SPACE SHUTTLE MISSIONS SUMMARY

FLT NO.	ORBITER	CREW (7) TITLE, NAMES & EVA'S	LAUNCH SITE, LIFTOFF TIME, LANDING SITES, ABORT TIMES	LANDING SITE/ RUNWAY, CROSSRANGE LANDING TIMES FLT DURATION, WINDS	SSME-TL NOM-ABORT EMERG THROTTLE PROFILE ENG. S.N.	SRB RSRM AND ET	ORBIT INC	ORBIT HA/HP	FSW	PAYLOAD WEIGHTS, PAYLOADS/ EXPERIMENTS	MISSION HIGHLIGHTS (LAUNCH SCRUBS/DELAYS, TAL WEATHER, ASCENT I-LOADS, FIRSTS, SIGNIFICANT ANOMALIES, ETC.)

SPACE SHUTTLE MISSIONS SUMMARY

STS-125 SEQ FLT # 126 KSC-126 PAD 39A (49) MLP-2 5TH & Final HST Service Flight	OV-104 (Flight 30) ATLANTIS OMS PODS LPO4-30 RPO1-37 FRC4-30	CDR: Scott Altman (Flt 4 - STS-90,STS-106, STS-109) P787/R237/V161/M207 PLT Gregory C. Johnson P788/R337/M292 MS1 Michael Good P789/R338//M293 MS2 Megan McAuthur P790/R339/F46 MS3 John Grunsfeld (Flt 5-STS-67, STS-81, STS-103, STS-109) P791/R191/V133/M167 MS4 Mike Massimino (Flt 2 - STS-109) P792/R275/V204/M241 MS5 Andrew Feustel P793/R340/M294 SS EVA 132 EMU/TETHERED EVA 125 SCHEDULED EVA 123 DURATION 7:20 SS EVA 133 EMU/TETHERED EVA 126 SCHEDULED EVA 124 DURATION 7:56 Continued...	KSC 39A 131:18:01:56Z 2:01:56 PM EDT (P) 2:01:56 PM EDT (A) Monday (14) 05/11/09 (8) LAUNCH WINDOW: 59M 45S (Total) 41M 50S (Preferred) EOM PLS: KSC TAL: MRN TAL WX: None. SELECTED: RTLS: KSC15 N/N TAL: MRN20 CI/N AOA: KSC15 N/N 1ST DAY PLS: NOR17 N/N Continued...	EDW22 CONC EDW 53 CONC 34 144:15:39:04Z 10:39:04 AM CDT SUNDAY (16) 05/24/09 (11) DEORBIT BURN: 144:14:24:41.0Z XRANGE: 405.6 NM ORBIT DIR: D/L (50) AIM PT: Nominal MLGTD: 3863 FT 144:15:39:04Z VEL: 192 KGS 200 KEAS HDOT: -2.5 FPS Continued...	104/104/109% PREDICTED: 100/104.5/104.5/ 72/104.5 ACTUAL: 100/104.5/94/ 72/104.5 1 = 2059 (3) 2 = 2044 (11) 3 = 2057 (4) M 3 EOM: WEIGHT: 225509.5 LBS X CG: 1078.3 IN LANDING: WEIGHT: 225898 LBS X CG: 1080.9	BI-137 RSRM 105 ET-130 SLWT 34 ET IMPACT 1:18:57 MET LAT: 16.699 N LONG: 147.375 W	28.45 (51)	DIRECT INSERTION POST OMS2: 298.1 NM X 106.8 NM DEORBIT: HA 294.3 NM HP 26.4 NM ENTRY VELOCITY: 26046 FPS ENTRY RANGE: 4267 NM	OI-32 (5)	CARGO: 32418 LBS PAYLOAD CHARGEABLE: 22254 LBS DEPLOYED: 4694 LBS NON-DEPLOYED: 17560 LBS MIDDECK: 0 LBS SHUTTLE ACCUMULATED WEIGHTS: DEPLOYED: 1524432 LBS NON-DEPLOYED: 1621371 LBS CARGO TOTAL: 4054222 LBS PERFORMANCE MARGINS (LBS): FPR: 2651 FUEL BIAS: 1063 FINAL TDDP: 1689 RECON:2499 PAYLOADS: PLB: HST SM4, ICBC 3D MIDDECK: HST SM4 5 CRYO TANK SETS RMS (83) SRMS, OBSS	***Brief Mission Summary:*** ***STS-125 was the 5th and final service mission (SM) visit to the 19 year old Hubble Space Telescope (HST) deployed on STS-31 in 1990. This was the 4th planned SM for HST . (The 3rd SM was conducted in two parts, 3A on STS-103 & 3B on STS-109 .) HST improvements included a new camera, a new spectrograph , repair of two other instruments, and replacement of six batteries and six gyroscopes. These improvements resulted in a higher definiton view of the universe and HST life extension into the next decade. A launch- on-need (LON) vehicle, STS-400, was readied on Pad B for potential crew rescue since there was no ISS safe haven on this misssion. STS-400 release from rescue duty occurred on May 21st , 2009, as the STS-125 crew prepared for the first deorbit/landing opportunity.*** **KSC W/D:** OPF Run 1: 178+2H+3Wx OPF Run 2: 120+11H VAB Run 1: 12+0C VAB Run 2: 8+0C PAD Run 1: 40+2C PAD Run 2: 38+4C Total Work Days = 396 (OPF Processing occurred over a total time period of 314 days.) **POSTPONEMENTS:** - Added STS-125 to FDRD - launch date of 08/07/08 on 06/29/07. - Ppd. to 08/28/08 on 02/14/08. Slip due to ECO sensor problems experienced during December launch attempt of STS-122. - Ppd. to 10/08/08 on 05/27/08. Slip due to delays in delivery of ET 127 & ET-129 (STS-400). - Ppd. to 10/10/08 on 09/08/08. Slip due to Hurricane Faye impacts to HST payload readiness. - Ppd. to 10/14/08 on 09/24/08. Slip due primarily to training time lost in the aftermath of Hurricane Ike. - Ppd. to NET Mid-Feb 2009 on 10/02/08. Slip due to HST on-orbit failure of A-side of Control Unit Science Data Formatter. - Ppd. to NET Mid-May 2009 on 10/30/08. Slip due to checkout problems with HST spare control unit. - Selected May 12, 2009 launch date on 12/04/08. - Advanced from 05/12/09 to 05/11/09 on 05/01/09. Advancing one day provided a 3rd launch opportunity before range conflicts. **LAUNCH SCRUBS**: None. Continued...

JSC2006-E-47144 (31 Oct. 2006): Last Shuttle Service Crew to HST selected: From left to right are McArthur, Good, Johnson (pilot), Altman (CDR), Grunsfeld, Massimino & Feustel.

SPACE SHUTTLE MISSIONS SUMMARY

FLT	ORBITER	CREW (7)	LAUNCH SITE, LIFTOFF TIME,	LANDING SITE/ RUNWAY, CROSSRANGE	SSME-TL NOM- ABORT EMERG	SRB RSRM	ORBIT		FSW	PAYLOAD WEIGHTS,	MISSION HIGHLIGHTS (LAUNCH SCRUBS/DELAYS,
NO.		TITLE, NAMES & EVA'S	LANDING SITES, ABORT TIMES	LANDING TIMES FLT DURATION, WINDS	THROTTLE PROFILE ENG. S.N.	AND ET	INC	HA/HP		PAYLOADS/ EXPERIMENTS	TAL WEATHER, ASCENT I-LOADS, FIRSTS, SIGNIFICANT ANOMALIES, ETC.)

SPACE SHUTTLE MISSIONS SUMMARY

STS-125
Continued ...

Ontinued...

SS EVA 134
EMU/TETHERED EVA 127
SCHEDULED EVA 125
DURATION 6:36

SS EVA 135
EMU/TETHERED EVA 128
SCHEDULED EVA 126
DURATION 8:02

SS EVA 136
EMU/TETHERED EVA 129
SCHEDULED EVA 127
DURATION 7:02

MCC WHITE FLIGHT
FCR (56)

FLIGHT DIRECTORS:
ASC/ENT- Norm Knight
LD/O1- Tony Ceccacci
O2- Rick LaBrode
Planning- Paul Dye
MOD – John McCullough
Team 4- Bryan lunneyi

CAPCOMS:
A/E - Greg (Box) Johnson
- Eric Boe (Wx)
LD/01 – Dan Burbank
O2 – Alan poindexter
Planning – Janice Voss
Team 4 - N/A

Continued...

SE TAL (BYD 104):
5:39 (P)
5:46 (A)

PTM (U/S 500 FPS):
5:09 (P)
5:12 (A)

SE PRESS 109
6:22 (P)
6:29 (A)

MECO CMD:
8:23.4 (P)
8:24.3 (A)

VI:
26088.0 (P)
26086.0 (A)

OMS-2:
43:46 (P)
43:45.0 (A)
142.5 (P) 139.7 (A) FPS

TDEL:
0.000 (P)
-0.448 (A)

MAX Q NAV:
740.95 (P)
734.75 (A)

SRB STG:
2:04.16 (P)
2:04.32 (A)

PERF: NOMINAL

2 ENG TAL (MRN):
2:48 (P) 2:55 (A)

NEG MRN (2@ 104):
3:53 (P)
3:56 (A)

PTA (U/S 483 FPS):
4:11 (P)
4:12 (A)

Continued...

TD NORM 205:
320
1 FT

DRAG CHUTE DEPLOY:
189 KEAS
144:15:39:06Z

NLGTD:
7134 FT
144:15:39:15Z
VEL: 137 KGS
141 KEAS
HDOT: -6.3 FPS

BRK INIT: 96 KGS

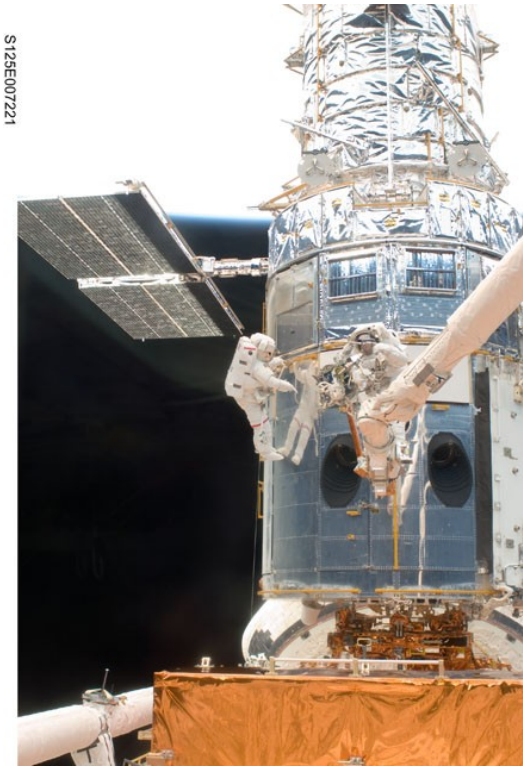
DRAG CHUTE JETTISON:
55 KGS
144:15:39:40Z

BRK DECEL FPS^2:
AVE 2.8 PK 7.4

WHEELS STOP:
144:15:40:13 Z
1236 7 FT

ROLLOUT:
8504 FT
1:09 M:S

WINDS:
16H KT 0 KTS
OFFICIAL:
23016P20 (X 2 PK 2 HD 16 PK 20)



S125-E-007221 (14 May 2009)-- Grunsfeld & Feustel and mirrored reflection during first HST EVA. Activities included installation of a new WFC3 and SI C&DH unit.

Continued...

LAUNCH WINDOW:
Total launch window was 59M 45S with window open at 131:17:44:01Z and close at 131:18:43:46Z. Preferred Launch Time was 131:18:01:56Z (In-Plane Time) for a launch window of 41M 50S.

LAUNCH DELAYS: None. Launch occurred on time at 131:18:01:56Z, 2:01:56 p.m. EDT,Monday, May 11, 2009. The Spaceflight Meteorology Group (SMG) forecast no flight rule violations for launch or RTLS. The SMG also tracked a large wildfire 18nm northwest of KSC that stayed north of the orbiter track for an RTLS if needed.

TAL WEATHER
At Moron, the only TAL site for the HST low inclination orbit, a trough of low pressure initially resulted in a "NO GO" with a slight chance of showers wihtin 20nm. Balloon data showed the atmosphere was too dry for showers and the forecast was updated to "GO" at 1636Z. Peak crosswinds of 15.5 kts surpassed the 15kt limit for a brief time at TAL landing, however, the FD had previouly stated a peak crosswind of 17kts was acceptable.

PERFORMANCE ENHANCEMENTS:
Include the standard set plus: PE Operational High Q TRN/MAY

FLIGHT DURATION CHANGES/LANDING:
- For both KSC landing opportunities on Friday, May 22nd the unstable weather was no go with low ceilings and thunderstorms expected. Landing was postponed to Saturday (EOM + 1).
- KSC weather was no go for EOM+1 with broken low ceilings and thunderstorms. Little change was expected for Sunday (EOM+2) and Monday (EOM+3) as moisture remained abundant over KSC.
- KSC landing for Sunday (EOM+2) waived off due to weather. Next opportunity to EDW's was selected on EOM +2 with typical summer weather and mostly clear skies. Landing occurred at 144:15:39:04Z (10:39:04 AM CDT Sunday, 05/24/09).

FIRSTS/LASTS:
- First mission post-STS-107 incident without ISS safe haven. LON STS-400 mission was on standby on PAD 39B. "First time since 2001 that two such birds have simultaneously perched on NASA's twin shuttle launch pads" - Todd Halvorson, Florida Today.
- 116 new EVA tools (GSFC) were developed to meet unique demands of this HST SM.
- First flight of food bars and Metamucil wafers
- First ET build with elimination of "Hand Pack Ablator (SLA)"

Continued...

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SPACE SHUTTLE MISSIONS SUMMARY

STS-125
Continued ...

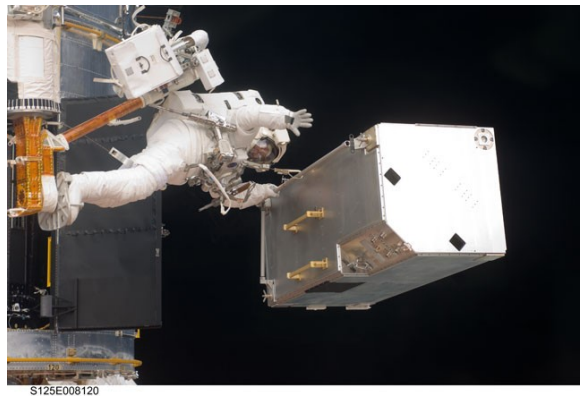
Continued...

FLT DURATION:
12:21:37:18
S/T:
1196:08:46:46

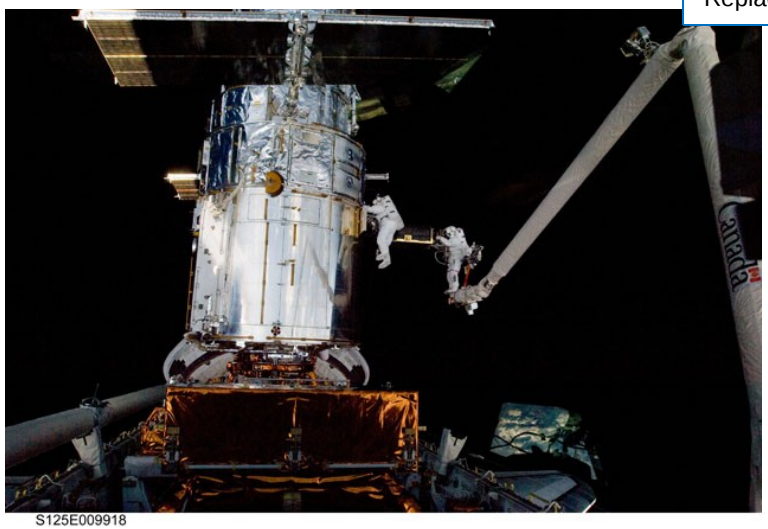
OV-105:
247:23:55:51

DISTANCE:
5,276,106 sm

TOTAL SHUTTLE DISTANCE:
490,854,365 sm


S125E008120

S125-E-008120 (16 May 2009)-- Andrew Feustel moves Corrective Optics Space Telescope Axial Replacement (COSTAR) in 3rd EVA to upgrade HST.


S125E009918

- Grunsfeld, on end of RMS, and Feustel, conduct mission's fifth and final HST service EVA: Replaced batteries, a Fine Guidance Sensor, and three thermal blankets (NOBL).

Continued... **FIRSTS/LASTS:**

- First flight of ATK BSM's in both forward and aft positions
- SRB Frangible nut redesigned with pyrotechnic crossover assembly
- Mike Massimino first to 'Tweet' from space, through email to JSC to his Twitter.
- First job offer in space: John Grunsfeld,whilel flying high in space, was named an adjoint professor at the University of Colorado at Boulder
- Fifth & last HST Service mission.

NIGHT LAUNCH: N/A

RENDEZVOUS: #73 Rendezvous with HST.

EVENTS:

- FD1: OMS2 ignition at 131:18:45:40.9Z resulted in a 298.1 by 106.6 NM orbit.
- T1 maneuver at 133:14:41:56.0Z resulted in a 303.2 by302.9 NM orbit
- FD2: RCC inspection found no areas of concern - no requirement for Focused Inspection.
- FD3: HST Grapple by McArthur occurred at 133:17:14Z. Timeline was about 20 min. behind schedule due to a comm. problem with HST that delayed HST prep for capture.
- FD4: EVA 1: Grunsfeld & Feustel: Activities included installing and completing good aliveness tests for new WFC3 and SI C&DH unit. The HST can now see farther into space and across a wider spectrum of colors. EVA ran 50 min longer than planned as the crew encountered difficult (aging) latches and bolts. EVA1 duration 7:20.
- FD5: EVA 2: Massimino & Good: Activities included Rate Sensor Unit changeouts & Bay 2 Battery checkout. EVA ran long due to the challenges for seating and bolting of RSU's. EVA2 duration 7:56.
- FD6: EVA 3: Grundsfeld & Feusel: Activities included replacement of the COSTAR instrument with the Cosmic Orgins Spectrograph and repair of the Advanced Camera for Surveys. EVA3 duration 6:36.
- FD7: EVA 4: Massimino & Good: Activities included refurbishment of Space Telescope Imaging Spectrograph and replacement of 6 Gyros. EVA 4 duration 8:02 (6th longest in program history).
- FD8: EVA 5:Grundsfeld & Feustel: Activities included Bay 3 battery changeout and FGS 2 changeout . On way back to A/L crew found debris liberated from carrier and head under HST. On retrieving the debris, PLSS contact damaged the TPS cover on the Low Gain Aantenna (LGA). The LGA cover was reinstalled. The HST was in a good configuration for long term exposure to space. EVA5 duration 7:02.
- On departing the telescope, astronaut Grunsfeld called the week a "tour de force of tools and human ingenuity." He also added: "'Hubble Isn't Just a Satellite, It Is About Mankind's Quest for Knowledge".
- FD9: HST was released at 139:12:57:00Z. This was followed shortly by OBSS late inspection of Atlantis TPS.
- During Entry comm blackout occurred at GMT 144/1513 - 1517 due to plasma effect.

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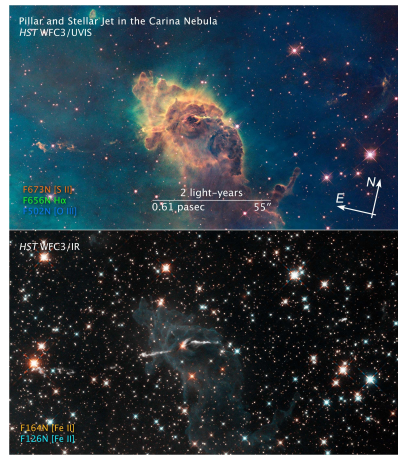
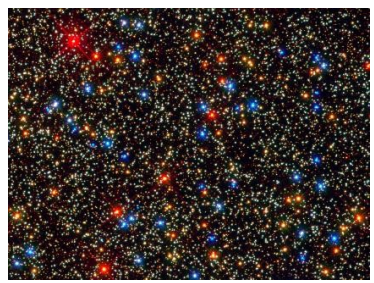
STS-125
Continued ...





HST Program released the above photos on 09/10/09 taken by the “Refurbished Hubble” (using WFC3). At upper right is: Stars Bursting to Life in Chaotic Carina Nebula - These two images of a huge pillar of star birth demonstrate how observations taken in visible and in infrared light by HST reveal dramatically different and complementary views of an object. At left is cauldrons of gas at 36K Deg F tearing across space at 600K mph resembling a “butterfly”. In center is NGC 6302 Stephan’s Quintet Galactic Wreckage - a clash among members of the quintet revealing stars from young blue stars to aging red stars. At right is a panoramic view of a colorful assortment of 100K stars residing in the core of a giant star cluster.
See: http://www.nasa.gov/hubble Credit: NASA, ESA, and the Hubble SM4 ERO Team

SIGNIFICANT ANOMALIES:

Orbiter:
- FWD STBD PLB FLOODLIGHT (#2) FAILED DURING STS-125
- DURING SSME IGNITION, AN ELECTRICAL ANOMALY OCCURRED THAT CAUSED ASA 1 TO BE LOST.
- AFTER CARRIER PANEL REMOVAL AN IN-PLANE CRACK WAS DETECTED AT THE DENSIFICATION LAYER INTERFACE WITH BASE MATERIAL ON TILES V070-395018-143 (SERIAL S83057) AND V070-395018-151 (SERIAL 7HB1DR)
- THE CREW DISCOVERED CARRYOVER OR UNPROCESSED CONDENSATE IN THE IMMEDIATE AREA OF THE HUMIDITY SEPARATORS IN THE LOWER EQUIPMENT BAY.
- THE IMU FAN DELTA PRESSURE (V61P2869A) WAS OBSERVED TO SLOWLY INCREASE ON FD 12, WITH THE FIRST INCIDENCE OF TOGGLING ABOVE THE FLIGHT RULE LIMIT OF 4.71 PSI OCCURRING AT GMT 142/18:22:37.
- DURING SSME IGNITION AN ELECTRICAL SHORT OCCURRED ON THE 26VAC EXCITATION CIRCUIT BETWEEN AEROSURFACE SERVOAMPLIFIER 1 (ASA-1) AND THE RIGHT HAND INBOARD ELEVON ACTUATOR PRIMARY DELTA PRESSURE TRANSDUCER.
- MDU CRT 4 REPORTED 'MSG COM 1553B ERROR', 'MESSAGE 1553B FAIL' AND 'MEDS I/O ERROR' IN DOWNLIST AT NOSE GEAR TOUCHDOWN.

KSC:
- Fondu-Fyre Liberated from SRB Main Flame Deflector, STS-125, Pad A
- Brick Liberated from East Flame Trench Wall, SSME Side, STS-125, Pad A

SRB: None.

RSRM:
- MISSING STIFFENER RING FOAM WITH DISCOLORATION, STIFFENER RINGS, RSRM-105B

SSME: None.

ET: None.

MOD: None.

Integration:
- Aerosurface Servo Amplifier-1 (ASA-1) Power Supply Failed
- Unexpected Debris/Expected Debris Exceeding Mass Allowable Prior to Pad Clearance (Liftoff Debris)
- Ice Internal and External to the LH2 T-0 Umbilical
- Gap Filler Releases From Port OMS Pod