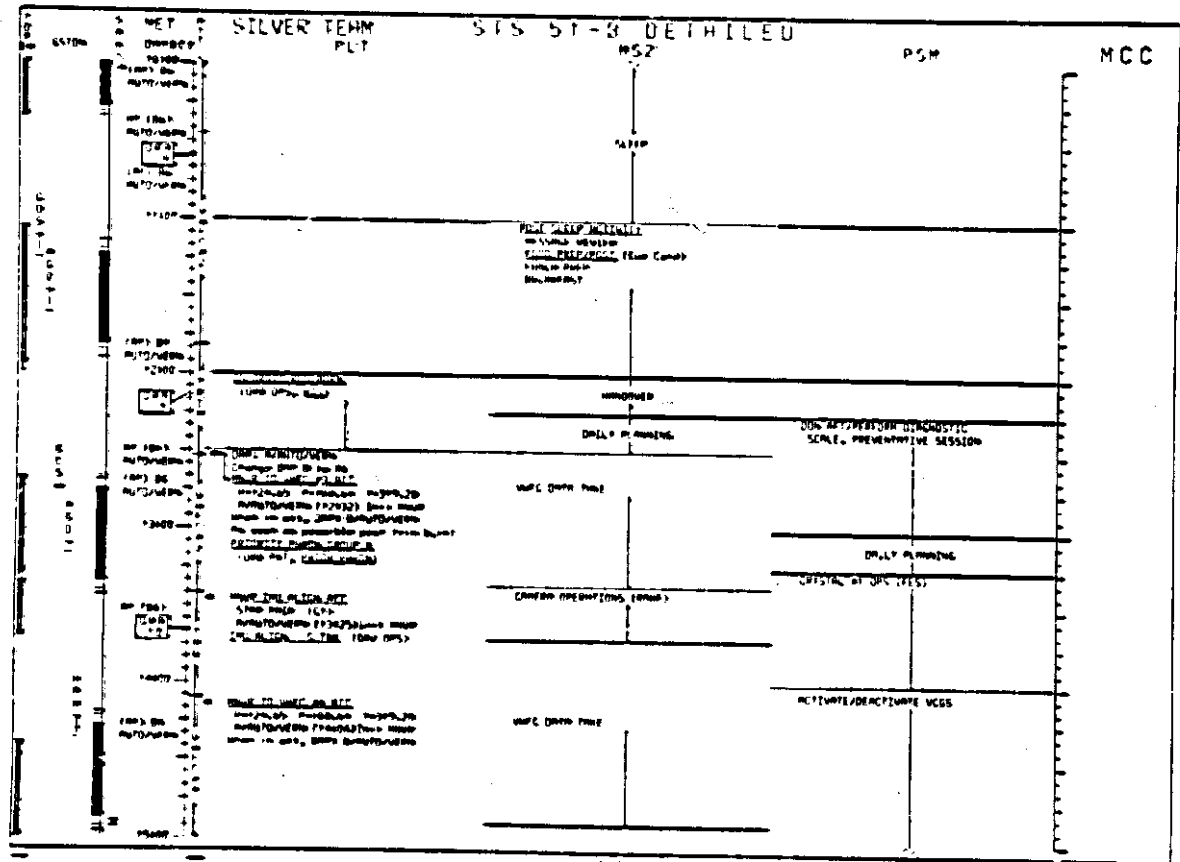
IMP. NOTICE CHECK/CONNECT  
(IMP)

IMP. NOTICE CHECK/CONNECT  
(IMP)







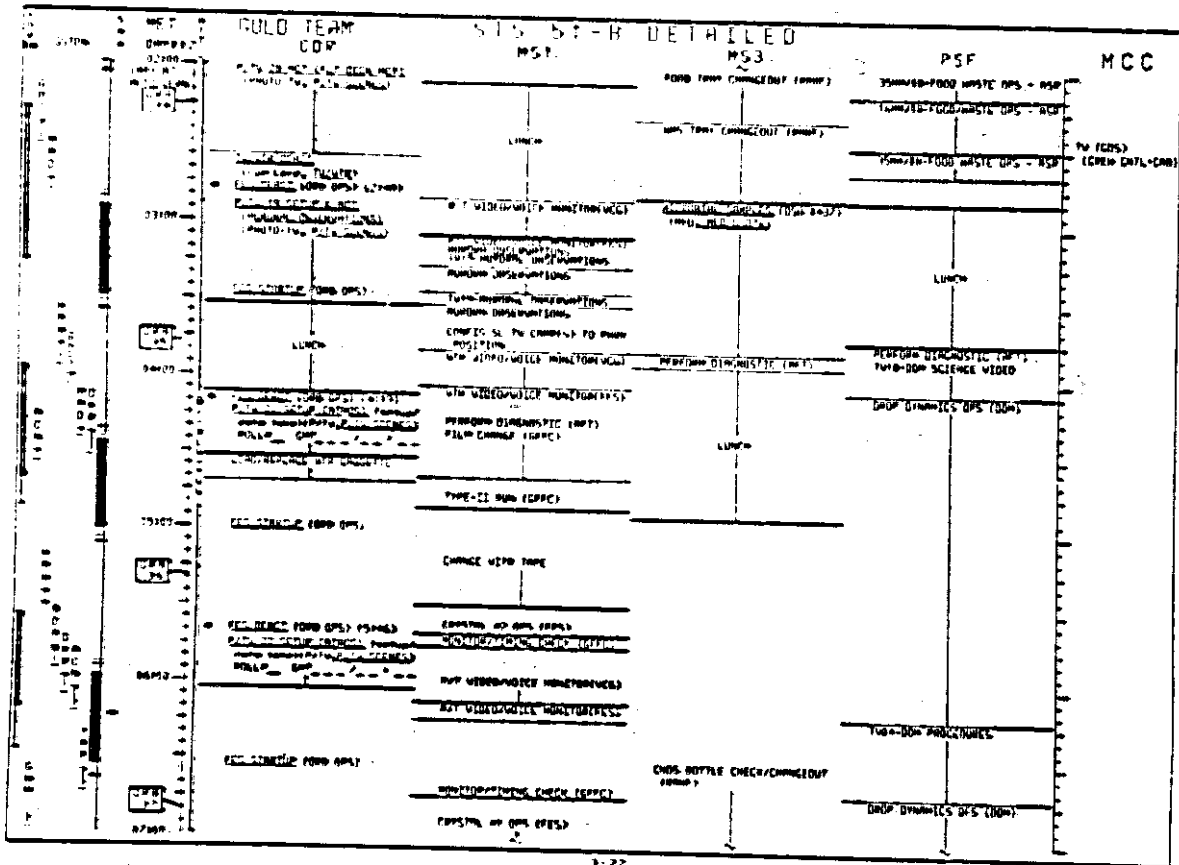




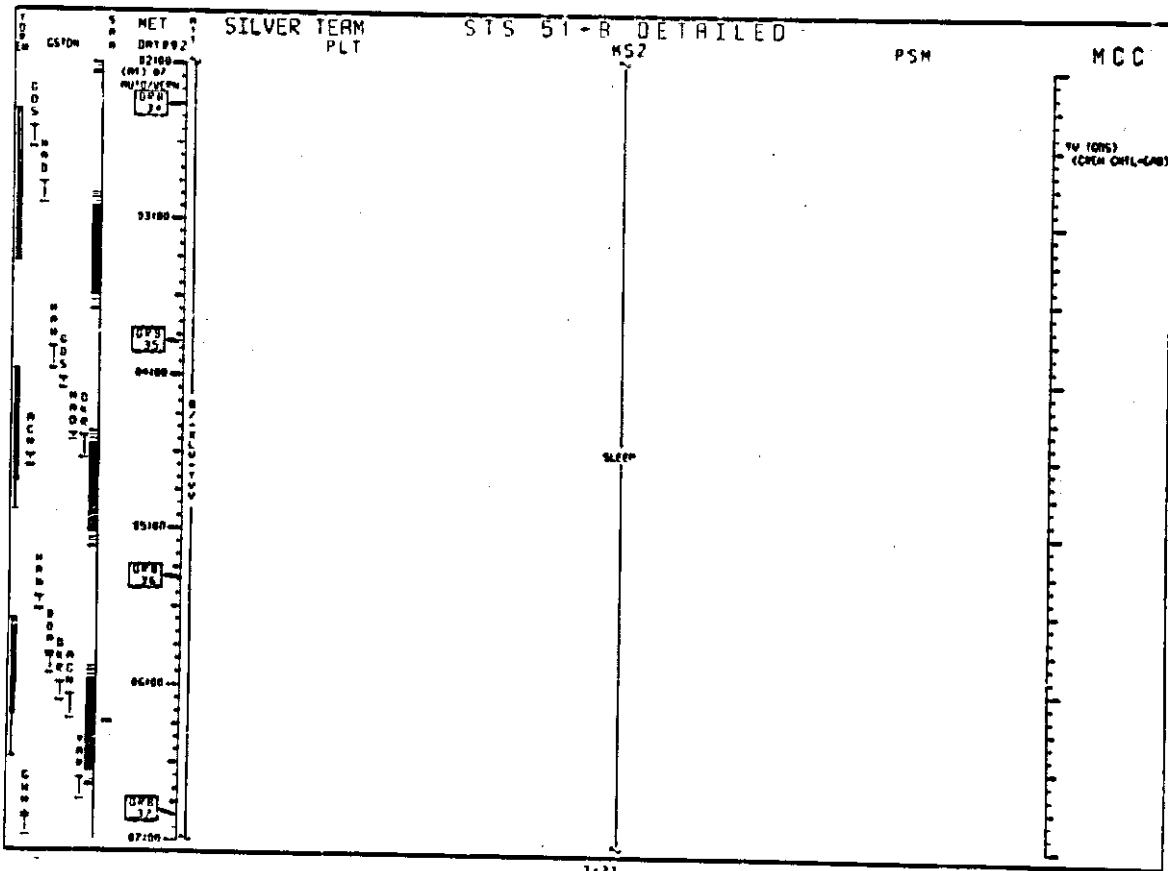


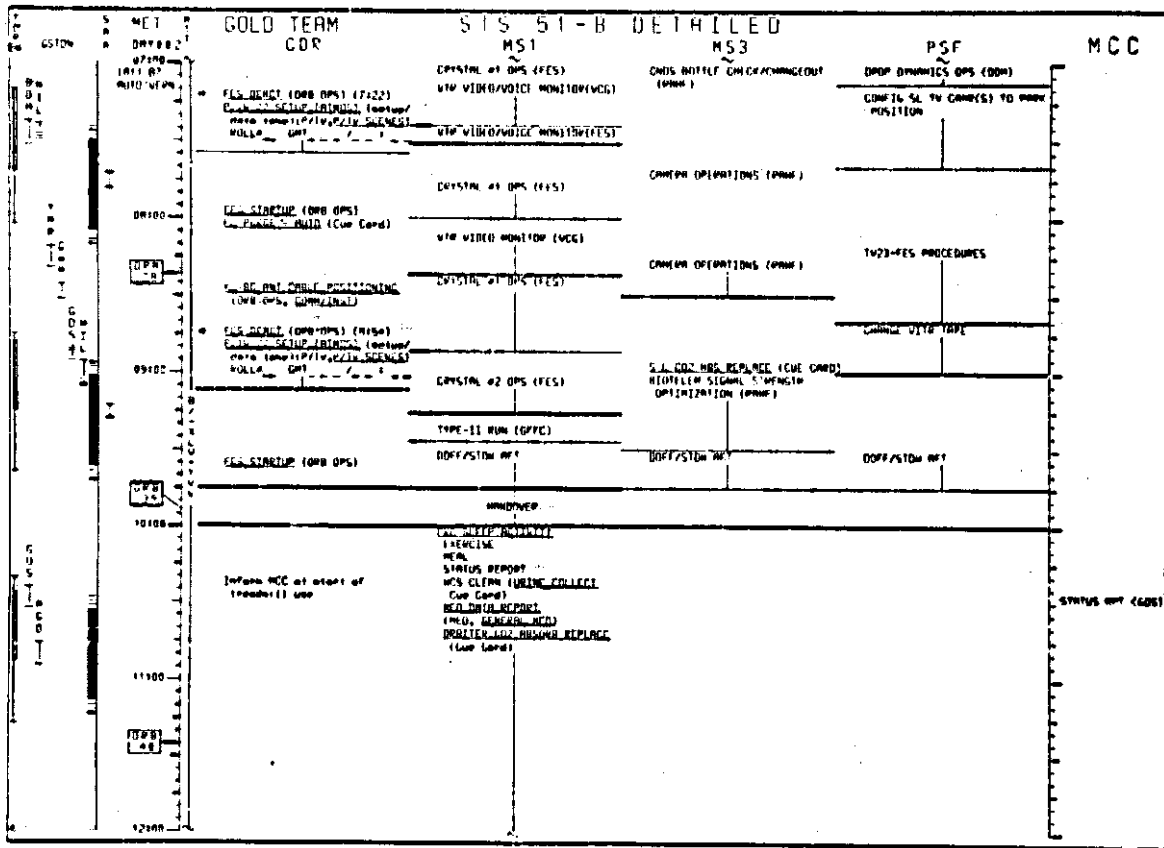


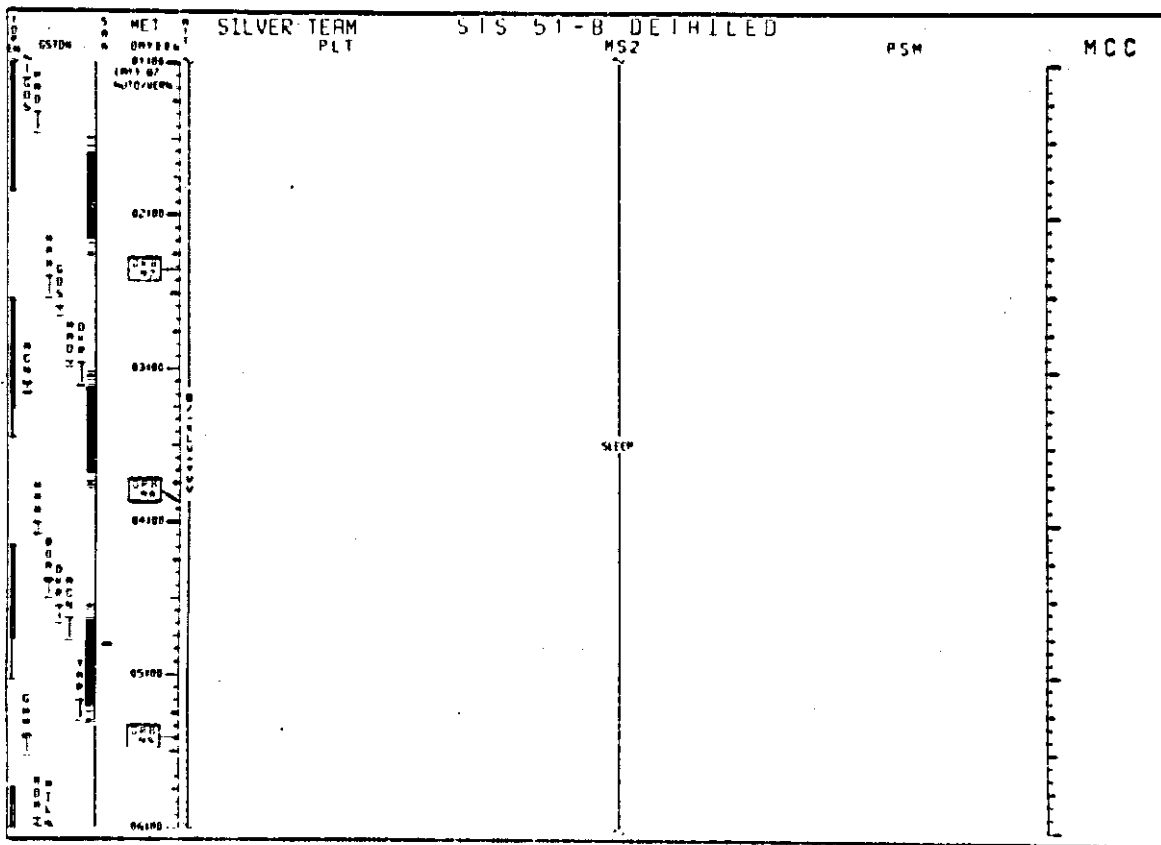




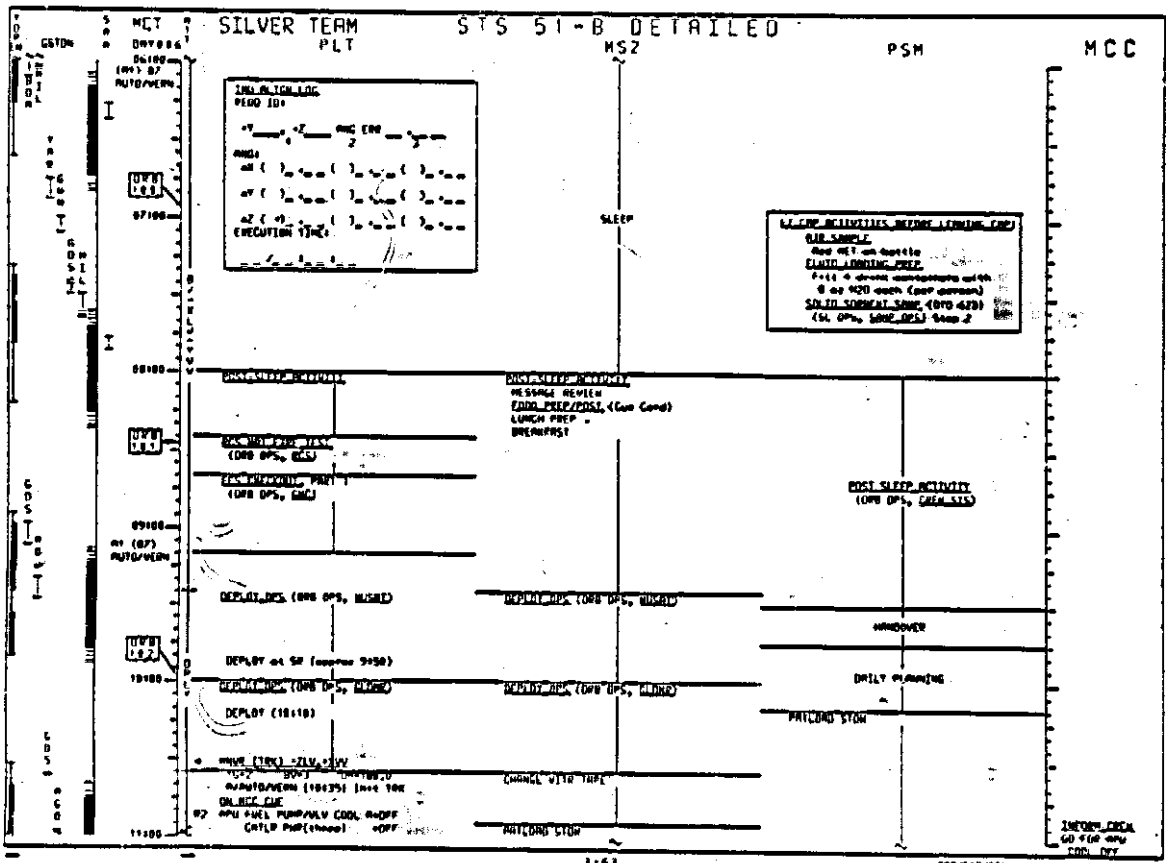


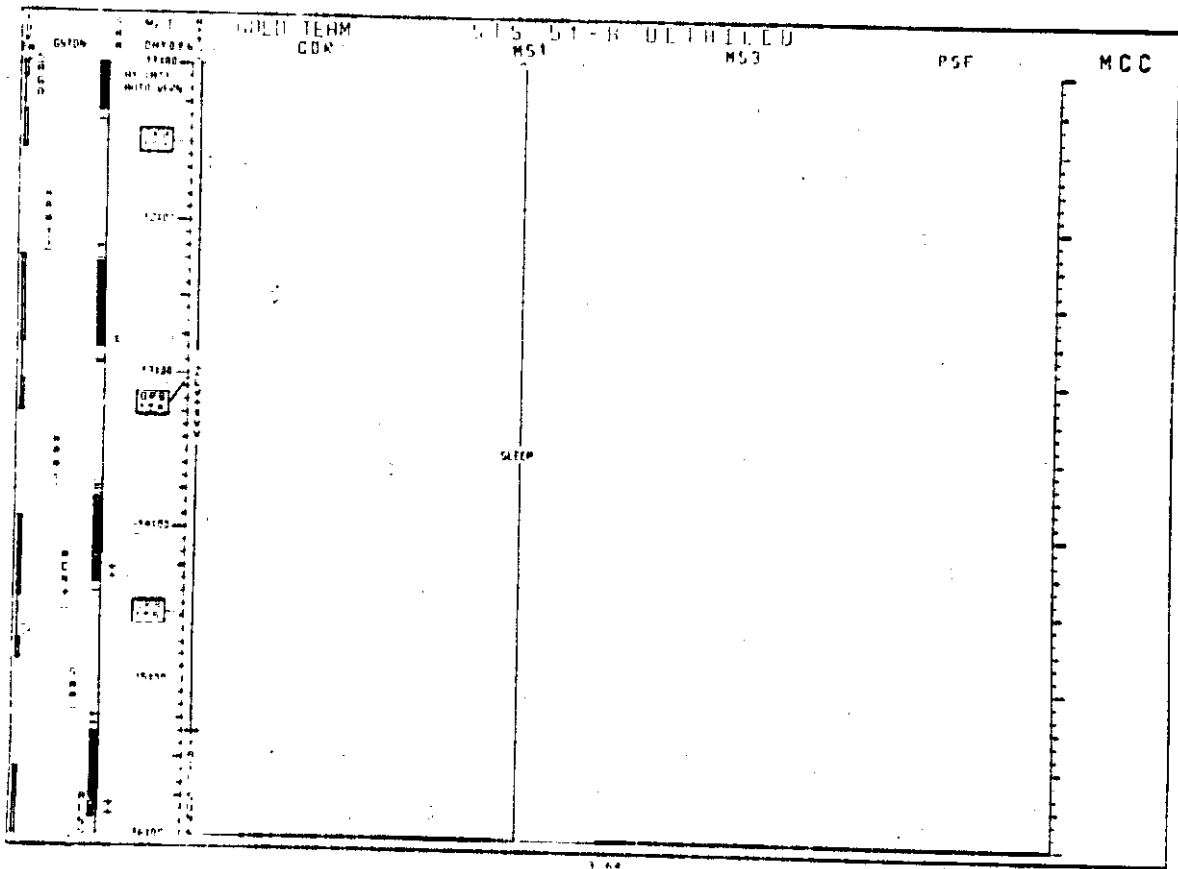






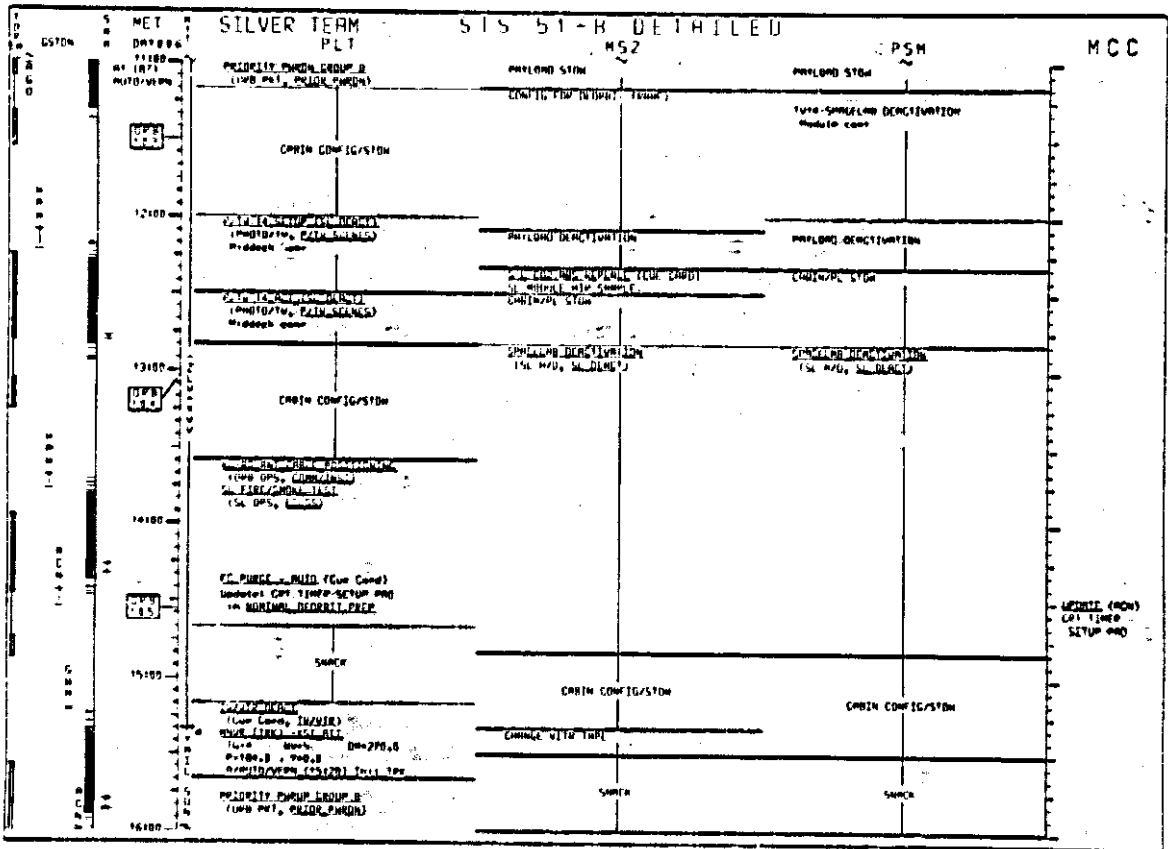






1.60

DR/2022/26 2/17/85







STS 51-B ATTITUDE TIMELINE

Attitude Timeline

REF	MNVR OPTION	DAP	E/S	REMARKS	EVENT
1 0/01:10:00	TRK TGT=2 BV=30 70.00, 0.00 OM=100.00	A1 AUTO NORM	BSC 0.200 BB AT 5.00 BB RT 0.20	EARTH LVLH R+100 P+ 0 Y+ 0	-ZLV +XVV
2 0/02:56:00 07:07:30	MNVR R+ 75.00 P+149.00 Y+344.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN -ZST+21 -YST+29	IMU/COAS (B1)
3 0/04:07:00 14:30 DAP 37	MNVR R+120.00 P+100.00 Y+ 51.90	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 59 0 315	TERR/ATMOS
4 0/08:49:00 59:19 DAP 36	MNVR R+ 15.21 P+181.00 Y+332.36	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 168 0 10	VWFC01
5 0/10:27:00 39:20 DAP 36	MNVR R+236.97 P+217.02 Y+ 9.92	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 109 0 166	VWFC02
6 0/11:43:00 59:47	MNVR R+320.00 P+359.00 Y+311.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 07 0 130	TRIM BURN
7 0/12:32:00 48:00 DAP 36	MNVR R+124.65 P+100.64 Y+319.20	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 140 0 43	VWFC03
8 0/13:25:00 56:23	MNVR R+238.00 P+ 70.00 Y+309.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN -ZST+27 -YST+24	IMU ALIGN (C1)
9 0/14:06:14 17:37 DAP 36	MNVR R+124.65 P+100.64 Y+319.20	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 140 0 43	VWFC04
10 0/17:54:00 56:33 DAP 37	TRK TGT=2 BV=5 177.00, 0.00 OM=270.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	EARTH LVLH R+ 50 P+ 50 Y+ 2	-ZLV +XVV BIASED
11 6/09:25:00 32:30	TRK TGT=2 BV=2 120.00, 0.00 OM= 0.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	EARTH LVLH P+ 0 P+ 50 Y+ 0	NUSAT GLCHP DEPLOY
12 6/10:35:00 50:00	TRK TGT=2 BV=3 70.00, 0.00 OM=100.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	EARTH LVLH R+100 P+ 0 Y+ 0	-ZLV +XVV

Altitude Sideline

RET	MNVR OPTION	DRP	E/S	REMARKS	EVENT	
1 6/15/20:00 20:54	TRK TGT=4 DV=3(184.00, 0.00) DR=270.00	R1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 176 0 179	ENRTL P=152 P=162 Y=316	-XSI
2 6/16/54:00 17:06:55	MNVR R=209.00 P=184.00 Y= 55.00	R1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 00 0 141	-ZST:20 -YST:17	IMU ALIGN
3 6/17/14:00 16:40	MNVR R=207.00 P=132.00 Y=353.00	B1 AUTO NORM	BSC 0.500 SB AT 3.00 SB RT 0.20	SUN 0 139 0 191	-ZST:43 -YST:28	IMU VERIF
4 6/17/39:00 44:03	MNVR R=280.00 P=346.00 Y= 58.00	B1 AUTO NORM	BSC 0.500 SB AT 3.00 SB RT 0.20	SUN 0 17 0 327		DECRBIT BURN ATTITUDE
5 6/19/54:07	ONS IGNITION	A AUTO A	BSC 0.500 SB AT 3.50 SB RT 0.20			DECRBIT BURN

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V. Paris  
A3P, Dowry  
C2K, Eggen  
C3K, Carman  
Y. W. Park  
B. Rosenman  
C5M, M. Powell (2)  
D3R, Theobald  
M. D. Pipher (2)

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258

**Lockhead - Houston**  
C15A, A. Martin (2)

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ZC1/O, E. Hest

**IBM - Houston**  
MC/2/P, Kellherert

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C4-W/D-2/K, B. Roberts (4)  
C5-W/D-3/B, Nelson  
C6-W/D-4/S, Zeman  
MD/SCOB, C. Adams (2)  
T. Smith

Newsome  
TO-NTS/KSCA, Reiter (2)  
VE-MSD-11/G, Vohler  
VT-MSR/W, Nygram (2)  
VT-DOBE, L. Steadman  
ZK/2S, Rochow/ Tech Data (19)

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M. Wadsworth (2)

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ROOM COPY

**FINAL**

# Flight Data File Crew Activity Plan

## STS 51-B

Spacelab 3

Mission Operations Directorate  
Operations Division

Final  
March 19, 1985

EVENTS	GMT		
Launch	11:00	Mon	Apr 29
Press Conference	21:45	Thu	May 2
MUSAT Deploy	20:35	Sun	May 5
GLCRA Deploy	20:55	Sat	May 6
Landing	07:59	Mon	May 6

# NASA

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas



MISSION OPERATIONS DIRECTORATE

STS 51-B CREW ACTIVITY PLAN  
SPACELAB 3

FINAL  
March 19, 1985

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This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted on standard JSC form 482 to OMA/OP Manager, Bldg 4, Room 352, 713-483-2868.

Comments concerning this document may be addressed to OMA/Jerry Shinkle Bldg 4, Rm 343A, 713-483-2201.

Changes to the distribution list should be submitted in writing to OMA/Gwen Butler, Bldg 4, Rm 373, 713-483-5224.

Incorporates 482

No: CAP-287	CAP-310	CAP-320
CAP-301	CAP-312	CAP-321 //
CAP-304	CAP-313	CAP-322
CAP-308	CAP-315	CAP-328
CAP-309	CAP-316	

ACKNOWLEDGMENTS

The following people contributed significantly in preparing the 51-B Crew Activity Plans:

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STS 51-B CREW ACTIVITY PLAN

**LIST OF EFFECTIVE PAGES**

FINAL 03/19/85

1	CAP/51-B/FIN	3-8	CAP/51-B/FIN
11	CAP/51-B/FIN	3-9	CAP/51-B/FIN
111	CAP/51-B/FIN	3-10	CAP/51-B/FIN
1v	CAP/51-B/FIN	3-11	CAP/51-B/FIN
v	CAP/51-B/FIN	3-12	CAP/51-B/FIN
vi	CAP/51-B/FIN	3-13	CAP/51-B/FIN
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1-1	CAP/51-B/FIN	3-16	CAP/51-B/FIN
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1-3	CAP/51-B/FIN	3-18	CAP/51-B/FIN
1-4	CAP/51-B/FIN	3-19	CAP/51-B/FIN
2-1	CAP/51-B/FIN	3-20	CAP/51-B/FIN
2-2	CAP/51-B/FIN	3-21	CAP/51-B/FIN
2-3	CAP/51-B/FIN	3-22	CAP/51-B/FIN
2-4	CAP/51-B/FIN	3-23	CAP/51-B/FIN
2-5	CAP/51-B/FIN	3-24	CAP/51-B/FIN
2-6	CAP/51-B/FIN	3-25	CAP/51-B/FIN
2-7	CAP/51-B/FIN	3-26	CAP/51-B/FIN
2-8	CAP/51-B/FIN	3-27	CAP/51-B/FIN
2-9	CAP/51-B/FIN	3-28	CAP/51-B/FIN
2-10	CAP/51-B/FIN	3-29	CAP/51-B/FIN
2-11	CAP/51-B/FIN	3-30	CAP/51-B/FIN
2-12	CAP/51-B/FIN	3-31	CAP/51-B/FIN
2-13	CAP/51-B/FIN	3-32	CAP/51-B/FIN
2-14	CAP/51-B/FIN	3-33	CAP/51-B/FIN
2-15	CAP/51-B/FIN	3-34	CAP/51-B/FIN
2-16	CAP/51-B/FIN	3-35	CAP/51-B/FIN
2-17	CAP/51-B/FIN	3-36	CAP/51-B/FIN
2-18	CAP/51-B/FIN	3-37	CAP/51-B/FIN
2-19	CAP/51-B/FIN	3-38	CAP/51-B/FIN
2-20	CAP/51-B/FIN	3-39	CAP/51-B/FIN
2-21	CAP/51-B/FIN	3-40	CAP/51-B/FIN
2-22	CAP/51-B/FIN	3-41	CAP/51-B/FIN
2-23	CAP/51-B/FIN	3-42	CAP/51-B/FIN
2-24	CAP/51-B/FIN	3-43	CAP/51-B/FIN
2-25	CAP/51-B/FIN	3-44	CAP/51-B/FIN
2-26	CAP/51-B/FIN	3-45	CAP/51-B/FIN
2-27	CAP/51-B/FIN	3-46	CAP/51-B/FIN
2-28	CAP/51-B/FIN	3-47	CAP/51-B/FIN
2-29	CAP/51-B/FIN	3-48	CAP/51-B/FIN
2-30	CAP/51-B/FIN	3-49	CAP/51-B/FIN
3-1	CAP/51-B/FIN	3-50	CAP/51-B/FIN
3-2	CAP/51-B/FIN	3-51	CAP/51-B/FIN
3-3	CAP/51-B/FIN	3-52	CAP/51-B/FIN
3-4	CAP/51-B/FIN	3-53	CAP/51-B/FIN
3-5	CAP/51-B/FIN	3-54	CAP/51-B/FIN
3-6	CAP/51-B/FIN	3-55	CAP/51-B/FIN
3-7	CAP/51-B/FIN	3-56	CAP/51-B/FIN

3-57 ..... CAP/51-B/FIN  
3-58 ..... CAP/51-B/FIN  
3-59 ..... CAP/51-B/FIN  
3-60 ..... CAP/51-B/FIN  
3-61 ..... CAP/51-B/FIN  
3-62 ..... CAP/51-B/FIN  
3-63 ..... CAP/51-B/FIN  
3-64 ..... CAP/51-B/FIN  
3-65 ..... CAP/51-B/FIN  
3-66 ..... CAP/51-B/FIN  
3-67 ..... CAP/51-B/FIN  
3-68 ..... CAP/51-B/FIN  
4-1 ..... CAP/51-B/FIN  
4-2 ..... CAP/51-B/FIN  
4-3 ..... CAP/51-B/FIN  
4-4 ..... CAP/51-B/FIN  
4-5 ..... CAP/51-B/FIN  
4-6 ..... CAP/51-B/FIN  
4-7 ..... CAP/51-B/FIN  
4-8 ..... CAP/51-B/FIN  
5-1 ..... CAP/51-B/FIN  
5-2 ..... CAP/51-B/FIN  
5-3 ..... CAP/51-B/FIN  
5-4 ..... CAP/51-B/FIN  
5-14 ..... CAP/51-B/FIN  
6-1 ..... CAP/51-B/FIN  
6-2 ..... CAP/51-B/FIN  
6-3 ..... CAP/51-B/FIN  
6-4 ..... CAP/51-B/FIN  
7-1 ..... CAP/51-B/FIN  
7-2 ..... CAP/51-B/FIN  
7-3 ..... CAP/51-B/FIN  
7-4 ..... CAP/51-B/FIN  
7-5 ..... CAP/51-B/FIN  
7-6 ..... CAP/51-B/FIN

STS 51-B DAP CUE CARDS

DAP Book Front Cover	5-4	CAP/51	B/O/BAS	
UNIV #16 (Back of DAP Book Front Cover)	5-4	CAP/51	B/O/BAS	
DAP A TOC	5-5	CAP/51	B/O/FIN	
DAP A1	5-5	CAP/51	B/O/FIN	
A1	5-5	CAP/51	B/O/BAS	
DAP A2	5-6	CAP/51	B/O/BAS	
A2	5-6	CAP/51	B/O/BAS	
DAP A3	5-6	CAP/51	B/O/BAS	
A3	5-6	CAP/51	B/O/BAS	
DAP A4	5-7	CAP/51	B/O/BAS	
A4	5-7	CAP/51	B/O/BAS	
DAP A5	5-7	CAP/51	B/O/BAS	
A5	5-7	CAP/51	B/O/BAS	
DAP A6	5-8	CAP/51	B/O/BAS	
A6	5-8	CAP/51	B/O/BAS	
Blank	5-8	CAP/51	B/O/BAS	
DAP B TOC	5-8	CAP/51	B/O/FIN	
DAP B1	5-9	CAP/51	B/O/FIN	
B1	5-9	CAP/51	B/O/BAS	
DAP B2	5-9	CAP/51	B/O/BAS	
B2	5-9	CAP/51	B/O/BAS	
DAP B3	5-10	CAP/51	B/O/BAS	
B3	5-10	CAP/51	B/O/BAS	
DAP B4	5-10	CAP/51	B/O/BAS	
B4	5-10	CAP/51	B/O/BAS	
DAP B5	5-11	CAP/51	B/O/BAS	
B5	5-11	CAP/51	B/O/BAS	A
DAP B6	5-11	CAP/51	B/O/BAS	A
B6	5-11	CAP/51	B/O/BAS	A
DAP B7	5-12	CAP/51	B/O/BAS	A
B7	5-12	CAP/51	B/O/BAS	A
Blank	5-12	CAP/51	B/O/BAS	A
DAP Book (Back Cover)	5-13	CAP/51	B/O/BAS	

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CONTENTSPAGE

INTRODUCTION.....	vii
SI-B OVERVIEW.....	1-1
SUMMARY TIMELINE.....	2-1
DETAILED TIMELINE.....	3-1
SILVER TEAM FLT DAY 1.....	3-3
FLT DAY 2.....	3-7
FLT DAY 3.....	3-15
FLT DAY 4.....	3-25
FLT DAY 5.....	3-35
FLT DAY 6.....	3-43
FLT DAY 7.....	3-53
FLT DAY 8.....	3-63
GOLD TEAM FLT DAY 1.....	3-2
FLT DAY 2.....	3-10
FLT DAY 3.....	3-18
FLT DAY 4.....	3-28
FLT DAY 5.....	3-38
FLT DAY 6.....	3-48
FLT DAY 7.....	3-56
FLT DAY 8.....	3-66
CONSUMABLES CURVES.....	4-1
SI-B DAP BOOK.....	5-1
SI-B ALTITUDE TIMELINE.....	6-1
CREW ACTIVITY NOTES.....	7-1

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## INTRODUCTION

The S1-B Crew Activity Plan is the flight data artifact that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry checklists. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the S1-B Flight Requirements Document (Revision C, January 1985).

The flight profile (OFF Cycle 3 trajectory data) used for this Crew Activity Plan is for a launch date of April 30, 1985.

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SI-B OVERVIEW





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SUMMARY  
TIMELINE

SUMMARY TIMELINE





GMT (DIMIN)	MET (DIMIN)	CDT (DIMIN)	WD/ DAY	RETR	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
12011000 / 12110000	08010100 / 08011200	12011100 / 12012100	1 / 178 GMT	21.0	☉	APRIL 30, 1965	525 41-0	7PM	3/1965
GMT 1120	12	13	14	15	16	17	18	19	20
MET 1000	1	2	3	4	5	6	7	8	9
PLT	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION
SILVER	ASCENT	ASCENT	ASCENT	ASCENT	ASCENT	ASCENT	ASCENT	ASCENT	ASCENT
MS2	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION
PSM	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION	POST INSERTION
ORBIT	2	3	4	5	6	7	8	9	
GRAPH TRACE									
BATHY	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
COVERAGE	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
TOPS	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
TEMPERATURE	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
WIND	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
TV EVENT	-800 -810 -820 -830 -840 -850 -860 -870 -880 -890 -900 -910 -920 -930 -940 -950 -960 -970 -980 -990 -1000								
NOTES:									





GMT (DINIM)	MET (DINIM)	CDT (DINIM)	PD/ DDY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
17000000	17000000	00000000	00000000	00000000	00000000	MAY 1, 1965	STS 91-B	170000	170000
MET 1800						000112	20	21	22
COR	RURON PIV	RURON PIV	LUNCH						
MS1			LUNCH	WFC STN					
MS3		REC-FOE	LUNCH	REC-FOE	MICROFIL SAMPLE	TOG	REC-FOE		
PSF	DM-1/2	DM-1/2	LUNCH		DM-1/2				
ORBIT	17	18	19	20	21	22	23	24	
SPIN TRACE									
STATION COVERAGE									
TOSS									
ORBITAL									
TV EVENT									
NOTES:	<ul style="list-style-type: none"> <li>• DTG 0623 CARRI AIR MONITORING</li> <li>• DTG 0623 MICROFIL MONITORING BY SPACELAB 3</li> <li>• DTG 0653 CONTINUED BLOOD INVESTIGATION</li> <li>• DTG 0653 CONTINUED BLOOD INVESTIGATION</li> </ul>								



GMT	(DINIM)	NET	(DINIM)	CDT	(DINIM)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	SUB. DATE																
122001000	122010000	081500000	082000000	121500000	122000000	/ 100 GMT	-26.7	☉	MAY 1, 1965	579 51-0	FINAL	3/19/65																
NET	1800 12	19	19	19	19	17	18	19	20	21	22	23																
CDR	MS1	PRE SLEEP ACT	SLEEP	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT																
													MS3	PSF	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT						
																							POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT	POST SLEEP ACT
SPOT	24	25	26	27	28	29	30	31	32																			
STATION COVERAGE	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL																
TOPS	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL																
TV EVENT																												
NOTES:																												

GMT (D/M/Y)	MET (D/M/Y)	CDT (D/M/Y)	FD/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
1771041000 / 177111000	0811121000 / 0812001000	1711123000 / 1721111000	/ 177 201	-26.8	☉	MAY 1, 1965	555 51-R	FINN	5/1/1965
MET 000 17	CDT 122 17								
PLT	FLTR 1FM		LUNCH						
SILVER	MS2		LUNCH						ONE SLEEP ACFT
PSM	OP		LUNCH						
ORBIT	24	25	26	27	28	29	30	31	32
CAPN TRACE W/SRR	[Decorative wavy line]								
ESTDN COVERAGE	[Coverage indicators: HRR, GRR, ORR, etc.]								
TORS	[Timeline bars]								
ATTITUDE	[Timeline bars]								
TV EVENT	[Timeline bars]								
NOTES:	* VOOMER * FILTER CLEANING * PES-MON    * STATUS REPORT								

GMT	(DSIM)	MET	(DSIM)	GOT	(DSIM)	FD/ OBY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUR. DATE
12211688Z	12210140Z	00210180Z	00210170Z	12211168Z	12212310Z	7 437 GMT	-26.7	☉	MAY 7, 1965	975 51-9	FL001	3/19/65
COLT 1122												
MET 1802												
GOLD	CDR	MURDER PTV	PTV SETUP	MURDER PTV	PTV ACT	MURDER PTV	LUNCH	MICROBIAL SAMPLES	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING
	NS1	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING
	NS3	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING
	PSP	DDH-OYE	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING	MICROBIAL MONITORING
32/25 CH												
32	33	34	35	36	37	38	39	40				
6570h	-100	-500	-1000	-1500	-2000	-2500	-3000	-3500	-4000	-4500	-5000	-5500
COVERAGE												
7000												
8700												
9200												
TV EVENT	10151	10152	10153	10154	10155	10156	10157	10158	10159	10160	10161	10162
NOTES:	<ul style="list-style-type: none"> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> <li>• MURDER</li> </ul>											
	<ul style="list-style-type: none"> <li>• DTD 823 CASH-RIP MONITORING</li> <li>• DTD 837 MICROBIAL MONITORING OF SPACELAB 1</li> <li>• REC-020</li> <li>• STATUS REPORT</li> </ul>											





GMT (DIN/IM)	NET (DIN/IM)	COT (DIN/IM)	FD/DOY	DETA	MOON	HOUSTON DATE	FLIGHT	POSITION	PUB. DATE	
1251000000 / 125116000	021121000 / 021100000	125121000 / 125111000	125111000 / 125111000	125111000 / 125111000	125111000 / 125111000	MAY 2, 1965	STS 51-L	FTW	3/19/65	
GMT 1722	NET 1847	COT 1179	13	14	15	16	17	18	19	
COLD	CDR									
	MS1	SLEEP				POST SLEEP ACT				
	MS3									
	PSF									
TIME	0001	40	41	42	43	44	45	46	47	48
GROUND FORCE W/SON	[Wavy line pattern]									
GROUND COVERAGE	[Coverage markers: -RSC, -RRM, -RCH, -GNN, -RCD, -RBD, -TAD]									
TDRS	[Timeline markers]									
TV EVENTS	[Timeline markers]									
NOTES	[Notes area]									

GMT (0200Z)	MFT (0200Z)	CDT (0200Z)	EDT (0200Z)	EST (0200Z)	GMT (0200Z)	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
17	17	17	17	17	17	17	17	17	17	17
PLT										
NAME							MS-CA			PRE SLEEP RPT
PCO										
SYSTEM COORDINATE -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000										
PERIOD -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000 -1000										
STATUS REPORT										
NOTES										













COMP (DAYS)	WRT (DAYS)	CDT (DAYS)	RD/ DAY	REFS	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
11/14/65	12	13	14	15	16	17	18	19	20
11/15/65	21	22	23	24	25	26	27	28	29
11/16/65	30	31	1	2	3	4	5	6	7
11/17/65	8	9	10	11	12	13	14	15	16
11/18/65	17	18	19	20	21	22	23	24	25
11/19/65	26	27	28	29	30	31	1	2	3
11/20/65	4	5	6	7	8	9	10	11	12
11/21/65	13	14	15	16	17	18	19	20	21
11/22/65	22	23	24	25	26	27	28	29	30
11/23/65	1	2	3	4	5	6	7	8	9
11/24/65	10	11	12	13	14	15	16	17	18
11/25/65	19	20	21	22	23	24	25	26	27
11/26/65	28	29	30	31	1	2	3	4	5
11/27/65	6	7	8	9	10	11	12	13	14
11/28/65	15	16	17	18	19	20	21	22	23
11/29/65	24	25	26	27	28	29	30	31	1
11/30/65	2	3	4	5	6	7	8	9	10
12/1/65	11	12	13	14	15	16	17	18	19
12/2/65	20	21	22	23	24	25	26	27	28
12/3/65	29	30	31	1	2	3	4	5	6
12/4/65	7	8	9	10	11	12	13	14	15
12/5/65	16	17	18	19	20	21	22	23	24
12/6/65	25	26	27	28	29	30	31	1	2
12/7/65	3	4	5	6	7	8	9	10	11
12/8/65	12	13	14	15	16	17	18	19	20
12/9/65	21	22	23	24	25	26	27	28	29
12/10/65	30	31	1	2	3	4	5	6	7
12/11/65	8	9	10	11	12	13	14	15	16
12/12/65	17	18	19	20	21	22	23	24	25
12/13/65	26	27	28	29	30	31	1	2	3
12/14/65	4	5	6	7	8	9	10	11	12
12/15/65	13	14	15	16	17	18	19	20	21
12/16/65	22	23	24	25	26	27	28	29	30
12/17/65	31	1	2	3	4	5	6	7	8
12/18/65	9	10	11	12	13	14	15	16	17
12/19/65	18	19	20	21	22	23	24	25	26
12/20/65	27	28	29	30	31	1	2	3	4
12/21/65	5	6	7	8	9	10	11	12	13
12/22/65	14	15	16	17	18	19	20	21	22
12/23/65	23	24	25	26	27	28	29	30	31
12/24/65	1	2	3	4	5	6	7	8	9
12/25/65	10	11	12	13	14	15	16	17	18
12/26/65	19	20	21	22	23	24	25	26	27
12/27/65	28	29	30	31	1	2	3	4	5
12/28/65	6	7	8	9	10	11	12	13	14
12/29/65	15	16	17	18	19	20	21	22	23
12/30/65	24	25	26	27	28	29	30	31	1
12/31/65	2	3	4	5	6	7	8	9	10
1966	11	12	13	14	15	16	17	18	19
1967	20	21	22	23	24	25	26	27	28
1968	29	30	31	1	2	3	4	5	6
1969	7	8	9	10	11	12	13	14	15
1970	16	17	18	19	20	21	22	23	24
1971	25	26	27	28	29	30	31	1	2
1972	3	4	5	6	7	8	9	10	11
1973	12	13	14	15	16	17	18	19	20
1974	21	22	23	24	25	26	27	28	29
1975	30	31	1	2	3	4	5	6	7
1976	8	9	10	11	12	13	14	15	16
1977	17	18	19	20	21	22	23	24	25
1978	26	27	28	29	30	31	1	2	3
1979	4	5	6	7	8	9	10	11	12
1980	13	14	15	16	17	18	19	20	21
1981	22	23	24	25	26	27	28	29	30
1982	31	1	2	3	4	5	6	7	8
1983	9	10	11	12	13	14	15	16	17
1984	18	19	20	21	22	23	24	25	26
1985	27	28	29	30	31	1	2	3	4
1986	5	6	7	8	9	10	11	12	13
1987	14	15	16	17	18	19	20	21	22
1988	23	24	25	26	27	28	29	30	31
1989	1	2	3	4	5	6	7	8	9
1990	10	11	12	13	14	15	16	17	18
1991	19	20	21	22	23	24	25	26	27
1992	28	29	30	31	1	2	3	4	5
1993	6	7	8	9	10	11	12	13	14
1994	15	16	17	18	19	20	21	22	23
1995	24	25	26	27	28	29	30	31	1
1996	2	3	4	5	6	7	8	9	10
1997	11	12	13	14	15	16	17	18	19
1998	20	21	22	23	24	25	26	27	28
1999	29	30	31	1	2	3	4	5	6
2000	7	8	9	10	11	12	13	14	15
2001	16	17	18	19	20	21	22	23	24
2002	25	26	27	28	29	30	31	1	2
2003	3	4	5	6	7	8	9	10	11
2004	12	13	14	15	16	17	18	19	20
2005	21	22	23	24	25	26	27	28	29
2006	30	31	1	2	3	4	5	6	7
2007	8	9	10	11	12	13	14	15	16
2008	17	18	19	20	21	22	23	24	25
2009	26	27	28	29	30	31	1	2	3
2010	4	5	6	7	8	9	10	11	12
2011	13	14	15	16	17	18	19	20	21
2012	22	23	24	25	26	27	28	29	30
2013	31	1	2	3	4	5	6	7	8
2014	9	10	11	12	13	14	15	16	17
2015	18	19	20	21	22	23	24	25	26
2016	27	28	29	30	31	1	2	3	4
2017	5	6	7	8	9	10	11	12	13
2018	14	15	16	17	18	19	20	21	22
2019	23	24	25	26	27	28	29	30	31
2020	1	2	3	4	5	6	7	8	9
2021	10	11	12	13	14	15	16	17	18
2022	19	20	21	22	23	24	25	26	27
2023	28	29	30	31	1	2	3	4	5
2024	6	7	8	9	10	11	12	13	14
2025	15	16	17	18	19	20	21	22	23
2026	24	25	26	27	28	29	30	31	1
2027	2	3	4	5	6	7	8	9	10
2028	11	12	13	14	15	16	17	18	19
2029	20	21	22	23	24	25	26	27	28
2030	29	30	31	1	2	3	4	5	6
2031	7	8	9	10	11	12	13	14	15
2032	16	17	18	19	20	21	22	23	24
2033	25	26	27	28	29	30	31	1	2
2034	3	4	5	6	7	8	9	10	11
2035	12	13	14	15	16	17	18	19	20
2036	21	22	23	24	25	26	27	28	29
2037	30	31	1	2	3	4	5	6	7
2038	8	9	10	11	12	13	14	15	16
2039	17	18	19	20	21	22	23	24	25
2040	26	27	28	29	30	31	1	2	3
2041	4	5	6	7	8	9	10	11	12
2042	13	14	15	16	17	18	19	20	21
2043	22	23	24	25	26	27	28	29	30
2044	31	1	2	3	4	5	6	7	8
2045	9	10	11	12	13	14	15	16	17
2046	18	19	20	21	22	23	24	25	26
2047	27	28	29	30	31	1	2	3	4
2048	5	6	7	8	9	10	11	12	13
2049	14	15	16	17	18	19	20	21	22
2050	23	24	25	26	27	28	29	30	31
2051	1	2	3	4	5	6	7	8	9
2052	10	11	12	13	14	15	16	17	18
2053	19	20	21	22	23	24	25	26	27
2054	28	29	30	31	1	2	3	4	5
2055	6	7	8	9	10	11	12	13	14
2056	15	16	17	18	19	20	21	22	23
2057	24	25	26	27					













GMT	FD (Days)	WFT	(Days)	CDT	(Days)	PG/DOY	BEIN	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
1200	1200	1200	1200	1200	1200	1200	1200	1200	NOV 5, 1993	SPR ST-P	FROM	1993/05
WFT	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
CIR	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
MSY	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
MS3	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
PCP	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
DOY	100	101	102	103								
SSP	[Map showing flight paths and locations]											
SSP	[Map showing coverage areas]											
YDP	[Map showing data points]											
PCP	[Map showing data points]											
NOTES	<ul style="list-style-type: none"> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> <li>• 1200</li> </ul>											







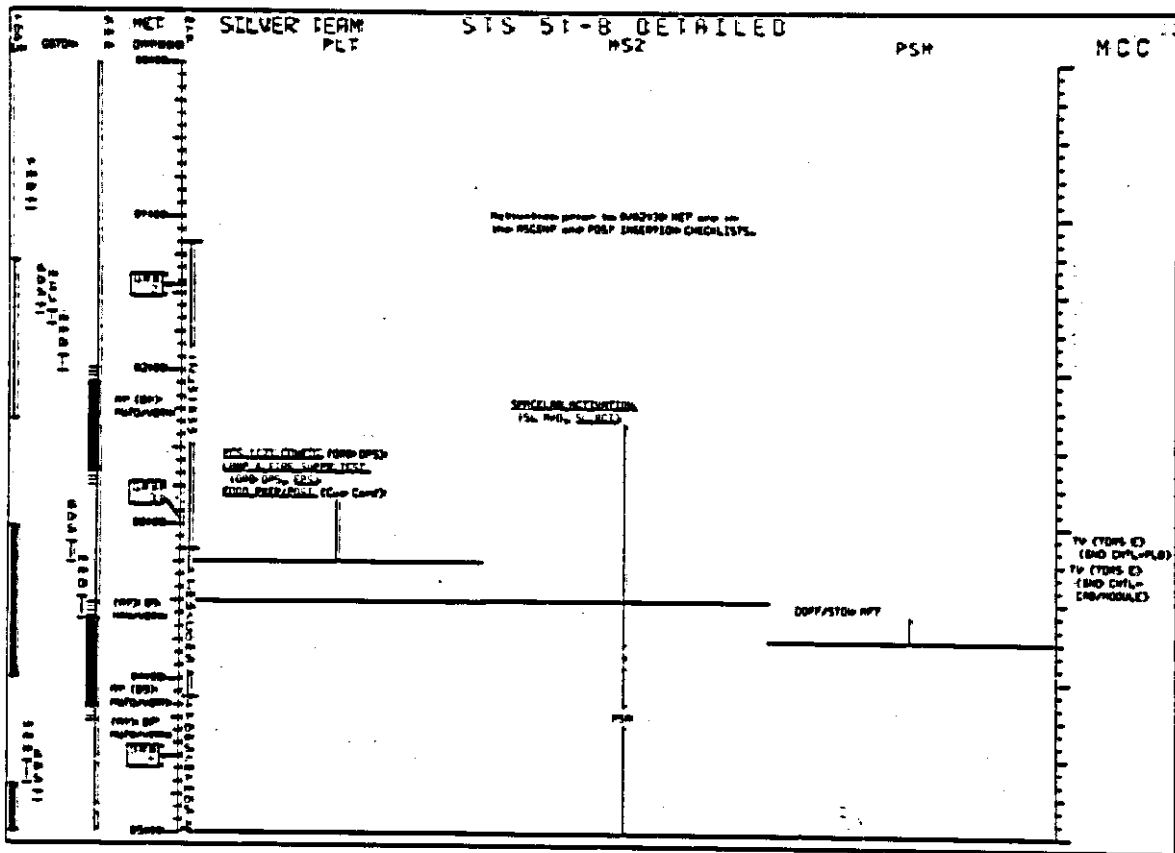


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DETAILED TIMELINE

DETAILED  
TIMELINE







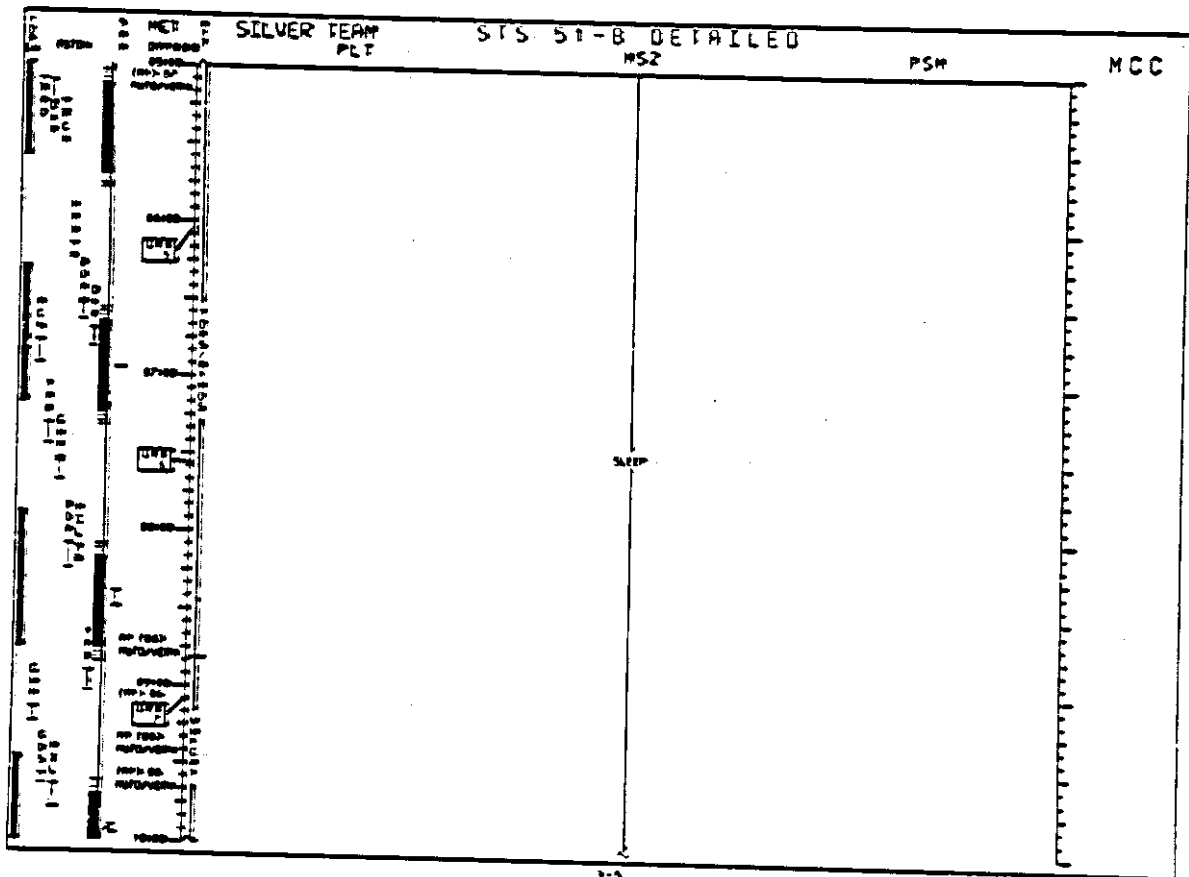


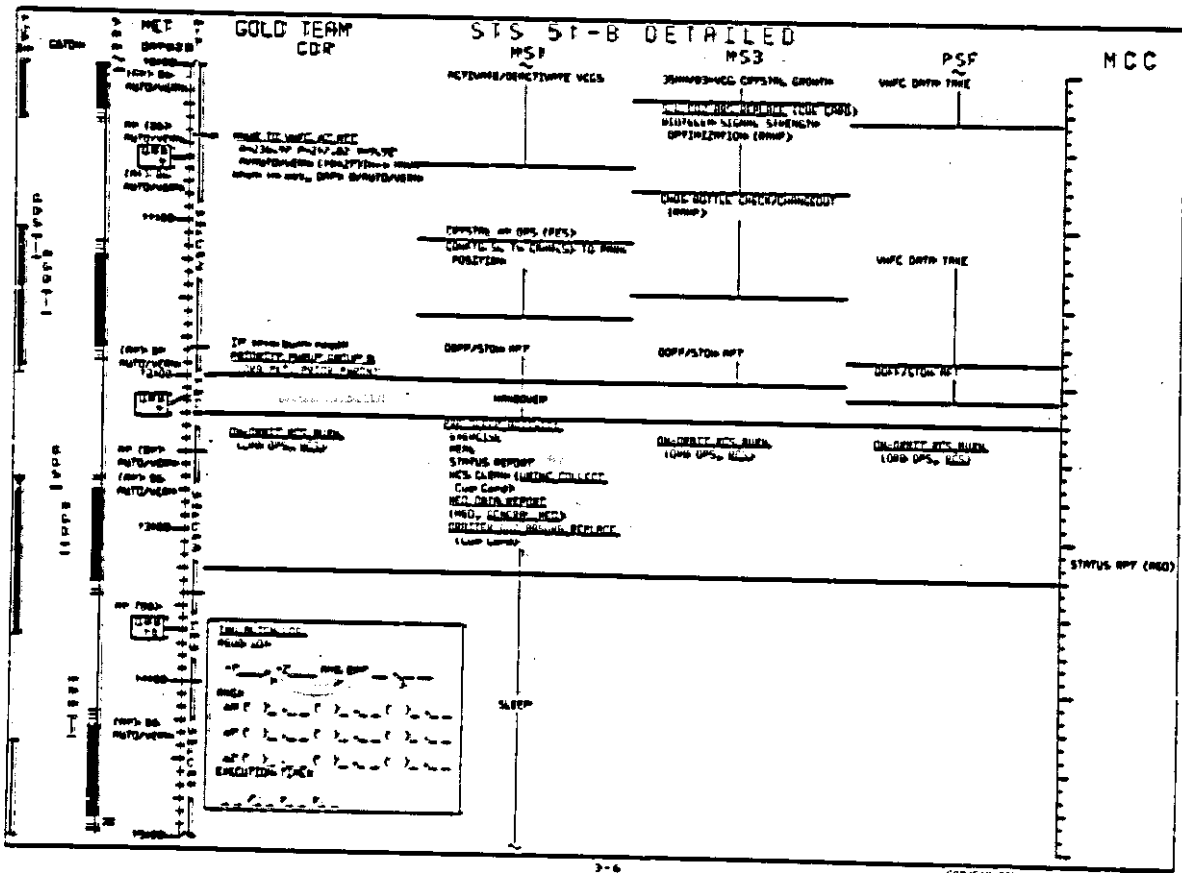
SILVER TEAM  
PLT

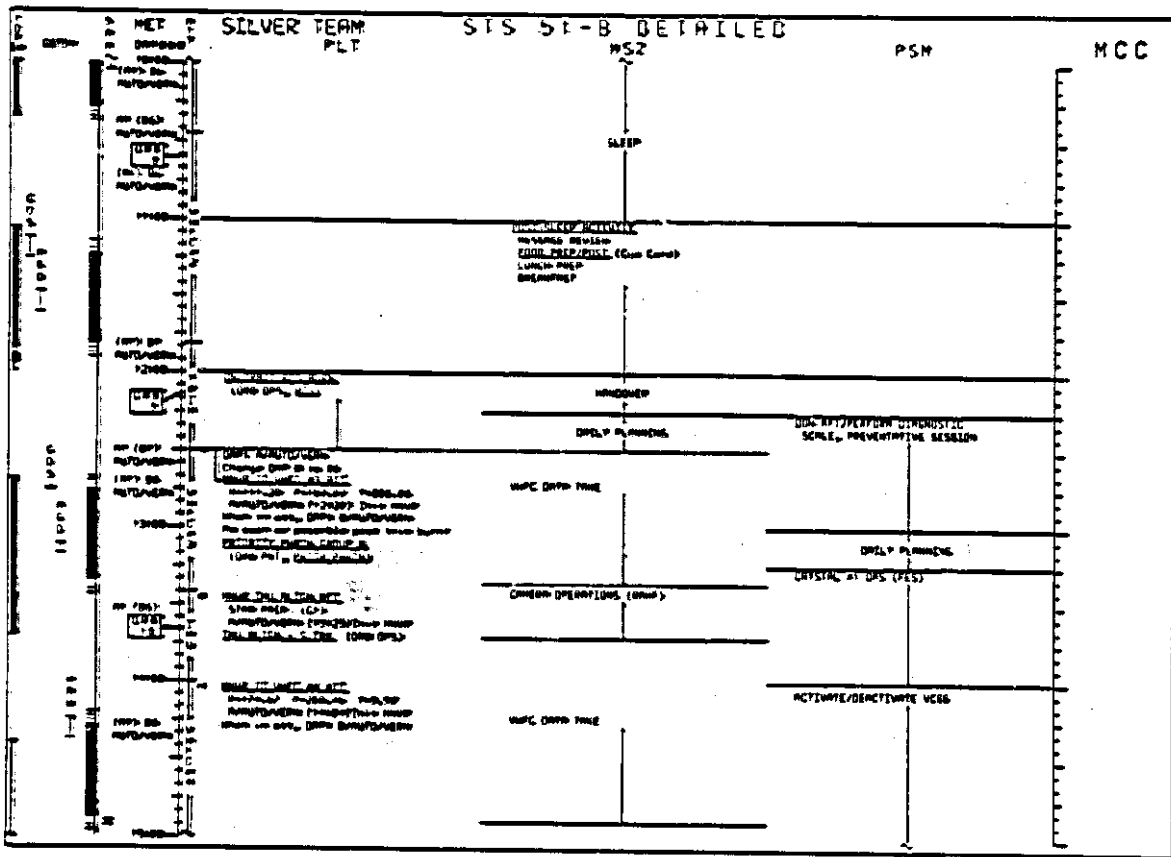
S/S 51-B DETAILED  
MS2

PSM

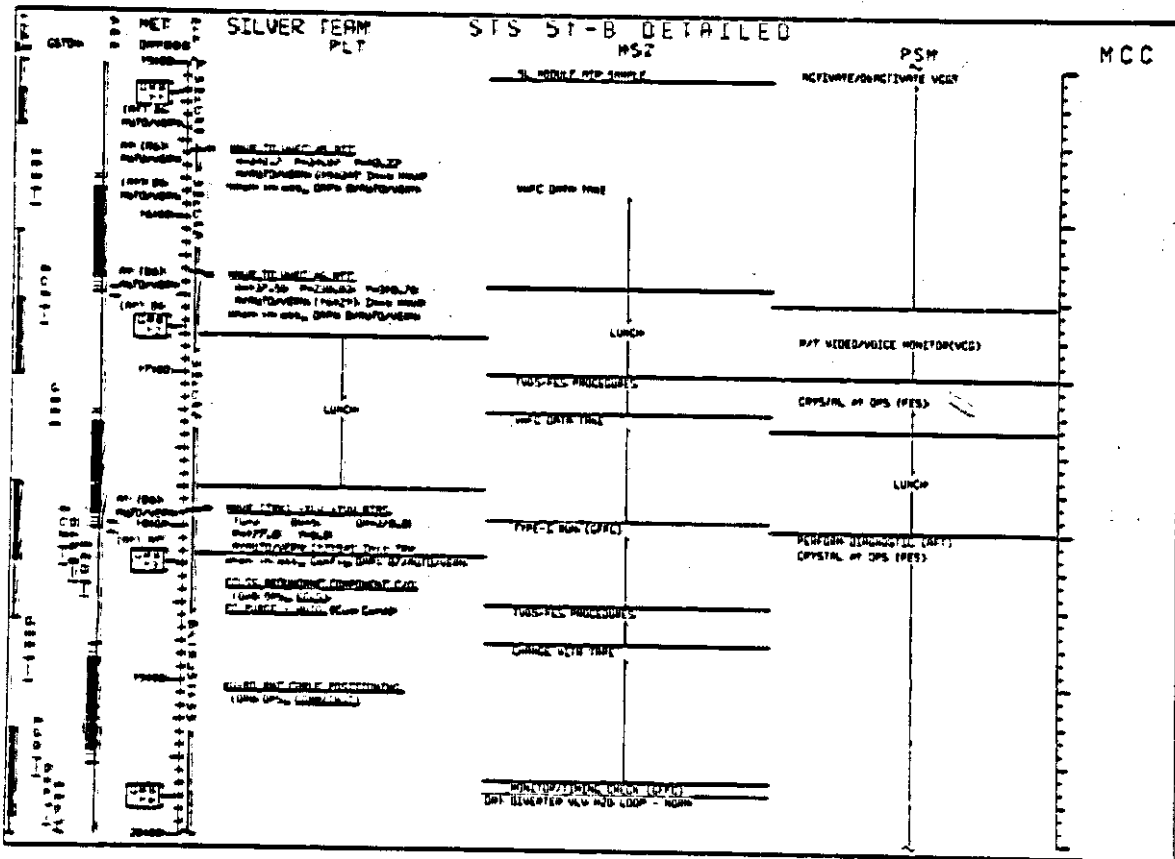
MCC











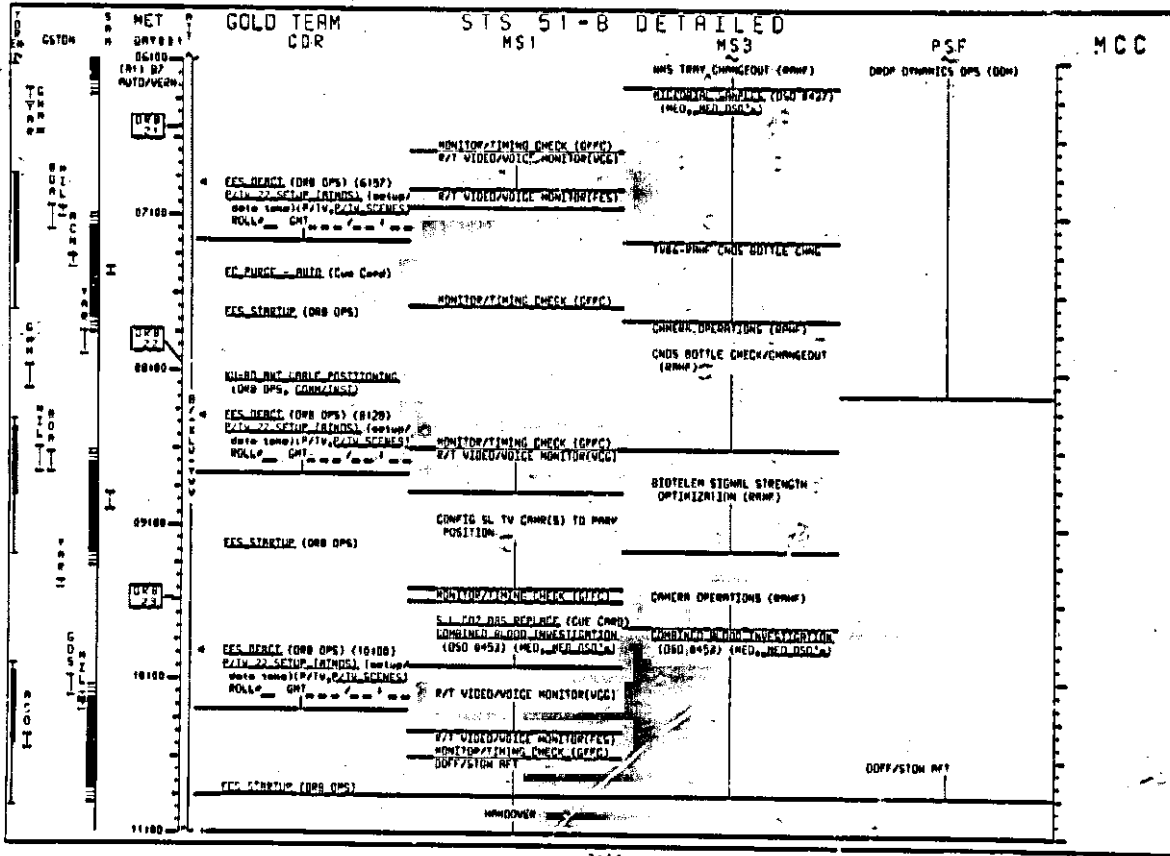


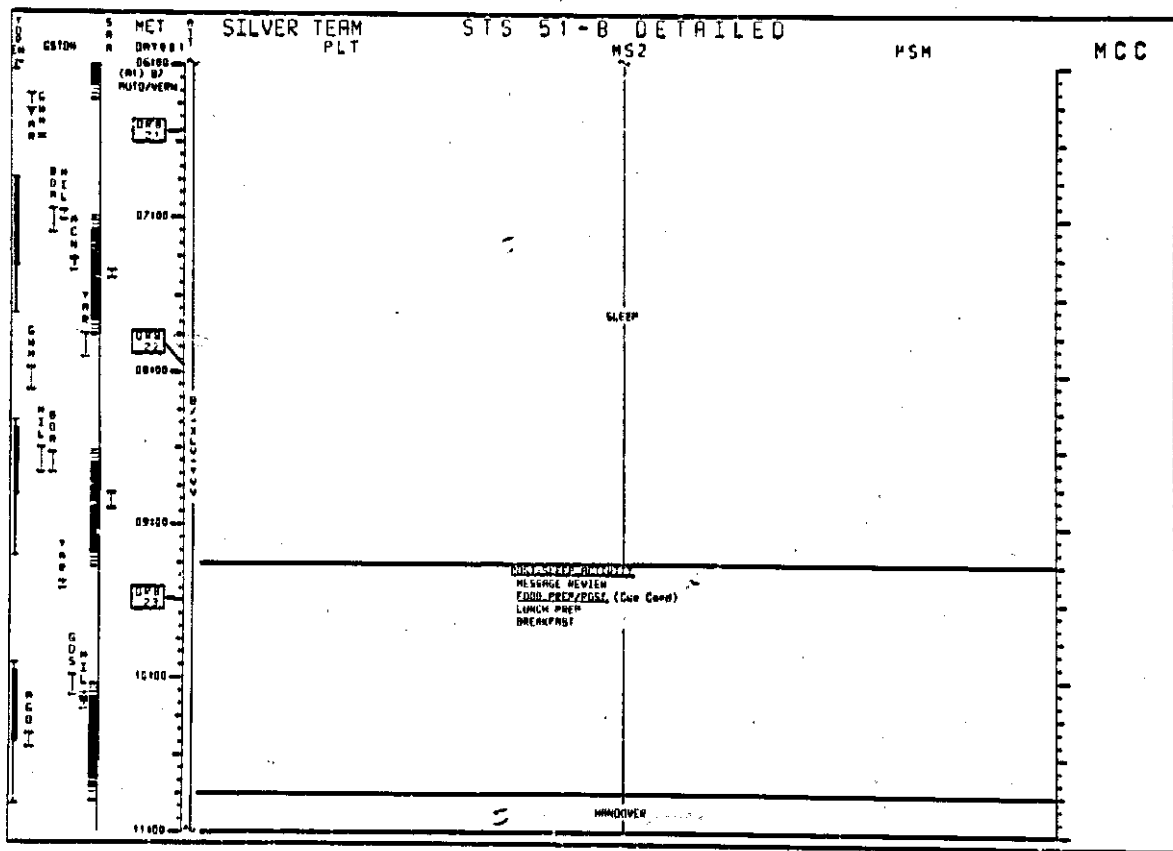






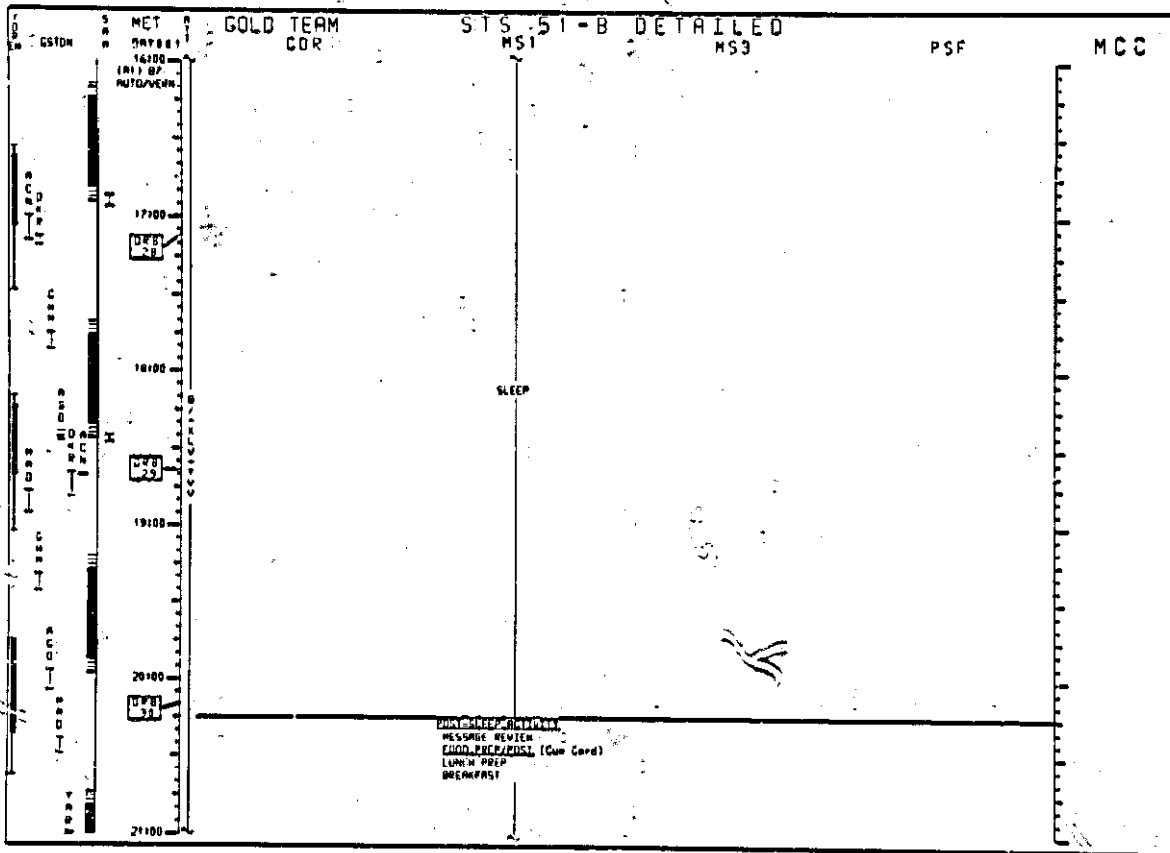


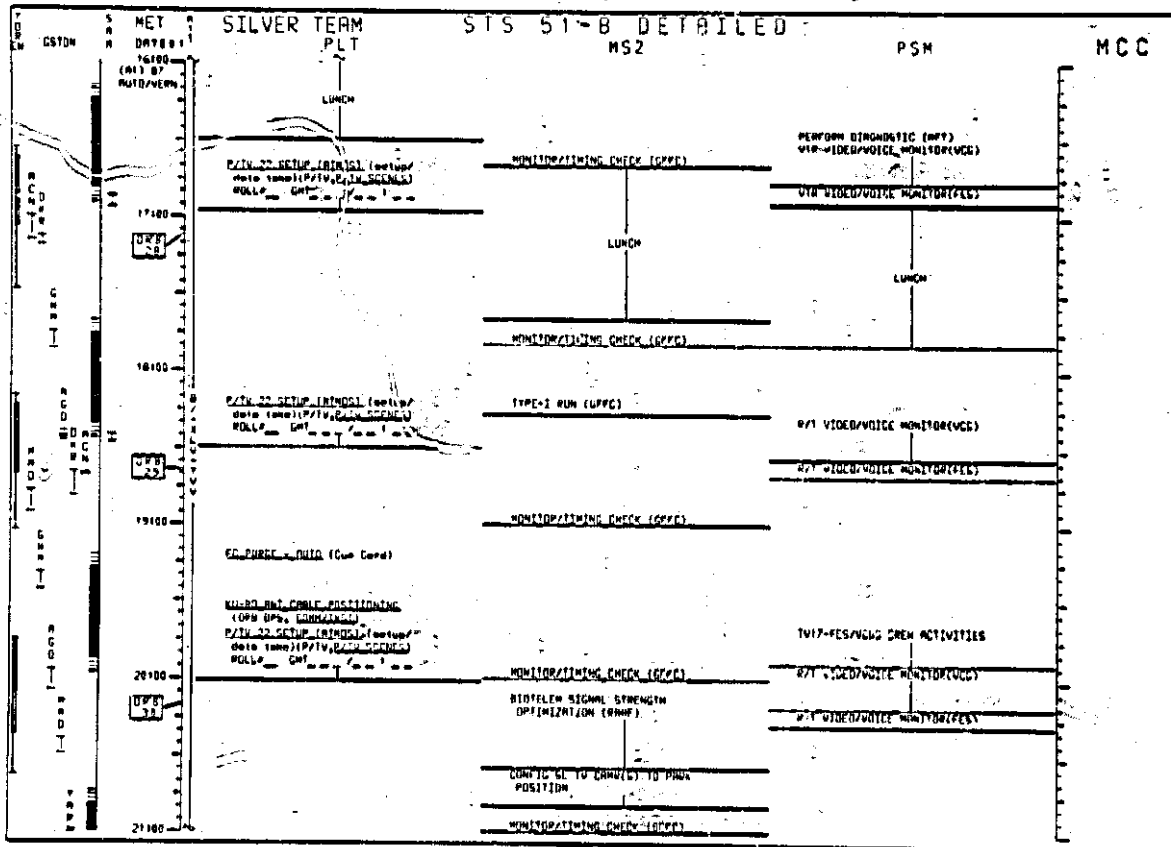












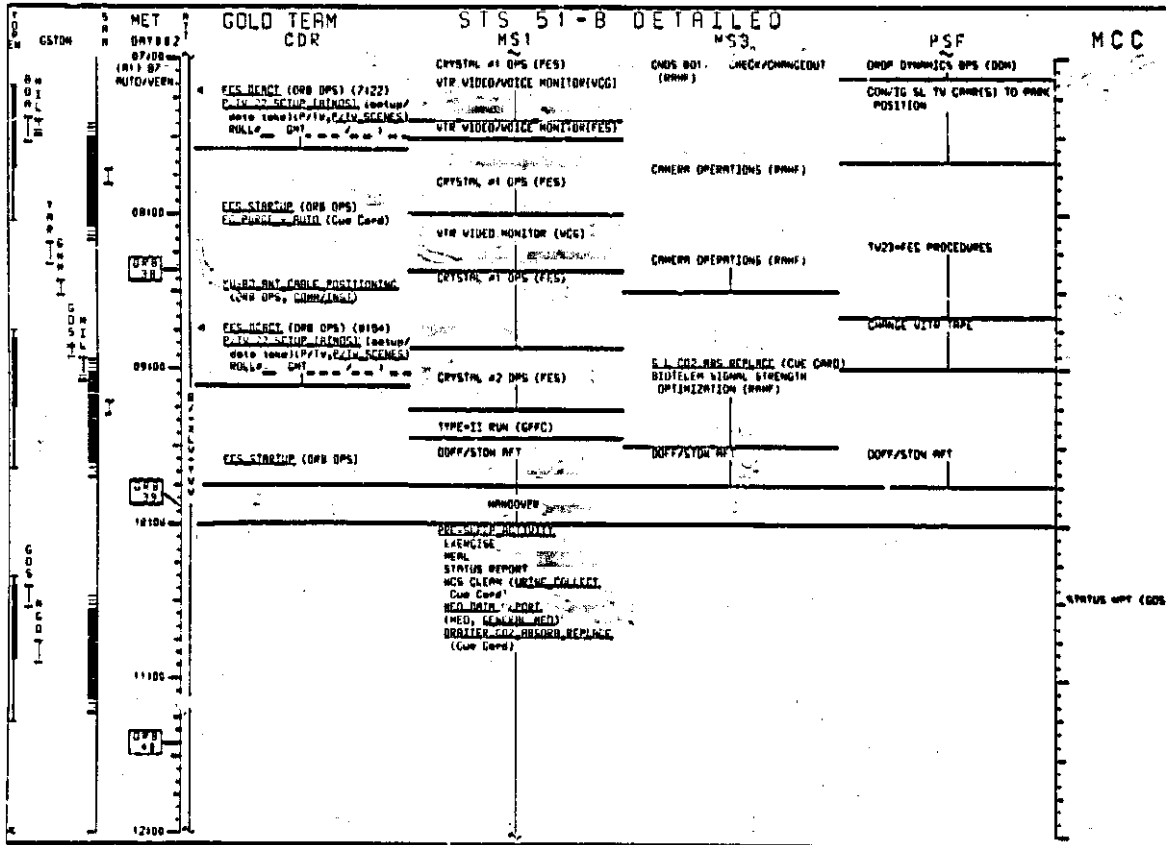




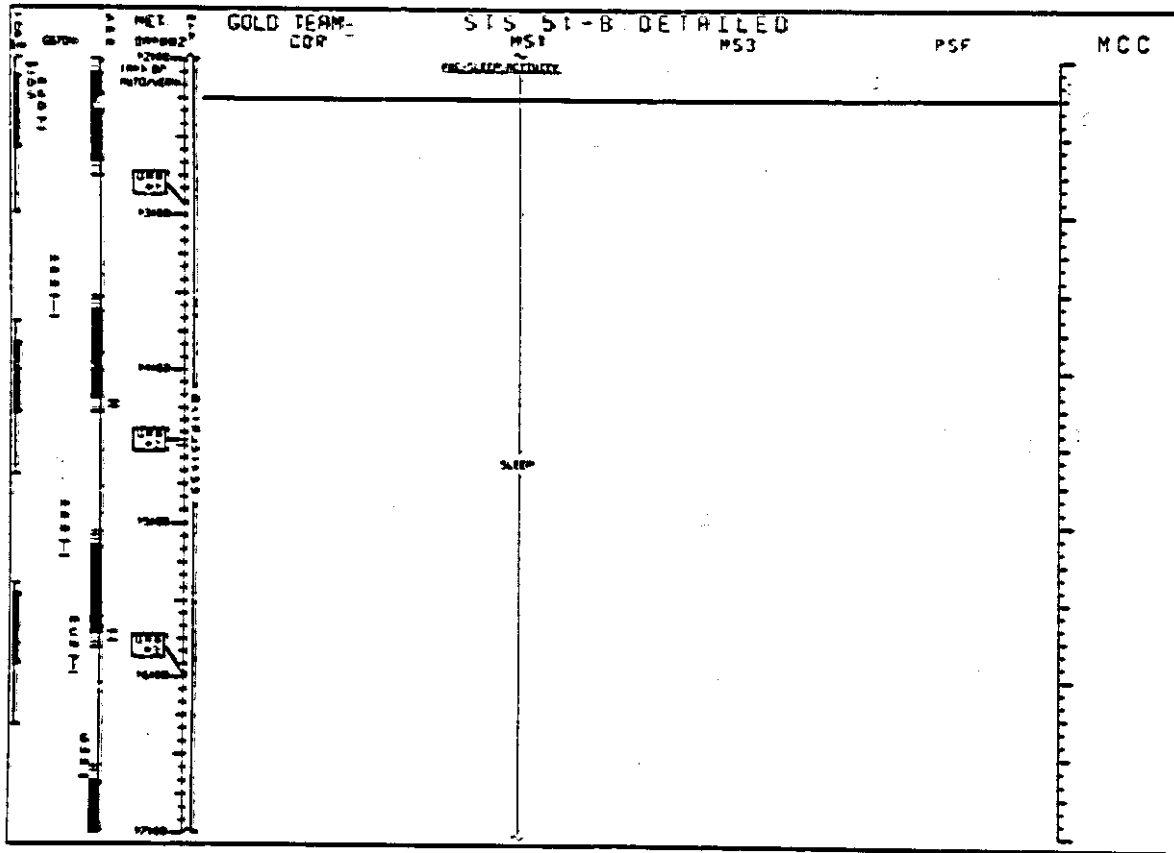


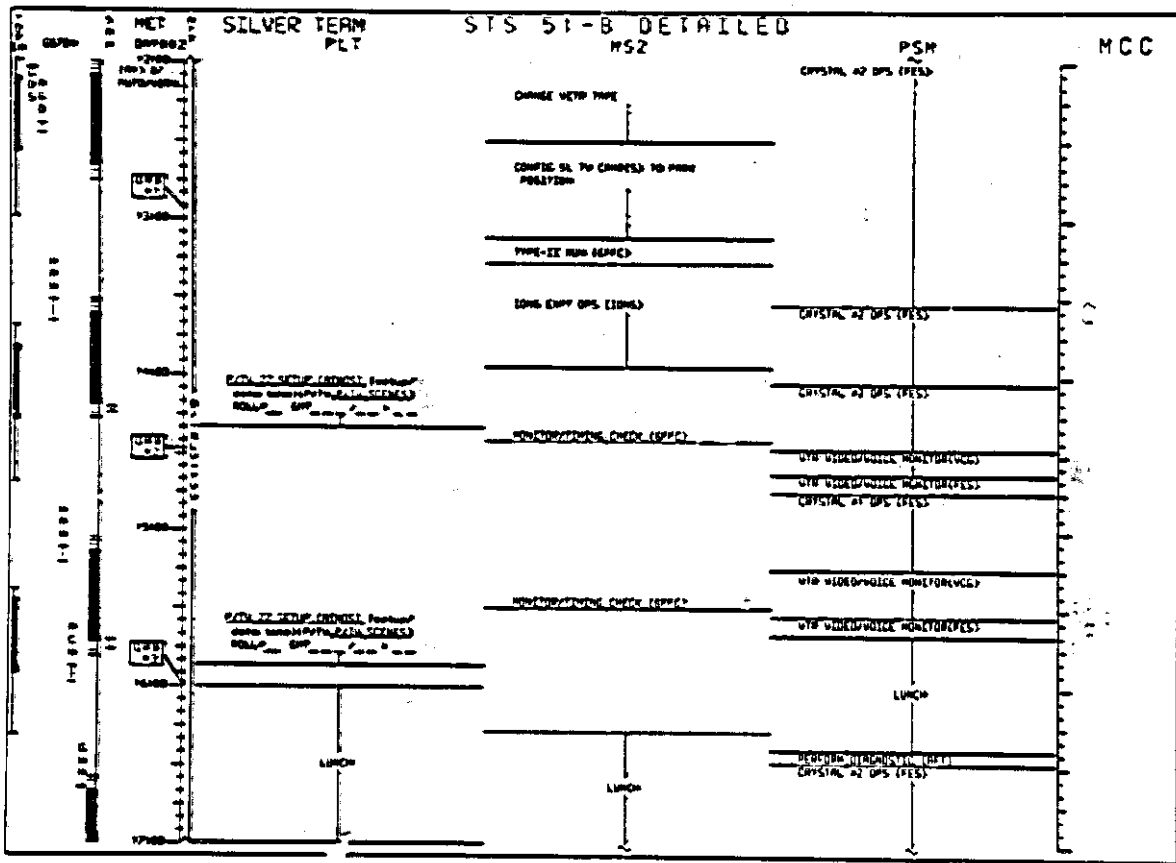


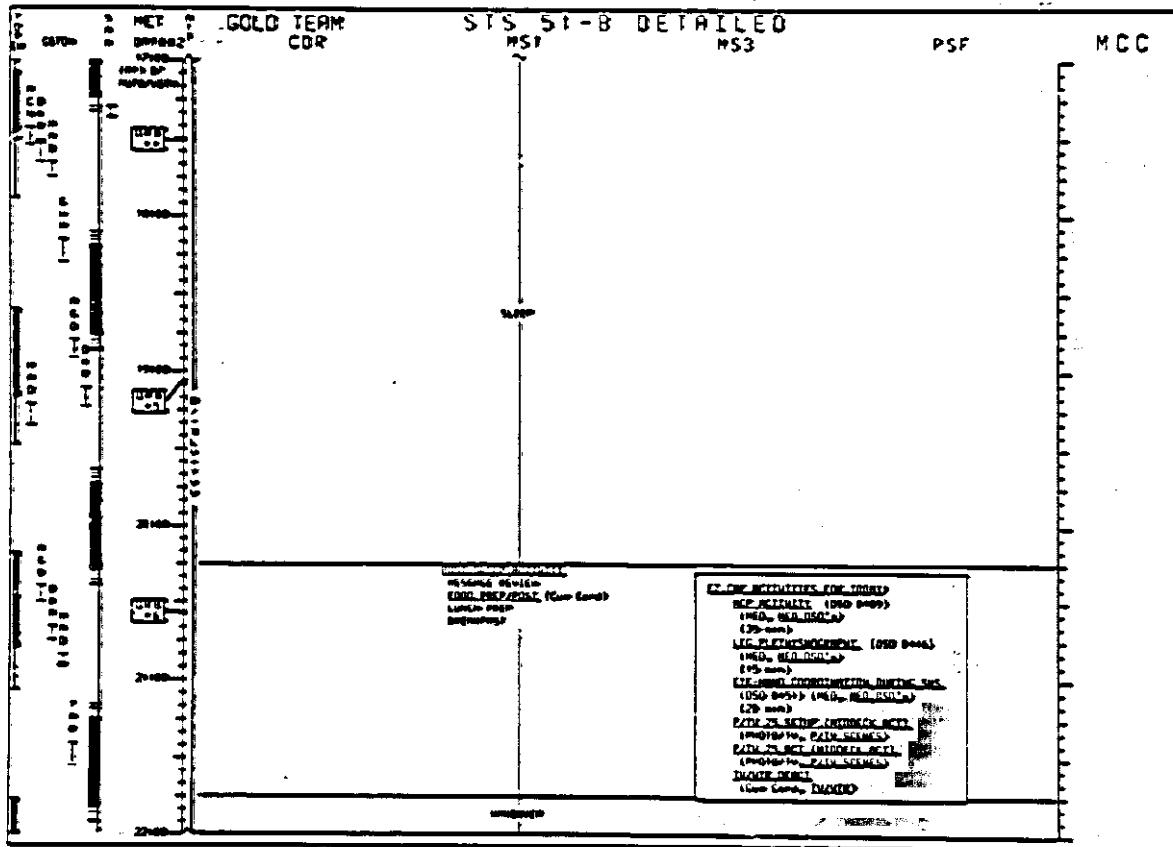
















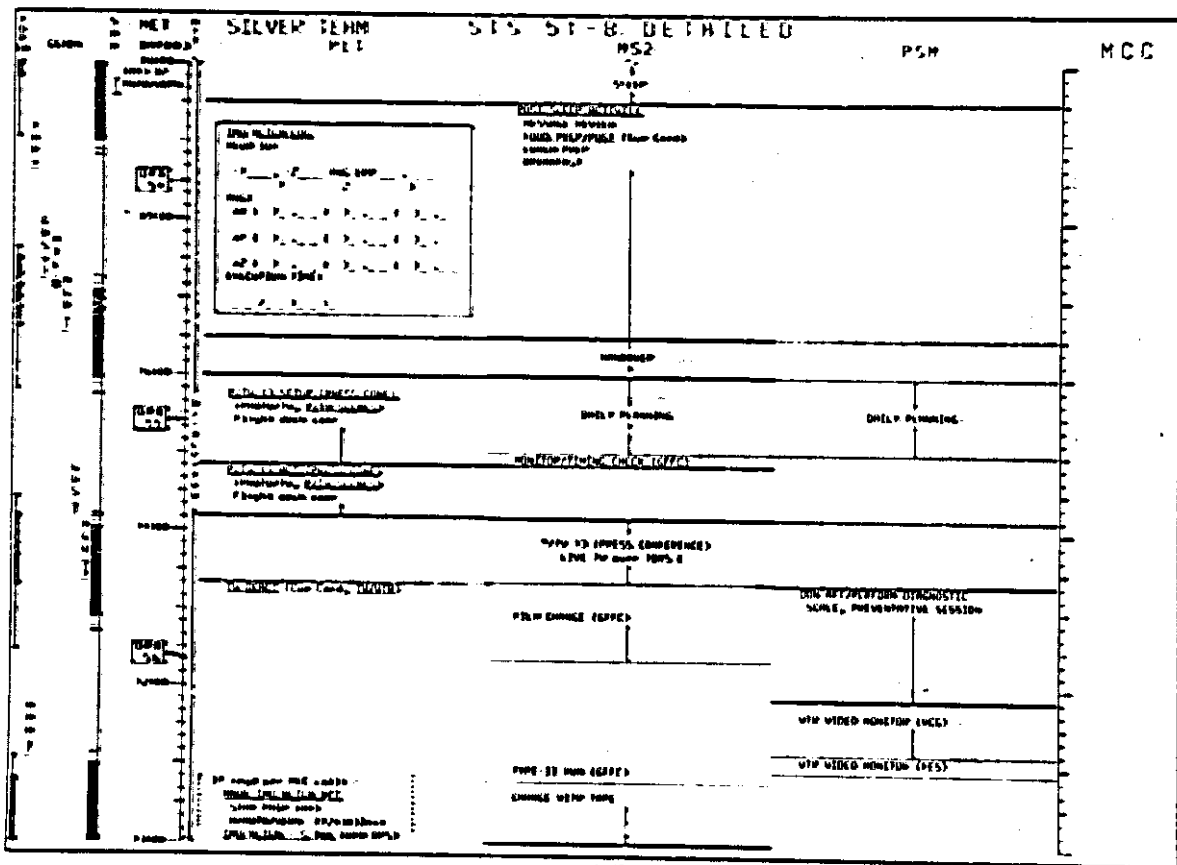


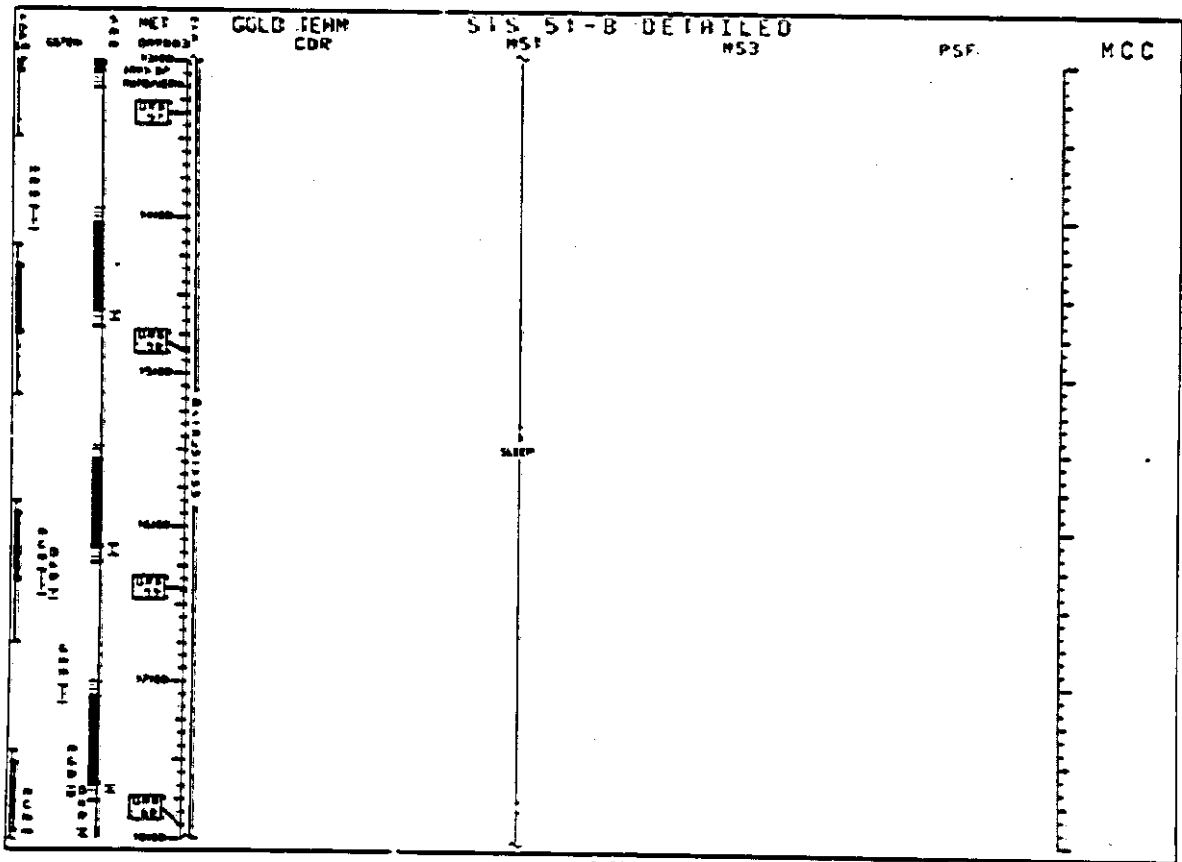










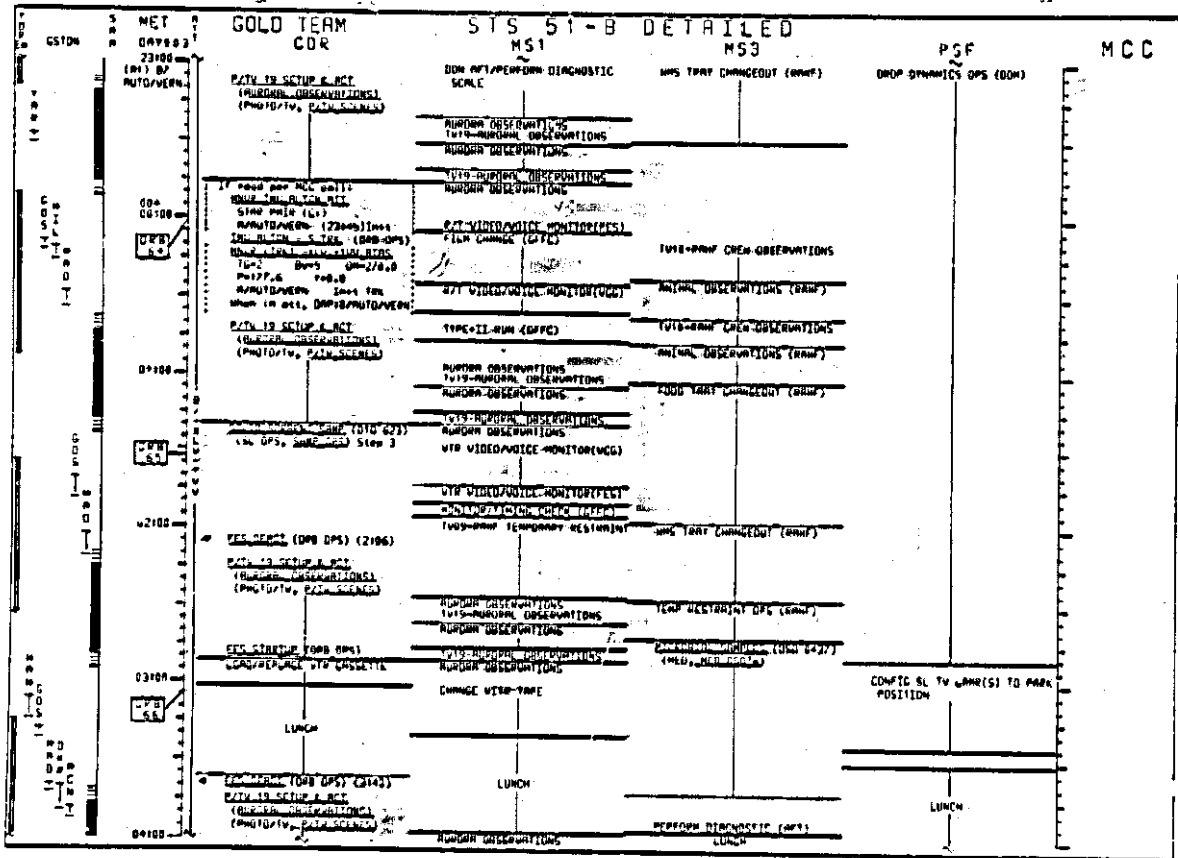














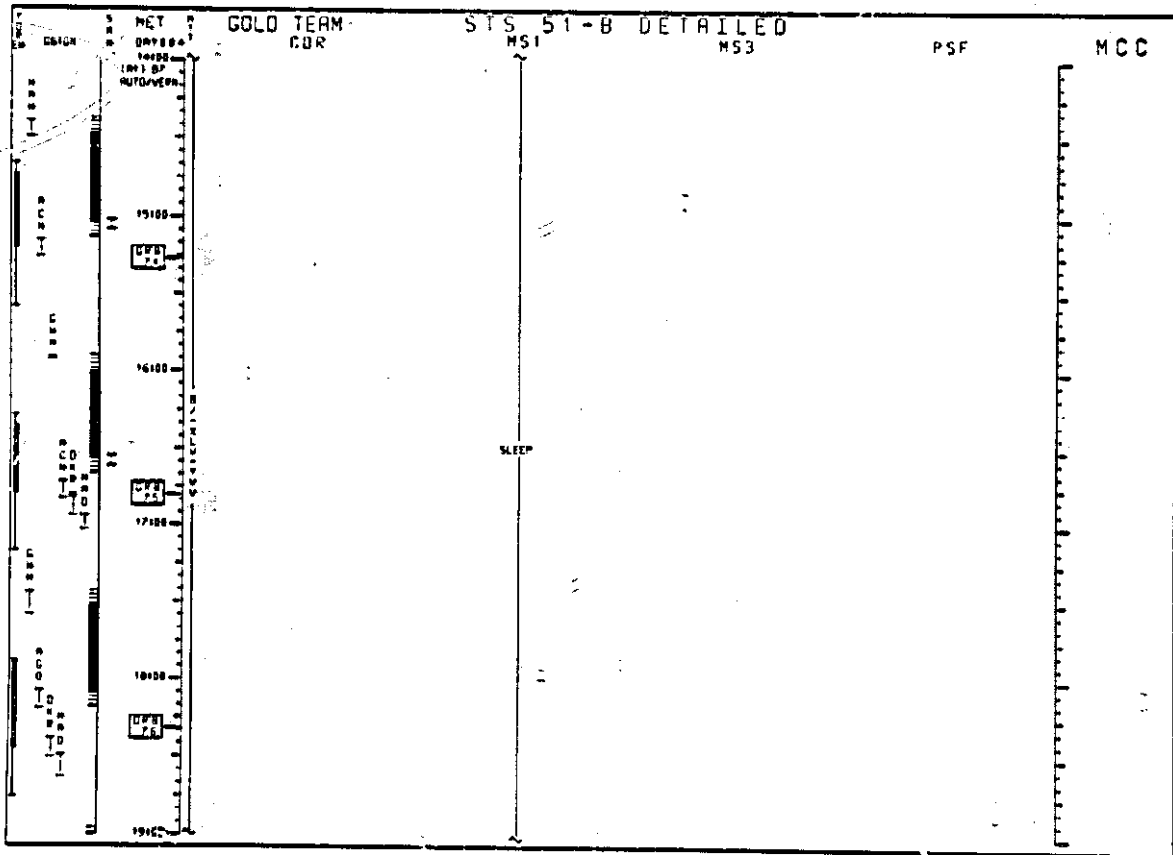




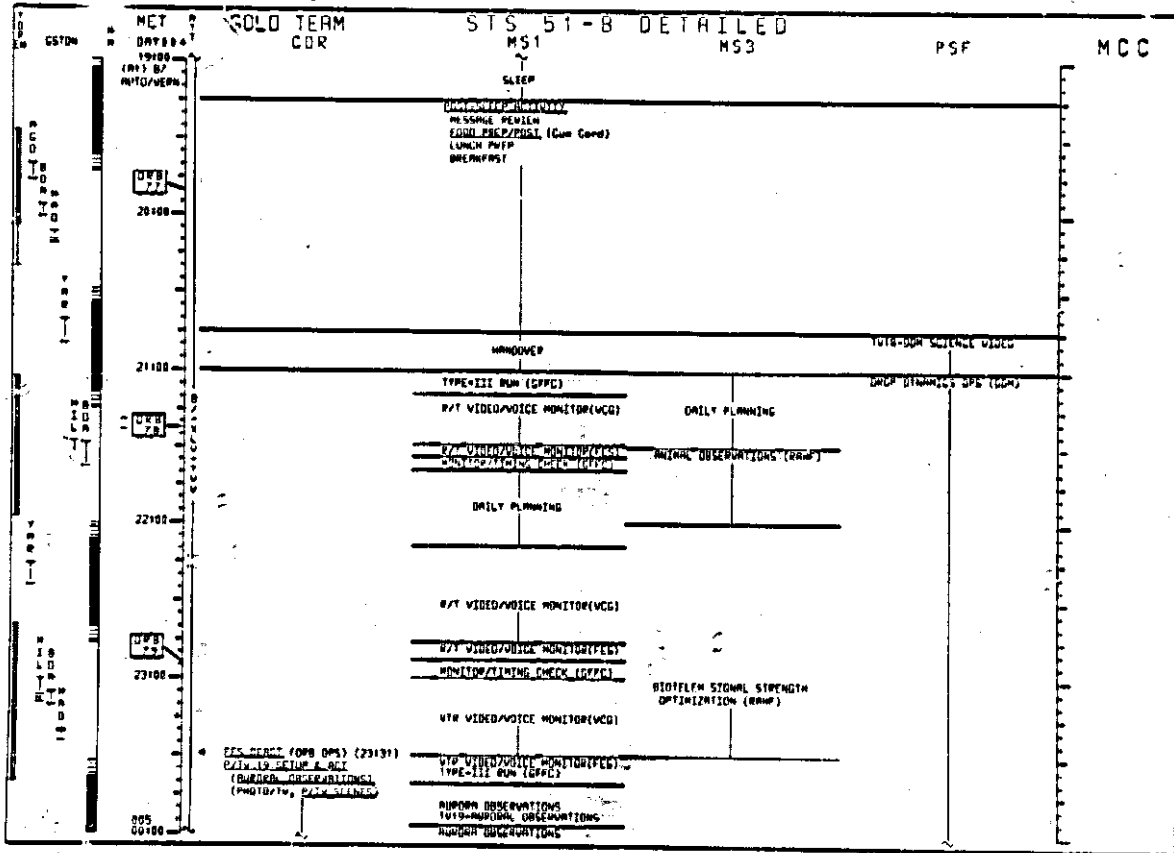












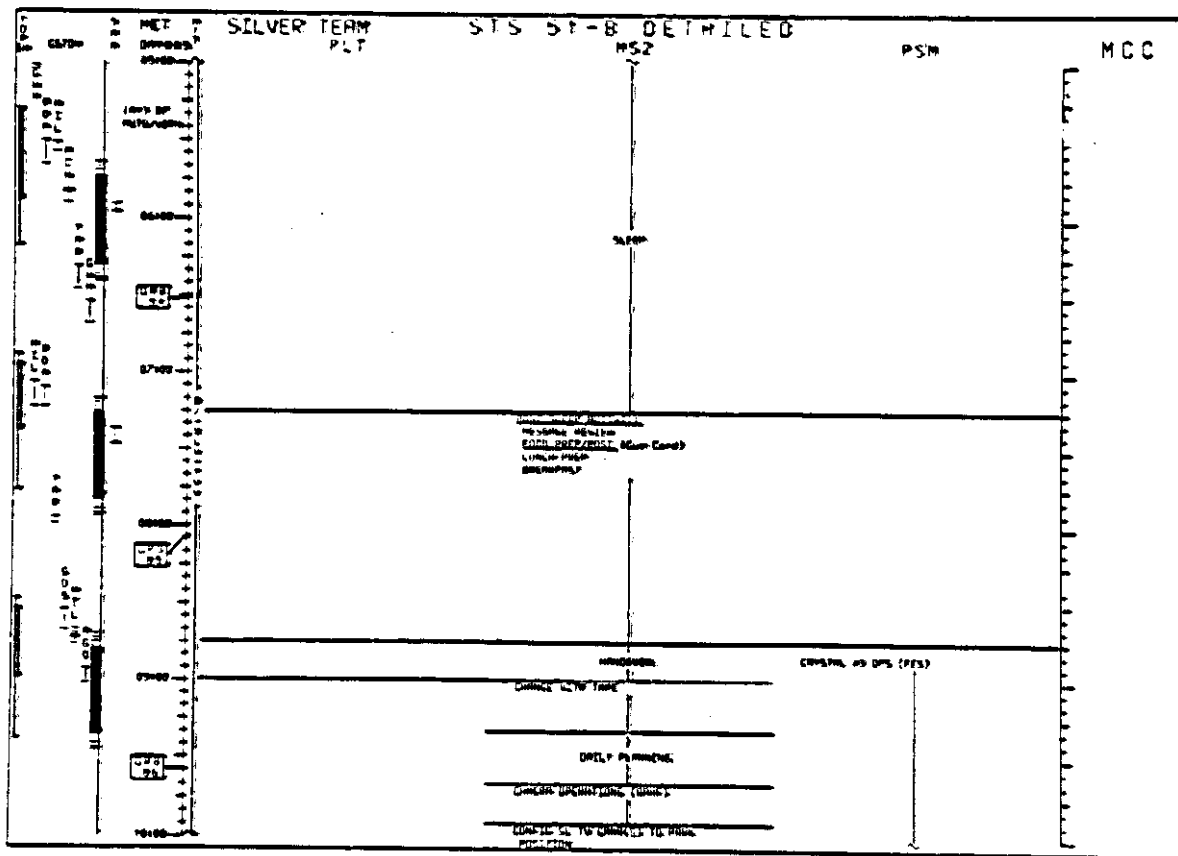




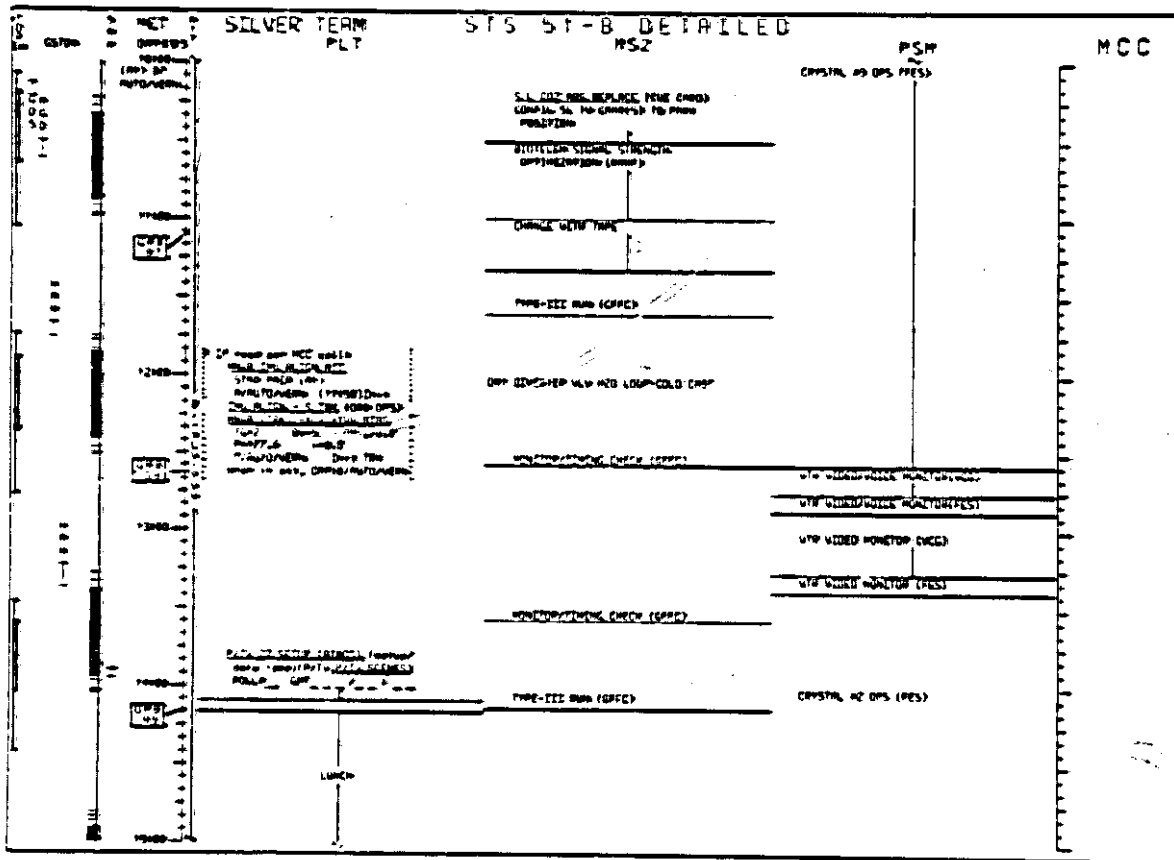


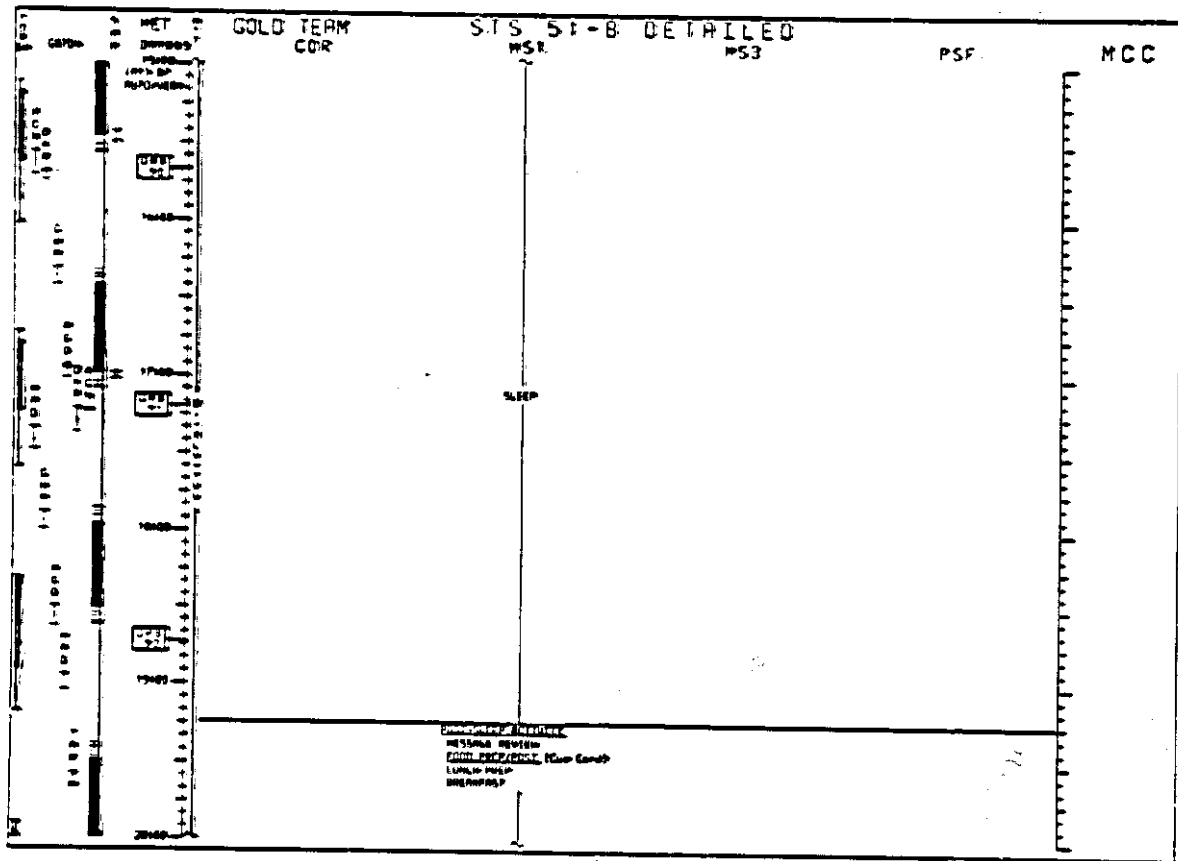


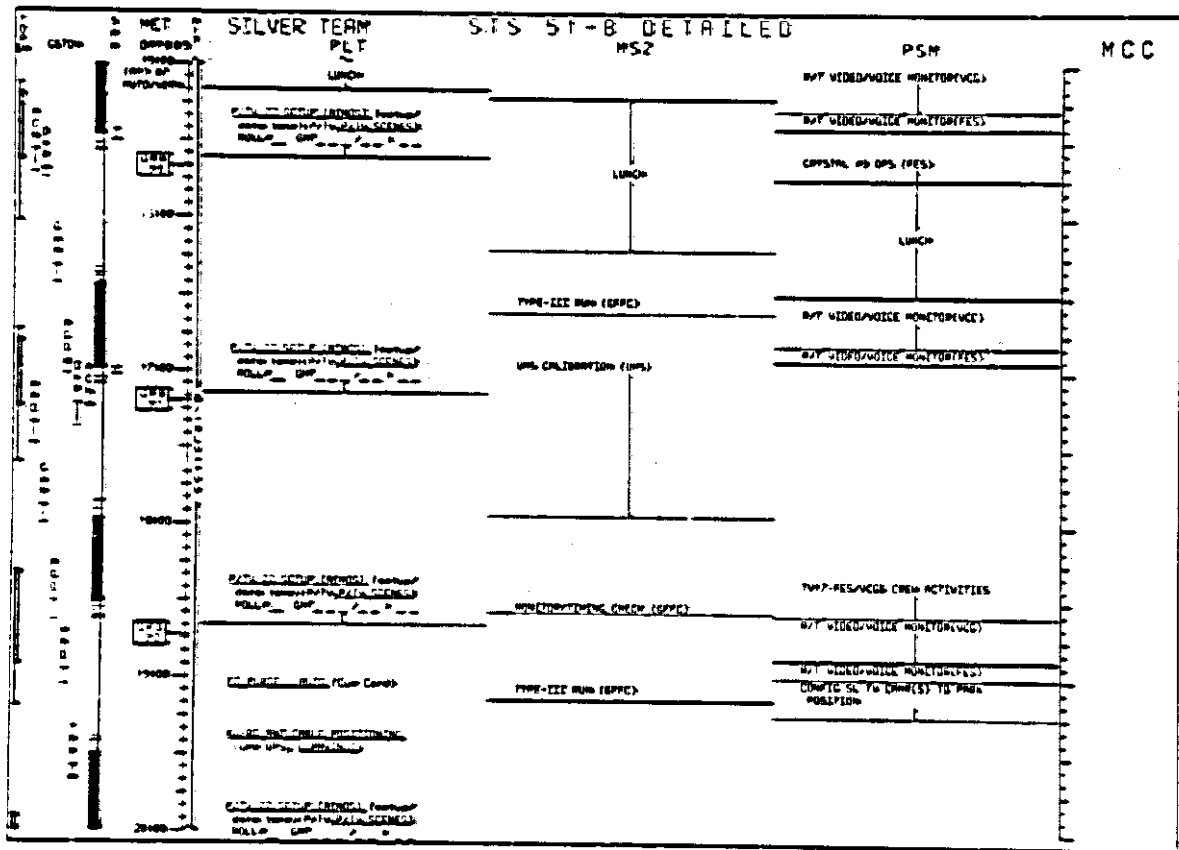










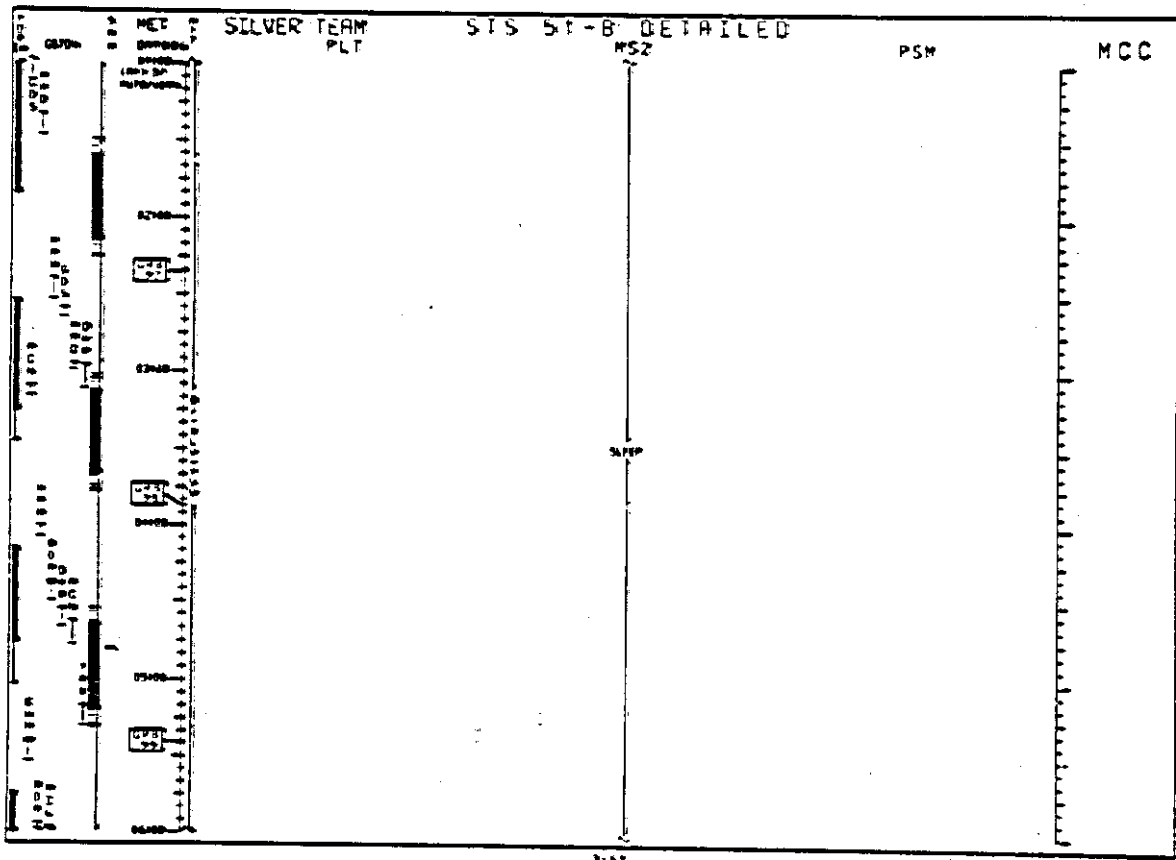










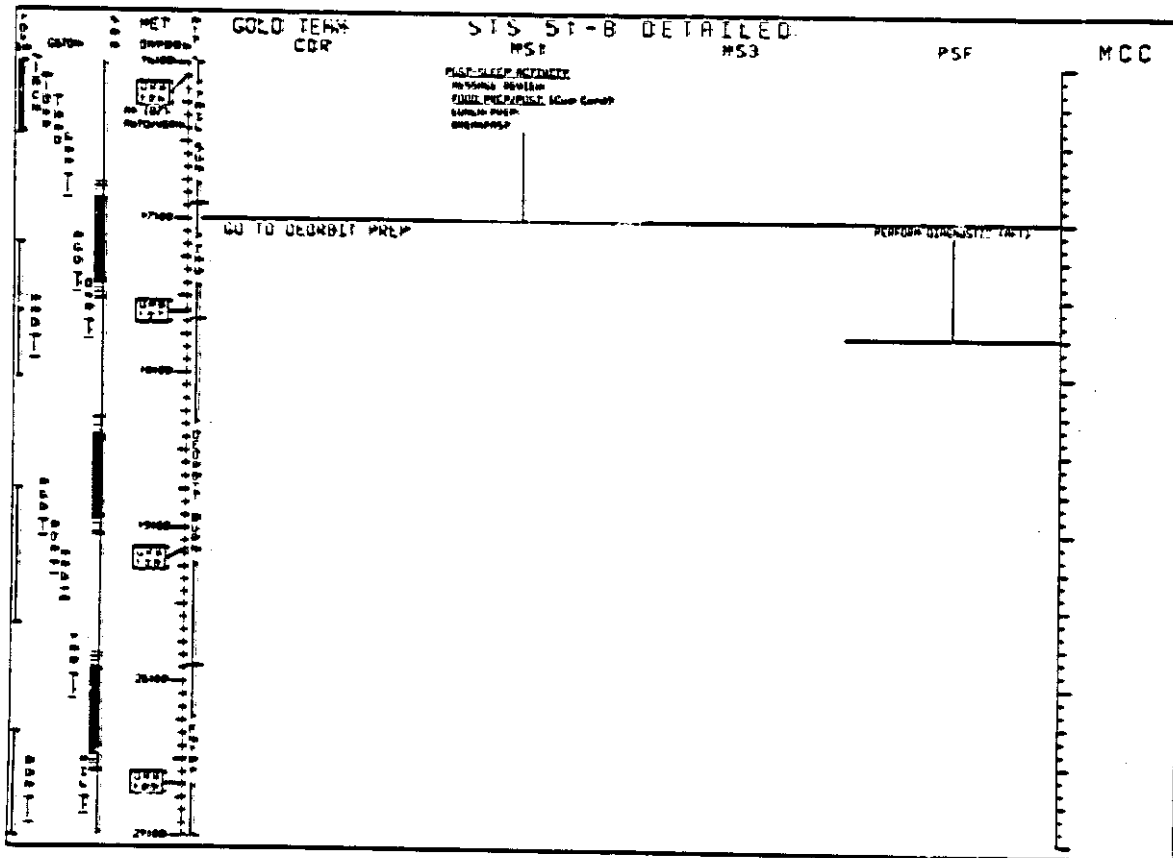














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CONSUMABLES CURVES

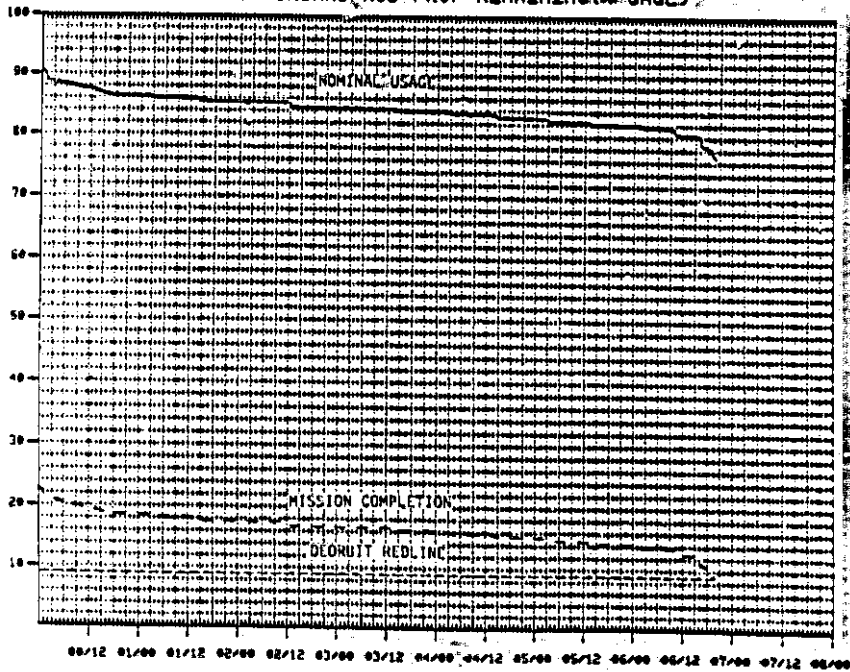
CONSUMABLES  
CURVES



P.M. KULESA/7 .CO  
DATA SUB: J-753 Add 5  
JSC-19466 CAP 1/23/85  
CHECKED BY: *[Signature]*

### 51-B FORWARD RCS PROP REMAINING(% GAGE)

FORWARD RCS PROP REMAINING

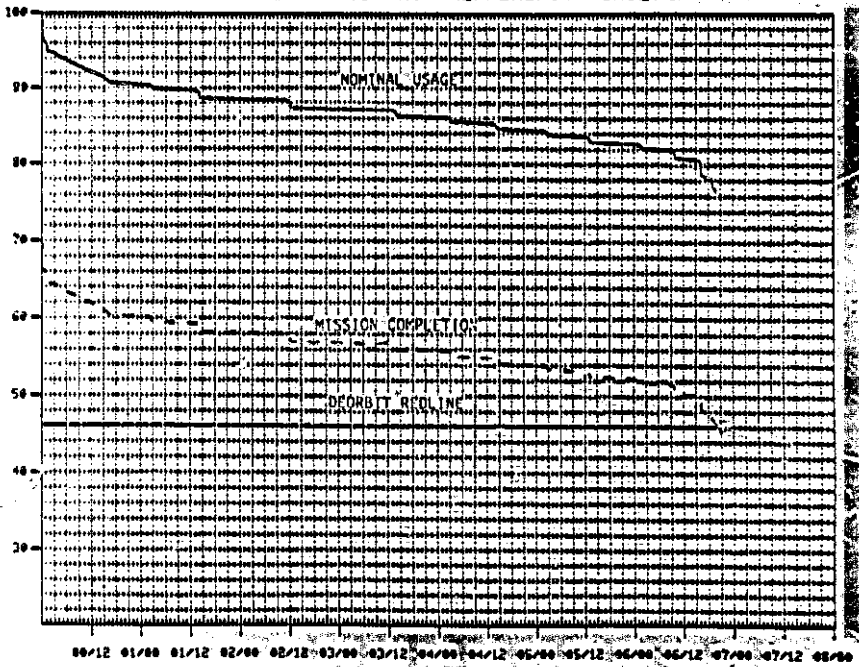


MISSION ELAPSED TIME IN DAYS/HOURS

P.M. KULESA/MDTSL  
DATA SUB: J-753 Add 5  
JSC-19466 CAP 1/23/85  
CHECKED BY *[Signature]*

### 51-B AFT RCS PROP REMAINING(% GAGE)

A  
T  
T  
R  
I  
B  
U  
T  
E  
S  
C  
A  
L  
E  
P  
R  
O  
P  
R  
E  
M  
A  
I  
N  
I  
N  
G



MISSION ELAPSED TIME IN DAYS/HOURS  
4-4

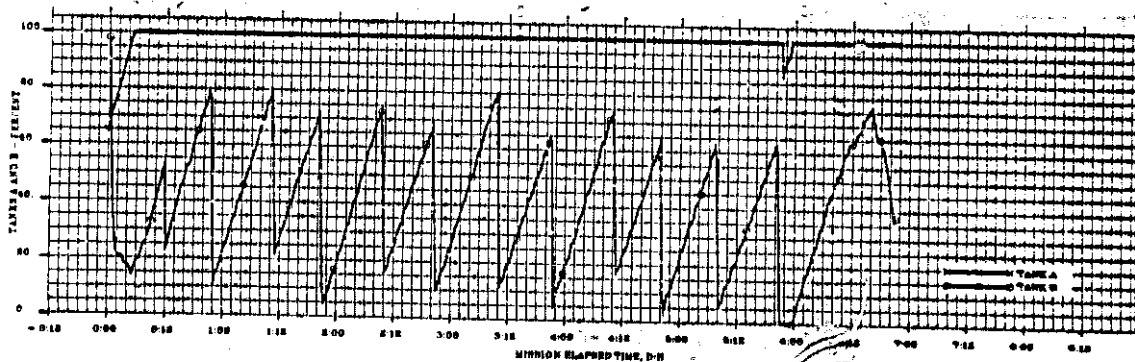
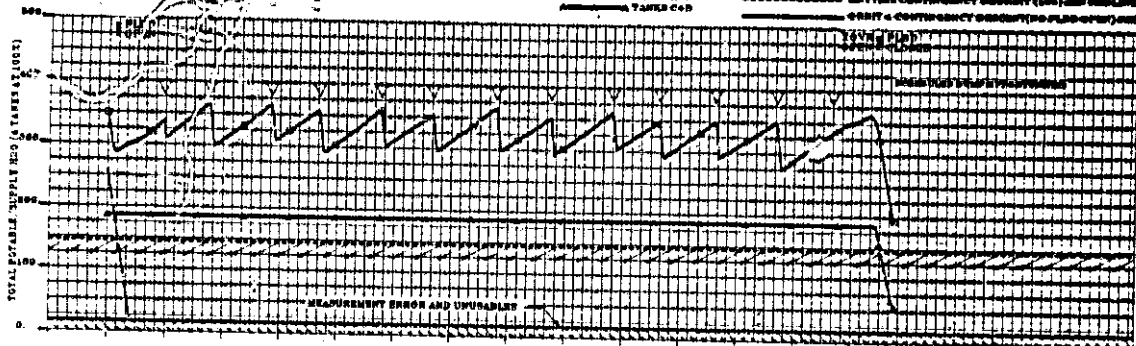
MISSION OPERATIONS DIRECTORATE - SYSTEMS DIVISION

M. J. BAIRD  
 INC. LINE (CAP) 18/12/00  
 DATA CONTINUED

TRANSIENT OFF-CYCLE  
 ANALYSIS DATE: 06/08/00

TAKE A  
 TAKE B

ATTITUDE CONTINGENCY (ACC) AND COLLISION  
 CONTINGENCY (CON) (FLIGHT/OPERATION)

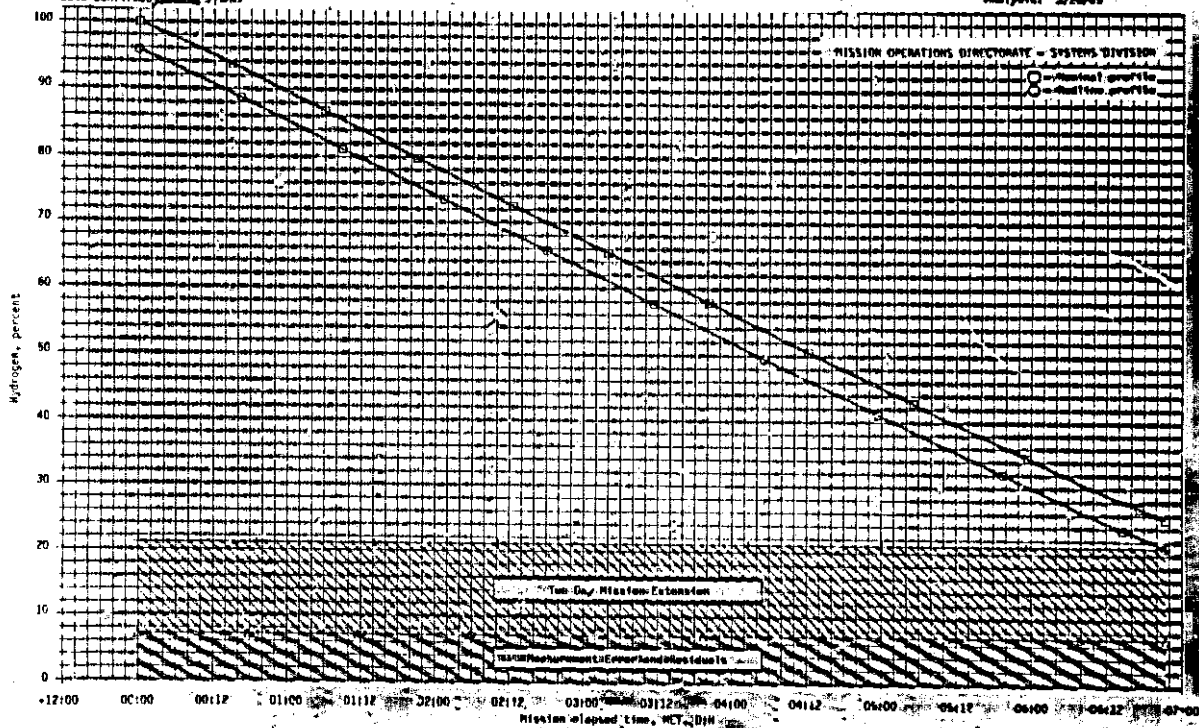


MISSION ELAPSED TIME, D-H

STS 31-B SUPPLY/WATER  
 443

S. Reig/DP6  
Data Source JSC-19446  
Data confirmed by *Chub J. J. J.*

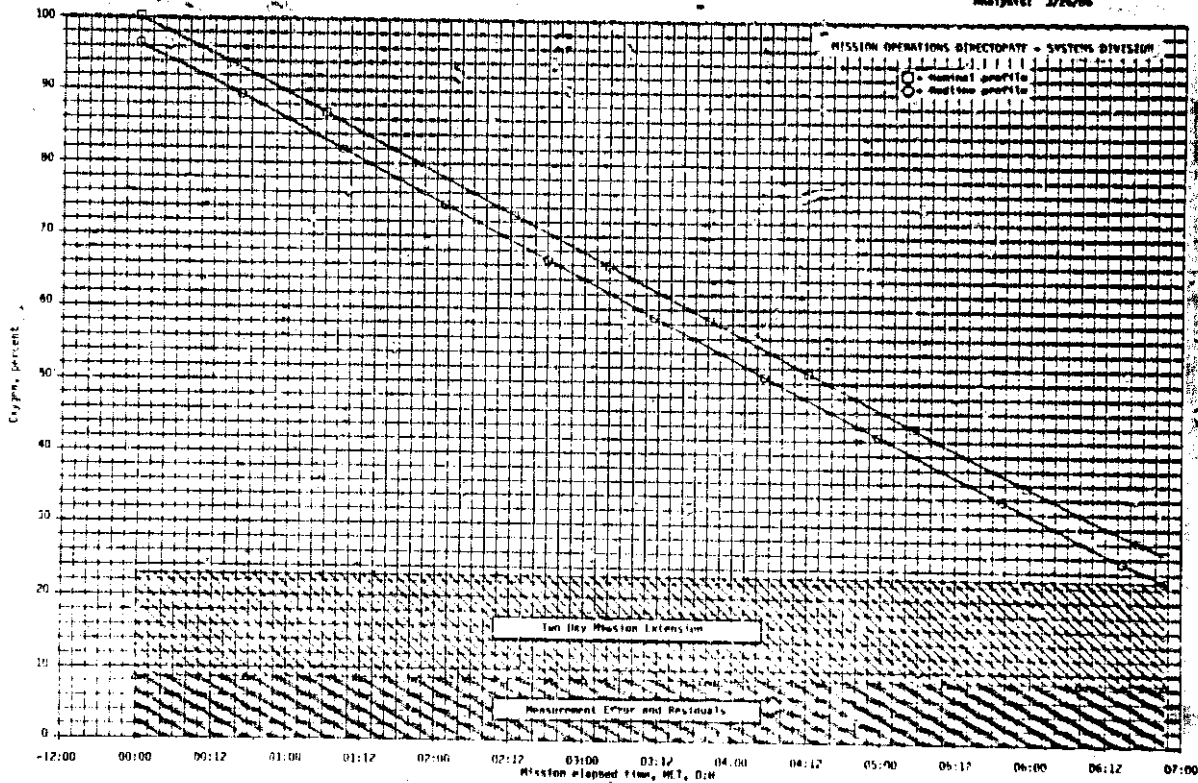
Trajectory OPP Cycle 3  
CAP: Basin, Run. A 12/21/64  
Analysis 1/26/65



Flight test cryogenic hydrogen profile.

3. M104/06  
Data Source JSC-18456  
Data confirmed 2/22/85

trajectory OFF Cycle 3  
CAP: Boris, Rev. A 12/21/84  
Analyst: 3/26/86



Flight 51-B cryogenic oxygen profile.

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

STS 51-B DAP BOOK

DAP A CONFIGURATIONS..... 5-2  
DAP B CONFIGURATIONS..... 5-3  
51-B DAP BOOK..... 5-4

DAP BOOK

**DAP A CONFIGURATIONS**

		A1*	A2	A3	A4	A5	A6
<b>TRANSLATION</b>							
PULSE	ft/sec	0.10	0.10	0.10	0.10	0.10	0.10
<b>ROTATION</b>							
DSC RT	NORM */sec	0.200	0.400	0.200	0.200	0.200	0.200
	VERN */sec	0.200	0.400	0.200	0.008	0.200	0.200
PULSE	NORM */sec	0.10	0.10	0.30	0.10	0.10	0.10
	VERN */sec	0.010	0.010	0.010	0.010	0.050	0.010
COMP	NORM */sec	.00	.00	.00	.00	.00	.00
	VERN */sec	.000	.000	.000	.000	.000	.000
<b>DEADBAND</b>							
ATI	NORM (deg)	5.000	1.00	5.00	1.00	5.00	5.00
	VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000
RATE	NORM */sec	0.20	0.20	0.20	0.20	0.20	0.20
	VERN */sec	.020	.020	.020	.010	.020	.020
<b>JET OPT</b>							
P		1	1	3	1	1	3
Y		1	1	3	3	1	3
<b>CNTL ACCEL</b>		0	0	0	0	0	0

\*1-Loaded OPS-2 DAP Configuration

**DAP 8 CONFIGURATIONS**

	B1*	B2	B3	B4	B5	B6	B7
<b>TRANSLATION</b>							
PULSE ft/sec	0.02	0.02	0.02	0.02	0.02	0.10	0.10
<b>ROTATION</b>							
DSC RT	NORM %/sec VERN %/sec	0.500 0.200	0.200 0.200	0.200 0.200	0.200 0.008	0.200 0.016	0.200 0.008
PULSE	NORM %/sec VERN %/sec	0.04 0.002	0.04 0.002	0.04 0.002	0.04 0.002	0.10 0.002	0.10 0.002
COMP	NORM %/sec VERN %/sec	.00 .000	.00 .000	.00 .000	.00 .000	.00 .000	.00 .000
<b>DEADBAND</b>							
ATT	NORM (deg) VERN (deg)	3.00 1.000	3.00 1.000	3.00 1.000	3.00 0.100	5.00 0.033	5.00 0.060
RATE	NORM %/sec VERN %/sec	0.20 .020	0.20 .020	0.20 .020	0.20 .010	0.20 .020	0.20 .010
<b>SET OPT</b>							
P		1	3	1	1	3	3
Y		1	3	1	3	3	3
CNTL ACCEL		0	0	0	0	0	0

\*1-loaded OPS-2 DAP Configuration

TOP  
FRONT COVER 'DAP BOOK'

# DAP BOOK



CAP/SI-8/O/BAS

UNIV 210		CAP/SI-8/O/BAS
TCY IS	<ul style="list-style-type: none"> <li>• Orbital Vehicle</li> <li>• Earth ctr</li> <li>• Earth tgt</li> <li>• Input CAT (+90)</li> <li>• LOR (+180) + + East)</li> <li>• ALT (+99.93nm)</li> <li>• S Sun ctr</li> <li>• S Celestial tgt</li> <li>• Input RA (0-359.99)</li> <li>• DEC (+90)</li> <li>• 11-10 Hrs Stars</li> </ul>	
BOOK VECT	<ul style="list-style-type: none"> <li>• 11</li> <li>• 12</li> <li>• 13</li> <li>• PIC (+/- below 11°)</li> <li>• Optional</li> <li>• Input P (0-359.99)</li> <li>• Input Q (0-359.99)</li> <li>• Input R (0-359.99)</li> </ul>	
NON ARTS	<ul style="list-style-type: none"> <li>• 1</li> <li>• 2</li> </ul>	
320 GAP CONF 10		
ENVS ACCEL	<ul style="list-style-type: none"> <li>• 0 Orbiter alone</li> </ul>	<ul style="list-style-type: none"> <li>• 1 Normal</li> <li>• 2 Base only</li> <li>• 3 Full only</li> </ul>

TOP  
BACK OF FRONT COVER  
'DAP BOOK'

(reduced copy)

TOP



RAP                      PURPOSE

- A1 - NOMINAL  
IMU ALIGN  
(LOSS OF VERN)
- A2 - PIC
- A3 - RCS HOT FIRE
- A4 - GG
- A5 - IMU ROTATION
- A6 - (LOSS OF VERN  
(TAIL ONLY))

CAP/SL-B/O/FIN



A1



TOP



DAPA1

PURPOSE

- NOMINAL  
IMU ALIGN  
(NOSE & TAIL)

A1

- 0.10 1 TRANSLATION  
PULSE
- 0.10 1 ROTATION  
BSC AT NORM
- 0.10 1 PULSE NORM
- 0.10 1 COMP VERN
- 0.10 1 BEADBAND  
ATT NORM
- 0.10 1 RATE NORM
- 1 11 M8 OP1 P
- 0 14 ENTL ACCEL

CAP/SL-B/O/FIN



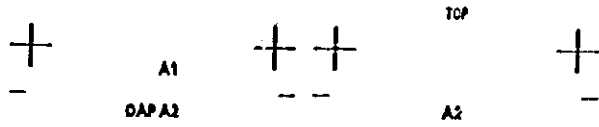
CAP/SL-B/O/BAS



A2



TOP

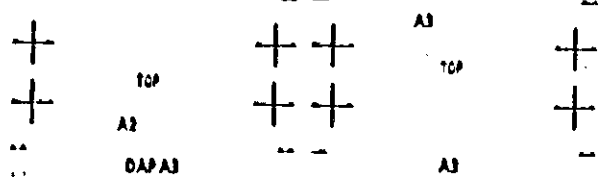


PURPOSE:  
PTC

TRANSLATION PULSE  
 ROTATION  
 BSC RE NORM  
 VERN  
 PULSE NORM  
 VERN  
 COMP NORM  
 VERN  
 DEADBAND  
 ATT NORM  
 VERN  
 RATE NORM  
 VERN  
 JET OP? P  
 CNTL ACCEL

CAP/BI-B/O/BAS

CAP/BI-B/O/BAS

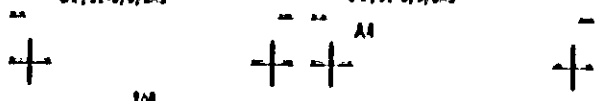


PURPOSE:  
RCS NOT FIRE

TRANSLATION PULSE  
 ROTATION  
 BSC RE NORM  
 VERN  
 PULSE NORM  
 VERN  
 COMP NORM  
 VERN  
 DEADBAND  
 ATT NORM  
 VERN  
 RATE NORM  
 VERN  
 JET OP? P  
 CNTL ACCEL

CAP/BI-B/O/BAS

CAP/BI-B/O/BAS



(reduced copy)

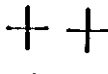


A3

DAP A4

PURPOSE:

CG



TOP



A4

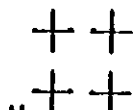
0-1-0	1	TRANSLATION PULSE
0-1-0	2	ROTATION OSC BY NORM
0-1-0	3	VERN
0-1-0	4	PULSE NORM
0-1-0	5	VERN
0-1-0	6	COMP NORM
0-1-0	7	VERN
0-1-0	8	DEADBAND ATT NORM
0-1-0	9	VERN
0-1-0	10	RATE NORM
0-1-0	11	VERN
	12	JET OFF P
	13	V
	14	CNTL ACCEL

CAP/51-8/0/BAS

CAP/51-8/0/BAS

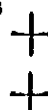


TOP



TOP

A3



DAP A3

PURPOSE:

EMU ROTATION

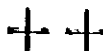
0-1-0	1	TRANSLATION PULSE
0-1-0	2	ROTATION OSC BY NORM
0-1-0	3	VERN
0-1-0	4	PULSE NORM
0-1-0	5	VERN
0-1-0	6	COMP NORM
0-1-0	7	VERN
0-1-0	8	DEADBAND ATT NORM
0-1-0	9	VERN
0-1-0	10	RATE NORM
0-1-0	11	VERN
	12	JET OFF P
	13	V
	14	CNTL ACCEL

CAP/51-8/0/BAS

CAP/51-8/0/BAS



TOP



A3



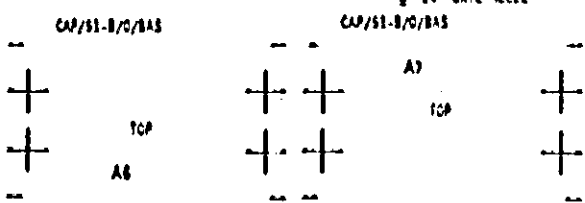
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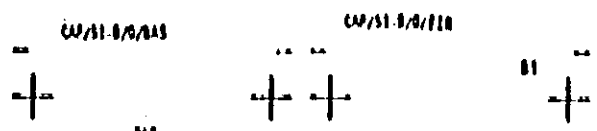


PURPOSE:  
LOSS OF VERN  
(TAIL ONLY)

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



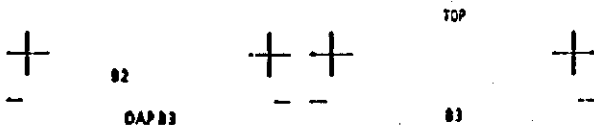
- GAP PURPOSE
- 01 - NOMINAL PACE (W) ALIGN CWS & RCS BURNS
  - 02 - LOSS OF VERN (TAIL ONLY)
  - 03 - LOSS OF VERN, SA ONLY
  - 04 - PAR DEPLOY PRISBEE DEPLOY
  - 05 - COAS CAL
  - 06 - TWP OPS
  - 07 - ATHOS OPS



(reduced copy)

S-B





PURPOSE:  
LOSS OF YERN  
(NOSE & TAIL)  
CG NVR

TRANSLATION  
PULSE 15 0-0 2

ROTATION  
DSC RT NORM 16 0-0 2  
YERN 17 0-0 2  
PULSE NORM 18 0-0 2  
YERN 19 0-0 2  
COMP NORM 20 0-0 2  
YERN 21 0-0 2

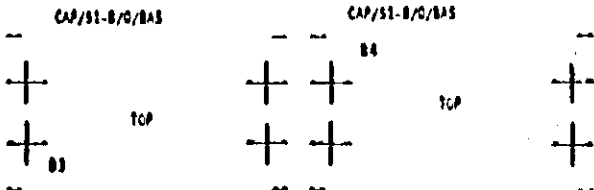
DEADBAND  
ATT NORM 22 0-0 2  
YERN 23 0-0 2

RATE NORM 24 0-0 2  
YERN 25 0-0 2

JET OPS P 26 1  
Y 27 1

ENTL ACCEL 28 0

CAP/SI-B/O/BAS



PURPOSE:  
RAM DEPLOY  
FRISBEE DEPLOY

TRANSLATION  
PULSE 15 0-0 2

ROTATION  
DSC RT NORM 16 0-0 2  
YERN 17 0-0 2  
PULSE NORM 18 0-0 2  
YERN 19 0-0 2  
COMP NORM 20 0-0 2  
YERN 21 0-0 2

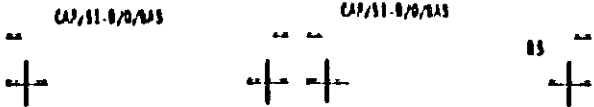
DEADBAND  
ATT NORM 22 0-0 2  
YERN 23 0-0 2

RATE NORM 24 0-0 2  
YERN 25 0-0 2

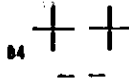
JET OPS P 26 1  
Y 27 1

ENTL ACCEL 28 0

CAP/SI-B/O/BAS



(reduced copy)



TOP



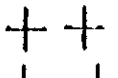
DAPBS

BS

PURPOSE:  
COAS CAL

TRANSLATION			
PULSE	15	0.0 2	
ROTATION			
BSC P1	NORM 16	0.0 0 0 0	
	VERN 17	0.0 0 0 0	
PULSE	NORM 18	0.0 0 0 0	
	VERN 19	0.0 0 0 0	
COMP	NORM 20	0.0 0 0 0	
	VERN 21	0.0 0 0 0	
DEADBAND			
ATT	NORM 22	0.0 0 0 0	
	VERN 23	0.0 0 0 0	
RATE	NORM 24	0.0 0 0	
	VERN 25	0.0 0 0	
JET OPT	P 26	0	
	V 27	0	
CNTL ACCEL	28	0	
CAP/S1-B/O/BAS A			

CAP/S1-B/O/BAS



BS



TOP

TOP

BS

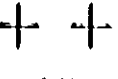
DAPBS

BS

PURPOSE:  
TYPE  
OPT

TRANSLATION			
PULSE	15	0.0 0	
ROTATION			
BSC AT	NORM 16	0.0 0 0 0	
	VERN 17	0.0 0 0 0	
PULSE	NORM 18	0.0 0 0 0	
	VERN 19	0.0 0 0 0	
COMP	NORM 20	0.0 0 0 0	
	VERN 21	0.0 0 0 0	
DEADBAND			
ATT	NORM 22	0.0 0 0 0	
	VERN 23	0.0 0 0 0	
RATE	NORM 24	0.0 0 0	
	VERN 25	0.0 0 0	
JET OPT	P 26	0	
	V 27	0	
CNTL ACCEL	28	0	
CAP/S1-B/O/BAS A			

CAP/S1-B/O/BAS A



BS



TOP

(reduced copy)

TOP

06

DAP 07

PURPOSE:  
ATMOS  
OPS

07

TRANSLATION		
PULSE	15	0.1 0
ROTATION		
DSC RT	NORM 16	0.1 0 0
	VERN 17	0.1 0 0
PULSE	NORM 18	0.1 0 0
	VERN 19	0.1 0 0
COMP	NORM 20	0.1 0 0
	VERN 21	0.1 0 0
DEADBAND		
ATT	NORM 22	0.1 0 0
	VERN 23	0.1 0 0
RATE	NORM 24	0.1 0 0
	VERN 25	0.1 0 0
JET OPT	P 26	1
	V 27	1
CNTL ACCEL	28	0

CAP/ST-B/O/BAS A

CAP/ST-B/O/BAS A

TOP

07

CAP/ST-B/O/BAS A

TOP

(reduced copy)

TOP  
BACK COVER 'DAP BOOK'



HOOK  
VELCRO

CAP/ST-8/0/BAS



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ATTITUDE  
TIMELINE

SIS SI-B ATTITUDE TIMELINE



ATTITUDE  
TIMELINE

Attitude Timeline

REF	MNVR OPTION		DAP	E/S	REMARKS	EVEAT
1 0-0110:00	TRK TGT=2 SV=3C 90.00, 0.00 GM=100.00	A1 AUTO NORM	DSC 0.200 SB AT 5.00 SB RT 0.20	EARTH 0 50 0 0	LVLH R=100 P= 0 Y= 0	-2LV +XVY
2 0-02:56:00 03:09:30	MNVR R+ 75.00 P+149.00 Y+344.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 157 0 41	-25T:21 -Y5T:29	IMU COAS (B1)
3 0-04:07:00 14:30 DAP 37	MNVR R+120.00 P+100.00 Y+ 51.90	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 50 0 315		TIRS-ATNOS
4 0-08:49:00 59:19 DAP 36	MNVR R+ 15.21 P+181.00 Y+332.36	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 161 0 10		VMFC01
5 0-10:27:00 39:20 DAP 36	MNVR R+230.97 P+217.02 Y+ 9.92	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 109 0 160		VMFC02
6 0-11:49:00 59:47	MNVR R+326.00 P+359.00 Y+311.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 07 0 130		TRIM BLN
7 0-12:30:00 39:22 DAP 36	MNVR R+181.20 P+183.00 Y+336.05	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 157 0 200		VMFC03
8 0-13:25:00 38:24	MNVR R+230.00 P+ 70.00 Y+309.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 122 0 201	-25T:27 -Y5T:54	IMU ALIGN (C1)
9 0-14:04:00 17:33 DAP 36	MNVR R+174.07 P+200.46 Y+ 9.92	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 115 0 215		VMFC04
10 0-15:24:00 40:43 DAP 36	MNVR R+242.70 P+ 24.00 Y+ 42.30	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 34 0 190		VMFC05
11 0-16:21:00 39:20 DAP 36	MNVR R+137.50 P+230.00 Y+310.70	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 122 0 246		VMFC06
12 0-17:54:00 18:03:03 DAP 37	TFF TGT=2 SV=5 (177.00, 0.00) GM=270.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 170 0 160	LVLH R= 50 P= 50 Y= 0	-2LV +XVY BIASED

ALL ATTITUDES IN MEAN OF 1950400

Attitude Timeline

MET	MNVR OPTION		DSP	E/S	REMARKS	EVENT
1 6/09:10:00 17:30	TRK TGT=2 SV=2(100.00, 0.00) CM= 0.00	A1 AUTO VERN	BSC 0.200 DB AT 1.00 DB RT 0.02	EARTH 0 100 0 0	LVLH P= 0 P= 90 Y= 0	MUSAT/GLOMR DEPLOY
2 6/10:20:00 35:00	TRK TGT=2 SV=3( 90.00, 0.00) CM=100.00	A1 AUTO VERN	BSC 0.200 DB AT 1.00 DB RT 0.02	EARTH 0 90 0 0	LVLH R=100 P= 0 Y= 0	-ZLV +XVV
3 6/15:20:00 20:54	TRK TGT=4 SV=5(104.00, 0.00) CM=270.00	A1 AUTO VERN	BSC 0.200 DB AT 1.00 DB RT 0.02	SUN 0 176 0 179	INRTL R=152 P=162 Y=316	-XSS
4 6/16:54:00 17:06:55	MNVR R=209.00 P=104.00 Y= 55.00	A1 AUTO VERN	BSC 0.200 DB AT 1.00 DB RT 0.02	SUN 0 00 0 141	-25T:20 -Y5T:17	IMU ALIGN
5 6/17:14:00 16:40	MNVR R=207.00 P=132.00 Y=333.00	B1 AUTO NORM	BSC 0.500 DB AT 3.00 DB RT 0.20	SUN 0 139 0 191	-25T:43 -Y5T:20	IMU VERIF
6 6/17:39:00 44:03	MNVR R=200.00 P=346.00 Y= 50.00	B1 AUTO NORM	BSC 0.500 DB AT 3.00 DB RT 0.20	SUN 0 17 0 327		DEGRAB BURN ATTITUDE
7 6/19:54:07	ONS IGNITION	0 AUTO 0	BSC 0.500 DB AT 3.50 DB RT 0.30			DEGRAB BURN

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CREW ACTIVITY PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

CREW..... 6-2

PAYLOADS..... 6-2

CAP NOTES

## A. CREW

1. There are 7 crewmen onboard divided into 2 teams: the SILVER team consisting of the PLT, MS2, and PSM (materials processing expert) and the GOLD team consisting of the CDR, MS1, MS3, and PSF (fluids expert). Each team works 12 hours, then is off duty for 12 hours.
2. Launch and Entry Seating - The CDR and PLT will occupy their normal flight deck seats. The MS2 (Thagard) will assume the role of Flight Engineer and sit on the flight deck behind and between the CDR and PLT. The MS1 (Lind) will sit on the flight deck to the right of the MS2. The MS3 and PSs will sit on the middeck.
3. The crewmen responsible for performing an EVA, should one become necessary, are: PLT and MS2.
4. The crewmen are assigned to the following tasks:
  - CDR (Overmyer) - ATMOS PHOTOS, AURORAL PHOTOS
  - PLT (Gregory) - ATMOS PHOTOS, GAS SATELLITE DEPLOYS (ORBITER CONTROL)
  - MS1 (Lind) - SI ACT/DEACT, FES/VCGS, VWFC, AURORAL OBS, MED DSOS
  - MS2 (Thagard) - SI ACT/DEACT, VWFC, GAS SATELLITE DEPLOYS (prime), MED DSOS
  - MS3 (Thornton) - RAHF, UMS ACT/DEACT, MED DSOS

All P/L crew - GFC, MCG, ATMOS, IONS, UMS

For APF, the PSs are the subjects and MS1 and MS3 are controls

## B. PAYLOADS

The following paragraphs give a brief description of the payloads of Spacelab 3. Also, in each case this description is followed by a list of Marshall Space Flight Center model numbers involving crew action (as seen in the summary timeline) and their corresponding descriptions.

## 1. Fluid Experiment System (FES)

This system is used to grow triglycine sulfate (TGS) crystals by removing heat from a saturated solution through a seed crystal. The purposes of this investigation are: to develop a technique for crystal growth in microgravity, to study the growth environment and relate it to growth behavior, and to determine how microgravity influences the properties of the resultant crystal.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
FES-ACT	EQUIP ACTIVATION
FES-1	CRYSTAL #1 OPS
FES-2	CRYSTAL #2 OPS
FES-3	CRYSTAL #3 OPS
FES-MON1	CREW MON - EARLY PHASE
FES-MON2	CREW MON - LATE PHASE
FES-MON3	

## 2. Vapor Crystal Growth System (VCGS)

The purpose of this experiment is to grow more-perfect crystals of mercuric iodide. They will be grown by vaporization and recondensation at 120° C in a special furnace and the growth process will be reversed if polycrystalline growth begins. These crystals should have fewer defects because of the microgravity environment.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
VCG	ACTIVATE/DEACTIVATE VCGS
VCG-MON1	CREW MON - EARLY PHASE
VCG-MON2	CREW MON - LATE PHASE
VCG-MON3	

## 3. Mercuric Iodide Crystal Growth (MICG)

The purpose of this experiment is to grow near-perfect single crystals of mercury iodide. The process will be carried out in a two-zone furnace with sensors to collect temperature data. The investigators hope to find that the effects of convection are greatly reduced in the microgravity environment.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
MICG	INITIATE MICG/CHNG CRYSTAL CARTRIDGE

## 4. Dynamics of Rotating and Oscillating Free Drops (DROP)

The main objectives of this experiment are to study the equilibrium figures of a rotating drop and to study the large-amplitude oscillations of a liquid drop. Another objective is to establish the advantages of conducting future drop and bubble investigations in space using the Drop Dynamics Module (DDM).

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
DDM-1/2	FIRST TWO RUNS
DDM-0/1	SUBSEQUENT RUNS

### 5. Geophysical Fluid Flow Cell (GFFC)

The purpose of this experiment is to simulate global atmospheric flows of rotating planets and stars in hopes of answering questions about their mechanics. The investigator is trying to identify those external conditions of fluid viscosity, rotation, gravity, etc., which determine the mode of flow. Simulation will be accomplished with the use of a dielectric fluid between two concentric, rotating electrically conductive spherical shells.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
GFFC-1	LONG DURATION RUN OPS
GFFC-2	SHORT DURATION RUN OPS
GFFC-3	SHORT RUN WITH CREW INTERVENTION
GFFC-FLM	FILM CHANGE
GFFC-MON	TIMING CHECK

### 6. Atmospheric Trace Molecules Spectroscopy (ATMOS)

The ATMOS investigation is designed to collect data on the chemistry and physics of Earth's upper atmosphere. It should determine the compositional structure of the upper atmosphere, and it should provide information useful in the design of future atmospheric studies. The investigation will use infrared absorption spectroscopy and will read sunlight that passes through the upper atmosphere with an interferometer.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
70nm/22R	SUNRISE PHOTOGRAPHY
70nm/22S	SUNSET PHOTOGRAPHY

### 7. Research Animal Holding Facility - Verification Test (RAHF-VI)

The objective of this investigation is to verify the performance of the RAHF. The RAHF is designed to support animals from rodents to small primates. It will house four monkeys and twenty-four rats. The animals will be monitored during the mission, and the food and water used will be recorded.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
ARC-000B	CONFIGURE FOR DEORBIT
ARC-F01F	DEMS SWITCH SAFING
ARC-F02A	ANIMAL OBSERVATIONS
ARC-F02C	CONDENSATION BOTTLE CHECK/CHANGE
ARC-F02D	CAMERA OPS
ARC-F02E	FOOD TRAY CHANGEOUT
ARC-F02F	WASTE TRAY CHANGEOUT
ARC-F02H	TEMP RESTRAINT OPS
ARC-F02K	BIOTELEMETRY SIGNAL OPTIMIZATION
ARC-PREP	CONFIGURE FOR ORBIT

### 8. Urine Monitoring Investigation (UMI)

The primary objectives of the UMI are: verify the operation of the Urine Monitoring System (UMS), perform inflight calibration of the UMS, develop a procedure for measuring crew water intake, and verify a system of urine sample collection. The investigation will involve recording water intake of crewmembers from the galley and water supply. It will also use the UMS to measure urine volume of each crewmember and collect samples on two crewmembers.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
-------------------	--------------------------

UMS-OPS	UMS ACT/DEACT
UMS-CAL	UMS CALIBRATION

### 9. Autogenic Feedback Training (AFT)

AFT is designed to help crewmembers overcome the effects of Zero-Gravity Motion Sickness. The crewmembers receive extensive preflight autogenic feedback training. Then they practice on orbit and during motion sickness attacks. Crewmembers will wear monitoring instruments and data recorders, and feedback displays will be used.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
-------------------	--------------------------

AFT	CHANGE CASSETTE/PERFORM DIAGNOSTIC SCALE
ON AFT	PUT ON AFT GARMENT AT START OF SHIFT
OFF AFT	TAKE OFF AFT GARMENT AT END OF SHIFT

### 10. Ionization States of Solar and Galactic Cosmic Ray Heavy Nuclei (IONS)

This experiment is designed to study the low-energy cosmic ray ions of C, N, O, Ne, Ca, and Fe. The detector system consists of layers of plastics that show a trail of damage after being penetrated by cosmic rays. Study of these trails on the ground gives data as to the energies of the ions in the cosmic rays.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
-------------------	--------------------------

IONS	IONS EXPT OPS
------	---------------

### 11. Very Wide Field Camera (VMFC)

This is a reflight of the payload flown on Spacelab 1. It will make a very general UV survey of a large part of the celestial sphere. The camera operates in both the photometric and spectrometric modes.



<u>C MODEL</u>	<u>MODEL DESCRIPTION</u>
YWFC	SETUP AND OPS OF CAMERA IN SAL
YWFC INSTALL	PLACING OF YWFC INTO SAL
YWFC OUTGASS	ALLOWANCE TIME FOR OUTGASSING OF THE YWFC
YWFC STOW	REMOVAL OF YWFC FROM SAL

## 12. Aurora Observation

Observations of the high-latitude aurora will be made by eye, by TV, and by photography.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
AURORA	AURORA OBSERVATION TIME

## 13. Television and Photography

The following list describes the television and photography scenes that are payload related.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
TV01	INITIAL SPACELAB INGRESS
TV02	RAWF TOUR
TV03	YCG OPS
TV04	OGM OPS
TV05	FES OPS
TV06	RAWF CONDENSATE BOTTLE CHANGE
TV07	RAT FOOD/WASTE MAINTENANCE
TV08	MONKEY FOOD/WASTE MAINTENANCE
TV09	RAWF TEMPORARY RESTRAINTS
TV10	ANIMAL OBSERVATION
TV13	TV13 - PRESS CONFERENCE
TV14	TV14 - SPACELAB DEACTIVATION AND EGRESS
TV15	SAL/YWFC OPS
TV16	YWFC EXTENSION
TV17	FES OR YCG OPS
TV18	OGM OPS
TV19	AURORA OBSERVATIONS
TV20	SPACELAB FUNNEL OPS
TV21	PAYLOAD RAT VIEWS
TV23	FES PROCEDURES
16mm/03	YCG OPS
16mm/07	RAT FOOD MAINTENANCE
16mm/08	MONKEY WASTE TRAY OPS
35mm/03	YCG OPS
35mm/07	RAT FOOD MAINTENANCE
35mm/08	MONKEY FOOD/WASTE MAINTENANCE
35mm/19	AURORA OBSERVATIONS

## 14. Other

These are other payload-related activities not directly associated with a particular payload.

AIR SAMPLE  
SAL FORCE GAUGE TEST





**BASIC REV-A**

# Flight Data File Crew Activity Plan

## STS 51-B

Spacelab 3

Mission Operations Directorate  
Operations Division

Baso, Revision A  
December 21, 1984

EVENT	GMT		
Launch	17:55	Thu	January 17
Press Conference	05:10	Mon	January 21
MUSAT Deploy	03:30	Thu	January 24
Landing - KSC	14:55	Thu	January 24

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

MISSION OPERATIONS DIRECTORATE


STS 51-B CREW ACTIVITY PLAN  
SPACELAB 3

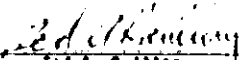
BASIC, REVISION A  
December 21, 1984

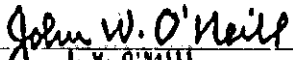
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Chief, Operations Division

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted on standard JSC form 482 to OMI/IDF Manager, Bldg 4, Room 352, 713-483-2868.

Comments concerning this document may be addressed to OMI/Jerry Shinkle Bldg 4, Pm 163A, 713-483-2201.

Changes to the distribution list should be submitted in writing to OMI/Gwen Butler, Bldg 4, Pm 373, 713-483-5224.

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CAP-257  
CAP-258  
CAP-260  
CAP-263A  
CAP-265  
CAP-269  
CAP-272  
CAP-278  
CAP-280  
CAP-281  
CAP-284  
CAP-286

Incorporates DN No:  
CAP-01  
CAP-02  
CAP-03  
CAP-04  
CAP-05  
CAP-07  
CAP-08  
CAP-09

#### ACKNOWLEDGMENTS

The following people contributed significantly in preparing the 51-B Crew Activity Plan:

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11  
STS 51-B CREW ACTIVITY PLAN

**LIST OF EFFECTIVE PAGES**

BASIC 09/13/84

REV A 12/21/84

i	CAP/51-B/BAS A	3-8	CAP/51-B/BAS A
ii	CAP/51-B/BAS A	3-9	CAP/51-B/BAS A
iii	CAP/51-B/BAS A	3-10	CAP/51-B/BAS A
iv	CAP/51-B/BAS A	3-11	CAP/51-B/BAS A
v	CAP/51-B/BAS A	3-12	CAP/51-B/BAS A
vi	CAP/51-B/BAS A	3-13	CAP/51-B/BAS A
vii	CAP/51-B/BAS A	3-14	CAP/51-B/BAS A
viii	CAP/51-B/BAS A	3-15	CAP/51-B/BAS A
1-1	CAP/51-B/BAS A	3-16	CAP/51-B/BAS A
1-2	CAP/51-B/BAS A	3-17	CAP/51-B/BAS A
1-3	CAP/51-B/BAS A	3-18	CAP/51-B/BAS A
1-4	CAP/51-B/BAS A	3-19	CAP/51-B/BAS A
2-1	CAP/51-B/BAS A	3-20	CAP/51-B/BAS A
2-2	CAP/51-B/BAS A	3-21	CAP/51-B/BAS A
2-3	CAP/51-B/BAS A	3-22	CAP/51-B/BAS A
2-4	CAP/51-B/BAS A	3-23	CAP/51-B/BAS A
2-5	CAP/51-B/BAS A	3-24	CAP/51-B/BAS A
2-6	CAP/51-B/BAS A	3-25	CAP/51-B/BAS A
2-7	CAP/51-B/BAS A	3-26	CAP/51-B/BAS A
2-8	CAP/51-B/BAS A	3-27	CAP/51-B/BAS A
2-9	CAP/51-B/BAS A	3-28	CAP/51-B/BAS A
2-10	CAP/51-B/BAS A	3-29	CAP/51-B/BAS A
2-11	CAP/51-B/BAS A	3-30	CAP/51-B/BAS A
2-12	CAP/51-B/BAS A	3-31	CAP/51-B/BAS A
2-13	CAP/51-B/BAS A	3-32	CAP/51-B/BAS A
2-14	CAP/51-B/BAS A	3-33	CAP/51-B/BAS A
2-15	CAP/51-B/BAS A	3-34	CAP/51-B/BAS A
2-16	CAP/51-B/BAS A	3-35	CAP/51-B/BAS A
2-17	CAP/51-B/BAS A	3-36	CAP/51-B/BAS A
2-18	CAP/51-B/BAS A	3-37	CAP/51-B/BAS A
2-19	CAP/51-B/BAS A	3-38	CAP/51-B/BAS A
2-20	CAP/51-B/BAS A	3-39	CAP/51-B/BAS A
2-21	CAP/51-B/BAS A	3-40	CAP/51-B/BAS A
2-22	CAP/51-B/BAS A	3-41	CAP/51-B/BAS A
2-23	CAP/51-B/BAS A	3-42	CAP/51-B/BAS A
2-24	CAP/51-B/BAS A	3-43	CAP/51-B/BAS A
2-25	CAP/51-B/BAS A	3-44	CAP/51-B/BAS A
2-26	CAP/51-B/BAS A	3-45	CAP/51-B/BAS A
2-27	CAP/51-B/BAS A	3-46	CAP/51-B/BAS A
2-28	CAP/51-B/BAS A	3-47	CAP/51-B/BAS A
2-29	CAP/51-B/BAS A	3-48	CAP/51-B/BAS A
2-30	CAP/51-B/BAS A	3-49	CAP/51-B/BAS A
3-1	CAP/51-B/BAS A	3-50	CAP/51-B/BAS A
3-2	CAP/51-B/BAS A	3-51	CAP/51-B/BAS A
3-3	CAP/51-B/BAS A	3-52	CAP/51-B/BAS A
3-4	CAP/51-B/BAS A	3-53	CAP/51-B/BAS A
3-5	CAP/51-B/BAS A	3-54	CAP/51-B/BAS A
3-6	CAP/51-B/BAS A	3-55	CAP/51-B/BAS A
3-7	CAP/51-B/BAS A	3-56	CAP/51-B/BAS A

CAP/51-B/BAS A



3-57..... CAP/51-B/BAS A  
3-58..... CAP/51-B/BAS A  
3-59..... CAP/51-B/BAS A  
3-60..... CAP/51-B/BAS A  
3-61..... CAP/51-B/BAS A  
3-62..... CAP/51-B/BAS A  
3-63..... CAP/51-B/BAS A  
3-64..... CAP/51-B/BAS A  
3-65..... CAP/51-B/BAS A  
3-66..... CAP/51-B/BAS A  
3-67..... CAP/51-B/BAS A  
3-68..... CAP/51-B/BAS A  
4-1..... CAP/51-B/BAS A  
4-2..... CAP/51-B/BAS A  
4-3..... CAP/51-B/BAS A  
4-14..... CAP/51-B/BAS A  
5-1..... CAP/51-B/BAS A  
5-2..... CAP/51-B/BAS A  
5-3..... CAP/51-B/BAS A  
5-4..... CAP/51-B/BAS A  
6-1..... CAP/51-B/BAS A  
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6-3..... CAP/51-B/BAS A  
6-4..... CAP/51-B/BAS A  
6-5..... CAP/51-B/BAS A  
6-6..... CAP/51-B/BAS A  
6-7..... CAP/51-B/BAS A  
6-8..... CAP/51-B/BAS A  
6-9..... CAP/51-B/BAS A  
6-10..... CAP/51-B/BAS A

STS 51-B DAP CUE CARDS

DAP Book Front Cover.....	4-4	CAP/51-B/O/BAS
UNIV FTG (Back of DAP Book Front Cover).....	4-4	CAP/51-B/O/BAS
DAP A TOC.....	4-5	CAP/51-B/O/BAS
DAP A1.....	4-5	CAP/51-B/O/BAS
A1.....	4-5	CAP/51-B/O/BAS
DAP A2.....	4-6	CAP/51-B/O/BAS
A2.....	4-6	CAP/51-B/O/BAS
DAP A3.....	4-6	CAP/51-B/O/BAS
A3.....	4-6	CAP/51-B/O/BAS
DAP A4.....	4-7	CAP/51-B/O/BAS
A4.....	4-7	CAP/51-B/O/BAS
DAP A5.....	4-7	CAP/51-B/O/BAS
A5.....	4-7	CAP/51-B/O/BAS
DAP A6.....	4-8	CAP/51-B/O/BAS
A6.....	4-8	CAP/51-B/O/BAS
Blank.....	4-8	CAP/51-B/O/BAS
DAP B TOC.....	4-8	CAP/51-B/O/BAS
DAP B1.....	4-9	CAP/51-B/O/BAS
B1.....	4-9	CAP/51-B/O/BAS
DAP B2.....	4-9	CAP/51-B/O/BAS
B2.....	4-9	CAP/51-B/O/BAS
DAP B3.....	4-10	CAP/51-B/O/BAS
B3.....	4-10	CAP/51-B/O/BAS
DAP B4.....	4-10	CAP/51-B/O/BAS
B4.....	4-10	CAP/51-B/O/BAS
DAP B5.....	4-11	CAP/51-B/O/BAS
B5.....	4-11	CAP/51-B/O/BAS A
DAP B6.....	4-11	CAP/51-B/O/BAS A
B6.....	4-11	CAP/51-B/O/BAS A
DAP B7.....	4-12	CAP/51-B/O/BAS A
B7.....	4-12	CAP/51-B/O/BAS A
Blank.....	4-12	CAP/51-B/O/BAS A
DAP Book (Back Cover).....	4-13	CAP/51-B/O/BAS

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CONTENTSPAGE

INTRODUCTION.....	vii
51-B OVERVIEW.....	1-1
SUMMARY TIMELINE.....	2-1
DETAILED TIMELINE.....	3-1
SILVER TEAM FLT DAY 1.....	3-3
FLT DAY 2.....	3-7
FLT DAY 3.....	3-15
FLT DAY 4.....	3-25
FLT DAY 5.....	3-35
FLT DAY 6.....	3-43
FLT DAY 7.....	3-53
FLT DAY 8.....	3-63
GOLD TEAM FLT DAY 1.....	3-2
FLT DAY 2.....	3-10
FLT DAY 3.....	3-18
FLT DAY 4.....	3-28
FLT DAY 5.....	3-38
FLT DAY 6.....	3-48
FLT DAY 7.....	3-56
FLT DAY 8.....	3-66
51-B DAP BOOK.....	4-1
51-B ATTITUDE TIMELINE.....	5-1
CREW ACTIVITY PLAN NOTES.....	6-1

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## INTRODUCTION

The 51-B Crew Activity Plan is the flight data article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry checklists. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the 51-B Flight Requirements Document (Revision 8, October 1984).

The flight profile (OFP Cycle 2 trajectory data) used for this Crew Activity Plan is for a launch date of January 17, 1985. The official launch date is April 1985.

This edition agrees with the January Payload CAP (PCAP) produced by the Marshall Space Flight Center (MSFC).

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2

51-B OVERVIEW



OVERVIEW

FLIGHT		515 41-8		EDITION		BASIC, REV 4		PUB. DATE		12/21/84	
S2L+	POST INSERTION	PSA	SLEEP (N)	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC
GOLD	POST INSERTION	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC
MET 1000											
S2L+	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
GOLD	PSA	SLEEP (P)	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
MET 1100											
S2L+	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
GOLD	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
MET 1200											
S2L+	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
GOLD	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
MET 1300											
S2L+	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC
GOLD	PSA	SLEEP	PSA	WFC	WFC	WFC	WFC	WFC	WFC	WFC	WFC

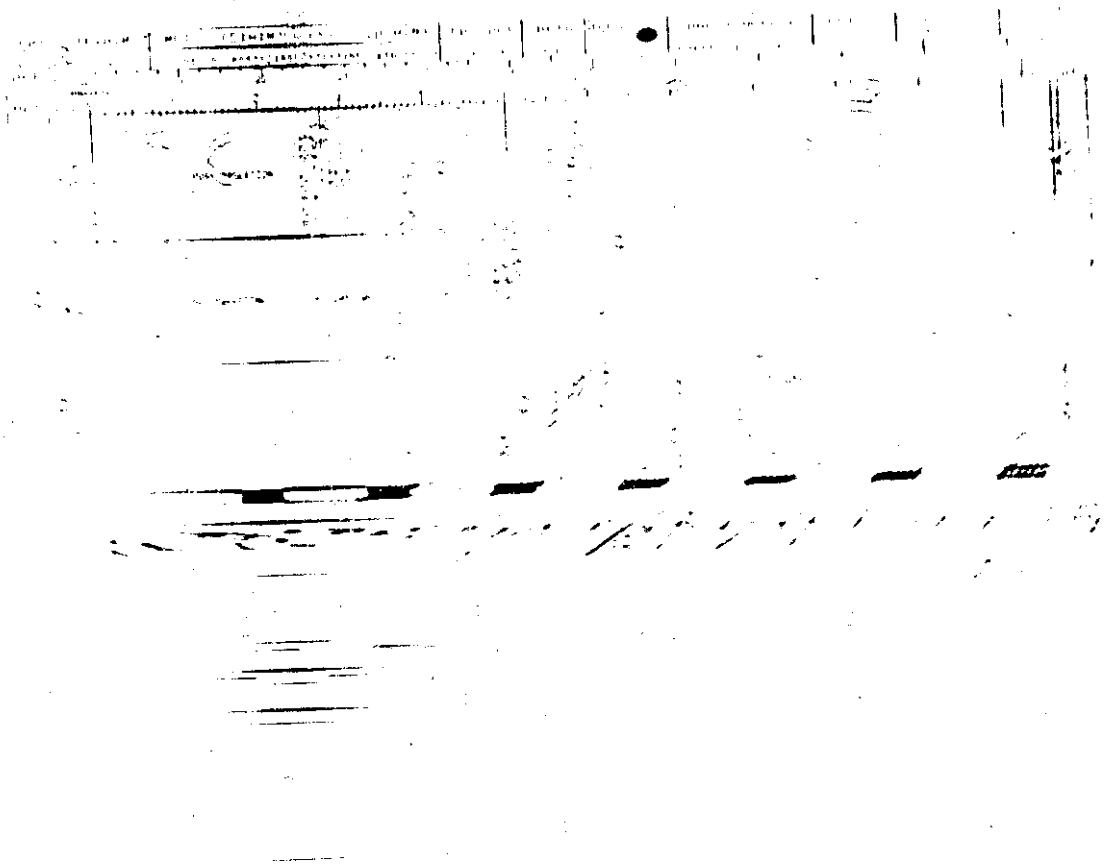


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SUMMARY  
TIMELINE

SUMMARY TIMELINE





UNIVERSITY MICROFILMS		EDITION	PUB. DATE
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<p>POST SLEEP</p>		<p>SLEEP</p>	<p>POST SLEEP</p>
<p>NOTES</p>			

















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COMP	TEAM	NO.	LEADER	START TIME	END TIME	ACTIVITY	REMARKS	DATE	TIME	STATUS	OTHER
PL											
MSO											
PSM											
<p>ESTON COVERAGE</p> <p>TOPS</p> <p>STATUS REPORT</p> <p>FC PURGE W/P ON</p> <p>FC PURGE W/P OFF</p>											
<p>NOTES:</p>											









GMT	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
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PLT																								
MS2																								
PSW																								
CPWT																								
COPTN																								
TRNGE																								
W/SRP																								
ESTDN																								
COVERAGE																								
TOPS																								
LEOPB																								
NOTES:																								











GMT	(DINEMA)	NET	(DINEMA)	POST	(DINEMA)	ED/ PDY	REFR	MOON	HOUSTON DATE	FLY/IN	EDITION	PUR. DATE
GMT 1800		NET							100000 21 1965	0000-1-0	0000 000 0	12/21/65
									-12	-11	-10	-9
										9	10	11
												12
PLT									POST SLEEP ACT	WCS CAP PDY 1	WUSAT DEPLOY	ORIN STN
MS2					SLEEP				POST SLEEP ACT	WUSAT DEPLOY	PL-510N	MC-000
PSM										W/D D/P	PL-510N	OFFN SETUP
PROCT	95	96	97	98	99	100	101	102	103			
ESTN TRACE												
ESTN COVERAGE												
FORM 5												
NOTES:												

GMT (DIMIN)	MPT (DIMIN)	CST (DIMIN)	FOZ DAY	BETH	NOON	HOUSTON DATE	FLIGHT	COITION	PUB. DATE
12	13	14	15	16	17	JANUARY 24, 1965	414 51-0	0011, 01V 0	12221000
GMT 1824	19	20	21	22	23	24	25	26	27
MPT	17	18	19	20	21	22	23	24	25
COLD	CDR								
	M51	SLEEP	POST SLEEP ACT			DEORBIT PREP	DEORBIT BURN (6/19:52)	ESA LANDING (6/21:00)	
	M53					DEORBIT PREP			
	PCF								
ORBIT	103	104	105	106	107	108	109	110	
COVERAGE									
TOPS									
NOTES:	<p>• 001-001</p>								



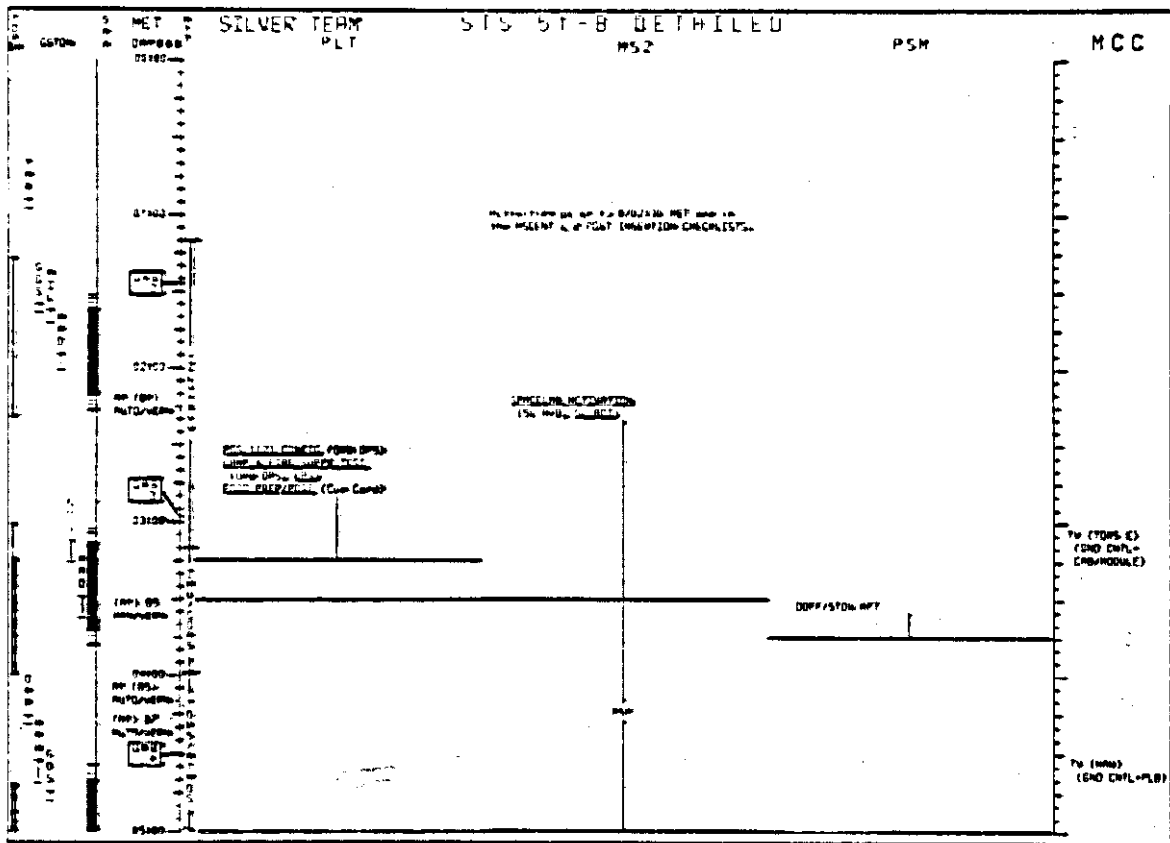


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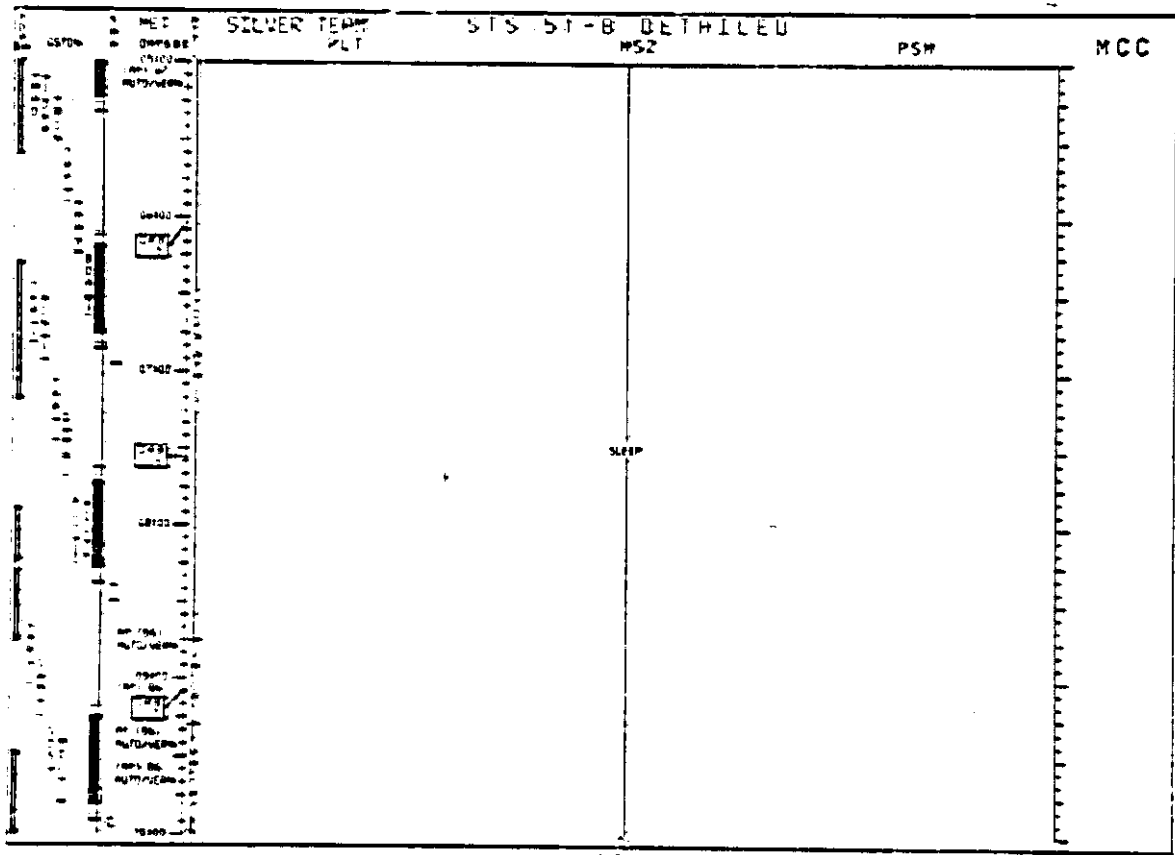
DETAILED TIMELINE

DETAILED  
TIMELINE





















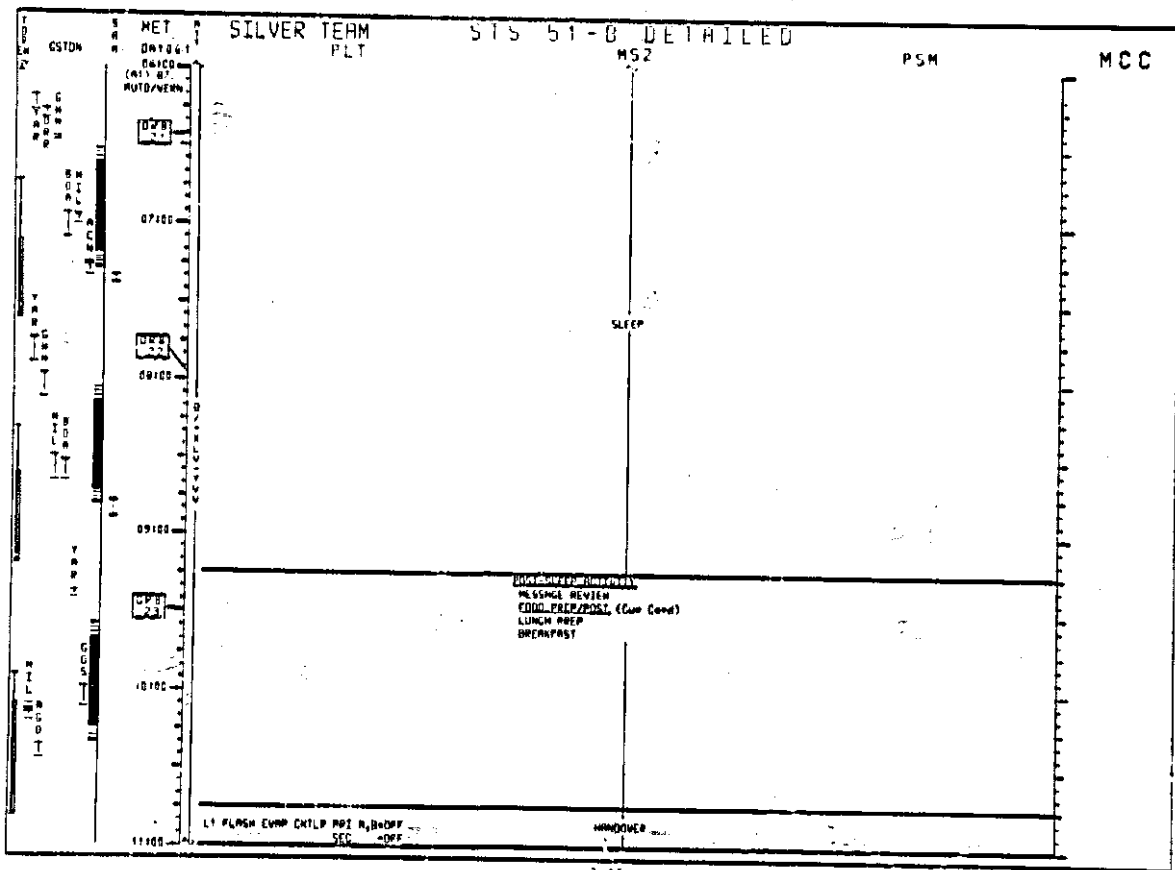


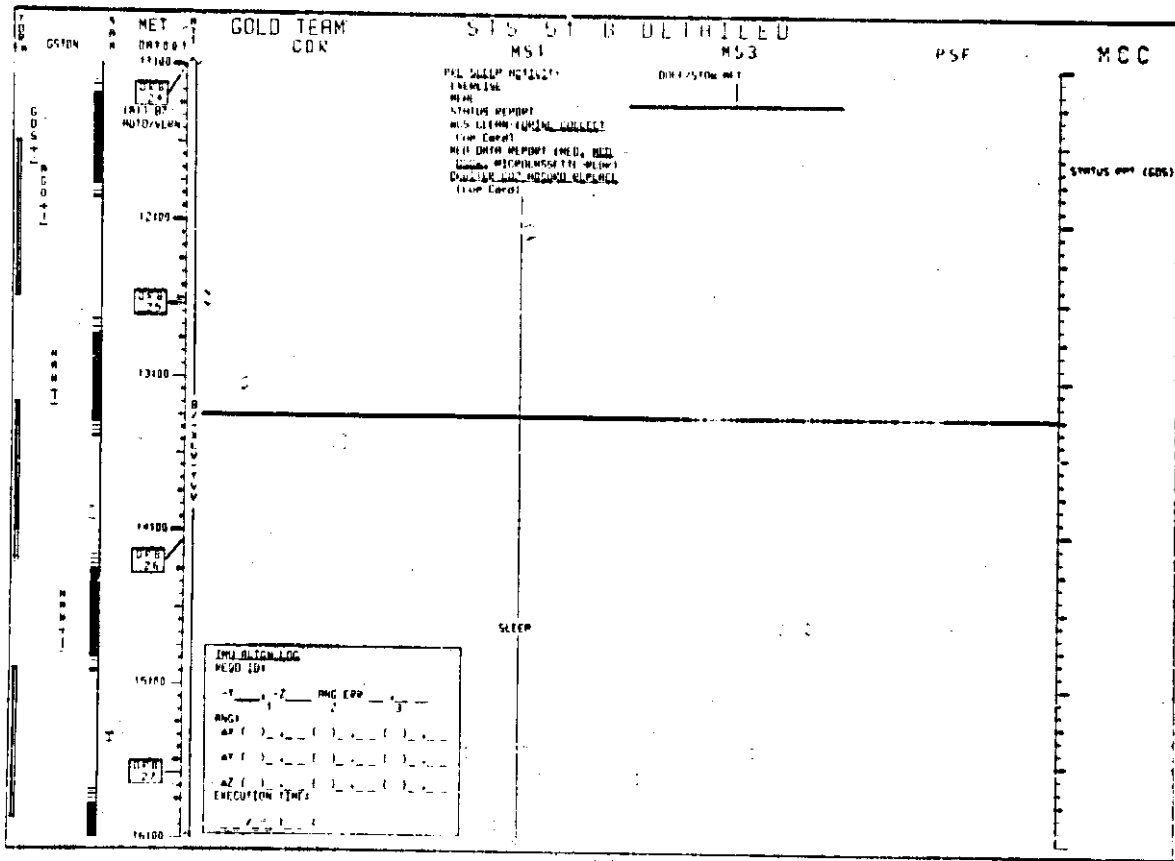


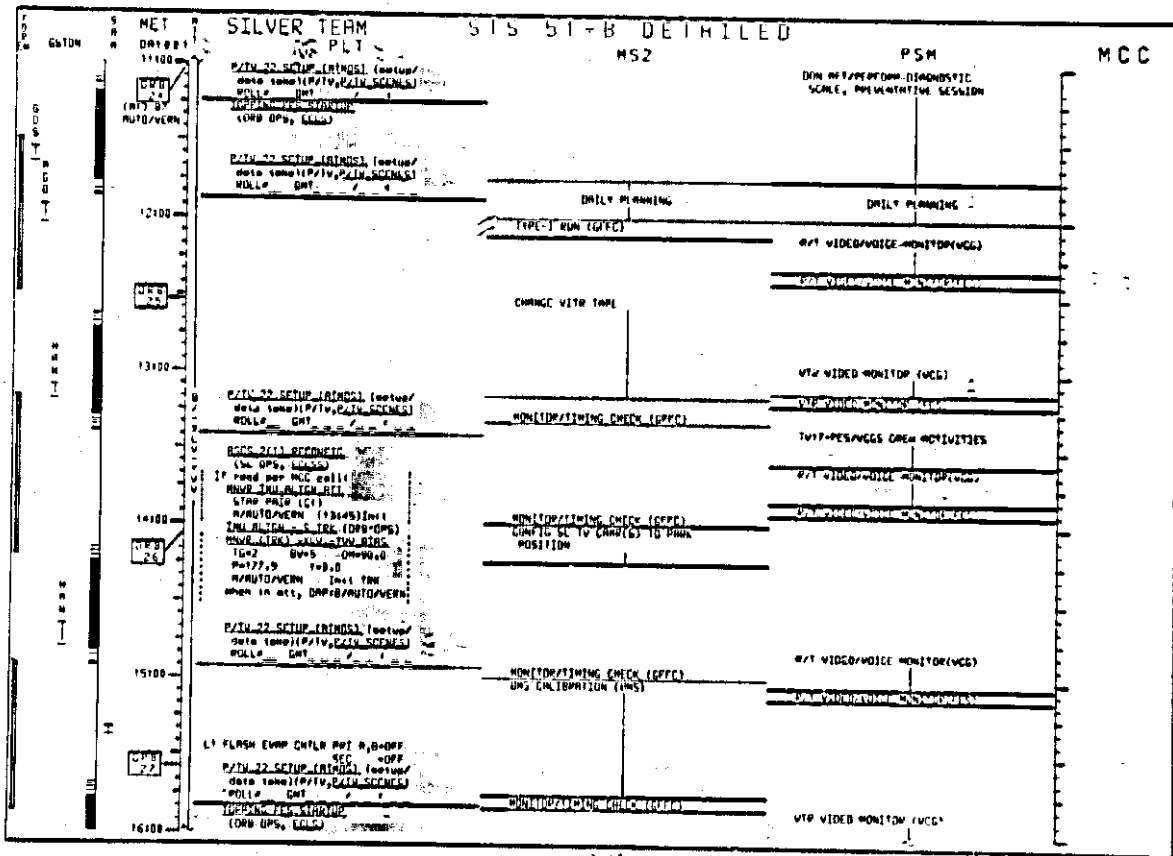




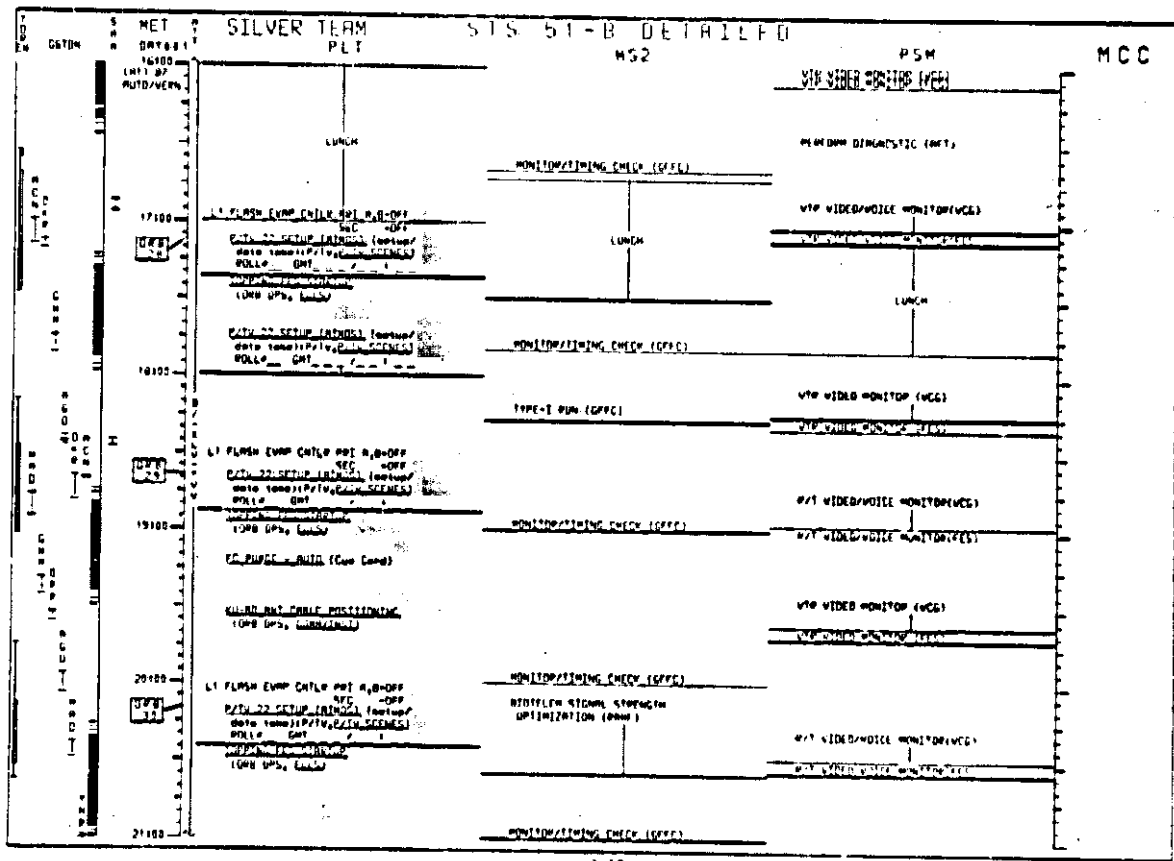






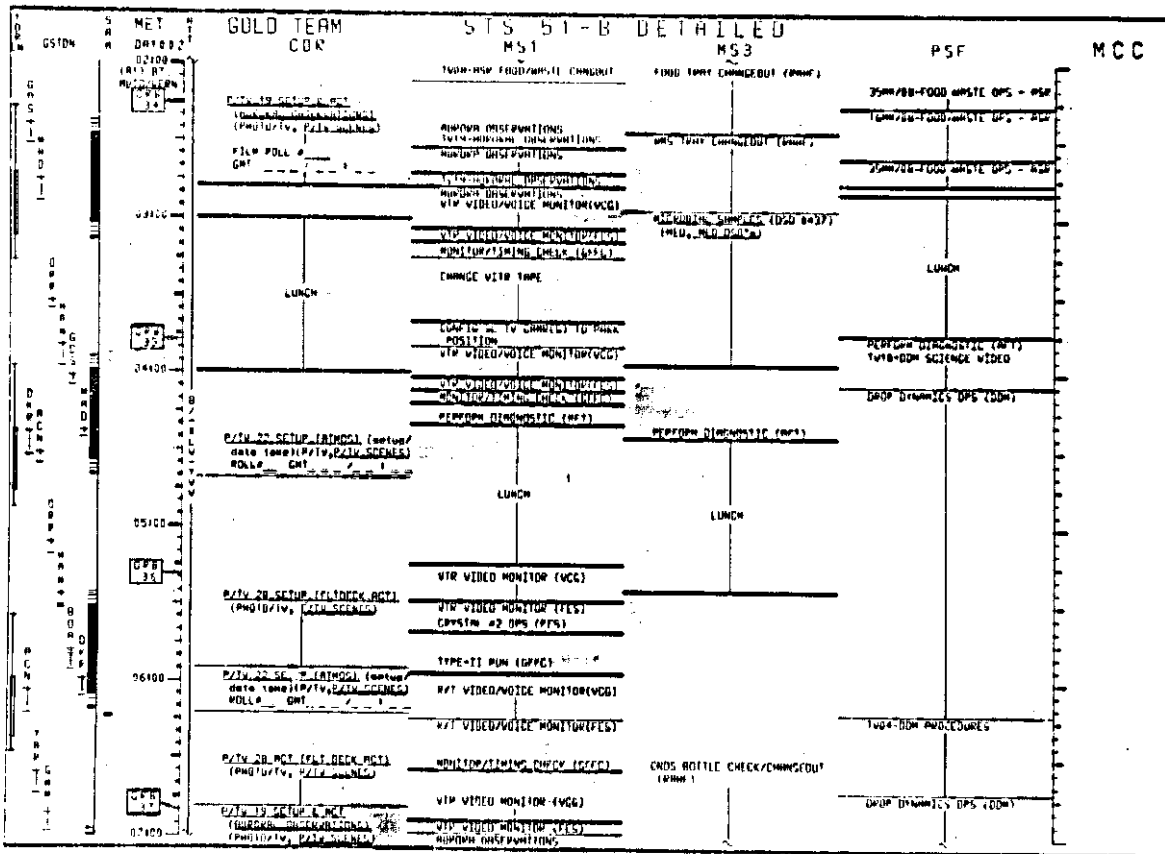












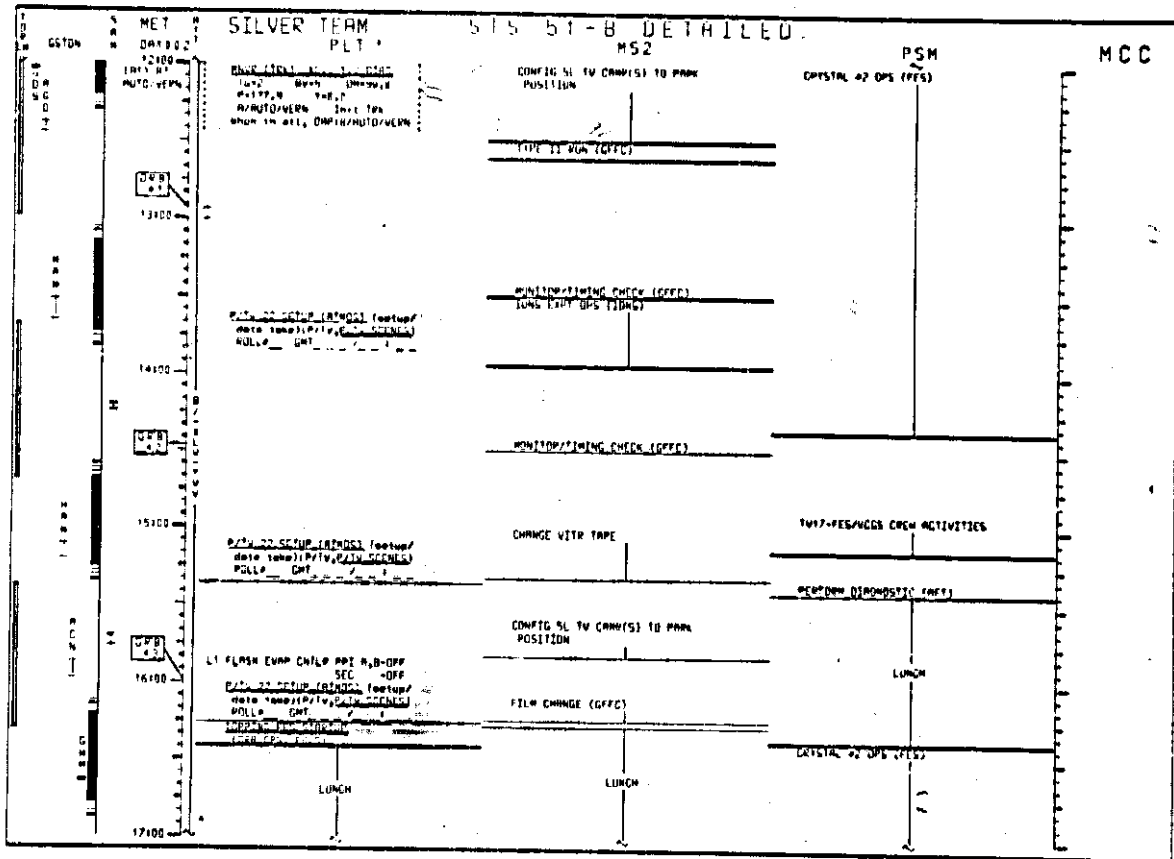




GOLD TERM		STS 51-B DETAILED		MCC	
COR		MS1		MS3	
68704 0700 (M) 07 AUTO/VERN 08100 09100 10100 11100 12100	MCT DAY 002 0700 (M) 07 AUTO/VERN	CPU IS SETUP & MCT (BURDEN OBSERVATIONS) FILM ROLL GET	WINDOW OPERATIONS TVIS-MANUAL OBSERVATIONS WINDOW OBSERVATIONS TVIS-MANUAL OBSERVATIONS WINDOW OBSERVATIONS	CDS BOTTLE CHECK/CHANGEOUT (RAWF)	DROP EXCHANGE OPS (CDS) CONFIG SL TV CHANNEL TO PARK POSITION
	LOAD/REPLACE VTR CASSETTE (Cue Card, INQUIRY)	MONITOR/TIME CHECK (OPFC) CRT VIBRATION MONITORING CRITICAL AT OPS (FLS)	CAMERA OPERATIONS (RAWF)	CAMERA OPERATIONS (RAWF)	TV22-FES PROCEDURES
	EG. PUNCE. RUID (Cue Card)	MONITOR/TIME CHECK (OPFC) CRITICAL AT OPS (FLS)	CAMERA OPERATIONS (RAWF)	CHANGE VTR TAPE	TV22-FES PROCEDURES
	VTR UNIT PAUSE POSITIONING (OPB OPS, CHANGE)	MONITOR/TIME CHECK (OPFC) CRITICAL AT OPS (FLS)	CAMERA OPERATIONS (RAWF)	CHANGE VTR TAPE	TV22-FES PROCEDURES
	CPU IS SETUP (RAWF) (Cue Card) (Cue Card) (Cue Card) (Cue Card) ROLL - CNT	CRITICAL AT OPS (FLS)	S.I. CO2 GAS REPLACE (CUE CARD) BATTERY SIGNAL STRENGTH OPTIMIZATION (RAWF)	S.I. CO2 GAS REPLACE (CUE CARD) BATTERY SIGNAL STRENGTH OPTIMIZATION (RAWF)	TV22-FES PROCEDURES
	TYPE II RUN (OPFC)	DOFF/STON APT	DOFF/STON APT	DOFF/STON APT	DOFF/STON APT
	HANDOVER	HANDOVER	HANDOVER	HANDOVER	HANDOVER
	PRE-KEEPER EXERCISE EXERCISE MENL STATUS REPORT MCS CLEAN (LINE COLLECT) (Cue Card) NEG DATA REPORT (END, NEG) (Cue Card) MICROCASSETTE RUID DEUTER CO2 SENSOR REPLACE (Cue Card)	PRE-KEEPER EXERCISE EXERCISE MENL STATUS REPORT MCS CLEAN (LINE COLLECT) (Cue Card) NEG DATA REPORT (END, NEG) (Cue Card) MICROCASSETTE RUID DEUTER CO2 SENSOR REPLACE (Cue Card)	PRE-KEEPER EXERCISE EXERCISE MENL STATUS REPORT MCS CLEAN (LINE COLLECT) (Cue Card) NEG DATA REPORT (END, NEG) (Cue Card) MICROCASSETTE RUID DEUTER CO2 SENSOR REPLACE (Cue Card)	PRE-KEEPER EXERCISE EXERCISE MENL STATUS REPORT MCS CLEAN (LINE COLLECT) (Cue Card) NEG DATA REPORT (END, NEG) (Cue Card) MICROCASSETTE RUID DEUTER CO2 SENSOR REPLACE (Cue Card)	PRE-KEEPER EXERCISE EXERCISE MENL STATUS REPORT MCS CLEAN (LINE COLLECT) (Cue Card) NEG DATA REPORT (END, NEG) (Cue Card) MICROCASSETTE RUID DEUTER CO2 SENSOR REPLACE (Cue Card)
	STATUS OPT (CDS)	STATUS OPT (CDS)	STATUS OPT (CDS)	STATUS OPT (CDS)	STATUS OPT (CDS)









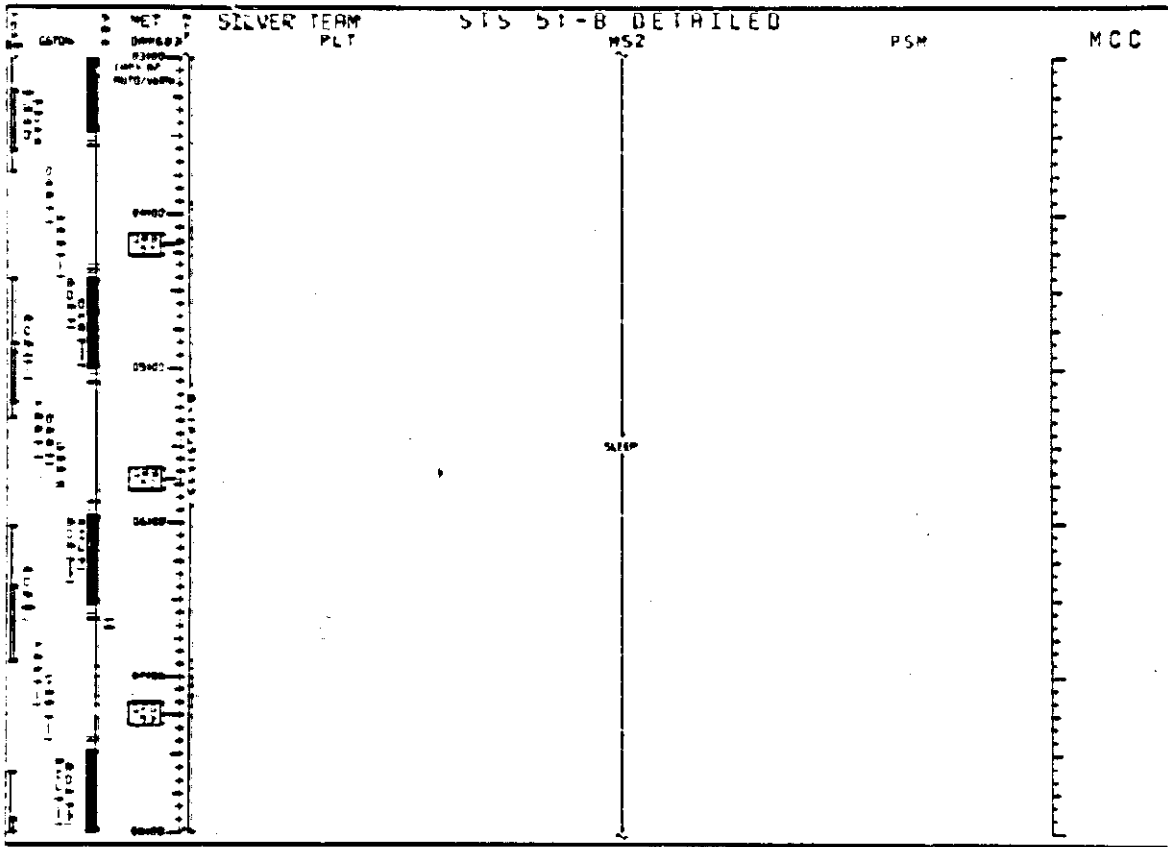




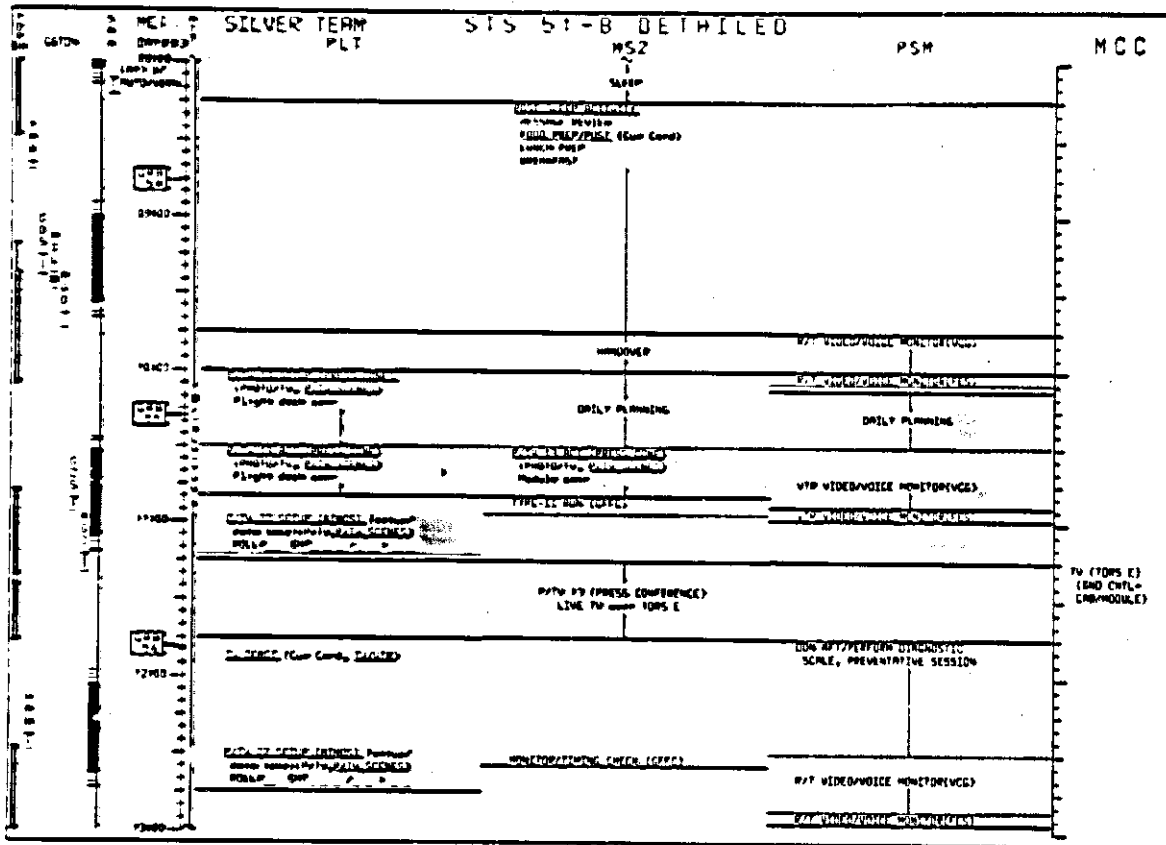


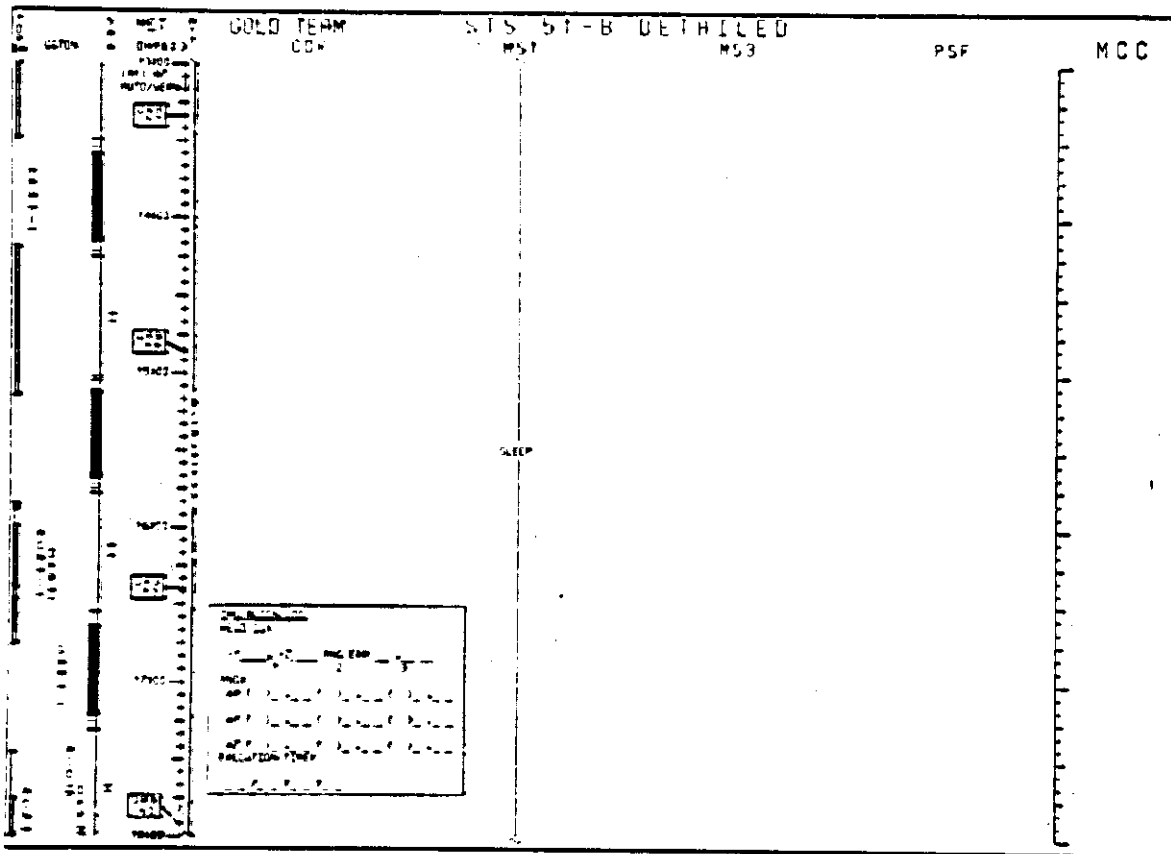


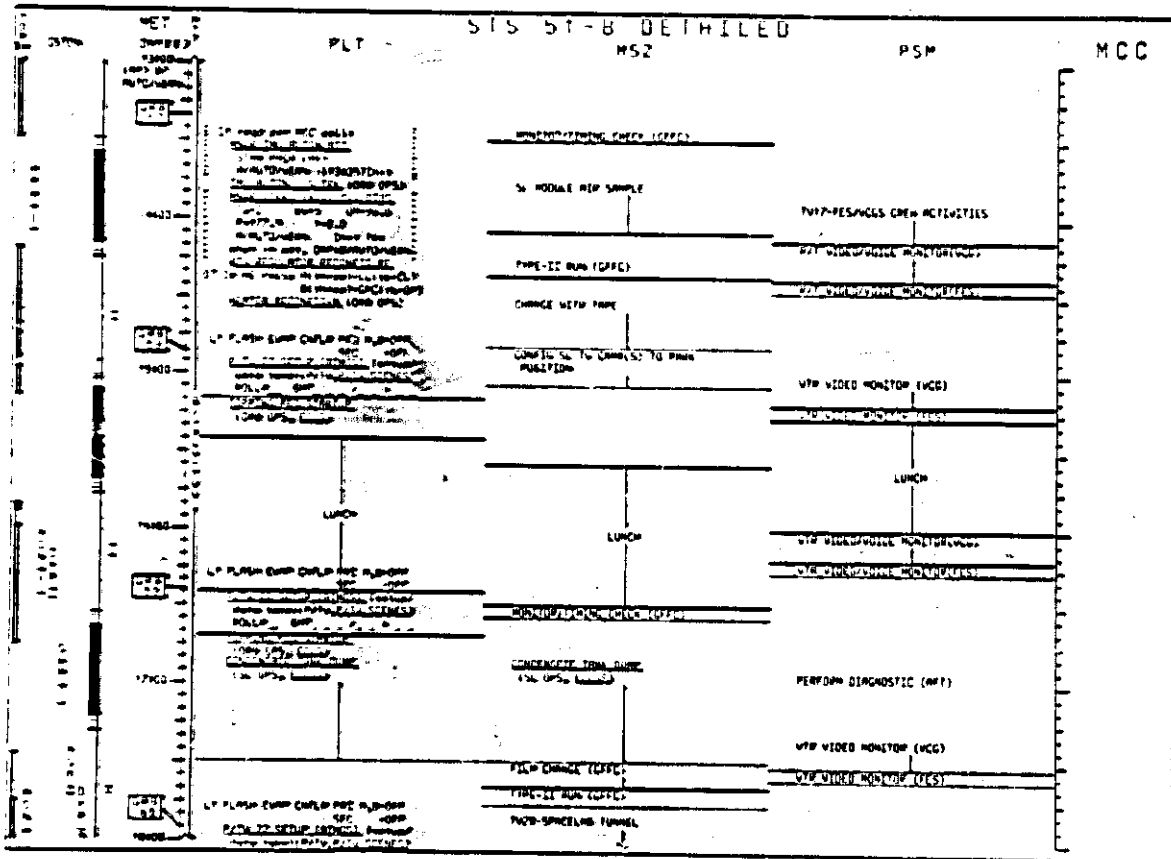
TIME	MET 0300 (1) BY M/T/V/MS	GOLD TEAM CDR	S/S S1-B MS1	DETAILED MS3	PSF	MCC
0300		PERFORM OPERATIONS	PERFORM OPERATIONS	FOOD TRAY CHANGEOUT (TIME)	LUNCH	
0315		PERFORM OPERATIONS	PERFORM OPERATIONS		PERFORM DIAGNOSTIC (MT)	
0330		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0345		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0400		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0415		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0430		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0445		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0500		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0515		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0530		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0545		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0600		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0615		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0630		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0645		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0700		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0715		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0730		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0745		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	
0800		PERFORM OPERATIONS	PERFORM OPERATIONS		TRASH/FOOD WASTE OPS - RDP	













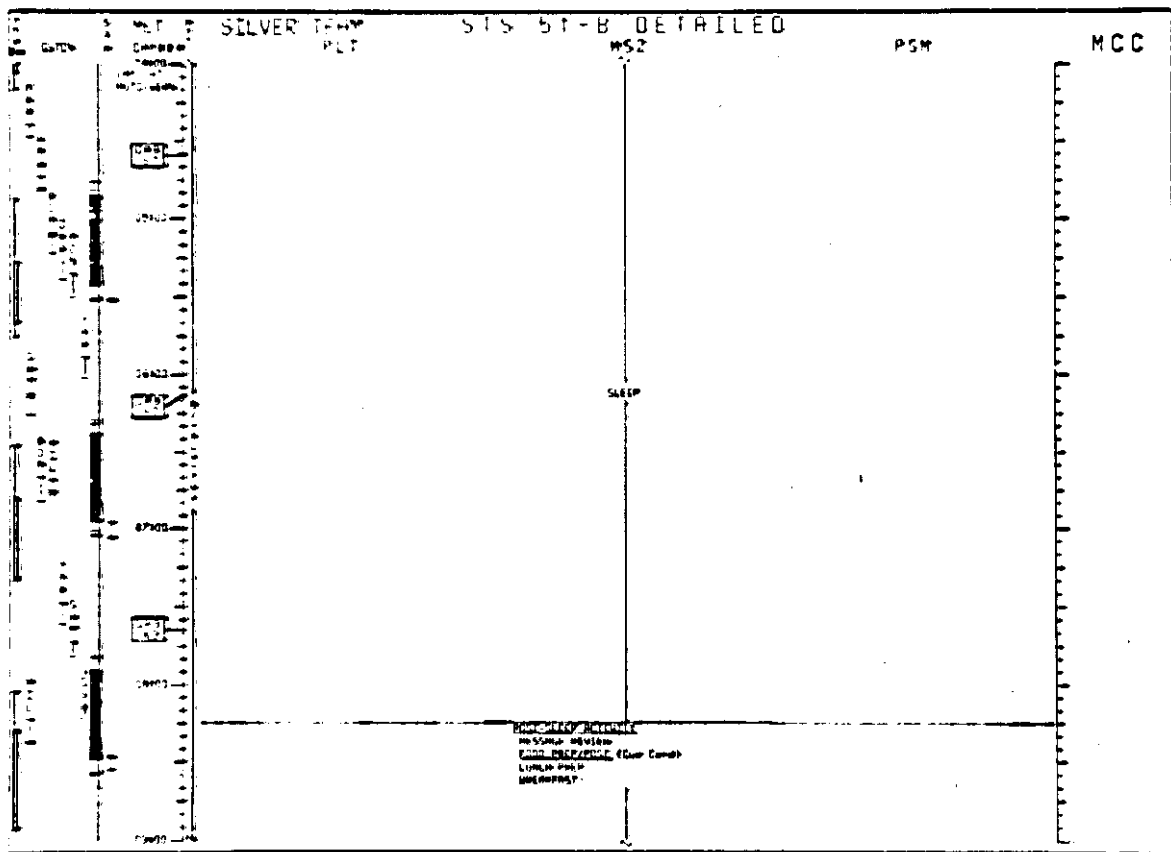


















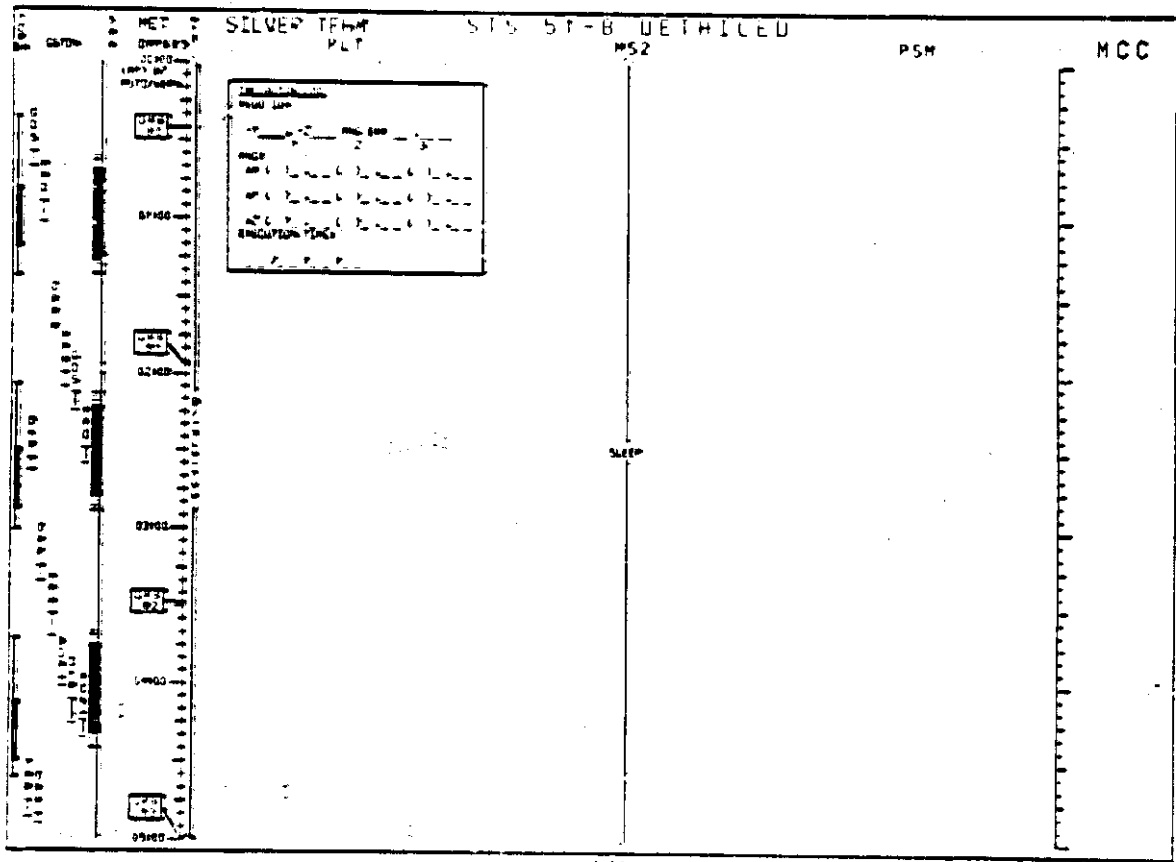




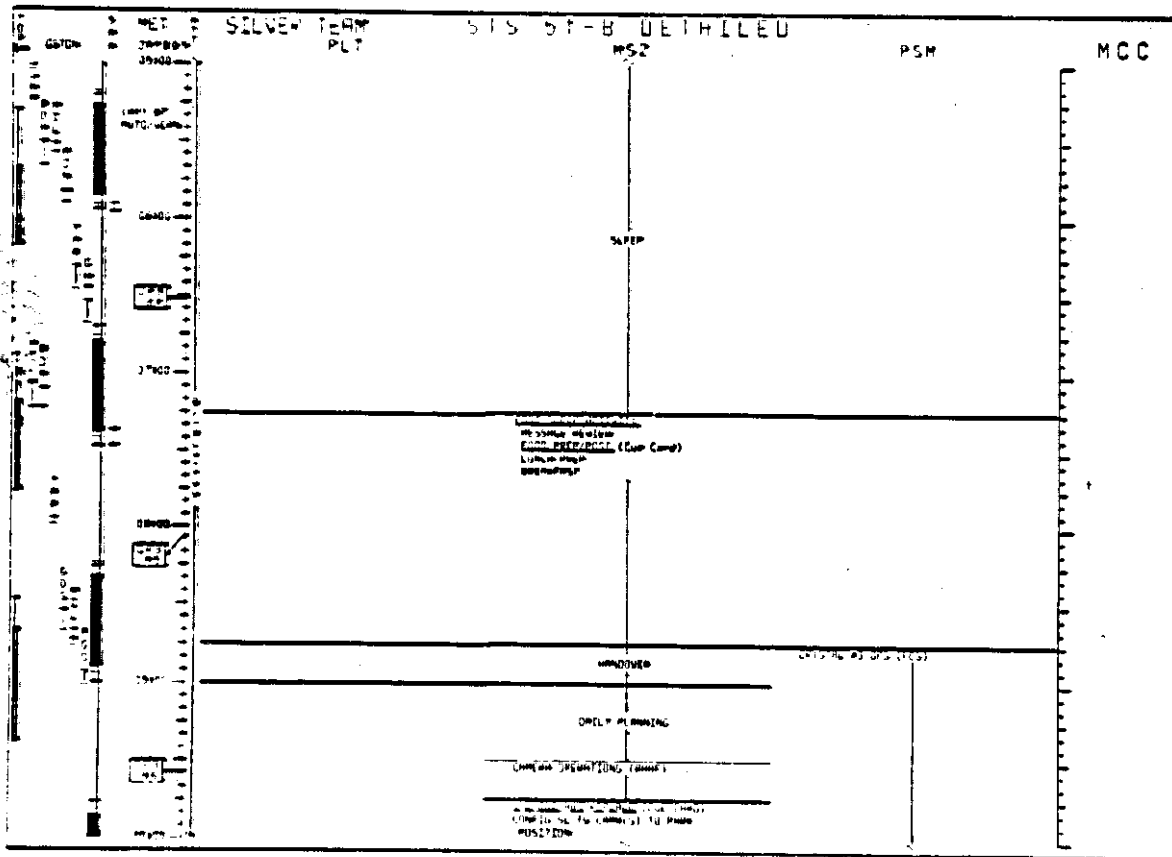


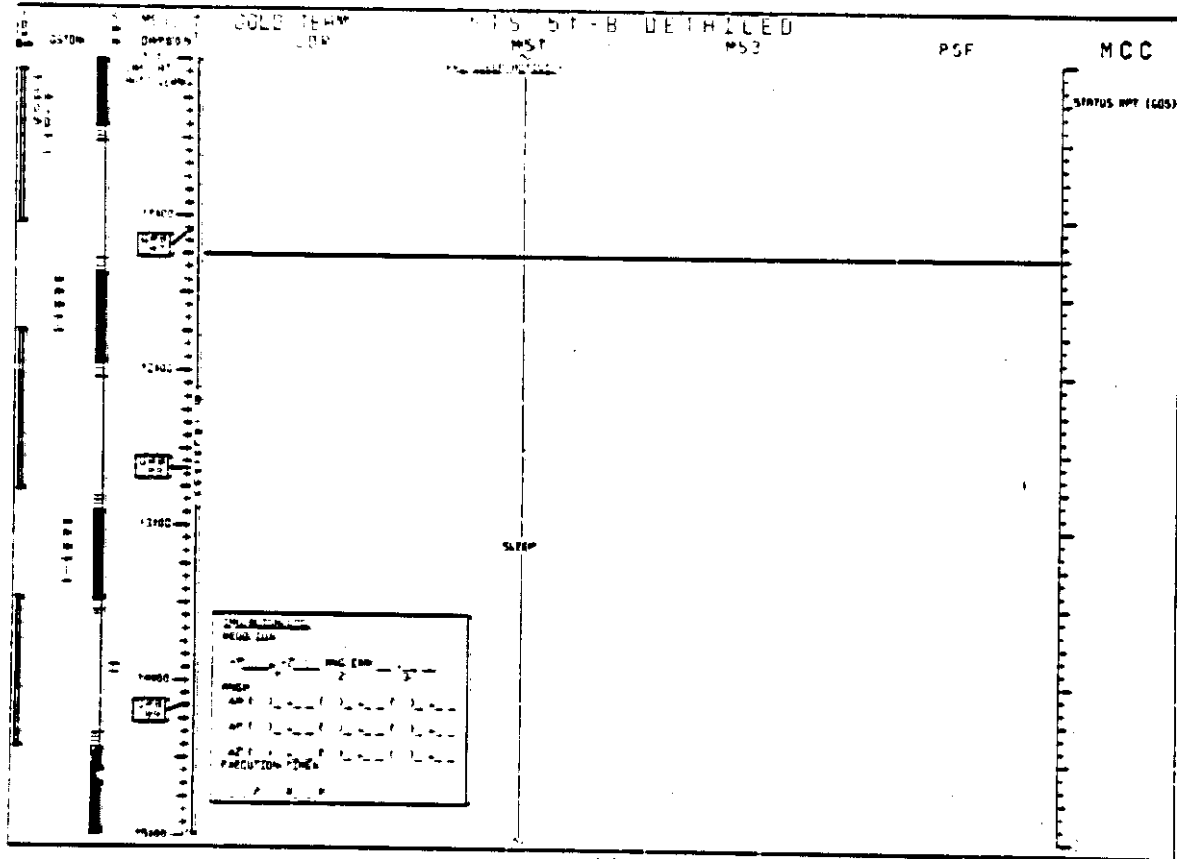








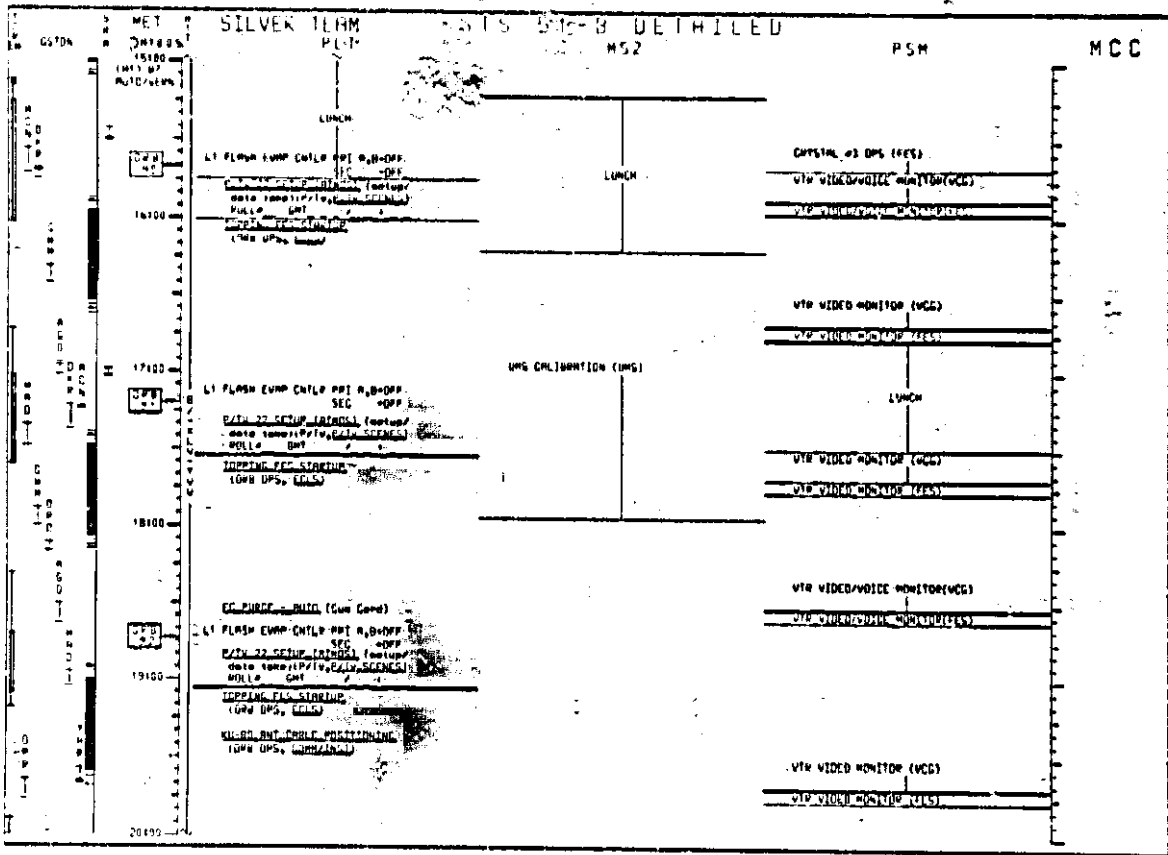






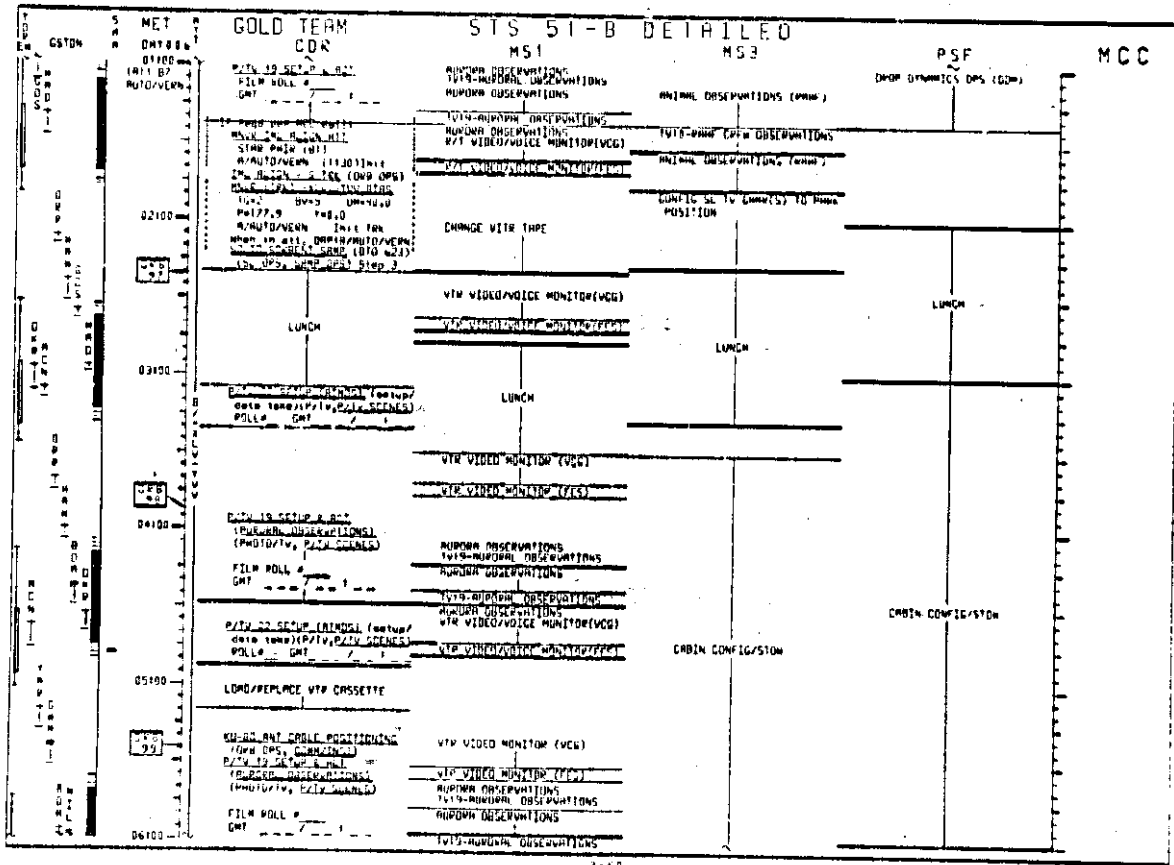












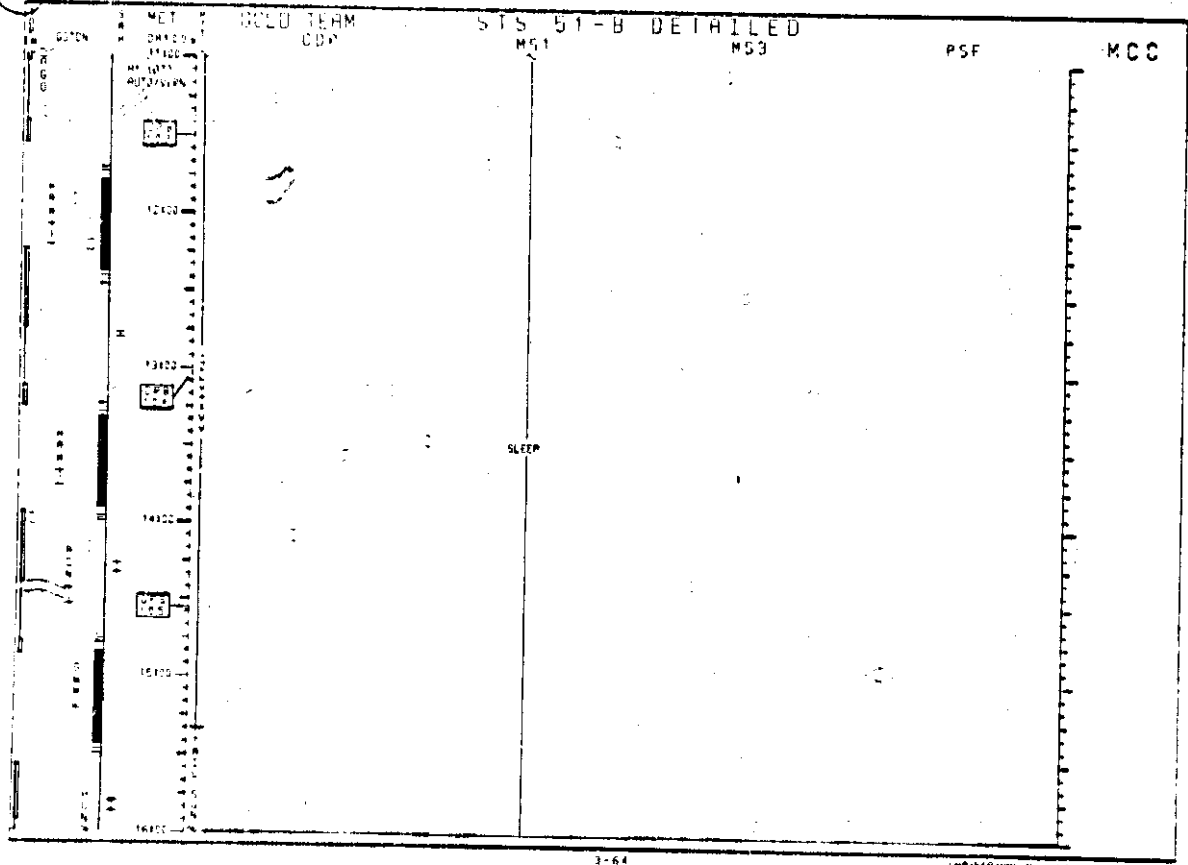








6





MET

GOLD TEAM  
CDR

STS 51-B DETAILED

MS1

MSG

PSF

MCC

POST-FLIGHT ACTIVITIES  
RESUME REVIEW  
LEAD PROGRAMMER (Cup Card)  
LUNCH PREP.  
RETURN MS1

1730  
1740  
1750  
1800  
1810  
1820  
1830  
1840  
1850  
1900  
1910  
1920  
1930  
1940  
1950  
2000  
2010  
2020  
2030  
2040  
2050  
2100

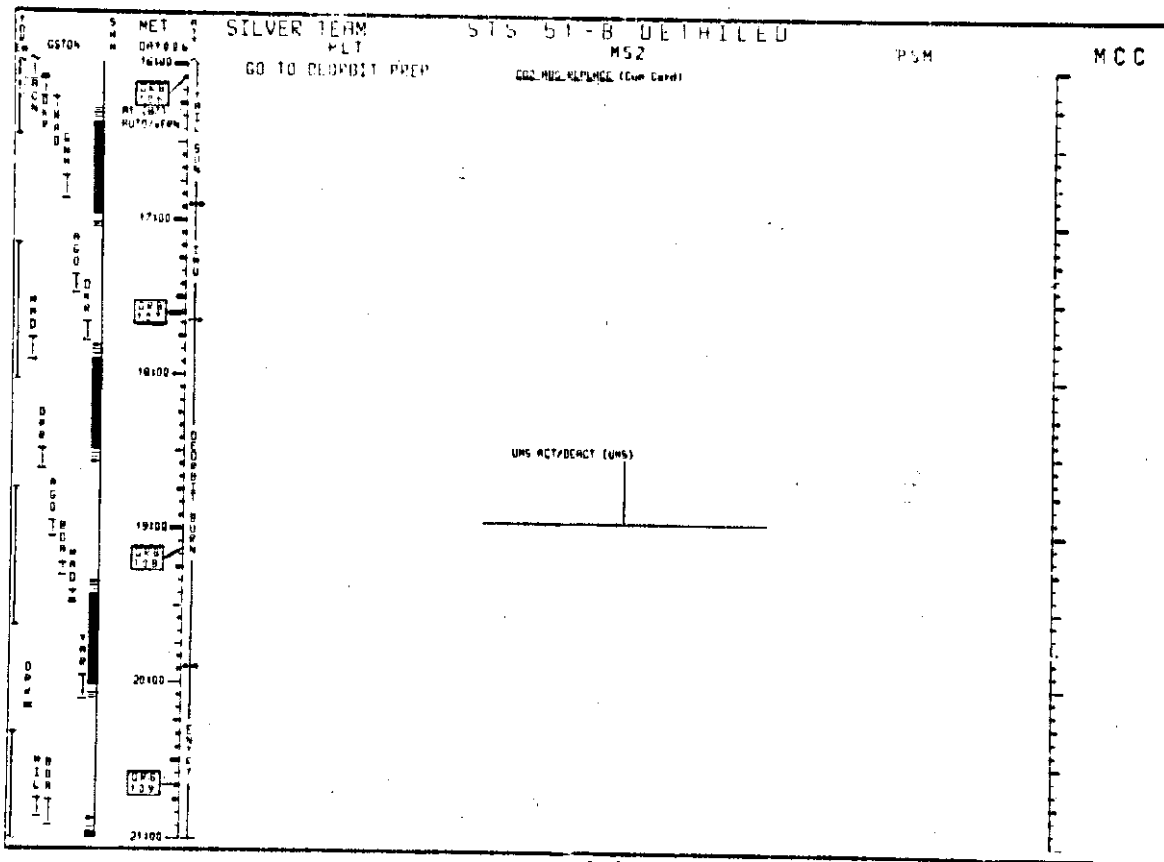
GO TO DEORBIT PREP

1830  
1830

1930  
1930

2030  
2030

DEMS SAFING SWITCH



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STS 51-B DAP BOOK

DAP A CONFIGURATIONS..... 4-2  
DAP B CONFIGURATIONS..... 4-3  
51-B DAP BOOK..... 4-4

DAP BOOK

DAP A CONFIGURATIONS

		A1*	A2	A3	A4	A5	A6
<u>TRANSLATION</u>							
PULSE	ft/sec	0.10	0.10	0.10	0.10	0.10	0.10
<u>ROTATION</u>							
DSC RT	NORM %/sec	0.200	0.400	0.200	0.200	0.200	0.200
	VERN %/sec	0.200	0.400	0.200	0.008	0.200	0.200
PULSE	NORM %/sec	0.10	0.10	0.30	0.15	0.10	0.10
	VERN %/sec	0.010	0.010	0.010	0.010	0.050	0.010
COMP	NORM %/sec	.00	.00	.00	.00	.00	.00
	VERN %/sec	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>							
ATT	NORM (deg)	5.000	1.00	5.00	1.00	5.00	5.00
	VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000
RATE	NORM %/sec	0.20	0.20	0.20	0.20	0.20	0.20
	VERN %/sec	.020	.020	.020	.010	.020	.020
<u>JET OPT</u>							
P		1	1	3	1	1	3
Y		1	1	3	3	1	3
<u>CNVL ACCEL</u>		0	0	0	0	0	0

\*1-loaded QPS-2 DAP Configuration



DAP B CONFIGURATIONS

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

\*1-loaded OPS-2 DAP Configuration

TOP  
FRONT COVER 'DAP BOOK'

# DAP BOOK

HOOK  
VELCRO

CAP/SI-8/O/BAS

TYPE PIC	
TGT ID = 1	Orbiting Vehicle
2	Earth ctr
3	Earth tgt
	Input (AT (+90))
	LOx (+180) * = fast)
	ALT (+90.93-c)
4	Sun ctr
5	Celestial tgt
	Input RA (0-359.99)
	DEC (+90)
6	11-110 Nav Sta-n
ORBIT VECS = 1	alt
2	-10
3	-10
4	PIC d-w below +2)
5	Optional
	Input P (0-350.00)
	Y (270-350.00, 0-90)
6	Input QM -0 QM (0-350.99)
FOR AXIS = 1	0
2	-1

CAP/SI-8/O/BAS

620 DAP COMP 10	
Cenl ACCEL = 0	Orbit alone
ALT OPT = 1	Normal
2	Rose only
3	Tail only

TOP  
BACK OF FRONT COVER  
'DAP BOOK'

(reduced copy)

TOP

DAP	PURPOSE
A1	- NOMINAL - ZLV - IMJ ALIGN - TAIL ONLY CONTROL - BACKOUT - PRE/POST PAM DEPLOY - OMS BURN - TAIL-TO-SUN - LOSS OF VERN
A2	- PIC
A3	- RCS HOT FIRE
A4	- GG
A5	- IMJ ROTATION
A6	- LOSS OF VERN (TAIL ONLY)

CAP/SI-B/O/BAS

A1

TOP

DAPA1

A1

PURPOSES:

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

0.1	0	1	TRANSLATION	
			PULSE	
0.1	0	2	ROTATION	NORM
0.1	0	3	DSC AT	VERN
0.1	0	4	PULSE	NORM
0.1	0	5		VERN
0.1	0	6	COMP	NORM
0.1	0	7		VERN
0.1	0	8	BEARBAND	
0.1	0	9	ATF	NORM
0.1	0	10		VERN
0.1	0	11	RATE	NORM
0.1	0	12		VERN
0.1	0	13	JR OPT	P
0.1	0	14	ENTL ACCEL	V

CAP/SI-B/O/BAS


CAP/SI-B/O/BAS




A2



TOP




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4-5





  
 A1
   
 DAP A2
   
 PURPOSE:
   
 PTC




  
 TOP
   
 A2
   
 TRANSLATION PULSE
   
 0-1 0 1
   
 ROTATION
   
 0-1 0 2 BSC RT NORM
   
 0-1 0 3 VERN VERN
   
 0-1 0 4 PULSE NORM
   
 0-1 0 5 VERN VERN
   
 0-1 0 6 COMP NORM
   
 0-1 0 7 VERN VERN
   
 DEADBAND
   
 0-1 0 8 ATT NORM
   
 0-1 0 9 VERN VERN
   
 0-1 0 10 RATE NORM
   
 0-1 0 11 VERN VERN
   
 1 12 JET OPT P
   
 1 13 V
   
 0 14 CNTL ACCEL

CAP/SI-B/O/BAS
   

  
 TOP
   

  
 A2
   
 DAP A3




  
 TOP
   
 A3
   
 TRANSLATION PULSE
   
 0-1 0 1
   
 ROTATION
   
 0-1 0 2 BSC RT NORM
   
 0-1 0 3 VERN VERN
   
 0-1 0 4 PULSE NORM
   
 0-1 0 5 VERN VERN
   
 0-1 0 6 COMP NORM
   
 0-1 0 7 VERN VERN
   
 DEADBAND
   
 0-1 0 8 ATT NORM
   
 0-1 0 9 VERN VERN
   
 0-1 0 10 RATE NORM
   
 0-1 0 11 VERN VERN
   
 1 12 JET OPT P
   
 1 13 V
   
 0 14 CNTL ACCEL

CAP/SI-B/O/BAS
   

  
 TOP




  
 A4

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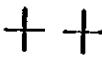


A3

DAP A4

PURPOSE:

GG



TOP



A4

TRANSLATION  
PULSE

0-1 0 1

ROTATION

0-2 0 0 0	2	BSC RT	NORM
0-2 0 0 0	3		VERN
0-2 0 0 0	4	PULSE	NORM
0-2 0 0 0	5		VERN
0-2 0 0 0	6	COMP	NORM
0-2 0 0 0	7		VERN

DEADBAND

0-1 0 0 0	8	ATT	NORM
0-1 0 0 0	9		VERN

RATE

0-2 0 0 0	10		NORM
0-2 0 0 0	11		VERN

JET OPT

0-1 0 0 0	12		P
0-1 0 0 0	13		V

0-14 CNTL ACCEL

CAP/SI-B/O/BAS



TOP



DAP A5

PURPOSE:

IMJ ROTATION



CAP/SI-B/O/BAS



A4

A5

TOP



A5

TRANSLATION  
PULSE

0-1 0 1

ROTATION

0-2 0 0 0	2	BSC RT	NORM
0-2 0 0 0	3		VERN
0-2 0 0 0	4	PULSE	NORM
0-2 0 0 0	5		VERN
0-2 0 0 0	6	COMP	NORM
0-2 0 0 0	7		VERN

DEADBAND

0-1 0 0 0	8	ATT	NORM
0-1 0 0 0	9		VERN

RATE

0-2 0 0 0	10		NORM
0-2 0 0 0	11		VERN

JET OPT

0-1 0 0 0	12		P
0-1 0 0 0	13		V

0-14 CNTL ACCEL

CAP/SI-B/O/BAS



TOP

(reduced copy)



CAP/SI-B/O/BAS



4-7

A5

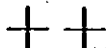




AS

OAPAS

PURPOSE:

LOSS OF VERN  
(TAIL ONLY)

TOP



AG

0-1	0	1	TRANSLATION	
			PULSE	
0-1	0	2	ROTATION	
			DSC RT	NORM
0-1	0	3		VERN
0-1	0	4	PULSE	NORM
				VERN
0-1	0	5	COMP	NORM
				VERN
0-1	0	6		
0-1	0	7		
0-1	0	8	ALT	NORM
				VERN
0-1	0	9		
0-1	0	10	RATE	NORM
				VERN
0-1	0	11		
0-1	0	12	JET OPT	P
				V
0-1	0	13		
0-1	0	14	ENTL ACCEL	

CAP/SE-B/O/BAS

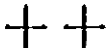
CAP/SE-B/O/BAS



TOP

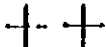


AG



A2

TOP



BAP

PURPOSE

- B1 - NOMINAL  
FACS IMP ALIGN  
TOP TO-SUN  
TAIL ONLY CONTROL  
BACKUP  
CHS 2 RCS BURNS
- B2 - LOSS OF VERN  
(TAIL ONLY)
- B3 - LOSS OF VERN;  
CG RV-8
- B4 - PAN BE-LIGN  
FRISBEE DEPLOY
- B5 - COAS CAL

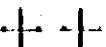
CAP/SE B/O/BAS

CAP/SE B/O/BAS



TOP

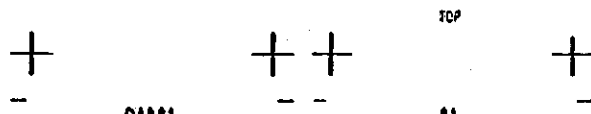
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4-8

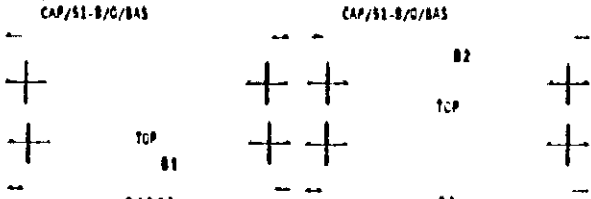
B1





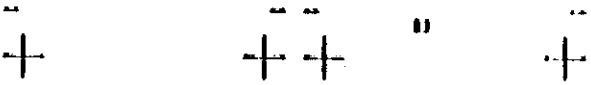
DAP B1  
 PURPOSE:  
 PRES IMU ALIGN  
 TOP-TO-SUN  
 TAIL GYRO CONTROL BACKOUT  
 GMS & RCS BURNS

TOP  
 B1  
 TRANSLATION  
 PULSE 15 0-0 2  
 ROTATION  
 OSC RT NORM 16  
 VERN 17  
 PULSE NORM 18  
 VERN 19  
 COMP NORM 20  
 VERN 21  
 DEADBAND  
 ATT NORM 22  
 VERN 23  
 RATE NORM 24  
 VERN 25  
 JET OPT P 26  
 V 27  
 CNTL ACCEL 28  
 CAP/SI-B/O/BAS

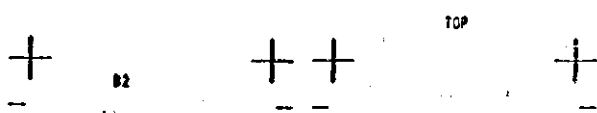


DAP B2  
 PURPOSE:  
 LOSS OF YERN  
 (TAIL ONLY)

B2  
 TOP  
 B1  
 TRANSLATION  
 PULSE 15 0-0 2  
 ROTATION  
 OSC RT NORM 16  
 VERN 17  
 PULSE NORM 18  
 VERN 19  
 COMP NORM 20  
 VERN 21  
 DEADBAND  
 ATT NORM 22  
 VERN 23  
 RATE NORM 24  
 VERN 25  
 JET OPT P 26  
 V 27  
 CNTL ACCEL 28  
 CAP/SI-B/O/BAS



(reduced copy) TCP



B2

TOP

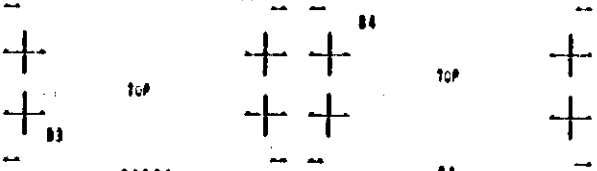
DAP B3

B3

PURPOSE:  
LOSS OF VERN  
(NOSE & TAIL)  
CG MNVR

TRANSLATION		
PULSE	15	0.0 2
ROTATION	4	
BSC AT	NORM 16	
	VERN 17	
PULSE	NORM 18	
	VERN 19	
COMP	NORM 20	
	VERN 21	
DEADBAND		
ATT	NORM 22	
	VERN 23	
RATE	NORM 24	
	VERN 25	
JET OFF	P 26	
	V 27	
ENTL ACCEL	28	0
CAP/SI-B/O/BAS		

CAP/SI-B/O/BAS



TOP

TOP

B3

B4

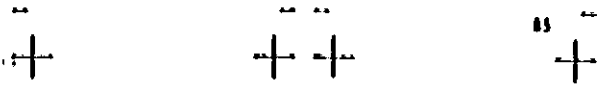
DAP B4

B4

PURPOSE:  
PAM DEPLOY  
FRISBEE DEPLOY

TRANSLATION		
PULSE	15	0.0 2
ROTATION	4	
BSC AT	NORM 16	
	VERN 17	
PULSE	NORM 18	
	VERN 19	
COMP	NORM 20	
	VERN 21	
DEADBAND		
ATT	NORM 22	
	VERN 23	
RATE	NORM 24	
	VERN 25	
JET OFF	P 26	
	V 27	
ENTL ACCEL	28	0
CAP/SI-B/O/BAS		

CAP/SI-B/O/BAS



TOP

B3

(reduced copy)



TOP

DAP B5

PURPOSE:  
COAS CAL

TRANSLATION			
PULSE	15	0-0	2
ROTATION			
DSC PT	NORM 16	0-0	0
	VERN 17	0-0	0
PULSE	NORM 18	0-0	0
	VERN 19	0-0	0
COMP	NORM 20	0-0	0
	VERN 21	0-0	0
DEADBAND			
ATT	NORM 22	0-0	0
	VERN 23	0-0	0
RATE	NORM 24	0-0	0
	VERN 25	0-0	0
JET OPT	P 26		1
	V 27		1
CNTL ACCEL	28		2

CAP/ST-B/O/BAS

TOP

B5

DAP B6

PURPOSE:  
YWC  
OPS

TRANSLATION			
PULSE	15	0-1	2
ROTATION			
DSC PT	NORM 16	0-0	0
	VERN 17	0-0	0
PULSE	NORM 18	0-0	0
	VERN 19	0-0	0
COMP	NORM 20	0-0	0
	VERN 21	0-0	0
DEADBAND			
ATT	NORM 22	0-0	0
	VERN 23	0-0	0
RATE	NORM 24	0-0	0
	VERN 25	0-0	0
JET OPT	P 26		1
	V 27		1
CNTL ACCEL	28		2

CAP/ST-B/O/BAS A

TOP

(reduced copy)

4-11

TOP

86

OAP 87

PURPOSE1  
ATMOS  
OPS

87

TRANSLATION			
PULSE	15	0.1	0
ROTATION			
BSC AT	NORM 16	0.1	0
	VERN 17	0.1	0
PULSE	NORM 18	0.1	0
	VERN 19	0.1	0
COMP	NORM 20	0.1	0
	VERN 21	0.1	0
DEADBAND			
ATT	NORM 22	0.1	0
	VERN 23	0.1	0
RATE			
	NORM 24	0.1	0
	VERN 25	0.1	0
JET CPT	P 26		0
	V 27		0
CNTL ACCEL	28		0
CAP/ST-B/O/BAS	A		

CAP/ST-B/O/BAS A

TOP

87

CAP/ST-B/O/BAS A

TOP

(reduced copy)

TOP  
BACK COVER "DAP BOOK"



HOOK  
VELCRO

CAP/SI-B/O/BAS



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SFS 51-B ALTITUDE TIMELINE

ALTITUDE  
TIMELINE

Altitude Timeline

REV	MNVR OPTION	DAF	E/S	REMARKS	EVENT	
1 0-01:10:00	TRK TGT=2 SV=34 90.00, 0.00 GM=100.00	A1 AUTO NORM	BSC 0.200 SB AT 5.00 SB RT 0.20	EARTH 0 90 0 90	LVLM R=100 P= 0 Y= 0	-ZLV +XVV
2 0-03:10:00 21:00	MNVR R= 81.00 P=176.00 Y=338.00	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 96 0 163	-25T121 -Y5T143	ENU-COAS (A1)
3 0-03:53:00 04:11:40 DAP 97	MNVR R=282.5A P=150.00 Y=343.40	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 90 0 315		TERS-ATMOS
4 0-08:10:00 23:41 DAP 86	MNVR R=381.37 P=318.64 Y= 42.72	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 119 0 359		VWFC01
5 0-08:10:00 30:12 DAP 86	MNVR R=103.97 P=215.62 Y=241.92	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 109 0 165		VWFC02
6 0-11:23:00 34:16	MNVR R=326.00 P=359.00 Y=381.00	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 8 0 24		TRIM BURN
7 0-12:00:00 03:03 DAP 86	MNVR R=116.70 P=191.04 Y=331.5	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 95 0 133		VWFC03
8 0-13:00:00 10:47	MNVR P=349.00 P= 23.00 Y=338.00	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 33 0 255	-26T115 -Y6T143	ENU-ALIGN (B1)
9 0-13:23:00 43:45 DAP 86	MNVR P= 91.63 P=241.13 Y=356.24	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 119 0 155		VWFC04
10 0-14:10:00 27:32 DAP 86	MNVR R=157.02 P=329.47 Y=355.99	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 73 0 147		VWFC05
11 0-16:00:00 03:31 DAP 86	MNVR R=172.99 P= 2 4.04 Y=357.32	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 97 0 132		VWFC06
12 0-17:23:00 42:30 DAP 97	TRK TGT=2 SV=5 177.90, 0.00 GM= 90.00	A1 AUTO VERN	BSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 170 0 360	LVLM R=270 P= 90 Y=350	+ZLV +XVV BIASED

ALTITUDE  
TIMELINE

17

Attitude Timeline

KEY	MNVR OPTION	B/B	E/S	REMARKS	EVENT
1 6 03:10:00 17:30	TRK TGT=3 DV=24100.00, 0.00 OM=100.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 0 100 BB RT 0.02 0 0	EARTH LVLN R+100 P+ 90 Y+ 0	MUSAT DEPLOY ATTITUDE
2 6 10:00:00 07:30	TRK TGT=2 DV=31 90.00, 0.00 OM=100.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 0 90 BB RT 0.02 0 0	EARTH LVLN R+100 P+ 0 Y+ 0	-ZLV +XVV
3 6 15:20:00 22:37	TRK TGT=4 DV=5184.00, 0.00 OM= 90.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 0 176 BB RT 0.02 0 101	SUN INRTL R+295 P+207 Y+ 53	-XSE
4 6 16:54:00 17:07:43	MNVR R+ 73.00 P+ 71.00 Y+312.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 0 27 BB RT 0.02 0 125	SUN -ZST:12 -YST:19	IMU ALIGN
5 6 17:14:00 19:47	MNVR R+203.00 P+113.00 Y+349.00	B1 AUTO NORM	BSC 0.500 BB AT 3.00 0 77 BB RT 0.20 0 305	SUN -ZST:43 -YST:26	IMU VERIF
6 6 17:33:00 43:52	MNVR R+296.00 P+331.00 Y+ 75.00	B1 AUTO NORM	BSC 0.500 BB AT 3.00 0 130 BB RT 0.20 0 21	SUN	DEORBIT BURN ATTITUDE
7 6 17:54:00	GMS IGNITION	* AUTO *	BSC 0.500 BB AT 3.50 BB RT 0.30		DEORBIT BURN

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

**CREW ACTIVITY PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)**

**CREW..... 6-2**  
**PAYLOADS..... 6-2**

**NOTES**

## A. CREW

1. There are 7 crewmen onboard divided into 2 teams: the SILVER team consisting of the PLT, MS2, and PSM (materials processing expert) and the GOLD team consisting of the COR, MS1, MS3, and PSF (fluids expert). Each team works 12 hours, then is off duty for 12 hours.
2. Launch and Entry Seating - The COR and PLT will occupy their normal flight deck seats. The MS2 (Thagard) will assume the role of Flight Engineer and sit on the flight deck behind and between the COR and PLT. The MS1 (Lind) will sit on the flight deck to the right of the MS2. The MS3 and PSs will sit on the middeck.
3. The crewmen responsible for performing an EVA, should one become necessary, are: PLT and MS2.
4. The crewmen are assigned to the following tasks:
  - COR (Overmyer) - ATMOS PHOTOS, AURORAL PHOTOS
  - PLT (Gregory) - ATMOS PHOTOS, MUSAT DEPLOY (photo/TV)
  - MS1 (Lind) - SL ACT/DEACT, FES/YCGS, YWFC, AURORAL OBS, MED DSOs
  - MS2 (Thagard) - SL ACT/DEACT, YWFC, MUSAT DEPLOY (prime), MED DSOs
  - MS3 (Thornton) - RAHF, UMS ACT/DEACT, MED DSOs

All P/L crew - GFFC, MCG, ATMOS, IONS, UMS

For AFT, the PSs are the subjects and MS1 and MS3 controls

## B. PAYLOADS

## 1. Spacelab Systems

## a. 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  $\leq 1.5$  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.

## b. Communications and Instrumentation

- 1) 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 PCOR. 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 HPM format is switched by the Subsystem Computer through either a Stored Program Command (SPC) or a Real-Time Command (RTC) from the INCO.

- 2) 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 RCOR can direct dump to the XUSP or can be dumped through the HRM. (The PL RCOR is not planned to be used on this flight, so the HDRR will handle all payload data recording).
- 3) The SL Intercom 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.

#### c. Environmental Control and Life Support (ECLS)

Because there will be a third payload crewman in the module on the GOLD shift and there are animals onboard, the change-out schedule and total number of canisters are not the same as SL-1. A changeout schedule has been developed wherein one or both of the module canisters will be changed out every 12 hours. This schedule appears in the PCAP and ORBIT OPS C/L.

#### d. Command and Data Management (COMS)

- 1) There are 3 computers in the Spacelab module: the Sub-systems 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 Subsystem and 3 Experiment 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 DCU in the Control Center rack (R2K) and one at the Orbiter aft flight deck Payload Specialist station (panel L11).

- 2) The SSC performs 3 basic functions with the systems hardware:

- (a) Sends commands to the H/W
- (b) Monitors data from the H/W and transfers selected pieces to the Orbiter PCMMU and Spacelab High Rate Multiplexer (HRM) for downlink
- (c) Detects and annunciates faults

The crewman can monitor the systems using either the SSC displays on the module or aft flight deck DDSs or the GPC displays on the flight deck CRTs.

- 3) The EXC performs similar functions to the SSC with the payload hardware plus several additional functions:

- (a) Performs a checkout of payloads
- (b) Controls payload operations through the use of automatic timelines (see item 4 below)
- (c) Processes payload data for feedback to the H/W, display to the crew, or transmission to the ground through the HRM

- 4) 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 CNT line. 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.

e. Common Payload Support Equipment (CPSE)

The Scientific Airlock (SAL) will be flown to support the YWFC (see Introduction, page vii). The Scientific Window Adapter Assembly (SWAA) will not be flown.

## 2. Spacelab Experiments

The following paragraphs give a brief description of the experiments of Spacelab 3. Also, in each case this description is followed by a list of Marshall Space Flight Center model numbers involving crew action (as seen in the summary timeline) and their corresponding descriptions.

### a. Fluid Experiment System (FES)

This system is used to grow triglycine sulfate (TGS) crystals by removing heat from a saturated solution through a seed crystal. The purposes of this investigation are: to develop a technique for crystal growth in microgravity, to study the growth environment and relate it to growth behavior, and to determine how microgravity influences the properties of the resultant crystal.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
FES-ACT	EQUIP ACTIVATION
FES-1	CRYSTAL #1 OPS
FES-2	CRYSTAL #2 OPS
FES-3	CRYSTAL #3 OPS
FES-MON1	CREW MON - EARLY PHASE
FES-MON2	CREW MON - LATE PHASE
FES-MON3	

### b. Vapor Crystal Growth System (VCGS)

The purpose of this experiment is to grow more-perfect crystals of mercuric iodide. They will be grown by vaporization and recondensation at 120° C in a special furnace and the growth process will be reversed if polycrystalline growth begins. These crystals should have fewer defects because of the microgravity environment.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
VCG	ACTIVATE/DEACTIVATE VCGS
VCG-MON1	CREW MON - EARLY PHASE
VCG-MON2	CREW MON - LATE PHASE
VCG-MON3	

### c. Mercuric Iodide Crystal Growth (MICG)

The purpose of this experiment is to grow near-perfect single crystals of mercury iodide. The process will be carried out in a two-zone furnace with sensors to collect temperature data. The investigators hope to find that the effects of convection are greatly reduced in the microgravity environment.

MSFC MODEL      MODEL DESCRIPTION

MICG              INITIATE MICG/  
CHNG CRYSTAL CARTRIDGE

d. Dynamics of Rotating and Oscillating Free Drops

The main objectives of this experiment are to study the equilibrium figures of a rotating drop and to study the large-amplitude oscillations of a liquid drop. Another objective is to establish the advantages of conducting future drop and bubble investigations in space using the Drop Dynamics Module (DDM).

MSFC MODEL      MODEL DESCRIPTION

DDM-1/2            FIRST TWO RUNS  
DDM-0/E            SUBSEQUENT RUNS

e. Geophysical Fluid Flow Cell (GFFC)

The purpose of this experiment is to simulate global atmospheric flows of rotating planets and stars in hopes of answering questions about their mechanics. The investigator is trying to identify those external conditions of fluid viscosity, rotation, gravity, etc., which determine the mode of flow. Simulation will be accomplished with the use of a dielectric fluid between two concentric, rotating electrically conductive spherical shells.

MSFC MODEL      MODEL DESCRIPTION

GFFC-1            LONG DURATION RUN OPS  
GFFC-2            SHORT DURATION RUN OPS  
GFFC-3            SHORT RUN WITH CREW INTERVENTION  
GFFC-FLM        FILM CHANGE  
GFFC-MON        TIMING CHECK

f. Atmospheric Trace Molecules Spectroscopy (ATMOS)

The ATMOS investigation is designed to collect data on the chemistry and physics of Earth's upper atmosphere. It should determine the compositional structure of the upper atmosphere, and it should provide information useful in the design of future atmospheric studies. The investigation will use infrared absorption spectroscopy and will read sunlight that passes through the upper atmosphere with an interferometer.

MSFC MODEL      MODEL DESCRIPTION

70mm/22R        SUNRISE PHOTOGRAPHY  
70mm/22S        SUNSET PHOTOGRAPHY

g. Research Animal Holding Facility - Verification Test (RAHF-VT)

The objective of this investigation is to verify the performance of the RAHF. The RAHF is designed to support animals from rodents to small primates. It will house four monkeys and twenty-four rats. The animals will be monitored during the mission, and the food and water used will be recorded.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
ARC-DORB	CONFIGURE FOR DEORBIT
ARC-F01F	DEMS SWITCH SAFING
ARC-F02A	ANIMAL OBSERVATIONS
ARC-F02C	CONDENSATION BOTTLE CHECK/CHANGE
ARC-F02D	CAMERA OPS
ARC-F02E	FOOD TRAY CHANGEOUT
ARC-F02F	WASTE TRAY CHANGEOUT
ARC-F02H	TEMPORARY RESTRAINT OPS
ARC-F02K	BIOTELEMETRY SIGNAL OPTIMIZATION
ARC-PREP	CONFIGURE FOR ONORBIT

h. Urine Monitoring Investigation (UMI)

The primary objectives of the UMI are: verify the operation of the Urine Monitoring System (UMS), perform inflight calibration of the UMS, develop a procedure for measuring crew water intake, and verify a system of urine sample collection. The investigation will involve recording water intake of crewmembers from the galley and water supply. It will also use the UMS to measure urine volume of each crewmember and collect samples on two crewmembers.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
UMS-OPS	UMS ACT/DEACT
UMS-CAL	UMS CALIBRATION

i. Autogenic Feedback Training (AFT)

AFT is designed to help crewmembers overcome the effects of Zero-Gravity Motion Sickness. The crewmembers receive extensive preflight autogenic feedback training. Then they practice on orbit and during motion sickness attacks. Crewmembers will wear monitoring instruments and data recorders, and feedback displays will be used.



MSFC MODEL      MODEL DESCRIPTION

AFT      CHANGE CASSETTE/PERFORM DIAGNOSTIC SCALE

J. Ionization States of Solar and Galactic Cosmic Ray Heavy Nuclei (IONS)

This experiment is designed to study the low-energy cosmic ray ions of C, N, O, Ne, Ca, and Fe. The detector system consists of layers of plastics that show a trail of damage after being penetrated by cosmic rays. Study of these trails on the ground gives data as to the energies of the ions in the cosmic rays.

MSFC MODEL      MODEL DESCRIPTION

IONS      IONS EXPT OPS

K. Very Wide Field Camera (VWFC)

This is a reflight of the payload flown on Spacelab 1. It will make a very general UV survey of a large part of the celestial sphere. The camera operates in both the photometric and spectrometric modes.

MSFC MODEL      MODEL DESCRIPTION

VWFC      SETUP AND OPS OF CAMERA IN SAL

L. Aurora Observation

Observations of the high-latitude aurora will be made by eye, by TV, and by photography.

MSFC MODEL      MODEL DESCRIPTION

AURORA      AURORA OBSERVATION TIME

m. Television and Photography

The following list describes the television and photography scenes that are payload related.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
TV01	INITIAL SPACELAB INGRESS
TV02	RAHF TOUR
TV03	YCG OPS
TV04	OCM OPS
TV05	FES OPS
TV06	RAHF CONDENSATE BOTTLE CHANGE
TV07	RAT FOOD/WASTE MAINTENANCE
TV08	MONKEY FOOD/WASTE MAINTENANCE
TV09	RAHF TEMPORARY RESTRAINTS
TV10	ANIMAL OBSERVATION
TV13	TV13 - PRESS CONFERENCE
TV14	TV14 - SPACELAB DEACTIVATION AND EGRESS
TV15	SAL/YWFC OPS
TV17	FES OR YCG OPS
TV18	OCM OPS
TV19	AURORA OBSERVATIONS
TV20	SPACELAB TUNNEL OPS
TV23	FES PROCEDURES
16mm/03	YCG OPS
16mm/07	RAT FOOD MAINTENANCE
16mm/08	MONKEY WASTE TRAY OPS
35mm/03	YCG OPS
35mm/07	RAT FOOD MAINTENANCE
35mm/08	MONKEY FOOD/WASTE MAINTENANCE
35mm/19	AURORA OBSERVATIONS

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PRINCIPLE

B. Peyton  
A. McClelland (2)  
B. Hornsby

Lord Space Flight Center

420 OK, Parris (3)  
682 W. Newport  
732 D. Butler  
742 J. Barrowman (5)  
842 D.D. Henry (2)  
850 G. Moore (2)  
853 2/R. Morgan (10)  
872 J. Taylor (2)  
932 SASC/G. Lenebaugh

NASA Headquarters

EA-8/M. A. Sander  
LP-6/R. Snelter  
LPD-10/J. W. McCulla  
MGA-8/E. Markleroad  
MPS-5/W. Hamby  
OS-5/J. C. Hammingham  
OT-6/C. Lee  
SB-3/A. E. Neagossian

McDonnell Douglas - Houston

41/T. Bruchmiller  
A. French  
R. LaCerna  
A2/R. T. Gullerian  
Y. Harbo  
A3/P. Dawdy  
C2/R. Eggers  
C4/R. Cannon  
Y. W. Park  
M. Rossmann  
CSM, M. Ferrell (2)  
D2/R. Theobald  
M. D. Pipher (2)

Lanaley Research Center

758

Lockheed - Houston

C15/A. Martin (2)

Rockwell - Houston

200 W.O. E. Hines

IBM - Houston

MC/5/B. Kalkhorst

Kennedy Space Center

CS-MVD-2/C. B. Roberts (4)  
CS-MVD-3/E. Nelson  
CV-DEL/A. Zeman  
MOTSCOR. C. Adams (2)

T. Smith  
J. Newsome

TO-NIS-KSC/J. Baker (2)

VE-MSD-11/R. Votaw  
VT-A1/R. W. Nygren (2)  
VT-MSD/R. L. Staudman  
ZK-25/Hodswell Tech Data (19)

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P. S. Greenwood

1A25A, Dearborn

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Singer Link - Houston

SMS Data Library  
K. Nelson

Honeywell Inc. Avionics Division

13250 U.S. Hwy 19

Clearwater, FL 33516

818-5/J. R. Peterson

Ford Aerospace - Houston

SSD-1A/Tech Lib (14)

SSD-208/G. Egan (2)

SSD-30CF, Pima (2)

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**BASIC**

# Flight Data File Crew Activity Plan

## STS 51-B

Spacelab 3

Mission Operations Directorate  
Operations Division

Basic  
September 13, 1984

EVENTS	EST		
Launch	17:30	Wed	November 21
Press Conference	04:45	Sun	November 25
MUSAT Deploy	03:30	Wed	November 28
Landing - KSC	17:34	Wed	November 28

# NASA

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

MISSION OPERATIONS DIRECTORATE

STS 51-B CREW ACTIVITY PLAN  
SPACELAB 3

BASIC  
September 13, 1984

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Changes to the distribution list should be submitted in writing to OHA/Gwen Butler, Bldg 4, Rm 373, 713-483-5224.



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The following people contributed significantly in preparing the SI-B  
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STS 51-B CREW ACTIVITY PLAN

LIST OF EFFECTIVE PAGES

BASIC 09/13/84

1.....	CAP/51-B/BAS	3-8.....	CAP/51-B/BAS
11.....	CAP/51-B/BAS	3-9.....	CAP/51-B/BAS
111.....	CAP/51-B/BAS	3-10.....	CAP/51-B/BAS
1v.....	CAP/51-B/BAS	3-11.....	CAP/51-B/BAS
v.....	CAP/51-B/BAS	3-12.....	CAP/51-B/BAS
vi.....	CAP/51-B/BAS	3-13.....	CAP/51-B/BAS
vii.....	CAP/51-B/BAS	3-14.....	CAP/51-B/BAS
viii.....	CAP/51-B/BAS	3-15.....	CAP/51-B/BAS
1-1.....	CAP/51-B/BAS	3-16.....	CAP/51-B/BAS
1-2.....	CAP/51-B/BAS	3-17.....	CAP/51-B/BAS
1-3.....	CAP/51-B/BAS	3-18.....	CAP/51-B/BAS
1-4.....	CAP/51-B/BAS	3-19.....	CAP/51-B/BAS
2-1.....	CAP/51-B/BAS	3-20.....	CAP/51-B/BAS
2-2.....	CAP/51-B/BAS	3-21.....	CAP/51-B/BAS
2-3.....	CAP/51-B/BAS	3-22.....	CAP/51-B/BAS
2-4.....	CAP/51-B/BAS	3-23.....	CAP/51-B/BAS
2-5.....	CAP/51-B/BAS	3-24.....	CAP/51-B/BAS
2-6.....	CAP/51-B/BAS	3-25.....	CAP/51-B/BAS
2-7.....	CAP/51-B/BAS	3-26.....	CAP/51-B/BAS
2-8.....	CAP/51-B/BAS	3-27.....	CAP/51-B/BAS
2-9.....	CAP/51-B/BAS	3-28.....	CAP/51-B/BAS
2-10.....	CAP/51-B/BAS	3-29.....	CAP/51-B/BAS
2-11.....	CAP/51-B/BAS	3-30.....	CAP/51-B/BAS
2-12.....	CAP/51-B/BAS	3-31.....	CAP/51-B/BAS
2-13.....	CAP/51-B/BAS	3-32.....	CAP/51-B/BAS
2-14.....	CAP/51-B/BAS	3-33.....	CAP/51-B/BAS
2-15.....	CAP/51-B/BAS	3-34.....	CAP/51-B/BAS
2-16.....	CAP/51-B/BAS	3-35.....	CAP/51-B/BAS
2-17.....	CAP/51-B/BAS	3-36.....	CAP/51-B/BAS
2-18.....	CAP/51-B/BAS	3-37.....	CAP/51-B/BAS
2-19.....	CAP/51-B/BAS	3-38.....	CAP/51-B/BAS
2-20.....	CAP/51-B/BAS	3-39.....	CAP/51-B/BAS
2-21.....	CAP/51-B/BAS	3-40.....	CAP/51-B/BAS
2-22.....	CAP/51-B/BAS	3-41.....	CAP/51-B/BAS
2-23.....	CAP/51-B/BAS	3-42.....	CAP/51-B/BAS
2-24.....	CAP/51-B/BAS	3-43.....	CAP/51-B/BAS
2-25.....	CAP/51-B/BAS	3-44.....	CAP/51-B/BAS
2-26.....	CAP/51-B/BAS	3-45.....	CAP/51-B/BAS
2-27.....	CAP/51-B/BAS	3-46.....	CAP/51-B/BAS
2-28.....	CAP/51-B/BAS	3-47.....	CAP/51-B/BAS
2-29.....	CAP/51-B/BAS	3-48.....	CAP/51-B/BAS
2-30.....	CAP/51-B/BAS	3-49.....	CAP/51-B/BAS
3-1.....	CAP/51-B/BAS	3-50.....	CAP/51-B/BAS
3-2.....	CAP/51-B/BAS	3-51.....	CAP/51-B/BAS
3-3.....	CAP/51-B/BAS	3-52.....	CAP/51-B/BAS
3-4.....	CAP/51-B/BAS	3-53.....	CAP/51-B/BAS
3-5.....	CAP/51-B/BAS	3-54.....	CAP/51-B/BAS
3-6.....	CAP/51-B/BAS	3-55.....	CAP/51-B/BAS
3-7.....	CAP/51-B/BAS	3-56.....	CAP/51-B/BAS

CAP/51-B/BAS

3-57..... CAP/51-B/BAS  
3-58..... CAP/51-B/BAS  
3-59..... CAP/51-B/BAS  
3-60..... CAP/51-B/BAS  
3-61..... CAP/51-B/BAS  
3-62..... CAP/51-B/BAS  
3-63..... CAP/51-B/BAS  
3-64..... CAP/51-B/BAS  
3-65..... CAP/51-B/BAS  
3-66..... CAP/51-B/BAS  
3-67..... CAP/51-B/BAS  
3-68..... CAP/51-B/BAS  
4-1..... CAP/51-B/BAS  
4-2..... CAP/51-B/BAS  
4-3..... CAP/51-B/BAS  
5-1..... CAP/51-B/BAS  
5-2..... CAP/51-B/BAS  
5-3..... CAP/51-B/BAS  
5-4..... CAP/51-B/BAS  
6-1..... CAP/51-B/BAS  
6-2..... CAP/51-B/BAS  
6-3..... CAP/51-B/BAS  
6-4..... CAP/51-B/BAS  
6-5..... CAP/51-B/BAS  
6-6..... CAP/51-B/BAS  
6-7..... CAP/51-B/BAS  
6-8..... CAP/51-B/BAS  
6-9..... CAP/51-B/BAS  
6-10..... CAP/51-B/BAS

STS 51-B DAP CUE CARDS

DAP Book Front Cover.....	4-4	CAP/51-B//BAS
UNITY FIG (Back of DAP Book Front Cover).....	4-4	CAP/51-B/O/BAS
DAP A TOC.....	4-5	CAP/51-B/O/BAS
DAP A1.....	4-5	CAP/51-B/O/BAS
A1.....	4-5	CAP/51-B/O/BAS
DAP A2.....	4-6	CAP/51-B/O/BAS
A2.....	4-6	CAP/51-B/O/BAS
DAP A3.....	4-6	CAP/51-B/O/BAS
A3.....	4-6	CAP/51-B/O/BAS
DAP A4.....	4-7	CAP/51-B/O/BAS
A4.....	4-7	CAP/51-B/O/BAS
DAP A5.....	4-7	CAP/51-B/O/BAS
A5.....	4-7	CAP/51-B/O/BAS
DAP A6.....	4-8	CAP/51-B/O/BAS
A6.....	4-8	CAP/51-B/O/BAS
Blank.....	4-8	CAP/51-B/O/BAS
DAP B TOC.....	4-9	CAP/51-B/O/BAS
DAP B1.....	4-9	CAP/51-B/O/BAS
B1.....	4-9	CAP/51-B/O/BAS
DAP B2.....	4-9	CAP/51-B/O/BAS
B2.....	4-9	CAP/51-B/O/BAS
DAP B3.....	4-10	CAP/51-B/O/BAS
B3.....	4-10	CAP/51-B/O/BAS
DAP B4.....	4-10	CAP/51-B/O/BAS
B4.....	4-10	CAP/51-B/O/BAS
DAP B5.....	4-11	CAP/51-B/O/BAS
B5.....	4-11	CAP/51-B/O/BAS
Blank.....	4-11	CAP/51-B/O/BAS
DAP Book (Back Cover).....	4-12	CAP/51-B/O/BAS

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CONTENTSPAGE

INTRODUCTION.....	vii
SI-D OVERVIEW.....	1-1
SUMMARY TIMELINE.....	2-1
DETAILED TIMELINE.....	3-1
SILVER TEAM FLT DAY 1.....	3-3
FLT DAY 2.....	3-7
FLT DAY 3.....	3-15
FLT DAY 4.....	3-25
FLT DAY 5.....	3-35
FLT DAY 6.....	3-45
FLT DAY 7.....	3-53
FLT DAY 8.....	3-63
GOLD TEAM FLT DAY 1.....	3-2
FLT DAY 2.....	3-10
FLT DAY 3.....	3-18
FLT DAY 4.....	3-28
FLT DAY 5.....	3-38
FLT DAY 6.....	3-48
FLT DAY 7.....	3-56
FLT DAY 8.....	3-66
SI-B GAP BOOK.....	4-1
SI-B ATTITUDE TIMELINE.....	5-1
CREW ACTIVITY PLAN NOTES.....	6-1

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## INTRODUCTION

The S1-B Crew Activity Plan is the flight data article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry checklists. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive and the requirements of the S1-B Flight Requirements Document (March 1984).

The flight profile (OFP Cycle 1 trajectory data) used for this Crew Activity Plan is for a launch date of November 21, 1984. The official launch date is January 17, 1985.

This edition agrees with the Basic Payload CAP (PCAP) produced by the Marshall Space Flight Center (MSFC) with the exception of the Northern Utah Satellite (NUSAT) deploy at 6/10:00.



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SI-B OVERVIEW

OVERVIEW

SILV GOLD		FLIGHT 575 51-0		EDITION 0451C		PUB. DATE 9/13/84	
REFLECT							
SILV	POST INSERTION	SL ACTIVATION	SLEEP	PER	WMP	WPC	WCC
GOLD	POST INSERTION	SL ACTIVATION	SLEEP	PER	WMP	WPC	WCC
REFLECT							
SILV	PER	SLEEP	PER	WMP	WPC	WCC	WCC
GOLD	OP & ORWP OPERATIONS	OP & ORWP OPERATIONS	ATMOS & WAGON DATA TAKES	PER	SLEEP	PER	OP & ORWP OPERATIONS
REFLECT							
SILV	SLEEP	PER	PER	WMP	WPC	WCC	WCC
GOLD	OP & ORWP OPERATIONS	OP & ORWP OPERATIONS	ATMOS & WAGON DATA TAKES	PER	SLEEP	PER	OP & ORWP OPERATIONS
REFLECT							
SILV	SLEEP	PER	PER	WMP	WPC	WCC	WCC
GOLD	OP & ORWP OPERATIONS	OP & ORWP OPERATIONS	ATMOS & WAGON DATA TAKES	PER	SLEEP	PER	OP & ORWP OPERATIONS

SILV GOLD		FLIGHT 575 51-0		EDITION BASIC		PUB. DATE 9/13/86	
REF: 1214	SILV	SLEEP	PSR	GDP			
	GOLD				PER	SLEEP	CON & CAMP OPERATIONS
REF: 1215	SILV	SLEEP	PSR	GDP	FEE SAMPLE #2	FEE SAMPLE #3	WINDS DATA TIMES
	GOLD				PER	SLEEP	CON & CAMP OPERATIONS
REF: 1216	SILV	SLEEP	PSR	FEE CAD NOT FIRE STOP	WINDS DATA TIMES	DEACT	DEACT
	GOLD				SLEEP	PER	DEACT
REF: 1217	SILV						
	GOLD						

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SUMMARY  
TIMELINE

SUMMARY TIMELINE

















GMT (DIMEN)		NET (DIMEN)		CSI (DIMEN)		PG/DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE		
3200000000 3200000000		0000000000 0000000000		1200000000 1200000000		/ 120 GMT	37.0	●	NOVEMBER 23, 1964	574 91-8	001TC	00000000		
NET 1000 12		12	13	14	15	16	17	18	19	20	21	22	23	24
SILVER	PLT		VC-10A 0430 ED 0400	VC-10A 0430 ED 0400			LUNCH	VC-10A 0430 ED 0400	VC-10A 0430 ED 0400	VC-10A 0430 ED 0400	VC-10A 0430 ED 0400			
	MS2						LUNCH						ONE SLEEP ACT	
	PSW						LUNCH							
EARTH TRACE														
ESTON COVERAGE														
TDDS														
OKURR KSL COM														
NOTES:		<p>           * PERS-003      * PERS-004      * PERS-005      * PERS-006      * PERS-007      * PERS-008      * PERS-009      * PERS-010            @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME      @ OTHER SUNRISE DATA TIME            @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME      @ OTHER SUNSET DATA TIME         </p>												



GMT (DINIM)	MET (DINIM)	EST (DINIM)	ED/DOY	BETA	MOON	HOUSTON DATE	FLIGHT*	EDITION	PUB. DATE
370123133 / 370111132	007001100 / 007111100	370117130 / 370105130	/ 370 GMT	31.3		NOVEMBER 23, 1966	ATS 91-0	00111	01/1966
GMT 1802	GMT 1320						SILVER PRO		
PLT									
SILVER	MS2		SLEEP			DN MET	POST SLEEP ACT	WSP	DPF
	PSH					DN MET		PCS-2	PCS-2
0011	32	33	34	35	36	37	38	39	40
STON	COVERAGE								
TOPS									
UK006	CLC								
M20	ENH								
NOTES:									























COMP (DZ0000)	WPT (DZ0000)	CST (DZ0000)	ED/DTY	REFR	MUDN	HOUSIGN DATE	FLIGHT	EDITION	PUB. DATE
						NOVEMBER 24 1990	574 51-0	00101	9/25/90
<p>WPT 0000 12 13 14 15 16 17 18 19 20 21 22 23 24</p>									
<p>PT</p>									
<p>SLEEP</p>									
<p>AS</p>									
<p>72 73 74 75 76 77 78 79</p>									
<p>55 PM</p>									
<p>FORM 6</p>									
<p>NOTES:</p>									















GMT	UT	UT	(020000)	CSP	(020000)	ED/ DDT	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
0000	0000	0000	000000	000000	000000	000000	0000	0000	000000 20 1966	0000	0000	000000
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2-30

CAP/51-B/BAS

DETAILED TIMELINE

DETAILED  
TIMELINE

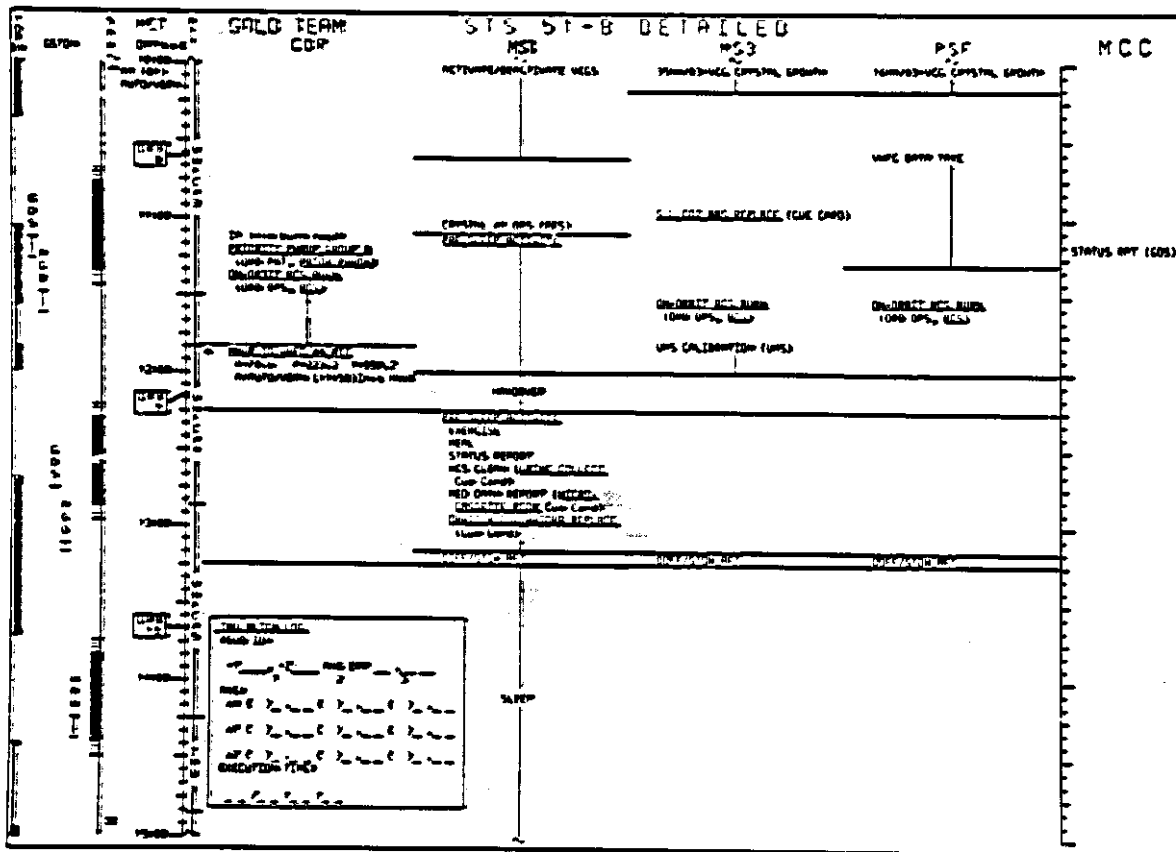


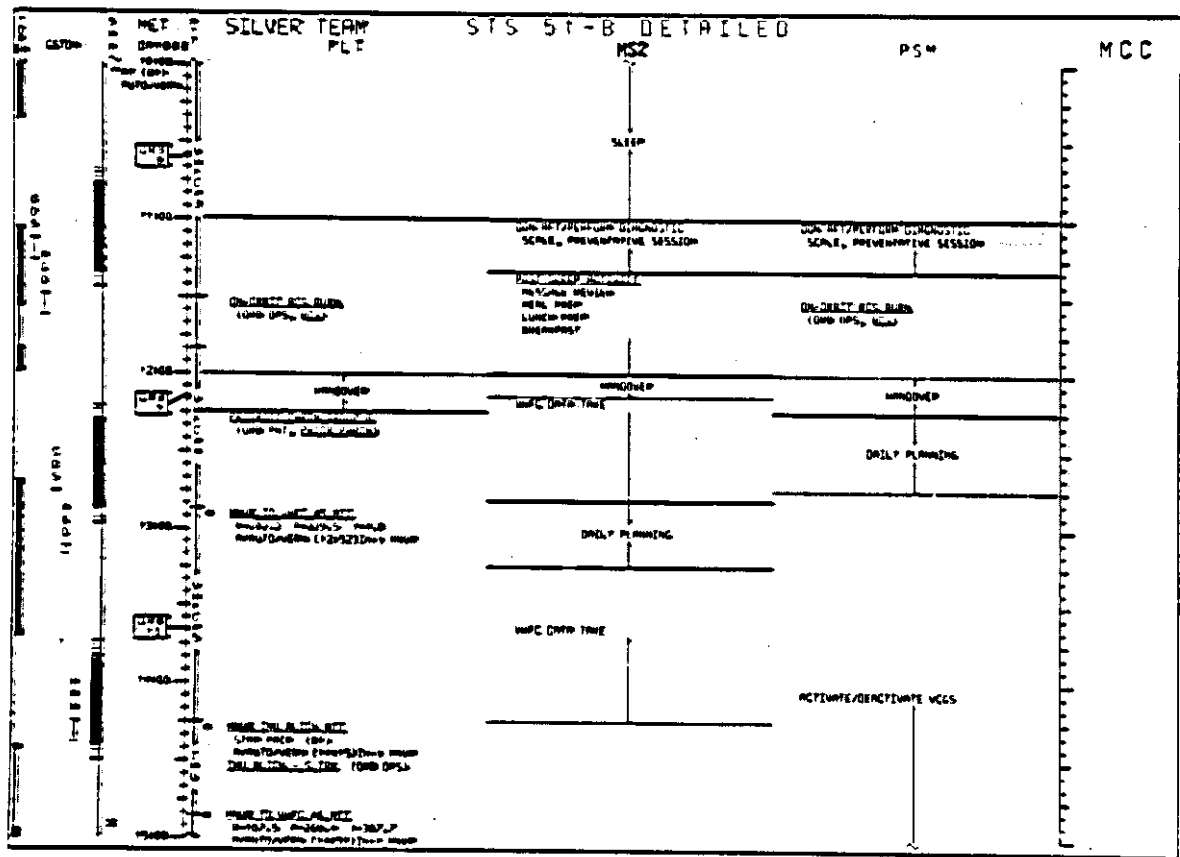


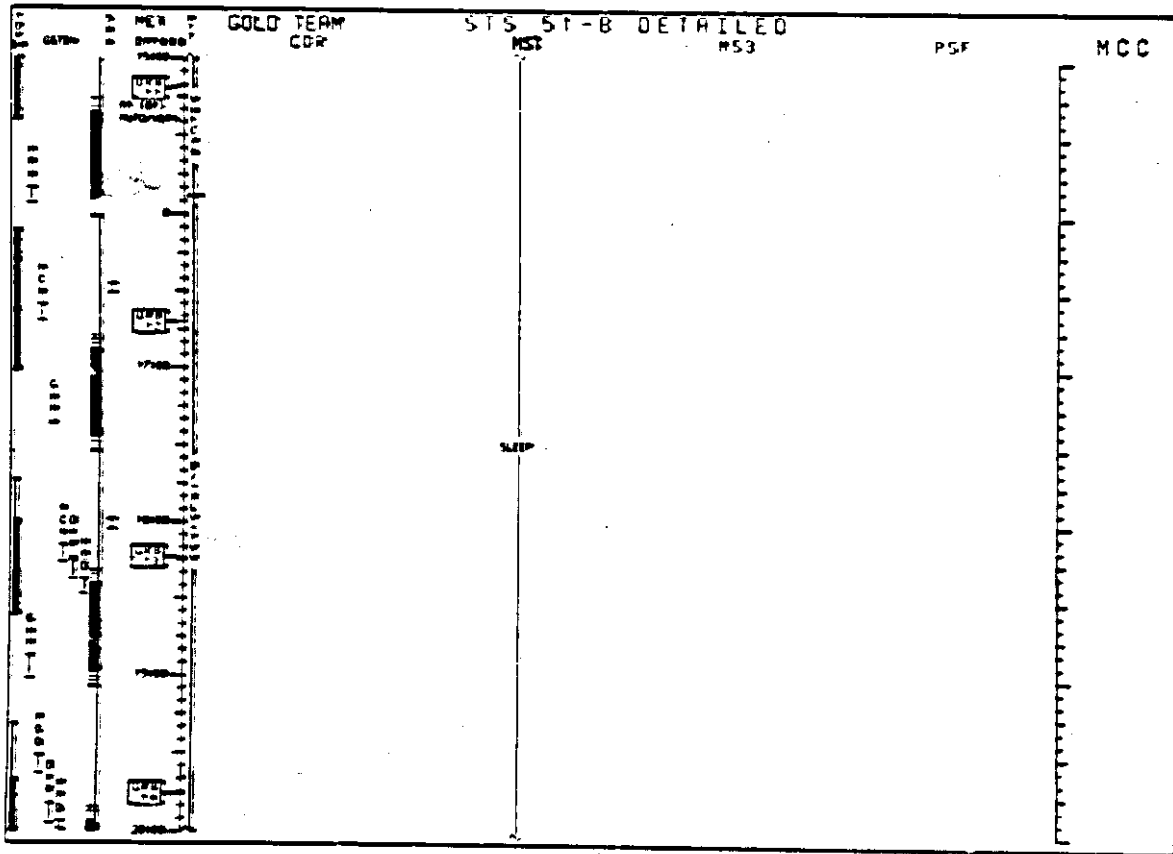




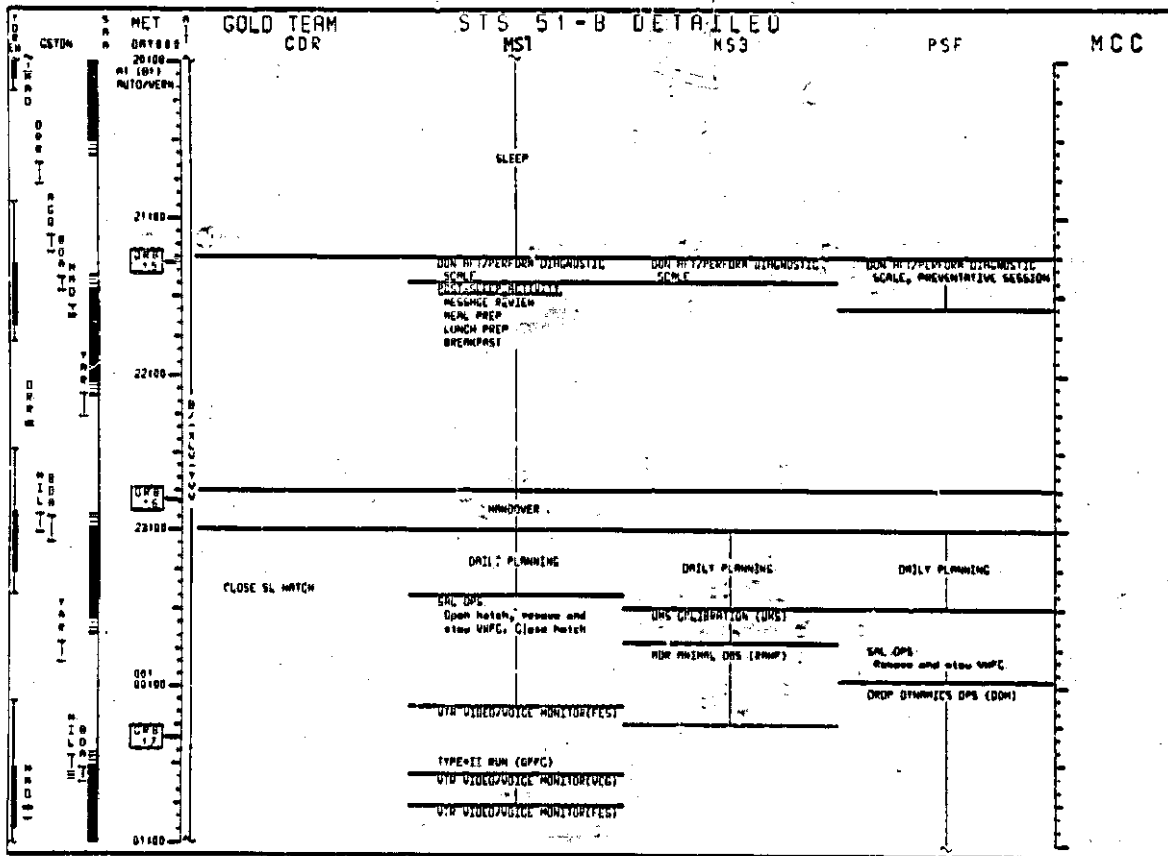


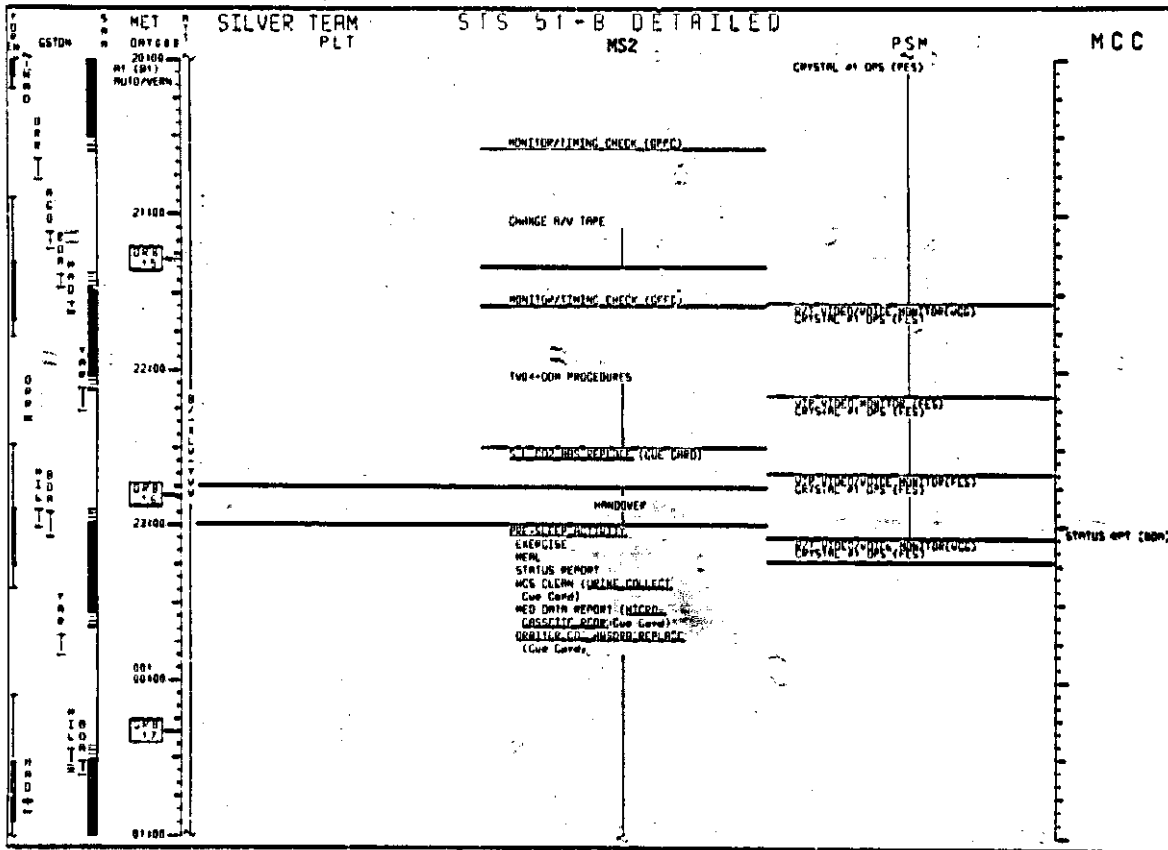








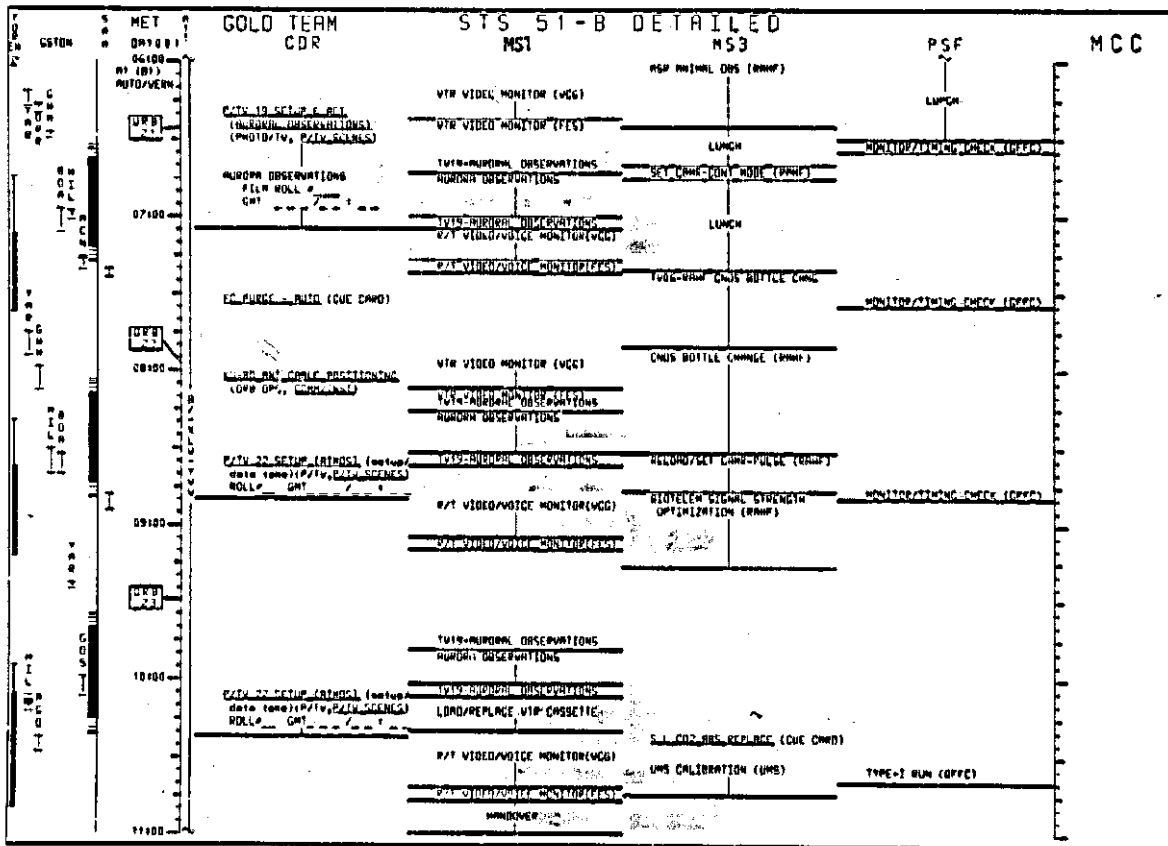


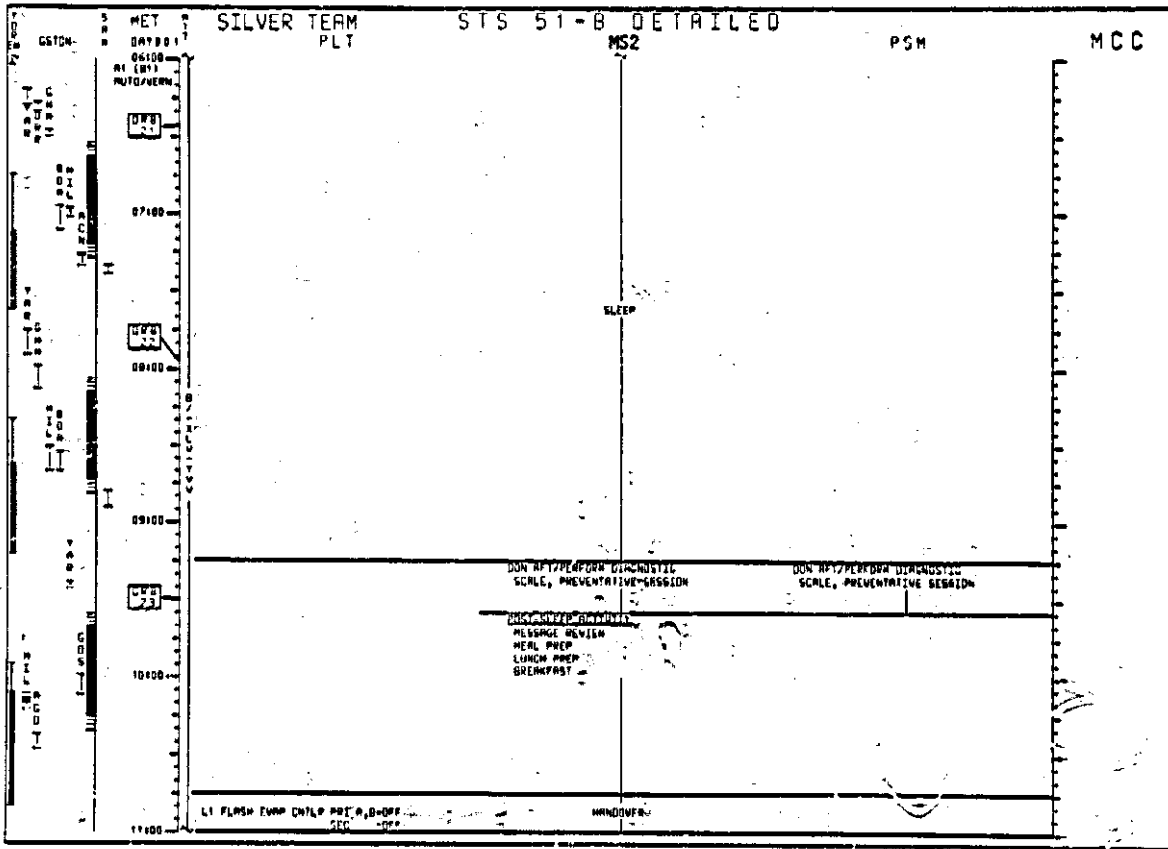








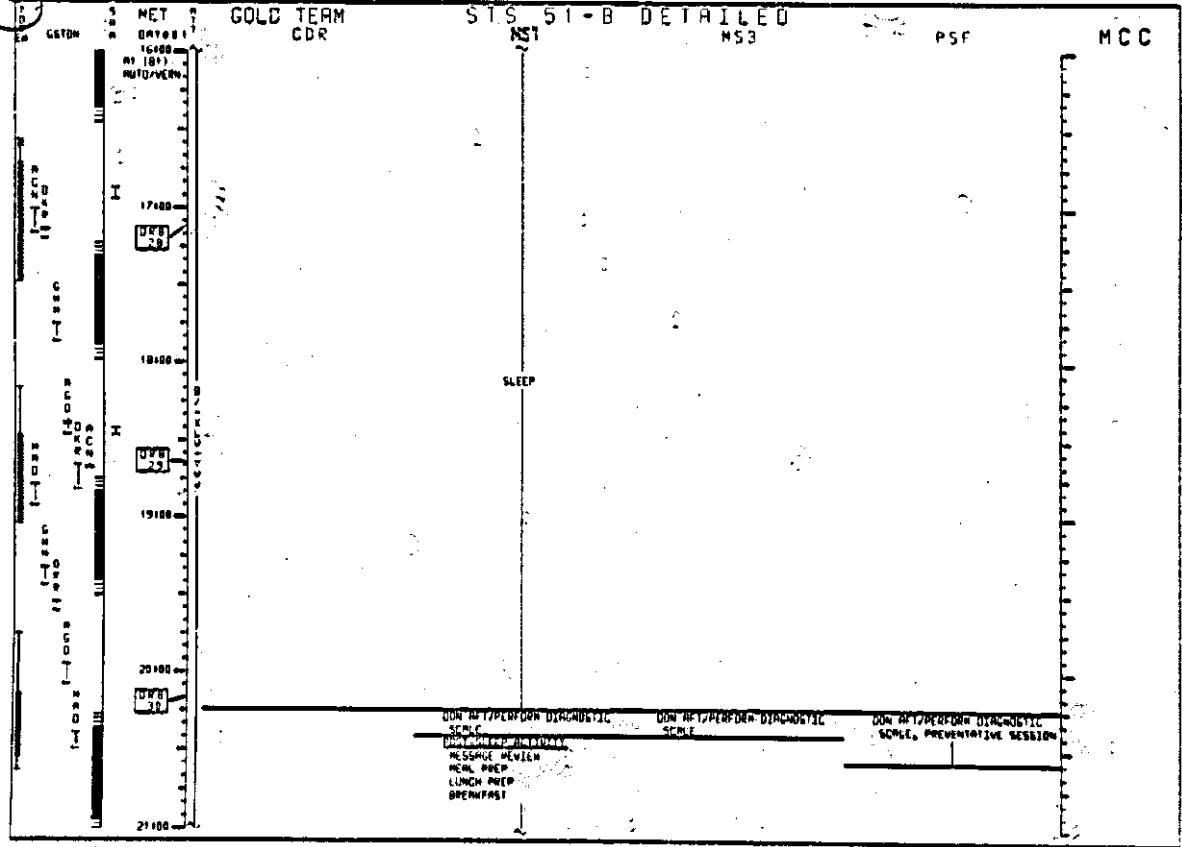




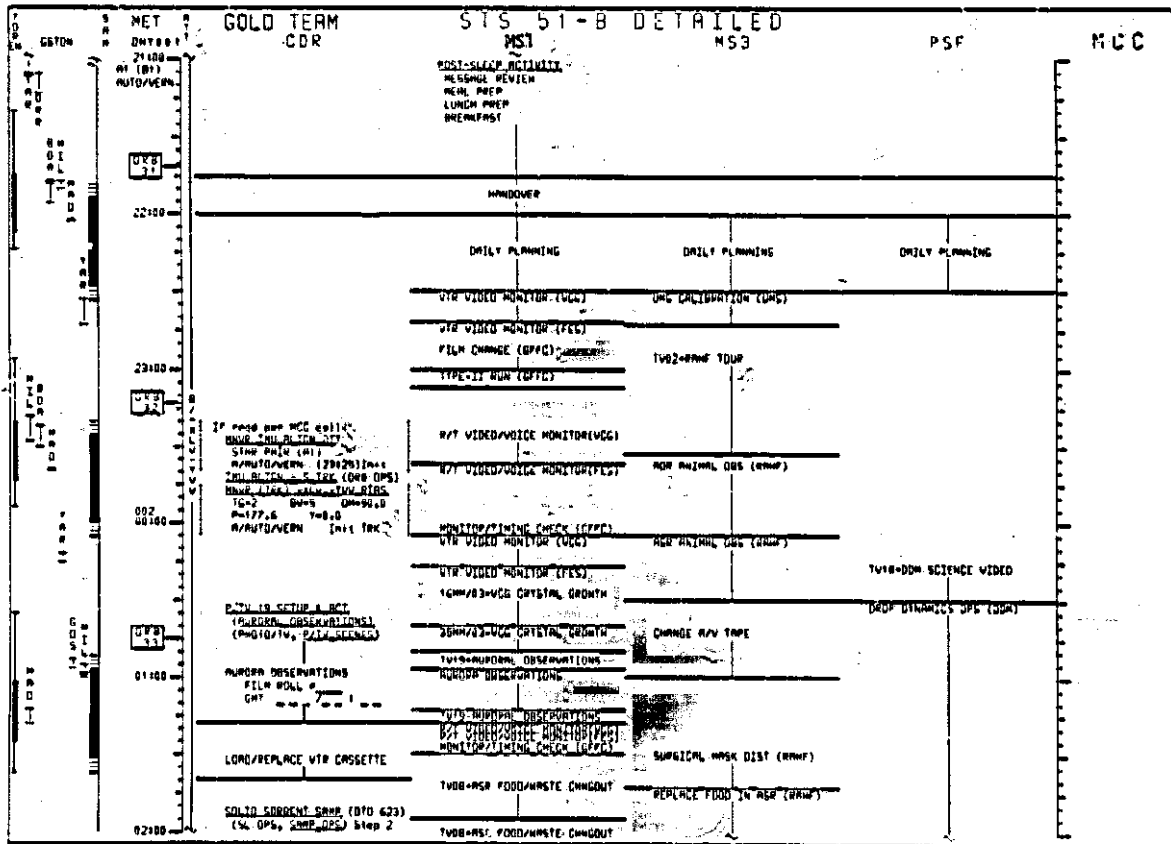


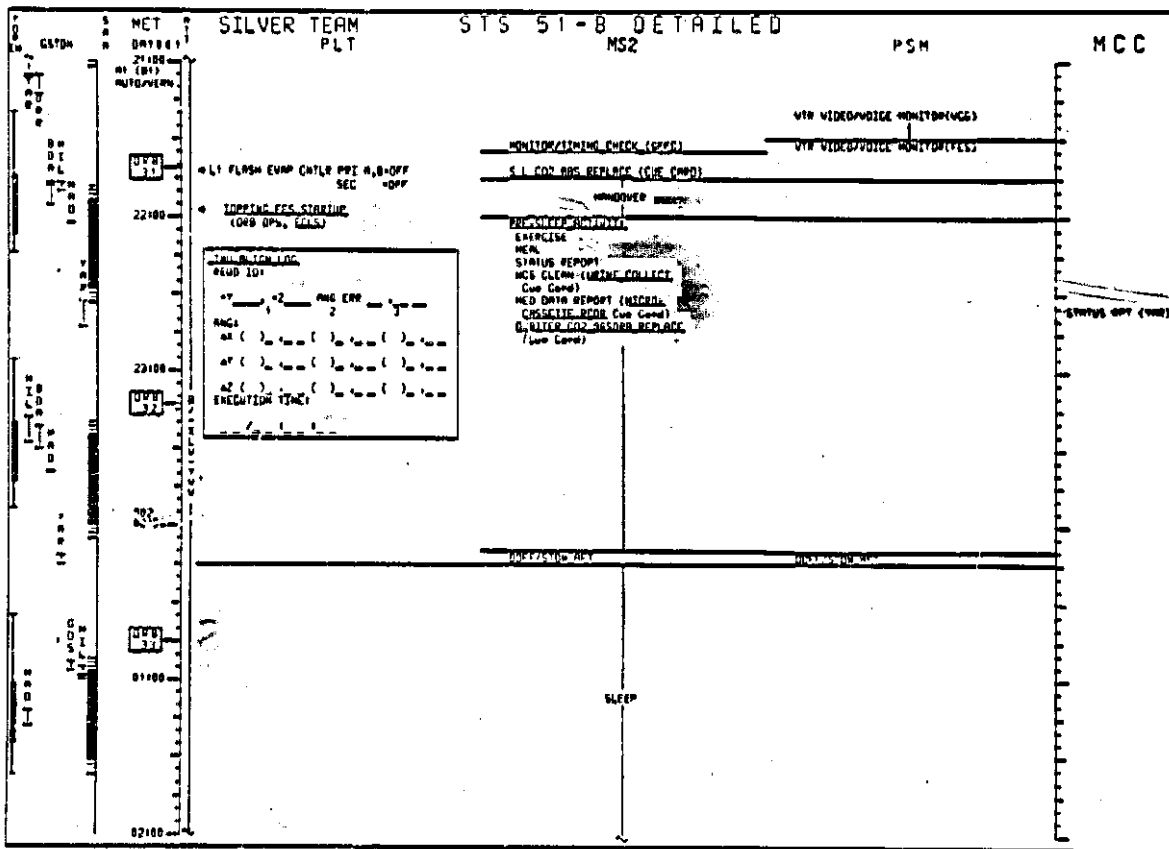


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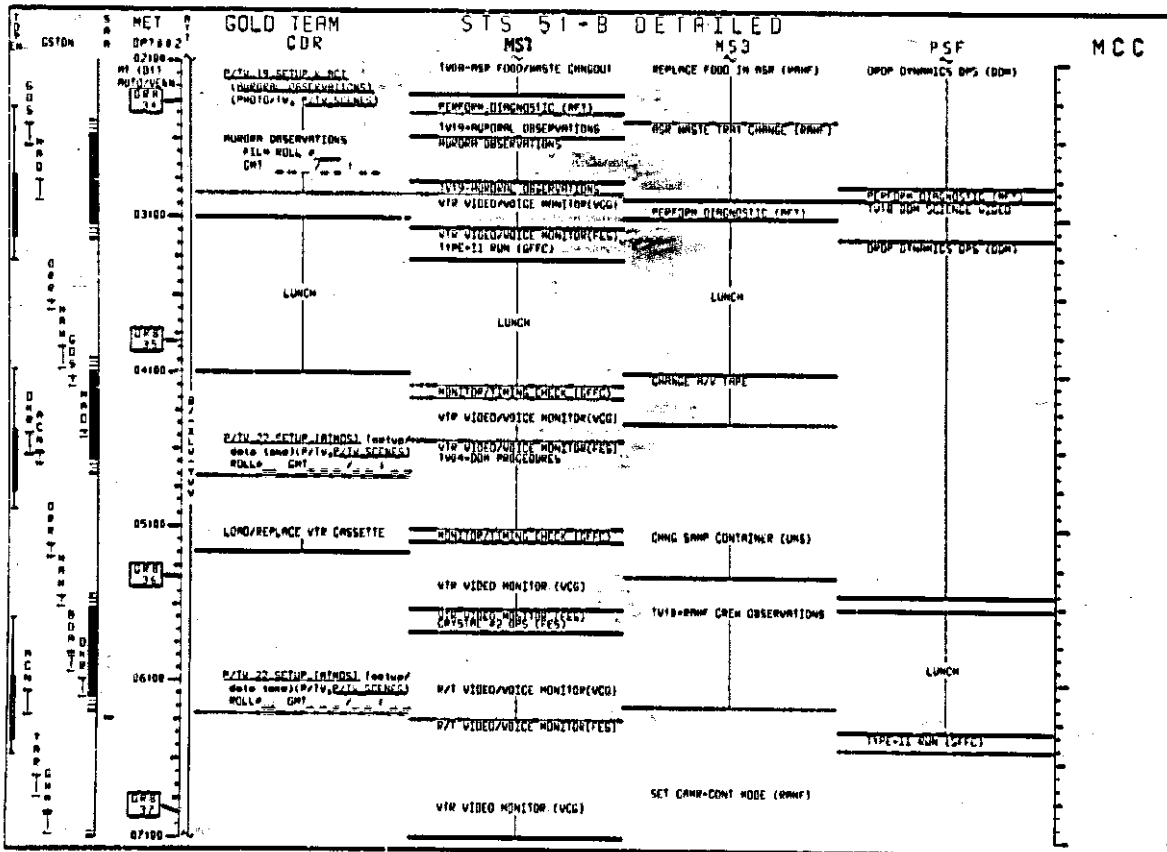


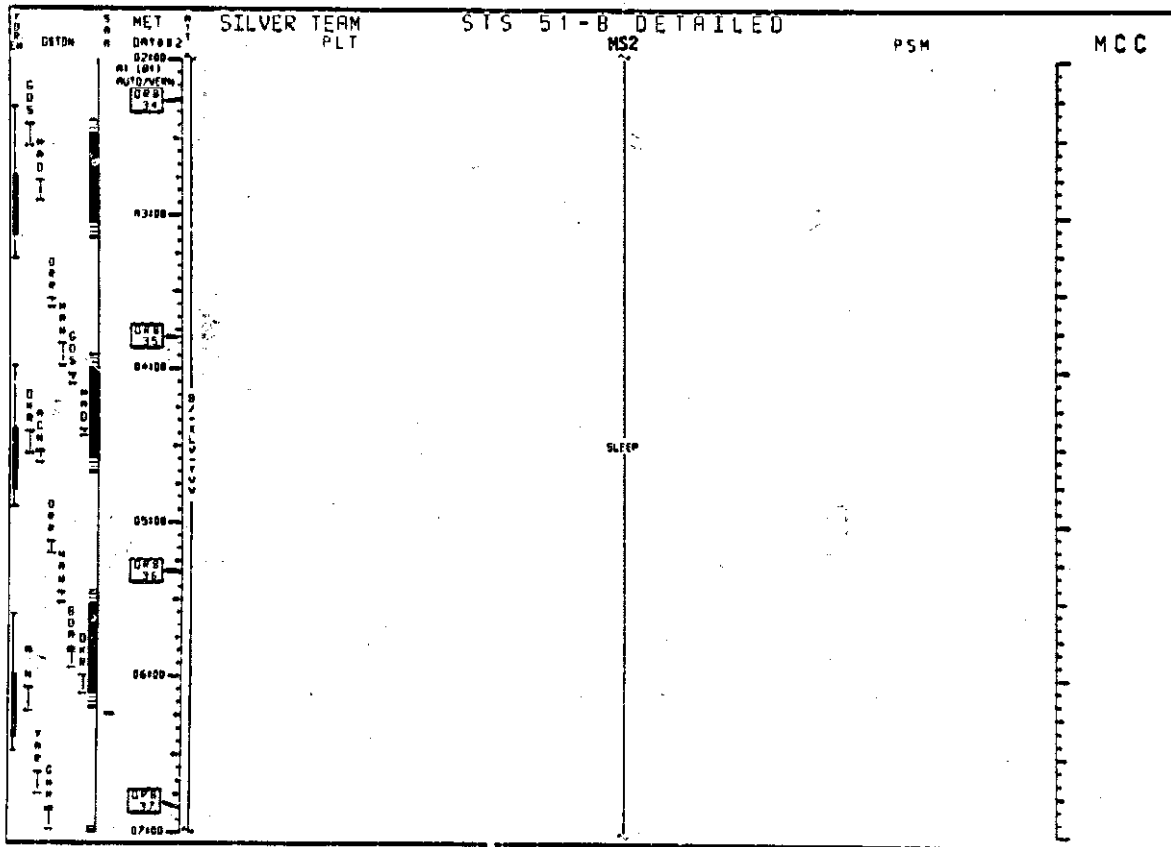










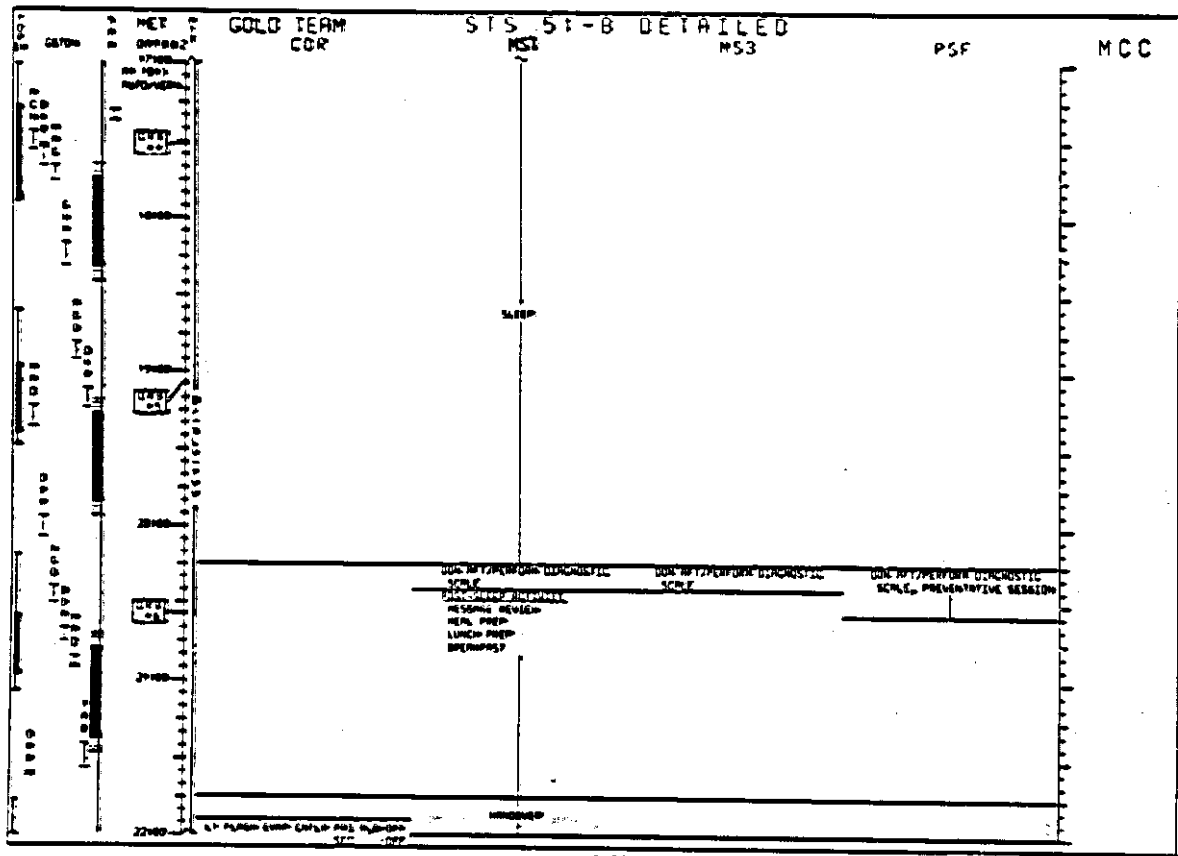












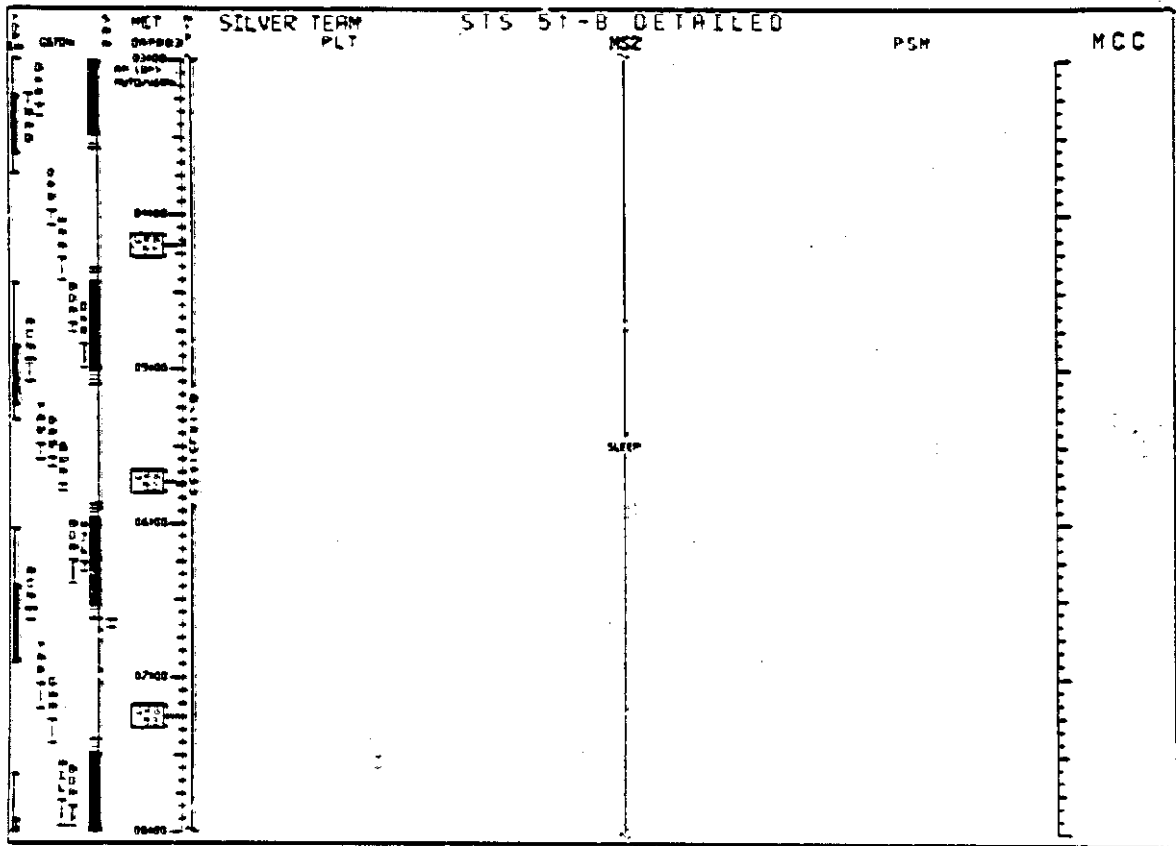




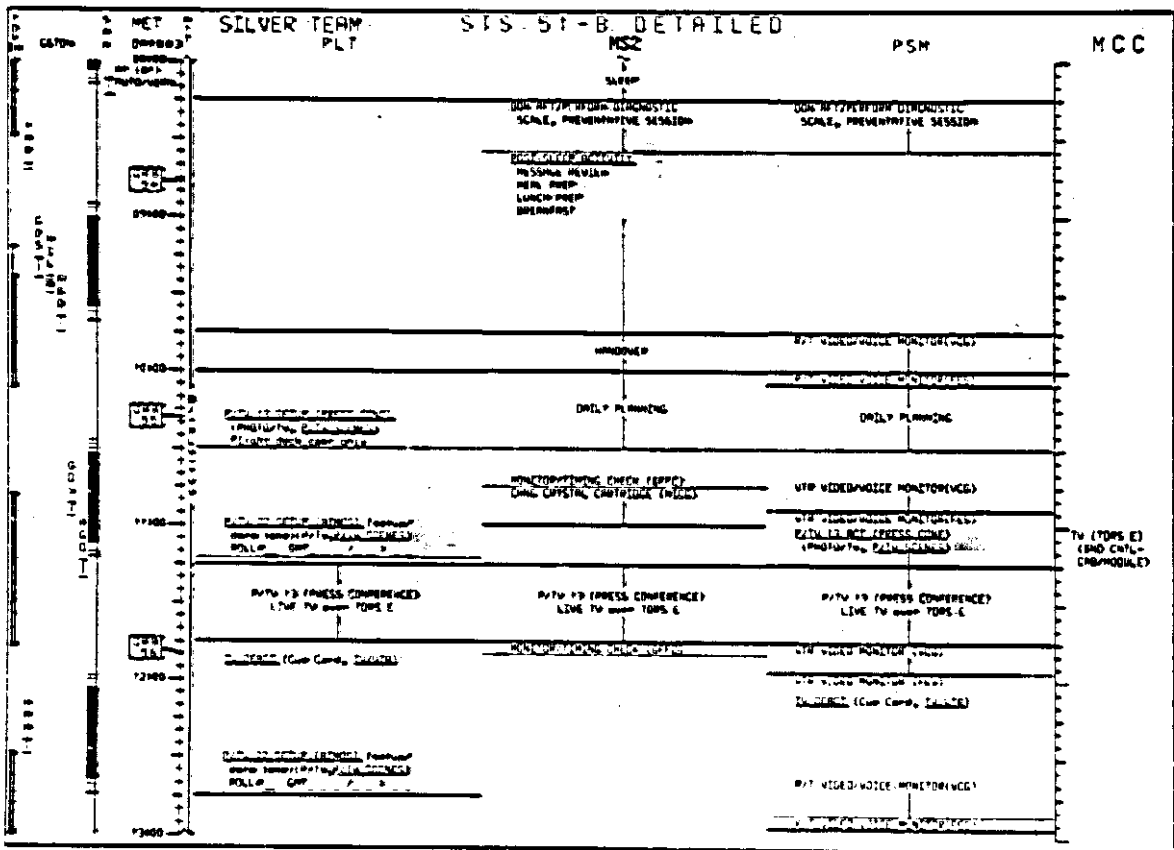


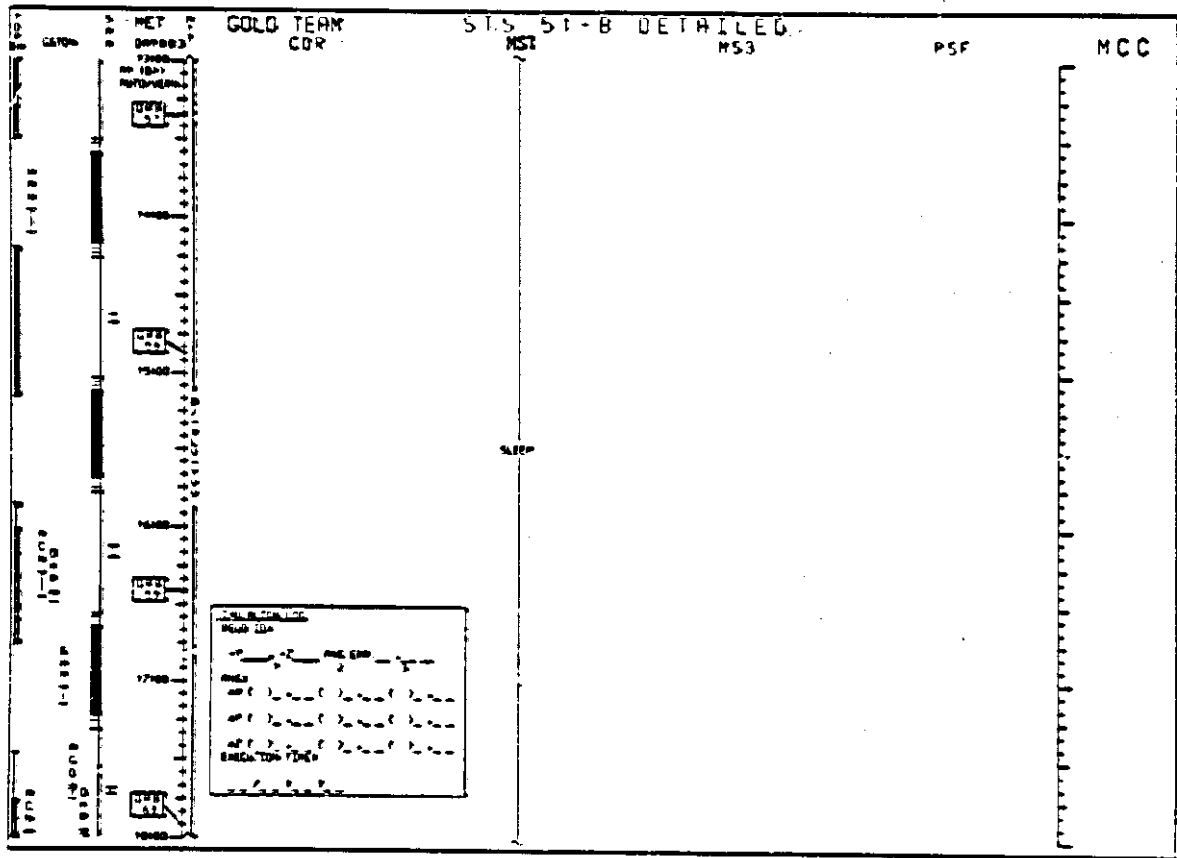








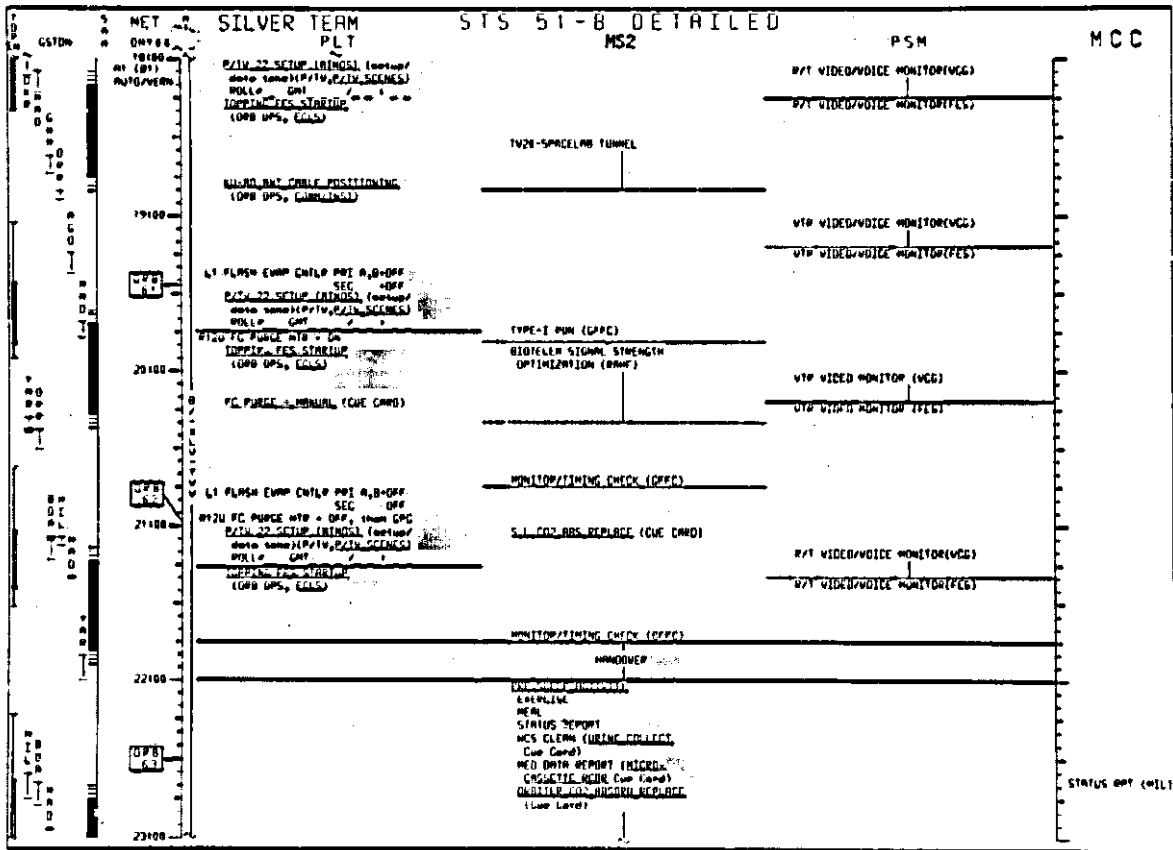


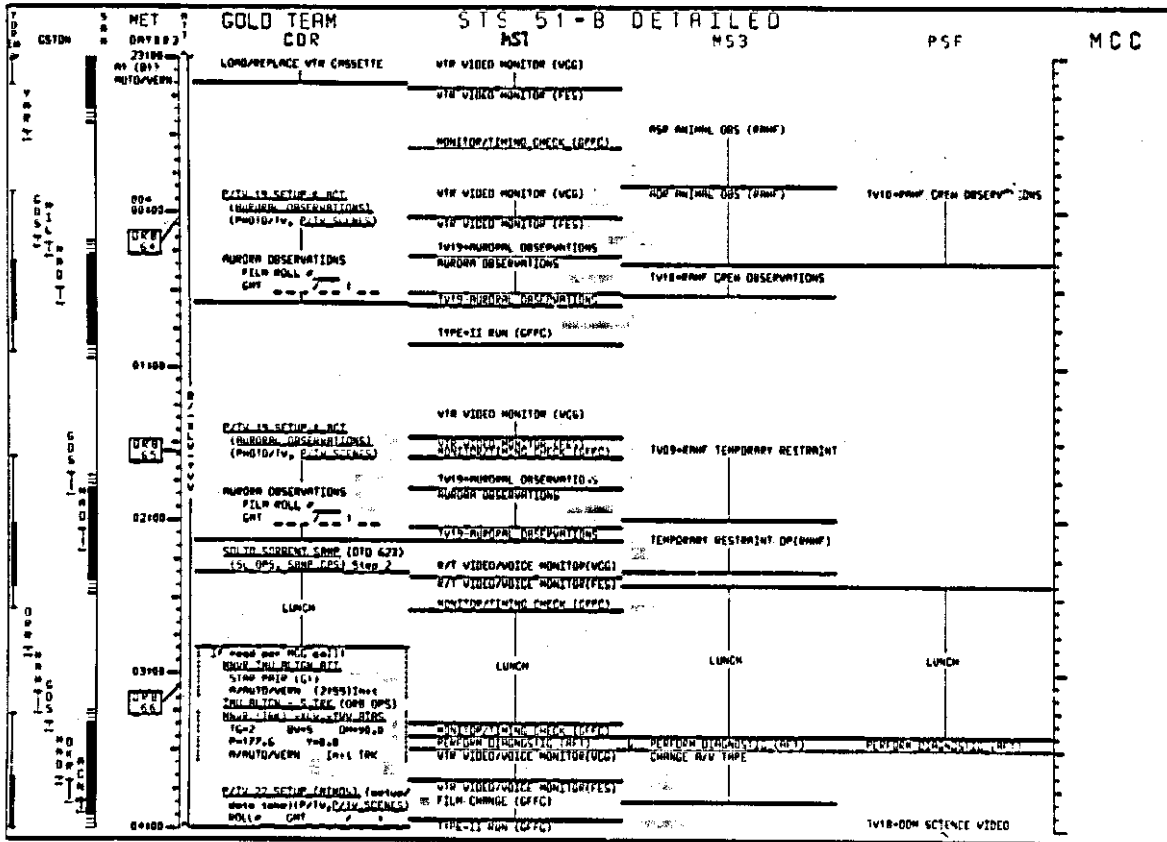


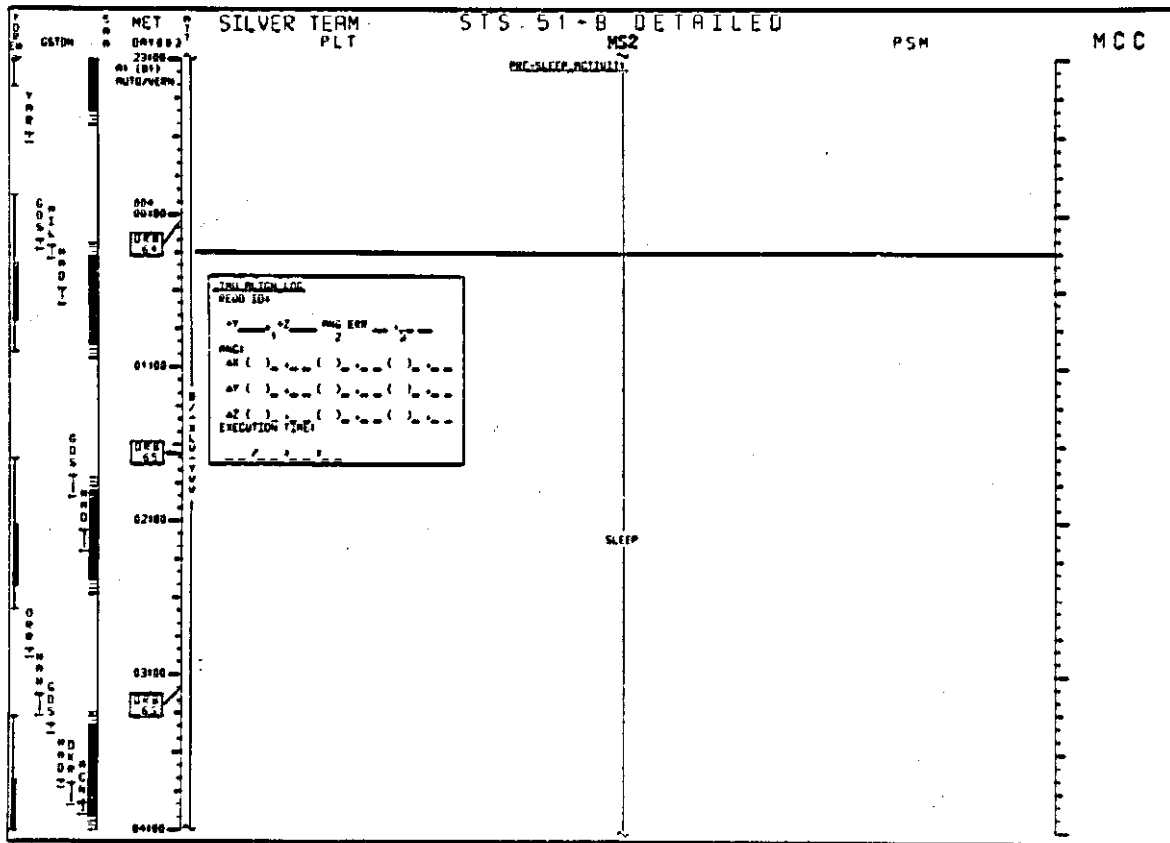














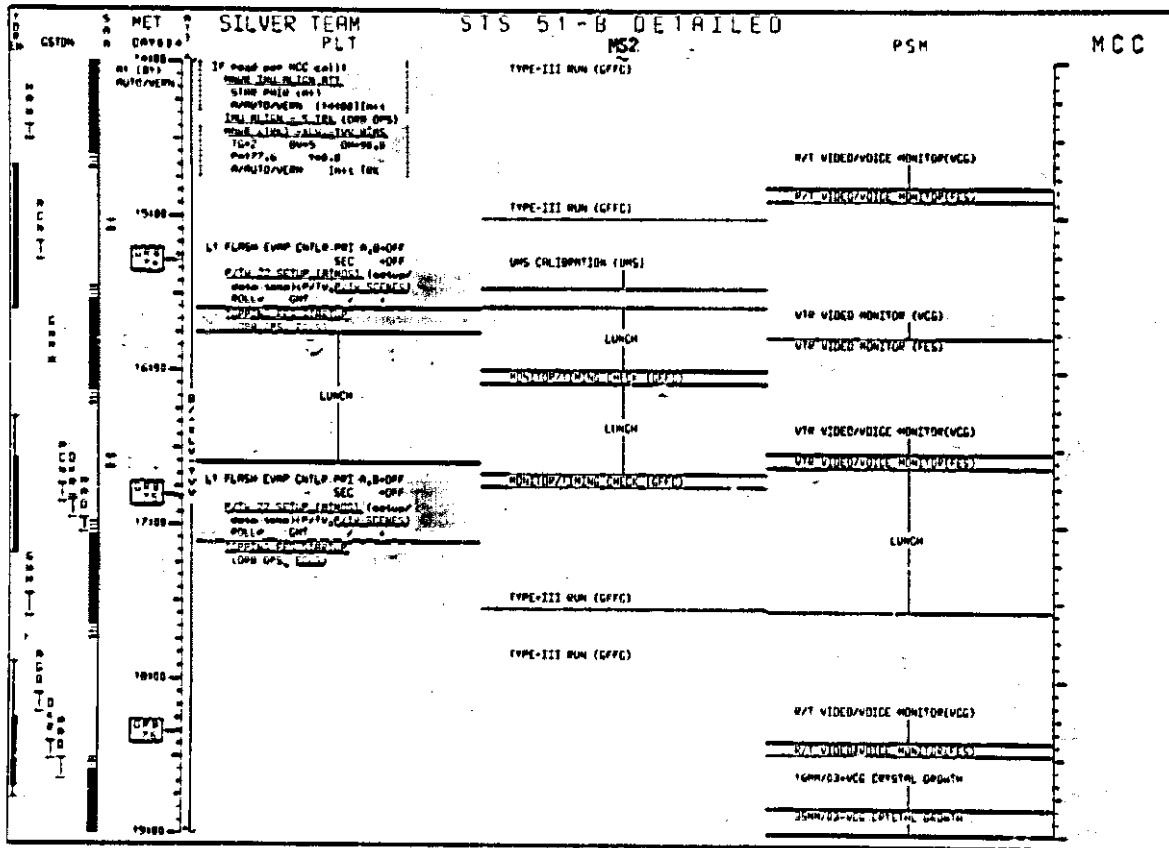
















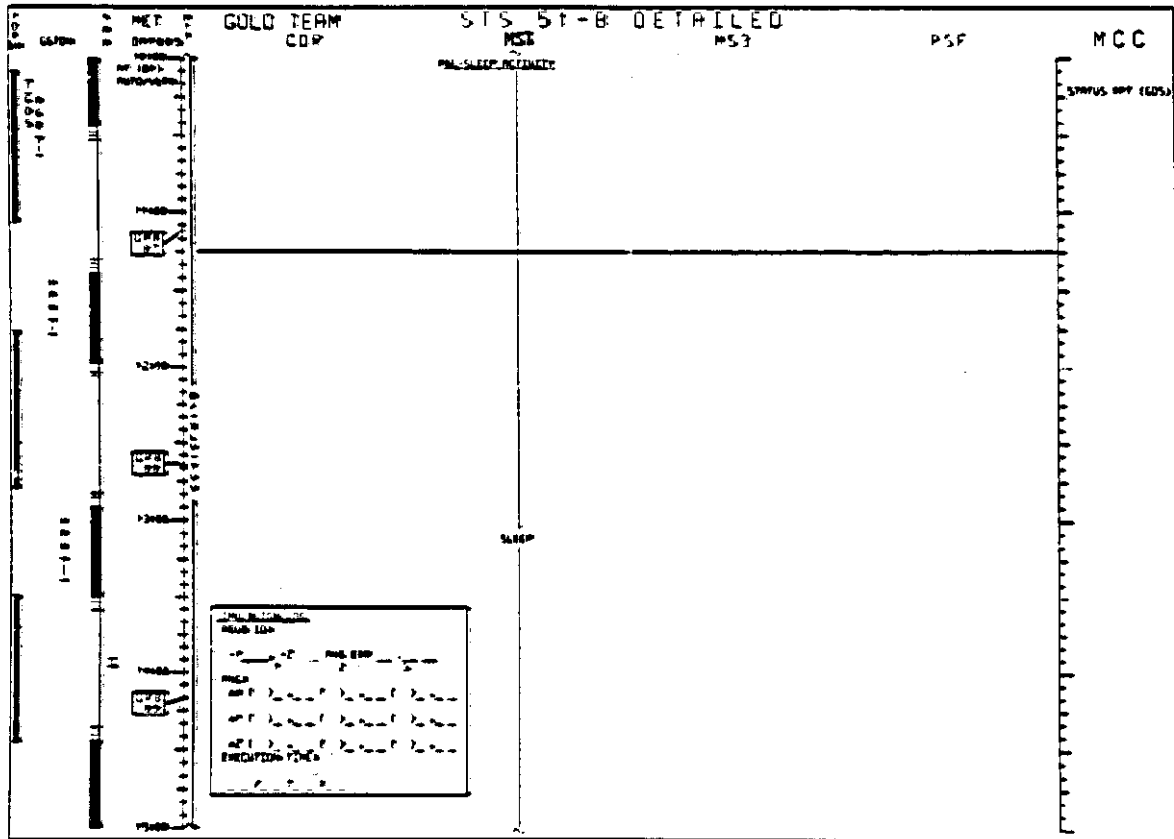








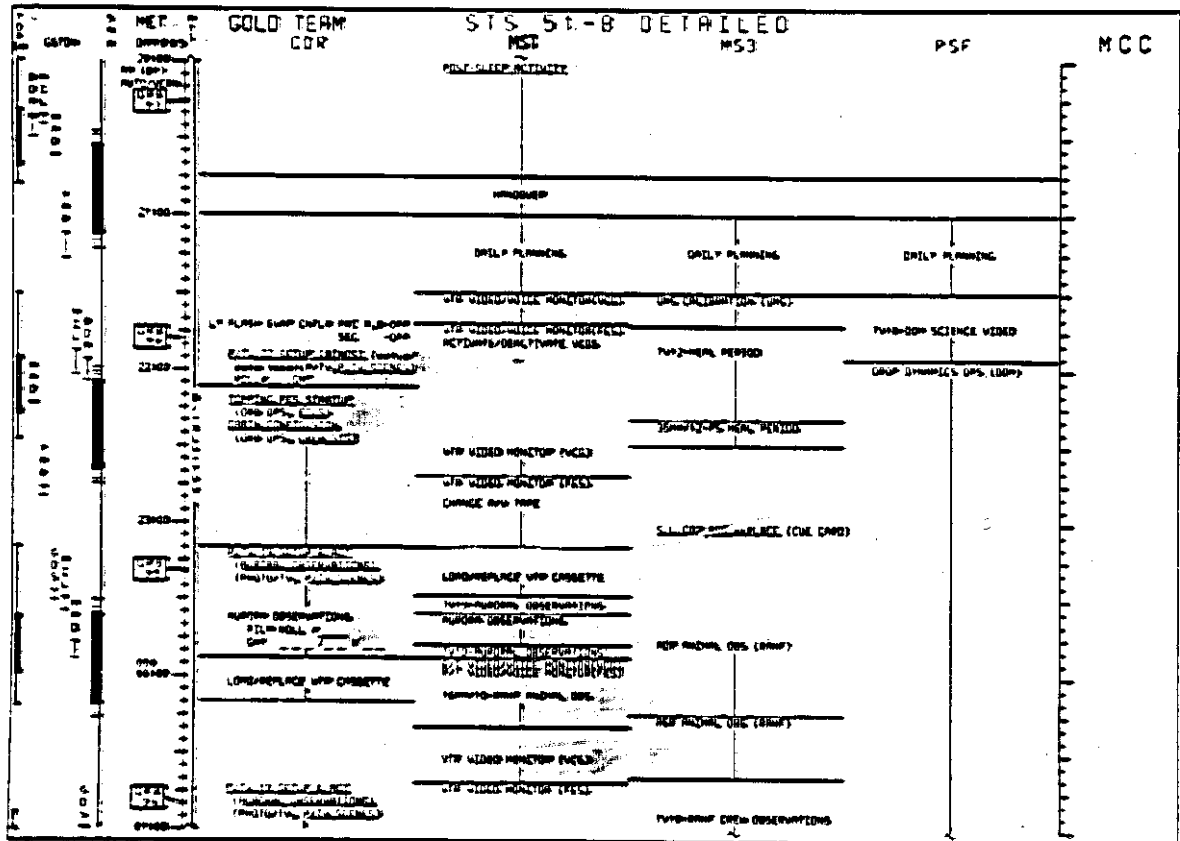




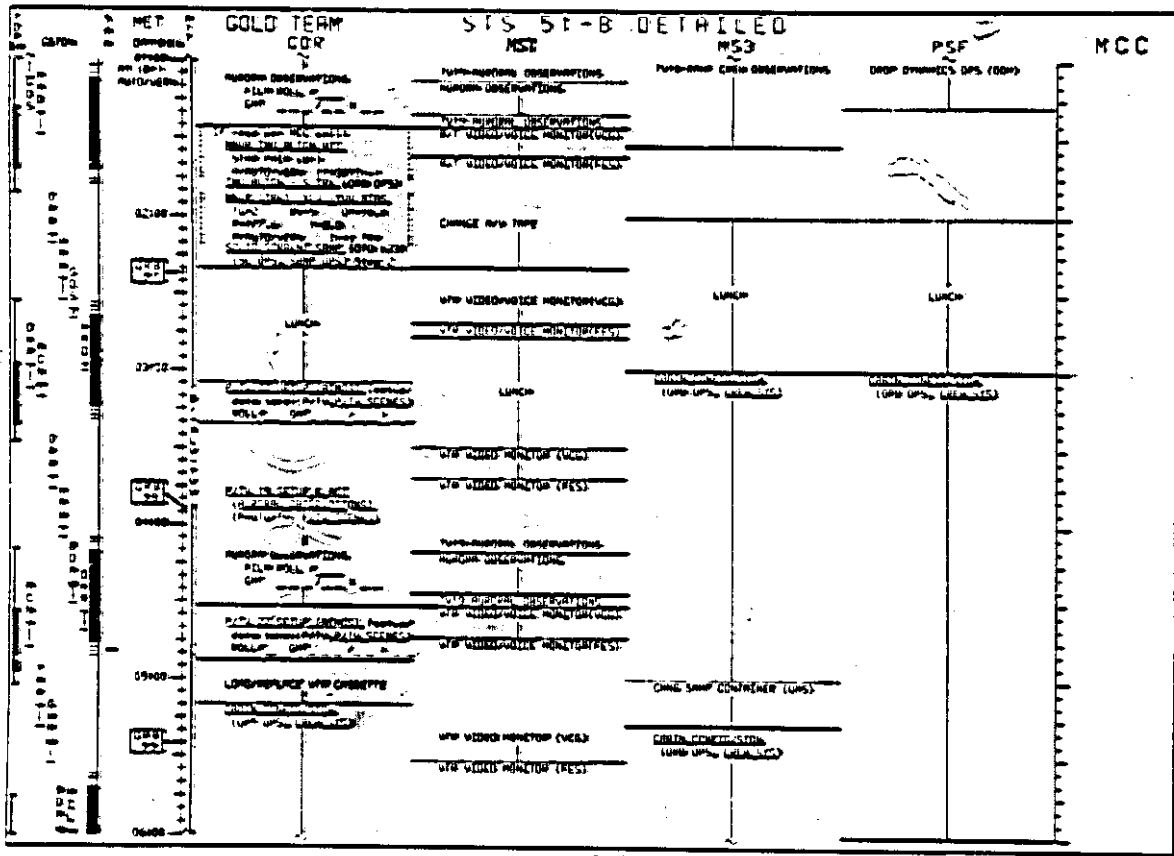
















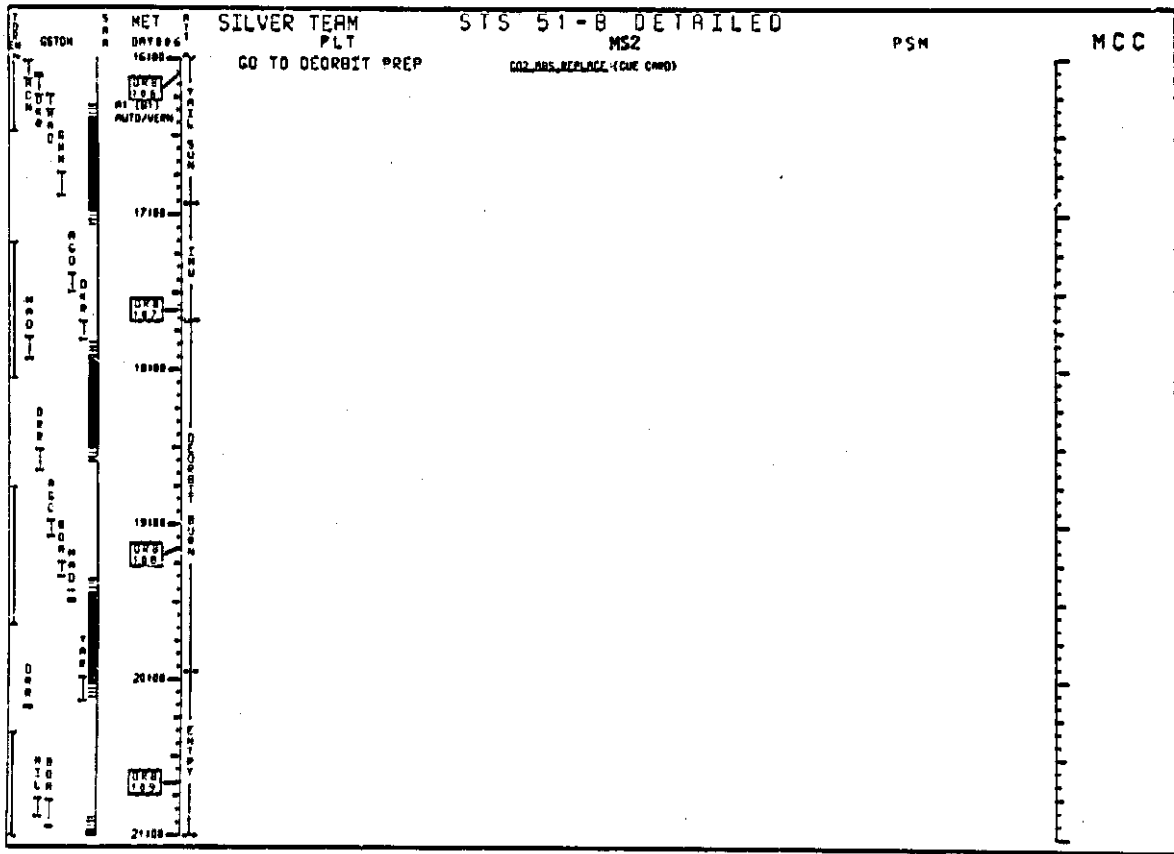












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STS 51-B DAP BOOK

DAP A CONFIGURATIONS..... 4-2  
DAP B CONFIGURATIONS..... 4-3  
51-B DAP BOOK..... 4-4

DAP BOOK



DAP A CONFIGURATIONS

		A1*	A2	A3	A4	A5	A6
<u>TRANSLATION</u>							
PULSE	ft/sec	0.10	0.10	0.10	0.10	0.10	0.10
<u>ROTATION</u>							
OSC RT	NORM %/sec	0.200	0.400	0.200	0.200	0.200	0.200
	VERN %/sec	0.200	0.400	0.200	0.008	0.200	0.200
PULSE	NORM %/sec	0.10	0.10	0.30	0.10	0.10	0.10
	VERN %/sec	0.010	0.010	0.010	0.010	0.050	0.010
COMP	NORM %/sec	.00	.00	.00	.00	.00	.00
	VERN %/sec	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>							
ATT	NORM (deg)	5.000	1.00	5.00	1.00	5.00	5.00
	VERN (deg)	1.000	1.000	1.000	0.070	1.000	1.000
RATE	NORM %/sec	0.20	0.20	0.20	0.20	0.20	0.20
	VERN %/sec	.020	.020	.020	.010	.020	.020
<u>JET OPT</u>							
P		1	1	3	1	1	3
Y		1	1	3	3	1	3
<u>CNTRL ACCEL</u>							
		0	0	0	0	0	0

\*I-loaded OPS-2 DAP Configuration

DAP B CONFIGURATIONS

		81*	82	83	84	85
<u>TRANSLATION</u>						
PULSE ft/sec		0.02	0.02	0.02	0.02	0.02
<u>ROTATION</u>						
DSC RT	NORM °/sec	0.500	0.200	0.200	0.200	0.200
	VERN °/sec	0.200	0.200	0.200	0.008	0.016
PULSE	NORM °/sec	0.04	0.04	0.04	0.04	0.04
	VERN °/sec	0.002	0.002	0.002	0.002	0.002
COMP	NORM °/sec	.00	.00	.00	.00	.00
	VERN °/sec	.000	.000	.000	.000	.000
<u>DEADBAND</u>						
ATT	NORM (deg)	3.00	3.00	3.00	0.30	3.00
	VERN (deg)	1.000	1.000	1.000	0.100	0.033
RATE	NORM °/sec	0.20	0.20	0.20	0.20	0.20
	VERN °/sec	.020	.020	.020	.010	.020
<u>JET OPT</u>						
P		1	3	1	1	3
Y		1	3	1	3	3
<u>CTRL ACCEL</u>		0	0	0	0	0

\*1-loaded OPS-2 DAP Configuration

TOP  
FRONT COVER 'DAP BOOK'

# DAP BOOK

HOOK  
VELCRO

CAP/S1-B/D/BAS

ENV PIC	
TGT ID = 1	Orbiting Vehicle
2	Earth ctr
3	Earth tgt
	Input CAT (+90)
	LOW (+180, + = East)
	ALT (+99.92nm)
4	Sun ctr
5	Celestial tgt
	Input RA (0-359.99)
	DEC (+90)
11-110	Nav Stars
BODY VECT = 1 +X	
	2 -X
	3 -Z
	4 PIC (-2° below +X)*
	5 Optional ..
	Input P (0-359.99)
	W (270-359.99, 0-90)
* Input OM →	OM (0-359.99)
NON AXIS = 1 +Z	
	2 -Z

G20 DAP CONFIG	
CTRL ACCEL = 0	Orbiter alone
NET OPT = 1	Normal
	2 Nose only
	3 Tail only

SUP  
BACK OF FRONT COVER  
'DAP BOOK'

TOP

DAP PURPOSE

- A1 - NOMINAL
- FLY
- IMJ ALIGN
- TAIL ONLY CONTROL
- BACKOUT
- PRE/POST PAM DEPLOY
- OMS BLRN
- TAIL-TO-SUN
- LOSS OF VERN
- A2 - PTC
- A3 - RCS HOT FIRE
- A4 - GG
- A5 - IMJ ROTATION
- A6 - LOSS OF VERN (TAIL ONLY)

CAP/51-B/O/BAS

A1

TOP

DAP A1

A1

PURPOSE:

- FLY
- IMJ ALIGN
- TAIL ONLY CONTROL
- BACKOUT
- PRE/POST PAM DEPLOY
- OMS BLRN
- TAIL-TO-SUN
- LOSS OF VERN (NOSE & TAIL)

0.100	1	TRANSLATION PULSE
0.200	2	ROTATION
0.200	3	DSC RT NORM
0.100	4	VERN
0.010	5	PULSE NORM
0.000	6	VERN
0.000	7	COMP NORM
		VERN
		DEADBAND
5.000	8	ATT NORM
1.000	9	VERN
0.200	10	RATE NORM
0.200	11	VERN
	12	JET OPT P
	13	V
	14	CNTL ACCEL

CAP/51-B/O/BAS

CAP/51-B/O/BAS

A2

TOP

+  
 A1  
 DAP A2  
 PURPOSE:  
 PTC

+ + TOP  
 + +  
 A2

0.00	1	TRANSLATION	
		PULSE	
0.000	2	ROTATION	
0.000	3	DSC RT	NORM
0.000	4	PULSE	VERN
0.000	5	PULSE	NORM
0.000	6	COMP	VERN
0.000	7	COMP	NORM
			VERN
1.000	8	DEADBAND	
1.000	9	ATI	NORM
			VERN
0.000	10	RATE	NORM
0.000	11		VERN
	12	JET OPT	P
	13		V
	Q 14	CNTRL ACCEL	

CAP/SI-B/O/BAS

CAP/SI-B/O/BAS

+ TOP  
 +  
 A2  
 DAP A3

+ + A3  
 + + TOP  
 + +  
 A3

PURPOSE:  
 RCS HOT FIRE

0.00	1	TRANSLATION	
		PULSE	
0.000	2	ROTATION	
0.000	3	DSC RT	NORM
0.000	4	PULSE	VERN
0.000	5	PULSE	NORM
0.000	6	COMP	VERN
0.000	7	COMP	NORM
			VERN
1.000	8	DEADBAND	
1.000	9	ATI	NORM
			VERN
0.000	10	RATE	NORM
0.000	11		VERN
	12	JET OPT	P
	13		V
	Q 14	CNTRL ACCEL	

CAP/SI-B/O/BAS

CAP/SI-B/O/BAS

+ TOP  
 +

+ + A4  
 + +  
 +



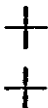
A3

DAP A4

PURPOSE:

GG

CAP/S1-R/O/BAS



TOP

DAP A5

PURPOSE:

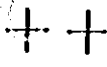
IMU ROTATION

CAP/S1-R/O/BAS



TOP

(reduced copy)

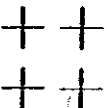


TOP

A4

0.10	1	TRANSLATION	
		PULSE	
		ROTATION	
0.2000	2	DSC RT	NORM
0.2000	3		VERN
0.1000	4	PULSE	NORM
0.0500	5		VERN
0.0500	6	COMP	NORM
0.0500	7		VERN
		DEADBAND	
0.0500	8	ATT	NORM
0.0500	9		VERN
0.1000	10	RATE	NORM
0.1000	11		VERN
	12	JET CPT	P
	13		V
	14	CNTL ACCEL	

CAP/S1-R/O/BAS

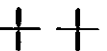


TOP

A5

0.10	1	TRANSLATION	
		PULSE	
		ROTATION	
0.2000	2	DSC RT	NORM
0.2000	3		VERN
0.1000	4	PULSE	NORM
0.0500	5		VERN
0.0500	6	COMP	NORM
0.0500	7		VERN
		DEADBAND	
0.0500	8	ATT	NORM
0.0500	9		VERN
0.1000	10	RATE	NORM
0.1000	11		VERN
	12	JET CPT	P
	13		V
	14	CNTL ACCEL	

CAP/S1-R/O/BAS



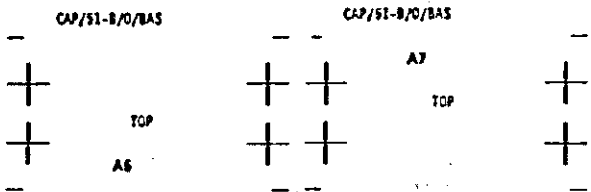
TOP

4-7

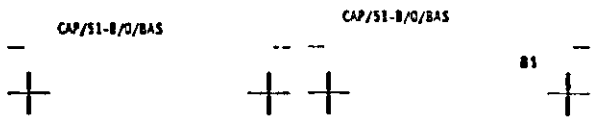


PURPOSE:  
LOSS OF YERN  
(TAIL ONLY)

- |                                 |    |                      |
|---------------------------------|----|----------------------|
| 0-1 0                           | 1  | TRANSLATION<br>PULSE |
| 0-1 0 0                         | 2  | ROTATION<br>DSC RT   |
| 0-1 0 0 0                       | 3  | NORM<br>YERN         |
| 0-1 0 0 0 0                     | 4  | PULSE<br>NORM        |
| 0-1 0 0 0 0 0                   | 5  | YERN<br>NORM         |
| 0-1 0 0 0 0 0 0                 | 6  | COMP<br>NORM         |
| 0-1 0 0 0 0 0 0 0               | 7  | YERN                 |
| 0-1 0 0 0 0 0 0 0 0             | 8  | DEADBAND<br>ATT      |
| 0-1 0 0 0 0 0 0 0 0 0           | 9  | NORM<br>YERN         |
| 0-1 0 0 0 0 0 0 0 0 0 0         | 10 | RATE                 |
| 0-1 0 0 0 0 0 0 0 0 0 0 0       | 11 | NORM<br>YERN         |
| 0-1 0 0 0 0 0 0 0 0 0 0 0 0     | 12 | JET OPT              |
| 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0   | 13 | P<br>Y               |
| 0-1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 14 | CNTL ACCEL           |



- | DAP | PURPOSE  |
|-----|--|
| B1  | - NOMINAL<br>PRCS IMP ALIGN<br>TOP-TO-SUN<br>TAIL-ONLY CONTROL<br>BACKOUT<br>OMS & RCS BURNS |
| B2  | - LOSS OF YERN<br>(TAIL ONLY)  |
| B3  | - LOSS OF YERN;<br>GG MOVN   |
| B4  | - PAK DEPLOY<br>FRISBEE DEPLOY   |
| B5  | - COAS CAL   |



(reduced copy)



DAP B1

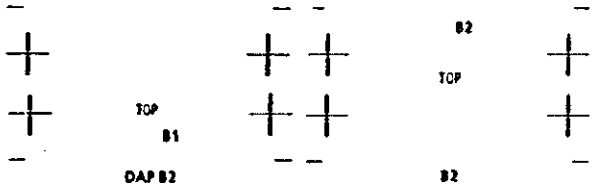
PURPOSE:  
 PRCS IMU ALIGN  
 TOP-TO-SUN  
 TAIL ONLY CONTROL BACKOUT  
 CMS & RCS BURNS

TOP

B1

TRANSLATION		
PULSE	15	0.0 2
ROTATION		
BSC RT NORM	16	0.0 2
VERM	17	0.0 2
PULSE NORM	18	0.0 2
VERM	19	0.0 2
COMP NORM	20	0.0 2
VERM	21	0.0 2
DEADBAND		
ATT NORM	22	0.0 2
VERM	23	0.0 2
RATE NORM	24	0.0 2
VERM	25	0.0 2
JET OPT P	26	0.0 2
V	27	0.0 2
ENTL ACCEL	28	0.0 2

CAP/SI-B/O/BAS



DAP B2

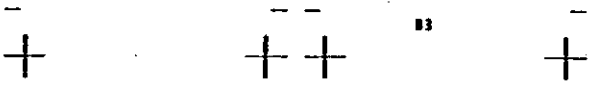
PURPOSE:  
 LOSS OF VERM  
 (TAIL ONLY)

TOP

B2

TRANSLATION		
PULSE	15	0.0 2
ROTATION		
BSC RT NORM	16	0.0 2
VERM	17	0.0 2
PULSE NORM	18	0.0 2
VERM	19	0.0 2
COMP NORM	20	0.0 2
VERM	21	0.0 2
DEADBAND		
ATT NORM	22	0.0 2
VERM	23	0.0 2
RATE NORM	24	0.0 2
VERM	25	0.0 2
JET OPT P	26	0.0 2
V	27	0.0 2
ENTL ACCEL	28	0.0 2

CAP/SI-B/O/BAS



(reduced copy) TOP



+  
 B2  
 + +  
 DAP B3  
 PURPOSE:  
 LOSS OF VERN  
 (NOSE & TAIL)  
 GG MNR

+  
 CAP/S1-B/O/BAS  
 +  
 TOP  
 +  
 B3

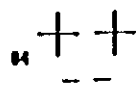
+  
 DAP B4  
 PURPOSE:  
 PAM DEPLOY  
 FRISBEE DEPLOY  
 +  
 CAP/S1-B/O/BAS

+  
 TOP  
 (reduced copy)

TOP  
 + +  
 B3  
 TRANSLATION  
 PULSE 15 0-0 2  
 ROTATION  
 DSC RT NORM 16  
 VERN 17  
 PULSE NORM 18  
 VERN 19  
 COMP NORM 20  
 VERN 21  
 DEADBAND  
 ATT NORM 22  
 VERN 23  
 RATE NORM 24  
 VERN 25  
 JET OPT P 26  
 V 27  
 CNTL ACCEL 28  
 CAP/S1-B/O/BAS

+ +  
 B4  
 TOP  
 + +  
 B4  
 TRANSLATION  
 PULSE 15 0-0 2  
 ROTATION  
 DSC RT NORM 16 0-2 0 0  
 VERN 17 0-0 0 0  
 PULSE NORM 18 0-0 0 0  
 VERN 19 0-0 0 0  
 COMP NORM 20 0-0 0 0  
 VERN 21 0-0 0 0  
 DEADBAND  
 ATT NORM 22 0-0 0 0  
 VERN 23 0-1 0 0  
 RATE NORM 24 0-2 0 0  
 VERN 25 0-1 0 0  
 JET OPT P 26 1  
 V 27 1  
 CNTL ACCEL 28 0  
 CAP/S1-B/O/BAS

+ +  
 B5  
 +



TOP



DAP BS

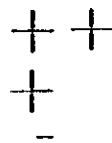
BS

PURPOSE:  
COAS CAL

TRANSLATION				
PULSE	15	0.92		
ROTATION				
OSC RT	NORM 16	0.000		
	VERN 17	0.000		
PULSE	NORM 18	0.000		
	VERN 19	0.000		
COMP	NORM 20	0.000		
	VERN 21	0.000		
DEADBAND				
ATT	NORM 22	0.000		
	VERN 23	0.000		
RATE				
	NORM 24	0.000		
	VERN 25	0.000		
JET OPT	P 26			
	V 27			
CNTL ACCEL	28	0		

CAP/SI-B/O/BAS

CAP/SI-B/O/BAS



TOP

BS

CAP/SI-B/O/BAS



TOP

TOP  
BACK COVER 'OFF BOOK'



HOOK  
VELCRO

CAP/51-B/3/845



STS 51-B ALTITUDE TIMELINE

ALTITUDE  
TIMELINE

Altitude Timeline

HEI	MNVR OPTION		DRP	E/S	REMARKS	EVENT
1 0-01:10:00	TRK TGT-2 SV=30 90.00, 0.00 OM=100.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	EARTH 0 90 0 0	LVLH R=100 P= 0 Y= 0	-ZLV +XVY
2 0-03:10:00 22:03	MNVR R= 80.00 P=154.50 Y= 7.50	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 61 0 176	-251:23 -Y51:46	IMU/COAS +A1
3 0-04:02:00 13:38	MNVR R=316.00 P=143.00 Y= 37.40	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 90 0 315		TIRS-ATMOS
4 0-05:25:00 29:33	MNVR R=121.00 P= 79.99 Y= 36.10	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 103 0 134		TRIM BURN
5 0-05:45:00 59:33	MNVR R=316.00 P=143.00 Y= 37.40	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 90 0 315		TIRS-ATMOS
6 0-06:46:00 59:13	MNVR R=351.00 P=275.40 Y= 54.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 151 0 205		VWPC01
7 0-08:27:00 29:19	MNVR R= 40.20 P=235.40 Y= 54.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 130 0 177		VWPC02
8 0-09:53:00 59:40	MNVR R= 37.00 P=230.40 Y=332.40	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 70 0 193		VWPC03
9 0-11:30:00 44:11	MNVR R=326.40 P=359.40 Y=311.30	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 74 0 324		TRIM BURN #2
10 0-11:50:00 12:03:44	MNVR R= 70.00 P=229.20 Y=359.20	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 82 0 153		VWPC04
11 0-12:52:00 13:04:27	MNVR R=202.20 P=329.50 Y= 8.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 131 0 71		VWPC05
12 0-14:15:00 29:46	MNVR R= 22.00 P= 71.30 Y=311.00	A1 AUTO VERN	BSC 0.200 BB AT 1.00 BB RT 0.02	SUN 0 45 0 253	-261:12 -Y51:19	IMU ALIGN (80)

ALTITUDE  
TIMELINE

Attitude Baseline

NET	MNVR OPTION	DRP	E-S	FERRIS	EVENT	
1 0 14191100 15105110	MNVR R+107.50 F+268.40 Y+307.70	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 45 1 129		WUPDR
2 0 15153100 16107152	TRF TGT+2 EV+5-177.00, 0.00 OM+ 30.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 176 1 260	LVLH R+270 F+ 30 Y+258	HOLY -177 EARTH
3 0 10100100 07130	TRF TGT+2 EV+2-188.00, 0.00 OM+ 0.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 150 1 0	LVLH R+ 0 F+ 30 Y+ 0	INERT SEAL ATTITUDE
4 0 11101100 16100	TRF TGT+2 EV+3- 38.00, 0.00 OM+180.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 30 1 0	LVLH R+180 F+ 0 Y+ 0	OL *
5 0 15120100 31127	TRF TGT+4 EV+5-184.00, 0.00 OM+270.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 176 1 150	INFL R+ 1 F+110 Y+ 51	- 11
6 0 16106100 1710122	MNVR R+321.70 F+147.10 Y+230.00	A1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 1 1 141	-21741 -21741	IMP ALIGN
7 0 17106100 17154	MNVR R+239.00 F+275.40 Y+236.70	B1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 55 1 109	-21741 -21741	IMP ERIP
8 0 17143100 43143	MNVR R+210.00 F+101.00 Y+ 15.00	B1 AUTO VERN	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 156 1 227		SECRET 1.8+ ATTITUDE
9 0 19106142	OMS POSITION	* AUTO *	DSC 0.200 SB AT 1.00 SB RT 0.02			SECRET 1.8+
10 0 20102100 05143	MNVR R+ 38.40 F+ 47.00 Y+201.70	* AUTO *	DSC 0.200 SB AT 1.00 SB RT 0.02	SUN 0 30 1 228		EI-S ATTITUDE
11 0 20123155	LVLH	* AUTO *	DSC 0.200 SB AT 1.00 SB RT 0.02	EARTH 0 129 1 160	LVLH R+ 1 F+ 39 Y+259	EI-S

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not be included in flight copies.



CREW ACTIVITY PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

CREW..... 6-2  
PAYLOADS..... 6-2

NOTES

## A. CREW

1. There are 7 crewmen onboard divided into 2 teams: the SILVER team consisting of the PLT, MS2, and PSM (materials processing expert) and the GOLD team consisting of the COR, MS1, MS3, and PSF (fluids expert). Each team works 12 hours, then is off duty for 12 hours.
2. Launch and Entry Seating - The COR and PLT will occupy their normal flight deck seats. The MS2 (Thagard) will assume the role of Flight Engineer and sit on the flight deck behind and between the COR and PLT. The MS1 (Lind) will sit on the flight deck to the right of the MS2. The MS3 and PSs will sit on the middeck.
3. The crewmen responsible for performing an EVA, should one become necessary, are: PLT and MS2.
4. The crewmen are assigned to the following tasks:
  - COR (Overmyer) - ATMOS PHOTOS, AURORAL PHOTOS
  - PLT (Gregory) - ATMOS PHOTOS, INSAT DEPLOY (photo/TV)
  - MS1 (Lind) - SL ACT/DEACT, FES/VCGS, YWFC, AURORAL OBS, MED DSOs
  - MS2 (Thagard) - SL ACT/DEACT, YWFC, INSAT DEPLOY (probe), MED DSOs
  - MS3 (Thornton) - RANF, LMS ACT/DEACT, MED DSOs

All P/L crew - GFFC, MICG, ATMOS, IONS, UMS

for AFT, MS2 and the PSs are the subjects and MS1 and MS3 controls

## B. PAYLOADS

## 1. Spacelab Systems

## a. 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 MATH BUS. The Ascent and Entry power level is 1.5KW. 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.

## b. Communications and Instrumentation

- 1) The HAM receives data from 24 separate input sources: 16 experiment channels, the MRR, the Payload Recorder, the S/S and Experiment Computers, the 3 SL voice circuits (pre-multiplexed), and a GM line signal. It multiplexes the various inputs it receives at any time and sends the data either to the RUP for downlink, or back to the MRR or PL PCOR. These inputs transmit data at many different data rates. In order for the HAM 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 HAM 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.

- 2) 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 RCOR can direct dump to the KUSP or can be dumped through the HRM. (The PL RCOR is not planned to be used on this flight, so the HDRR will handle all payload data recording).
- 3) The SL Intercom 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 core.

c. Environmental Control and Life Support (ECLS)

Because there will be a third payload crewman in the module on the GOLD shift and there are animals onboard, the change-out schedule and total number of canisters are not the same as SL-1. A changeout schedule has been developed wherein one or both of the module canisters will be changed out every 12 hours. This schedule appears in the PCAP and Orbit Ops C/L.

d. Command and Data Management (CDMS)

- 1) There are 3 computers in the Spacelab modules: the Sub-systems Computer (SSC), the Experiment Computer (EC), and a Backup Computer (BUC). The BUC is loaded with SSC software because losing the SSC is more critical than losing the EC, and a timely recovery is necessary. One Mass Memory Unit (MMU) services all 3 computers and contains a copy of both the SSC and EC software. Data is collected and transmitted to and from the computers to the systems and payload hardware by 7 Subsystem and 3 Experiment Remote Acquisition Units (RAUs), the Spacelab equivalent of the Orbiter MEMs. 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 ODU in the Control Center rack (R2K) and one at the orbiter aft flight deck Payload Specialist station (panel 111).

- 2) The SSC performs 3 basic functions with the systems hardware:
  - (a) Sends commands to the H/W
  - (b) Monitors data from the H/W and transfers selected pieces to the Orbiter PCMMU and SpaceLab High Rate Multiplexer (HRM) for downlink
  - (c) Detects and annunciates faults

The crewman can monitor the systems using either the SSC displays on the module or aft flight deck DSSS or the GPC displays on the flight deck CRTs.

- 3) The EXC performs similar functions to the SSC with the payload hardware plus several additional functions:
  - (a) Performs a checkout of payloads
  - (b) Controls payload operations through the use of automatic timelines (see item 4 below)
  - (c) Processes payload data for feedback to the H/W, display to the crew, or transmission to the ground through the HRM
- 4) 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 line. 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 line of entries. Timelines are called from the MMU into a Work Buffer (separate from the active timeline buffer), modified, then returned to the MMU.

#### e. Common Payload Support Equipment (CPSE)

The Scientific Airlock (SAL) will be flown to support the YWFC (see Introduction, page 1). The Scientific Window Adapter Assembly (SWAA) will not be flown.

## 2. Spacelab Experiments

The following paragraphs give a brief description of the eleven experiments of Spacelab 3. Also, in each case this description is followed by a list of Marshall Space Flight Center model numbers involving crew action (as seen in the summary timeline) and their corresponding descriptions.

### a. Fluid Experiment System (FES)

This system is used to grow triglycine sulfate (TGS) crystals by removing heat from a saturated solution through a seed crystal. The purposes of this investigation are: to develop a technique for crystal growth in microgravity, to study the growth environment and relate it to growth behavior, and to determine how microgravity influences the properties of the resultant crystal.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
FES-ACT	EQUIP ACTIVATION
FES-DEACT	EQUIP DEACTIVATION
FES-1	CRYSTAL #1 OPS
FES-2	CRYSTAL #2 OPS
FES-3	CRYSTAL #3 OPS
FES-MON1	CREW MON - EARLY PHASE
FES-MON2	CREW MON - LATE PHASE
FES-MON3	

### b. Vapor Crystal Growth System (VCGS)

The purpose of this experiment is to grow more-perfect crystals of mercuric iodide. They will be grown by vaporization and recendensation at 120° C in a special furnace and the growth process will be reversed if polycrystalline growth begins. These crystals should have fewer defects because of the microgravity environment.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
VCG	ACTIVATE/DEACTIVATE VCGS
VCG-MON1	CREW MON - EARLY PHASE
VCG-MON2	CREW MON - LATE PHASE
VCG-MON3	

### c. Mercuric Iodide Crystal Growth (MICG)

The purpose of this experiment is to grow near-perfect single crystals of mercury iodide. The process will be carried out in a two-zone furnace with sensors to collect temperature data. The investigators hope to find that the effects of convection are greatly reduced in the microgravity environment.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
MICG	INITIATE MICG/ CHNG CRYSTAL CARTRIDGE

d. Dynamics of Rotating and Oscillating Free Drops (DROP)

The main objectives of this experiment are to study the equilibrium figures of a rotating drop and to study the large-amplitude oscillations of a liquid drop. Another objective is to establish the advantages of conducting future drop and bubble investigations in space using the Drop Dynamics Module (DCM).

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
DCM-1/2	FIRST TWO RUNS
DCM-0/E	SUBSEQUENT RUNS

e. Geophysical Fluid Flow Cell (GFFC)

The purpose of this experiment is to simulate global atmospheric flows of rotating planets and stars in hopes of answering questions about their mechanics. The investigator is trying to identify those external conditions of fluid viscosity, rotation, gravity, etc., which determine the mode of flow. Simulation will be accomplished with the use of a dielectric fluid between two concentric, rotating electrically conductive spherical shells.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
GFFC-1	LONG DURATION RUN OPS
GFFC-2	SHORT DURATION RUN OPS
GFFC-3	SHORT RUN WITH CREW INTERVENTION
GFFC-F	FILM CHANGE
GFFC-MON	TIMING CHECK

f. Atmospheric Trace Molecules Spectroscopy (ATMOS)

The ATMOS investigation is designed to collect data on the chemistry and physics of Earth's upper atmosphere. It should determine the compositional structure of the upper atmosphere, and it should provide information useful in the design of future atmospheric studies. The investigation will use infrared absorption spectroscopy and will read sunlight that passes through the upper atmosphere with an interferometer.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
70nm/22R	SUNRISE PHOTOGRAPHY
70nm/22S	SUNSET PHOTOGRAPHY

g. Research Animal Holding Facility - Verification Test (RAHF-VI)

The objective of this investigation is to verify the performance of the RAHF. The RAHF is designed to support animals from rodents to small primates. It will house four monkeys and twenty-four rats. The animals will be monitored during the mission, and the food and water used will be recorded.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
ARC-A-SR	ASR (Ames Single Pack) ANIMAL OBS
ARC-A-DR	ADR (Ames Double Pack) ANIMAL OBS
ARC-B	CNFG FOR ON-ORBIT/DESC
ARC-C	EMPTY CONDENSATE BOTTLE
ARC-D1/2	RELOAD/SET CAMR-PULSE MODE
ARC-D4	SET CAMR-CONT MODE
ARC-E-SR	REPLACE FOOD IN ASR
ARC-E-DR	REPLACE FOOD IN ADR
ARC-F-SR	ASR HOUSEKEEPING
ARC-F-DR	ADR HOUSEKEEPING
ARC-F01F	DEMS SAFING FOR ENTRY
ARC-H	TEMPORARY RESTRAINT OPS
ARC-MASK	UNSTOW SURGICAL MASKS

h. Dynamic Environment Measuring System (DEMS) and Biotelemetry System (BTS)

The objective of these investigations is to verify the performance of each of these systems while providing supporting data for the RAHF-VI. The DEMS is designed to measure noise, vibration and accelerations on the animals during launch and entry. The BTS measures basic physiological functions in research animals such as body temperature, heart rate, and ECG. The sensor packages will be implanted in four rats and four monkeys preflight, and data is then telemetered to an antenna in the cages and routed to the BTS.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
ARC-I	BIOTELEMETRY PWR ACT/DEACT
ARC-J	DATA ACTIVATION
ARC-K	BIOTELEMETRY SIGNAL STRENGTH OPTIMIZATION
ARC-L	DEMS CASSETTE CHANGE
ARC-N	DEMS ACT FROM AFD

1. Urine Monitoring Investigation (UMI)

The primary objectives of the UMI are: verify the operation of the Urine Monitoring System (UMS), perform inflight calibration of the UMS, develop a procedure for measuring crew water intake, and verify a system of urine sample collection. The investigation will involve recording water intake of crewmembers from the galley and water supply. It will also use the UMS to measure urine volume of each crewmember and collect samples on two crewmembers.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
UMS-OPS	UMS ACT/DEACT
UMS-SAM	CHNG/STOW UMS SAMPLE
UMS-CAL	UMS CALIBRATION

J. Autogenic Feedback Training (AFT)

AFT is designed to help crewmembers overcome the effects of Zero-Gravity Motion Sickness. The crewmembers receive extensive preflight autogenic feedback training. Then they practice on orbit and during motion sickness attacks. Crewmembers will wear monitoring instruments and data recorders, and feedback displays will be used.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
AFT	CHANGE CASSETTE/PERFORM DIAGNOSTIC SCALE

K. Ionization States of Solar and Galactic Cosmic Ray Heavy Nuclei (ICNS)

This experiment is designed to study the low-energy cosmic ray ions of C, N, O, Ne, Ca, and Fe. The detector system consists of layers of plastics that show a trail of damage after being penetrated by cosmic rays. Study of these trails on the ground gives data as to the energies of the ions in the cosmic rays.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
ICNS	IONS EXPT OPS

L. Very Wide Field Camera (VWFC)

This is a reflight of the payload flown on Spacelab 1. It will make a very general UV survey of a large part of the celestial sphere. The camera operates in both the photometric and spectrometric modes.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
VWFC	SETUP AND OPS OF CAMERA IN SAL



m. Television and Photography

The following list describes the television and photography scenes that are payload related.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
TV01	INITIAL SPACELAB INGRESS
TV02	RAHF TOUR
TV03	VCG OPS
TV04	CCM OPS
TV05	FES OPS
TV06	RAHF CONDENSATE BOTTLE CHANGE
TV07	RAT FOOD/WASTE MAINTENANCE
TV08	MONKEY FOOD/WASTE MAINTENANCE
TV09	RAHF TEMPORARY RESTRAINTS
TV10	ANIMAL OBSERVATION
TV11	PS SLEEP RESTRAINTS
TV12	TV12 - MEAL
TV13	TV13 - PRESS CONFERENCE
TV14	TV14 - SPACELAB DEACTIVATION AND EGRESS
TV15	SAL/YWFC OPS
TV17	FES OR VCG OPS
TV18	CCM OPS
TV19	AURORA OBSERVATIONS
TV20	SPACELAB TUNNEL OPS
16mm/03	VCG OPS
16mm/07	RAT FOOD MAINTENANCE
16mm/08	MONKEY WASTE TRAY OPS
16mm/10	ANIMAL OBSERVATION
35mm/03	VCG OPS
35mm/07	RAT FOOD MAINTENANCE
35mm/08	MONKEY FOOD/WASTE MAINTENANCE
35mm/11	PS SLEEP RESTRAINT
35mm/12	MEAL
35mm/19	AURORA OBSERVATIONS

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5853th Lane  
Aurora, Co. Ont.  
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MONTGOMERY, Maryland  
5000th St. New York  
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ALBANY, New York

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**PRELIMINARY**

# Flight Data File Crew Activity Plan

## 51-B

Spacelab 3

Mission Operations Directorate  
Operations Division

Preliminary  
January 23, 1984

**NASA**

National Aeronautics and  
Space Administration

Lyndon B. Johnson Space Center  
Houston, Texas

FLIGHT DATA FILE

CONTROL

Ascent Checklist

Post Insertion

Crew Activity Plan

Deorbit Prep

Entry Checklist

SUPPORT

Cue Cards Book

EVA Checklist

Flight Maps and Charts Book

Orbit Operations Checklist

Payload Deploy Checklist\*

Payload Operations Checklist\*

PDRS Operations Checklist\*

Photo/TV Checklist

Rendezvous/Proximity Operations\*

OFF-NOMINAL

Ascent Pocket Checklist

Orbit Pocket Checklist

Entry Pocket Checklist

Ascent/Entry Systems Procedures

Contingency Deorbit Prep

Contingency EVA Operations

In-Flight Maintenance Checklist

Medical Checklist

Payload Systems Data and Malfunction Procedures\*

Malfunction Procedures

REFERENCE

Data Processing System Dictionary

Reference Data

Systems Data

\*If required

MISSION OPERATIONS DIRECTORATE

SI-B CREW ACTIVITY PLAN  
SPACELAB 3

PRELIMINARY  
January 23, 1984

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ACKNOWLEDGMENTS

The following people contributed significantly in preparing the SI-B Crew Activity Plan:

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Word Processing (Kentron)	B. Evans D. Prange J. Roberts P. Romero T. Walker

CONTENTS

PAGE

INTRODUCTION.....	v
TIMELINE FORMAT SYMBOL NOMENCLATURE.....	1-1
SI-B OVERVIEW.....	2-1
SUMMARY TIMELINE.....	3-1
CREW ACTIVITY PLAN NOTES (CONSTRAINTS AND GUIDELINES).....	4-1
DETAILED TEST OBJECTIVES (DTOs), DETAILED SUPPLEMENTARY OBJECTIVES (DSOs).....	5-1
TABLES.....	6-1
ABBREVIATIONS/ACRONYMS.....	7-1
REFERENCES.....	8-1

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### INTRODUCTION

The S1-B Crew Activity Plan is the flight data file article that contains the on-orbit timeline. It does not contain the detailed timelines that are covered in the Ascent, Post Insertion, Deorbit Prep, and Entry checklists. For continuity, the entire flight is shown in the summary level timeline.

This on-orbit timeline satisfies the objectives specified in the Flight Definition and Requirements Directive (Ref. 1) and the requirements of the S1-B Flight Requirements Document (Preliminary, September 1983, Ref. 2).

The flight profile (Cycle 1 trajectory data, Ref. 3) used for this Crew Activity Plan is for a launch date of November 24, 1984.

Attitude and KU-band data is not included in the Preliminary edition of the CAP.

Several additional payloads have been approved for incorporation on S1-B including the Very Wide Field Camera (using the Scientific Airlock) that was flown on S15-9. These new payloads will appear in the Basic edition at a later time.

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FORMAT

TIMELINE FORMAT SYMBOL NOMENCLATURE

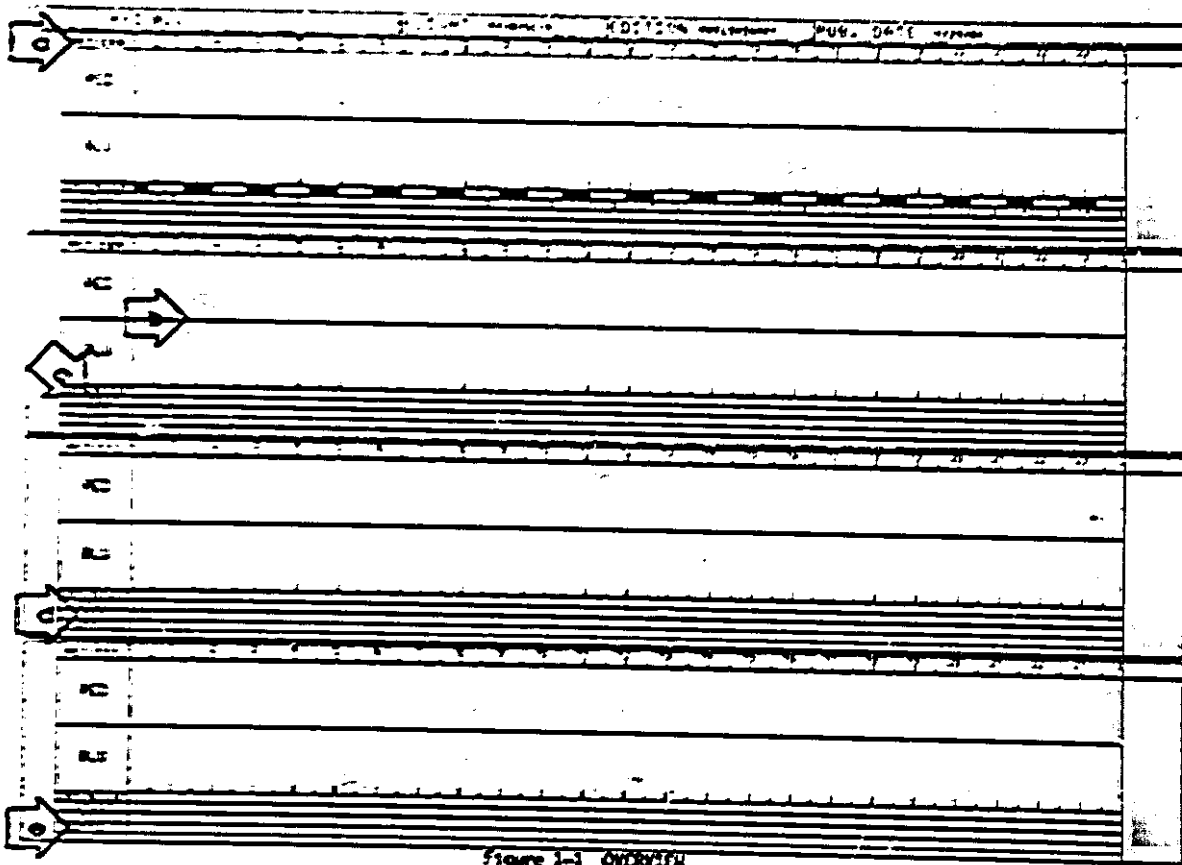


Figure 1-1 OVD/ID  
1-2

## A. FORMAT SYMBOL NOMENCLATURE

### 1. Overview Timeline

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

- a. **TIMESCALE** - The time reference used on this format is cumulative Mission Elapsed Time (MET) expressed in days and hours. MET is referenced to liftoff, which occurs at 0/00:00:00 (days, hours, minutes, seconds).
- b. **ACTIVITY COLUMNS** - These columns present an overview of activities scheduled during the flight. For clarity of presentation, only major activities are presented, and activity durations are sometimes lengthened. Abbreviated activity titles can be found in the Abbreviations/Acronyms section of this CAP. Activities are identified for the 2 crew teams, RED and BLUE.
- 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. **FCS** - This column indicates the running times for the 3 Fluid Experiment System samples.
- e. **GFFC** - This column indicates the running times for the Geophysical Fluid Flow Cell. Some runs are 3 hrs long, some 6 hrs, and these are indicated.

### 2. Summary Level Timeline (12-Hr Timespan)

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

- a. **TIMESCALES** - Three time references are presented in this section of the summary timeline format. The time references used are Time of Ignition minus (TIG), Greenwich Mean Time (GMT), and Mission Elapsed Time (MET). MET is referenced to liftoff, beginning at 0/00:00:00 (days, hours, minutes, seconds). TIG is referenced to the deorbit ignition time and counts down to 0/00:00:00 at ignition on the CRT timer. TIG is only used on the deorbit preparations on entry day.





- b. **CREW TEAMS/CREWMAN (Red Team/Blue Team)** - The crew consists of seven (7) personnel working on the two (2) shifts. The crew has been divided into two teams in order to allow sequencing for 24-hour operations. The Red Team consists of the pilot (PLT), Mission Specialist 2 (MS2), and the crystal growth payload specialist (PSM). The Blue Team consists of the commander (COR), Mission Specialists 1 & 3 (MS1 & MS3), and drop dynamics payload specialist (PSF). Each crewman has a column 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 row 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 OSAD and will appear in subsequent CAP documents).
- e. **GSTDN COVERAGE** - The GSTDN communication coverage periods are identified in this area with a horizontal line indicating when communication is available; the GSTDN site is identified to the right of the line.
- f. **TDRS** - The TDRS communication coverage periods are identified in this area, with a horizontal line indicating when there is a line-of-sight between TDRS and the Orbiter. The boxed areas indicate when there is Ku-Band communication which is based upon an unblocked line-of-sight between the Ku-Band antenna and TDRS.
- g. **ALTITUDE** - The altitude of the vehicle (-ZLV, IMU, etc.) is shown in this row.
- h. **DEORBIT OPP**: The time of ignition (TIG) for deorbit with landing at KSC or ECW. An asterisk signifies the landing would be in darkness.

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OVERVIEW

51-B  
OVERVIEW

OVERVIEW

MISSION		FLIGHT		MISSION		PUBLICATION		PUB. DATE	
RED	POST INSERTION	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING
BLU	POST INSERTION	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING
RED	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	
BLU	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	
RED	SLEEP	PSR	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	
BLU	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	
RED	SLEEP	PSR	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	
BLU	PSR	SLEEP	PSR	MONITORING	PSR	SLEEP	PSR	MONITORING	



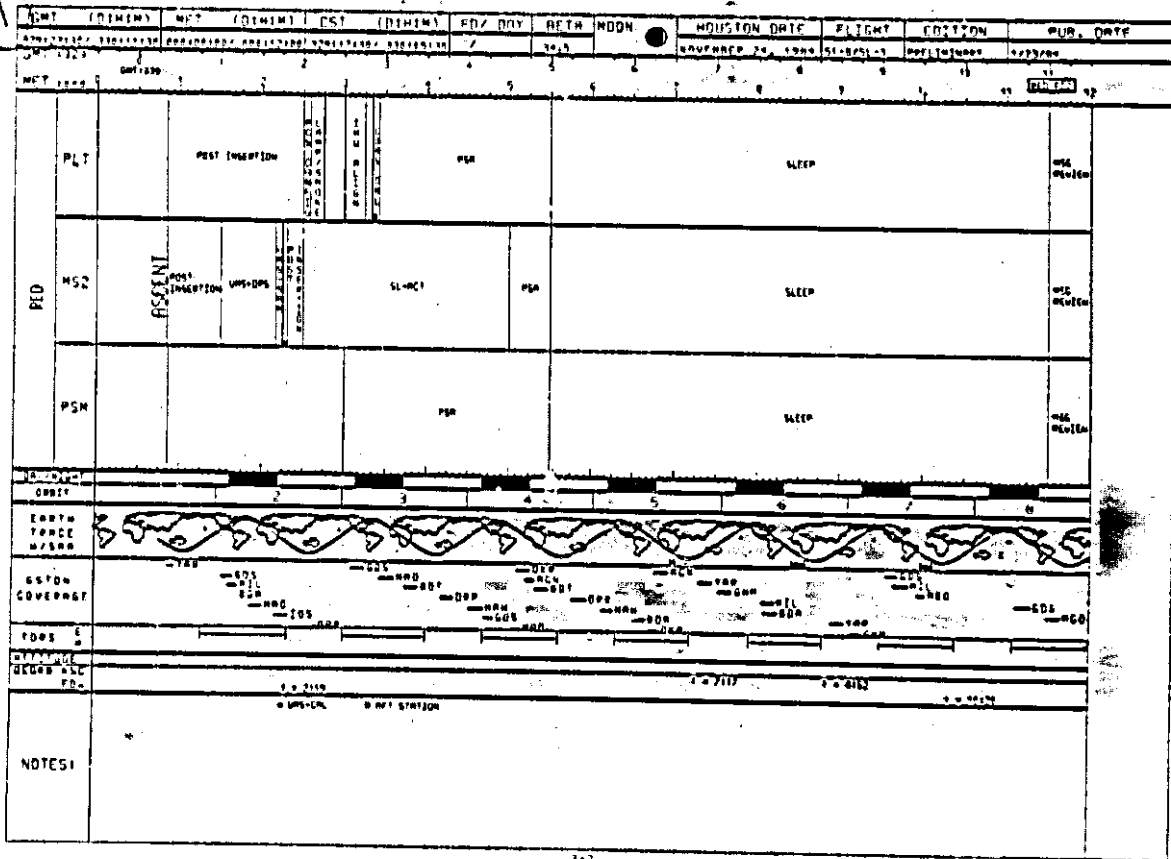
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SUMMARY TIMELINE

SUMMARY  
TIMELINE



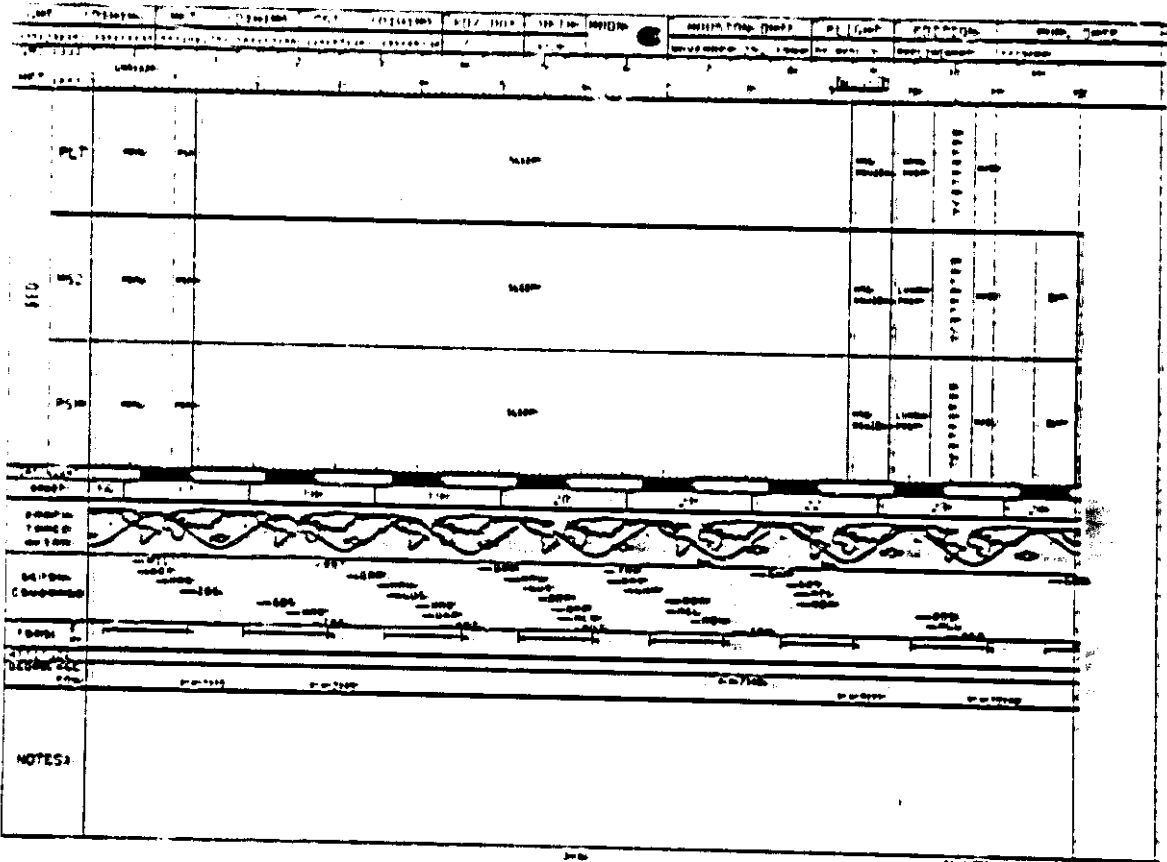
SUMMARY  
TIMELINE



CAMP	COMPANY	UNIT	POSITION	DUTY	DINING	SLEEPING	TOILET	BATH	MOON	MOONLIGHT DATA		FLIGHT		EJECTION		FIRE DATA		
										NUMBER	TIME	TYPE	TIME	TYPE	TIME	TYPE		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
BLUE	FOURTH	CGP	POST INSERTION		LUNCH													
		MS1	POST INSERTION	SL-REF		LUNCH							VEE					MOBILE
		MS3	POST INSERTION			LUNCH												
		PSF				LUNCH												
<p>NOTES:</p> <ul style="list-style-type: none"> <li>• SI LONG-TERM</li> <li>• R/C COMP CHECK - • AMP AND BELOW IS</li> <li>• PMP ON CAMP II • NICK</li> <li>• R/C-R</li> <li>• R/C-I</li> <li>• SI FIRE/SMOKE TEST</li> </ul>																		

GMT	(DIMIM)	NET	(DIMIM)	CST	(DIMIM)	FDZ	BOY	RETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
GMT 1233								7	17.8	NOVEMBER 25, 1964	SI-0451-3	NOV 1964	1964
NET 1233													
PLT		NO											ENERGIC
MSZ		NO	DP										ENERGIC
PSM		NO	DP										EN
OPDT		9		10		11		12		13		14	15
STRT													
TERCE													
W/SUR													
CSYD													
COVERAGE													
TOPS													
ATTN													
OCOR													
ASC													
ED													
NOTES:													

GMT (DINIM)	MFT (DINIM)	CSI (DINIM)	FD/ DOT	REIN	MOON	HOUSTON DATE	FLIGHT	EDITION	PHR. DATE
12:00:00	12:00:00	12:00:00	12	13	14	15	16	17	18
MFT 1200	12	13	14	15	16	17	18	19	20
COR	W/D	REN		SLEEP			WSE	REN	W/D
MS1	W/D	REN		SLEEP			WSE	REN	W/D
MS3	W/D	REN		SLEEP			WSE	LUNCH	W/D
PSF	W/D	REN		SLEEP			WSE	LUNCH	W/D
ESTON	9	10	11	12	13	14	15	16	
COVERGE	-E05	-E04	-E03	-E02	-E01	-E00	-E00	-E00	-E00
TOPS									
NOTES:									





NO.	DATE	DESCRIPTION	AMOUNT	CHECK NO.	BANK	INITIALS	REMARKS	DATE	AMOUNT	CHECK NO.	BANK	INITIALS	REMARKS
1													
2													
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NOTES:													

Date		Lat		Long		Alt		Wind		Temp		Humidity		Pressure		Visibility		Remarks	
Day	Month	Year	North	East	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
12	12	1952	12	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
BLU	00	00																	
	01	01																	
	02	02																	
	03	03																	

































UNIT	POSITION	NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	NO. 9	NO. 10	NO. 11	NO. 12	NO. 13	NO. 14	NO. 15	NO. 16	NO. 17	NO. 18	NO. 19	NO. 20	NO. 21	NO. 22	NO. 23	NO. 24	
PLT																										
NSC																										
PSN																										
EARTH FORCE		[Decorative wavy pattern]																								
EARTH COVERAGE		[Technical drawing with lines and annotations]																								
TPOB		[Technical drawing with lines and annotations]																								
EARTH		[Technical drawing with lines and annotations]																								
NOTES:		[Blank area for notes]																								

GMT	(DIMIN)	MET	(DIMIN)	CGT	(DIMIN)	FD/ DAY	REFR	MOON	HOUSTON DATE	FLIGHT	EDITION	OUR. DATE
GMT 1325									NOVEMBER 28, 1964	SI-BAL-3	NOVEMBER	1964
MET 1204									28	21	22	23
BLUE	COR			SLEEP					MSG OLIVEN	MSG OLIVEN		
	MS1			SLEEP					MSG OLIVEN	MSG OLIVEN	TW3	MS1 DAF
	MS3			SLEEP					MSG OLIVEN	LUNCH PULP	TW3	MS3 DAF
	PSP			SLEEP					MSG OLIVEN	LUNCH PULP	TW3	MS3 DAF
0700												
0800	07		08		09		10		11		12	13
0900												
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2100												
2200												
2300												
NOTES:												



GRT (DIMENS)		NET (DIMENS)		CST (DIMENS)		ED/DOY	4FLH	MOON	MOISTURE DATE	FLIGHT	POSITION	PLUB. DATE	
10000000		30000000		00000000		00000000	00000000	00000000	00000000	00000000	00000000	00000000	
NET 1000		NET 2000		NET 3000		NET 4000		NET 5000		NET 6000		NET 7000	
PED	PLT	PSM	SLEEP					PSM	PCS CAP	0	0	0	0
	MS2	PSM	SLEEP					MSG	PLUJEN	0	0	0	0
	PSM	PSM	SLEEP					MSG	PLUJEN	0	0	0	0
NOTES:													



GMT (DIMIN)		MET (DIMIN)		CST (DIMIN)		ED/ DAY		MTR		MOON		HOUSTON DATE		FLIGHT		EDITION		PUB. DATE	
1234		1234		1234		/		1234		1234		DECEMBER 1 1966		11-051-3		DECEMBER 1 1966		1234	
12		13		14		15		16		17		18		19		20		21	
PLT	CABIN STOW	EMER STOW	SEAT BELT	SMOKE	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	MS2	CLIMBER	SL-DEACT	EGRESS	CABIN STOW	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	PSM	SEAT BELT	SL-DEACT	EGRESS	CABIN STOW	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
103		104		105		106		107		108		109		110					
EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE		EARTH TRACE	
STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE		STATION COVERAGE	
TDP5		TDP5		TDP5		TDP5		TDP5		TDP5		TDP5		TDP5		TDP5		TDP5	
DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU		DEURS ECU	
NOTES:		NOTES:		NOTES:		NOTES:		NOTES:		NOTES:		NOTES:		NOTES:		NOTES:		NOTES:	



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3-30

51-8/PRE

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

CREW ACTIVITY PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)

FLIGHT DESCRIPTION.....	4-2
CREW.....	4-3
ORBITER SYSTEMS.....	4-3
COMMUNICATIONS AND INSTRUMENTATION.....	4-3
GUIDANCE AND NAVIGATION.....	4-4
ENVIRONMENTAL CONTROL AND LIFE SUPPORT SUBSYSTEM.....	4-4
TEXT UPLINK SYSTEM.....	4-5
TELEVISION/PHOTOGRAPHY.....	4-5
PAYLOADS.....	4-5

CAP NOTES

**CREW ACTIVITY PLAN NOTES  
(CONSTRAINTS AND GUIDELINES)**

CP-1000

**A. FLIGHT DESCRIPTION**

SL-8 (OV099) will launch from RSC on November 29, 1984, into a 190 nm orbit at an inclination of 57.05°. The mission duration will be 7 days (-165 hours). Nominal landing occurs at RSC on December 1, 1984.

Landing opportunities are:

		<u>LANDING ORBIT NO.</u>	<u>SITE</u>	<u>LOCAL TIME</u>
Nominal	Primary	109	RSC	1530 EST
	Backup	110	RSC	1508 EST
	Weather Alternate	111	ECW	1535 PST
1 Day Late	Primary	125	RSC	1555 EST
	Backup			
	Weather Alternate	124	ECW	1601 PST

**MAJOR EVENTS**

<u>LAUNCH (RSC)</u>	November 29, 1984
<u>RET (00:MM:SS)</u>	07:00:00:00
<u>Day of year</u>	328
<u>EST/GMT</u>	17:30/23:30
<u>ME-0</u>	
<u>RET (00:MM:SS)</u>	07:00:06:23
<u>Alt h/h/p (nm)</u>	099/018
<u>OMS-1</u>	
<u>RET (00:MM:SS)</u>	07:00:10:21
<u>Alt (ps)</u>	233
<u>Alt (MM:SS)</u>	02:22
<u>ORBIT h/h/p (nm)</u>	190/050
<u>OMS-2</u>	
<u>RET (00:MM:SS)</u>	07:00:43:59
<u>Alt (ps)</u>	250
<u>Alt (MM:SS)</u>	02:33
<u>ORBIT h/h/p (nm)</u>	190/190
<u>DCORBIT h/h/p</u>	
<u>RET (00:MM:SS)</u>	07:19:57:22
<u>Alt (ps)</u>	313
<u>Alt (MM:SS)</u>	03:04
<u>ORBIT h/h/p (nm)</u>	190/015
<u>ENTRY INTERFACE</u>	
<u>RET (00:MM:SS)</u>	06/20:23:30



LANDING (KSC)  
NET (DO/MI/MI/SS)  
Day of year  
EST/GMT

December 1, 1984  
07:05:19Z  
136  
20:29/02:19  
(December 2, 1984)

## B. CREW

1. There are 7 crewmen onboard divided into 2 teams: the RED team consisting of the PLT, MS2, and PSM (materials processing expert) and the BLUE team consisting of the COR, MS1, MS3, and PSE (fluids expert). Each team works 12 hours, then is off duty for 12 hours.
2. Launch and Entry Seating - The COR and PLT will occupy their normal flight deck seats. The MS2 (Ingram) will assume the role of Flight Engineer and sit on the flight deck behind and between the COR and PLT. The MS1 (Lind) will sit on the flight deck to the right of the MS2. The MS3 and PSE will sit on the middeck.
3. The crewmen responsible for performing an EVA, should one become necessary, are: PLT and MS2.
2. The crewmen are assigned to the following tasks:
  - COR (Overmyer) = ATMOS PHOTOS
  - PLT (Gregory) = ATMOS PHOTOS
  - MS1 (Lind) = SL AC1/DEACT, FES/VC65
  - MS2 (Ingram) = SL AC1/DEACT
  - MS3 (Thornton) = ALU4

All P/L crew = GFC, MIC6, ATMOS, 1045, AFI, UMI

The timeline shows the COR and PLT participating in the COM. This is limited to monitoring the SL C&W system on the flight deck (because the COM is noisy and would mask any C&W tones back in the module).

## C. GABITER SYSTEMS

### 1. Communications and Instrumentation

- a. The Operational Instrumentation (OI) system will nominally be managed from the ground through uplink RTC commands coordinated with the crew.
- b. The Modular Auxiliary Data System (MADS) will nominally be managed through uplink RTC commands and crew switch actions.
- c. There are 12 GS104 sites available for on-orbit coverage: COR, 605, MIL, BDA, RAW, GMY, AGO, AC4, PAB, PAR, BOI, and BRK.
- d. There are 3 GS104 sites available for real-time for: RAW, 605, and MIL.

- e. There are 2 GSTN sites available for UHF voice only: YAR and BOI.
- f. The primary means of communication with the orbiter will be through the TDRS, located at 410 W. Forward link will be S-Band only, return link S-Band and Ku-Band.

## 2. Guidance and Navigation

- a. The Orbiter state vector must be uplinked whenever downtrack error in the on-board vector becomes greater than 20 nm, but is usually uplinked when errors are much greater than 5 nm. These are real-time calls.
- b. IMU alignments are scheduled approximately every 12 hours and prior to major events requiring low navigation uncertainty. Because of the desire for minimum accelerations throughout the flight IMU alignments will be done using stars-of-opportunity whenever possible. If maneuvers for alignments are required they will be done to minimize the acceleration effects.
- c. The on-orbit avionics configuration is listed below. Group B configuration will be used to minimize electrical loads.

### POWERDOWN GROUP B

GPC 1	= GNC OPS 2
GPC 2	= OFF
GPC 3	= FD OPS 3 (OFF)
GPC 4	= SM OPS 2
GPC 5	= EPS (OFF)
IMU 1 (1)	= OPERATE
STAR TRACKERS (2)	= ON
MASS MEMORY UNIT (1)	= ON
FLIGHT-CRITICAL MDAs (4)	= ON

## 3. Environmental Control and Life Support Subsystem (ECLSS)

- a. The CO<sub>2</sub> absorbers are installed for launch and are alternately replaced on-orbit as required.
- b. The four supply water tanks and one waste water tank are loaded for launch with volumes sufficient to meet a launch day deorbit opportunity with PLDBs failed closed. If waste water production exceeds storage capacity, a real-time call will be made to perform a dump. Normally two supply water dumps will occur per flight day. A real-time call will be made prior to each to inform the crew whether a dump is required, and to what level. Because there are instruments in the payload that are sensitive to contamination, dumps will be coordinated in real-time with PA OPS to minimize the effects. The POCC will provide a list of dump windows that the SIS can use for dump planning. Tanks A and B will be dumped to a level that will allow the tanks to be full prior to the next daily group of deorbit opportunities.

#### D. TEXT UPLINK SYSTEM

1. The teleprinter (TPR) will provide an on-orbit capability to receive and reproduce text-only data (such as procedures, weather data, and CAP updates or changes) from MCC. The TPR uses S-Band and is not dependent on TDRS Ku-Band. TPR uplink requires 1 to 2.5 minutes per message, depending upon the number of lines. Activation includes powering up the unit during post insertion. The TPR will remain on continuously until deactivation prior to seat ingress on entry day.
2. The Text and Graphics System (TAGS) is a hardcopy machine that operates via telemetry. The system provides the capability to transmit text material, maps, schematics, and photographs to the Orbiter through a two-way Ku-Band link using the TDRS. Transmission time for an 8 x 11 inch page can vary from just over 1 minute to just over 16 minutes depending on the resolution desired.

Availability of TAGS is TBD for this flight.

#### E. TELEVISION/PHOTOGRAPHY

1. The CCTV systems provide 3 color wide-angle cameras for in-cabin coverage. There will also be 2 PLB TV cameras configured as follows:

<u>Camera</u>	<u>Lens</u>
A (Port Fwd).....	CLA
D (Starboard Fwd).....	WLA

2. The video tape recorder (VTR) is available with 30-minute cassettes.
3. 16mm, 35mm, and 70mm camera systems are available.

#### F. PAYLOADS

##### 1. Spacelab Systems

##### a. 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 1.5kW. 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.

## b. Communications and Instrumentation

- 1) 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 St voice circuits (pre-multiplexed), and 1 GMT line signal. It multiplexes the various inputs it receives at any time and sends the data either to the RUSP for downlink, or back to the HDRR or PL RCOR. 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.
- 2) The HDRR is located in the Control Center rack of the St. 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 RCOR can direct dump to the RUSP or can be dumped through the HRM. (The PL RCOR is not planned to be used on this flight, so the HDRR will handle all payload data recording).
- 3) The St Intercom 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.

## c. Environmental Control and Life Support (ECLS)

The two LICH canisters in the module are good for about 48 hours 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 approximately every 24 hours. Because there will be a third payload crewman in the module on the blue shift and there are animals onboard, the change-out schedule and total number of canisters may be altered. This is under study and will be updated when and if required.

## d. Command and Data Management (CDMS)

- 1) There are 3 computers in the Spacelab module: the Subsystems Computer (SSC), the Experiment Computer (EC), and a Backup Computer (BUC). The BUC is loaded with SSC software because losing the SSC is more critical than losing the EC, and a timely recovery is necessary. One Mass Memory Unit (MMU) services all 3 computers and contains a copy of both the SSC and EC 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 an experiment rack in the module.

- 2) The SSC performs 3 basic functions with the systems hardware:
  - (a) Sends commands to the H/W
  - (b) Monitors data from the H/W and transfers selected pieces to the Orbiter PCMAJ for downlink
  - (c) 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.

- 3) The ERC performs similar functions to the SSC with the payload hardware plus several additional functions:
  - (a) Performs a checkout of payloads
  - (b) Controls payload operations through the use of automatic timelines (see item 4 below)
  - (c) Processes payload data for feedback to the H/W, display to the crew, or transmission to the ground through the HRM

- 4) 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 crew 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 ERC at the corresponding GMT line. 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.

#### e. Common Payload Support Equipment (CPSE)

The Scientific Airlock (SAL) will be flown to support the WFC (see Introduction, page v). The Scientific Window Adapter Assembly (SWAA) will not be flown.

## 2. Spacelab Experiments.

The following paragraphs give a brief description of the eleven experiments of Spacelab 3. Also, in each case this description is followed by a list of Marshall Space Flight Center model numbers involving crew action (as seen in the summary timeline) and their corresponding descriptions.

### a. Fluid Experiment System (FES)

This system is used to grow triglycine sulfate (TGS) crystals by removing heat from a saturated solution through a seed crystal. The purposes of this investigation are: to develop a technique for crystal growth in microgravity, to study the growth environment and relate it to growth behavior, and to determine how microgravity influences the properties of the resultant crystals.

#### MSFC MODEL = MODEL DESCRIPTION

FES-1	CRYSTAL #1 OPS
FES-2	CRYSTAL #2 OPS
FES-3	CRYSTAL #3 OPS
FES-MON1	CREW MON - EARLY PHASE
FES-MON2	CREW MON - LATE PHASE

### b. Vapor Crystal Growth System (VCGS)

The purpose of this experiment is to grow more-perfect crystals of mercuric iodide. They will be grown by vaporization and recondensation at 1200 C in a special furnace and the growth process will be reversed if polycrystalline growth begins. These crystals should have fewer defects because of the microgravity environment.

#### MSFC MODEL = MODEL DESCRIPTION

VCG	ACTIVATE/DEACTIVATE VCGS
VCG-MON1	CREW MON - EARLY PHASE
VCG-MON2	CREW MON - LATE PHASE

### c. Mercuric Iodide Crystal Growth (MICG)

The purpose of this experiment is to grow near-perfect single crystals of mercury iodide. The process will be carried out in a two-zone furnace with sensors to collect temperature data. The investigators hope to find that the effects of convection are greatly reduced in the microgravity environment.

#### MSFC MODEL = MODEL DESCRIPTION

MICG	INITIATE MICG/ CHNG CRYSTAL CARTRIDGE
------	--

d. Dynamics of Rotating and Oscillating Free Drops (DROP)

The main objectives of this experiment are to study the equilibrium figures of a rotating drop and to study the large-amplitude oscillations of a liquid drop. Another objective is to establish the advantages of conducting future drop and bubble investigations in space using the Drop Dynamics Module (DOM).

MSFC MODEL \* MODEL DESCRIPTION

DOM-1	RUN #1 OPS
DOM-2	RUN #2 OPS
DOM-0	ODD NUMBERED FO's
DOM-E	EVEN NUMBERED FO's
DOM-FILM	FILM MAGAZINE CHANGE

e. Geophysical Fluid Flow Cell (GFFC)

The purpose of this experiment is to simulate global atmospheric flows of rotating planets and stars in hopes of answering questions about their mechanics. The investigator is trying to identify those external conditions of fluid viscosity, rotation, gravity, etc., which determine the mode of flow. Simulation will be accomplished with the use of a dielectric fluid between two concentric, rotating electrically conductive spherical shells.

MSFC MODEL \* MODEL DESCRIPTION

GFFC-1	LONG DURATION RUN OPS
GFFC-2	SHORT DURATION RUN OPS
GFFC-F	FILM CHANGE

f. Atmospheric Trace Molecules Spectroscopy (ATMOS)

The ATMOS investigation is designed to collect data on the chemistry and physics of Earth's upper atmosphere. It should determine the compositional structure of the upper atmosphere, and it should provide information useful in the design of future atmospheric studies. The investigation will use infrared absorption spectroscopy and will read sunlight that passes through the upper atmosphere with an interferometer.

MSFC MODEL \* MODEL DESCRIPTION

ATMCAR	SUNRISE PHOTOGRAPHY
ATMCAS	SUNSET PHOTOGRAPHY

g. Research Animal Holding Facility - Verification Test (RAHF-VT)

The objective of this investigation is to verify the performance of the RAHF. The RAHF is designed to support animals from rodents to small primates. It will house four monkeys and twenty-four rats. The animals will be monitored during the mission, and the food and water used will be recorded.

MSFC MODEL \* MODEL DESCRIPTION

ARC-A-SR	ASR (Aries Single Rack) ANIMAL OBS
ARC-A-DR	ADR (Aries Double Rack) ANIMAL OBS
ARC-B	CNFG FOR ON-ORBIT/DESC
ARC-C	EMPTY CANS BOTTLE
ARC-D12	RELOAD/SET CAMR-PULSE MODE
ARC-D4	SET CAMR-CONT MODE
ARC-E-SR	REPLACE FOOD IN ASR
ARC-E-DR	REPLACE FOOD IN ADR
ARC-F-SR	ASR HOUSEKEEPING
ARC-F-DR	ADR HOUSEKEEPING
ARC-G1	VIDEO OF ANIMALS
ARC-G2	VIDEO OF CREW PROC
ARC-H	TEMPORARY RESTRAINT OPS

h. Dynamic Environment Measuring System (DEMS) and Biotelemetry System (BTS)

The objective of these investigations is to verify the performance of each of these systems while providing supporting data for the RAHF-VT. The DEMS is designed to measure noise, vibration and accelerations on the animals during launch and entry. The BTS measures basic physiological functions in research animals such as body temperature, heart rate, and ECG. The sensor packages will be implanted in four rats and four monkeys preflight, and data is then telemetered to an antenna in the cages and routed to the BTS.

MSFC MODEL \* MODEL DESCRIPTION

ARC-I	BIOTELEMETRY PWR ACT/DEACT
ARC-J	DATA ACTIVATION
ARC-K	BIOTELEMETRY SIGNAL STRENGTH OPTIMIZATION
ARC-L	DEMS CASSETTE CHANGE
ARC-N	DEMS ACT FROM AFD



**i. Urine Monitoring Investigation (UMI)**

The primary objectives of the UMI are: verify the operation of the Urine Monitoring System (UMS), perform inflight calibration of the UMS, develop a procedure for measuring crew water intake, and verify a system of urine sample collection. The investigation will involve recording water intake of crewmembers from the galley and water supply. It will also use the UMS to measure urine volume of each crewmember and collect samples on two crewmembers.

MSFC MODEL \* MODEL DESCRIPTION

UMS-OPS	UMS ACT/DEACT
UMS-SAM	CHNG/STOW UMS SAMPLE
UMS-CAL	UMS CALIBRATION

**j. Autogenic Feedback Training (AFT)**

AFT is designed to help crewmembers overcome the effects of Zero-Gravity Motion Sickness. The crewmembers receive extensive preflight autogenic feedback training. Then they practice on orbit and during motion sickness attacks. Crewmembers will wear monitoring instruments and data recorders, and feedback displays will be used.

MSFC MODEL \* MODEL DESCRIPTION

AFT CHANGE CASSETTE/PERFORM DIAGNOSTIC SCALE

**k. Ionization States of Solar and Galactic Cosmic Ray Heavy Nuclei (IONS)**

This experiment is designed to study the low-energy cosmic ray ions of C, N, O, Ne, Ca, and Fe. The detector system consists of layers of plastics that show a trail of damage after being penetrated by cosmic rays. Study of these trails on the ground gives data as to the energies of the ions in the cosmic rays.

MSFC MODEL \* MODEL DESCRIPTION

IONS IONS EXPT OPS

## 1. Television and Photography

The following list describes the television and photography scenes that are payload related. The requestor (PAO, PI, or both) is TBS in the Flight Planning Annex.

<u>MSFC MODEL</u>	<u>MODEL DESCRIPTION</u>
TV01	TV01 - INITIAL SPACELAB INGRESS
TV02	TV02 - RAHF TOUR
TV03	TV03 - YCG PROCEDURES
TV04	TV04 - DOM PROCEDURES
TV05	TV05 - PES PROCEDURES
TV11	TV11 - PS SLEEP RESTRAINTS
TV12	TV12 - MEAL PERIOD
TV13	TV13 - PRESS CONFERENCE
TV14	TV14 - SPACELAB EGRESS
MOV01	16mm/01 - YCG CRYSTAL GROWTH
MOV02	16mm/02 - ADR HOUSEKEEPING
MOV03	16mm/03 - ASR HOUSEKEEPING
MOV04	16mm/04 - ANIMAL OBS
STILO1	35mm/01 - YCG CRYSTAL GROWTH
STILO2	35mm/02 - ADR HOUSEKEEPING
STILO3	35mm/03 - ASR HOUSEKEEPING
STILO4	35mm/04 - PS RESTRAINTS
STILO5	35mm/05 - MEAL PERIOD

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

INTRODUCTION..... 5-2  
TABLE 5-1 51-B DTOs/DSOs..... 5-3

DTOs/DSOs

### INTRODUCTION

The following table describes the scheduling data and rationale for on-orbit crew activity related DTOs/DSOs for S1-B. The current FRD (Ref. 2) was used for compiling this table.

DTOs/DSOs

TABLE 5-1 51-B ON-ORBIT CREW ACTIVITY RELATED DTOS/DSOs

DTOS/DSO NUMBER	TITLE	SCHEDULED MET (G/MN:PM)	SCHEDULING REMARKS
DSO 0401	Validation of Predictive Tests and Countermeasures for Space Motion Sickness	NOT SCHEDULED	
DSO 0402	Cardiovascular Deconditioning Countermeasure Assessment	NOT SCHEDULED	
DSO 0901	Documentary Television	TBS	
DSO 0902	Documentary Motion Picture Photography	TBS	
DSO 0903	Documentary Still Photography	TBS	

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TABLES

TABLE 6-1 DAP 2 3 CONFIGURATIONS..... 6-2  
TABLE 6-2 ATTITUDE TIMELINE..... TBS

TABLES

TABLE 6-1  
DAP A CONFIGURATIONS

	A10	A2	A3	M	A5	A6
<u>TRANSCATION</u>						
PULSE ft/sec	0.10	0.10	0.10	0.10	0.10	0.10
<u>ROTATION</u>						
DSC RT NORM °/sec	0.200	0.400	0.200	0.200	0.200	0.200
YERN °/sec	0.200	0.400	0.200	0.008	0.200	0.200
PULSE NORM °/sec	0.10	0.10	0.30	0.10	0.10	0.10
YERN °/sec	0.010	0.010	0.010	0.010	0.050	0.010
COMP NORM °/sec	.00	.00	.00	.00	.00	.00
YERN °/sec	.000	.000	.000	.000	.000	.000
<u>DEADBAND</u>						
ATT NORM (deg)	5.000	1.00	5.00	1.00	5.00	5.00
YERN (deg)	1.000	1.000	1.000	.070	1.000	1.000
RATE NORM °/sec	0.20	0.20	0.20	0.20	0.20	0.20
YERN °/sec	.020	.020	.020	.010	.020	.020
<u>DET OPT</u>						
P	1	1	3	1	1	3
V	1	1	3	3	1	3
CNTL ACCEL	0	0	0	0	0	0

1-loaded OPS-2 DAP Configuration

TABLES



TABLE 6-1 (Cont)  
DAP B CONFIGURATIONS

	01*	02	03	04	05
<u>TRANSLATION</u>					
PULSE ft/sec	0.02	0.02	0.02	0.02	0.02
<u>ROTATION</u>					
OSC RT NORM $\text{O/sec}$	0.500	0.200	0.200	0.200	0.200
VERN $\text{O/sec}$	0.200	0.200	0.200	0.008	0.016
PULSE NORM $\text{O/sec}$	0.04	0.04	0.04	0.04	0.04
VERN $\text{O/sec}$	0.002	0.002	0.002	0.002	0.002
COMP NORM $\text{O/sec}$	.00	.00	.00	.01	.00
VERN $\text{O/sec}$	.000	.000	.000	.000	.000
<u>DEADBAND</u>					
ATT NORM (deg)	3.00	3.00	3.00	0.30	3.00
VERN (deg)	1.000	1.000	1.000	0.100	0.033
RATE NORM $\text{O/sec}$	0.20	0.20	0.20	0.20	0.20
VERN $\text{O/sec}$	.020	.020	.020	.010	.020
<u>JET OPT</u>					
P	1	3	1	1	3
V	1	3	1	3	3
<u>ENTL ACCEL</u>					
	0	0	0	0	0

\*1-loaded OPS-2 DAP Configuration

TABLE 6-2 51-B ATTITUDE TIMELINE  
(TBS)

ABBREVIATIONS/ACRONYMS

More complete compilations of abbreviations and acronyms are available in the STS glossary (Ref. 4).

((

ABBREVIATIONS/  
ACRONYMS

## ABBREVIATIONS/ACRONYMS

ABS	ABSORBER
ACN	ASCENSION ISLAND (STON SITE)
ACT	ACTIVATE/ACTIVATION
ADI	ATTITUDE DIRECTION INDICATOR
ADR	AMES DOUBLE RACK
AFD	AFT FLIGHT DECK
AFT	AUTOGENIC FEEDBACK TRAINING
AGO	SANTIAGO, CHILE (STON SITE)
ALN	ALIGNMENT
ANT	ANTENNA
AOA	ABORT ONCE AROUND
ADS	ACQUISITION OF SIGNAL
APU	AUXILIARY POWER UNIT
ARC/RAHF	AMES RESEARCH CENTER/RESEARCH ANIMAL HOLDING FACILITY
ASCS	ATMOSPHERE STORAGE & CONTROL SYSTEM
ASR	AMES SINGLE RACK
ATCS	ACTIVE THERMAL CONTROL SYSTEM
ATMOS	ATMOSPHERIC TRACE MOLECULES SPECTROSCOPY
ATO	ABORT TO ORBIT
ATT	ATTITUDE
BDA	BERMUDA ISLAND, BWI (STON SITE)
BHD	BULKHEAD
BLKT	BLANKET
BOT	BOTSWANA (STON SITE)
BTS	BIOTELEMETRY SYSTEM
BYP	BYPASS
CAL	CALIBRATION

ABBREVIATIONS/  
ACRONYMS

CAMR	CAMERA
CCTV	CLOSED-CIRCUIT TV
COR	COMMANDER
CHG	CHANGE
CIC	CREW INTERFACE COORDINATOR
C/L	CHECKLIST
CL	CLOSE/CLOSED
CLN	CLEAN
CNDS	CONDENSATE
C/O	CHECKOUT
COAS	CREWMAN OPTICAL ALIGNMENT SIGHT
COMM	COMMUNICATIONS
CONFIG/CNFG	CONFIGURATION/CONFIGURE
CONT	CONTINUOUS
CST	CENTRAL STANDARD TIME
CTLS	CONTROLS
C&W	CAUTION AND WARNING
DAP	DIGITAL AUTO PILOT
DB	DEADBAND
DDM	DROP DYNAMICS MODULE
DEACT	DEACTIVATE
DED	DEDICATED
DENS	DYNAMIC ENVIRONMENT MEASURING SYSTEM
DEORB	DEORBIT
DESC	DESCENT
DEU	DISPLAY ELECTRONICS UNIT
DISP	DISPLAY
DKR	DAKAR, SENEGAL (STDM SITE)
DMP	DUMP

DPLY/DPY	DEPLOY
DSO	DETAILED SUPPLEMENTARY OBJECTIVE
OTO	DETAILED TEST OBJECTIVE
ECLS	ENVIRONMENTAL CONTROL LIFE SUPPORT SYSTEM
EDW	EDWARDS AFB, CALIFORNIA
EI	ENTRY INTERFACE
ENA	ENABLE
ENT	ENTRY
EVA	EXTRAVEHICULAR ACTIVITY
EXPT	EXPERIMENT
FC	FUEL CELL
FCS	FLIGHT CONTROL SYSTEM
FD	FREEZE DRIED; FLIGHT DAY; FLIGHT DECK
FDI	FLIGHT DATA FILE
FORD	FLIGHT DEFINITION AND REQUIREMENTS DIRECTIVE
FES	FLASH EVAPORATOR SYSTEM; FLUID EXPERIMENT SYSTEM
FM	FREQUENCY MODULATION
FO	FUNCTIONAL OBJECTIVE
FOV	FIELD OF VIEW
FWD	FORWARD
GAS	GET AWAY SPECIAL
GOS	GOLDSTONE, CALIFORNIA (STON SITE)
GFFC	GEOPHYSICAL FLUID FLOW CELL
GMT	GREENWICH MEAN TIME
GNC	GUIDANCE NAVIGATION AND CONTROL
GPC	GENERAL PURPOSE COMPUTER
GRP	GROUP
GSE	GROUND SUPPORT EQUIPMENT

GSTDN	GROUND SPACE TRACKING & DATA NETWORK
GIM	GUAM ISLAND, U.S. (STDN SITE)
HAW	HAWAII (KAUAI, STDN SITE)
HL	HI LOAD FLASH EVAPORATOR
HP	HEAT PIPES
HTR	HEATER
HYD	HYDRAULIC
I'CONNECT/ I'CONNECT	INTERCONNECT
IMU	INERTIAL MEASUREMENT UNIT
INH	INHIBIT
INRTL	INERTIAL
IONS	IONIZATION STATES OF HEAVY NUCLEI
KSC	KENNEDY SPACE CENTER
LOS	LOSS-OF-SIGNAL
L'V'LH	LOCAL VERTICAL LOCAL HORIZONTAL
MAD	MADRID, SPAIN (STDN SITE, 1ST ANTENNA)
MCC	MISSION CONTROL CENTER
MD	MIDDECK
MDM	MULTIPLEXER/DEMULTIPLEXER
MECH	MECHANISM; MECHANICAL
MECO	MAIN ENGINE CUTOFF
MET	MISSION ELAPSED TIME
MICG	MERCURY IODIDE CRYSTAL GROWTH
MIL	MERRITT ISLAND, FLORIDA (STDN SITE)
MILA	MERRITT ISLAND LAUNCH AREA
MMU	MANNED MANEUVERING UNIT

MNR	MANEUVER
MOI	MONITOR
MPS	MAIN PROPULSION SYSTEM
MSG	MESSAGE
NAV	NAVIGATION
OI	OPERATIONAL INSTRUMENTATION
OMS	ORBITAL MANEUVERING SYSTEM
O/O	ON ORBIT
OPS	OPERATIONS; OPERATIONAL SEQUENCE
ORB	ORBITER
ORR	ORRORAL VALLEY, AUSTRALIA (STDN SITE)
PCM	PULSE-CODE MODULATION
PCS	PRESSURE CONTROL SYSTEM
PERF	PERFORM; PERFORMANCE
PLBD	PAYLOAD BAY DOORS
PL/PLD	PAYLOAD
PLT	PILOT
PM	PHASE MODULATION
POCC	PAYLOAD OPERATIONS CONTROL CENTER
PRCS	PRIMARY REACTION CONTROL SYSTEM
PREP	PREPARATION
PRO	PROCEED
PRSD	POWER REACTANT SUPPLY AND DISTRIBUTION
PSA	PRE/POST SLEEP ACTIVITY
PTC	PASSIVE THERMAL CONTROL
PWRDN	POWERDOWN
RAD	RADIATOR



RCS	REACTION CONTROL SYSTEM
REF	REFERENCE
REFSMAT	REFERENCE STABLE MEMBER MATRIX
RELMAT	RELATIVE MATRIX
RF	RADIO FREQUENCY
RME	RADIATION MONITORING EQUIPMENT
RMS	REMOTE MANIPULATOR SYSTEM
ROT	ROTATION; ROTA FIELD
RSET	RESET
RTC	REAL-TIME COMMAND
S-BD	S-BAND
SAL	SCIENTIFIC AIRLOCK
SEL	SELECT
SEP	SEPARATION
SEQ	SEQUENCE
SGLS	SPACE GROUND LINK SYSTEM/STATION (OOD)
SPLY	SUPPLY
SSP	STANDARD SWITCH PANEL
SSUS	SPINNING SOLID UPPER STAGE
STBD	STARBOARD
STDN	SPACE TRACKING & DATA NETWORK
ST/S TRKR	STAR TRACKER
STS	SPACE TRANSPORTATION SYSTEM
STW	STOW
SW	SWITCH
SYS	SYSTEM
TAGS	TEXT AND GRAPHICS SYSTEM
TB	TALKBACK
TDRS	TRACKING AND DATA RELAY SATELLITE SYSTEM

TERM	TERMINATE; TERMINAL
TIG	TIME OF IGNITION
TPR	TELEPRINTER
UHF	ULTRA HIGH FREQUENCY
UMS	URINE MONITORING SYSTEM
VAC	VACUUM
VCG	VAPOR CRYSTAL GROWTH
VRCS	VERNIER REACTION CONTROL SYSTEM
VTR	VIDEO TAPE RECORDER
VWFC	VERY WIDE FIELD CAMERA
WCS	WASTE COLLECTION SYSTEM
XFER	TRANSFER
X-POP	X BODY AXIS PERPENDICULAR TO ORBIT PLANE
+X VV	+X BODY AXIS COINCIDENT WITH VELOCITY VECTOR
YAR	YARRAGADEE (STDN SITE)
Y-POP	Y BODY AXIS PERPENDICULAR TO ORBIT PLANE
-ZLV	-Z LOCAL VERTICAL (-Z BODY AXIS TOWARDS EARTH)

REFERENCES

REFERENCES

#### REFERENCES

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