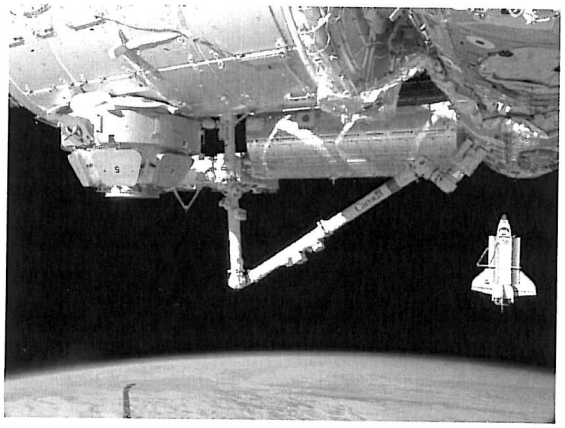
Annex 5

2010 Mission Overviews

STS-130 / ISS 20A
Vehicle: Endeavour - 24th flight
Launch: February 8, 2010 at 4:14 am EDT from Pad 39A, KSC
Landing: February 21, 2010 at 10:20 pm EDT on Runway 15, KSC

Crew
Commander: George Zamka
Pilot: Terry Virts
Mission Specialist 1: Nicholas Patrick
Mission Specialist 2: Robert Behnken
Mission Specialist 3: Stephen Robinson
Mission Specialist 4: Kathryn Hire

ISS Crew
Commander (E22): Jeff Williams
Flight Engineer (E22): Maxim Suraev
Commander (E23): Oleg Kotov
Flight Engineer (E23): Soichi Noguchi
Flight Engineer (E23): T.J. Creamer

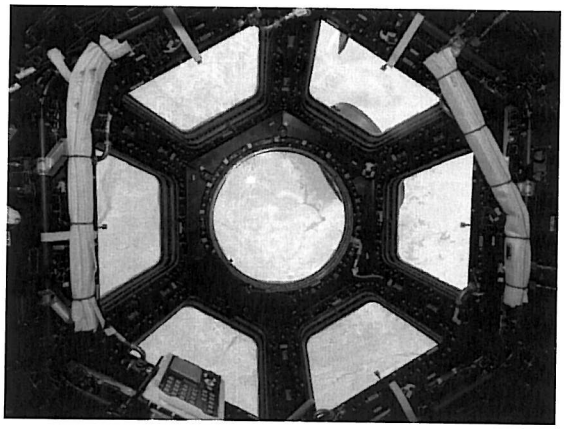


Pictured are the newly-installed Tranquility node and Cupola, as well as Space Shuttle Endeavour shortly after undocking.

Mission Overview
STS-130 delivered and installed the final U.S. module, named Tranquility, to the International Space Station (ISS). Tranquility was the name chosen from thousands of suggestions submitted by participants on NASA's Web site, "Help Name Node 3". This mission also took up the Cupola, a mini control tower attached to the Tranquility node that provides an incredible view of Earth from seven windows.

Three scheduled EVAs, totaling 18 hours and 13 minutes, were completed during STS-130. These were necessary to install the new Node 3 and Cupola modules.

STS-130 was the planned last night launch and the last planned night landing of the Shuttle program.



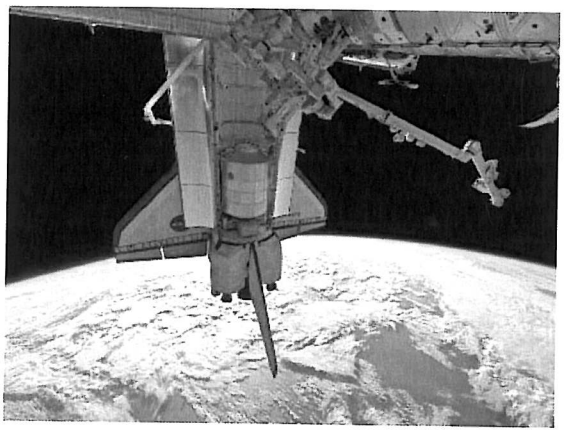
The first image taken through the ISS's new seven-windowed Cupola. Visible below is the Sahara Desert.

2010 Mission Overviews

STS-131 / ISS 19A
Vehicle: Discovery - 38th flight
Launch: April 5, 2010 at 6:21 am EDT from Pad 39A, KSC
Landing: April 20, 2010 at 9:08 am EDT on Runway 15, KSC

Crew
Commander: Alan Poindexter
Pilot: James P. Dutton Jr.
Mission Specialist 1: Rick Mastracchio
Mission Specialist 2: Clayton Anderson
Mission Specialist 3: Dorothy Metcalf-Lindenburger
Mission Specialist 4: Stephanie Wilson
Mission Specialist 5: Naoko Yamazaki

ISS Crew
Commander (E23): Oleg Kotov
Flight Engineer (E23): Soichi Noguchi
Flight Engineer (E23): T.J. Creamer
Commander (E24): Alexander Skvortsov
Flight Engineer (E24): Tracy Caldwell Dyson
Flight Engineer (E24): Mikhail Kornienko

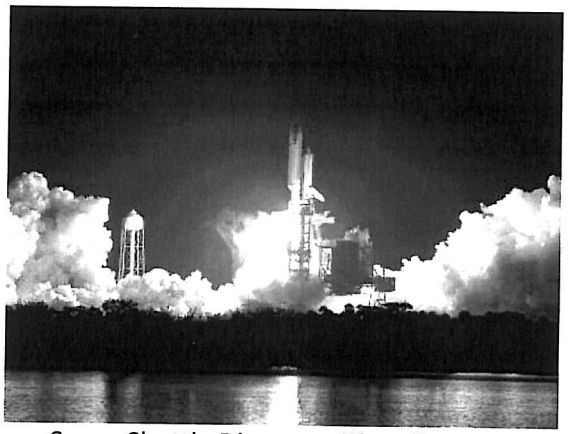


Space Shuttle Discovery with the Leonardo Multi-Purpose Logistics Module visible in the payload bay.

Mission Overview
STS-131 delivered supplies and equipment to the station, more than 17,000 pounds of it stowed inside the Italian-built multi-purpose logistics module Leonardo. The payload included new crew sleeping quarters, an ammonia tank, gyroscope and experiments. This mission marked the first time four women were in space at the same time.

Discovery's Ku-band antenna system, a vital link for radar and high-rate data communications from the shuttle to the ground failed to work once in orbit. The station's downlink capability was utilized to work around this issue.

Three scheduled EVAs, totaling 20 hours and 17 minutes, were completed during STS-131. The main task was replacing a depleted ammonia tank with a new one.



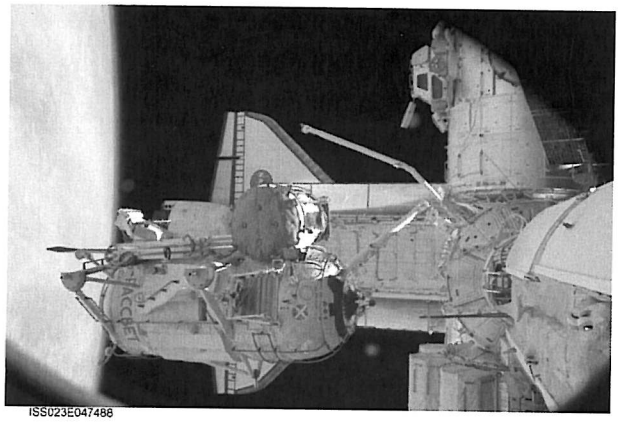
Space Shuttle Discovery lifts off at 6:21 a.m. EDT on April 5, 2010.

2010 Mission Overviews

STS-132 / ISS ULF4
Vehicle: Atlantis - 32nd flight
Launch: May 14, 2010 at 2:20 pm EDT from Pad 39A, KSC
Landing: May 26, 2010 at 8:48 am EDT on Runway 15, KSC

Crew
Commander: Ken Ham
Pilot: Tony Antonelli
Mission Specialist 1: Garrett Reisman
Mission Specialist 2: Michael Good
Mission Specialist 3: Steve Bowen
Mission Specialist 4: Piers Sellers

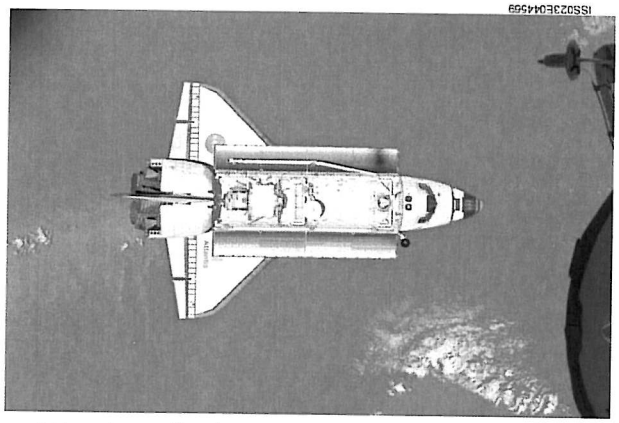
ISS Crew
Commander (E23): Oleg Kotov
Flight Engineer (E23): Soichi Noguchi
Flight Engineer (E23): T.J. Creamer
Commander (E24): Alexander Skvortsov
Flight Engineer (E24): Tracy Caldwell Dyson
Flight Engineer (E24): Mikhail Kornienko



MRM-1, held by Canadarm2, is moved for permanent attachment to the ISS.

Mission Overview
STS-132 launched an Integrated Cargo Carrier and a Russian-built Mini Research Module (MRM-1). MRM-1 is also known as Rassvet, which is Russian for "dawn". The new MRM-1 module was installed on the ISS Zarya module. This and the Integrated Cargo Carrier were positioned using Canadarm2. The cargo carrier provided a worksite for spacewalkers to store tools and gear.

Three spacewalks were conducted, totaling 21 hours and 20 minutes. During the first spacewalk a spare antenna and stowage platform were installed. On the second spacewalk batteries on the P6 Truss were replaced. The final spacewalk replaced the last of the P6 Truss batteries and retrieved a power data grapple fixture for installation at a later date.



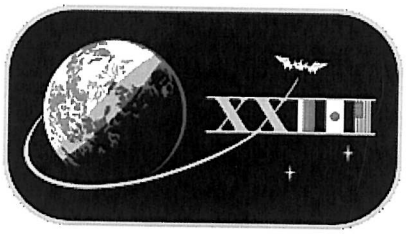
Atlantis on final approach with MRM-1 visible in the payload bay.

2010 Mission Overviews

International Space Station Overview

Major Milestones for 2010

The final US module, Node 3, was delivered and installed during the STS-130 / ISS 20A mission early in the year. The station was expanded later in the year by the addition of the Russian MRM-1 module. A major failure of the station's cooling system occurred on July 31, 2010 when the External Thermal Cooling System ammonia pump module failed off. This required three unscheduled US EVAs to safe the failed pump and install a new one. Without these repairs several modules would have been without cooling, threatening science and avionics. The ultimate consequence could have been a reduction in crew size or a full demanning of the station. The three EVAs were fully successful and cooling was restored.



ISS Crew Members for 2010

Expeditions 22, 23, 24, 25 and 26 flew in 2010. Listed below are those crew members who spent time on the ISS during the 2010 calendar year, and some highlights from their Expeditions.

Expedition 22 Crew: Jeffrey Williams (NASA), Maxim Suraev (RUS), Oleg Kotov (RUS), Soichi Noguchi (JAXA), T.J. Creamer (NASA)
Milestones: RS EVA #24 - January 14th 2010, Progress 36P launch - February 3rd, 2010

Expedition 23: Oleg Kotov (RUS), Soichi Noguchi (JAXA), T.J. Creamer (NASA), Alexander Skvortsov (RUS), Mikhail Kornienko (RUS), Tracy Caldwell Dyson (NASA)
Milestones: Soyuz 22S launch - April 2nd, 2010, Progress 37P launch - April 28th, 2010

Expedition 24: Alexander Skvortsov (RUS), Mikhail Kornienko (RUS), Tracy Caldwell Dyson (NASA), Doug Wheelock (NASA), Fyodor Yurchikin (RUS), Shannon Walker (NASA)
Milestones: Soyuz 23S launch - June 15th, 2010, Progress 38P launch - June 30th, 2010, RS EVA #25 - July 27th, 2010, US EVA #15 - August 7th, 2010, US EVA #16 - August 11th, 2010, US EVA #17 - August 16th, 2010, Progress 39P launch - September 8th, 2010

Expedition 25: Doug Wheelock (NASA), Fyodor Yurchikin (RUS), Shannon Walker (NASA), Scott Kelly (NASA), Alexander Kaleri (RUS), Oleg Skripochka (RUS)
Milestones: Soyuz 24S launch - October 7th, 2010, Progress 40P launch - October 28th, 2010,
RS EVA #26 - November 15th, 2010

Expedition 26: Scott Kelly (NASA), Alexander Kaleri (RUS), Oleg Skripochka (RUS), Dmitry Kondratyev (RUS), Paolo Nespoli (ESA), Catherine Coleman (NASA)
Milestones: Soyuz 25S launch - December 15th, 2010

2010 Mission Overviews

Pad Abort 1 Flight Test

Vehicle: Orion crew module simulator, Launch Abort System
Launch: 9:00 a.m. EDT May 6th, 2010 at White Sands Missile Range
Length of mission: ~135 seconds from launch until crew module touchdown
Max Altitude: ~1.2 miles (~1.9 km)

Mission Overview

NASA's Pad Abort 1 flight test, a launch of the abort system designed for the Orion crew vehicle, lifted off at 9 a.m. EDT May 6 at the U.S. Army's White Sands Missile Range (WSMR) near Las Cruces, N.M. The flight lasted about 135 seconds from launch until the crew module touchdown about a mile north of the launch pad.

The flight was the first fully-integrated test of this launch abort system design. The information gathered from the test will help refine design and analysis for future launch abort systems, resulting in safer and more reliable crew escape capability during rocket launch emergencies.

The test involved three motors. An abort motor produced a momentary half-million pounds of thrust to propel the crew module away from the pad. It burned for approximately six seconds, with the highest impulse in the first 2.5 seconds. The crew module reached a speed of approximately 445 mph in the first three seconds, with a maximum velocity of 539 mph, in its upward trajectory to about 1.2 miles high.

The attitude control motor fired simultaneously with the abort motor and steered the vehicle using eight thrusters producing up to 7,000 pounds of thrust. It provided adjustable thrust to keep the crew module on a controlled flight path and reorient the vehicle as the abort system burned out.

The jettison motor, the only motor of the three that would be used in all nominal rocket launches, pulled the entire launch abort system away from the crew module and cleared the way for parachute deployment and landing. After explosive bolts fired and the jettison motor separated the system from the crew module, the recovery parachute system deployed. The parachutes guided the crew module to touchdown at
16.2 mph (24 feet per second), about one mile from the launch pad.

The Orion launch abort system lifts off during the PA-1 flight test at the White Sands Missile Range.

Crew Module and Main Parachutes

2010 Mission Overviews

SpaceX Falcon 9 Inaugural Test Flight

Vehicle: Falcon 9, Dragon Spacecraft Qualification Unit
Launch: 2:45 p.m. EDT June 4th, 2010 from the SpaceX launch pad at Launch Complex 40, Cape Canaveral

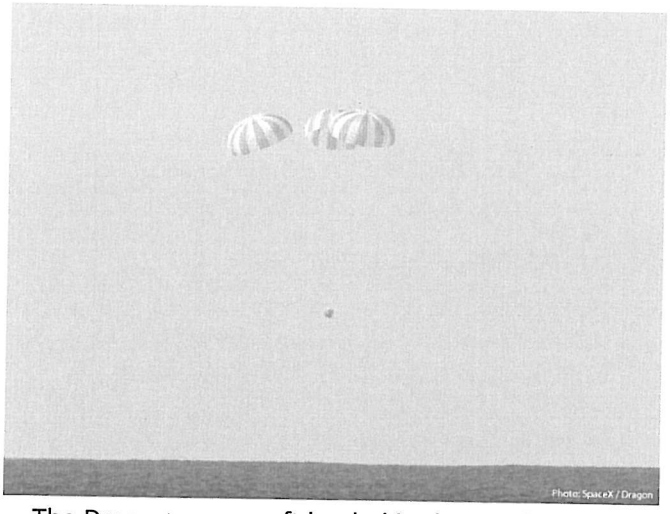
Mission Overview:
Falcon 9 is a spaceflight launch system that uses rocket engines designed and manufactured by SpaceX. Both stages of the two-stage-to-orbit vehicles use liquid oxygen (LOS) and rocket-grade kerosene (RP-1) propellants. On January 2, 2010, the second stage of the Falcon 9 Flight 1 vehicle was test fired for the full duration required for orbital insertion, 345 seconds. On March 13, 2010, the first stage engines successfully underwent a 3.5 second static test firing, having failed a previous attempt the day before. Falcon 9 lifted off on the inaugural test flight at 2:45 pm. EDT on June 4th, 2010 and successfully entered into a 250 km orbit. The rocket made more than 300 orbits before reentering the Earth's atmosphere and burning up on June 29th after its orbit had decayed.

Falcon 9 launches with the Dragon Spacecraft Qualification Unit. *Image credit: SpaceX.*

SpaceX NASA COTS - Demo 1

Vehicle: Falcon 9, Dragon
Launch: December 8th, 2010 from the SpaceX launch pad at Launch Complex 40, Cape Canaveral
Length of mission: 3 hours 19 minutes 52 seconds

Mission Overview:
On December 8, SpaceX became the first commercial company in history to re-enter a spacecraft from Earth orbit. SpaceX launched its Dragon spacecraft into orbit atop a Falcon 9 rocket at 10:43 AM EST from Launch Complex 40 at the Cape Canaveral Air Force Station in Florida. As the very first flight under the Commercial Orbital Transportation Services (COTS) program, COTS Demo 1 followed a nominal flight profile that included a roughly 9.5-minute ascent. The Dragon spacecraft orbited the Earth at speeds greater than 7,600 meters per second (17,000 miles per hour), reentered the Earth's atmosphere, and landed just after 2:00 PM EST less than one mile from the center of the targeted landing zone in the Pacific Ocean.



The Dragon spacecraft landed in the Pacific Ocean 3 hours, 19 minutes and 52 seconds after liftoff. *Image credit: SpaceX.*

References:

http://en.wikipedia.org/wiki/

http://spaceflight1.nasa.gov/gallery/images/shuttle/

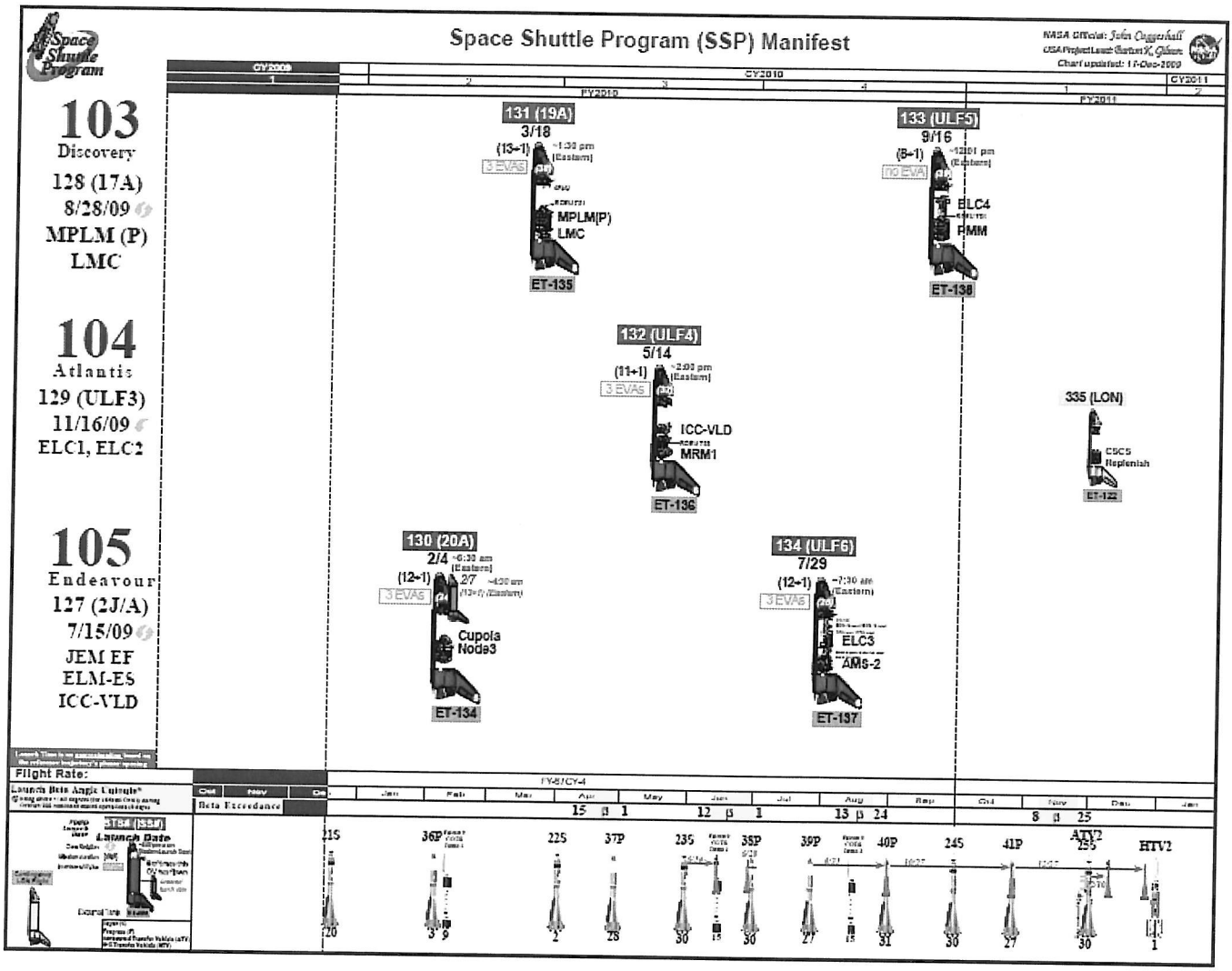
http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/list_2010.html

http://www.nasa.gov/mission_pages/station/expeditions/crews_past_crews.html

http://www.nasa.gov/mission_pages/constellation/orion/pad_abort1_success.html

http://mod.jsc.nasa.gov/da8/rules/space_shuttle_mission_summary

http://www.spacex.com


Space Shuttle Program (SSP) Manifest
NASA Official: John Coggerdall
Chart updated: 17-Dec-2009
103
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127 (2J/A)
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JEM EF
ELM-ES
ICC-VLD
131 (19A)
3/18
(13+1)
3 EVAs
MPLM(P)
LMC
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133 (ULF5)
9/16
(8+1)
no EVA
ELC4
PMM
ET-138
132 (ULF4)
5/14
(11+1)
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ICC-VLD
MRM1
ET-136
335 (LON)
CSC5
Nepenlah
ET-122
130 (20A)
2/4
(12+1)
3 EVAs
Cupola
Node3
ET-134
134 (ULF6)
7/29
(12+1)
3 EVAs
ELC3
AMS-2
ET-137
Flight Rate:
Launch Beta Angle Cutoffs*
Beta Exceedance
FY-01CY-4
Oct
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15 β 1
12 β 1
13 β 24
8 β 25
STS# (SSP)
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External Tank
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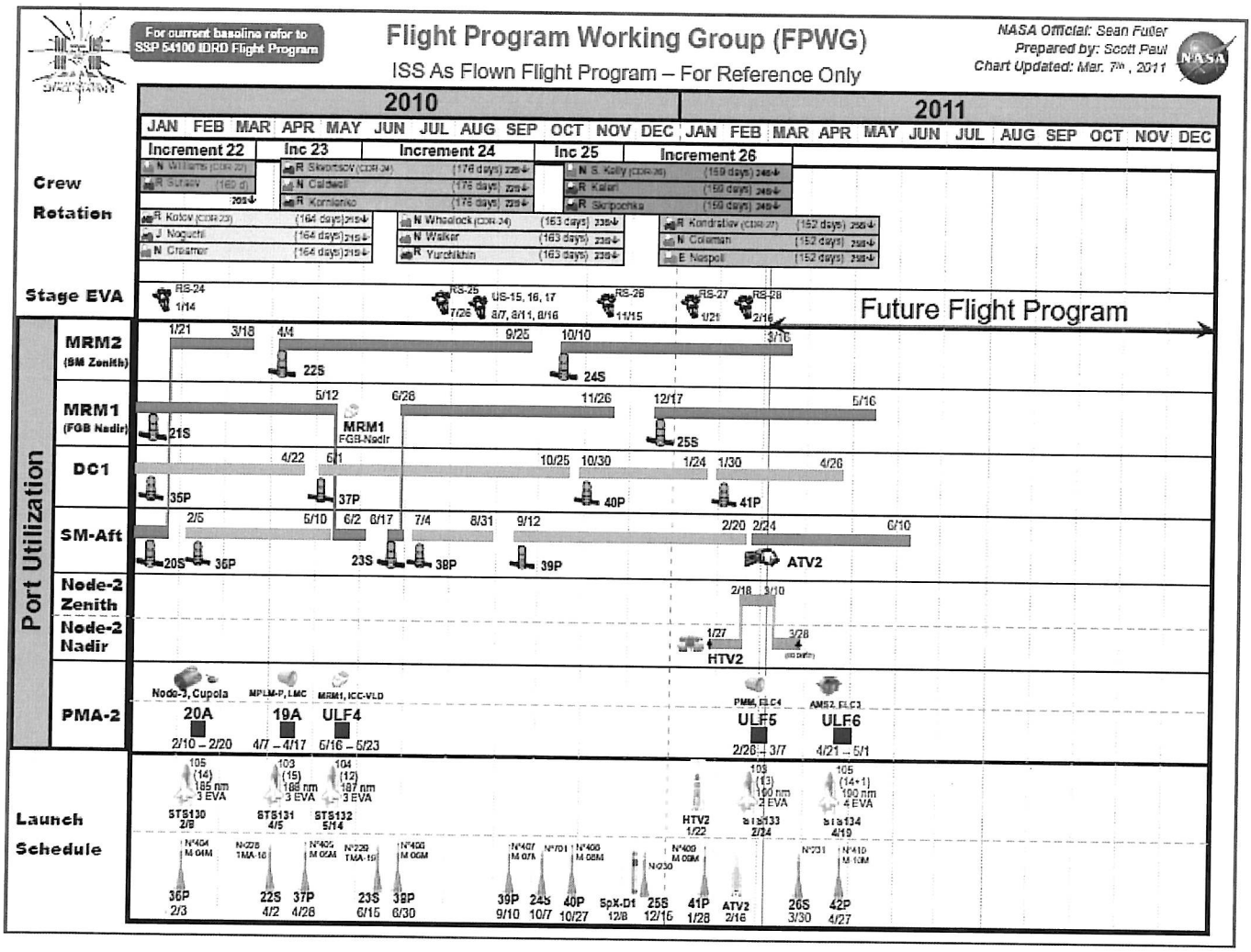
23S
38P
39P
40P
24S
41P
25S
ATV2
HTV2


For current baseline refer to SSP 54100 IDRD Flight Program
Flight Program Working Group (FPWG)
ISS As Flown Flight Program – For Reference Only
NASA Official: Sean Fuller
Prepared by: Scott Paul
Chart Updated: Mar. 7th , 2011
2010
2011
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Increment 22
Inc 23
Increment 24
Inc 25
Increment 26
Crew Rotation
Stage EVA
Future Flight Program
Port Utilization
MRM2 (SM Zenith)
MRM1 (FGB Nadir)
DC1
SM-Aft
Node-2 Zenith
Node-2 Nadir
PMA-2
Node-3, Cupola
MPLM-P, LMC
MRM1, ICC-VLD
20A
2/10 – 2/20
19A
4/7 – 4/17
ULF4
5/16 – 5/23
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AMS2, ELC3
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36P 2/3
22S 4/2
37P 4/26
23S 6/15
38P 6/30
39P 9/10
24S 10/7
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25S 12/16
41P 1/28
ATV2 2/16
26S 3/30
42P 4/27

Annex 6

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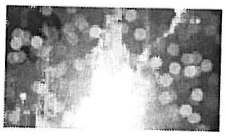

Ariane 5 orbits ATV-2

Ariane 5 lifted off from the Guiana Space Centre on 16 February, carrying ESA's 2nd ISS resupply vehicle into orbit. Credits : ESA/CNES/Arianespace.

Picard, a better knowledge of the Sun

The Mission is dedicated to the study of the Earth' climate and Sun variability relationship. Credits : CNES.

What's on

Now

Earthwatch : the satellite revolution

Now

Cité de l'Espace in Toulouse

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Launches

2011

1st Soyouz launch in French Guiana

19 May 2011

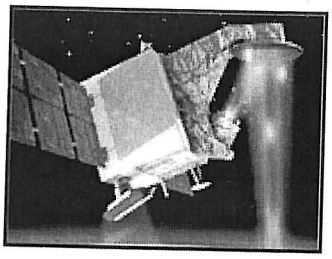
Launch of Ariane 5 ECA

16 February 2011

ATV 2 - Johannes Kepler

See the full launch schedule

In the news



CFOSAT to gain new insights into sea state

April 27, 2011

A joint project of the China National Space Administration (CNSA) and CNES, CFOSAT is now entering its detailed definition phase. The future satellite's chief goal will be to measure surface wind and the directional spectrum of waves.

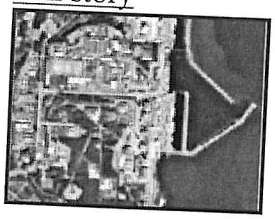
Full story

CNES works to enhance GPS positioning

April 14, 2011

As professional applications relying on the satellite-based Global Positioning System (GPS) continue to expand, CNES's engineers are working tirelessly to improve its positional accuracy.

Full story



SPOT: 25 years in service, 25 million images

April 06, 2011

The SPOT satellites, conceived and designed by CNES engineers, are celebrating 25 years in service. During their career, three generations of satellites have brought users an ever-more-precise and complete picture of Earth.

Full story

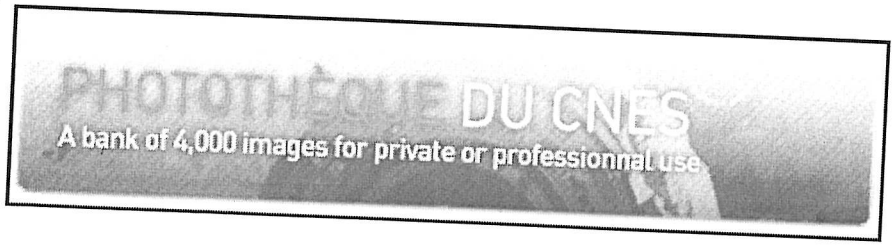
Yuri Gagarin exhibition at the Palais de la Découverte

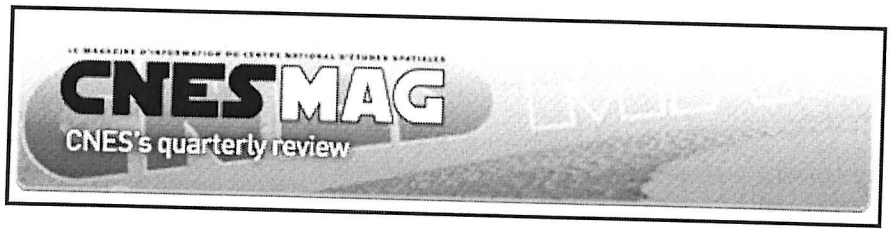
March 18, 2011

To mark 50 years of human spaceflight, the Palais de la Découverte in Paris is hosting an exhibition supported by CNES on "Yuri Gagarin: a revolution" from 5 April to 28 August 2011.

More

More news





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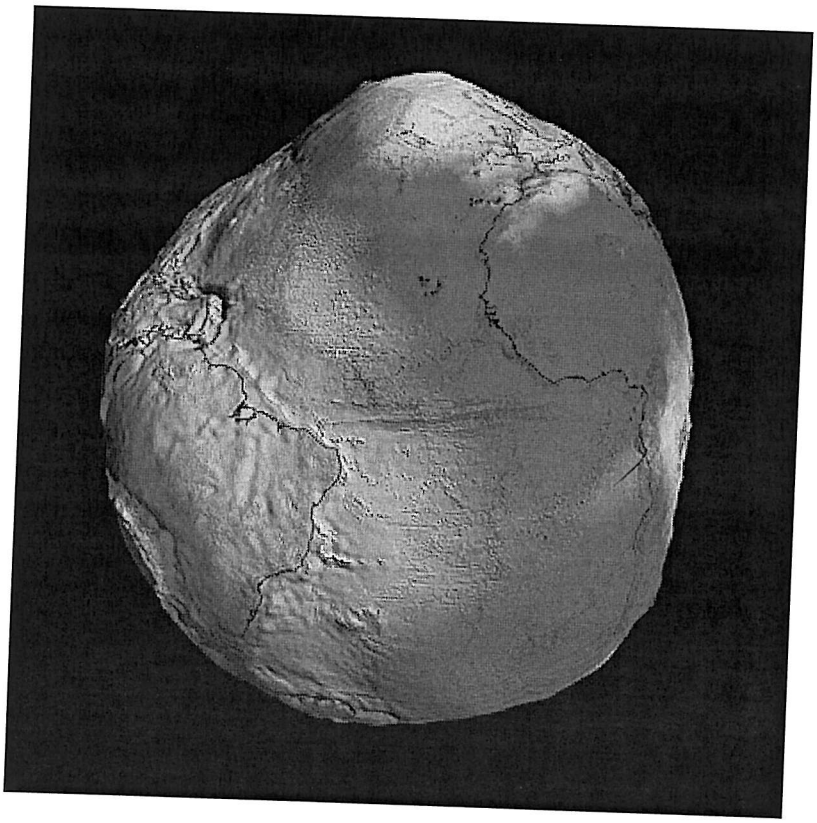
RSS FEEDS

Accueil

Observation de la Terre – Mission accomplie pour Goce et ses accéléromètres Onera

Une réunion des utilisateurs de Goce s'est tenue à Munich les 31 mars et 1er avril pour partager entre scientifiques les très bons résultats de cette mission de gravimétrie et en annoncer le succès à la presse.



Après deux années en orbite et une récolte de données sur la gravité, qui aura duré plus de 12 mois, la mission Goce est une réussite scientifique remarquable. Au cœur du succès, un instrument de mesure qui est une première spatiale : un gradiomètre triaxial conçu pour mesurer la gravité terrestre. Cet appareil repose sur l'ultrasensibilité de mesure de six accéléromètres, conçus et développés par l'Onera.

En savoir plus

Actu intranet DMPH accélérométrie GOCE

Annex 2

The Expedition 24 crew, comprised of Alexander Skvortsov, Mikhail Kornienko, Tracy Caldwell Dyson, Fyodor Yurchikhin, Shannon Walker, and Douglas Wheelock is nominated for the FAI Gagarin Gold Medal for exceptional and heroic service during their long duration mission on the International Space Station (ISS). The almost four month long mission lasted from June 1 to September 25, 2010.

Justification: Just before midnight on July 31st, 2010, the ISS crew responded to one of the largest and most far reaching failures in ISS history, the failure of the External Thermal Control System (ETCS) Loop A Pump Module. The crew, in conjunction with the ground, managed a massive time-critical response to prevent permanent damage due to overheating. Over the next few weeks, the crew conducted three unrehearsed contingency Extra-Vehicular Activities (EVAs). During the first EVA, Caldwell Dyson and Wheelock made most of the configuration changes required to replace the pump module. They were unable to complete the task due to difficulty with one of the ammonia connections. In addition, the EVA crew had to spend time performing a "bake out" of their EVA suits to ensure that no ammonia was carried into the ISS, a situation that could prove deadly to the inhabitants. During each EVA, Walker supported from inside the ISS using the Space Station Remote Manipulator System. She did so without the normal benefit of practice runs and a secondary arm operator. On the second EVA, Caldwell-Dyson and Wheelock finished disconnecting and removing the broken pump module, and prepared the spare for installation, which they did on their third EVA.

If these EVAs had been unsuccessful, the ISS would have been left with a single external cooling loop supporting the United States On-Orbit Segment (USOS), which is one failure away from having to completely powerdown the USOS. That would force reduction of the crew size from six to three (if not completely demanning). Additionally, if ETCS Loop A had not been recovered, half of the Japanese Experiment Module and Columbus module would have been left unpowered, removing all redundancy in these modules and severely reducing the ability to support experiments.

For their unparalleled service to the International Space Station and its supporting space agencies, the crew of Expedition 24 is nominated for the FAI Gagarin Gold Medal.

Annex 8

Crew of STS-Mission 130 / ISS Assembly Mission 20A (International)

The crew of STS-130 / ISS Assembly Mission 20A:

George Zamka, Commander, NASA Astronaut
Terry Virts, Pilot, NASA Astronaut
Kathryn Hire, Mission Specialist, NASA Astronaut
Stephen Robinson, Mission Specialist, NASA Astronaut
Nicholas Patrick, Mission Specialist, NASA Astronaut
Robert Behnken, Mission Specialist, NASA Astronaut

The crew of STS-130 teamed up with International Space Station (ISS) Expedition 22 crew:

Jeffrey Williams, Commander, NASA Astronaut
Maxim Suraev, Flight Engineer, RSA Cosmonaut
Oleg Kotov, Flight Engineer, RSA Cosmonaut
Soichi Noguchi, Flight Engineer, JAXA Astronaut
Timothy Creamer, Flight Engineer, NASA Astronaut

Justification: STS-130/20A was Endeavour's 24th flight and the 32nd flight of the Space Shuttle to the ISS. STS-130 delivered two modules, the Tranquility Module and the Cupola, to ISS. Tranquility provides additional room for crew habitation and the Regenerative Environmental Life Support System. The Cupola provides a greatly enhanced view of the earth and ISS for use as the robotics workstation and an unparalleled earth observation platform.

After a successful launch and rendezvous, the combined crew set to work preparing for the main objectives of the flight. On flight day 4, the crew successfully removed both Tranquility and the Cupola from Endeavour and installed them on Unity. All three EVAs included extremely challenging EVA activities supported by precision robotics using the Space Station's robotic arm.

The crew proceeded to outfit Tranquility, both internally with ventilation, power, data, and electrical connections, and externally by installing ammonia cooling loops and thermal blankets on the second EVA. The Cupola was relocated to the nadir port of Tranquility, where outfitting was completed. Racks for recycling condensation and waste water, removing carbon dioxide, generating oxygen, and the Advanced

Annex 9

The Expedition 24 crew, comprised of Alexander Skvortsov, Mikhail Kornienko, Tracy Caldwell Dyson, Fyodor Yurchikhin, Shannon Walker, and Douglas Wheelock is nominated for the FAI Korolev Diploma for exceptional and heroic service during their long duration mission on the International Space Station (ISS). The almost four month long mission lasted from June 1 to September 25, 2010.

Justification: Just before midnight on July 31st, 2010, the ISS crew responded to one of the largest and most far reaching failures in ISS history, the failure of the External Thermal Control System (ETCS) Loop A Pump Module. The crew, in conjunction with the ground, managed a massive time-critical response to prevent permanent damage due to overheating. Over the next few weeks, the crew conducted three unrehearsed contingency Extra-Vehicular Activities (EVAs). During the first EVA, Caldwell Dyson and Wheelock made most of the configuration changes required to replace the pump module. They were unable to complete the task due to difficulty with one of the ammonia connections. In addition, the EVA crew had to spend time performing a "bake out" of their EVA suits to ensure that no ammonia was carried into the ISS, a situation that could prove deadly to the inhabitants. During each EVA, Walker supported from inside the ISS using the Space Station Remote Manipulator System. She did so without the normal benefit of practice runs and a secondary arm operator. On the second EVA, Caldwell-Dyson and Wheelock finished disconnecting and removing the broken pump module, and prepared the spare for installation, which they did on their third EVA.

If these EVAs had been unsuccessful, the ISS would have been left with a single external cooling loop supporting the United States On-Orbit Segment (USOS), which is one failure away from having to completely powerdown the USOS. That would force reduction of the crew size from six to three (if not completely demanning). Additionally, if ETCS Loop A had not been recovered, half of the Japanese Experiment Module and Columbus module would have been left unpowered, removing all redundancy in these modules and severely reducing the ability to support experiments.

For their unparalleled service to the International Space Station and its supporting space agencies, the crew of Expedition 24 is nominated for the FAI Korolev Diploma.

Annex 10

FAI - Fédération Aéronautique Internationale's Notes

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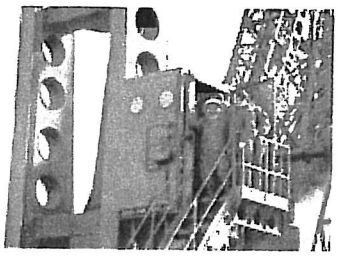
Celebrating 50 years of Manned Spaceflight - Part 1: THE PIONEERS

by FAI - Fédération Aéronautique Internationale on Tuesday, April 12, 2011 at 12:50am

Yuri Gagarin: first human being to leave the confines of the Earth's atmosphere

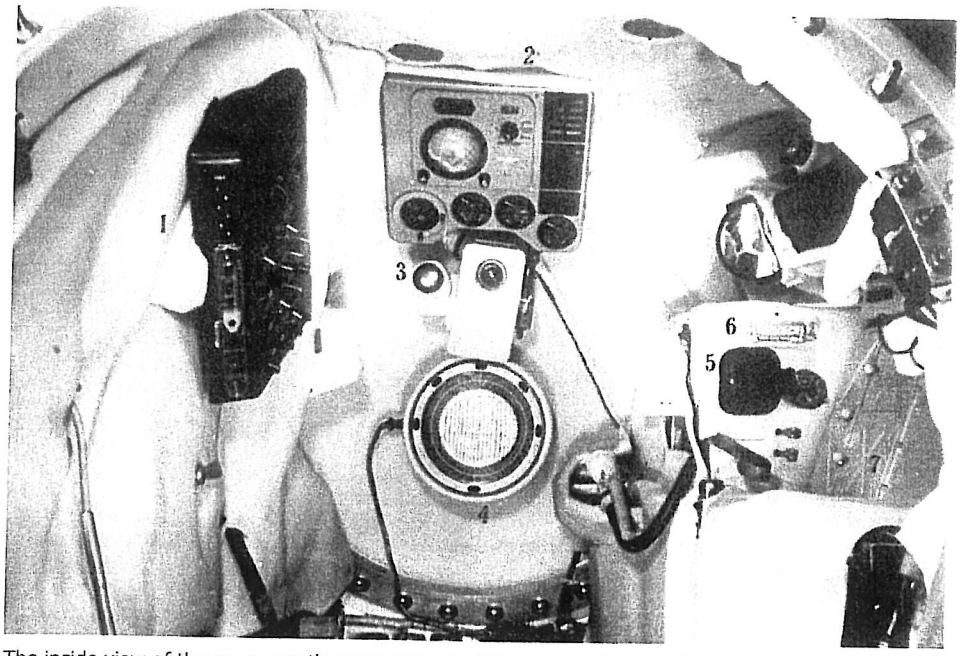
Pilot-cosmonaut Y.A. Gagarin in his flight suit

It was 50 years ago that man first ventured into space. On April 12, 1961, Soviet Cosmonaut Yuri Gagarin orbited the Earth in Vostok 1 (*Vostok 3KA-3*) on a flight lasting 108 minutes and became the first human being to leave the confines of the Earth's atmosphere. The space capsule was carried aloft by a Vostok 8K72K rocket, derived from the R-7 ICBM, from a launch site that was claimed to be at 47oN 65oE, not far from the mining town of Baikonur in Kazakhstan. In fact the true launch site was about 320km to the southwest, near Tyuratam railway station and the name 'Baikonur' was used to cause confusion and keep the location secret. Presently known as Gagarin's Start (45.920278oN 63.342222oE) the launch pad is part of the world's largest operational space launch facility now known as the Baikonur Cosmodrome.



Gagarin before entering "Vostok"

The full details of Gagarin's flight were submitted to the FAI by The USSR Central Aero Club V. P. Tchkalov on May 26, 1961, requesting that records for flight duration (108minutes), altitude (327km) and mass lifted to this altitude (4725kg) be recognised as World Records. Two copies of the Records File were provided, one in Russian and the other in English, each consisting of a title page and 16 numbered leaves, including Gagarin's own flight report signed in ink, and black-and-white photographs of Gagarin in uniform, Gagarin in his flight suit and an inside view of the Vostok capsule. Gagarin begins his statement by saying that *"On the 12th of April, 1961, the Soviet spaceship-sputnik 'Vostok' was put in orbit around the Earth with me on board"*. He goes on to describe briefly his training, physical fitness and the beginning of the flight "*... In the course of the powered flight, in the ascent period, g-loads and vibrations had no depressing effects on me and I could fruitfully work in accordance with a predetermined programme. The spaceship put in orbit and the carrier rocket separated, weightlessness set in. At first the sensation was to some extent unusual, although I had experienced weightlessness of short duration before. But soon I adapted myself ..... and could continue fulfilling my programme".* He *"ate and drank and maintained continuous communication with the Earth on different channels by telephone and telegraph".* He soon descends and lands uneventfully.



The inside view of the cosmonaut's compartment of the spaceship-sputnik "Vostok"
1.- pilot's desk; 2.- instrument panel with the globe; 3.- television camera; 4.- porthole with an optical orientation system; 5.- control handle of the spaceship orientation; 6.- radio receiver; 7.- food container

During the flight he also observes the Earth and *"could clearly distinguish big mountain ranges, big rivers, large forests, coastlines and islands..... The sky was jet black .....The Earth had a very pretty and distinct blue halo [which] had a smooth transition from pale blue to blue, dark blue, violet and absolutely black .... a magnificent picture".* He concludes, *"Thanks to a thorough training I experienced no discomfort from the effects of the space-flight factors. At present I feel fine. April 15, 1961."*

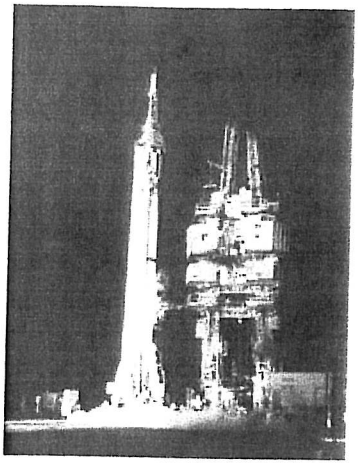
Gagarin directly after the landing is reporting by telephone to Nikita Khrushchev of the successful fulfilment of the first manned flight into space

Alan Shepard: first American to travel into space

Vehicle commander Alan Shepard

Gagarin's achievement launched a new era in the history of mankind. Further manned space flights occurred in quick succession. On May 5, 1961, Alan Shepard piloted the *Freedom 7* spacecraft and

became the second person, and the first American, to travel into space. He was launched by a Redstone rocket, and unlike Gagarin's 108 minute orbital flight, Shepard stayed on a ballistic trajectory suborbital flight - a flight which carried him to an altitude of 187 km and to a landing point 486 km downrange.



Mercury-Redstone on the pad

Beginning of the Apollo program

Following this success, President John F. Kennedy announced on May 25, 1961, the dramatic and ambitious goal of landing a man on the Moon and returning him safely to the Earth. This was the beginning of the Apollo program. Ten years later, Shepard commanded the Apollo 14 mission, and was the fifth person to walk on the Moon.

Gus Grissom: second American spaceflight

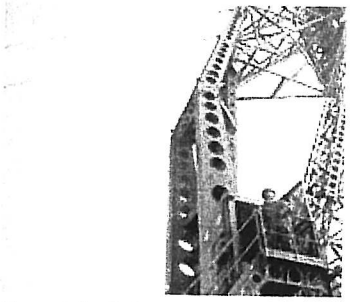
Shortly afterwards on July 21, 1961, Gus Grissom piloted *Liberty Bell 7* on the second American (suborbital) spaceflight. This was the second of seven manned flights in Project Mercury.

German Titov: Vostok 2

Pilot-cosmonaut German Titov on the way to the cosmodrome

Meanwhile the Soviet manned space programme continued and on August 6, 1961, German Titov completed over 17 orbits in Vostok 2, before returning to Earth safely at the beginning of the 18th orbit.

The flight was an almost complete success, marred only by a heater that had inadvertently been turned off prior to liftoff, allowing the temperature inside the capsule to drop to 10°C, a bout of space sickness, and a troublesome re-entry when the reentry module failed to separate cleanly from its service module. Once again the USSR Tchkalov Central Aero Club submitted the Records File to the FAI in support of World Record claims for Earth orbit flight duration (25h 18m) and distance flown (703150km).



German Titov before entering the spaceship Vostok 2

John Glenn: first American to orbit the Earth

The first American to orbit the Earth was John Glenn who made a total of 3 orbits in *Friendship 7* on February 20, 1962. Interestingly, he became the oldest person to fly in space, and the only one to fly in both the Mercury and Space Shuttle programs, when at age 77, he flew on Space Shuttle *Discovery* (STS-95) on October 29, 1998.