1981-2011

Space Shuttle Missions: STS-1 to STS-135

USA
United Space Alliance

BOEING

NASA

Pratt Whitney
Rocketdyne

Kennedy Space Center

Main Propulsion Systems - MPS

Space Shuttle Main Engines - SSME

SSME Avionics - CCME

STS-001 (1) *"First Flight"*

Orbiter/Flight:		**102/1**		
ET:		**01**		
SSME:		**2007/1**	**2006/1**	**2005/1**
Facilities/Usage:		**OPF-1**	**03/25/79**	
		VAB-3	**11/24/80**	
		PADA/01	**12/29/80**	
		MLP1/1		
Payload:		**Development Flight Instrumentation**		
Testing:	**01/22/81**	**LH2 Tanking Test**		
	01/24/81	**LO2 Tanking Test**		
FRF:	**02/20/81**	**A successful 20s FRF was conducted and all 3 Main Engines were operated simultaneously at RPL with the entire Space Shuttle including the SRB on the launch pad in the launch attitude.**		
Scrub:	**04/10/81**	**Launch attempt scrubbed due to a timing issue in the general purpose computers at T-31s (comparison error)**		
Launch:	**04/12/81**	**12:00/58.356 GMT**		
Landing:	**04/14/81**	**18:20/57 GMT *Edwards***	**04/28/81 *KSC Return***	

Highlights: Aside from being the first flight, STS-001 was the first time solid-fuel rockets were used for a U.S. manned space vehicle.

Crew Members John W. Young (left) and Robert L. Crippen pose in ejection escape suits (EES) with small model of space shuttle orbiter.

STS-002 (2) *"First Flight RMS"*

Orbiter/Flight:		**102/2**		
ET:		**02**		
SSME:		**2007/2**	**2006/2**	**2005/2**
Facilities/Usage:		**OPF-1**	**04/29/81**	
		VAB-3	**08/10/81**	
		PADA/02	**08/31/81**	
		MLP1/2		
Payload:		**Orbital Flight Test Pallet**		
PLAST:	**09/15/81**	**ME-2 MFV Leak: LCC Violated at 2.5hrs of 5hr test**		
Scrub:	**10/09/81**	**Nitrogen Tetroxide spill occurred during loading of FWD RCS.**		
	11/04/81	**CD hold due to low reading on fuel cell oxygen tank pressure. High oil pressure in 2 of 3 APUs during hold.**		
Launch:	**11/12/81**	**15:10/09.407 GMT**		
Landing:	**11/14/81**	**21:23/11 GMT *Edwards***		**11/25/81 *KSC Return***

Highlights: First time manned vehicle reflown with a second crew. Mission shortened 3 days due to failure of 1of 3 fuel cells. RMS a success.

STS-003 (3) *"First Orange ET"*

Orbiter/Flight:		**102/3**		
ET:		**03**		
SSME:		**2007/3**	**2006/3**	**2005/3**
Facilities/Usage:		**OPF-1**	**11/26/81**	
		VAB-3	**02/03/82**	
		PADA/03	**02/16/82**	
		MLP1/3		
Payload:		**Office of Space Science Pallet/DFI Pallet/ACIP Package**		
PLAST:	**02/26/82**			
Launch:	**03/22/82**	**16:00/07.793 GMT**		
		APU#3 Shutdown at T+485s. ME-3 Hydraulic Lockup at T+491.5s, Pneumatic Shutdown.		
Landing:	**03/30/82**	**16:04/46 GMT *White Sands***		**04/06/82 *KSC Return***

Highlights: External Tank not painted white for the first time in order to reduce mass by 600 lbs. First and only landing at White Sands.

STS-004 (4) *"Final STS RD Flight"*

Orbiter/Flight:		**102/4**		
ET:		**04**		
SSME:		**2007/4**	**2006/4**	**2005/4**
Facilities/Usage:		**OPF-1**	**04/07/82**	
		VAB-3	**05/19/82**	
		PADA/04	**05/26/82**	
		MLP1/4		
Payload:		**DoD 82-1, CFES(1), CIRRIS, MLR(2), IECM, SSIP(x2), GAS (G-001), VPCF**		
PLAST:	**06/02/82**			
Launch:	**06/27/82**	**15:00/00 GMT**		
Landing:	**07/04/82**	**16:09/31 GMT *Edwards***		**07/15/82 *KSC Return***

Highlights: Final STS Research and Development flight. First on schedule launch; last flight with Development Flight Instrumentation active. First landing on 15K foot concrete runway at Edwards.

STS-005/31A (5) "Four-man Shuttle Crew"

Orbiter/Flight:		**102/5**		
ET:		**05**		
SSME:		**2007/5**	**2006/5**	**2005/5**
Facilities/Usage:		**OPF-1**	**07/16/82**	
		VAB-3	**09/09/82**	
		PADA/05	**09/21/82**	
		MLP1/5		
Payload:		**ANIK-C3, SitS-C**		
PLAST:	**09/28/82**			
Launch:	**11/11/82**	**12:19/00 GMT**		
Landing:	**11/16/82**	**14:33/26 GMT *Edwards***		**11/22/82 *KSC Return***

Highlights: First Shuttle operational mission deployed two commercial communications satellites, ANIK C-3 for TELESAT Canada and SitS-C for Satellite Business Systems. EVA cancelled because one astronaut was severely spacesick.

STS-006/31B (6) *"First Challenger Flight"*

Orbiter/Flight:		**099/1**		
ET:		**08/LWT-1**		
SSME:		**2017/1**	**2015/1**	**2012/1**
Facilities/Usage:		**OPF-2**	**07/06/82**	
		VAB-3	**11/23/82**	
		PADA/06	**11/30/82**	
		MLP2/1		
Payload:		**Tracking and Data Relay Satellite**		
FRF-002:	**12/18/82**	**Hydrogen leak detected in E1 aft compartment.**		
FRF-003:	**01/25/83**	**Cracks found in ME1 found to be cause of leak, E2 and E3 reinstalled at the pad after extensive testing and E1 replaced.**		
Launch:	**04/04/83**	**18:30/02.137 GMT**		
Landing:	**04/09/83**	**18:53/42 GMT *Edwards***		**04/16/83 *KSC Return***

Highlights: First spacewalk. First launch of lightweight ET and booster casings. First launch from MLP2. OV-099 "Challenger" first flight.

STS-007/31C (7) "Sally Ride in Space"

Orbiter/Flight:		**099/2**		
ET:		**06**		
SSME:		**2017/2**	**2015/2**	**2012/2**
Facilities/Usage:		**OPF-1**	**04/17/83**	
		VAB-3	**05/21/83**	
		PADA/07	**05/26/83**	
		MLP1/6		
Payload:		**ANIK-C2, PALAPA-B1, SPAS-01, OSTA-2, MLR(2), CFES (3), GAS(x7)**		
Launch:	**06/18/83**	**11:33/02.804 GMT**		
Landing:	**06/24/83**	**13:56/59 GMT *Edwards***		**06/29/83 *KSC Return***

Highlights: First American woman (Sally Ride) in space. First five person crew aboard a single spacecraft.

STS-008/31C (8) "Guion Bluford in Space"

Orbiter/Flight:		**099/3**		
ET:		**09/LWT-2**		
SSME:		**2017/3**	**2015/3**	**2012/3**
Facilities/Usage:		**OPF-1**	**06/30/83**	
		VAB-3	**07/26/83**	
		PADA/08	**08/02/83**	
		MLP2/2		
Payload:		**INSAT-1B,PDRS/PFTA,CFES(4),OIM, MLR(30,GAS(x7)**		
Launch:	**08/30/83**	**06:32/03.564 GMT**		
Landing:	**09/05/83**	**07:40/43 GMT *Edwards***		**09/09/83 *KSC Return***

Highlights: First African-American man (Guion Bluford) in space. First night launch and landing.

STS-009/41A (9) "First Rollback"

Orbiter/Flight:		**102/6**			
ET:		**11/LWT-4**			
SSME:		**2011/1**	**2018/1**	**2019/1**	
Facilities/Usage:		**OPF-1**	**11/23/82**	**10/20/83**	
		VAB-3	**09/24/83**	**10/17/83**	**11/03/83**
		PADA/09	**09/28/83**		**11/08/83**
		MLP1/7			
Payload:		**SPACELAB-1**			
PLAST:	**10/11/83**				
Postponed:		**Launch set on September 30 postponed due to suspect exhaust nozzle on SRB. Problem discovered at Pad, vehicle rolled back to VAB and eventually restacked.**			
Launch:	**11/28/83**	**18:30/38.039 GMT**			
Landing:	**12/08/83**	**23:47/24 GMT *Edwards***			**12/15/83 *KSC Return***

Highlights: First SPACELAB mission and 1st astronaut to represent the ESA. First time 6 persons carried into space on a single vehicle. During landing, 2 of 3 APUs caught fire.

STS-011/41B (10) "First KSC Landing"

Orbiter/Flight:		**099/4**		
ET:		**10/LWT-3**		
SSME:		**2109/1**	**2015/4**	**2012/4**
Facilities/Usage:		**OPF-1**	**10/10/83**	
		VAB-3	**01/26/84**	
		PADA/10	**01/12/84**	
		MLP2/3		
Payload:		**PALAPA-B2, WESTAR-6, ACES, IEF, RME, MLR(4), IRT, SSIP(x1), GAS(x5)**		
Postponed:		**Set for January 29 but postponed to allow for changeout of all 3 APUs as precautionary to STS-9.**		
Launch:	**02/03/84**	**13:00/01.600 GMT**		
Landing:	**02/11/84**	**12:15/55 GMT *KSC***		
Highlights:	First KSC Landing. First untethered spacewalk.			

STS-013/41C (11)

Orbiter/Flight:		**099/5**		
ET:		**12/LWT-5**		
SSME:		**2109/2**	**2020/1**	**2012/5**
Facilities/Usage:		**OPF-2**	**02/11/84**	
		VAB-3	**03/14/84**	
		PADA/11	**03/19/84**	
		MLP1/8		
Payload:		**LDEF-1, SSIP(x1), RME, IMAX-camera(1)**		
Launch:	**04/06/84**	**13:58/03.162 GMT**		
Landing:	**04/13/84**	**13:38/07 GMT *Edwards***		**04/18/84 *KSC Return***
Highlights:	First direct ascent trajectory for Space Shuttle. First on-orbit satellite repair.			

STS-014/41D (12) "First Discovery Flight"

Orbiter/Flight:		**103/1**			
ET:		**13/LWT-5**			
SSME:		**2109/3**	**2018/2**	**2021/1**	
Facilities/Usage:		**OPF-1**	**01/10/84**	**07/17/84**	
		VAB-3	**05/12/84**	**07/14/84**	**08/02/84**
		PADA/12	**05/19/84**		**08/09/84**
		MLP2/4			
Payload:		**SBS-D,TELSTAR-3C,LEASAT-1,OAST-1,CFES(5), RME(3),SSIP(x1),CLOUDS,IMAX-camera(2)**			
FRF-004:	**06/02/84**				
Scrub:	**06/25/84**	**During T-9 minute hold due to GPC#5 Miscompare**			
	06/26/84	**Aborted at T-6s when GPC detected ME-3 AFV Actuator CH A Failure (Transient Contamination)**			
	08/29/84	**Delayed due to discrepancy noted in flight software of Master events controller relating to SRB fire commands.**			
Launch:	**08/30/84**	**12:41/50 GMT**			
Landing:	**09/05/84**	**12:37/54 GMT *Edwards***		**09/10/84 *KSC Return***	

Highlights: Maiden voyage of OV-103 "Discovery". RSLS Abort after SSME ignition on second launch attempt (1st Abort).

STS-017/41G (13) "First American Woman Spacewalk"

Orbiter/Flight:		**099/6**			
ET:		**15/LWT-8**			
SSME:		**2023/1**	**2020/2**	**2021/2**	
Facilities/Usage:		**OPF-2**	**04/18/84**		
		VAB-1	**09/08/84**		
		PADA/13	**09/13/84**		
		MLP1/9			
Payload:		**OSTA-3,ERBS,LFC/ORS,RME(4),TLD,APE, CANEX, IMAX-camera(3)**			
Launch:	**10/05/84**	**11:03/02.990 GMT**			
Landing:	**10/13/84**	**16:26/33 GMT *KSC***			

Highlights: First flight with two women on board. Sullivan first woman to spacewalk. First seven person crew onboard a spacecraft. First Canadian astronaut.

STS-019/51A (14)

Orbiter/Flight:		**103/2**		
ET:		**16/LWT-9**		
SSME:		**2109/4**	**2018/3**	**2012/6**
Facilities/Usage:		**OPF-2**	**09/10/84**	
		VAB-1/3	**10/18/84**	
		PADA/14	**10/23/84**	
		MLP2/5		
Payload:		**ANIK-D2, LEASAT-2, DMOS, RME(5)**		
Scrub:	**11/07/84**	**Scrub during T-20 minute hold due to wind shears in upper atmosphere.**		
Launch:	**11/08/84**	**12:15/01.331 GMT**		
Landing:	**11/16/84**	**11:59/56 GMT *KSC***		
Highlights:	3rd Kennedy Space Center Landing.			

STS-020/51C (15)

Orbiter/Flight:		**103/3**		
ET:		**14/LWT-7**		
SSME:		**2109/5**	**2018/4**	**2012/7**
Facilities/Usage:		**OPF-2**	**11/16/84**	
		VAB-3/1	**12/21/84**	
		PADA/15	**01/05/85**	
		MLP1/10		
Payload:		**DoD 85-1**		
Scrub:	**01/23/85**	**Scrub due to freezing weather conditions. OV099 scheduled on manifest for STS-51C but substituted due to thermal tile problems.**		
Launch:	**01/24/85**	**19:50/00 GMT**		
		He Concentration in mid-body elevated until MPS He system pressurized to flight level.		
Landing:	**01/27/85**	**21:23/23 GMT *KSC***		
Highlights:	1st mission dedicated to DoD.			

STS-023/51D (16)

Orbiter/Flight:		**103/4**		
ET:		**18/LWT-11**		
SSME:		**2109/6**	**2018/5**	**2012/8**
Facilities/Usage:		**OPF-2**	**01/28/85**	
		VAB-3	**03/23/85**	
		PADA/16	**03/28/85**	
		MLP1/11		
Payload:		**LEASAT-3, ANIK-E2, CFES(6), AFE, PPE/SAS, SSIP(x2), GAS(x2)**		
Postponed:	**03/19/85**	**03/28/85 due to remanifesting of payload from cancelled Mission STS-51E. Delayed further due to damage to payload door when facility access platform dropped.**		
Launch:	**04/12/85**	**13:59/07.808 GMT**		
Landing:	**04/19/85**	**13:54/28 GMT *KSC***		
Highlights:	5th KSC landing.			

STS-024/51B (17) "3rd Rollback"

Orbiter/Flight:		**099/7**			
ET:		**17/LWT-10**			
SSME:		**2023/2**	**2020/3**	**2021/3**	
Facilities/Usage:		**OPF-1**	**10/13/84**	**03/07/85**	
		VAB-3/1	**02/10/85**	**03/04/85**	**04/10/85**
		PADA/17	**02/15/85**		**04/15/85**
		MLP2/6			
Payload:		**SPACELAB-3**			
Launch:	**04/29/85**	**16:02/21.063 GMT**			
Landing:	**05/06/85**	**16:11/04 GMT *Edwards***		**05/11/85 *KSC Return***	
Highlights:	Orbiter rollback to VAB on 03/04/85 due to timing problems				

STS-025/51G (18)

Orbiter/Flight:		**103/5**		
ET:		**20/LWT-13**		
SSME:		**2109/7**	**2018/6**	**2012/9**
Facilities/Usage:		**OPF-2**	**04/19/84**	
		VAB-1	**05/29/85**	
		PADA/18	**06/04/85**	
		MLP2/6		
Payload:		**MORELOS-A, ARABSAT-1B, TELSTAR-3D, SPARTAN-1, FEE, FPE, ADSF**		
Launch:	**06/17/85**	**11:33/02.771 GMT**		
Landing:	**06/24/85**	**13:11/52 GMT *Edwards***		**06/28/85 *KSC Return***
Highlights:	Launch proceeded with no delays.			

STS-026/51F (19) "Abort to Orbit (ATO)"

Orbiter/Flight:		**099/8**		
ET:		**19/LWT-12**		
SSME:		**2023/3**	**2020/4**	**2021/4**
Facilities/Usage:		**OPF-1**	**05/12/85**	
		VAB-3	**06/24/85**	
		PADA/19	**06/29/85**	
		MLP2/7		
Payload:		**SPACELAB-2, SAREX(1), CBDE, PGU**		
Scrub:	**07/12/85**	**RSLS abort T-3s after SSME ignition due to E2 coolant valve malfunction causing shutdown of all 3 main engines ME-2 CCV Actuator CH A Failure (Broken Wire).**		
Launch:	**07/29/85**	**21:00/02.889 GMT** **E1 shutdown prematurely 5m45s into ascent resulting in ATO trajectory. HPFTP Turbine Discharge Temp A&B failed**		
Landing:	**08/06/85**	**19:45/26 GMT *Edwards***		**08/11/85 *KSC Return***
Highlights:	RSLS Abort after SSME ignition on first launch attempt (2nd Abort). ATO due to Engine 1 shutdown (1st ATO).			

STS-027/51I (20)

Orbiter/Flight:		**103/6**			
ET:		**21/LWT-14**			
SSME:		**2109/8**	**2018/7**	**2012/10**	
Facilities/Usage:		**OPF-1**	**06/29/85**		
		VAB-1	**07/30/85**		
		PADA/20	**08/06/85**		
		MLP1/13			
Payload:		**ASC-1, AUSSAT-1, LEASAT-4, PVTOS**			
Scrub:	**08/24/85**	**T-5m due to thunderstorms in the vicinity.**			
	08/25/85	**GPC #5 on board general purpose computer failed during replenish.**			
Launch:	**08/27/85**	**10:58/03.113 GMT**			
Landing:	**09/03/85**	**13:15/43 GMT *Edwards***		**09/08/85 *KSC Return***	
Highlights:	Mission shortened one day because of early deployment of AUSSAT due to sunshield hangup on RMS camera.				

STS-028/51J (21) "Birth of Atlantis"

Orbiter/Flight:		**104/1**			
ET:		**25/LWT-18**			
SSME:		**2011/2**	**2019/2**	**2017/4**	
Facilities/Usage:		**OPF-1/2**	**04/10/85**	**05/28/85**	**07/30/85**
		VAB-3	**05/10/85**	**07/18/85**	**08/12/85**
		PADA/21			**08/30/85**
		MLP2/8			
Payload:		**DoD(2)**			
FRF-005:	**09/12/85**				
Launch:	**10/03/85**	**15:15/31.569 GMT**			
		Launch delayed 22m 30s due to prevalve showing faulty ON indication.			
Landing:	**10/07/85**	**17:00/08 GMT *Edwards***		**10/11/85 *KSC Return***	
Highlights:	Second mission dedicated to Dept. of Defense. Maiden voyage of OV-104 "Atlantis".				

STS-030/61A (22)

Orbiter/Flight: 099/9
ET: 24/LWT-17
SSME: 2023/4 2020/5 2021/5
Facilities/Usage: OPF-1 08/12/85
VAB-1 10/12/85
PADA/22 10/16/85
MLP1/14
Payload: SPACELAB-D1, GLOM AR
Launch: 10/30/85 17:00/01.326 GMT
Landing: 11/06/85 17:44/51 GMT *Edwards* 11/16/85 *KSC Return*
Highlights: Launch proceeded as scheduled with no delays.

STS-031/61B (23)

Orbiter/Flight: 104/2
ET: 22/LWT-15
SSME: 2011/3 2019/3 2017/5
Facilities/Usage: OPF-1 10/12/85
VAB-3 11/07/85
PADA/23 11/12/85
MLP2/9
Payload: MORELOS-B, SATCOM-KU1, AUSSAT-2,
EASE/ACCESS/CFES(6), UVX, IMAX (4), GAS
Launch: 11/26/85 01:33/27.038 GMT
Landing: 12/03/85 21:33/49 GMT *Edwards* 12/07/85 *KSC Return*
Highlights: Launch proceeded as scheduled with no delays. 2ND Night launch.

STS-032/61C (24)

Orbiter/Flight:		**102/7/AA/CO**		
ET:		**30/LWT-23**		
SSME:		**2015/5**	**2018/8**	**2109/9**
Facilities/Usage:		**OPF-2**	**07/18/85**	**09/26/85**
		VAB-1	**09/06/85**	**11/22/85**
		PADA/24		**12/02/85**
		MLP1/15		
Payload:		**SATCOM-KU2,LEASAT-5,MSL-2,CHAMP,IR-IE, SSIP(x3), GAS(X13)**		
Postponed:	**12/18/85**	**Additional time needed to close aft compartment.**		
Scrub:	**12/19/85**	**T-14s right SRB Hyd. power unit exceeded RPM limits**		
	01/06/86	**T-31s Accidental drain of approx. 4000gls of LO2 from ET**		
	01/07/86	**T-9m due to bad weather at both TAL sites**		
	01/09/86	**Pad LO2 sensor breaking off and dislodging into E2 PV2.**		
	01/10/86	**Delayed 2 days due to heavy rain.**		
Launch:	**01/12/86**	**11:55/02.420 GMT**		
Landing:	**01/18/86**	**13:58/51 GMT *Edwards***		**01/23/86 *KSC Return***

Highlights: Bolden/Nelson 1st flight. 2nd night landing.

STS-033/51L (25) *"Challenger Disaster"*

Orbiter/Flight: 099/10
TCID: SV33A3.CL
ET: 26/LWT-19
SRB: 026
SSME1/Usage: 2023/5
SSME2/Usage: 2020/6
SSME3/Usage: 2021/6
Facilities/Usage: OPF-1 11/11/85
VAB-3 12/16/85
PADB/1 12/22/85
MLP2/10
Payload: TDRS-B, SPARTAN/HALLEY, MPESS, CHAMP, FDE, RME, TISP, SSIP(x3)
Postponed: 01/22/86 to 01/23/86, then to 01/24/86 due to mission delays in 61-C.
01/25/86 Bad weather at TAL sites.
01/26/86 Launch processing unable to meet new morning T-0.
Scrubbed: 01/27/86 GSE hatch closing fixture could not be removed from Orbiter hatch. Problem fixed, however cross winds exceeded return-to-launch site limits at KSCs SLF.
Launch: 01/28/86 16:38/01.425 GMT
Launch delayed two hours when hardware interface module in launch processing system, which monitors fire detection system failed during LH2 tanking procedures.
Landing: N/A
Summary: An explosion 73 seconds after liftoff claimed crew and vehicle. Cause of Explosion was determined to be an O-ring failure in the right SRB. Cold weather was a contributing factor.

Back row (L-R): **Ellison S. Onizuka (MS2), Christa McAuliffe (PS2, TISP), Gregory Jarvis (PS1), and Judith A Resnik (MS1).** ***Front row (L-R):*** **Michael J. Smith (Pilot), Francis "Dick" Scobee (Commander), and Ronald McNair (MS3).**

Modifications to Support Return-To-Flight STS-26R

MPS 17-Inch Disconnect Latch - MCR11018

ISSUE: LO2 and LH2 17-Inch Disconnect valve Flappers are sensitive to angle and tip load measurements. Inadvertent closure of valves during powered flight would be catastrophic.

ACTION: Add flapper latch and sequence control system to 17-Inch disconnect assembly. Revisions to File III OMRSD (Rockwell). Modifications of existing GSE for Removal and Installation of Disconnect (Rockwell). Fabrication of new GSE (Rockwell). Provide new electrical circuits for operation of the latch (Rockwell). New Flight Software to operate latch during the ET Separation Sequence (Rockwell). Write Ground Software to operate the latch for test and checkout (Lockheed). Decision was to completely redesign the disconnect using the Fairchild "Twin-Visor Concept" and Parker "Twin-Flat" Disk Swing Flapper Concept.

MPS Anti-Slam Prevalve Single Point Failure - MCR11815

ISSUE: Single Point Failures in Anti-Slam prevalve actuators can prevent valves from closing. A failure to close LOX prevalves after MECO could overspeed the SSME pumps, which is catastrophic. Actuators already incorporate anti-slam devices with a gas cushion provided to prevent slamming of the visor and hardware damage utilizing small passageways and poppets, which are susceptible to blockage, causing valve malfunction.

ACTION: Either add filters to pneumatic inlet ports or eliminate valve anti-slam capability and utilize existing ground software to preclude valve slamming. Decision was made to add filters to all pneumatic unions on inlet ports of actuator, replace present vehicle unions with unions having filters, add unions with filters on all new or refurbished valves at supplier.

AC Voltmeter Select Switch - MCR11953

ISSUE: All three AC Busses are to a rotary switch on Panel F9 and could cause simultaneous AC Buss Transient that could affect SSME Controller in powered flight.

ACTION: Reduce fuse size to ½ Amp to obtain faster blow time.

SSMEC Catastrophic Shutdown - MCR11819, 12023

ISSUE: A onetime transient single bit toggle in an engine status word which erroneously indicated shutdown (or Post-Shutdown Phase) could result in loss of vehicle. Multiple Avionics dual failures and generic software failures could result in catastrophic main engine shutdown.

ACTION: NASA established an SSMEC Mode team and assessed the issue at 3 separate meetings and generated orbiter hardware/software solutions.

Third Turbine Sensor - MCR11867

ISSUE: Increased redundancy for turbine pump sensors to prevent unnecessary SSME Shutdown.

ACTION: SW Change to PFS

Replace LH2 ET Ullage Transducers

ISSUE: Failure of existing transducers and subsequent lab tests indicate a generic problem with this model Xducer.

ACTION: Initial fix was minor redesign and cycle test prior to installation. The permanent fix was to replace this model with an entirely different "Tavis" Transducer (Gulton Xducers are potentiometric and Tavis Xducers are Variable Reluctance)

MPS LO2 and LH2 Prevalve Screen - MCR11973

ISSUE: 61-C Prelaunch anomaly showed debris could prevent valve closure. Failure to close at MECO is criticality 1. No screens exist in the KSC Propellant Fill/Drain system at orbiter interface and debris can enter system and cause damage or failures.

ACTION: Addition of perforated plate in LO2 and LH2 systems installed at 8-Inch QDs/Facility Interface in T-0 Umbilical's.

SSME Hydraulic QD - MCR12054

ISSUE: Main Engine propellant control valves require positive flow path to hydraulic return system to allow for normal actuator positioning of propellant valves. Interrupted return flow caused by improperly mated QD will cause loss of valve control and probable SSME damage (Criticality-1).

ACTION: Studies were done to assess whether to maintain existing configuration, change the QD with a threaded collar, provide redundant return path for SSME Hydraulics, modify QD not to seal off line, or add instrumentation to SSME Hydraulic System to allow failure to be identified in time for APU SD. It was determined to pursue the QD with threaded collar option.

GO2 Flow Control Valve and Particle Impact Ignition Concerns

ISSUE: Particle Impact Ignition (material sensitivity, angles of particle impact, areas of high velocity, particle sizes for testing). 90 degree GO2 design presented at PDR will require modification to reduce particle impact ignition sensitivity.

ACTION: Cleanliness requirements of system reviewed. Filter capabilities assessed (inspect and clean after each flight vs. R&R). Redesign after testing to improve tolerance: fabricate poppet from Monel 500, employ Monel insert in outlet tube downstream of poppet or fabricate tube from Monel, utilize Monel insert to shield sleeve in inlet area. New Design eliminates critical sonic orifices and reduces number of flow passages where particles are accelerated (redesign valve has one sonic velocity area (poppet/seat) with low incidence angle on downstream side) and eliminates tortuous flow path.

Other Notables

Upgrade SSME Shop, LOX/LH2 Debris Trap & LK PF Joint, PIC System - Key Connectors and Separate Primary and Redundant Cabling, 8" QD LH2 Leak Detection System, Aft Attach Pinched Wire, Umbilical Hold Down Pinched Wire, MDM A/D Failures.

Space Shuttle Main Engine (SSME)*

"Changes to increase the operating life, safety, reliability and quality of the SSME are being implemented. The primary objective of these changes is to expand the operating margins in areas such as temperature, pressure, operating time, etc. This effort incorporates an aggressive engine test program to certify hardware improvements for nominal operation at power levels up to 104 percent for the earlier flights. Subsequent engine improvements and testing are planned to expand this nominal capability to 109 percent. NASA will not operate the engines at the 109-percent power level except for emergency situations until the operating margins of the engine are better demonstrated. Overtesting and limits-testing were integral parts of the engine certification cycle, and substantial demonstrations were conducted during the development of the engine. Additional overtesting, limits testing, and malfunction testing programs are being evaluated. Several modifications to the engine have been identified which will be incorporated prior to the resumption of flight. These changes included modifications to the high-pressure turbopump blades to significantly reduce the susceptibility to cracking in structurally critical areas. These modifications will result in increased margins and will be demonstrated by certifying the changes in ground tests for longer periods and at engine power levels greater than those planned for flight. Improvements in structural capabilities of components such as the main fuel valve housing an the main combustion chamber outlet neck will result in significant increases (factor of 4) in useful life. Changes to the high pressure fuel turbopump coolant circuit will reduce the overall operating pressures and will more than double the margins between the normal operating pressures and the redline values. The current hydraulic actuators are being replaced with actuators that have improved manufacturing cleanliness requirements and design modifications to reduce the susceptibility to electrical shorts. These changes will reduce the probability of launch pad aborts. The engine ground test program has been emphasized and accelerated in order to demonstrate existing margins to the maximum extent possible and to certify those changes that are planned for incorporation prior to the return to flight. This emphasis will assure maximum ground test exposure of the hardware with a resultant increase in confidence prior to the resumption of flight."

Orbiter (MPS Related)*

"A positive latch open design feature for the main propulsion system disconnect valve between the Orbiter and the ET is being developed. This feature will provide an additional safety margin to ensure that the valve remains open during powered flight. The Orbiter reaction control system onorbit attitude control engines are being modified to automatically turn off should they experience thrust instability that results in chamber wall burnthrough... With respect to preflight operations, final debris traps are being designed and incorporated into the liquid oxygen and liquid hydrogen servicing systems at the Orbiter interface. These traps will preclude the entry of foreign objects into the flight vehicle during propellant loading. A series of wire harness and fluid line protective covers is being incorporated in to the Orbiter aft compartment area. These devices will provide improved protection for critical Orbiter subsystem elements during required ground-crew servicing."

As a direct result of the modifications to the 17" disconnect and to prevent damage to the 17" latch and valve a TCS sequence (VFE01 and VFE02) was written to turn off commands if they were incorrectly issued from the ground.

***excerpts from NASA Memo to White House**

STS-026R (26) "Return to Flight"

Orbiter/Flight:		**103/7**		
ET:		**28/LWT-21**		
SSME:		**2019/4**	**2022/1**	**2028/1**
Facilities/Usage:		**OPF-1**	**10/30/86**	
		VAB-3	**06/21/88**	
		PADB/2	**07/04/88**	
		MLP2/11		
Payload:		**TDRS-C, PVTOS, PCG, IRCFE, ARC, IFE, MLE, PPE, ELRAD, ASDF, SSIP(x2), OASIS-1**		
PLAST:	**07/29/88**	**Vibrations in LO2 Loading pumps (PLAST SCRUB)**		
	08/01/88	**High H2 concentrations, test stopped at 60% full**		
FRF-006:	**08/04/88**	**ME-2 FBV not indicating closed at T-7.3s (FRF SCRUB)**		
	08/10/88			
Launch:	**09/29/88**	**16:38/01.425 GMT**		
		975 days after the Challenger disaster. Delayed 1hr 38m To replace fuses in cooling system of two of crew's flight pressure suits and due to lighter than expected upper atmospheric winds.		
Landing:	**10/03/88**	**16:37/11 GMT *Edwards***	**10/08/88 *KSC Return***	
Highlights:	Return to Flight a success. Cabin Flash Evaporator System iced up, raising crew cabin temperature to mid-80's. Problem corrected on Flight Day 4.			

STS-027R (27)

Orbiter/Flight:		**104/3**		
ET:		**23/LWT-16**		
SSME:		**2027/1**	**2030/1**	**2029/1**
Facilities/Usage:		**OPF-2**	**03/20/87**	
		VAB-1	**10/22/88**	
		PADB/3	**11/02/88**	
		MLP1/16		
Payload:		**DoD(3)**		
Scrub:	**12/01/88**	**Unacceptable cloud cover and wind conditions.**		
Launch:	**12/02/88**	**14:30/36.402 GMT**		
Landing:	**12/06/88**	**23:36/11 GMT *Edwards***	***12/13/88 KSC Return***	
Highlights:	Third mission dedicated to Department of Defense.			

STS-029R (28)

Orbiter/Flight:		**103/8**		
ET:		**36/LWT-29**		
SSME:		**2031/1**	**2022/2**	**2028/2**
Facilities/Usage:		**OPF-1**	**10/09/88**	
		VAB-1	**01/23/89**	
		PADB/4	**02/03/89**	
		MLP2/12		
Payload:		**TDRS-D, IMAX-01, SHARE-1**		
Postponed:		**Launch manifested Feb. 18 reassessed for late Feb/early March launch to replace suspect liquid oxygen turbopumps on OV103 three main engines and faulty master events controller.**		
Launch:	**03/13/89**	**14:57/03.669 GMT**		
		Launch delayed 1hr. 50min due to fog and upper winds.		
Landing:	**03/18/89**	**14:35/51 GMT *Edwards***		**03/24/89 *KSC Return***

Highlights: Crew photographed Earth with handheld IMAX camera.

STS-030R (29)

Orbiter/Flight:		**104/4**		
ET:		**29/LWT-22**		
SSME:		**2027/2**	**2030/2**	**2029/2**
Facilities/Usage:		**OPF-2**	**12/14/88**	
		VAB-3	**03/11/89**	
		PADB/5	**03/22/89**	
		MLP1/17		
Payload:		**MAGELLAN**		
Scrub:	**04/28/89**	**E-1 LH2 Recirc Pump failure during terminal count (T-61s). GSE circuit breaker tripped. Resolved by replacing the pump. Failure analysis discovered internal short within the pump in the electrical connector.**		
Launch:	**05/04/89**	**18:47/01.519 GMT**		
Landing:	**05/08/89**	**19:43/27 GMT *Edwards***		**05/15/89 *KSC Return***

Highlights: 1 of 5 GPCs failed and had to be replaced in orbit.

STS-028R (30)

Orbiter/Flight:		**102/8**		
ET:		**31/LWT-24**		
SSME:		**2019/5**	**2022/3**	**2028/3**
Facilities/Usage:		**OPF-1/2/1**	**01/23/89**	
		VAB-1/3	**07/03/89**	
		PADB/6	**07/14/89**	
		MLP2/13		
Payload:		**DoD(4)**		
Issues:		**Replaced LV8 and PR4 on the MPS Reg Panel.**		
Launch:	**08/08/89**	**12:37/02.253 GMT**		
Landing:	**08/13/89**	**13:37/08 GMT *Edwards***		**08/21/89 *KSC Return***

Highlights: 4th mission dedicated to Dept of Defense. First OV102 mission since 61C.

STS-034R (31)

Orbiter/Flight:		**104/5**		
ET:		**27/LWT-20**		
SSME:		**2027/3**	**2030/3**	**2029/3**
Facilities/Usage:		**OPF-2**	**05/16/89**	
		VAB-1	**08/21/89**	
		PADB/7	**08/29/89**	
		MLP1/18		
Payload:		**GALILEO, IMAX-02, SSBUV-01**		
Issues:		**GO2 Repress orifice (RP1) was discovered to be clogged since Flight 1 of OV-104. Orifice and line segment replaced. GO2 system cleaned.**		
Postponed:	**10/12/89**	**ME-2 Block 1 controller DCU-B Halt during T-27 hours Sensor Checkout. Controller replaced.**		
	10/17/89	**Weather constraints for a RTLS landing.**		
Launch:	**10/18/89**	**16:53/42.124 GMT**		
Landing:	**10/23/89**	**16:33/00 GMT *Edwards***		**10/29/89 *KSC Return***

Highlights: Galileo sent on a 6yr. trip to Jupiter via gravitational boosts from Venus and Earth.

STS-033R (32)

Orbiter/Flight:		**103/9**		
ET:		**38/LWT-31**		
SSME:		**2011/4**	**2031/2**	**2107/1**
Facilities/Usage:		**OPF-2/1/2**	**08/20/89**	
		VAB-3	**10/05/89**	
		PADB/8	**10/27/89**	
		MLP2/14		
Payload:		**DoD(5)**		
Postponed:	**11/20/89**	**Rescheduled to allow changeout of suspect integrated Electronics assemblies on twin solid rocket boosters.**		
Launch:	**11/23/89**	**00:23/32.432 GMT**		
Landing:	**11/28/89**	**00:30/16 GMT *Edwards***		**12/04/89 *KSC Return***
Highlights:	3rd night launch. 5th mission dedicated to Dept. of Defense.			

STS-032R (33)

Orbiter/Flight:		**102/9**		
ET:		**32/LWT-25**		
SSME:		**2024/1**	**2022/4**	**2028/4**
Facilities/Usage:		**OPF-2**	**08/22/89**	
		VAB-1	**10/16/89**	
		PADA/25	**11/28/89**	
		MLP3/1		
Payload:		**SYNCOM IV-5, IMAX-03, LDEF**		
Issues:		**GOX Active Flow Control Valve failure during processing. GH2 Flow Control Valve replaced due to failure during previous mission which was attributed to contamination.**		
Postponed:	**12/18/89**	**More time needed to complete and verify mods to PAD A**		
Scrub:	**01/08/90**	**Weather conditions (RTLS Visibility).**		
Launch:	**01/09/90**	**12:35/01.867 GMT**		
Landing:	**01/20/90**	**09:35/37 GMT *Edwards***		**01/26/90 *KSC Return***
Highlights:	1st use of MLP-3 for Shuttle.			

STS-036R (34)

Orbiter/Flight:		**104/6**		
ET:		**33/LWT-26**		
SSME:		**2019/6**	**2030/4**	**2027/4**
Facilities/Usage:		**OPF-1**	**10/30/89**	
		VAB-3	**01/19/90**	
		PADA/26	**01/25/90**	
		MLP1/19		
Payload:		**DoD(6)**		
Issues:		**PV6 Internal Relief Valve replaced due to leakage associated with contamination.**		
Postponed:		**02/22 to 02/23 to 02/24 to 02/25 due to illness of crew commander and weather conditions.**		
Scrub:	**02/25/90**	**Malfunction of Range Safety Computer.**		
	02/26/90	**Weather conditions.**		
Launch:	**02/28/90**	**07:50/23.657 GMT**		
Landing:	**03/04/90**	**18:08/44 GMT *Edwards***		**03/13/90 *KSC Return***
Highlights:	6th mission dedicated to the Dept. of Defense.			

STS-031R (35)

Orbiter/Flight:		**103/10**		
ET:		**34/LWT-27**		
SSME:		**2011/5**	**2031/3**	**2107/2**
Facilities/Usage:		**OPF-2**	**12/05/89**	
		VAB-1	**03/05/90**	
		PADB/09	**03/15/90**	
		MLP2/15		
Payload:		**HST, IMAX-04, APM-01**		
Scrub:	**04/12/90**	**T-4m due to faulty valve in APU number one.**		
Launch:	**04/24/90**	**12:33/52.471 GMT**		
		Delay at T-31s when computer software failed to shut down a fuel valve line on GSE.		
Landing:	**04/29/90**	**13:49/57 GMT *Edwards***		**05/07/90 *KSC Return***
Highlights:	Hubble Space Telescope deployed. First use of carbon brakes at landing.			

STS-041 (36)

Orbiter/Flight:		**103/11**			
ET:		**39/LWT-32**			
SSME:		**2011/6**	**2031/4**	**2107/3**	
Facilities/Usage:		**OPF-1**	**05/08/90**		
		VAB-3/1	**08/27/90**		
		PADB/10	**09/04/90**		
		MLP2/16			
Payload:		**ULYSSES, SSBUV-02, ISAC**			
Launch:	**10/06/90**	**11:47/16.580 GMT**			
Landing:	**10/10/90**	**13:57/18 GMT *Edwards***		**10/16/90 *KSC Return***	
Highlights:	Heaviest payload to date.				

STS-038 (37) "5th Rollback"

Orbiter/Flight:		**104/07**			
ET:		**40/LWT-33**			
SSME:		**2019/7**	**2022/5**	**2027/5**	
Facilities/Usage:		**OPF-2**	**03/14/90**		**08/15/90**
		VAB-3/1	**06/08/90**	**08/09/90**	**10/02/90**
		PADA/27	**06/18/90**		**10/12/90**
		MLP1/20			
Payload:		**DoD (7)**			
Testing:	**06/29/90**	**LH2 Tanking Test to investigate source of potential H2 Leak (ref. STS-35)**			
	07/13/90	**LH2 Tanking Test to investigate source of potential H2 Leak within 17" QD**			
	07/25/90	**LH2 Tanking Test to quantify H2 leak at ET side of 17" disconnect flange**			
	10/24/90	**LH2/LO2 Tanking Test. O2 line replaced due to damage from Aft work platform.**			
Launch:	**11/15/90**	**23:48/16.197 GMT**			
Landing:	**11/20/90**	**21:42/42 GMT *KSC***			
Highlights:	7th mission dedicated to Dept. of Defense.				

STS-035R (38) "Tiger Team from Hell"

Orbiter/Flight:		**102/10**				
ET:		**35/LWT-28**				
SSME:		**2024/2**	**2012/11**	**2028/5**		
Facilities/Usage:		**OPF-2**	**01/30/90**	**06/15/90**		
		VAB-3/1	**04/16/90**	**06/12/90**	**08/02/90**	**10/09/90**
		PADA	**04/22/90**		**08/09/90**	
`		**PADB /11**			**10/08/90**	**10/14/90**
		MLP3/2				
Payload:		**ASTRO-1**				

Scrub: **05/30/90** **During prelaunch ET loading, significant GH2 leakage occurred externally at the ET/Orb 17 inch disconnect and internal to the AFT.**

Tank Test: **06/06/90** **Verified leakage at the external location with the internal AFT fuselage leakage being attributed to migration of the disconnect leakage. Destack and roll back to the OPF was required to replace both the Orbiter and ET 17-inch disconnect assemblies.**

Postponed: **09/01/90** **Avionics Box on Astro Payload R&R**

Tank Test: **09/06/90** **High AFT GH2 concentration still existed and real time troubleshooting pointed to the recirc pump package being the source of the anomaly. The recirc pump package was replaced as was the Engine 3 prevalve detent cover seal.**

Tank Test: **09/18/90** **AFT GH2 leak was not yet corrected. "Tiger Team" was appointed to oversee the effort to resolve the leakage. Exhaustive MPS system leak checks identified additional LH2 prevalve detent teflon seals that while leaking within specifications, were higher than their historical nominal values for ambient conditions. Inspections revealed that the seals were slightly damaged, probably as a result of installation.**

Postponed: **10/09/90** **Tropical Storm Klaus forced rollback to VAB**

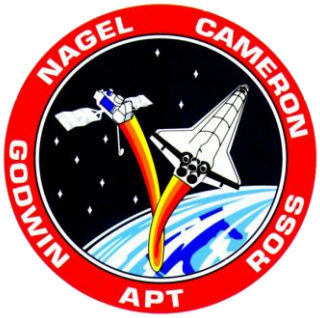
Tank Test: **10/30/90** **A Tanking Test with special drag on instrumentation consisting of special sensors, strain gages, flow meters, video cameras, and a see through Plexiglas aft compartment door was carried out with no excessive hydrogen leakage being detected. Corrective action associated with the hydrogen leakage resolution consisted of improved and more stringent detent seal installation process and a redundant seal being installed on the Orbiter 17 inch disconnect shaft.**

Launch: **12/02/90** **06:49/02.794 GMT Delayed 21min due to low-level clouds**

Landing: **12/11/90** **05:54/08 GMT *Edwards*** **12/20/90 *KSC Return***

Highlights: Pad switch from Pad A to Pad B. 4th and 6th rollback. Hydrogen leaks in the AFT.

STS-037R (39)



Orbiter/Flight:		**104/8**			
ET:		**37/LWT-30**			
SSME:		**2019/8**	**2031/5**	**2107/4**	
Facilities/Usage:		**OPF-2**	**11/20/90**		
		VAB-3/1	**03/08/91**		
		PADB/12	**03/15/91**		
		MLP1/21			
Payload:		**GRO, CETA, APM-02**			
Launch:	**04/05/91**	**15:10/45.263 GMT**			
		Delayed briefly due to low level clouds.			
Landing:	**04/11/91**	**13:55/29 GMT *Edwards***		**04/18/91 *KSC Return***	
Highlights:	Extended mission.				

STS-039 (40) "7th Rollback"

Orbiter/Flight:		**103/12**				
ET:		**46/LWT-39**				
SSME:		**2026/1**	**2030/5**	**2029/4**		
Facilities/Usage:		**OPF-1/2**	**10/17/90**		**03/15/91**	
		VAB-1	**02/09/91**	**03/07/91**	**03/25/91**	
		PADA/28	**02/15/91**		**04/01/91**	
		MLP2/17				
Payload:		**DoD (8), AFP-675, IBSS, STP-01, MPEC**				
Postponed:	**03/09/91**	**Launch originally scheduled for 3-9, but during work at Pad A, significant cracks found on all four lug hinges on the two ET umbilical door drive mechanisms.**				
Scrub:	**04/22/91**	**During prelaunch ET loading, the SSME 3 HPOTP Secondary Seal Cavity Pressure Sensor Channel A Violated the upper qualification limit. The transducer and its associated wiring harness were replaced.**				
Launch:	**04/28/91**	**11:33/17.137 GMT**				
Landing:	**05/06/91**	**18:55/35 GMT *KSC***				
Highlights:	8th mission dedicated to the Department of Defense.					

STS-040 (41)

Orbiter/Flight:		**102/11**		
ET:		**41/LWT-34**		
SSME:		**2015/6**	**2022/6**	**2027/6**
Facilities/Usage:		**OPF-1**	**02/09/91**	
		VAB-3	**04/26/91**	
		PADB/13	**05/02/91**	
		MLP3/3		
Payload:		**SLS-01, GAS-BRIDGE**		
Postponed:	**05/22/91**	**Vendor failure analysis of cryo temperature transducers lead to a suspect condition which resulted in the postponement of the initial attempt on 5/22.The possibility of the 9 on-board LO2/LH2 temperature transducer probe welds cracking and leaking or separating from the housing resulted in the removal and replacement of the three LO2 engine feedline units, the three 17 inch feedline units, and the removal and plugging of the three LH2 feedline units. All the replacement units were screened by X-ray analysis and were subjected to more stringent limited life requirements.**		
Scrub:	**06/01/91**	**IMU #2 Calibration Failure**		
Launch:	**06/05/91**	**13:24/52.462 GMT**		
Landing:	**06/14/91**	**15:39/11 GMT *Edwards***		**06/21/91 *KSC Return***
Highlights:	Fifth dedicated Spacelab mission.			

STS-043 (42)

Orbiter/Flight:		**104/9**		
ET:		**47/LWT-40**		
SSME:		**2024/3**	**2012/12**	**2028/6**
Facilities/Usage:		**OPF-2**	**11/20/90**	
		VAB-1	**03/08/91**	
		PADA/29	**03/15/91**	
		MLP1/22		
Payload:		**TDRS-E, SSBUV-03, SHARE-II, OCTW-01, TPCE**		
Postponed:	**07/23/91**	**7/23 to 7/24 (faulty electronics assembly that controls ET Sep).**		
Scrub:	**07/24/91**	**Scrub the result of a SSME 3 Controller DCU-A parity error. The Main Engine #3 controller was removed and replaced and the launch rescheduled for 8/1.**		
	08/01/91	**Delayed due to cabin pressure reading. Scrubbed for weather.**		
Launch:	**08/02/91**	**15:02/02.285 GMT**		
Landing:	**08/11/91**	**12:23/25 GMT *KSC***		
Highlights:	First landing scheduled at KSC since 61-C (1986-diverted to Edwards).			

STS-048 (43)

Orbiter/Flight: 103/13
ET: 42/LWT-35
SSME: 2019/9 2031/6 2107/5
Facilities/Usage: OPF-1/2 05/06/91
VAB-3 07/25/91
PADA/30 08/12/91
MLP3/4
Payload: UARS, AMOS(1), APM, MODE, SAM, CREAM, PARE, PGC-11-2, IPMP
Launch: 09/12/91 23:11/06.196 GMT
Launch delayed 14 minutes by a faulty communication link between KSC and Mission Control in Houston.
Landing: 09/18/91 07:38/42 GMT *Edwards* *09*/26/91 *KSC Return*
Highlights: KSC landing diverted to Edwards due to bad weather.

STS-044 (44)

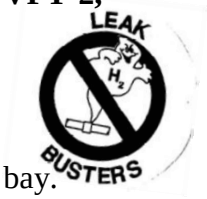
Orbiter/Flight: 104/10
ET: 53/LWT-46
SSME: 2015/7 2030/6 2029/5
Facilities/Usage: OPF-1 08/12/91
VAB-1 10/18/91
PADA/31 10/23/91
MLP1/23
Payload: DSP, IOCM, MODE(2), AMOS(2), MMIS, CREAM, SAM, RME-III, VFT-1, UVPI, BFPT, EDOMP
Postponed: Launch 11-19 postponed due to failure of redundant IMU on Inertial Upper Stage (Payload)
Launch: 11/24/91 23:44/02.322 GMT
Delayed 13 minutes to due to LO2 leak at Replenish Valve at approximately T-3 hours
Landing: 12/01/91 22:34/12 GMT *Edwards* 12/08/91 *KSC Return*
Highlights: Dedicated Dept. of Defense mission.

STS-042 (45)

Orbiter/Flight:		**103/14**		
ET:		**52/LWT-45**		
SSME:		**2026/2**	**2022/7**	**2027/7**
Facilities/Usage:		**OPF-3**	**09/27/91**	
		VAB-1	**12/12/91**	
		PADA/32	**12/19/91**	
		MLP3/5		
Payload:		**IML-01,IMAX-05, GAS(x10), SSIP(x2), GOSAMR, IPMP**		
Launch:	**01/22/92**	**14:52/34.220 GMT**		
		Delayed 1 hour due to weather.		
Landing:	**01/30/92**	**16:07/17 GMT *Edwards***		**02/16/92 *KSC Return***
Highlights:	45th space shuttle mission.			

STS-045 (46)

Orbiter/Flight:		**104/11**		
ET:		**44/LWT-37**		
SSME:		**2024/4**	**2012/13**	**2028/7**
Facilities/Usage:		**OPF-2**	**12/09/91**	
		VAB-3	**02/13/92**	
		PADA/33	**02/19/92**	
		MLP1/24		
Payload:		**ATLAS-01,SSBUV-04, STL-01, IPMP, SAREX(2), VFT-2, RME-III, CLOUDS-1A, GAS(x1)**		
Scrub:	**03/23/92**	**H2 and O2 leakage in AFT Fuselage**		
Launch:	**03/24/92**	**13:13/41.857 GMT**		
Landing:	**04/02/92**	**11:23/00 GMT *KSC***		
Highlights:	Carried ATLAS-1 on SPACELAB pallets mounted on orbiters cargo bay.			

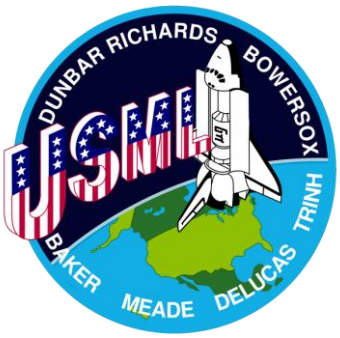


STS-049 (47) "First Flight OV105"

Orbiter/Flight:		**105/01**		
ET:		**43/LWT-36**		
SSME:		**2030/7**	**2015/8**	**2017/6**
Facilities/Usage:		**OPF-1**	**07/25/91**	
		VAB-1	**03/07/92**	
		PADB/14	**03/13/92**	
		MLP2/18		
Payload:		**INTELSAT-VI-RESCUE, ASEM, CPGC, UVPI, AMOS**		
FRF-007:	**04/06/92**			
Postponed:	**05/04/92**	**Mission delayed to aquire an earlier launch window for better visibility to support ascent photographic documentation.**		
Launch:	**05/07/92**	**23:40/02.560 GMT**		
		Delayed 34 minutes due to bad weather at TAL site.		
Landing:	**05/16/92**	**22:57/38 GMT *Edwards***		**05/30/92 *KSC Return***

Highlights: First use of drag chute during landing. Maiden voyage for Endeavour. First 3 person EVA and Satellite rescue.

STS-050 (48)



Orbiter/Flight:		**102/12/J1**		
ET:		**45/LWT-38**		
SSME:		**2019/10**	**2031/7**	**2011/7**
Facilities/Usage:		**OPF-3**	**02/10/92**	
		VAB-3	**05/29/92**	
		PADA/34	**06/03/92**	
		MLP3/6		
Payload:		**USML-01, IPMP, SAREX-II, UVPI**		
Launch:	**06/25/92**	**16:12/25.040 GMT**		
		Delayed 5 minutes due to weather conditions.		
Landing:	**07/09/92**	**11:42/27 GMT *KSC***		

Highlights: Mission duration eclipsed all previous U.S. manned space flights except the three flights to the Skylab Space Station in 1973 and 1974.

STS-046 (49)

Orbiter/Flight:		**104/12**		
ET:		**48/LWT-43**		
SSME:		**2032/1**	**2033/1**	**2027/8**
Facilities/Usage:		**OPF-1**	**04/02/92**	
		VAB-1	**06/04/92**	
		PADB/15	**06/11/92**	
		MLP1/25		
Payload:		**TSS-1, EURECA-II, LDCE, PHCF, IVPI, IMAX-06, EOIM-III/TEMP-2A, CONCAP-II, ICBS, AMOS**		
Launch:	**07/31/92**	**13:56/50.136 GMT**		
Landing:	**08/08/92**	**13:11/50 GMT *KSC***		

Highlights: Mission extended an extra day to meet scientific objectives.

STS-047 (50)

Orbiter/Flight:		**105/02**		
ET:		**45/LWT-42**		
SSME:		**2026/3**	**2022/8**	**2029/6**
Facilities/Usage:		**OPF-3**	**05/31/92**	
		VAB-3	**08/17/92**	
		PADB/16	**08/25/92**	
		MLP2/19		
Payload:		**SPACELAB-J, GAS-BRIDGE, ISAIAH, SSCE, SAREX-II, AMOS, UVPI**		
Launch:	**09/12/92**	**14:23/01.666 GMT**		
Landing:	**09/20/92**	**12:53/24 GMT *KSC***		

Highlights: First on time shuttle mission since STS-61B in November 1985.

STS-052 (51)

Orbiter/Flight:		**102/13**		
ET:		**55**		
SSME:		**2030/8**	**2015/9**	**2034/1**
Facilities/Usage:		**OPF-2**	**07/09/92**	
		VAB-1	**09/20/92**	
		PADB/17	**09/26/92**	
		MLP3/7		
Payload:		**LAGEOS-II, USMP-1, CANEX-2, CMIX, CPCG, PSE, SPIE, CVTEHPPE, TPCE/TP**		
Launch:	**10/22/92**	**17:09/40.759 GMT**		
		Delayed 1hr 53min due to RTLS crosswind constraints at KSCs SLF and cloud conditions at the Banjul TAL site.		
Landing:	**11/01/92**	**13:05/53 GMT *KSC***		
Highlights:	ME-1 replaced due to nozzle steerhorn cracks.			

STS-053 (52)

Orbiter/Flight:		**103/15/J1**		
ET:		**49**		
SSME:		**2024/5**	**2012/14**	**2017/7**
Facilities/Usage:		**OPF-3**	**08/17/92**	
		VAB-3	**11/03/92**	
		PADA/35	**11/08/92**	
		MLP1/26		
Payload:		**DoD(9), ODERACS, GCP, MIS-1, STL, VFT-2, CREAM RME-III, FARE, HERCULES, BLAST, CLOUDS**		
Launch:	**12/02/92**	**13:24/02.087 GMT**		
		Delayed 1hr. 25min due to ice buildup on the ET.		
Landing:	**12/09/92**	**20:43/17 GMT *Edwards***	**12/18/92 *KSC Return***	
Highlights:	Classified Dept. of Defense primary payload, plus two unclassified secondary payloads and nine unclassified middeck experiments.			

STS-054 (53)

Orbiter/Flight:		**105/03**		
ET:		**51**		
SSME:		**2019/11**	**2033/2**	**2018/9**
Facilities/Usage:		**OPF-1**	**09/20/92**	
		VAB-1	**11/23/92**	
		PADB/18	**12/03/92**	
		MLP2/20		
Payload:		**TDRS-F, DXS, CGBA, CHROMEX, PARE, SAMSSSCE**		
Launch:	**01/13/93**	**13:59/31.163 GMT**		
		Delayed 7min. due to concerns associated with upper Atmospheric winds.		
Landing:	**01/19/93**	**13:37/47 GMT *KSC***		
Highlights:	14th KSC landing.			

STS-056 (54)

Orbiter/Flight:		**103/16**		
ET:		**54**		
SSME:		**2024/6**	**2033/3**	**2018/10**
Facilities/Usage:		**OPF-3**	**12/19/92**	
		VAB-1	**03/02/93**	
		PADB/19	**03/15/93**	
		MLP1/27		
Payload:		**ATLAS-2, SPARTAN-201, SAREX-II, SUVE, CMIX, PARE, STL-1, CREAM, HERCULES, RME-III, AMOS, SSBUV-5**		
Scrub:	**04/06/93**	**At T-11s, MPS LH2 High Point Bleed Valve (PV22) not indicating closed. Analysis showed valve in proper config.**		
Launch:	**04/08/93**	**05:29/01.910 GMT**		
Landing:	**04/17/93**	**11:37/19 GMT *KSC***		
Highlights:	RSLS Abort(4), Night Launch (7), Extended mission.			

STS-055 (55)

Orbiter/Flight:		**102/14**		
ET:		**56**		
SSME:		**2031/8**	**2109/10**	**2029/7**
Facilities/Usage:		**OPF-2**	**11/02/92**	
		VAB-3	**02/03/93**	
		PADA/36	**02/08/93**	
		MLP3/8		
Payload:		**Spacelab-D2, SAREX-II**		
Delay:	**02/25/93**	**All 3 HPOTPs replaced due to suspect Tip Seal Retainers**		
	04/24/93	**IMU#2 Platform Fail bite indication (prior to tanking)**		
Scrub:	**03/22/93**	**RSLS Abort at Engine Start +1.4s due to oxidizer preburner purge pressure spike greater than 50 psi, indicating preburner check valve leakage. Concern that Engine 3 might contain obsolete tip-seal retainers in the HPOTP. All engines were removed, inspected and contained the proper retainers.**		
Launch:	**04/26/93**	**14:50/01.316 GMT**		
Landing:	**05/06/93**	**14:30/00 GMT *KSC***		

Highlights: RSLS Abort after SSME Ignition (3rd Abort). Investigation revealed that the OPB ASI Purge Check Valve was contaminated with metallic particles.

STS-057 (56)

Orbiter/Flight:		**105/04**		
ET:		**58**		
SSME:		**2019/12**	**2034/2**	**2017/8**
Facilities/Usage:		**OPF-1**	**01/19/93**	
		VAB-1	**03/24/93**	
		PADB/20	**04/28/93**	
		MLP2/21		
Payload:		**SPACEHAB-01, EURECA, SHOOT, CONCAP-IV, GAS-BRIDGE, FARE, BLAST, SAREX-II, AMOS**		
Postponed:	**06/03/93**	**E-2 HPOTP Replaced. Suspect etched bearing spring.**		
Scrub:	**06/20/93**	**Weather: Adverse KSC (RTLS) and TAL Sites**		
Launch:	**06/21/93**	**13:07/23.167 GMT**		
Landing:	**07/01/93**	**12:52/00 GMT *KSC***		

Highlights: 16th KSC landing.

STS-051 (57)

Orbiter/Flight:		**103/17**		
ET:		**59**		
SSME:		**2031/9**	**2034/3**	**2029/8**
Facilities/Usage:		**OPF-3**	**04/18/93**	
		VAB-1	**06/18/93**	
		PADB/21	**06/26/93**	
		MLP3/9		
Payload:		**ACTS-TOS, ORFEUS-SPAS, IMAX, CPCG-II, APE-B, IPMP, RME-III, AMOS, CHROMEX-04, HRSGS-A**		
Postponed:	**06/03/93**	**E-2 HPOTP Replaced. Suspect etched bearing spring.**		
Scrub:	**07/17/93**	**At T-20min Premature arming of indication of SRB Holddown bolts.**		
	07/24/93	**Right-hand SRB HPU Turbine Speed dropped below limit**		
	08/12/93	**RSLS Abort at T-3s E-2 Fuel flow sensor #1 Intrachannel Miscompare**		
Launch:	**09/12/93**	**11:45/01.097 GMT**		
Landing:	**09/22/93**	**07:56/00 GMT *KSC***		
Highlights:	RSLS Abort on third launch attempt resulting in all 3 SSMEs being replaced at the pad (4th Abort).			

STS-058 (58)

Orbiter/Flight:		**102/15**		
ET:		**57**		
SSME:		**2024/7**	**2109/11**	**2018/10**
Facilities/Usage:		**OPF-2**	**05/17/93**	
		VAB-3	**08/12/93**	
		PADB/22	**09/17/93**	
		MLP1/28		
Payload:		**Spacelab-SLS-2, DEEFD, OARE, SAREX-2, PILOT**		
Scrub:	**10/14/93**	**Range Safety computer failure at T-31s.**		
	10/15/93	**Orbiter S-Band Transponder Failure at T-9min.**		
Launch:	**10/18/93**	**14:53/14.118 GMT**		
Landing:	**11/01/93**	**14:05/42 GMT *Edwards***		**11/09/93 *KSC Return***
Highlights:	16th KSC landing.			

STS-061 (59) "Hubble repair"

Orbiter/Flight:		**105/05**		
ET:		**60**		
SSME:		**2019/13**	**2033/4**	**2017/9**
Facilities/Usage:		**OPF-1**	**07/02/93**	
		VAB-3	**10/21/93**	
		PADA	**10/28/93**	
		PADB/23	**11/15/93**	
		MLP2/22		
Payload:		**HST-repair, IMAX**		
Scrub:	**12/01/93**	**Adverse Weather KSC (Pad & RTLS)**		
Launch:	**12/02/93**	**09:27/01.212 GMT**		
Landing:	**12/13/93**	**05:26/25 GMT *KSC***		

Highlights: One of the most sophisticated in the Shuttle's history. 11days, and made 5 EVA sorties, an all time record. First servicing mission repairing the Hubble Space Telescope resulting in greatly improved images (Left: Before / Right: After).

STS-060 (60) "1st Russian on Shuttle"

Orbiter/Flight:		**103/18**		
ET:		**61**		
SSME:		**2012/15**	**2034/4**	**2032/2**
Facilities/Usage:		**OPF-3**	**09/23/93**	
		VAB-1	**01/04/94**	
		PADA/37	**01/10/94**	
		MLP3/10		
Payload:		**SPACEHAB-02, Wake Shield, COB/GBA, SAREX-II, APE-B, ODERACS, BREMSAT, CPL**		
Launch:	**02/03/94**	**12:10/01.955 GMT**		
Landing:	**02/11/94**	**19:18/41 GMT *KSC***		

Highlights: 19th KSC landing. 1st Russian on Shuttle.

STS-062 (61)

Orbiter/Flight:		**102/16**		
ET:		**62**		
SSME:		**2031/10**	**2109/12**	**2029/9**
Facilities/Usage:		**OPF-2**	**11/09/93**	
		VAB-1	**02/03/94**	
		PADB/24	**02/10/94**	
		MLP1/29		
Payload:		**USMP-2, OAST-2, DEE, SSBUV-6, LDCE, APCG, PSE, CPCG, CGBA, BDS, MODE, AMOS, BSTC, EDO**		
Postponed:	**03/03/94**	**Adverse weather conditions.**		
Launch:	**03/04/94**	**13:53/01.140 GMT**		
Landing:	**03/18/94**	**13:10/42 GMT *KSC***		
Highlights:	20th KSC landing.			

STS-059 (62)

Orbiter/Flight:		**105/06**		
ET:		**63**		
SSME:		**2028/8**	**2033/5**	**2018/11**
Facilities/Usage:		**OPF-1**	**12/14/93**	
		VAB-3	**03/14/94**	
		PADA/38	**03/19/94**	
		MLP2/23		
Payload:		**SRL-1, MAPS, CONCAP-IV, SAREX-II, STL, TUFI, VFT-4, GAS(x3)**		
Postponed:	**04/07/94**	**ON-PAD Inspections of SSME HPOTPs Preburner Volute Radii**		
Scrub:	**04/08/94**	**Adverse weather conditions**		
Launch:	**04/09/94**	**11:05/02.483 GMT**		
Landing:	**04/20/94**	**16:55/00 *Edwards***		**05/02/94 *KSC Return***
Highlights:	40th EAFB landing.			

STS-065 (63)

Orbiter/Flight:		**102/17**		
ET:		**64**		
SSME:		**2109/14**	**2030/9**	**2017/10**
Facilities/Usage:		**OPF-2**	**03/18/94**	
		VAB-1	**06/08/94**	
		PADA/39	**06/15/94**	
		MLP3/11		
Payload:		**IML-2, APCF, CPCG, AMOS, OARE, MAST SAREX-II, EDO**		
Launch:	**07/08/94**	**16:43/01.660 GMT**		
Landing:	**07/23/94**	**10:38/01 GMT *KSC***		
Highlights:	Longest STS mission to date.			

STS-064 (64)

Orbiter/Flight:		**103/19**		
ET:		**66**		
SSME:		**2031/11**	**2109/13**	**2029/10**
Facilities/Usage:		**OPF-3/2**	**02/11/94**	
		VAB-1	**08/11/94**	
		PADB/25	**08/19/94**	
		MLP2/24		
Payload:		**LITE, ROMPS, SPARTAN-201, TCS, SPIFEX, GAS(x11) SAFER, SSCE, BRIC-III, RME-III, MAST, SAREX-II, AMOS**		
Launch:	**09/09/94**	**22:22/55.964 GMT**		
Landing:	**09/20/94**	**21:12/52 GMT *Edwards***		**09/27/94 *KSC Return***
Highlights:	28th EVA of Shuttle Program.			

STS-068 (65) "8th Rollback"

Orbiter/Flight:		**105/07**		
ET:		**65/LWT-58**		
SSME:		**2028/9**	**2033/6**	**2026/4**
Facilities/Usage:		**OPF-1**	**05/03/94**	
		VAB-3/1	**07/21/94**	**08/24/94**
		PADA/40	**07/27/94**	**09/13/94**
		MLP1/30		
Payload:		**SRL-2,CPCG,BRIC,CHROMEX,CREAM,MAST,GAS(5)**		
Scrub:	**08/18/94**	**RSLS Abort after SSME ignition ME-3 Exceeded 1560 Degree HPOTP DISC Temp CH A Redline**		
Launch:	**09/30/94**	**11:16/02.229 GMT**		
Landing:	**10/11/94**	**17:02/09 GMT *Edwards***		**10/20/94 *KSC Return***
Highlights:	RSLS Abort on first launch attempt (5th Abort). 3 flight certified SSMEs were removed from 104 and installed on 105.			

STS-066 (66)

Orbiter/Flight:		**104/13/J1**		
ET:		**67**		
SSME:		**2030/10**	**2034/5**	**2017/11**
Facilities/Usage:		**OPF-3**	**05/30/94**	
		VAB-3	**10/03/94**	
		PADB/26	**10/09/94**	
		MLP3/12		
Payload:		**ATLAS-03,SSBUV-7,CRISTA-SPAS,ESCAPE-II,HPP-2 PARE/NIR-R,PCG-TES,PCG-STES,STL/NIH-C,SAMS**		
Postponed:	**10/27/94**	**Week delay to furnish engines for 104 after RSLS for STS-68.**		
Launch:	**11/04/94**	**16:59/44.070 GMT**		
Landing:	**11/14/94**	**15:33/45 GMT *Edwards***		**11/21/94 *KSC Return***
Highlights:	43rd EAFB landing.			

STS-063 (67)

Orbiter/Flight:		**103/20**		
ET:		**68**		
SSME:		**2035/1**	**2109/14**	**2029/11**
Facilities/Usage:		**OPF-2**	**09/28/94**	
		VAB-1	**01/05/95**	
		PADB/27	**01/10/95**	
		MLP2/25		
Payload:		**SPACEHAB-3,Spartan-204,MIR-Rendezvous,CSE, GLO-2, ODERACS-11,IMAX,SSCE,AMOS,MSX**		
Scrub:	**02/02/95**	**IMU Failure during Power-up activation.**		
Launch:	**02/03/95**	**05:22/05.553 GMT**		
Landing:	**02/11/95**	**11:51/40 GMT *KSC***		
Highlights:	1st mission with female pilot. MIR Rendezvous.			

STS-067 (68)

Orbiter/Flight:		**105/08**		
ET:		**69**		
SSME:		**2012/16**	**2033/7**	**2031/12**
Facilities/Usage:		**OPF-1**	**10/21/94**	
		VAB-3	**02/03/95**	
		PADA/41	**02/08/95**	
		MLP1/31		
Payload:		**ASTRO-2,MACE,GAS(x2),PCG-TES-03,PCG-STES-02, SAREX-II, CMIX-03, MSX**		
Launch:	**03/02/95**	**06:38/14.278 GMT**		
Landing:	**03/18/95**	**21:47/22 GMT *Edwards***		**03/28/95 *KSC Return***
Highlights:	1st launch new AF Range Control Center.			

STS-071 (69)

Orbiter/Flight:		**104/14**		
ET:		**70**		
SSME:		**2028/10**	**2034/6**	**2032/3**
Facilities/Usage:		**OPF-3**	**11/22/94**	
		VAB-1	**04/20/95**	
		PADA/42	**04/26/95**	
		MLP3/13		
Payload:		**SPACELAB/MIR, IMAX-10, SAREX-II**		
Postponed:	**06/23/95**	**Severe Weather and Lightning prevented tanking.**		
Scrub:	**06/24/95**	**Weather: Adverse KSC Conditions (T-9min)**		
Launch:	**06/27/95**	**15:09/01.142 GMT**		
Landing:	**07/07/95**	**14:55/28 GMT *KSC***		
Highlights:	100th US Manned Launch.			

STS-070 (70) "9th Rollback"

Orbiter/Flight:		**103/21**		
ET:		**71**		
SSME:		**2036/1**	**2019/15**	**2017/12**
Facilities/Usage:		**OPF-2**	**02/11/95**	
		VAB-3	**05/03/95**	**06/08/95**
		PADB/28	**05/11/95**	**06/15/95**
		MLP2/26		
Payload:		**TDRS-G/IUS-26,MSX-01,PARE/NIH-R-02,BDS-02, CPCG-07,STL-05(B)/NIH-C,BRIC-04,BRIC-5,SAREX-II VFT-4-02,HERCULES-03,AMOS-25,MIS-B-01,MAST WINDEX-02,RME-III-19**		
Scrub:	**06/08/95**	**Woodpeckers damage External Tank. Rollback to VAB for repairs.**		
Launch:	**07/13/95**	**13:41/56.490 GMT**		
Landing:	**07/22/95**	**12:02/00 GMT *KSC***		
Highlights:	Woodpeckers damage the ET and force a rollback.			

STS-069 (71) "10th Rollback"

Orbiter/Flight:		**105/09**		
ET:		**72**		
SSME:		**2035/2**	**2109/15**	**2029/12**
Facilities/Usage:		**OPF-1**	**03/28/95**	
		VAB-1	**06/28/95**	**08/01/95**
		PADA/43	**07/05/95**	**08/08/95**
		MLP1/32		
Payload:		**SPARTAN-201-03,WSF-2,IEH-01,CAPL-02/GBA,G-726, EDFT-02,MSX-02,STL/NIH-C-04,CGBA-03,BRIC-06,EPICS**		
Postponed:	**07/30/95**	**Manpower/Personnel concerns with 3 launches in short period**		
	08/01/95	**Weather: Rollback to VAB due to Hurricane Erin**		
	08/15/95	**SRB ON-PAD repairs due to O-Ring Heat effects**		
	08/30/95	**Orbiter Fuel Cell #2 Failed at Power-up, Prior to Tanking**		
Launch:	**09/07/95**	**15:09/00 GMT**		
Landing:	**09/18/95**	**11:38/56 GMT *KSC***		
Highlights:	30th Shuttle EVA, 10th Rollback.			

STS-073 (72)

Orbiter/Flight:		**102/18/J2**		
ET:		**73**		
SSME:		**2037/1**	**2031/13**	**2038/1**
Facilities/Usage:		**OPF-2**	**04/14/95**	
		VAB-3	**08/21/95**	
		PADB/29	**08/28/95**	
		MLP3/14		
Payload:		**USML-2/EDO, OARE-06, 3DMA, STABLE**		
Postponed:	**10/05/95**	**Weather: 24 hour slip due to Hurricane Opal**		
	10/06/95	**Trapped Air in Orbiter Hydraulic System #1 prior to tanking**		
	10/14/95	**SSME High Pressure Oxidizer Ducts Ultrasonic Inspections**		
	10/19/95	**Range Conflict due to Atlas Mission (AC119) weather Scrub**		
Scrub:	**09/28/95**	**ME-1 MFV Leak ~20min after Recirc Pumps ON**		
	10/07/95	**Master Events Controller Core B Failure at T-20min.**		
	10/15/95	**Weather at KSC/TAL Darkness at T-5min (12hr Chill)**		
Launch:	**10/20/95**	**13:53/01.132 GMT**		
Landing:	**11/05/95**	**10:45/21 GMT *KSC***		
Highlights:	72nd Space Shuttle Mission.			

STS-074 (73)

Orbiter/Flight:		**104/15**		
ET:		**74**		
SSME:		**2012/17**	**2026/5**	**2032/4**
Facilities/Usage:		**OPF-3**	**07/07/95**	
		VAB-1	**10/03/95**	
		PADA/44	**10/12/95**	
		MLP2/27		
Payload:		**S/MM-02-Mir Docking, ICBS-05, IMAX, GLO, DSO,GAS MCSA, SAREX, GPP, Trek Experiment**		
Scrub:	**11/11/95**	**Adverse weather conditions at all 3 TAL Sites (T-5min)**		
Launch:	**11/12/95**	**12:30/44.691 GMT**		
Landing:	**11/20/95**	**17:01/27 GMT *KSC***		
Highlights:	2nd Mir Docking, 27th KSC Landing			

STS-072 (74)

Orbiter/Flight:		**105/10**		
ET:		**75**		
SSME:		**2028/11**	**2039/1**	**2036/2**
Facilities/Usage:		**OPF-3**	**09/18/95**	
		VAB-3	**11/30/95**	
		PADB/30	**12/06/95**	
		MLP1/33		
Payload:		**SFURetrieval,SPARTAN/OAST-FLYER,SSBUV-8,EDFT SLA-01/GAS(5),VDA-2,NIH-R3,STL/NIH-C,PBE,TES-2, CPCG**		
Launch:	**01/11/96**	**09:41/01.772 GMT**		
Landing:	**01/20/96**	**07:41/41 GMT *KSC***		
Highlights:	Night Landing (8)			

STS-075 (75)

Orbiter/Flight:		**102/19**		
ET:		**76**		
SSME:		**2029/13**	**2034/7**	**2017/13**
Facilities/Usage:		**OPF-2**	**11/05/95**	
		VAB-1	**01/23/96**	
		PADB/31	**01/29/96**	
		MLP3/15		
Payload:		**TSS-1R,,OARE,CPCG,MGBX(CSD,FFFT,RITSI)**		
		USMP-03(SAMS,MEPHISTO,AADSF,ZENO,IDGE)		
Launch:	**02/22/96**	**20:18/02.876 GMT**		
Landing:	**03/09/96**	**13:58/22 GMT *KSC***		

Highlights: 75th Space Shuttle Mission.

STS-076 (76)

Orbiter/Flight:		**104/16**		
ET:		**77**		
SSME:		**2035/3**	**2109/16**	**2019/16**
Facilities/Usage:		**OPF-1**	**11/20/95**	
		VAB-3	**02/19/96**	
		PADB/32	**02/28/96**	
		MLP2/28		
Payload:		**S/MM-03, SPACEHAB-SM, SAREX-II, TRIS(GAS),**		
		WNE, KidSat, MEEP(PPMD,ODC,POSA-I,POSA-II)		
Postponed:	**03/21/96**	**Severe Weather and Lightning prevented tanking.**		
Launch:	**03/22/96**	**08:13/05.883 GMT**		
Landing:	**03/31/96**	**13:28/57 GMT *Edwards***		**04/12/96 *KSC Return***

Highlights: 3rd MIR Docking. 1st Launch and Landing using new MCC. Night Launch.

STS-077 (77)

Orbiter/Flight:		**105/11**		
ET:		**78**		
SSME:		**2037/2**	**2040/1**	**2038/2**
Facilities/Usage:		**OPF-3**	**01/20/96**	
		VAB-1	**04/09/96**	
		PADB/33	**04/16/96**	
		MLP1/34		
Payload:		**SPACEHAB-04 (CFZF,SEF), SPARTAN-207/IAE, ARF, TEAMS (GANE,VTRE,LMTE,PAMS), BETSCE, BRIC, GBA (12,G-056,G-200)**		
Postponed:	**05/16/96**	**Range conflict with unmanned vehicles.**		
Launch:	**05/19/96**	**10:30/01.495 GMT**		
Landing:	**05/29/96**	**11:09/18 GMT *KSC***		

Highlights: 14th Night Launch, KSC Landing (30).

STS-078 (78)

Orbiter/Flight:		**102/20**		
ET:		**79**		
SSME:		**2041/1**	**2039/2**	**2036/3**
Facilities/Usage:		**OPF-2**	**03/09/96**	
		VAB-3	**05/20/96**	
		PADB/34	**05/30/96**	
		MLP3/16		
Payload:		**SPACELAB-LMS,SAMS-D,OARE,BDPU(TMIBD,SIE), SAREX-II**		
Launch:	**06/20/96**	**14:49/03.611 GMT**		
Landing:	**07/07/96**	**12:37/30 GMT *KSC***		

Highlights: Second longest mission to date 16 Days, 21 hr, 47 min, 45 sec. Hot gas penetration of rubber insulation on SRBs.

STS-079 (79) "11th and 12th Rollback"

Orbiter/Flight:		**104/17**				
ET:		**82**				
SSME:		**2012/18**	**2031/14**	**2033/8**		
Facilities/Usage:		**OPF-1**	**04/15/96**		**08/03/96**	
		VAB-1	**06/24/96**	**07/10/96**	**08/13/96**	**09/04/96**
		PADA/45	**07/01/96**		**08/20/96**	**09/05/96**
		MLP1/35				
Payload:		**SPACEHAB/MIR, IMAX, SAREX-II**				
Postponed:	**07/31/96**	**After Rollback to VAB due to Hurricane Bertha, SRB joint anomalies from STS-078.**				
	09/14/96	**Rollback to VAB due to Hurricane Fran on September 4.**				
Launch:	**09/16/96**	**08:54/50.008 GMT**				
Landing:	**09/26/96**	**08:13/20 GMT *KSC***				
Highlights:	4th Mir Docking, Night Launch(15), KSC Landing(32).					

STS-080 (80)

Orbiter/Flight:		**102/21**				
ET:		**80**				
SSME:		**2032/5**	**2026/6**	**2029/14**		
Facilities/Usage:		**OPF-1**	**07/07/96**			
		VAB-3	**10/09/96**			
		PADB/35	**10/16/96**			
		MLP3/17				
Payload:		**ORFEUS-SPAS-02,WSF-3,NIH-R4,SEM,EDFT-05,BRIC CMIX,VIEW-CPL,CCM-A**				
Postponed:	**10/31/96**	**Ripple Effect from SRB Stacking delays and Range..**				
	11/08/96	**Unresolved SRB Nozzle Erosion issue during Level 1 FRR**				
	11/15/96	**Range conflict due to Atlas Mission Weather Scrub**				
	11/16/96	**Weather: Adverse KSC Conditions predicted.**				
Launch:	**11/19/96**	**19:55/50.375 GMT**				
Landing:	**12/07/96**	**11:49/05 GMT *KSC***				
Highlights:	Longest mission to date 17 Days, 15 hr, 53 min, 18 sec.					

STS-081 (81)

Orbiter/Flight:		**104/18**		
ET:		**83**		
SSME:		**2041/2**	**2034/8**	**2042/1**
Facilities/Usage:		**OPF-3**	**09/26/96**	
		VAB-1	**12/05/96**	
		PADB/36	**12/10/96**	
		MLP2/29		
Payload:		**Mir-Docking/5,SpaceHab-DM,SAREX-II,KIDSAT,TVIS, Biorack,CREAM,OSVS,MSX**		
Launch:	**01/12/97**	**09:27/23 GMT**		
Landing:	**01/22/97**	**14:23/51 GMT *KSC***		

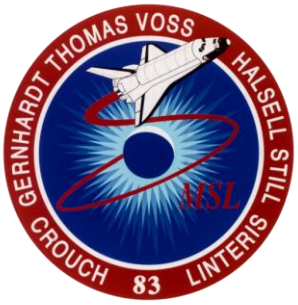
Highlights: 5th Mir Docking. Night Launch(16). KSC Landing (34).

STS-082 (82)

Orbiter/Flight:		**103/22/J2**		
ET:		**81**		
SSME:		**2037/3**	**2040/2**	**2038/3**
Facilities/Usage:		**OPF-2**	**06/30/96**	
		VAB-3	**01/11/97**	
		PADA/46	**01/17/97**	
		MLP1/36		
Payload:		**Hubble Servicing Mission 2**		
Launch:	**02/11/97**	**09:29/17.039 GMT**		
Landing:	**02/21/97**	**08:32/00 GMT *KSC***		

Highlights: 35th KSC landing. Night Launch(17). Night Landing(9).

STS-083 (83)



Orbiter/Flight:		**102/22**		
ET:		**84**		
SSME:		**2012/19**	**2109/17**	**2019/17**
Facilities/Usage:		**OPF-1**	**12/07/96**	
		VAB-1	**03/05/97**	
		PADA/47	**03/11/97**	
		MLP3/18		
Payload:		**MSL, SAREX**		
Postponed:	**04/03/97**	**Uninsulated Orbiter Coolant Loop Identified at L-2 Day FRR on 04/01.**		
Launch:	**04/04/97**	**19:20/33.248 GMT**		
Landing:	**04/08/97**	**14:33/00 GMT *KSC***		
		Mission cut short due to problems with Fuel Cell #2		
Highlights:	36th KSC landing. Spacelab(14)			

STS-084 (84)

Orbiter/Flight:		**104/19**		
ET:		**85**		
SSME:		**2032/6**	**2031/15**	**2029/15**
Facilities/Usage:		**OPF-3**	**01/22/97**	
		VAB-3	**04/19/97**	
		PADA/48	**04/24/97**	
		MLP2/30		
Payload:		**Mir-Docking/6, SpaceHab-DM, LME, SAMS, CGEL**		
Launch:	**05/15/97**	**08:07/50.859 GMT**		
Landing:	**05/24/97**	**13:27/44 GMT *KSC***		
Highlights:	6th Mir Docking. KSC Landing(37). Night Launch(8).			

STS-094 (85)

Orbiter/Flight:		**102/23**		
ET:		**87**		
SSME:		**2037/4**	**2034/9**	**2033/9**
Facilities/Usage:		**OPF-1**	**12/07/96**	**04/09/97**
		VAB-1	**03/05/97**	**06/04/97**
		PADA/49	**03/11/97**	**06/11/97**
		MLP1/37		
Payload:		**MSL, SAREX**		
Launch:	**07/01/97**	**18:02/01.410 GMT**		
Landing:	**07/17/97**	**10:47/29 GMT *KSC***		
Highlights:	38th KSC Landing. Spacelab(15).			

STS-085 (86)

Orbiter/Flight:		**103/23**		
ET:		**86**		
SSME:		**2041/3**	**2039/3**	**2042/2**
Facilities/Usage:		**OPF-2**	**02/21/97**	
		VAB-3	**07/07/97**	
		PADA/50	**07/14/97**	
		MLP3/19		
Payload:		**CRISTA-SPAS(DARA), MFD, TAS-01, IEH-2, ACIS, MIM, MAHRSI, GAS, BDS-03, MSX-08, SSCE-07, MIDE SWUIS-01, SIMPLEX-01, PCG-STES-05, BRIC-10**		
Launch:	**08/07/97**	**14:41/03.496 GMT**		
Landing:	**08/19/97**	**11:08/00 GMT *KSC***		
Highlights:	39th KSC Landing.			

STS-086 (87)

Orbiter/Flight:		**104/20**		
ET:		**88**		
SSME:		**2012/20**	**2040/3**	**2019/18**
Facilities/Usage:		**OPF-3**		**05/24/97**
		VAB-1	**04/08/97**	**08/11/97**
		PADA/51		**08/18/97**
		MLP3/31		
Payload:		**Mir-Docking/7, SpaceHab-DM, MEEP-R, EDFT-06, SEEDS-II, GAS(G-036), CCM-07, MSX-09, RME-III-21 CREAM-09, KIDSAT-03, SIMPLEX-02**		
Launch:	**09/26/97**	**02:34/22.338 GMT**		
Landing:	**10/06/97**	**21:55/00 GMT *KSC***		
Highlights:	Night Launch(19), 40th KSC Landing.			

STS-087 (88) "1st Heads Up Ascent"

Orbiter/Flight:		**102/24**		
ET:		**89**		
SSME:		**2031/16**	**2039/4**	**2037/5**
Facilities/Usage:		**OPF-2**	**07/17/97**	
		VAB-3	**10/24/97**	
		PADB/37	**10/29/97**	
		MLP1/38		
Payload:		**USMP-4, SPARTAN-201-4, LHP/NaSBE, TGDF, SOLSE, EDFT-05, OARE-10, GAS, CUE, MGBX-02, SIMPLEX**		
Launch:	**11/19/97**	**19:46/03.907 GMT**		
Landing:	**12/05/97**	**12:20/05.776 GMT *KSC***		
Highlights:	1st heads up ascent. EDO, EVA.			

STS-089 (89)

Orbiter/Flight:		**105/12/J1**			
ET:		**90**			
SSME:		**2043/1**	**2044/1**	**2045/1**	
Facilities/Usage:		**OPF-1**	**03/28/97**		**06/04/97**
		OPF-3		**04/21/97**	
		VAB-1	**04/08/97**	**05/23/97**	**12/12/97**
		PADA/52			**12/19/97**
		MLP3/20			
Payload:		**Mir-Docking/8, SpaceHab-DM, MPNE, SIMPLEX, TMIP CEBAS, GPS-DTO, HP, MSD, EarthKAM, OSVS, GAS, RME-1331, TEHM, DSO-914, CoCult, BIO3D**			
Launch:	**01/23/98**	**02:48/16.612 GMT**			
Landing:	**01/31/98**	**22:35/11.513 GMT *KSC***			
Highlights:	First flight SSME Block 11A. Night Launch (20).				

STS-090 (90)

Orbiter/Flight:		**102/25**			
ET:		**91**			
SSME:		**2041/4**	**2032/7**	**2012/21**	
Facilities/Usage:		**OPF-3**	**12/05/97**		
		VAB-3	**03/16/98**		
		PADB/38	**03/23/98**		
		MLP2/32			
Payload:		**Neurolab, GAS(G-197, G-467, G-772)**			
Postponed:	**04/16/98**	**1 of 2 Orbiter Communications Signal Processor Failed (prior to tanking).**			
Launch:	**04/17/98**	**18:19/02.435 GMT**			
Landing:	**05/03/98**	**16:09/00.783 GMT *KSC***			
Highlights:	Ascent OMS Burn(2).				

STS-091 (91)

Orbiter/Flight:		**103/24**		
ET:		**96**		
SSME:		**2047/1**	**2040/4**	**2042/3**
Facilities/Usage:		**OPF-2**	**08/18/97**	**10/30/97**
		VAB-1	**10/01/97**	**04/27/98**
		PADA/53		**05/02/98**
		MLP1/39		
Payload:		**Mir-Docking/9, AMS, SpaceHab-SM, GAS**		
Launch:	**06/02/98**	**22:06/26.000 GMT**		
Landing:	**06/12/98**	**18:00/19.376 GMT *KSC***		
Highlights:	1st flight SLWT. On 05/18/98 SLWT Tanking Demonstration.			

STS-095 (92)

Orbiter/Flight:		**103/25**		
ET:		**98**		
SSME:		**2048/1**	**2043/2**	**2045/2**
Facilities/Usage:		**OPF-2**	**06/15/98**	
		VAB-1	**09/14/98**	
		PADB/39	**09/21/98**	
		MLP2/33		
Payload:		**SPACEHAB-SM, Spartan-201, HOST, IEH-03, GAS LifeSciences, CRYOTSU**		
Launch:	**10/29/98**	**19:19/36.316 GMT**		
Landing:	**11/07/98**	**17:03/32.551 GMT *KSC***		
Highlights:	1st flight SSME Block II. 45th KSC Landing.			

STS-088 (93) "Birth of the ISS"

Orbiter/Flight:		**105/13**		
ET:		**97**		
SSME:		**2050/1**	**2044/2**	**2041/5**
Facilities/Usage:		**OPF-1**	**02/01/98**	
		VAB-3	**10/15/98**	
		PADA/54	**10/21/98**	
		MLP3/21		
Payload:		**Space Station Assembly Flight 2A(ISS-01-2A)/Unity Module(Node 1, PMA1/2), ICBC, SAC-A, MightySat-1 SEM-07, GAS(G-093)**		
Scrub:	**12/03/98**	**Unresolved Orbiter Master Alarm at T-4min, 30s (Hydraulic Pressure Dip)**		
Launch:	**12/04/98**	**08:35/35.091 GMT**		
Landing:	**12/16/98**	**03:53/30.968 GMT *KSC***		
Highlights:	1st USA Space Station Assembly Flight.			

STS-096 (94) "13th Rollback"

Orbiter/Flight:		**103/26**		
ET:		**100**		
SSME:		**2047/2**	**2051/1**	**2049/1**
Facilities/Usage:		**OPF-1**	**11/07/98**	
		VAB-3	**04/12/99**	**05/16/99**
		PADB/40	**04/23/99**	**05/20/99**
		MLP2/34		
Payload:		**Space Station Assembly Flight (ISS-02-2A-1, ICC, SVF, STARSHINE, IVHM**		
Postponed:	**05/16/99**	**Launch for 5/20 postponed due to Hail Damage to ET.**		
Launch:	**05/27/99**	**10:49/43.647 GMT**		
Landing:	**06/06/99**	**06:02/43 GMT *KSC***		
Highlights:	KSC Landing (47), Night Landing (11), Rollback (13) due to Hail Damage.			

STS-093 (95) "Commander Collins"

Orbiter/Flight:		**102/26**		
ET:		**99**		
SSME:		**2012/22**	**2031/17**	**2019/19**
Facilities/Usage:		**OPF-3**	**05/03/98**	
		VAB-1	**02/01/99**	
		PADB/41	**06/07/99**	
		MLP1/40		
Payload:		**AXAF, MSX, SIMPLEX, SWUIS, GOSAMR, STL-B, CCM, LFSAH, SAREX-II, EarthKAM, PGIM, CGBA, MEMS, BRIC**		
Scrub:	**07/20/99**	**Manual cut Off by FR1 at T-8s due to erroneous H2 concentrations (1-time Spike/640PPM) in AFT compartment.**		
	07/22/99	**Weather: Adverse KSC Conditions; Lightning within 20 miles of Pad**		
Launch:	**07/23/99**	**04:31/02.239 GMT**		
Landing:	**07/27/99**	**17:04/00 GMT *KSC***		

Highlights: Eileen M. Collins becomes the 1st Female Shuttle Commander. 22nd Night Launch. 48th KSC Landing. Phase II SSME Last flight. IFA STS-93-V-01, AC1 Phase A bus experienced a short at approximately T+5s.

STS-103 (96)

Orbiter/Flight:		**103/27**		
ET:		**101**		
SSME:		**2053/1**	**2043/3**	**2049/2**
Facilities/Usage:		**OPF-1**	**06/06/99**	
		VAB-1	**11/04/99**	
		PADB/42	**11/13/99**	
		MLP2/35		
Payload:		**Hubble Servicing Mission 3 (SM3A)**		
Postponed:	**12/02/99**	**VAB: ME-3 Replacement on 10/11-Nov due to Broken Drill bit between main injector primary and secondary faceplates. (Launch date prior to VAB Rollout)**		
	12/06/99	**Launch date of 12/09 set after program FRR.**		
	12/09/99	**Orbiter Wiring Work in aft did not support 12/09 Launch**		
	12/11/99	**MPS Recirc manifold found dented; 1-day slip to assess Options**		
	12/12/99	**MPS Recirc Manifold removed and replaced**		
	12/16/99	**MPS weld wire issue required 25 hours to resolve (prior to tanking)**		
	12/18/99	**Predicted adverse KSC weather conditions prior to tanking**		
Scrub:	**12/17/99**	**Weather: Adverse KSC Conditions (T-9min)**		
Launch:	**12/20/99**	**00:50/01.794 GMT**		
Landing:	**12/28/99**	**00:00/48.700 GMT *KSC***		

Highlights: 23rd Night Launch. 49th KSC Landing.

STS-099 (97)

Orbiter/Flight:		**105/14**		
ET:		**92**		
SSME:		**2052/1**	**2044/3**	**2047/3**
Facilities/Usage:		**OPF-2**	**12/15/98**	
		VAB-3	**07/11/99**	
		PADA/55	**12/13/99**	
		MLP3/22		
Payload:		**SRTM, EarthKAM**		
Postponed:	**01/13/00**	**VAB: ME-3 Replacement on 07/08-Dec due to LTMCC suspect copper fracture (Launch date prior to VAB Rollout)**		
	01/16/00	**Date changed from 01/16 to 01/23 at PRCB on 12/15**		
	01/23/00	**Date changed from 01/23 to 01/31 at PRCB on 01/05**		
	02/01/00	**MEC Troubleshooting did not resolve issue, unit replaced**		
Scrub:	**01/31/00**	**Master Events Controller-2 Data Anomaly during test at T-29 minutes. Weather: Adverse KSC Conditions at Pad.**		
Launch:	**02/11/00**	**17:43/41.617 GMT**		
Landing:	**02/22/00**	**23:22/24.048 GMT *KSC***		
Highlights:	50th KSC Landing.			

STS-101 (98)

Orbiter/Flight:		**104/21/J2**		
ET:		**102**		
SSME:		**2043/4**	**2054/1**	**2049/3**
Facilities/Usage:		**OPF-3**	**09/28/98**	
		VAB-3	**03/17/00**	
		PADA/56	**03/25/00**	
		MLP1/41		
Payload:		**Space Station Assembly Flight ISS-2A-2a (SpaceHab/DM,ICC)**		
Postponed:	**02/13/00**	**E-1 Replacement on 3/21 due to suspect HPFTP 2nd Stage seals**		
	02/17/00	**Mission Commander Ankle Injury & Add'l Crew Training**		
	05/18/00	**Range Conflict due to Atlas 3 Mission (AC-201) Scrub**		
Scrub:	**04/24/00**	**At T-9min. adverse KSC conditions (SLF Crosswinds)**		
	04/25/00	**At T-41min. adverse KSC conditions (Pad & SLF Crosswinds)**		
	04/26/00	**At T-9min. adverse TAL conditions.**		
Launch:	**05/19/00**	**10:11/12.178 GMT**		
Landing:	**05/29/00**	**06:20/20.165 GMT *KSC***		
Highlights:	First launch glass cockpit.			

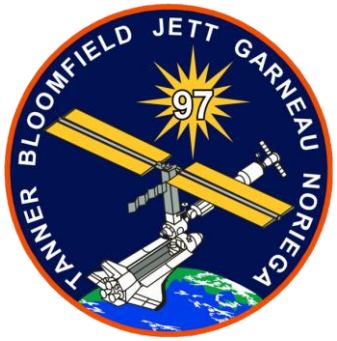
STS-106 (99)

Orbiter/Flight:		**104/22**		
ET:		**103**		
SSME:		**2052/2**	**2044/4**	**2047/4**
Facilities/Usage:		**OPF-3**	**05/29/00**	
		VAB-1	**08/07/00**	
		PADB/43	**08/13/00**	
		MLP2/36		
Payload:		**4th Space Station Flight ISS-2A-2b (SpaceHab/DM,ICC)**		
Launch:	**09/08/00**	**12:45/49.167 GMT**		
Landing:	**09/19/00**	**07:56/45.582 GMT *KSC***		
Highlights:	52nd KSC Landing. 15th Night Landing.			

STS-092 (100) "100th Shuttle Mission"

Orbiter/Flight:		**103/28**		
ET:		**104**		
SSME:		**2045/3**	**2053/2**	**2048/2**
Facilities/Usage:		**OPF-3**	**12/27/99**	
		VAB-3	**08/21/00**	
		PADA/57	**09/11/00**	
		MLP3/23		
Payload:		**Space Station Assembly Flight ISS-05-3A, IMAX**		
Postponed:	**10/05/00**	**STS-106 review revealed ET Separation Bolt not fully retracted. Flight Rationale could not be developed in time to proceed with tanking. PV21 not indicating open during recycle activities after decision was made not to tank.**		
	10/09/00	**High winds at Pad prohibited pretanking operations.**		
Scrub:	**10/10/00**	**PIP-PIN with tether found on 17" disconnect during Ice Team Inspections.**		
Launch:	**10/11/00**	**23:17/02.285 GMT**		
Landing:	**10/24/00**	**20:59/43.965 GMT *Edwards***		**11/03/00 *KSC Return***
Highlights:	Milestone 100th Space Shuttle Mission.			

STS-097 (101)



Orbiter/Flight:		**105/15**		
ET:		**105**		
SSME:		**2054/2**	**2043/5**	**2049/4**
Facilities/Usage:		**OPF-2**	**02/24/00**	
		VAB-1	**10/25/00**	
		PADB/44	**10/31/00**	
		MLP1/42		
Payload:		**Space Station Flight ISS-04-4A (PV Module P6)**		
Launch:	**12/01/00**	**03:06/03.809 GMT**		
Landing:	**12/11/00**	**23:03/24.922 GMT *KSC***		
Highlights:	24th Night Launch, 16th Night Landing, 53rd KSC Landing.			

STS-098 (102) "14th Rollback"

Orbiter/Flight:		**104/23**		
ET:		**106**		
SSME:		**2052/3**	**2044/5**	**2047/5**
Facilities/Usage:		**OPF-3**	**09/20/00**	
		VAB-3	**12/04/00**	**01/19/01**
		PADA/58	**01/02/01**	**01/26/01**
		MLP2/37		
Payload:		**7th Space Station Assembly Flight ISS-07-5A, ORU, PDGF**		
Postponed:	**01/18/01**	**Postflight STS-97 SRB inspections found 1 of 2 NSI didn't fire on left-hand SRB lower strut. Inspections and cable R&Rs delayed rollout from 12/11 to 01/03. Crawler computer failure delayed rollout again to 01/04.**		
	01/19/01	**Add'l booster cables failed inspections leading to suspect of units on OV104. Rollback to VAB on 01/19.**		
	02/06/01	**1 day delay allows FD3 instead of FD4 docking.**		
Launch:	**02/07/01**	**23:13/03.529 GMT**		
Landing:	**02/20/01**	**20:33/08.539 GMT *Edwards***		**03/04/01 *KSC Return***
Highlights:	14th Rollback.			

STS-102 (103)

Orbiter/Flight:		**103/29**		
ET:		**107**		
SSME:		**2048/3**	**2053/3**	**2045/4**
Facilities/Usage:		**OPF-1**	**11/03/00**	
		VAB-1	**02/01/01**	
		PADB/45	**02/12/01**	
		MLP3/24		
Payload:		**ISS-07/5A1 (MPLM-1)**		
Launch:	**03/08/01**	**11:42/10.943 GMT**		
Landing:	**03/21/01**	**07:31/45.057 GMT *KSC***		

Highlights: 54th KSC Landing, 17th Night Landing.

STS-100 (104)

Orbiter/Flight:		**105/16**		
ET:		**108**		
SSME:		**2054/3**	**2043/6**	**2049/5**
Facilities/Usage:		**OPF-2**		
		VAB-303/19/01		
		PADA/59	**03/22/01**	
		MLP1/43		
Payload:		**Space Station Assembly Flight ISS-09-6A**		
Launch:	**04/19/01**	**18:40/43.559 GMT**		
Landing:	**05/01/01**	**16:10/44.609 GMT *Edwards***		**05/10/01 *KSC Return***

Highlights: 48th EAFB Landing.

STS-104 (105)

Orbiter/Flight:		**104/24**		
ET:		**109**		
SSME:		**2056/1**	**2051/2**	**2047/6**
Facilities/Usage:		**OPF-3**	**03/04/01**	
		VAB-1	**05/29/01**	
		PADB/46	**06/20/01**	
		MLP2/38		
Payload:		**Space Station Assembly Flight ISS-7A**		
Postponed:	**06/14/01**	**Drying & Waterproofing of ~180 Orbiter Tiles**		
	06/20/01	**Space Station Robot Arm Troubleshooting.**		
	07/07/01	**Space Station Robot Arm Troubleshooting**		
Launch:	**07/12/01**	**09:04/01.153 GMT**		
Landing:	**07/25/01**	**03:38/56.837 GMT *KSC***		
Highlights:	55th KSC Landing, 18th Night Landing. Block II SSME First Flight.			

STS-105 (106)

Orbiter/Flight:		**103/30**		
ET:		**110**		
SSME:		**2052/4**	**2044/6**	**2045/5**
Facilities/Usage:		**OPF-2**	**03/21/01**	
		VAB-3	**06/13/01**	
		PADA/60	**07/02/01**	
		MLP3/25		
Payload:		**Space Station Assembly Flight ISS-05-3A, IMAX**		
Postponed:	**07/12/01**	**Ripple Effect of Station Robot Arm Troubleshooting**		
	08/05/01	**Changed from N.E.T Sunday 08/05 to 08/09 on 07/13.**		
Scrub:	**08/09/01**	**At T-9min. due to adverse KSC conditions**		
Launch:	**08/10/01**	**21:10/15.542 GMT**		
Landing:	**08/22/01**	**18:23/01.015 GMT *KSC***		
Highlights:	MPLM(3), 56th KSC Landing.			

STS-108 (107)

Orbiter/Flight:		**105/17**		
ET:		**111**		
SSME:		**2049/6**	**2043/7**	**2050/2**
Facilities/Usage:		**OPF-1**	**05/10/01**	
		VAB-1	**10/24/01**	
		PADB/47	**10/30/01**	
		MLP1/44		
Payload:		**UF-1, MPLM, GAS, MACH-1**		
Postponed:	**11/29/01**	**Progress resupply ship docking anomalies**		
Scrub:	**12/04/01**	**At T-5min. Adverse KSC Conditions (Pad & RTLS)**		
Launch:	**12/05/01**	**22:19/30.417 GMT**		
Landing:	**12/07/01**	**17:58/01.875 GMT *KSC***		
Highlights:	Space Station Utilization Flight.			

STS-109 (108)

Orbiter/Flight:		**102/27/J3**		
ET:		**112**		
SSME:		**2056/2**	**2053/4**	**2047/7**
Facilities/Usage:		**OPF-1**	**03/06/01**	
		VAB-3	**01/16/02**	
		PADA/61	**01/28/02**	
		MLP2/39		
Payload:		**Hubble Space Telescope Servicing Mission #3**		
Postponed:	**02/28/02**	**Predicted Adverse KSC conditions-Low Temps (prior to tanking)**		
Launch:	**03/01/02**	**11:22/03.344 GMT**		
Landing:	**03/12/02**	**09:31/53.649 GMT *KSC***		
Highlights:	27th Night Launch, 19th Night Landing, 58th KSC Landing. Block IIA SSME Last flight.			

STS-110 (109)

Orbiter/Flight:		**104/25**		
ET:		**114**		
SSME:		**2048/4**	**2051/3**	**2045/6**
Facilities/Usage:		**OPF-2**	**07/25/01**	
		VAB-1	**03/06/02**	
		PADB/48	**03/12/02**	
		MLP3/26		
Payload:		**ISS-8A (ITS SO, MT)**		
Scrub:	**04/04/02**	**LH2 Drain Line Failure (on MLP) ~12 minutes after Hydrogen Fast Fill.**		
Launch:	**04/08/02**	**20:44/20.547 GMT**		
Landing:	**04/19/02**	**16:26/59.648 GMT *KSC***		
Highlights:	1st use of 3 Block-II SSME.			

STS-111 (110)

Orbiter/Flight:		**105/18**		
ET:		**113**		
SSME:		**2050/3**	**2044/7**	**2054/4**
Facilities/Usage:		**OPF-1**	**12/17/01**	
		VAB-3	**04/22/02**	
		PADA/62	**04/29/02**	
		MLP1/45		
Payload:		**International Space Station Utilization Flight UF-2, MBS**		
Postponed:	**05/31/02**	**Prior to tanking Adverse KSC conditions (weather)**		
	06/03/02	**Left-Hand OMS Nitrogen Regulator R&R (leakage observed during scrub).**		
Scrub:	**05/30/02**	**At T-9min. Adverse KSC Conditions (Lightning)**		
Launch:	**06/05/02**	**21:22/51.145 GMT**		
Landing:	**06/19/02**	**17:57/44.575 GMT *Edwards***	**06/29/02 *KSC Return***	
Highlights:	49th EAFB Landing.			

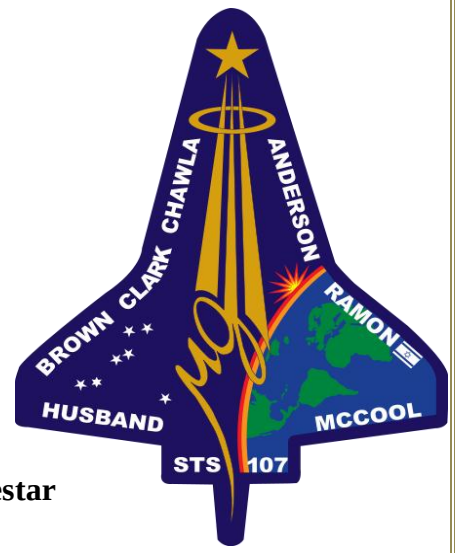
STS-112 (111)

Orbiter/Flight:		**104/26**		
ET:		**115**		
SSME:		**2048/5**	**2051/4**	**2047/8**
Facilities/Usage:		**OPF-2**	**04/19/02**	
		VAB-3	**09/04/02**	
		PADB/49	**09/10/02**	
		MLP3/27		
Payload:		**International Space Station Flight 9A, PGBA,CGBA,ZCG PCG--STES-PCAM**		
Issues:	**06/17/02**	**Cracks discovered on the LH2 engine flowliners resulting in weld repairs and polishing of slots on all vehicles. Every flight NDE inspections (Eddy current, Ultrasound and Borescope) of slots introduced.**		
Postponed:	**10/02/02**	**Hurricane Lili Threat to JSC**		
	10/03/02	**Hurricane Lili Threat to JSC**		
Launch:	**10/07/02**	**19:49/37.241 GMT**		
Landing:	**10/18/02**	**15:43/42.566 GMT *KSC***		
Highlights:	60th KSC Landing. Flowliner cracks and introduction of slot NDE.			

STS-113 (112)

Orbiter/Flight:		**105/19**		
ET:		**116**		
SSME:		**2050/4**	**2044/8**	**2045/7**
Facilities/Usage:		**OPF-1**	**05/09/02**	
		VAB-1	**10/24/02**	
		PADA/63	**10/30/02**	
		MLP2/40		
Payload:		**International Space Station Flight 11A, MEMS**		
Issues:	**07/11/02**	**Cracks in Engine 1 and Engine 2 LH2 flowliners.**		
Postponed:	**11/10/02**	**Space Station Crew Sleep Schedule/Soyuz 5S Launch**		
Scrub:	**11/11/02**	**O2 Leak in Payload bay: ECLSS Bottle #2 (T-2hr 18min)**		
Postponed:	**11/18/02**	**Additional O2/N2 line repairs & robot arm damage evaluation. Range conflict with Delta IV.**		
Scrub:	**11/22/02**	**At T-9min adverse weather conditions at TAL Sites**		
Launch:	**11/24/02**	**00:49/48.607 GMT**		
Landing:	**12/07/02**	**19:37/16.841 GMT *KSC***		
Highlights:	61st KSC Landing, 28th Night Launch.			

STS-107 (113) *"Columbia Disaster"*



Orbiter/Flight:	**102/28**	
TCID:	**SA107C**	
ET:	**093**	
SRB:	**116**	
SSME1/Usage:	**2055/1**	
SSME2/Usage:	**2053/5**	
SSME3/Usage:	**2049/7**	
Facilities/Usage:	**OPF-1**	**03/12/02**
	VAB-3	**11/18/02**
	PADA/64	**12/09/02**
	MLP1/46	

Payload: **SpaceHab-DM Research Mission, Freestar**

Launch: **01/16/03** **15:39/02.248 GMT**
Launch countdown proceeded as scheduled with no delays

Landing: **02/01/03** **9:16AM *KSC (planned)***

Summary: During ascent, pieces of foam from the ET Bi-pod area struck the orbiter's left wing causing damage to the thermal protection system allowing for an intensive heat buildup in the left wing during re-entry, this led to the total disintegration of the vehicle and the loss of life of all crew members.

Rear (L-R): **David M. Brown (MS1), Laurel B. Clark (MS4), Michael P. Anderson (PL Commander), Ilan Ramon (Israeli PS1).** ***Front (L-R):*** **Rick D. Husband (Commander), Kalpana Chawla (MS2), William C. McCool (Pilot).**

Post Columbia Procedure Review

At the time of the OV-102 loss (Feb 2003), OV-103 was currently undergoing its third OMDP in OPF3, OV-104 was stacked in the VAB, and OV-105 was processing in OPF2.

During the Return to Flight period, an extensive technical review of Problem Reports (PR), Test Preparation Sheets (TPS), and Material Reviews (MR) was performed and only minor issues with respect to MPS procedures were discovered. The most significant issues discovered involved the following fasteners:

- Horse Shoe support bolts which attach the SSME LOX feedline to structure were undertorqued.
- Curtain attach plate mounting screws were overtorqued.

No other significant technical issues were discovered with any of the MPS procedures.

During the review, improvements to online documentation systems were implemented. The Shuttle Image Management System (SIMS) was developed as a digital repository of hardware images. The system would result in a highly successful tool and would be used for future processing. The Shuttle Processing Electronic Archive and Retrieval System (SPEARS) would also be developed to allow online retrieval of archived procedures. This system would prove to be an invaluable tool in reviewing as worked procedure documentation in a web based environment.

OV-103 Return to Flight OMDP Summary

OV-103 would complete the most extensive OMDP ever performed and executed the STS-114 Return to Flight mission. During the OMDP operations, the following intrusive operations were performed:

- LO2 17" Feedline BSTRA Joint replacement due to a crack of the ball: This repair operation would involve removal of the 17" disconnect and the LO2 line. The vendor would disassemble the line and weld a new BSTRA joint. The line would be re-installed with the originally removed 17" disconnect.
- LH2 4" recirculation disconnect and line removal and re-installation in order to perform Belleville load test.
- GH2 2" pressurization line removal and re-installation in order to perform Belleville load test.
- LO2 and LH2 plate gap pressure transducer installation, an upgrade modification)
- Prevalve Detent Mechanism removal, inspection, and re-installation
- Elimination of the propellant delta-pressure transducer on the LOX side.

Based on the flight hardware intrusions/modifications, length of time since the last launch, and the continual aging of the facility, the decision was made to perform a cryogenic tanking test in preparation for STS-114.

STS-114 (114) "Return to Flight II"

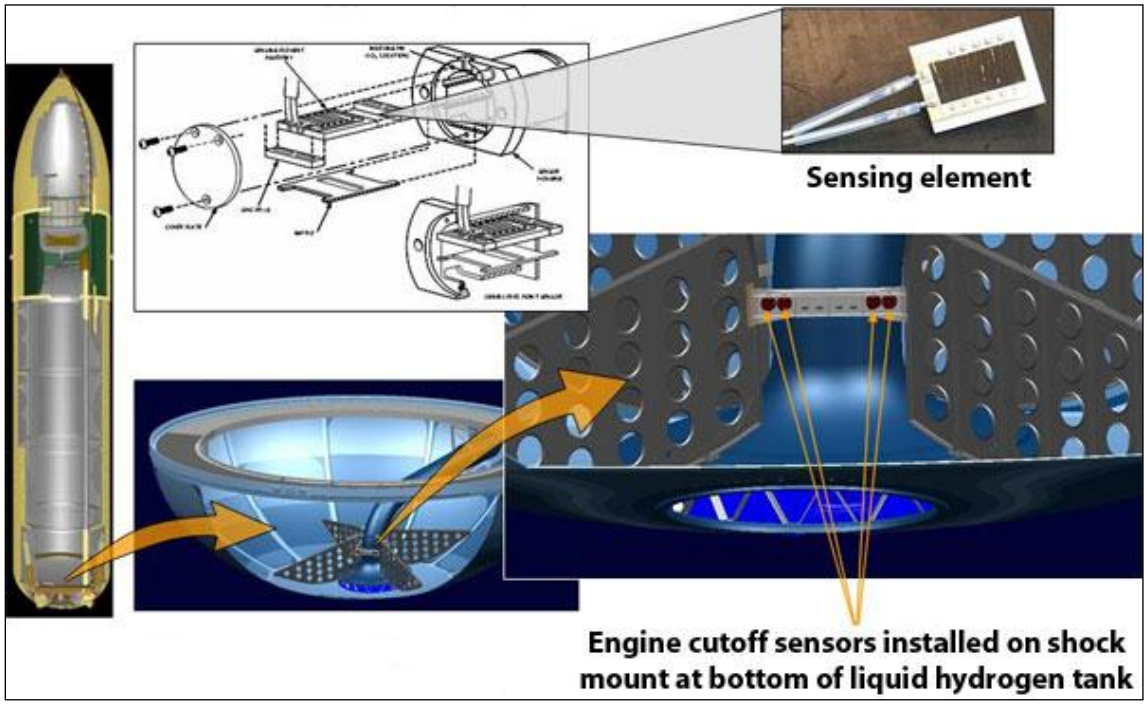
Orbiter/Flight:		**103/31/J3**		
ET:		**120/121**		
SSME:		**2057/1**	**2054/5**	**2056/3**
Facilities/Usage:		**OPF-3**	**08/23/01**	
		VAB-3	**03/18/05**	**05/26/05**
		PADB/50	**04/07/05**	**06/14/05**
		MLP3/28		
Payload:		**ISS-17-LF1/MLPM2 (P)-03**		
Issues:	**06/22/02**	**Cracks discovered on Engine 1 LH2 Feeline slots.**		
	12/09/02	**Crack discovered in LO2 17-inch feedline BSTRA Ball 3 (manifold). Due to lack of spares, line sent to Arrowhead for repair and returned for reinstallation in OV-103.**		
	04/03/03	**Belleville spring load cell out of calibration.**		
	05/28/05	**CV40 found to have bent/mangled spring.**		
Tank Test	**04/14/05**	**LH2 LLCO sensor anomaly first detected. Excessive LH2 prepress cycles detected. Unacceptable potential ice debris observed.**		
Tank Test:	**05/20/05**	**Rollback to VAB to change to ET-121 due to double-dutch weave on the ET-120 LH2 prepress diffuser resulting in excessive prepress cycles.**		
Scrub:	**07/13/05**	**LH2 LLCO Sensor #2 stayed "WET" when commanded "DRY" during planned checkouts at T-2hrs 30min.**		
Launch:	**07/26/05**	**14:39/02.158 GMT**		
Landing:	**08/09/05**	**12:11/24.259 GMT *Edwards***	**08/21/05 *KSC Return***	

Highlights: Nation returns to space after Columbia Disaster. LH2 LLCO sensor anomaly. Introduction of the modernized Low Pressure Actuation Test (LPAT) to better detect galling on Fill and Drain valves, Bi-pod heater and on-orbit tile inspection tools. First EVA below the Orbiter; performed to remove gap filler. OMM performed at KSC to reduce costs associated with transporting the Orbiter to Palmdale.

STS-114 First Cyrogenic Tanking Test

The first STS-114 cryogenic tanking test was performed on April 4, 2005 and would be the start of a series of LH2 LLCO sensor problems that would continue until the root cause was finally discovered in December 2007.

During the Liquid Level Sensor Checks at Replenish, a failure of the LH2 LLCO #3 sensor was discovered: the sensor did not respond when the checkout commanded was initiated by the point sensor box. A scrub was declared and the sensor would return to a functioning state when the cryogenic hydrogen had been drained and boil off was underway. During the boil-off operations, another sensor (LH2 LLCO #4) also indicated a failed state; the sensor would return to a functioning state when the temperatures approached ambient conditions.



Ambient troubleshooting was unsuccessful at determining the root cause of the failures; therefore, the point sensor box and a substantial amount of orbiter wiring was replaced. A second Cryogenic tanking test was determined necessary.

STS-114 Second Cryogenic Tanking Test

The second STS-114 Cryogenic Tanking test occurred on May 20, 2005 and all point sensors performed nominally. MPS Engineer "Murphy" was absent for the second tanking test but would return during the cryogenic loading on the subsequent launch attempt.

STS-114 First Launch Attempt

The first STS-114 Launch attempt occurred on July 13, 2005 and a LH2 LLCO Sensor failure would be encountered when cryogenics were loaded in the ET. Although this failure would be associated with sensor #2, the characteristic nature of the low temperature failure was identical to the previous failures.

STS-114 Launch

Space Shuttle Discovery was successfully launched on July 26, 2005 with no problems associated with the ECO sensors. The exact cause of the STS-114 LLCO sensor anomaly was not positively identified; however, LLCO sensor anomalies of a similar nature would continue and Time-Domain Reflectivity trouble shooting during the STS-122 tanking test (December, 2007) revealed the probable cause to lie with a cryogenic pass through connector in the ET. Due to ET foam loss during STS-114 ascent, the next launch (Discovery, STS-121) would not occur for almost a year later in July, 2006.

STS-121 (115)

Orbiter/Flight:		**103/32**			
ET:		**119**			
SSME:		**2045/8**	**2051/5**	**2056/4**	
Facilities/Usage:		**OPF-3**	**08/22/05**		
		VAB-3	**05/13/06**		
		PADB/51	**05/20/06**		
		MLP1/47			
Payload:		**ISS-18-ULF.1**			
Scrub:	**07/01/06**	**At T-9min adverse weather conditions at KSC (lightning)**			
	07/02/06	**At T-80min adverse weather conditions at KSC**			
Launch:	**07/04/06**	**18:37/57.688 GMT**			
Landing:	**07/17/06**	**13:14/44.143 *KSC***			
Highlights:	Crew rotation, delivery of supplies and space walk.				

STS-115 (116) "OV-104 Destack"

Orbiter/Flight:		**104/27**			
ET:		**118**			
SSME:		**2044/9**	**2048/6**	**2047/9**	
Facilities/Usage:		**OPF-1**	**10/19/02**	**03/14/03**	
		VAB-3	**01/27/03**	**07/25/06**	**08/28/06**
		PADB/52		**08/02/06**	**08/29/06**
		MLP2/41			
Payload:		**ISS-19-12A**			
Postponed:	**08/07/06**	**Lightning strike at the PAD on 08/25**			
	08/29/06	**Tropical Storm Ernesto causes partial rollback to VAB**			
	09/06/06	**Fuel Cell#1 Freon Coolant Motor AC Short during initial power up prior to tanking.**			
Scrub:	**09/08/06**	**LH2 LLCO Sensor#3 stayed "WET" when commanded DRY during planned checkouts. Scrub called at T-9min hold.**			
Launch:	**09/09/06**	**15:14/57.378 GMT**			
Landing:	**09/21/06**	**10:21/24.954 GMT *KSC***			
Highlights:	12 day ISS Assembly mission. LH2 LLCO sensor anomaly detected again. OV-104 was initially stacked in the VAB for STS-114 at the same time as STS-107 (provided potential for rescue mission), destack occurred to perform an extended flow in OPF-1 once the OPF was opened for work after the investigation STS-107 impound period.				

STS-116 (117)

Orbiter/Flight:		**103/33**		
ET:		**123**		
SSME:		**2050/5**	**2054/6**	**2058/1**
Facilities/Usage:		**OPF-3**	**07/18/06**	
		VAB-3	**11/01/06**	
		PADB/53	**11/08/06**	
		MLP1/48		
Payload:		**ISS-20-12A.1**		
Scrub:	**12/07/06**	**At T-5min adverse weather conditions (cloud ceiling rule)**		
Launch:	**12/10/06**	**01:47/36.347 GMT**		
Landing:	**12/22/06**	**22:32/00.211 GMT *KSC***		
Highlights:	13 day ISS Electrical Assembly Mission			

STS-117 (118) "18th Rollback"

Orbiter/Flight:		**104/28**		
ET:		**124**		
SSME:		**2059/1**	**2052/5**	**2057/2**
Facilities/Usage:		**OPF-1**	**09/22/07**	
		VAB-1	**02/07/07**	**03/04/07**
		PADA/65	**02/14/07**	**05/15/07**
		MLP2/42		
Payload:		**ISS-21-13A/S4 Arrays**		
Postponed:	**03/15/07**	**Hail Storm (02/26) Damages ET/Rollback to VAB**		
Launch:	**06/08/07**	**23:38/06.522 GMT**		
Landing:	**06/22/07**	**19:49/39.703 GMT *Edwards***	**07/03/07 *KSC Return***	
Highlights:	Successful 14-Day construction for I.S.S.			

STS-118 (119)

Orbiter/Flight:		**105/20**		
ET:		**117**		
SSME:		**2047/10**	**2051/6**	**2045/9**
Facilities/Usage:		**OPF-2**	**12/08/02**	
		VAB-1	**07/02/07**	
		PADA/66	**07/11/07**	
		MLP1/49		
Payload:		**ISS-22-13A.1/SHAB SM**		
Postponed:	**08/07/07**	**1 day delay due to unfinished work associated with Crew Cabin Valve R&R (MMT Decision on 08/03)**		
Launch:	**08/08/07**	**22:36/44.784 GMT**		
Landing:	**08/21/07**	**16:32/18.201 GMT *KSC***		
Highlights:	14 day mission. Teacher in space.			

STS-120 (120)

Orbiter/Flight:		**103/34**		
ET:		**120**		
SSME:		**2050/6**	**2048/7**	**2058/2**
Facilities/Usage:		**OPF-3**	**12/23/06**	
		VAB-1	**09/23/07**	
		PADA/67	**09/30/07**	
		MLP2/43		
Payload:		**ISS-23-10A NODE-2**		
Launch:	**10/23/07**	**15:38/21.863 GMT**		
Landing:	**11/07/07**	**18:01/18.704 GMT *KSC***		
Highlights:	15 day ISS-23-10A NODE-2 - Repaired tear in blanket.			

STS-122 (121) "It's NOT the Point Sensor Box"

Orbiter/Flight:		**104/29**		
ET:		**125**		
SSME:		**2059/2**	**2052/6**	**2057/3**
Facilities/Usage:		**OPF-1**	**07/04/07**	
		VAB-3	**10/30/07**	
		PADA/68	**11/06/07**	
		MLP1/50		
Payload:		**ISS-24-1E/COLUMBUS**		
Issues:	**07/30/07**	**Two 17.3 ft^3 GHe Tanks R&Red from the midbody due to COPV fatigue concern. Hardware sent to White Sands for destructive testing.**		
Scrub:	**12/06/07**	**LH2 LLCO Sensor #3 & #4 failed "WET" when commanded "DRY" during checkouts (15 mins after Fast-Fill). Scrub called just prior to T-3hrs HOLD.**		
	12/09/07	**LH2 LLCO Sensor #3 failed "WET" when commanded DRY during checkouts (5 mins after Fast-Fill). Scrub called at T-4hrs, 30mins. Tanking test on 12/18 established 02/07 launch date.**		
Launch:	**02/07/08**	**19:45/31.391 GMT**		
Landing:	**02/20/08**	**14:07/09.593 GMT *KSC***		
Highlights:	13 day science laboratory Columbia to ISS mission. LH2 LLCO sensor anomalies traced to design change on the electrical feed through connector on the ET that KSC was not informed of by the vendor, exonerating the Point Sensor Box in the Orbiter.			

STS-123 (122)

Orbiter/Flight:		**105/21**		
ET:		**126**		
SSME:		**2047/11**	**2044/10**	**2054/7**
Facilities/Usage:		**OPF-2**	**08/22/07**	
		VAB-1	**02/11/08**	
		PADA/69	**02/18/08**	
		MLP2/44		
Payload:		**ISS-25-1J/A JEMS ELM PS**		
Launch:	**03/11/08**	**06:28/16.123 GMT**		
Landing:	**03/27/08**	**00:39/07.702 GMT *KSC***		
Highlights:	16 Day - Deliver (JPL) Pressurized Module Section in prep for JAXA.			

STS-124 (123)

Orbiter/Flight:		**103/35**		
ET:		**128**		
SSME:		**2051/7**	**2048/8**	**2058/3**
Facilities/Usage:		**OPF-3**	**11/08/07**	
		VAB-3	**04/26/08**	
		PADA/70	**05/03/08**	
		MLP3/29		
Payload:		**ISS-26-IJ/1 JEMS PM**		
Launch:	**05/31/08**	**21:02/13.986 GMT**		
Landing:	**06/14/08**	**15:15/18.992 GMT *KSC***		
Highlights:	Mission delivered the main segment of Japan's Laboratory.			

STS-126 (124)

Orbiter/Flight:		**105/22**		
ET:		**129**		
SSME:		**2047/12**	**2052/7**	**2054/8**
Facilities/Usage:		**OPF-2**	**03/27/08**	
		VAB-1	**09/11/08**	
		PADB	**09/18/08**	
		PADA/71	**10/23/08**	
		MLP3/30		
Payload:		**ISS-27-ULF2 (MPLM) SSPL PSSC**		
Postponed:	**11/12/08**	**Schedule impacts of STS-125 moved STS-126 from 11/12 to 11/16. STS-125 then delayed to 2009 with new target date set for 11/14.**		
Launch:	**11/15/08**	**00:55/41.233 GMT**		
Landing:	**11/30/08**	**21:25/08.418 GMT *Edwards***		**12/12/08 *KSC Return***
Highlights:	Upgraded the ISS for larger future crews. Engine 2 GH2 Flow Control Valve poppet material liberated during flight resulting in the other two valves compensating for the pressure increase.			

STS-119 (125) "Red Crew Cavity Purge"

Orbiter/Flight:		**103/36**		
ET:		**127**		
SSME:		**2048/9**	**2051/8**	**2058/4**
Facilities/Usage:		**OPF-3**	**06/15/08**	
		VAB-3	**01/07/09**	
		PADA/72	**01/14/09**	
		MLP1/51		
Payload:		**ISS-28-15A/S6**		
Postponed:	**02/12/09**	**MPS Flow Control Valve Flight Rationale incomplete at combined Shuttle/ISS FRR on 02/03. Target launch date set at no earlier than 02/19. Lack of FCV rationale moves target date to 02/22, 02/27, and 03/12.**		
Scrub:	**03/11/09**	**GUCP leakage at T-3hrs 20min**		
Launch:	**03/15/09**	**23:43/46.256 GMT MPS Red Crew to adjust cavity purge**		
Landing:	**03/28/09**	**19:13/27.008 GMT *KSC***		

Highlights: 13 day mission to install the starboard side solar arrays. Last Shuttle flight for MLP-1 prior to being transferred to Constellation for Ares-1X.

STS-125 (126) "19th Rollback"

Orbiter/Flight:		**104/30**			
ET:		**130**			
SSME:		**2059/3**	**2044/11**	**2057/4**	
Facilities/Usage:		**OPF-1**	**02/21/08**	**11/11/09**	
		VAB-3	**08/23/08**	**10/20/08**	**03/23/09**
		PADA/73	**09/04/08**		**03/31/09**
		MLP2/45			
Payload:		**HST SM4, ICBS 3D**			
Postponed:	**10/08/08**	**Schedule impacts of TS Fay & Hannah moved date to 10/10.**			
	10/10/08	**Schedule impacts i.e. astronaut training/Hurricane Ike to 10/14**			
	10/14/08	**Hubble on-orbit science data formatter & data handling system failure on 09/27. Rollback to VAB on 10/20.**			
Launch:	**05/11/09**	**18:01/58.194 GMT**			
Landing:	**05/24/09**	**15:39/05.472 GMT *Edwards***		**06/02/09 *KSC Return***	

Highlights: Servicing and upgrading the Hubble Space Telescope for the final time. LH2 ET umbilical AFT pyro bolt hole damaged during ET Umbilical mate.

STS-127 (127)

Orbiter/Flight:		**105/23**		
ET:		**131**		
SSME:		**2045/10**	**2060/1**	**2054/9**
Facilities/Usage:		**OPF-2**	**12/13/08**	
		VAB-1	**04/10/09**	
		PADB	**04/17/09**	
		PADA/74	**05/31/09**	
		MLP3/31		
Payload:		**ISS-29-J/A JEM EF**		
Postponed:	**07/11/09**	**Lightning strike near the pad required technical review**		
	07/01/09	**Tanking Test did not repeat GUCP leakage**		
Scrub:	**06/13/09**	**GUCP Leakage at T-3hrs 50min**		
	06/17/09	**Repeat GUCP leakage T-2hrs 50min (tanking started late)**		
	07/12/09	**At T-9min hold due to adverse weather conditions**		
	07/13/09	**At T-9min hold due to adverse weather conditions**		
Launch:	**07/15/09**	**22:03/12.020 GMT**		
Landing:	**07/31/09**	**14:48/08.848 *KSC***		
Highlights:	Completed construction of Japan Aerospace Exploration Kibo Laboratory.			

STS-128 (128)

Orbiter/Flight:		**103/37**		
ET:		**132**		
SSME:		**2052/8**	**2051/9**	**2047/13**
Facilities/Usage:		**OPF-3**	**03/29/09**	
		VAB-1	**07/26/09**	
		PADA/75	**08/04/09**	
		MLP2/46		
Payload:		**ISS-17A MPLM (P) LMC**		
Scrub:	**08/25/09**	**At T-9min hold due to adverse weather conditions**		
	08/25/09	**PV12 not indicating closed at T-4.5hrs.**		
Launch:	**08/29/09**	**03:59/39.854 GMT**		
Landing:	**09/12/09**	**00:53/21.448 GMT *Edwards***	**09/21/09 *KSC Return***	
Highlights:	Dedicated to the assembly and maintenance of the ISS.			

STS-129 (129)

Orbiter/Flight:		**104/31**		
ET:		**133**		
SSME:		**2048/10**	**2044/12**	**2058/5**
Facilities/Usage:		**OPF-1**	**06/04/09**	
		VAB-1	**10/06/09**	
		PADA/76	**10/14/09**	
		MLP3/32		
Payload:		**ISS-31-ULF-3/ELC 1&2**		
Launch:	**11/16/09**	**19:28/11.999 GMT**		
Landing:	**11/27/09**	**14:44/22.119 GMT *KSC***		

Highlights: 11 day- stocking the ISS with Spares for the Future. Final ISS Crew Member on Shuttle.

STS-130 (130)

Orbiter/Flight:		**105/24**		
ET:		**134**		
SSME:		**2059/4**	**2061/1**	**2057/5**
Facilities/Usage:		**OPF-2**	**08/01/09**	
		VAB-1	**12/11/09**	
		PADA/77	**01/06/10**	
		MLP2/47		
Payload:		**ISS-32-20A NODE 3**		
Scrub:	**02/07/10**	**At T-9min hold due to adverse weather conditions**		
Launch:	**02/08/10**	**09:14/08.620 GMT**		
Landing:	**02/22/10**	**03:20/29.793 GMT *KSC***		

Highlights: 73rd KSC Landing. Night Landing. ISS Assembly mission which delivered the NODE 3 and the Cupola observatory to the station. This brought the ISS to 85-90 percent completion.

STS-131 (131) "Four Women in Space"

Orbiter/Flight:		**103/38**		
ET:		**135**		
SSME:		**2045/11**	**2060/2**	**2054/10**
Facilities/Usage:		**OPF-3**	**09/22/10**	
		VAB-1	**02/22/10**	
		PADA/78	**03/03/10**	
		MLP3/33		
Payload:		**ISS-33-19A MPLM (P) LMC**		
Launch:	**04/05/10**	**10:21/27.396 GMT**		
Landing:	**04/20/10**	**13:08/35.714 GMT *KSC***		

Highlights: Longest flight for space shuttle Discovery. Only the 3rd mission to carry three female astronauts and once it docked with the space station it was the first time that there were 4 women in space together. First time that two Japanese Astronauts had been in space together (1 on shuttle and 1 in the ISS).

STS-132 (132) "First Final OV104 Mission"

Orbiter/Flight:		**104/32**		
ET:		**136**		
SSME:		**2052/9**	**2051/10**	**2047/14**
Facilities/Usage:		**OPF-1**	**11/28/09**	
		VAB-1	**04/13/10**	
		PADA/79	**04/22/10**	
		MLP2/48		
Payload:		**ISS-34-ULF4, ICC-VLD**		
Launch:	**05/14/10**	**18:20/11.018 GMT**		
Landing:	**05/26/10**	**12:48/10.154 GMT *KSC***		

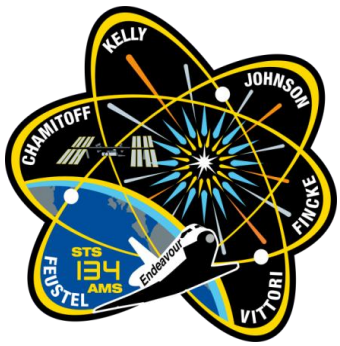
Highlights: First planned final flight of OV104.

STS-133 (133) "Final OV103 Mission"

Orbiter/Flight:		**103/39**		
ET:		**137**		
SSME:		**2059/5**	**2061/2**	**2057/6**
Facilities/Usage:		**OPF-3**	**04/21/10**	
		VAB-1	**09/08/10**	**12/21/10**
		PADA/80	**09/21/10**	**02/01/11**
		MLP3/34		
Payload:		**ISS-35-ULF5/ELC4-PMM/R2**		
Postponed:	**11/02/10**	**IPR 133V-0058 taken by CCME during E-3, ME2058, Controller Power Up in SSME Final Preps at T-19 hours, indicated insufficient current rise rate in AC Bus 1 Phase B current. Coutdown held for 24 hours, resumed at T-11 hours on 11/03/10.**		
Scrub:	**11/04/10**	**Held another 24 hours on the morning of the 3rd at T-6 hours for weather.**		
Scrub:	**11/05/10**	**Count picked up at 05:38 on 11/05/10. Two hours into tanking a LH2 leak was detected at the GUCP. During the post test tanking walkdown of the ET, a 7" wide x 8" long crack, with offset was detected on the LO2 Intertank Flange, Panel 1 overlapping stringers 6 and 7 (IPR 133V-0072). This drove extensive testing at KSC, MSFC and MAF to determine the cause. Rollback to the VAB was required to install doublers on the stringers and complete NDE.**		
Tank Test:	**12/17/10**	**Successful instrumented tanking test validating math model of ET stringers to provide rationale for flight.**		
Launch:	**02/24/11**	**21:53/25.720 GMT**		
Landing:	**03/09/11**	**16:57/17.278 GMT *KSC***		

Highlights: Stringer failure led to significant delay in launch date and drove the requirement for a tanking test for ET-138 on the STS-135 mission. OV-103 delivered the Permanent Multipurpose Module, Robonaut2 and critical spares to the ISS. After T&R operations are complete OV-103 is slated to be on permanent display at the Smithsonian Institution, taking the place of OV-101 "Enterprise" which will be moved to the Intrepid Sea-Air-Space Museum in New York.

STS-134 (134) "Final OV105 Mission"



Orbiter/Flight:		**105/25**		
ET:		**122**		
SSME:		**2048/11**	**2044/13**	**2058/6**
Facilities/Usage:		**OPF-2**	**02/23/10**	
		VAB-1	**02/28/11**	
		PADA/81	**03/11/11**	
		MLP2/49		
Payload:		**ISS-36-ULF6/ELC3/AMS**		
Scrub:	**04/29/11**	**APU line heater issue pointed towards a problem with LCA-2 which was changed out requiring extensive retest in the AFT.**		
Launch:	**05/16/11**	**12:56/29.665 GMT**		
Landing:	**05/31/11**	**03:37/57.748 GMT**		

Highlights: During launch countdown APU-1 experienced line heater problems leading to a scrub and eventual change out of AFT LCA-2 requiring significant retest and a launch slip to 05/16/11. Final Shuttle mission to launch from MLP-2. OV-105 delivered the Alpha Magnetic Spectrometer and supplies critical to the operation of the ISS. After T&R operations are complete OV-105 is to be put on permanent display at the California Science Center in Los Angeles.

STS-335/135 (135) "Final Mission"

Orbiter/Flight:		**104/33**		
ET:		**138**		
SSME:		**2052/9**	**2051/10**	**2047/14**
Facilities/Usage:		**OPF-1**	**05/27/10**	
		VAB-1	**05/17/11**	
		PADA/81	**06/01/11**	
		MLP3/35		
Payload:		**MPLM and LMC**		
Tank Test:	**06/15/11**	**A tanking test was required to validate ET-138 stringers for flight. Post tanking, seven days of NDE were required to verify stringer health. During the tanking test, SSME ME2045 (Engine 3) Main Fuel Valve leaked and violated LCC SSME-02 limit of -130 F. The MFV was replaced and retest was performed by re-running FRT and Helium Signature Tests.**		
Launch:	**07/08/11**	**15:29/06.035 GMT**	**Hold at T-31s due to retract indicator failure on GOX Vent Arm.**	
Landing:	**07/21/11**	**09:57/01.315 GMT**	**09:57/54 GMT Wheel stop**	***KSC***

Highlights: Revert after T-3hr and counting due to low oil temperature on the primary LOX pump. OV-104 delivered enough supplies and critical spares to keep the ISS operational throughout 2012, giving COTS providers additional time to bring their systems online. This is the last Space Shuttle flight. After T&R operations are complete OV-104 shall be entrusted to the Kennedy Space Center Visitors Complex.

Aft Isometric