HUBBLE SPACE TELESCOPE

ORBITAL SYSTEM TEST MISSION INTEGRATED TIMELINE

September 29, 1998

Launch on 10/29/98

HMIT LEGEND

The format of the HOST Mission Integrated Timeline is described as follows:

(a)	TIME	Incrementing from launch, time is shown in GMT (Greenwich Mean Time) and MET (Mission Elapsed Time). For GMT the day of the year is shown in the margin. For MET the day of mission is shown in the margin.
(b)	ORBIT#	The orbit number of the Orbiter is shown, as is the ascending node crossing.
(c)	DAY/NIGHT	The shaded intervals show when the Orbiter is in the earth's shadow.
(d)	SAA	The thin line represents the entire SAA region. The thick shaded region represents SAA contour #1.
(e)	NCC MODE	Shows the state of the NICMOS Cryo-Cooler.
(f)	ORBITER ATTITUDE	Shows the orientation of the Orbiter as required to support the HOST Mission.
(g)	CREW SCHEDULE	Shows the crew activities and their activities involving the Orbiter e.g. crew sleep cycles, EVA prep etc..
(h)	CREW ACTIVITIES	Shows the Orbiter/Crew activities in support of the HOST and the SSE (Space Support Equipment).
(i)	HOST POCC ACTIVITY (KSC)	Provides a functional description of the command and verification activities to support the HOST Mission. A legend is provided in the margin to differentiate between the types of commands.
(j)	TLM FORMAT	Shows the telemetry format requirements for the engineering and science channels.
(k)	TDRSS/I&C	Shows the TDRSS coverage and the zone-of-exclusion (ZOE). When using the Shuttle Orbiter communications, PSP Bypass, the S-band and Ku-band coverage will be shown. For Orbiter coverage, the thin line is S-band and the thick line is Ku-band,
(l)	MCC (JSC) ACTIVITIES	Describes the major activities within the MCC required to support the HOST Mission.

MET	SEQ #	SEQUENCE TITLE
00:01:30	1	PLBD OPEN [60 min]
00:02:30	2	HOST ACTIVATION & CHECKOUT
00:03:32	3	VERIFY EQUIPMENT POWER ON
00:03:43	4	ESM ACTIVATION & CHECKOUT
00:03:58	5	NCLS ACTIVATION-1
00:04:03	6	CPL START-UP-A1
00:05:47	7	VERIFY SAMS POWER ON
00:06:00	8	ACTIVATE SSR POWER & CONFIGURE
00:06:24	9	ACTIVATE SSR RECORD
00:06:25	10	ACTIVATE 486 1-2 & VERIFY
00:06:36	11	SAMS PRE-MISSION BASELINE FREE DRIFT RECORD
00:07:54	12	ACTIVATE SSR PLAYBACK
00:08:08	13	CPL START-UP-A2
00:12:46	14	CPL START-UP-A3
00:18:05	15	NCS HIGHCOOL-1
01:00:10	16	NCS HIGHCOOL-1 (PART 2)
01:21:10	17	NCS OPERATE-1
02:00:10	18	NCLS ACTIVATION-3
02:10:45	19	NCS IDLE-1
02:21:10	20	NCS HIGHCOOL-2
03:05:02	21	DEACTIVATE 486 1-2
03:05:10	22	ACTIVATE 486 1-3
03:07:00	23	NCS OPERATE-2
03:19:00	24	NCS IDLE-2
04:07:00	25	NCS HIGHCOOL-3
04:17:00	26	NCS OPERATE-3
05:03:00	27	NCS IDLE-3
06:05:03	28	DEACTIVATE 486 1-3
06:05:15	29	ACTIVATE 486 2-3
06:12:00	30	NCS IDLE-3 TO STANDBY
06:13:30	31	NCS HIGHCOOL-4 (COLD START)
06:14:04	32	NCS COLD START SHUTDOWN TO STANDBY
06:14:39	33	CPL DEPRIME-1
06:17:39	34	CPL START-UP-B
07:01:03	35	CPL DEPRIME-2
07:03:03	36	CPL START-UP-C
07:10:18	37	NCS HEAT-UP
08:07:15	38	DEACTIVATE 486 2-3
08:07:45	39	DEACTIVATE SSR
08:07:51	40	VERIFY EQUIPMENT POWER OFF
08:10:18	41	NCS HEATUP TO STANDBY
08:10:33	42	CPL DEPRIME-3
08:11:13	43	NCLS POWER OFF
08:11:15	44	CPL POWER OFF
08:11:18	45	ESM POWER DOWN
08:11:28	46	VERIFY NCS POWER OFF
08:12:30	47	SAMS POST-MISSION BASELINE FREE DRIFT RECORD
08:14:45	48	VERIFY SAMS POWER OFF
08:15:05	49	VERIFY HOST DEACTIVATION

HOST MISSION INTEGRATED TIMELINE

SHEET 1 OF 40

442 / 441

DATE:Sep 29, 1998

TIME GMT: 301 MET: -00	1900 -24	2000 -23	2100 -22	2200 -21	2300 -20	0000 -19	0100 -18
ORBIT# ascend node ∇							
DAY / NIGHT							
SAA							
NCC MODE							
ORBITER ATT							
CREW SCHED							
CREW ACTIVITIES							
HOST POCC ACTIVITY (KSC)							
Δ REAL-TIME COMMAND							
• COMMENT/ EVENT							
SPC							
HAZARDOUS							
COMM ENG							
COMM EAST WEST							
MCC (JSC) ACTIVITIES:							

HOST MISSION INTEGRATED TIMELINE

SHEET 2 OF 40

442 / 441

DATE:Sep 29, 1998

TIME GMT: 302 MET: -00	0100 -18	0200 -17	0300 -16	0400 -15	0500 -14	0600 -13	0700 -12
ORBIT# ascend node ∇							
DAY / NIGHT							
SAA							
NCC MODE							
ORBITER ATT							
CREW SCHED							
CREW ACTIVITIES							
HOST POCC ACTIVITY (KSC) Δ REAL-TIME COMMAND • COMMENT/ EVENT SPC HAZARDOUS							
COMM ENG							
COMM EAST WEST							
MCC (JSC) ACTIVITIES:							

HOST MISSION INTEGRATED TIMELINE

SHEET 3 OF 40

442 / 441

DATE:Sep 29, 1998

TIME GMT: 302 MET: -00	0700 -12	0800 -11	0900 -10	1000 -9	1100 -8	1200 -7	1300 -6
ORBIT# ascend node ∇							
DAY / NIGHT							
SAA							
NCC MODE							
ORBITER ATT							
CREW SCHED							
CREW ACTIVITIES							
HOST POCC ACTIVITY (KSC) Δ REAL-TIME COMMAND • COMMENT/ EVENT SPC HAZARDOUS							
COMM ENG							
COMM EAST WEST							
MCC (JSC) ACTIVITIES:							

HOST MISSION INTEGRATED TIMELINE

SHEET 4 OF 40

442 / 441

DATE:Sep 29, 1998

TIME GMT: 302 MET: -00	1300 -6	1400 -5	1500 -4	1600 -3	1700 -2	1800 -1	1900 -0
ORBIT# ascend node ∇							
DAY / NIGHT							
SAA							
NCC MODE							
ORBITER ATT							
CREW SCHED							
CREW ACTIVITIES							
HOST POCC ACTIVITY (KSC) Δ REAL-TIME COMMAND • COMMENT/ EVENT SPC HAZARDOUS							
COMM ENG							
COMM EAST WEST							
MCC (JSC) ACTIVITIES:							

HOST MISSION INTEGRATED TIMELINE

TIME — GMT: 302 / MET: 00 — 1900 (0), 2000 (1), 2100 (2), 2200 (3), 2300 (4), 0000 (5), 0100 (6)

ORBIT# (ascend node ∇): 2, 3, 4

DAY / NIGHT

SAA

NCC MODE

ORBITER ATT: ASC — -ZLV -XVV — IMU — -ZSI — SOL — -ZLV -XVV

CREW SCHED

CREW ACTIVITIES

- **1 • PLBD OPEN [60 min]**
- **• HOST PLATFORM ACTIVATION [6 min]**
  - • POWER ON SURVIVAL HEATERS [3 min]
  - • POWER ON FMDM'S [3 min]

HOST PLATFORM SURVIVAL HTRS MUST BE ON WITHIN 120 MIN AFTER PLBD OPENING

HOST POCC ACTIVITY (KSC)

- **2 • HOST ACTIVATION & CHECKOUT**
  - 2 ΔA005-VERIFY HOST PLATFORM ACTIVATION [6min]
  - 2 ΔA004-VERIFY HOST CONTROLLER PWR ON [5min]
  - 2 ΔA001-NO-OP [5min]
  - 2 ΔA002-ADV COMP 486 PNTR INIT [5min]
  - 2 ΔA003-GND SYS VALIDATION [35min]
  - 2 ΔA006-INIT NCS LATCHING RELAYS [5min]
- **3 • VERIFY EQUIPMENT POWER ON**
  - 3 ΔA101-VERIFY EQUIPMENT POWER ON [5min]
- **4 • ESM ACTIVATION & CHECKOUT**
  - 4 ΔB001-ESM OFF TO BOOT [10min]
  - 4 ΔB003-ESM BOOT TO OPERATE [5min]
- **5 • NCLS ACTIVATION-1**
  - 5 ΔC001-COMMAND STARTING HTR CONFIGURATION [5min]
- **6 • CPL START-UP-A1**
  - 6 ΔD001-CPL HOLD TO STANDBY [3min]
- **VERIFY SAMS POWER ON • 7**
  - VERIFY SAMS TLM (HEARTBEAT) [2min]-A102 Δ7
  - ENABLE SAMS LIMIT CHECK [1min]-A106 Δ7

FOFE TELEMETRY FEED AVAILABLE

PATCHES TLM CHK EN S/M

INCLUDES FSW PATCH IF NECESSARY

INNER ENCL HTR ON
OUTER ENCL HTR ON

TRIM HTR ON
BOOST HTR ON

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG, EAST, WEST

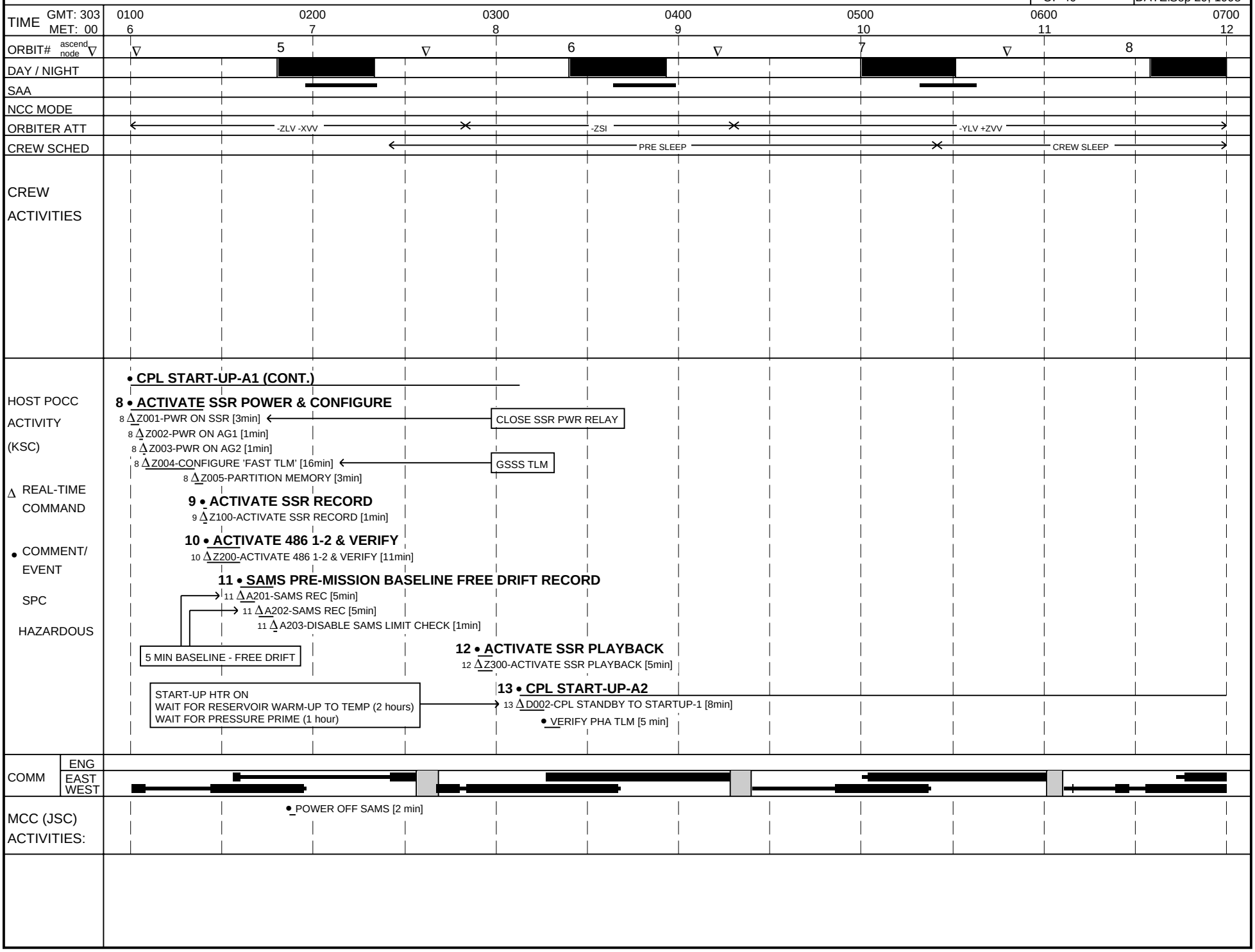
MCC (JSC) ACTIVITIES:

- **• PWR ON HOST CONTROLLER [2 min]**
- **• PWR ON PHA [2 min]**
- **• PWR ON 486 [2 min]**
- **PWR ON SAMS [2 min] •**
- **• PWR ON SSR [2 min]**
- **• PWR ON NCS [5 min]**

• LAUNCH
(GMT 19:00, 2:00pm EST)

NOTE: NEED SEPARATE REQUIREMENT FOR JSC MANAGEMENT OF SAMS POWER ON/OFF AROUND SAA EVENTS

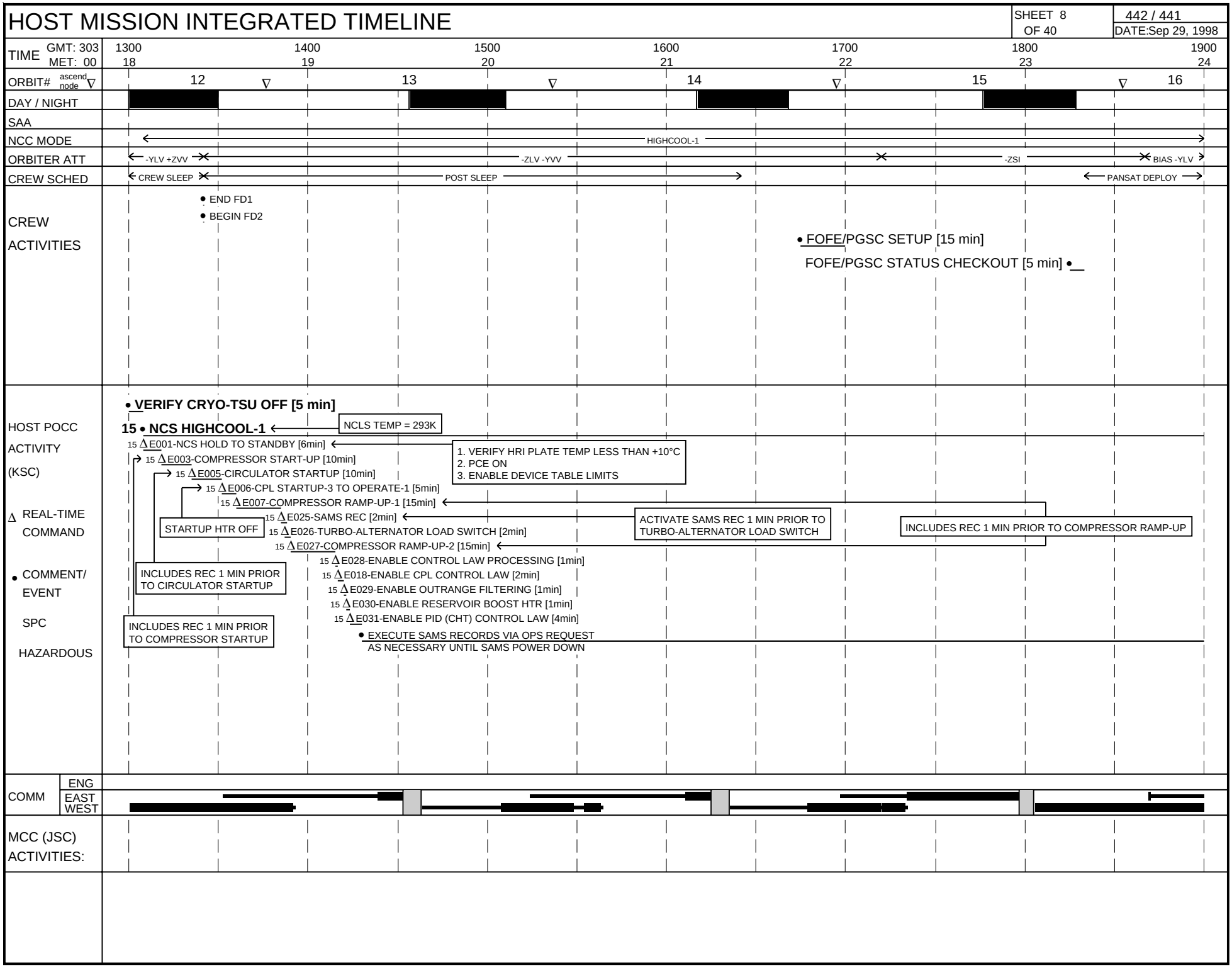
HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 303 MET: 00	0700 12			0800 13			0900 14			1000 15			1100 16			1200 17		1300 18
ORBIT# ascend node ∇			8	∇		9		∇		10			∇		11		∇	12	
DAY / NIGHT																			
SAA																			
NCC MODE																			
ORBITER ATT		← -YLV +ZVV →																	
CREW SCHED		← CREW SLEEP →																	
CREW ACTIVITIES																			
HOST POCC ACTIVITY (KSC)		• CPL START-UP-A2 (CONT.)																	
			14 • CPL START-UP-A3																
			→ 14 Δ D004-CPL STARTUP-1 TO STARTUP-3 [8min]																
															14 Δ A107-VERIFY SAMS TLM (HEARTBEAT) [2min] 14 Δ D005-ENABLE SAMS LIMIT CHECK [1min]				
Δ REAL-TIME COMMAND			ADJUST RES TEMP TO STARTING OPERATIONAL TEMP WAIT 1 HOUR AFTER REACHING OPERATIONAL TEMP																
• COMMENT/ EVENT																			
SPC																			
HAZARDOUS																			
COMM	ENG																		
	EAST WEST																		
MCC (JSC) ACTIVITIES:															• SAMS PWR ON				

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME GMT: 303 MET: 01

1900 (0) | 2000 (1) | 2100 (2) | 2300 (3) | 2300 (4) | 0000 (5) | 0100 (6)

ORBIT# ascend node ∇: 16, 17, 18, 19

DAY / NIGHT

SAA

NCC MODE: HIGHCOOL-1

ORBITER ATT: BIAS -YLV | -ZSI | -YLV +ZVV

CREW SCHED

CREW ACTIVITIES

HOST POCC ACTIVITY (KSC)

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

• NCS HIGHCOOL-1 (CONT.)

• EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

16 • NCS HIGHCOOL-1 (PART 2)

16 Δ F003-DISABLE SAMS LIMIT CHECK [1min]

16 Δ F004-ENABLE SAMS LIMIT CHECK [1min]

• EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

DISABLE SAMS LIMIT CHECK [1min]-F005 Δ 16

ENABLE SAMS LIMIT CHECK [1min]-F007 Δ 16

EXECUTE SAMS RECORDS VIA OPS REQUEST • AS NECESSARY UNTIL SAMS POWER DOWN

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

• SAMS PWR OFF

• SAMS PWR ON

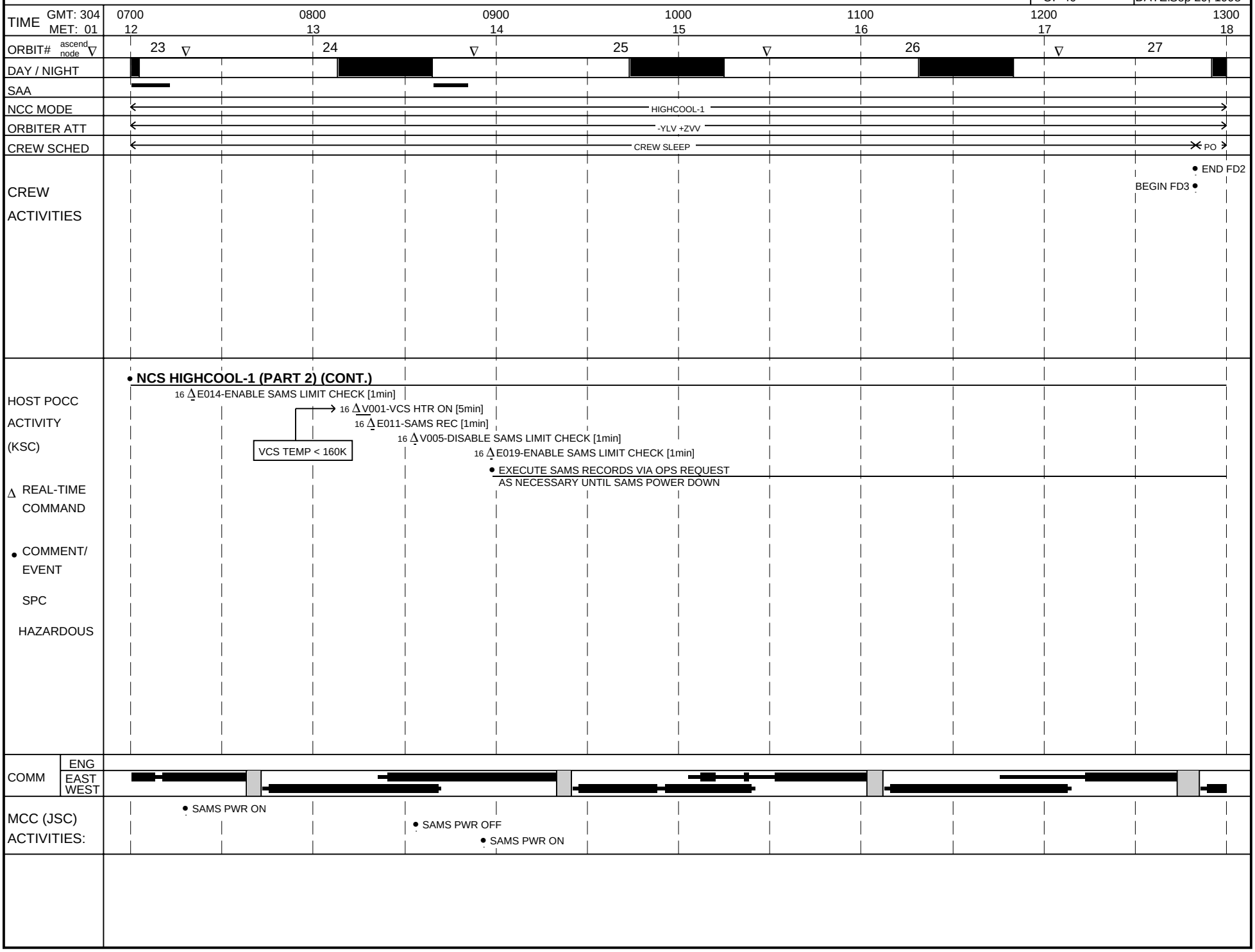
• SAMS PWR OFF

SAMS PWR ON •

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 304 / MET: 01 — 0100 (6), 0200 (7), 0300 (8), 0400 (9), 0500 (10), 0600 (11), 0700 (12)
ORBIT#	ascend node ∇ — 20, 21, 22, 23
DAY / NIGHT	
SAA	
NCC MODE	HIGHCOOL-1
ORBITER ATT	-YLV +ZVV
CREW SCHED	PRE SLEEP — CREW SLEEP
CREW ACTIVITIES	• FOFE/PGSC STATUS CHECKOUT [5 min]
HOST POCC ACTIVITY (KSC)	**• NCS HIGHCOOL-1 (PART 2) (CONT.)** • EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.) 16 Δ F008-DISABLE SAMS LIMIT CHECK [1min] 16 Δ F006-VERIFY TURBINE INLET TEMP [2min]
Δ REAL-TIME COMMAND	
• COMMENT/ EVENT	
SPC	
HAZARDOUS	
COMM — ENG	
COMM — EAST / WEST	
MCC (JSC) ACTIVITIES:	• SAMS PWR OFF • FOFE/PGSC DATA DUMP [5 min]

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME — GMT: 304 / MET: 01

1300 (18) | 1400 (19) | 1500 (20) | 1600 (21) | 1700 (22) | 1800 (23) | 1900 (24)

ORBIT# (ascend node ∇): 27, 28, 29, 30, 31

DAY / NIGHT

SAA

NCC MODE: HIGHCOOL-1 → OPERATE-1

ORBITER ATT: -YLV +ZVV → +Y CEL → -ZSI → BIAS -YLV

CREW SCHED: POST SLEEP

CREW ACTIVITIES

- FOFE/PGSC STATUS CHECKOUT [5 min]

HOST POCC ACTIVITY (KSC)

- **NCS HIGHCOOL-1 (PART 2) (CONT.)**
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

WAIT UNTIL COLD PLATE 2 TEMP = 72K → **17 • NCS OPERATE-1**

17 ΔG003-NCS COOLDOWN TO OPERATE [3min]

- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

ZERO OUT PID INTEGRAL ERROR 0.3K ABOVE DESIRED OPERATIONAL TEMPERATURE AT COLD PLATE 2

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

HOST MISSION INTEGRATED TIMELINE

TIME — GMT: 304 / MET: 02

1900 (0) | 2000 (1) | 2100 (2) | 2200 (3) | 2300 (4) | 0000 (5) | 0100 (6)

ORBIT# (ascend node ∇): 31, 32, 33, 34

DAY / NIGHT

SAA

NCC MODE: OPERATE-1

ORBITER ATT: BIAS -YLV | +Y CEL | -XLV -YVV | +Y CEL | -ZSI

CREW SCHED

CREW ACTIVITIES

FOFE/PGSC STATUS CHECKOUT [5 min] •

HOST POCC ACTIVITY (KSC)

• **NCS OPERATE-1 (CONT.)**

• EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

18 • NCLS ACTIVATION-3

18 ΔV002-COLD PLATE HTR ON [5min]

18 ΔV004-SAMS REC [1min]

20mW SETTING

FREE DRIFT

• **VERIFY CRYO-TSU OFF [5 min]**

• SAMS REC [5 min]

• VARY PARASITICS [5 min]

18 ΔH004-DISABLE SAMS LIMIT CHECK [1min]

400mW SETTING

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG / EAST / WEST

MCC (JSC) ACTIVITIES:

• SAMS PWR OFF

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 305 MET: 02 — 0100 (6), 0200 (7), 0300 (8), 0400 (9), 0500 (10), 0600 (11), 0700 (12)

ORBIT# (ascend node ∇): 35, 36, 37, 38

DAY / NIGHT

SAA

NCC MODE: OPERATE-1 → IDLE-1

ORBITER ATT: -ZSI → -YLV +ZVV

CREW SCHED: PRE SLEEP → CREW SLEEP

CREW ACTIVITIES

HOST POCC ACTIVITY (KSC)

- Δ REAL-TIME COMMAND
- • COMMENT/ EVENT
- SPC
- HAZARDOUS

• **NCS OPERATE-1 (CONT.)**

• **NCLS ACTIVATION-3 (CONT.)**

18 Δ E023-ENABLE SAMS LIMIT CHECK [1min]

18 Δ V003-DEACTIVATE COLD PLATE HEATER [5min]

ACTIVATE REC 1 MIN PRIOR TO NCS IDLE TRANSITION

19 • NCS IDLE-1

19 Δ H001-SAMS REC [5min]

ADJUST PID WEIGHTING TO UTILIZE TA INLET TEMP = 90K [3min]-H002 Δ 19

ADJUST CONTROL LAW RANGE TO IDLE SETTINGS [1min]-H003 Δ 19

EXECUTE SAMS RECORDS VIA OPS REQUEST • AS NECESSARY UNTIL SAMS POWER DOWN

DISABLE SAMS LIMIT CHECK [1min]-E024 Δ 19

ZERO OUT PID INTEGRAL ERROR [3min]-H005 Δ 19

PERFORM ACTIVITY AT 0.3K BELOW 90K SETPOINT TEMP ON THE TURBINE INLET

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

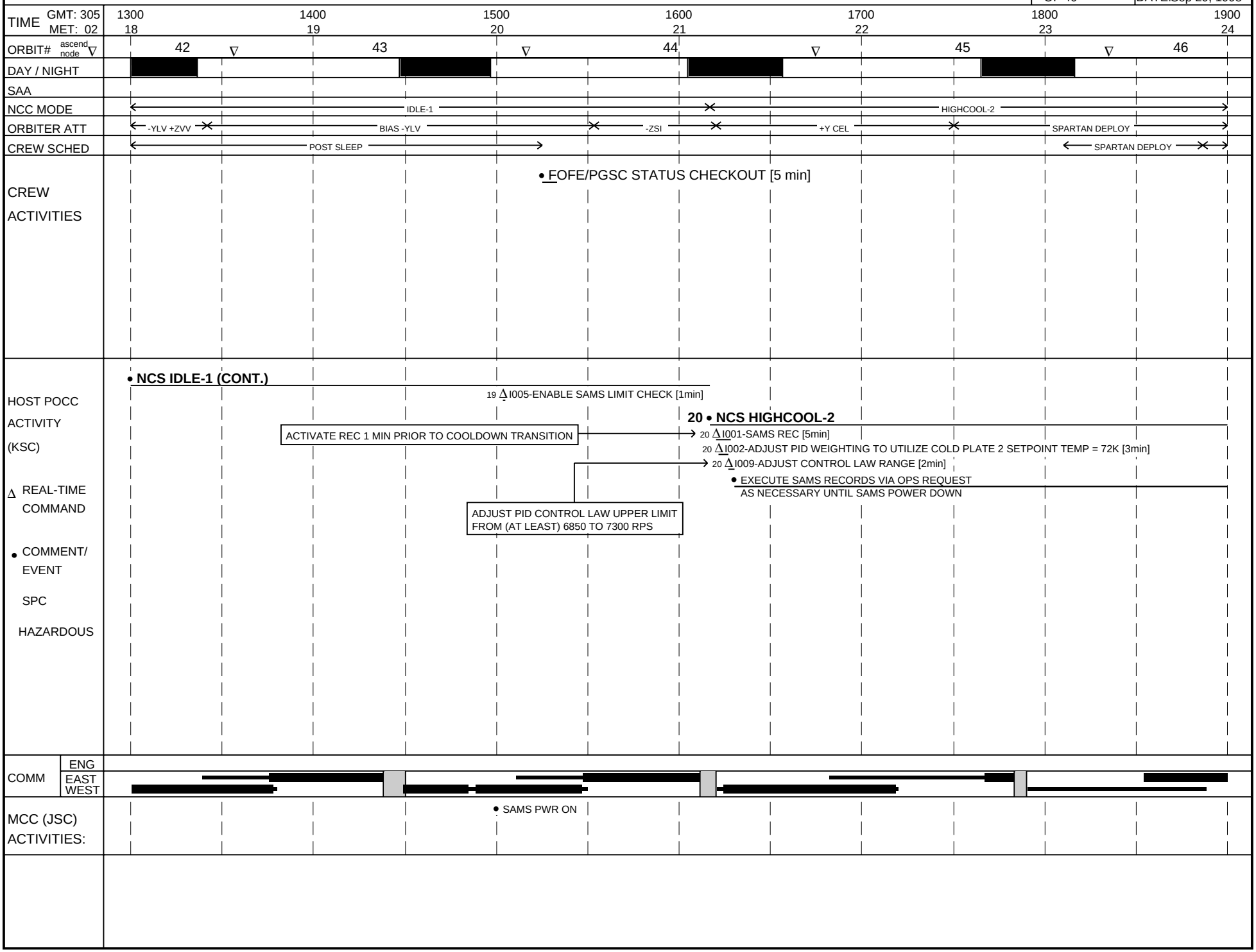
• SAMS PWR ON

SAMS PWR OFF •

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 305 MET: 02	0700 12	0800 13	0900 14	1000 15	1100 16	1200 17	1300 18	
ORBIT# ascend node ∇	38 ∇	39 ∇	40 ∇	41 ∇	42			
DAY / NIGHT								
SAA								
NCC MODE	IDLE-1							
ORBITER ATT	-YLV +ZVV							
CREW SCHED	CREW SLEEP					POST SLEEP		
CREW ACTIVITIES						• END FD3 • BEGIN FD4		
HOST POCC ACTIVITY (KSC)	• NCS IDLE-1 (CONT.)							
Δ REAL-TIME COMMAND								
• COMMENT/ EVENT								
SPC								
HAZARDOUS								
COMM ENG								
COMM EAST WEST								
MCC (JSC) ACTIVITIES:								

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 305	1900				2000				2100				2200				2300				0000				0100
	MET: 03	0				1				2				3				4				5				6
ORBIT#	ascend node ∇			46		∇				47				∇			48				∇			49			∇	50
DAY / NIGHT																												
SAA																												
NCC MODE		HIGHCOOL-2																										
ORBITER ATT		SPARTAN DEPLO				PI				NC1								-XLV +ZVV										
CREW SCHED		SEP 1				SEP 2				NC 1																	PRE SLEE	

CREW ACTIVITIES

- FOFE/PGSC STATUS CHECKOUT [5 min]

HOST POCC ACTIVITY (KSC)

- **NCS HIGHCOOL-2 (CONT.)**
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

20 Δ I006-DISABLE SAMS LIMIT CHECK [1min]

21 • DEACTIVATE 486 1-2

21 Δ Z400-DEACTIVATE 486 1-2 [6min]

22 • ACTIVATE 486 1-3

22 Δ Z500-ACTIVATE 486 1-3 [16min]

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM

ENG

EAST WEST

MCC (JSC) ACTIVITIES:

- SAMS PWR OFF

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 306 MET: 03 — 0100 (6), 0200 (7), 0300 (8), 0400 (9), 0500 (10), 0600 (11), 0700 (12)

ORBIT# (ascend node ∇): 50, 51, 52, 53

DAY / NIGHT

SAA

NCC MODE: HIGHCOOL-2 → OPERATE-2

ORBITER ATT: -XLV +ZVV → NC2 → -YLV +ZVV

CREW SCHED: PRE SLEEP → NC 2 → CREW SLEEP

CREW ACTIVITIES

HOST POCC ACTIVITY (KSC)

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

- **NCS HIGHCOOL-2 (CONT.)**
- **23 • NCS OPERATE-2**
- 23 Δ I004-ZERO OUT PID INTEGRAL ERROR [3min]
- 23 Δ J003-ENABLE SAMS LIMIT CHECK [1min]
- • EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN
- 23 Δ J004-DISABLE SAMS LIMIT CHECK [1min]
- 23 Δ J012-ENABLE SAMS LIMIT CHECK [1min]
- • EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN
- 23 Δ J013-DISABLE SAMS LIMIT CHECK [1min]
- 23 Δ J005-ADJUST COLD PLATE HTR [5min]
- 23 Δ J014-ENABLE SAMS LIMIT CHECK [1min]
- • EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN
- DISABLE SAMS LIMIT CHECK [1min]-J015 Δ 23

PERFORM ACTIVITY AT 0.3K ABOVE DESIRED OPERATING TEMP

20 mW SETTING

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

- • FOFE/PGSC DATA DUMP [5 min]
- • SAMS PWR ON
- • SAMS PWR OFF
- • SAMS PWR ON
- • SAMS PWR OFF
- • SAMS PWR ON
- SAMS PWR OFF •

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 306 MET: 03 — 0700 (12), 0800 (13), 0900 (14), 1000 (15), 1100 (16), 1200 (17), 1300 (18)

ORBIT# (ascend node ∇): 54, 55, 56, 57

DAY / NIGHT

SAA

NCC MODE: OPERATE-2

ORBITER ATT: -YLV +ZVV → +Y JUP → UV* VBAR → +Y JUP → UV* VBAR → +Y JUP

CREW SCHED: CREW SLEEP → POST SLEEP

CREW ACTIVITIES
- END FD4
- BEGIN FD5

HOST POCC ACTIVITY (KSC)

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

- **NCS OPERATE-2 (CONT.)**
- 23 Δ I007-ENABLE SAMS LIMIT CHECK [1min]
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN
- VARY PARASITICS [5 min]
- 23 Δ I008-DISABLE SAMS LIMIT CHECK [1min]
- 23 Δ J011-ENABLE SAMS LIMIT CHECK [1min]
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

400 mW SETTING
ADJUST VCS HTR IF NECESSARY

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:
- SAMS PWR ON
- SAMS PWR OFF
- SAMS PWR ON

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 306 / MET: 03 — 1300 (18), 1400 (19), 1500 (20), 1600 (21), 1700 (22), 1800 (23), 1900 (24)

ORBIT# (ascend node ∇): 57, 58, 59, 60, 61

DAY / NIGHT

SAA

NCC MODE: OPERATE-2 → IDLE-2

ORBITER ATT: +Y JUP → +Y CEL → -ZSI → +Y CEL → -ZSI → PROT

CREW SCHED: POST SLEEP

CREW ACTIVITIES

- FOFE/PGSC STATUS CHECKOUT [5 min]

HOST POCC ACTIVITY (KSC)

- **NCS OPERATE-2 (CONT.)**
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

24 • NCS IDLE-2

24 Δ K001-SAMS REC [5min]

24 Δ K002-ADJUST PID WEIGHTING TO UTILIZE TA INLET TEMP = 90K [3min]

24 Δ K003-ADJUST CONTROL LAW RANGE TO IDLE SETTINGS [1min]

- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

ACTIVATE REC 1 MIN PRIOR TO NCS IDLE TRANSITION

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

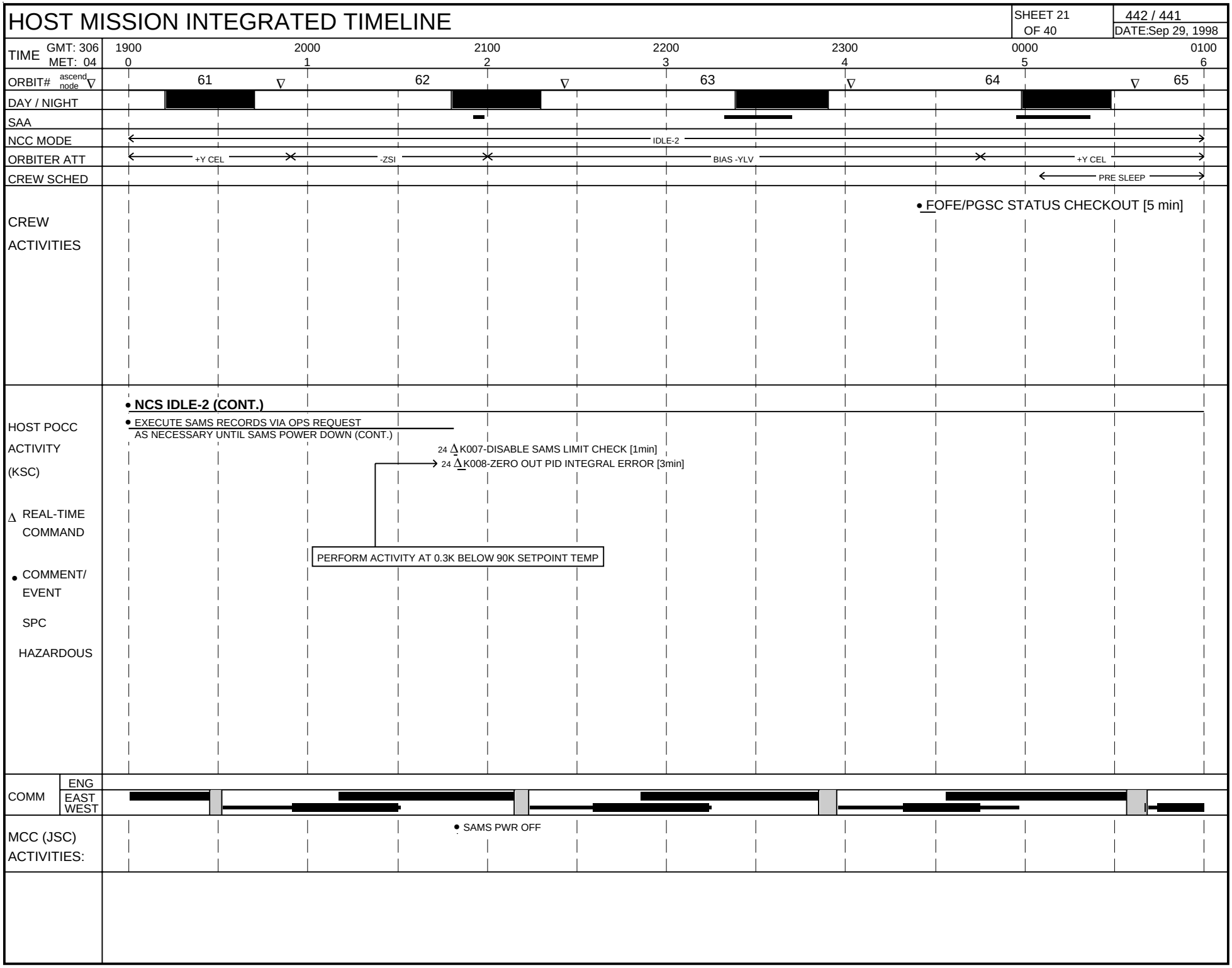
SPC

HAZARDOUS

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME GMT: 307 MET: 04

0100 (6) 0200 (7) 0300 (8) 0400 (9) 0500 (10) 0600 (11) 0700 (12)

ORBIT# ascend node ∇: 65 ∇ 66 ∇ 67 ∇ 68

DAY / NIGHT

SAA

NCC MODE: IDLE-2 → HIGHCOOL-3

ORBITER ATT: +Y CEL → NC 3 → +Y CEL → -ZLV -YVV

CREW SCHED: PRE SLEEP → NC 3 → PRE SLEE → CREW SLEEP

CREW ACTIVITIES

HOST POCC ACTIVITY (KSC)

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

• **NCS IDLE-2 (CONT.)**

25 • NCS HIGHCOOL-3

25 Δ L005-ENABLE SAMS LIMIT CHECK [1min]

25 Δ L001-SAMS REC [5min]

25 Δ L002-ADJUST PID WEIGHTING TO UTILIZE COLD PLATE SETPOINT TEMP = 72K [3min]

25 Δ L009-ADJUST CONTROL LAW RANGE [2min]

ADJUST PID CONTROL LAW UPPER LIMIT FROM (AT LEAST) 6850 TO 7350 RPS

• EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

25 Δ L006-DISABLE SAMS LIMIT CHECK [1min]

25 Δ L007-ENABLE SAMS LIMIT CHECK [1min]

ACTIVATE REC 1 MIN PRIOR TO COOLDOWN TRANSITION

• EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN

25 Δ L008-DISABLE SAMS LIMIT CHECK [1min]

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

• SAMS PWR ON

• SAMS PWR OFF

• SAMS PWR ON

• SAMS PWR OFF

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 307 MET: 04

0700 12 | 0800 13 | 0900 14 | 1000 15 | 1100 16 | 1200 17 | 1300 18

ORBIT# ascend node ∇ ∇ 69 ∇ 70 ∇ 71 ∇ 72

DAY / NIGHT

SAA

NCC MODE: HIGHCOOL-3 → OPERATE-3

ORBITER ATT: -ZLV -YVV → +Y JUP

CREW SCHED: CREW SLEEP → POST SLEEP

CREW ACTIVITIES
- END FD5
- BEGIN FD6

HOST POCC ACTIVITY (KSC)
- NCS HIGHCOOL-3 (CONT.)
- 25 Δ M003-ENABLE SAMS LIMIT CHECK [1min]
- 26 • NCS OPERATE-3
- ZERO OUT PID INTEGRAL ERROR [3min]-L004 Δ 26
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN
- PERFORM ACTIVITY AT 0.3K ABOVE DESIRED OPERATING TEMP

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:
- SAMS PWR ON

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 307	1300				1400				1500				1600				1700				1800				1900
	MET: 04	18				19				20				21				22				23				24
ORBIT# ascend node ∇		72	∇			73				∇	74				∇		75					∇		76		
DAY / NIGHT																										
SAA																										
NCC MODE		OPERATE-3																								
ORBITER ATT		+Y JUP	RENDEZVOUS																							
CREW SCHED		POST SLEEP				NC 4				NH								TI								

CREW ACTIVITIES

- FOFE/PGSC STATUS CHECKOUT [5 min]

HOST POCC ACTIVITY (KSC)

- **NCS OPERATE-3 (CONT.)**
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)

∆ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG, EAST, WEST

MCC (JSC) ACTIVITIES:

HOST MISSION INTEGRATED TIMELINE

TIME GMT: 307 MET: 05
1900 (0) 2000 (1) 2100 (2) 2200 (3) 2300 (4) 0000 (5) 0100 (6)

ORBIT# (ascend node ∇): 76 ∇ 77 ∇ 78 ∇ 79 ∇ 80

DAY / NIGHT: [redacted]

SAA: [redacted]

NCC MODE: OPERATE-3 → IDLE-3

ORBITER ATT: RENDEZVOUS → -ZSI → -YLV +ZVV

CREW SCHED: SPARTAN GRAPPLE → PRE SLEEP

CREW ACTIVITIES
- FOFE/PGSC STATUS CHECKOUT [5 min]

HOST POCC ACTIVITY (KSC)
- **NCS OPERATE-3 (CONT.)**
- EXECUTE SAMS RECORDS VIA OPS REQUEST AS NECESSARY UNTIL SAMS POWER DOWN (CONT.)
- 26 Δ M004-DISABLE SAMS LIMIT CHECK [1min]
- 26 Δ N004-ENABLE SAMS LIMIT CHECK [1min]
- ACTIVATE REC 1 MIN PRIOR TO NCS IDLE TRANSITION
- **27 • NCS IDLE-3**
- 27 Δ N001-SAMS REC [5min]
- 27 Δ N002-ADJUST PID WEIGHTING TO UTILIZE TA INLET TEMP = 90K [3min]
- 27 Δ N003-ADJUST CONTROL LAW RANGE TO IDLE SETTINGS [1min]
- 27 Δ N007-DISABLE SAMS LIMIT CHECK [1min]
- PERFORM ACTIVITY AT 0.3K BELOW 90K SETPOINT TEMP
- 27 Δ N008-ZERO OUT PID INTEGRAL ERROR [3min]

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

COMM: ENG / EAST WEST [redacted]

MCC (JSC) ACTIVITIES:
- SAMS PWR OFF
- SAMS PWR ON
- SAMS PWR OFF
- FOFE/PGSC DATA DUMP [15 min]

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 308 MET: 05	0100 6	0200 7	0300 8	0400 9	0500 10	0600 11	0700 12
ORBIT#	ascend node ∇	80 ∇		81 ∇		82 ∇	83 ∇	
DAY / NIGHT								
SAA								
NCC MODE		IDLE-3						
ORBITER ATT		-YLV +ZVV						
CREW SCHED		PRE SLEEP		CREW SLEEP				
CREW ACTIVITIES								
HOST POCC ACTIVITY (KSC)		• NCS IDLE-3 (CONT.)						
Δ REAL-TIME COMMAND								
• COMMENT/ EVENT								
SPC								
HAZARDOUS								
COMM	ENG							
	EAST WEST							
MCC (JSC) ACTIVITIES:								

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 308 MET: 05	0700 12	0800 13	0900 14	1000 15	1100 16	1200 17	1300 18
ORBIT#	ascend node ∇	84	∇	85	∇	86	∇ 87	
DAY / NIGHT								
SAA								
NCC MODE		IDLE-3						
ORBITER ATT		-YLV +ZVV						
CREW SCHED		CREW SLEEP				POST SLEEP		
CREW ACTIVITIES						• END FD6 • BEGIN FD7		
HOST POCC ACTIVITY (KSC)		• **NCS IDLE-3 (CONT.)**						
Δ REAL-TIME COMMAND								
• COMMENT/ EVENT								
SPC								
HAZARDOUS								
COMM	ENG							
	EAST WEST							
MCC (JSC) ACTIVITIES:								

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 308	1300				1400				1500				1600				1700				1800				1900
	MET: 05	18				19				20				21				22				23				24
ORBIT# ascend node ∇		87 ∇				88				∇				89				∇				90				∇ 91
DAY / NIGHT																										
SAA																										
NCC MODE		IDLE-3																								
ORBITER ATT		-YLV +ZVV				-XLV -YVV																BIAS -YLV				
CREW SCHED		POST SLEEP																								
CREW ACTIVITIES				• FOFE/PGSC STATUS CHECKOUT [5 min]																						
HOST POCC ACTIVITY (KSC)		• **NCS IDLE-3 (CONT.)**																								
Δ REAL-TIME COMMAND																										
• COMMENT/ EVENT																										
SPC																										
HAZARDOUS																										
COMM	ENG																									
	EAST																									
	WEST																									
MCC (JSC) ACTIVITIES:																										

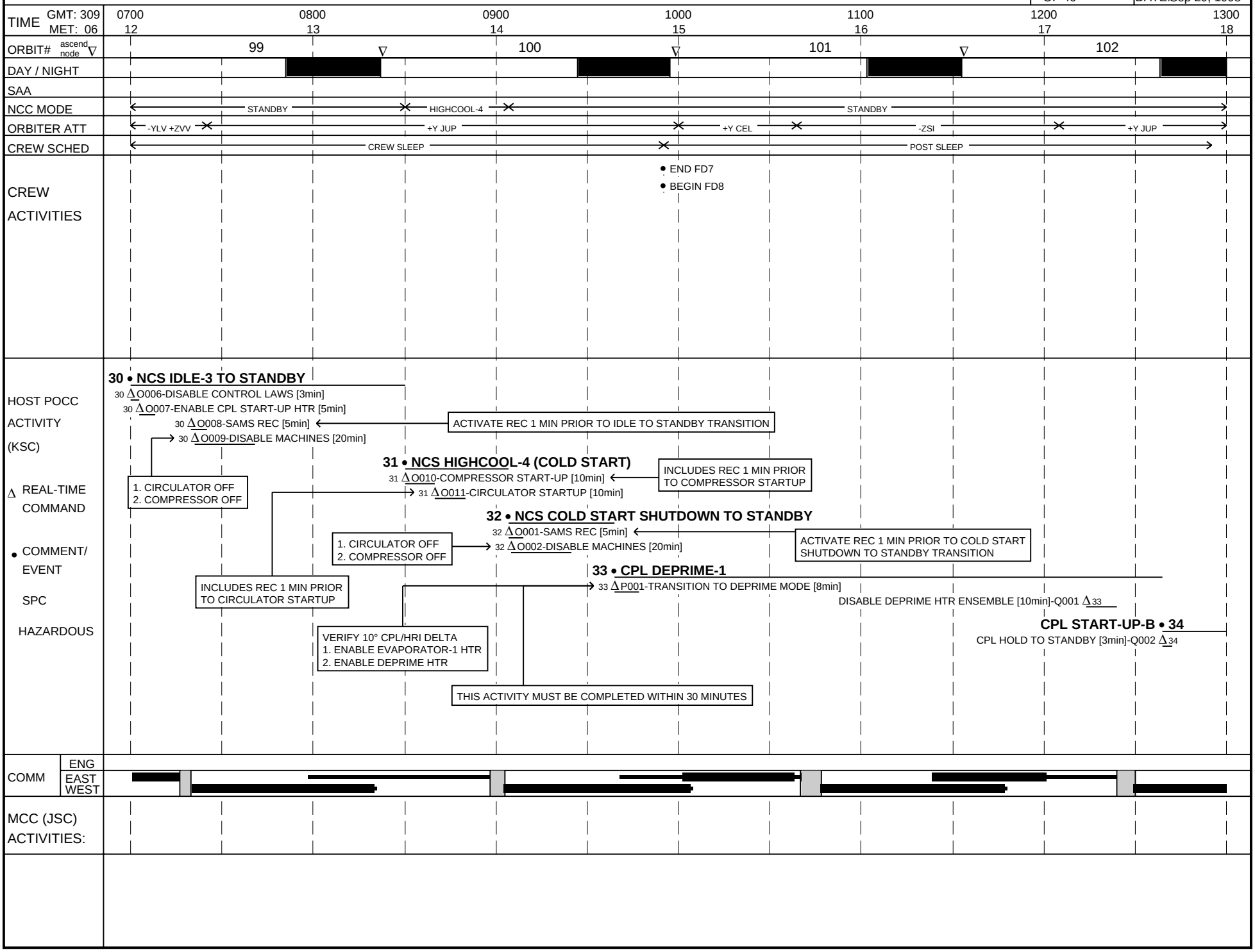
HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 308 MET: 06	1900 0			2000 1			2100 2			2200 3			2300 4			0000 5		0100 6
ORBIT# ascend node ∇		91	∇		92		∇			∇	93		∇			94		∇	95
DAY / NIGHT																			
SAA																			
NCC MODE		IDLE-3																	
ORBITER ATT		BIAS -YLV					+Y JUP				-ZSI			+Y CEL			+Y JUP		-ZSI
CREW SCHED														PRE SLEEP					
CREW ACTIVITIES											• FOFE/PGSC STATUS CHECKOUT [5 min]								
HOST POCC ACTIVITY (KSC)		• **NCS IDLE-3 (CONT.)**															**28 • DEACTIVATE 486 1-3** 28 ΔZ600-DEACTIVATE 486 1-3 [6min] **29 • ACTIVATE 486 2-3** ACTIVATE 486 2-3 [16min]-Z700 Δ29		
Δ REAL-TIME COMMAND																			
• COMMENT/ EVENT																			
SPC																			
HAZARDOUS																			
COMM	ENG																		
	EAST WEST																		
MCC (JSC) ACTIVITIES:																			

HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 309 / MET: 06	0100 / 6	0200 / 7	0300 / 8	0400 / 9	0500 / 10	0600 / 11	0700 / 12
ORBIT#	ascend node ∇	95 ∇		96 ∇		97 ∇	98 ∇	
DAY / NIGHT								
SAA								
NCC MODE		IDLE-3						
ORBITER ATT		-ZSI	-YLV +ZVV					
CREW SCHED		PRE SLEEP	CREW SLEEP					
CREW ACTIVITIES								
HOST POCC ACTIVITY (KSC)		• NCS IDLE-3 (CONT.)					ENABLE SAMS LIMIT CHECK [1min]-O004 Δ 29	
Δ REAL-TIME COMMAND								
• COMMENT/ EVENT								
SPC								
HAZARDOUS								
COMM ENG								
COMM EAST WEST								
MCC (JSC) ACTIVITIES:							SAMS PWR ON •	

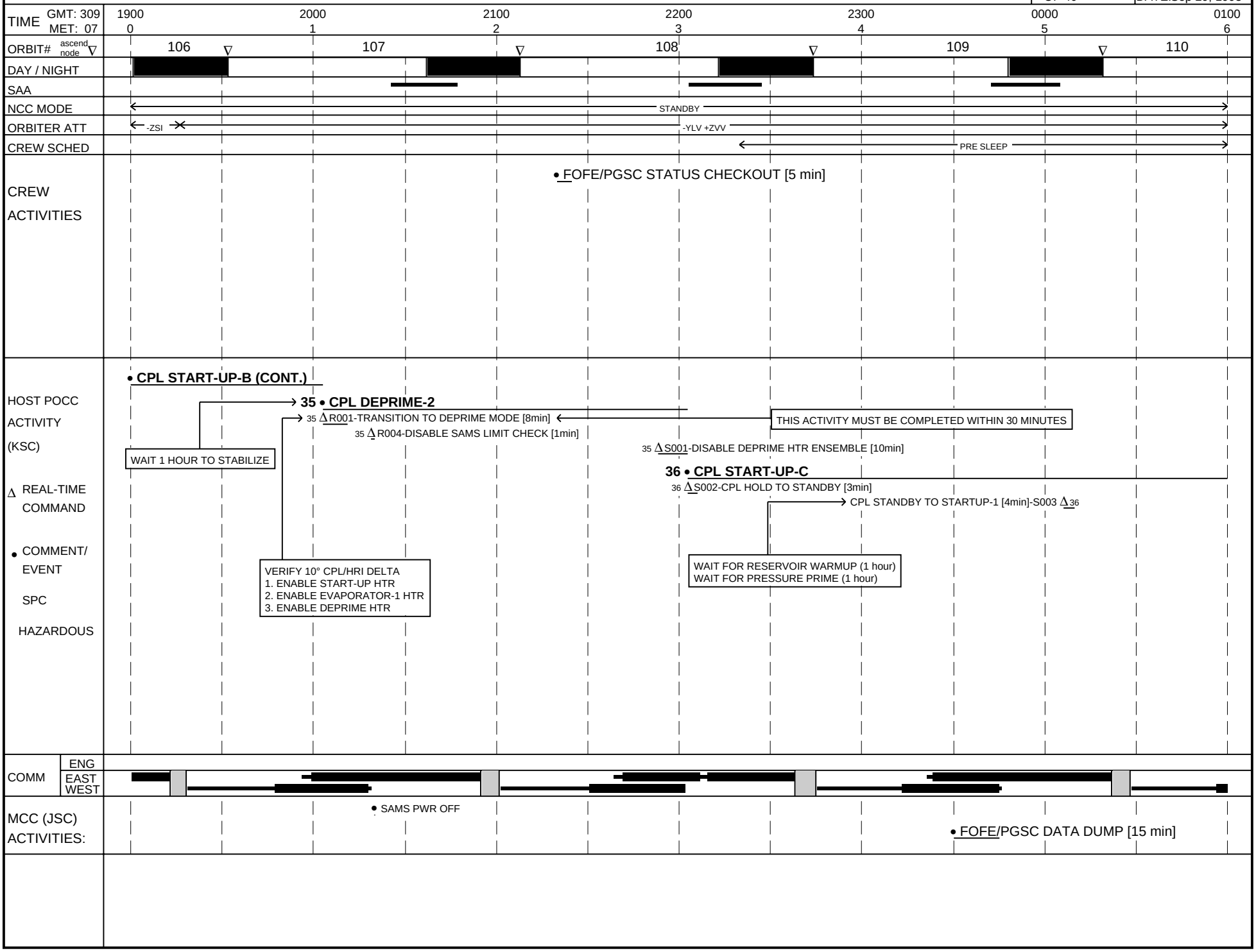
HOST MISSION INTEGRATED TIMELINE



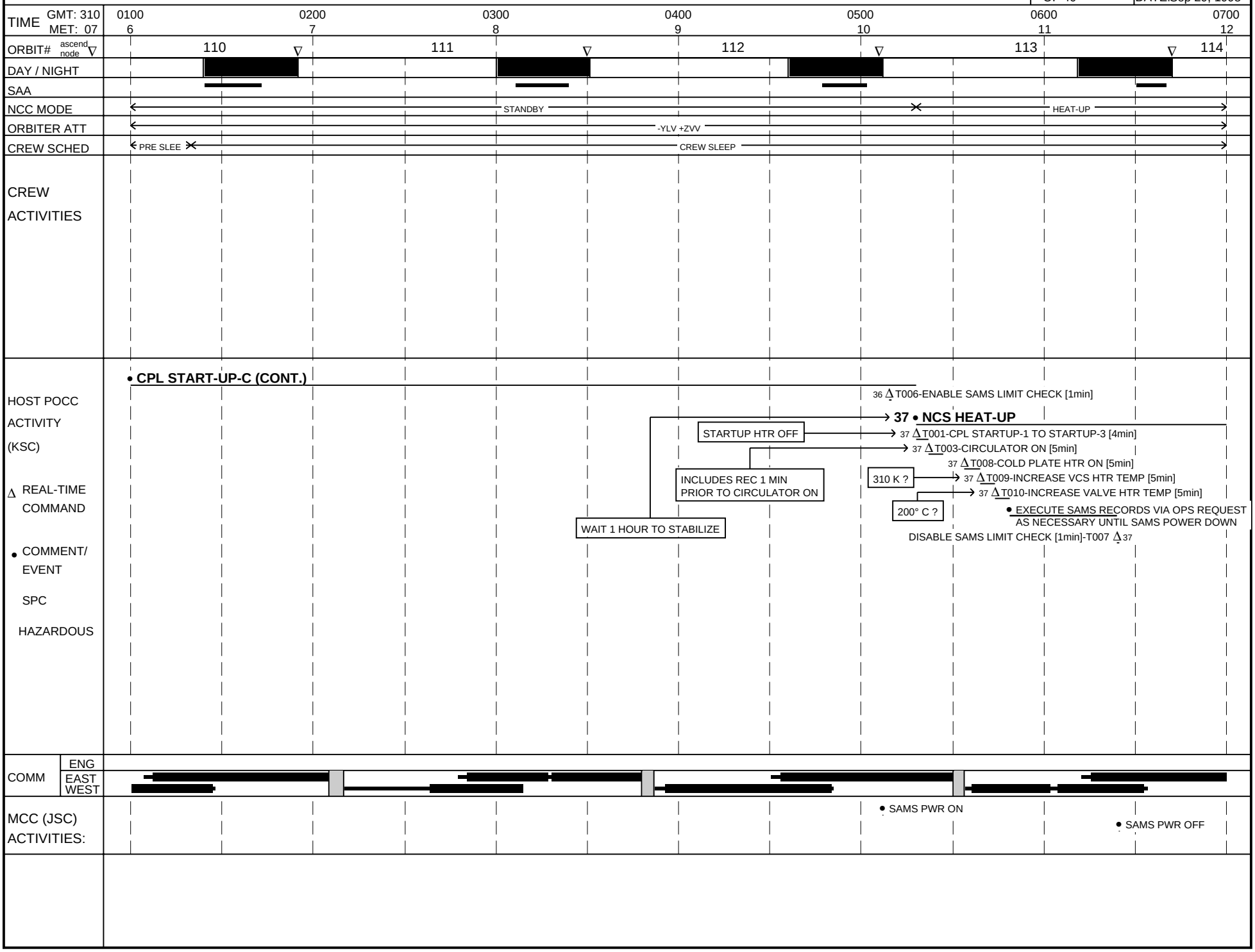
HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 309 MET: 06	1300 18		1400 19		1500 20		1600 21		1700 22		1800 23		1900 24					
ORBIT#	ascend node ∇	∇	103		∇		104		∇		105		∇		106				
DAY / NIGHT																			
SAA																			
NCC MODE		STANDBY																	
ORBITER ATT		+Y JUP				BIAS -YLV								-ZSI					
CREW SCHED																			
CREW ACTIVITIES		• FOFE/PGSC STATUS CHECKOUT [5 min]																	
HOST POCC ACTIVITY (KSC)		• **CPL START-UP-B (CONT.)**																	
						34 ΔQ003-CPL STANDBY TO STARTUP-1 [4min]										STARTUP-1 TO STARTUP-3 [4min]-Q005 Δ34			
Δ REAL-TIME COMMAND						WAIT FOR RESERVOIR WARMUP (1 hour) WAIT FOR PRESSURE PRIME (1 hour) WAIT FOR LOOP TO BEGIN CIRCULATION (2 hours)													
• COMMENT/ EVENT																			
SPC																			
HAZARDOUS																			
COMM	ENG																		
	EAST																		
	WEST																		
MCC (JSC) ACTIVITIES:																			

HOST MISSION INTEGRATED TIMELINE



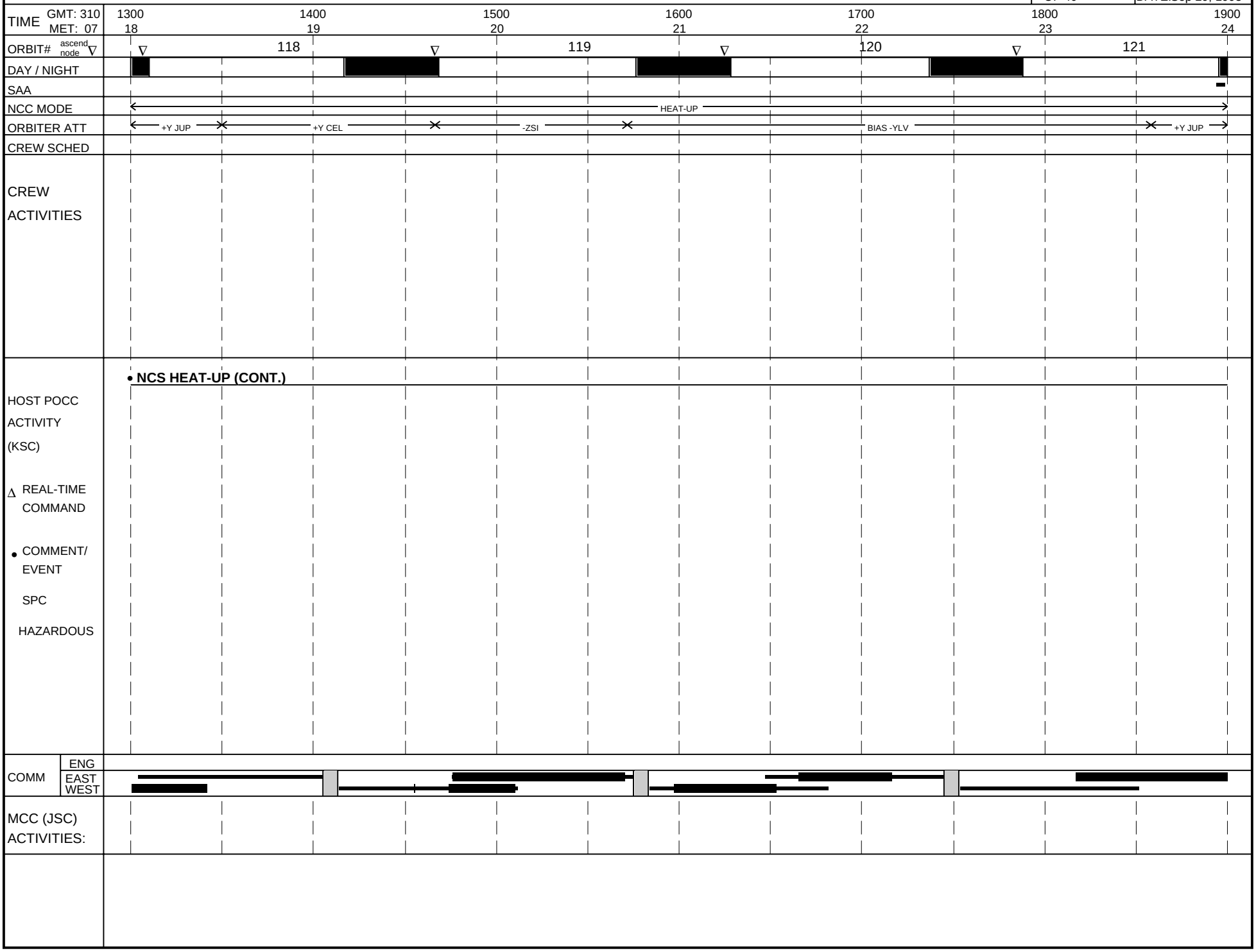
HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME GMT: 310 MET: 07	0700 12	0800 13	0900 14	1000 15	1100 16	1200 17	1300 18	
ORBIT# ascend node ∇	114	∇	115	∇	116	∇	117	
DAY / NIGHT								
SAA								
NCC MODE	HEAT-UP							
ORBITER ATT	-YLV +ZVV					+Y JUP		
CREW SCHED	CREW SLEEP			POST SLEEP				
CREW ACTIVITIES			• END FD8 • BEGIN FD9			FOFE/PGSC STATUS CHECKOUT [5 min] •__		
HOST POCC ACTIVITY (KSC)	• **NCS HEAT-UP (CONT.)**							
Δ REAL-TIME COMMAND								
• COMMENT/ EVENT								
SPC								
HAZARDOUS								
COMM ENG								
COMM EAST WEST								
MCC (JSC) ACTIVITIES:								

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 310	1900					2000					2100					2200					2300					0000					0100
	MET: 08	0					1					2					3					4					5					6
ORBIT# ascend node ∇		121 ∇					122					∇					123					∇					124					∇	125
DAY / NIGHT																																	
SAA																																	
NCC MODE		HEAT-UP																															
ORBITER ATT		+Y JUP					OA					+Y JUP					-ZSI					SOL					-ZSI					SOL	-ZLV -YVV
CREW SCHED							OA										PRE SLEEP															
CREW ACTIVITIES												• FOFE/PGSC DEACTIVATION & STOW [15 min]																					
HOST POCC ACTIVITY (KSC)		• **NCS HEAT-UP (CONT.)**																															
Δ REAL-TIME COMMAND																																	
• COMMENT/ EVENT																																	
SPC																																	
HAZARDOUS																																	
COMM	ENG																																
	EAST																																
	WEST																																
MCC (JSC) ACTIVITIES:																																	

HOST MISSION INTEGRATED TIMELINE

TIME — GMT: 311 / MET: 08

0100 (6) | 0200 (7) | 0300 (8) | 0400 (9) | 0500 (10) | 0600 (11) | 0700 (12)

ORBIT# (ascend node ∇): 125 ∇ | 126 ∇ | 127 ∇ | 128 ∇ | 129

DAY / NIGHT

SAA

NCC MODE: HEAT-UP → STANDBY

ORBITER ATT: -ZLV -YVV

CREW SCHED: CREW SLEEP

CREW ACTIVITIES

HOST POCC ACTIVITY (KSC)

Δ REAL-TIME COMMAND

• COMMENT/ EVENT

SPC

HAZARDOUS

• NCS HEAT-UP (CONT.)

38 • DEACTIVATE 486 2-3
38 ΔZ800-DEACTIVATE 486 2-3 [6min]

39 • DEACTIVATE SSR
39 ΔZ900-DEACTIVATE SSR [6min]

40 • VERIFY EQUIPMENT POWER OFF
40 ΔA103-VERIFY EQUIPMENT POWER OFF [6min]

1. ESM OPERATE TO BOOT
2. ESM BOOT TO HOLD
3. ESM POWER OFF

45 • ESM POWER DOWN
ESM POWER DOWN [2min]-Y001 Δ45

VERIFY NCS POWER OFF • 46
VERIFY NCS POWER OFF [5min]-A104 Δ46

THIS ACTIVITY MUST BE COMPLETED WITHIN 30 MINUTES

41 • NCS HEATUP TO STANDBY
41 ΔU003-COLD PLATE HTR OFF [5min]
41 ΔU001-SHUTDOWN CIRCULATOR [2min]
41 ΔU002-DISABLE PCE AND CLEANUP TABLES [2min]

VERIFY 10° CPL/HRI DELTA
1. ENABLE EVAPORATOR-1 HTR
2. ENABLE DEPRIME HTR

42 • CPL DEPRIME-3
42 ΔR007-TRANSITION TO DEPRIME MODE [8min]
DISABLE DEPRIME HTR ENSEMBLE [10min]-R008 Δ42

43 • NCLS POWER OFF
DISABLE NCLS HTRS AND CLEANUP TABLES [2min]-W001 Δ43

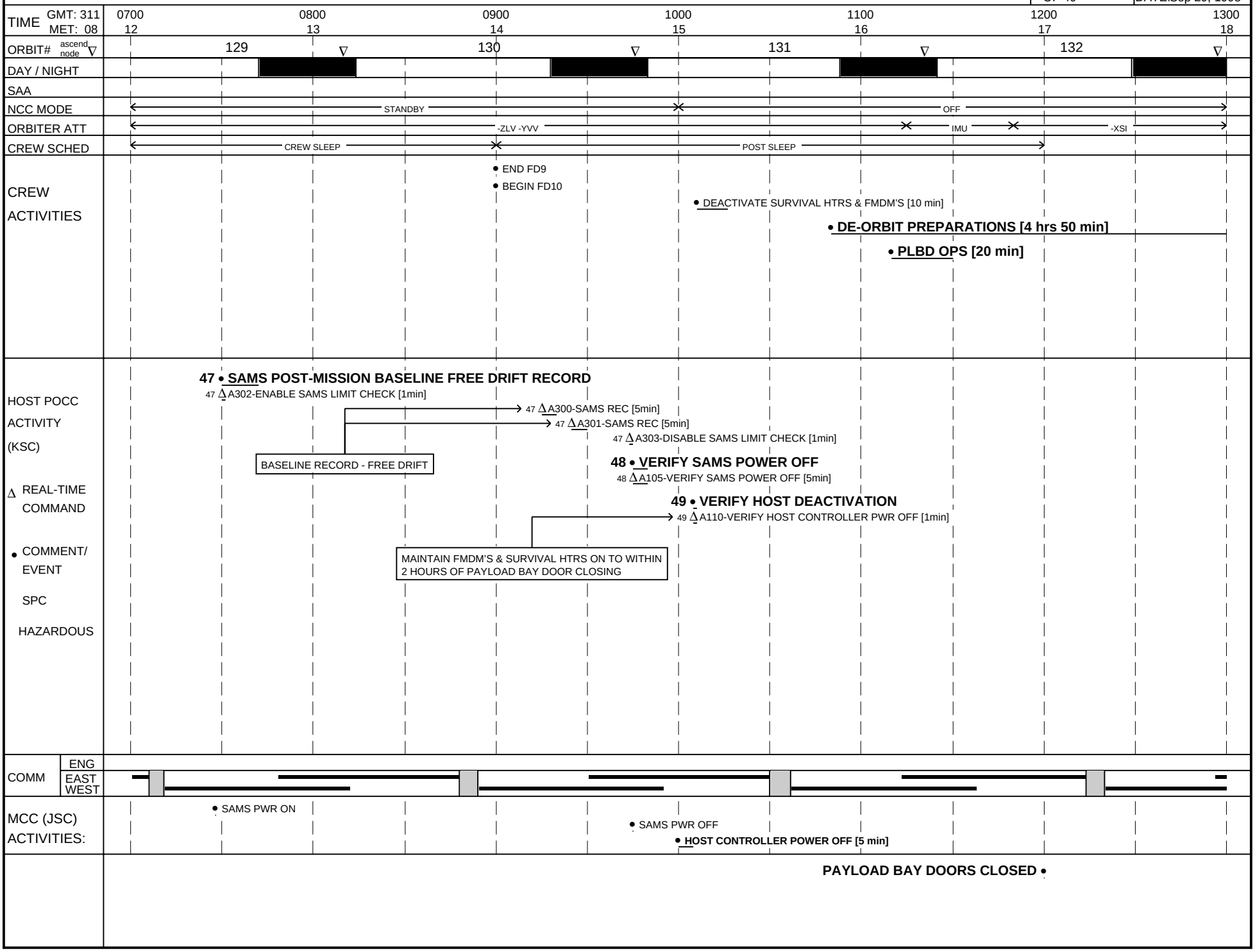
44 • CPL POWER OFF
CPL TRANSITION TO STANDBY [2min]-X001 Δ44
CPL STANDBY TO HOLD [1min]-X002 Δ44

COMM: ENG / EAST / WEST

MCC (JSC) ACTIVITIES:

• POWER OFF SSR
• POWER OFF 486
• PWR OFF PHA [2 min]
• PWR OFF NCS [2 min]

HOST MISSION INTEGRATED TIMELINE



HOST MISSION INTEGRATED TIMELINE

TIME	GMT: 311	1300				1400				1500				1600				1700				1800				1900
	MET: 08	18				19				20				21				22				23				24
ORBIT#	ascend node ∇				133				∇				134				∇				135					
DAY / NIGHT																										
SAA																										
NCC MODE																										
ORBITER ATT					-XSI								COMM				D/O				ENTRY					
CREW SCHED																										
CREW ACTIVITIES					• DE-ORBIT PREPARATIONS [4 hrs 50 min] (CONT.)									• DE-ORBIT BURN [20 min]							• ORBITAL LANDING					
HOST POCC ACTIVITY (KSC)																										
Δ REAL-TIME COMMAND																										
• COMMENT/ EVENT																										
SPC																										
HAZARDOUS																										
COMM	ENG																									
	EAST																									
	WEST																									
MCC (JSC) ACTIVITIES:																										

ACRONYM LIST

A

ADV	Advanced
AG1,2	Array Group
ASC	Ascent
ATT	Attitude

B

C

CHK	Check
CHT	Compressor Housing Temperature
CLS	Cooling Loop Simulator
CMD	Command or Command (Module in DMU)
COMM	Communications
COMP	Computer
CPL	Capillary Pump Loop

D

D/O	De-orbit

E

EN	Enable
ENCL	Enclosure
ENG	Engineering
ESM	Electronics Support Module
EST	Eastern Standard Time

F

FD	Flight Day
FMDM	Flexible Multiplexer De-Multiplexer
FOFE	Fiber Optic Flight Experiment

G

GMT	Greenwich Mean Time
GND	Ground
GSSS	Ground System Support Software

H

HMIT	HOST Mission Integrated Timeline
HOST	HST Orbital System Test
HRI	Heat Rejection Interface
HST	Hubble Space Telescope
HTR(S)	Heater(s)

I

I/F	Interface
IMU	Inertial Measurement Unit Alignment (Shuttle Orbiter)
INIT	Initialization

J

JSC	Johnson Space Center

K

KSC	Kennedy Space Center

L

M

MCC	Mission Control Center
MET	Mission Elapsed Time

N

NC1,2,3,4	Nominal Catchup [burn]
NCC	NICMOS Cryo-cooler
NCLS	NICMOS Cooling Loop Simulator
NCS	NICMOS Cryo-cooler Subsystem, NICMOS Cooling System
NH	Nominal Height (adjust maneuver)
NICMOS	Near Infrared Camera and Multi-Object Spectrometer

O

OA	Orbit Adjust
OP(S)	Operation(s)

P

PANSAT	Petite Amateur Navy Satellite
PCE	Power Control Electronics
PGSC	Payload General Support Computer
PHA	Pulse Height Analyzer
PI	Payload Interrogator
PID	Proportional-Integral-Derivative
PLBD	Payload Bay Door
PNTR	Pointer
POCC	Payload Operations Control Center
PR	Position Record
PROT	VBAR Protect Attitude
PWR	Power

Q

R

RAM	Random Access Memory
REC	Record
RES	Reservoir
RPS	Revolutions per second

S

S/M	Safing Monitor
SAA	South Atlantic Anomaly
SAMS	Space Accelerometer Measuring System
SEP 1,2	Separation (burn)
SOL	SOLCON Space Attitude
SOLCON	Solar Constant Experiment
SPC	Stored Program Command
SSR	Solid State Data Recorder
SYS	System

T

TBR	To Be Resolved
TEMP	Temperature
TI	Terminal Initiation
TLM	Telemetry

U

V

VCS	Vapor Cooled Shroud

W

X

-XLV	Orbiter -X body axis (tail) pointed to Local Vertical
-XSI	Orbiter -X body axis (tail) pointed to Solar Inertial
+XSI	Orbiter +X body axis (nose) pointed to Solar Inertial
-XVV	Orbiter –X body axis (tail) pointed to Velocity Vector

Y

+Y CEL	+Y Celestial Attitude
+Y JUP	+Y Jupiter Attitude
-YLV	Orbiter –Y body axis pointed to Local Vertical(Earth center)
+YVV	Orbiter +Y body axis pointed to Velocity Vector
-YVV	Orbiter –Y body axis pointed to Velocity Vector

Z

-ZLV	Orbiter -Z body axis (cargo bay) pointed to Local Vertical
+ZLV	Orbiter +Z body axis (belly) pointed to Local Vertical
-ZSI	Orbiter –Z body axis pointed to Solar Inertial
+ZVV	Orbiter +Z body axis (belly) pointed to Velocity Vector