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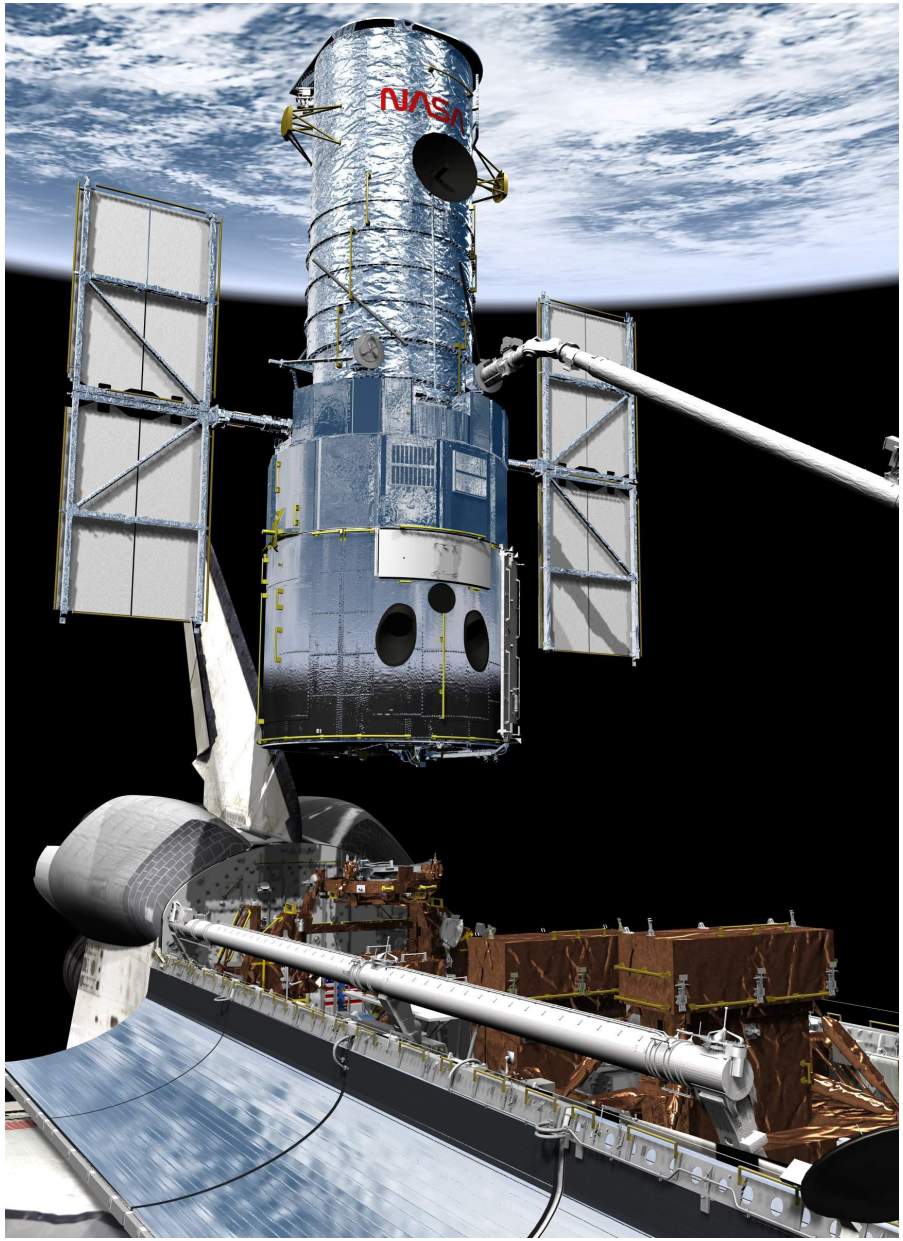

HST Program Status

Presentation to:

Space Telescope User's Committee

Preston M. Burch

April 10, 2008

Topics

- Program Update
- Observatory Health
- SM4 Preparations and Status

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HST Program Status
(Since October 19, 2007)

Significant Progress

- **HST Program presently working to August 28, 2008 LRD**
  - Shuttle Program indicates LRD NET 10/08/08; one to two week delay beyond that is likely
  - Program remains on schedule for August 2008 LRD
- **Completed reassessment of mission priorities**
  - Developed presentation on System Reliability and Redundancy Implications for SM4 Contingency Planning; submitted to HQ/SMD
  - Expect new letter from HQ/SMD redefining “core priorities”
- **Completed on-orbit testing of One-Gyro Science Mode and Kalman Filter Sunpoint Mode**
- **Resolved COS alignment measurement anomaly**
- **Completed Joint Integrated Simulation #1 (JIS 1) April 1**

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HST Servicing Mission 4
Planned Mission Manifest and Priorities

Manifest in Priority Order

1. RSUs (Gyros)
2. WFC3
3. COS
4. Battery Modules
5. FGS2RR
6. STIS Repair
7. ACS Repair
8. NOBL 8
9. NOBL 5
10. NOBL 7

Note: SCM and Reboost are parallel activities that do not contend with other EVA tasks and, therefore, do not affect priorities

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HST SM4 JIS Schedule

EVENT	Duration (hours)	DATE	ACTIVITY	LOCAL TIME (ET) *		SIM PERIOD (MET)		SEQUENCES
				Start	End	Start	End	
JIS 1 EVA 3	**10.0**	**4/1/2008**	COS, ACS Repair	09:00 AM	07:00 PM	4/1600	5/0200	86 - 95
		4/1/2008	Debrief	07:30 PM				
JIS 2 EVA 4	**10.5**	**4/24/2008**	STIS Repair, NOBL8	09:00 AM	07:30 PM	5/1630	6/0300	96 - 102
		4/24/2008	Debrief	08:00 PM				
JIS 3 EVA 5	**10.0**	**5/15/2008**	FGS, ACS Repair	09:00 AM	07:00 PM	6/1700	7/0300	103 - 114
		5/15/2008	Debrief	07:30 PM				
JIS 4 FD2/FD3-RNDZ/ FD4-EVA 1	**46.5 JSC team 45 GSFC team**	**6/16-18/2008**	Rendezvous, Planning, WFC3, Battery	16/06:30 PM CT (JSC team) 16/09:00 PM ET (GSFC team)	18/05:00 PM CT (JSC team) 18/06:00 PM ET (GSFC team)	1/0130 (JSC team) 1/0300 (GSFC team)	3/0000	22 - 69
		6/19/2008	Debrief	TBD				
JIS 5 Plan/ EVA 2	**24.0**	**7/17-18/2008**	Planning, RSU, Battery	17/07:00 PM	18/07:00 PM	3/0130	4/0130	72 - 81
		7/21/2008	Debrief	TBD				
JIS 6 2 Short Deploys	**10.0**	**7/29/2008**	Deploys (Run 2 times)	09:00 AM	07:00 PM	7/1445	7/1915	126 - 140
		7/29/2008	Debrief	7:30 PM				
JIS 7 Rendezvous	**8.5**	**7/31/2008**	Rendezvous/Capture	09:00 AM	05:30 PM	1/1700	2/0130	34 - 55
		7/31/2008	Debrief	06:30 PM				
LAUNCH		**8/28/2008**		*** Note: - all times are ET unless otherwise noted**				

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HST Program Status

Significant Challenges

- **Minimize impact of any launch schedule delays**
- **Manage SM4 development activity within remaining contingency allocation**
- **Complete design, development, and verification of Crew Aids and Tools**
- **Complete ACS-R development**
- **HST Operations budget reduced $83.6M from FY10 thru FY13**
  - $40.6M reduction reflects “Compromise Budget” in FY10 thru FY13 agreed to in Fall 2007
  - Additional $43M removed from FY12 and FY13, results in “Broken Operation” (Unacceptable Risk)

For detailed flow operations refer to Preliminary Manifest Option 07B-10A

Flight Assignment Working Group (FAWG) Planning Manifest

NASA Official: John Coggeshall
Prepared by: USH700C/Barton K. Gibson
Chart updated: 26-February-2008

CY2007 | CY2008 | CY2009 | CY2010
1 2 3 4 1 2 3 4 1 2 3 4 1
FY2009 | FY2010

103 Discovery

124 (1J) — 4/24 (5/25) — (13+2) — 3 EVAs — (35) — SPDU — JEM PM (4 JEM Sys racks, JEM RMS) — ECSH — A — 5 — 185 nmi — ET-128 — 324 — 4/24 — 5/10

119 (15A) — 12/4 — (13+1) — 4 EVAs — (36) — S6 — A — 6 — 195 nmi — ET-130

128 (17A) — 4/30 — 3 EVAs — Last Shuttle Crew Rotation — ROEU 751 — MPLM(P) — LMC — 35,620 lbs — 1500 lbs — 205 nmi — 7 — ET-132

130 (19A) — OCT — 3 EVAs — ROEU 751 — MPLM(P) — LMC — 35,789 lbs — 1411 lbs — 210 nmi — 8 — ET-134

132 (20A) — APR — 3 EVAs — Cupola — Node3 — 37,672 lbs — 823 lbs — 205 nmi — 9 — ET-136

OV-103 Out of Service

104 Atlantis

125 (HST-SM4) — 8/28 — (11) — (30) — SLIC — ORUC (ICBC-3D) — PFR/MFR — FSS — MULE — A — 4 — 304 nmi — ET-127

OV-104 Out of Service

Ares I-X — 4/15

105 Endeavour

123 (1J/A) — 3/11 — (16+1) — 4 EVAs — (21) — SPDU / Y-Joint — DCSU / MISSE6 PEC6a — DCSU / MISSE6 PEC6b — SLP-SPDM — ECSH — JEM ELM-PS — MISSE6-LWAPA/RIGEX — A — 2 — 185 nmi — ET-126 — 323 — 3/13

126 (ULF2) — 10/16 — (15+1) — 4 EVAs — (22) — ROEU 751 — MPLM(P) — LMC — A — 3 — 190 nmi — ET-129 — 326 — 7/13 — 400 — 9/4

127 (2J/A) — 3/12 — 5 EVAs — SPDU / DragonSat — JEM EF — ECSH / PPSU (2) — ELM-ES — ROEU 755 — ICC-VLD — ECSH / Ande-2 — 36,305 lbs — 1219 lbs — 200 nmi — 4 — ET-131

129 (ULF3) — AUG — 3-4 EVAs — SPDU / MISSE 7A — SASA / MISSE 7B — ELC1 — ROEU 755 (2) — ELC2 — 36,294 lbs — 1500 lbs — 205 nmi — 5 — ET-133

131 (ULF4) — FEB — 3 EVAs — ICC-VLD — ROEU 755 — MRM1 — 35,575 lbs — 816 lbs — 210 nmi — ET-135

133 (ULF5) — JUL — 3-4 EVAs — ELC3 — ROEU 755 (2) — ELC4 — 35,480 lbs — 1572 lbs — 210 nmi — ET-137

OV-105 Out of Service

This chart represents cargo bay configurations approved by the JCAWG

Hardware available to support 6-person crew on ISS | 6-person crew presence on ISS following Soyuz 19S (May 2009)

Flight Rate: FY-5 / CY-5 | FY-5 / CY-4 | FY-4 / CY-3

Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

Launch Beta Angle Cutouts* — 7 β 24 — 4 β 21 — 29 β 16 — Beta Exceedance

*being above +/- 65 degrees (for 185nmi Orbit) during Orbiter/ISS combined mated ops (8 days)

* Under Review
Green APM #: Flight specific vehicle & launch month
Black APM #: Generic specific vehicle & launch month

ATV1 3/8 — 16S 4/8 — 29P 5/14 — 30P 8/12 — 31P 9/11 — 17S 10/12 — 32P 11/26 — 33P 2/10 — 18S 3/25 — 34P Apr — 19S May — 35P Jun — HTV1 Jul — MRM2 — 36P Aug — 20S Sep — ATV2 Oct — 21S Nov — 37P Dec

Soyuz (S)
Progress (P)
Automated Transfer Vehicle (ATV)
H-II Transfer Vehicle (HTV)

STS# (ISS#) — FDRD Launch Date — Launch Date
Crew Rotation — (###) — # of times this OV has flown
Mission duration — # EVAs
Number of EVAs — Assessed launch date
Launch Pad — A — Rendezvous altitude (nmi)
External Tank — ET-###
Not baselined in the FDRD — ISS Chargeable weight (lbs) — APM (lbs) — Rendezvous altitude (nmi) — # of times this OV has flown since last OMDP
Contingency Logistic Flights
Contingency Shuttle Crew Support (CSCS) (Empty Cargo Bay)

HST Spacecraft Health

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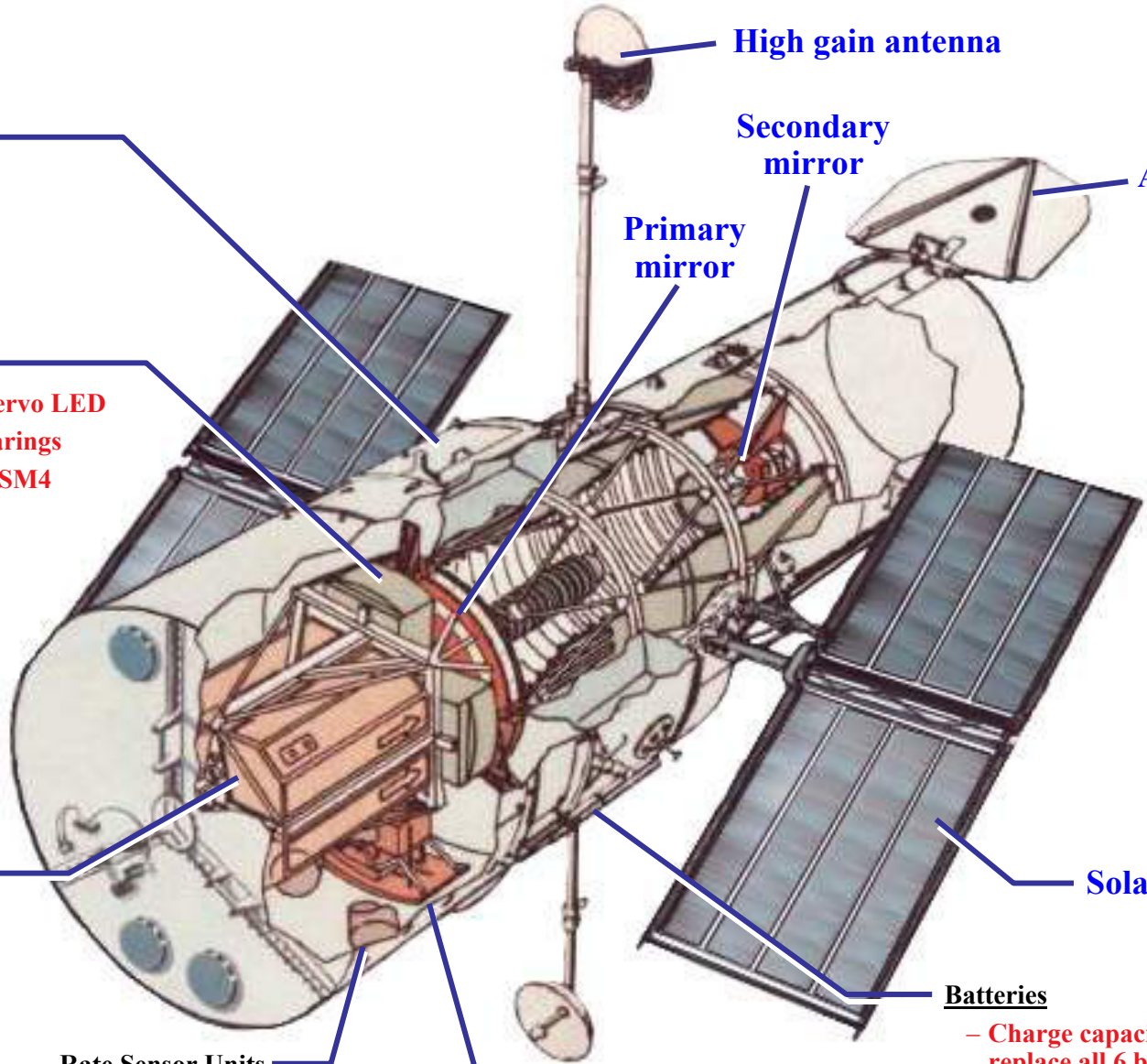

Equipment Section

- Degraded MLI: Install NOBLs on Bays 5, 7, 8 in SM4

Fine Guidance Sensors

- FGS2R: degrading servo LED
- FGS3: degrading bearings
- Replace one FGS on SM4

Axial Scientific Instruments

- STIS, failed 8/04
- STIS Repair on SM4
- ACS CCD Imaging failed 1/07
- ACS Repair on SM4
- Install COS on SM4

Rate Sensor Units

- Gyros 2, 3, and 5 failed: replace all 6 gyros on SM4

Radial Scientific Instrument

- Replace WFPC2 w/ WFC3 on SM4

Batteries

- Charge capacity trending downward; replace all 6 batteries on SM4

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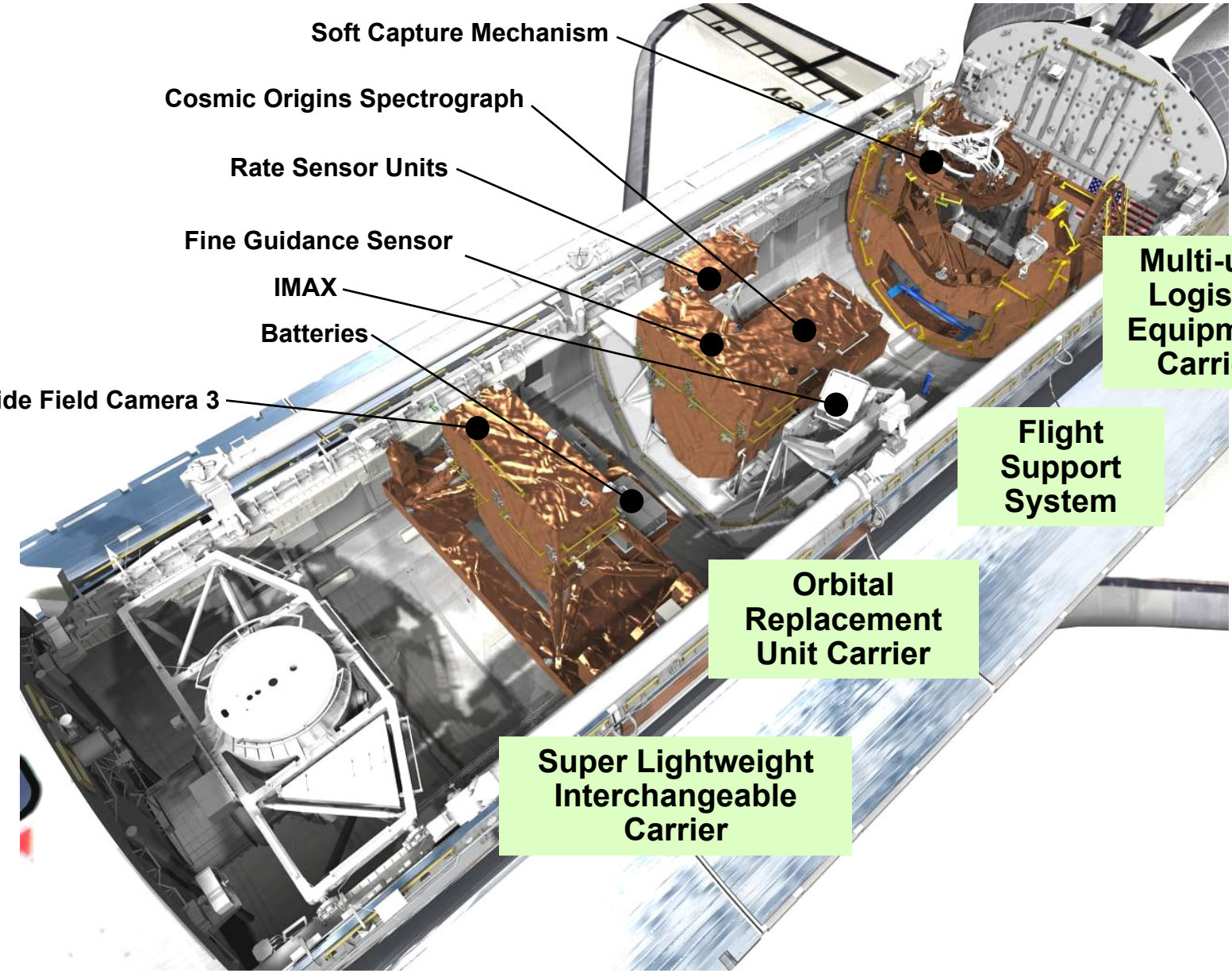
HST Servicing Mission 4 (SM4) Configuration



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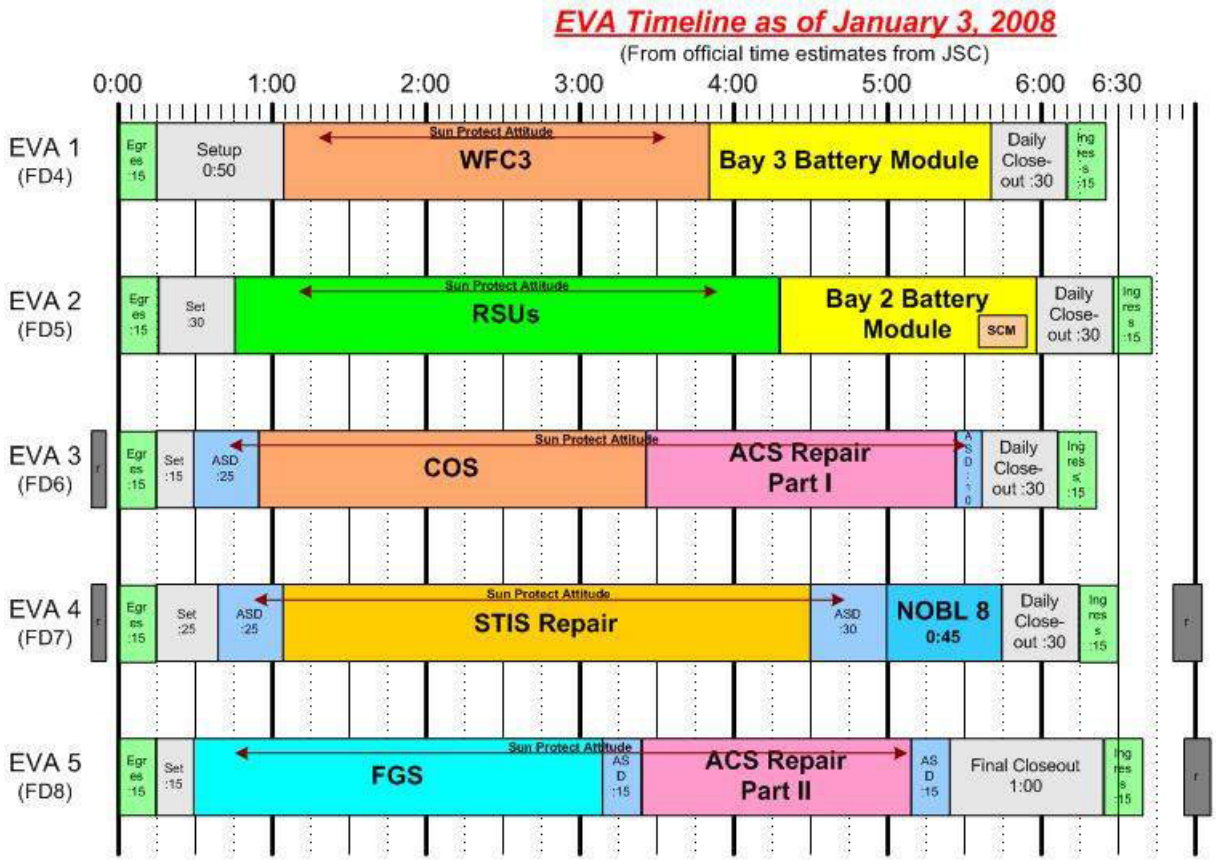
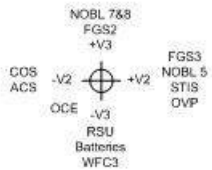
Current HST SM4 EVA Timeline



Priority	Task Times
1. RSUs (3)	3:30
2. WFC3	2:45
3. COS	2:30
4. Bay 3 Battery Mod.	1:50
Bay 2 Battery Mod.	1:40
5. FGS 2	2:40
6. STIS Repair	3:25
7. ACS - part I	2:00
- part II	1:45
8. NOBL 8	0:45
9. NOBL 5	
10. NOBL 7	
11. SCM	0:15
12. Reboost	

Note: Total ACS task time is 3 hours. If placed on one day with COS, EVA duration is 7:25. By splitting into two days, setup and cleanup need to be performed twice. At the end of ACS Part I, two cards have been removed.



Note:

Sun Protect Attitude

indicates a sun protect attitude is required from start of opening aft shroud door to closing of aft shroud door. The length of the arrow is not to scale of task time between door opening and closing

1/7/2008; 1:19 PM -- BGK/442

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STS-125/HST SM4 Overview Timeline with 1 OA Burn 11 Day Mission (5 EVAs)

FD 01

MET 0/-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	00/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS											ASC	Post Insert		RMS/SSE C/O; FD1 CNFG				SLEEP						
Orb Att											ASC		-ZLV -YVV	NC-1	-ZLV -XVV									

FD 02

MET 0/13	14	15	16	17	18	19	20	21	22	23	1/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS	SLEEP			FSS Prep, A/L Prep, EMU C/O						Meal	RNDZ Prep, P/TV Setup							SLEEP						
			U/B		STBD		T1	Nose	Meal	Port		Tile2		Berth		RNDZ								
Orb Att	-ZLV -XVV		NC-2	STBD			T1	Nose		Port		Tile2		NC-3	-ZLV -XVV									

FD 03

MET 1/13	14	15	16	17	18	19	20	21	22	23	2/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS	SLP		SVY	RNDZ						Berth	SRMS SVY; EVA 1 Prep			EVA PROC RVW				SLEEP						
Orb Att	-XVV	Dump		NH	RNDZ					FREE	Batt Chg			-ZLV -XVV										
HST Att		Dump		RNDZ					CAPT	Berth	-V3 Axis FWD													

Grapple 1/22:36 ^

FD 04

MET 2/13	14	15	16	17	18	19	20	21	22	23	3/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS		EVA Prep			EVA 1						Post EVA			RVW				SLEEP						
Orb Att	-ZLV -XVV				Sun Protect				-ZLV -XVV		Batt Chg				RSU	-ZLV -XVV								
HST Att	-V3 Axis FWD																							

FD 05

MET 3/13	14	15	16	17	18	19	20	21	22	23	4/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS		EVA Prep			EVA 2							Post EVA		RVW				SLEEP						
Orb Att	-ZLV -XVV					Sun Protect			-ZLV -XVV			Batt Chg			-ZLV -XVV									
HST Att	-V3 Axis FWD																							

FD 06

MET 4/13	14	15	16	17	18	19	20	21	22	23	5/0	1	2	3	4	5	6	7	8	9	10	11	12	13
STS		EVA Prep			EVA 3							Post EVA		RVW				SLEEP						
Orb Att	-ZLV -XVV					Sun Protect					-ZLV	Dump			-ZLV -XVV									
HST Att	-V3 Axis FWD				-V2 Axis FWD										-V3 Axis FWD									

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FD 07 — MET 5/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 6/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS		EVA Prep	EVA 4								Post EVA	RVW		SLEEP										
Orb Att	-ZLV -XVV			Sun Protect					-ZLV -XVV		Reboost	-ZLV -XVV												
HST Att	-V3 Axis FWD			+V2 Axis FWD							-V3 Axis FWD													

FD 08 — MET 6/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 7/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS		EVA Prep	EVA 5								Post EVA	RVW		SLEEP										
Orb Att	-ZLV -XVV			Sun Protect			Sun Protect			-ZLV -XVV			Dump	-ZLV -XVV										
HST Att	-V3 Axis FWD				+V3 Axis FWD						-V3 Axis FWD													

FD 09 — MET 7/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 8/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS		HST Release Ops					Meal/ FSS Stow	OBSS U/B	STBD SRVY	Nose SRVY	Port SRVY	OBSS				SLEEP								
			EVA																					
Orb Att	Batt Chg		RELEASE		SEP	-ZLV -XVV			STBD	Nose	Port	-ZLV -XVV												
HST Att	-V3 FWD		RMS																					

Release 7/18:19 ^

FD 10 — MET 8/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 9/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS			Conf		OFF DUTY	Meal	OFF DUTY, Exercise								SLEEP									
Orb Att	-ZLV -XVV			OA	-ZLV -XVV																			

FD 11 — MET 9/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 10/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS		Filter Clean	FCS C/O	RCS	Pilot Ops	PAO	Meal	Brief	Cabin Stow						SLEEP									
Orb Att	-ZLV -XVV									Dump	-ZLV -XVV													

FD 12 — MET 10/13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 11/0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13

STS		IMU	Deorbit Prep			Entry																		
Orb Att		IMU	-XSI		Comm	Ent																		

TIG 10/18:55 ^ ^ 10/20:02 KSC Landing

Lead FAO: M. Scheib (x41149)
Lead Timeline: T. Melroy (x41132)
Lead Pointing: K. Lawson (x41222)

Last Updated: 14 December 2007

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Contingency Plans For Shortened SM4

	PLANNED EVA'S COMPLETED				
EVA'S REMAINING	0	1	2	3	4
5	NOMINAL PLAN				
4	EVA 1 - WFC 3, BAY 3 BATT (6:30) EVA 2 - RSU, BAY 2 BATT, (6:40) EVA 3 - COS, FGS 2 (7:20) EVA 4 - STIS, FINAL CLOSEOUT (6:20)	NOMINAL PLAN			
3.5	N/A - FOCUSED INSPECTION NOT UNTIL AFTER EVA 1	EVA 2 - RSU (5:00) EVA 3 - COS, ACS-ALL (7:20) EVA 4 - STIS, NOBL 8 (6:30) EVA 5 - FGS 2, BAY 2 BATT (6:15)			
3	EVA 1 - WFC 3, BAY 3 BATT (6:30) EVA 2 - RSU (2), FGS 2 (7:10) EVA 3 - COS, BAY 2 BATT, FINAL CLOSEOUT (6:50)	EVA 2 - RSU, BAY 2 BATT(6:40) EVA 3 - COS, FGS 2 (7:20) EVA 4 - STIS, FINAL CLOSEOUT (6:20)	NOMINAL PLAN		
2	EVA 1 - WFC 3, BAY 3 BATT, NOBL 8 (7:10) EVA 2 - 2 RSU (2), BAY 2 BATT, FINAL CLOSEOUT (6:40)	EVA 2 - RSU (2), FGS 2 (7:10) EVA 3 - COS, BAY 2 BATT, FINAL CLOSEOUT (6:50)	EVA 3 - COS, FGS 2 (7:20) EVA 4 - STIS, FINAL CLOSEOUT (6:20)	NOMINAL PLAN	
1	EVA 1 - WFC 3, RSU (#1), FINAL CLOSEOUT (7:05)	EVA 2 - RSU (2), BAY 2 BATT, FINAL CLOSEOUT (6:40)	EVA 3 - COS, NOBL (3), FINAL CLOSEOUT (6:40)	EVA 4 - FGS 2, ACS PT. 2, FINAL CLOSEOUT (6:40)	NOMINAL PLAN

SM4 Flight Hardware Status

- **WFC3**
  - Completed Thermal Vac Test #2
  - UVIS-1 and IR-4 detectors installed in WFC3
  - Calibration system upgraded with improved lamps
  - IR channel throughput issue resolved
  - Close Call event happened when ceramic isolator broke on IR vacuum system causing rapid loss of vacuum on IR detector
    - Vacuum restored; detector powered on with nominal performance
    - Analysis shows no issues with detector
  - Completed EMI/EMC testing
    - Needed to modify electronic box shielding to pass susceptibility tests
  - SMGT testing completed February 11, 2008
  - Thermal Vac Test #3 to be completed end of April
- **COS**
  - HOMS/CAOS Pre-acoustics alignment anomaly (degradation in image quality on NUV detector and slanted lines on FUV detector) attributed to optical effects of GN2 purge
  - Completed acoustics test with ORUC

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SM4 Flight Hardware Status (cont'd)

- **ACS-R**
  - EM-1 CEB delivered to Software Team to support software development and verification testing
  - EM-2 CEB completed and delivered to system test
  - CEB EM-3 ASPC/BIAS Board at SEAKR for assembly
    - Flight Boards 1 and 2 will follow
  - Completed assembly of all other flight CEB boards
    - Initial testing will be with EM-3 ASPC/BIAS with flight clock and timing boards
  - Both flight LVPS-R boards completed all acceptance tests and are scheduled for delivery next week
  - DCL testing of EM-2 CEB with ACS flight spare detector has achieved noise performance of ~4e
- **STIS-R**
  - Primary and spare LVPS boards ready for flight
  - EVA-activated latches for replacement cover reworked (tension adjustment); flight assembly in progress

SM4 Flight Hardware Status (cont'd)

- **Gyros (RSUs)**
  - RSUs 1004, 1005, 1006, and 1007 ready for flight
- **FGS**
  - Ready for flight
- **Batteries**
  - Recent testing shows excellent charge capacity; no signs of degradation
- **Soft Capture Mechanism (SCM)**
  - Final assembly and alignment under way
- **New Outer Blanket Layers (NOBLs)**
  - Successful CDR held February 15, 2008

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SM4 Flight Hardware Status (cont'd)

- **Space Support Equipment**
  - FSS
    - Completed installation of thermal blankets
    - Carrier level EMI testing completed
  - SLIC
    - Completed installation of battery plate assemblies
    - Battery testing successfully completed
  - MULE
    - RNS hardware installed
    - Electrical testing in progress
  - ORUC
    - Supported COS acoustics test
    - IMAX Team is at Goddard supporting IMAX enclosure environmental test program; thermal vac test in progress

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SM4 Flight Hardware Status (cont'd)

- **EVA and Crew Training**
  - Completed NBL 08.1
    - Friday, 2/1 EVA Day 4 (STIS Repair, Bay 8 NOBL)
    - Monday, 2/4 EVA Day 1 (WFC3, Bay 3 Battery)
    - Tuesday, 2/5 EVA Day 2 (SCM, RSU Changeout, Bay 2 Battery)
    - Wednesday, 2/6 EVA Day 3 (COS, ASC Repair Part I)
    - Thursday, 2/7 EVA Day 4 (STIS Repair, Bay 8 NOBL)
    - Friday, 2/8 (ACS Repair end to end run)
  - NBL 08.2 started April 8, runs through April 17
  - Crew Fam #4 scheduled for April 28-May 1

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SM4 Flight Hardware Status (cont'd)

- **Crew Aids and Tools (CATS)**
  - Conducted reviews with JSC Mission Director, HQ, Directorate, and Program to review tool development planning and to ensure appropriate oversight
  - Also conducting multiple reviews with CATS Team and ATK Management
  - Completing review of tool development schedules
    - All tools are meeting, and many are beating, original planned delivery schedule
    - Launch slip to August 28, 2008, is not being incorporated in schedule review effort
  - Minimal design change requests coming from NBL
  - All engineering drawing packages released to manufacturing
  - Tool fabrication making good progress

-- Backup Charts --

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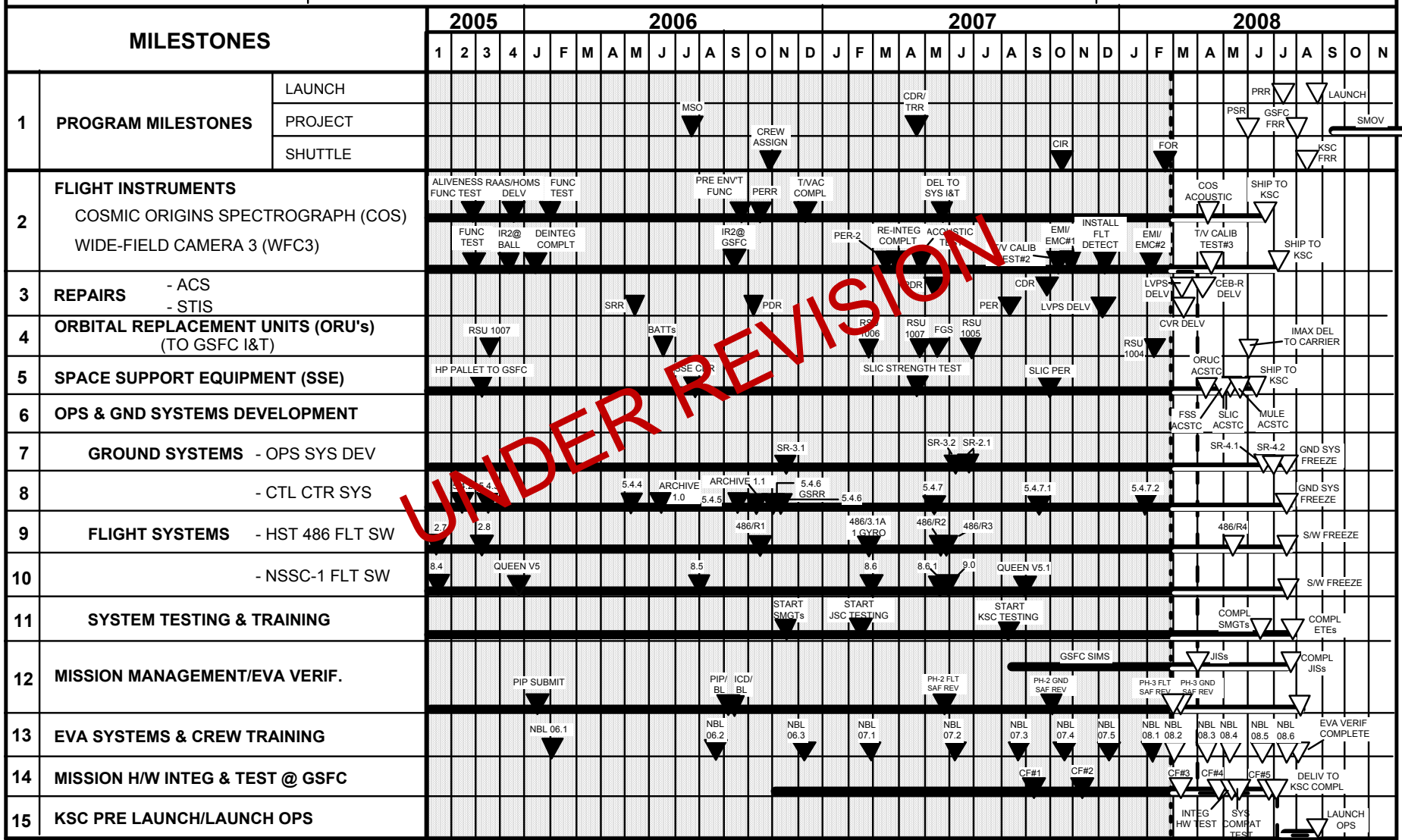
APPVL RESP P. BURCH

HUBBLE SPACE TELESCOPE
SM4 MASTER SCHEDULE

BASELINE AS OF 03/10/08
LAST SCHED CHG 03/10/08
STATUS AS OF 02/29/08



NOTES:

(LAUNCH DATE 08/28/08)

GODDARD SPACE FLIGHT CENTER

APPVL RESP: F. CEPOLLINA

HUBBLE SPACE TELESCOPE DEVELOPMENT PROJECT / CODE 442

FOURTH SERVICING MISSION (SM4)

PROJECT MASTER SCHEDULE

BASELINE AS OF: 03/10/08
LAST SCHED CHG: 03/10/08
STATUS AS OF: 02/29/08

CY2006: Q1 Q2 Q3 Q4 | CY2007: Q1 Q2 Q3 OCT NOV DEC | CY2008: JAN FEB MAR APR MAY JUN JUL AUG SEP

1 PROGRAM MAJOR MILESTONES
- SHUTTLE: Crew Assigned; FDRD; CIRD; CIR; FPSR; FOR; CEIT; PRR; KSC FRR; LAUNCH 08/28/08
- PROJECT: POWG; MSO; CDR/TRR; PSR; GSFC FRR

2 COSMIC ORIGINS SPECTROGRAPH (COS): RAS/HOMS; INTEG'N; PER; COS EMI; T/V /CALIB #2; INSTALL FLT DETECTOR; COS ACOUSTIC; SHIP TO KSC

3 WIDE-FIELD CAMERA 3 (WFC3): IR2; PER; ACOUSTIC #1; EMI/ EMC#1; ACOUSTIC #2; EMI/ EMC#2; FINAL DELV to SI&T; T/V /CALIB #3; SHIP TO KSC

4 SPACE TELESCOPE IMAGING SPECTROGRAPH REPAIR (STIS-R): SRR; PDR; STIS-Repair PER; MEB COVER DELV; LVPS-2R DELV; CEB-R DELV; FLT #2 DELV to SI&T; FLT #1 DELV to SI&T; FLT #1 SHIP to KSC

5 ADVANCE CAMERA - REPAIR(ACS-R): PDR; CDR; EM2 DELV to SI&T

6 FINE GUIDANCE SENSOR (FGS): DELIV'D; SHIP TO KSC

7 RATE SENSOR UNIT (RSU): RSU #1006 DELV'd; RSU #1005 DELV'd; DELV; SHIP TO KSC

8 BATTERY MODULE(S): DELIV'D; BATT CONDITIONING; SHIP TO KSC

9 RNS, SCM & OTHER: SCM PDR; RNS PDR; SCM CDR; RNS CDR; SCM CDR/PER; RNS FLT SC to SI&T

10 FLIGHT SUPPORT SYSTEMS (FSS): SSE CDR; PER; SCM EDU FIT; T/V; PER-2; FSS; EMI/EMC; ACOUSTIC; SHIP TO KSC

11 ORBITAL REPLACEMENT UNIT CARRIER (ORUC): PER; PER-2; ORUC; ACOUSTIC; SHIP TO KSC

12 SUPER LIGHTWEIGHT INTER-CHANGEABLE CARRIER (SLIC): T/; PER; PER-2; SLIC; ACOUSTIC; EMI/EMC; SHIP TO KSC

13 MULTI-USE LIGHTWEIGHT EQUIPMENT (MULE): PER; PER-2; MULE/RNS; EMI/EMC; MULE/RNS; T/V; ACOUSTIC; MULE/RNS; SHIP TO KSC

14 MISSION H/W INTEG & TEST @ GSFC & KSC PRE LAUNCH/LAUNCH OPS: Crew Orient'n #1 & 2; 3 RSUs RECV; CF #1; CF #2; CF #3; CF #4; CF #5; I&T CMPLT; BMA DELV; COS RECV; WFC3 RECV; LVPS RECV; RNS FLT SC RECV; RSU #1004 RECV; STIS-R LVPS2 RECV; SCM RECV; GSE ARRIVES @ KSC; SI's ARRIVE; CF #6; PYLD to PAD; LAUNCH 08/28/08

15 EVA SYSTEMS & CREW TRAINING (EVA): NBL 06.1; NBL 06.2; NBL 06.3; NBL 07.1; NBL 07.2; NBL 07.3; NBL 07.4; NBL 07.5; NBL 08.1; NBL 08.2; NBL 08.3; NBL 08.4; NBL 08.5; NBL 08.6; EVA VERIF COMPLT

16 CREW AIDS & TOOLS (CATS): CATs REV#1; CATs REV#2; CATs CDR-1; CATs CDR-2; CATs CDR-3; TSA CATs on DOCK; PYLD BAY CATs on DOCK; BENCH REV

17 MISSION MANAGEMENT: PIP & ICD B/L; PH-II FLT SAF REV; PH-I/II GND SAF REV; PH-III FSDP; PH-III GSDP; PH-III GRND SAF REV; PH-III FLT SAF REV

18 SYSTEMS ENGINEERING MGM'T: ENERGY ASSES'MT; START SIMS L&LLA; PVTR; PVLR; VADAR; START JIS's; T-VAR; S-VAR; FINAL-VAR; COMPLT JIS's

UNDER REVISION

NOTE: SCHEDULE BASELINED AS OF 3/10/08 FOR 08/28/08 LRD.

SM4-1-3.1

03/10/08 12:43 H

HST Observatory Status

Goddard Space Flight Center

Status as of 2/29/08 Last changed 1/31/08

Subsystem	Color Code	Summary	Changes in Status/Accomplishments/ Life-Extension Measures
Science Instruments	G	• WFPC2 Excellent • ACS Redundant electronics failed 1/27/07 SM4 recovery of WFC/HRC pending • NICMOS Excellent • STIS Failed 8/3/04, SM4 repair pending	• Highly competitive Cycle 16 Science Programs implementing 1st rate science with the remaining SIs • ACS SBC science resumed 2/20/07 • NICMOS recovered 9/4/07 from 9/1 safing
Electrical Power System	G	• Batteries are aging • System-level battery charge capacity increased ~ 6 Ahr from 2004 to 2006 • SA3 performing very well (~78 of 80 strings)	• Software taper charge continues • 2006 capacity testing completed 8/25/06 • 2 amps of array output shorted on 8/31/07; short self-cleared on 11/30/07
Pointing Control System	G	• Gyros 1, 6 operating well; Gyro 4 in reserve, and should be used with primary heaters off • Gyro 2 failed 8/31/07 • FSW compensation of Gyro 6's bias instability recalibrated • FGS-1R Excellent • FGS-2R Degraded (Anomalous A-Servo LED suspected) • FGS-3 Degraded (Bearing performance sub-par; higher torques required)	• Two-Gyro Science Mode ops began 8/29/05 • FGS-2R acceleration limit K-factor lowered to ameliorate loss of performance. Effectiveness decreases with servo-loop gain loss; remaining margin uncertain. Periodic tests show that performance is slowly worsening • FGS-3 use reduced to preserve bearings • Hybrid HST 486/FGE acquisition mode de-activated • OGS/KFSP on-orbit test fully successful
Data Mgmt System	G	• Excellent	
Communications	G	• No performance liens • On/off cycles for the Multi-access & S Band Single-access transmitters are accumulating	• Operations has realized a 38% decrease in SSAT cycles [2044 (7/05-7/06) vs. 3281 (7/03-7/04)] • 1st year of MAT power cycling LEI yielded a 24.7% reduction [7599 (2/06-2/07 vs. 10089 (2/05-2/06)]
Thermal Performance	G	• MLI degradation assumed to be continuing; may accelerate during coming Solar Min • Slow warming of aft shroud and equipment bays	• Tailor attitude and equipment usage as needed • Consider conditional limitations on operations in order to retain flexibility • Install Bays 8 and 5 NOBLs on SM4