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capcom

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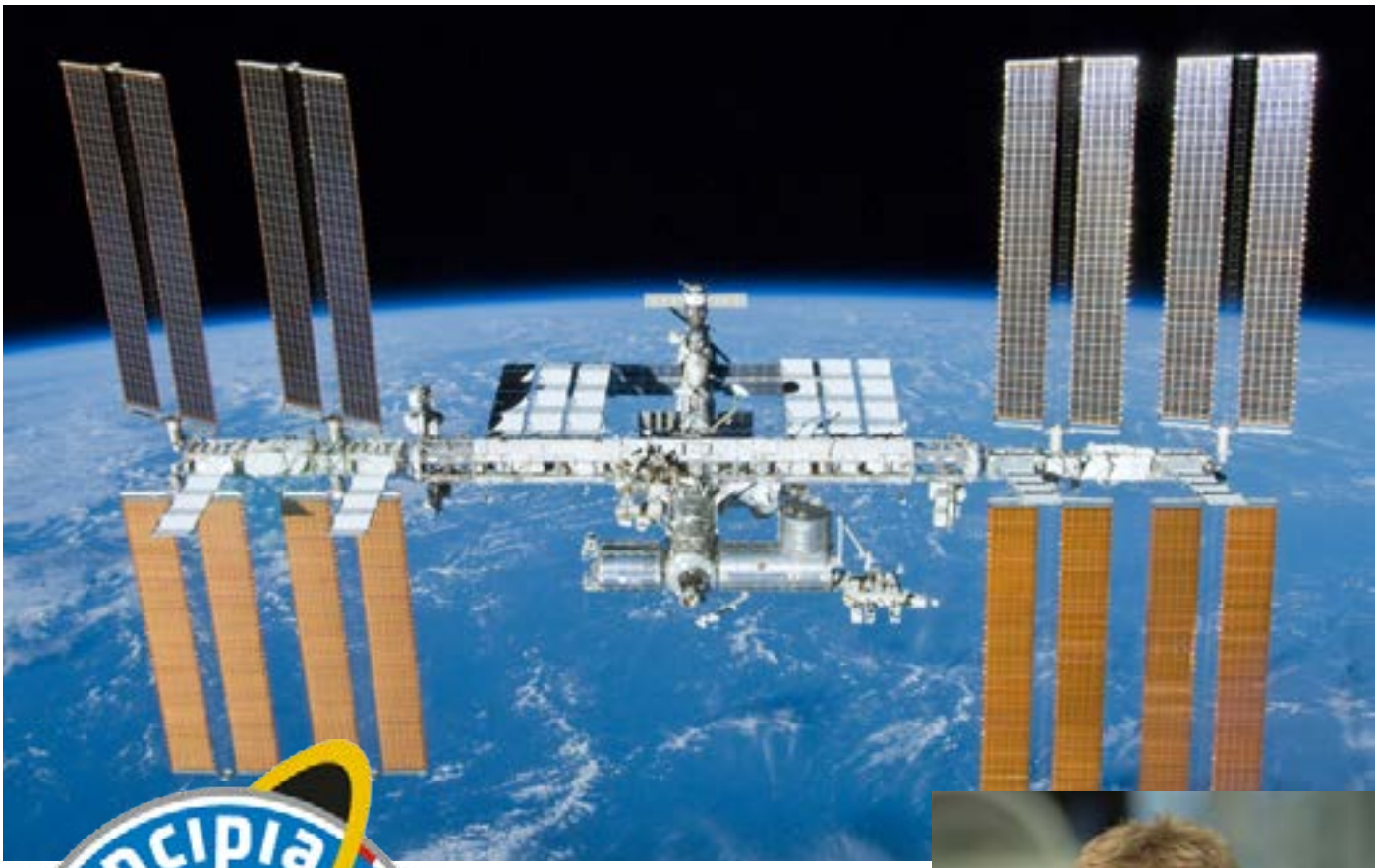
15 Years of ISS Operations



In this issue we celebrate 15 Years of ISS operations and the launch of the first UK Astronaut Major Tim Peake to the ISS in December on the Principia Mission

Images: NASA/ESA

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space news roundup

UK poised to wave astronaut Tim Peake on his journey to space

As British European Space Agency astronaut Tim Peake makes his final stop in the UK before his upcoming launch to the ISS, the UK Space Agency is pleased to announce that it will hold 4 large launch-day events in the nation's capitals and 16 smaller events at discovery and science centres across the country.

The announcement was made on 6th November by Minister for Universities and Science Jo Johnson at Tim Peake's final pre-flight press briefing at the Science Museum in London – the main venue for the London launch-day event.

The celebratory launch events will give more than 10,000 members of the general public the chance to take part in a variety of science and outreach activities and will air live footage of Tim's launch and docking.

Those who aren't able to attend one of the official events can still get involved in this momentous day by watching the launch via ESA TV or by organising their own event with assistance from the UK Space Agency's launch event pack, available for download on the Principia website.

The launch events will complement the £3 million programme of education and outreach activities being run by the UK Space Agency to harness the inspirational power of Tim's mission, bring the excitement of space to classrooms and venues across the country and encourage interest in STEM subjects.

Speaking at the press conference, Minister for Universities and Science Jo Johnson said:

Tim Peake's launch in December will be a historic moment for the UK in space, and marks the culmination of our partnership with the International Space Station.

Our £80 million investment in the International Space Station programme supports pioneering research and will inspire Britain's next generation of scientists and engineers to push the boundaries of science here on Earth.

Tim Peake added: I feel privileged to be part of this incredible adventure in international cooperation. During my training in recent months I have come to learn that none of this would have been possible without the efforts of many. Although my job is a very visible one, I would like to pay a tribute to the many colleagues who are making my mission possible. These are now my new friends in many Member States of the European Space Agency, as well as in Canada, Japan, Russia and the US. I feel part of a big family working for science, for new technologies, and for the education of our younger generation.

Launch

Tim will launch on a Soyuz spacecraft from Baikonur, Kazakhstan, at 11:02 GMT on 15 December 2015. Soyuz separation is expected at 11:13 GMT, ISS rendezvous at 16:58 GMT and hatch opening at 18:33 GMT.

Once the crew dock with the ISS they have to check out their systems and prepare for hatch opening. There is a vestibule between the Soyuz hatch and the ISS that must be pressurised and the pressures equalised before the hatches can be opened.

Once the hatches are opened, the new crew are greeted by those already on board (in Tim's case there will, unusually, be six crew members waiting to greet him as the departing crew are leaving after he arrives).

After the welcomes are over, a safety briefing includes familiarisation with all the fire extinguishers, breathing apparatus and pressure gauges, for example. Once that is complete the crew assemble in the Service Module (Zvezda) for a family conference (this is scheduled for 18.38 GMT). The newly arrived crew get to speak to their friends and family back at the launch site complex – this is broadcast live.

It is also possible that Tim will undertake a few activities on the first day – including the ESA experiment Space Headaches which involves a daily questionnaire for the first week.

After that, the crew will wrap up their working day and say goodnight to mission control. Tim will then have a chance to settle into his new home.

The next day Tim will get to work. The first couple of weeks on board the ISS have time built into the crew's schedules for getting used to living and working in weightlessness, but the science will begin in earnest from day 1.

UK Space Agency
https://www.gov.uk/government/organisations/uk-space-agency

Tim Peake - Britain's first International Space Station astronaut – on the BBC

On 15 December 2015, Tim Peake makes history as he launches into space - embarking on a six-month mission to become Britain's first ESA (European Space Agency) Astronaut and the first Briton to serve a mission on the International Space Station. The BBC's coverage includes a Horizon special, Stargazing Live Launch and Docking Shows, and Royal Institution Christmas Lectures.

The BBC will be the home of all things Tim Peake in the coming months with programmes and activity covering the launch, Tim's journey into space and regular updates and details of his time at the Space Station. These include Horizon Tim Peake Special in December on BBC Two, Blast Off Live: A Stargazing Special on BBC One in December and Live Docking Show (BBC Two) on 15 December, The Royal Institution Christmas Lectures: How To Survive In Space (BBC Four) and Stargazing Live (BBC Two) in January 2016. On CBBC, Blue Peter and Newsround will be covering the mission in depth and CBeebies Stargazing returns.

Kim Shillinglaw, Controller of BBC Two and BBC Four, says: "No other channels do science like BBC Two and BBC Four - programmes such as Stargazing Live and the Sky at Night are great watches that make a genuine contribution to our understanding of the wonders of our solar system. I'm thrilled that both channels, joined by content from across the BBC, will be bringing audiences every step of Tim Peake's incredible adventure in what is a really exciting moment for British science."

BBC Breakfast

BBC Breakfast will be live from the London Science Museum on 15 December ahead of the launch.

Horizon Tim Peake Special. Transmission: December on BBC Two

For the last two years, Horizon has had unprecedented and unique behind-the-scenes access as Tim trains for this six-month mission and for his launch from the Baikonur Cosmodrome on the 15 December

2015. Horizon also has exclusive access to Tim's own video diary. He has filmed every aspect of his training for launch in a Soyuz rocket (and the rollercoaster descent), life on board the International Space Station, spacewalks and the science he will be performing. The programme also exclusively features Tim's wife, Rebecca and his two sons as they prepare for life without husband and father. Narrated by Tim Peake, this Horizon gives us both an intimate portrait and remarkable insight into the world of an astronaut.

Blast Off Live: A Stargazing Special. Transmission: 15 December on BBC One

Following the success of the eclipse coverage on BBC One, Stargazing Live returns to the daytime schedule for a momentous one-off national celebration, as British astronaut Tim Peake blasts off to the International Space Station. Hosts Professor Brian Cox and Dara O Briain will be joined in the studio by a team of presenters and experts, as the clock ticks down to the lift off at 11.05am.

Stargazing Live Special: Tim Peake Docking. Transmission: 15 December on BBC Two

A special live event covering Tim's capsule docking with the ISS and him entering the station that same evening. The programme will give viewers a unique perspective of Tim's mission, and the scale of the achievement behind the International Space Station. Presented by Dara O Briain and Professor Brian Cox, the live broadcast will come from the Science Museum in London which will be the focus of national events to celebrate the Astronaut's launch.

The Royal Institution Christmas Lectures: How to Survive In Space. Transmission: December on BBC Four

In this year's Royal Institution Christmas Lectures, How to Survive in Space, space doctor Kevin Fong takes us on a ride from launch to orbit and to the cosmos beyond, following the mission of British astronaut Tim Peake. Space and technology allowing, Tim will be a part of the lectures from on board the International Space Station.

Stargazing Live: Transmission: January 2016 on BBC Two

Stargazing Live returns for its sixth season, following the successful Aurora and Total Eclipse-spotting spectacles of the last two series. This time, our highlight will be Tim Peake on-board the International Space Station. Time and technology allowing, Tim will chat with Professor Brian Cox and Dara O Briain, and share his experiences of life in space. Through a series of specially recorded video messages, he will show us how space has affected his body, reveal how he and the crew deal with the dangers of space, and the experiments he'll be doing throughout his historic mission on board. Stargazing will go behind the scenes at the European Space Agency's Astronaut training Centre in Cologne, where we will experience the kind of training that Tim Peake went through before taking off into space, including venturing into a centrifuge live on air.

CBeebies and CBBC

Children of all ages will be following Tim's mission with great interest and curiosity and BBC Children's have a wide range of programmes to reflect this. On CBBC, Newsround has been covering the Tim Peake mission in depth from the moment it was announced. The programme will be visiting Tim during the final part of his training in Moscow, and will have live coverage on TV and online of the launch, as well as all the latest from his mission on the International Space Station.

When Tim becomes the first British ESA astronaut to go to the International Space Station he'll be taking a part of Blue Peter with him, because last year he chose 13-year-old Troy's Mission Patch design for his space suit from thousands of Blue Peter viewers competition entries. Barney Harwood meets Tim in the ESA astronaut training facility in Cologne, to find out how he's feeling before he embarks on his mission and what experiments he'll be doing in space, and in the New Year Barney will travel to ESA Mission Control in Munich to find out how the International Space station is supported from the ground. He will tour the facility and control room and meet the team who keep spaceships in space.

For younger viewers, CBeebies Stargazing returns in January and there's lots of excitement about Tim's mission. There will be specially shot footage of Tim sharing with the young Stargazers what's involved in training to be an astronaut. And throughout the week, Tim will give updates on his mission. Pre-schoolers can get involved by downloading Tim's mission patch from the CBeebies Website, colouring it in and asking a grown up to upload their picture, giving Tim a 'Thumbs Up!'.

Radio

On the BBC Radio 2 Breakfast Show (weekdays 6.30am to 9.30am), Chris Evans will be catching up with Tim Peake while he's in orbit aboard the International Space Station at the start of his six-month mission.

Next February, BBC Radio 3 will have Great Leap Forward, five essays exploring how humans might live on other planets. On BBC Radio 6 Music, there will be a Guy Garvey's Finest Hour space special on Sunday 13 December, 2-4pm. Tim Peake will be suggesting tracks for the Songs For Guy feature – music he thinks Guy might not have heard and would love.

In When Britain Had The Right Stuff (BBC Radio 4 on 12 December) Richard Hollingham draws on little-heard radio and television archive from the 1950s as well as new interviews, and uncovers the forgotten history of Britons in space. He also asks why - after decades of indifference - the British government is now supporting space flight.

iWonder Guides

There will be a selection of BBC iWonder content available at bbc.co.uk/iwonder through November and December.

In Tim Peake: How I Became A British Astronaut, Tim Peake writes a timeline about his life and career, including his time as a school army cadet, flying Apache helicopters for the British Army, becoming a test pilot and his selection for the ESA astronaut corps. Featuring exclusive personal footage, including his time in the military, discover Tim's characteristics and qualities that have made him the perfect fit to be Britain's first European astronaut. (To be published on 6 November.)

In the guide Do You Have What It Takes To Be An Astronaut? Tim Peake welcomes you from Star City, Russia and lets you know the basic criteria for astronaut selection. You can then try three ESA approved sample tests of physical health, decision making and spatial ability. (To be published on 14 December.)

There will also be an historical timeline available, Britain's Hidden Role In The Space Race, which details how Britain's original spaceflight ambitions withered but were replaced by satellite brilliance and a key technological role in European space exploration, culminating in the recent Rosetta comet mission and Tim Peake's 'Principia' mission to the ISS. It is produced in collaboration with the Science Museum. (To be published on 7 December.)

Published on the BBC Media Centre Web Site: http://www.bbc.co.uk/mediacentre/latestnews/2015/bbc-tim-peake

ESA Member States Welcome Estonia

The Estonian flag is now flying at ESA sites alongside those of ESA's other Member States, after Estonia officially became ESA's 21st Member State on 1 September.

The Agreement on Estonia's accession to the ESA Convention was signed on 4 February 2015 by Jean-Jacques Dordain, then ESA Director General, Anne Sulling, Estonian Minister of Economic Affairs and Communications responsible for Foreign Trade and Entrepreneurship, Ene Ergma, Member of Parliament and Head of Estonian Space Committee, and Sven Jürgenson, Estonian Ambassador in France.

Following this signing, the process of ratification by the Estonian government began. This process was concluded last month, as of 1 September, Estonia deposited its instrument of ratification of the ESA Convention in Paris, becoming an official ESA Member State. Estonian delegates will participate in the various Committees and Programme Boards as full Member State from the Council meeting of 21–22 October onwards.

Estonia's cooperation with ESA started with the signature of a Cooperation Agreement on 20 June 2007 in Tallinn. Estonia strengthened its cooperation with ESA through the European Cooperating State Agreement signed on 10 November 2009.

ESA
http://www.esa.int

Hungary Becomes Esa's 22nd Member State

Following on from Estonia, the Hungarian flag is also now flying alongside those of ESA's other Member States, after Hungary formally became ESA's 22nd Member State on 4 November.

The Agreement on Hungary's accession to the ESA Convention was signed on 24 February 2015 by Jean-Jacques Dordain, then ESA Director General, with Ákos Kara, Hungarian Minister of State for Infocommunication and Consumer Protection, Ministry of National Development, and in the presence of Fruzsina Tari, Head of the Hungarian Space Office, also from the Ministry of National Development.

Following this signing, the process of ratification by the Hungarian government began. This process was concluded on 4 November, when Hungary deposited its instrument of ratification of the ESA Convention in Paris to become an official ESA Member State. Hungarian delegates will participate in the various Committees and Programme Boards as full Member State from ESA's Council meeting of 17 December onwards.

Hungary has a long history of cooperation with ESA; it was the first central European state to sign a Cooperation Agreement with ESA in 1991. The country also became the first European Cooperating State (ECS), signing the ECS Agreement on 7 April 2003 in Budapest.

ESA
http://www.esa.int

Orion's European Module Ready For Testing

A test version of ESA's service module for NASA's Orion spacecraft arrived in the US on the 9 November.

The European Service Module is adapted from Europe's largest spacecraft, the Automated Transfer Vehicle, which completed its last mission to the International Space Station in February. Just nine months later, prime contractor Airbus Defence & Space in Bremen, Germany, has delivered the first test module.

The module sits directly below Orion's crew capsule and provides propulsion, power, thermal control, and water and air for four astronauts. The solar array spans 19 m and provides enough to power two households.

A little over 5 m in diameter and 4 m high, it weighs 13.5 tonnes. The 8.6 tonnes of propellant will power one main engine and 32 smaller thrusters.

The structural test article delivered was built by Thales Alenia Space in Turin, Italy. Following initial tests in Europe, it will now undergo rigorous vibration tests in NASA's Plum Brook Station in Ohio to ensure the structure and components can withstand the extreme stresses during launch.

"This is the first major element of the European Service Module to be delivered to the US," notes Philippe Deloo, ESA's programme manager, "demonstrating the commitment of ESA to this human exploration endeavour."

More than 20 companies around Europe are working on the project, most building on their expertise earned from the five Automated Transfer Vehicles that delivered cargo to the Space Station and reboosted its orbit from 2009 to 2015.

The first, uncrewed, launch of the full Orion vehicle is planned for 2018 with the first European Service Module. It will fly beyond the Moon and back, returning to Earth at higher speeds than any other previous spacecraft.

During the mission, the module will detach shortly before entry into Earth's atmosphere.

ESA
http://www.esa.int

Ariane 5'S Sixth Launch This Year

An Ariane 5 has delivered two telecom satellites, Arabsat-6B and GSAT-15, into their planned orbits.

Liftoff of flight VA227 occurred on 10 November at 21:34 GMT (22:34 CET, 18:34 local time) from Europe's Spaceport in Kourou, French Guiana.

Arabsat-6B, with a mass at liftoff of 5798 kg and mounted in the upper position atop Ariane's Sylda dual-payload carrier inside the fairing, was the first to be released about 27 minutes into the mission.

Following a series of burns controlled by Ariane's computer, the Sylda structure encasing the 3164 kg GSAT-15 was then jettisoned. GSAT-15 was released into its own transfer orbit about 16 minutes after the first satellite.

Arabsat-6B, built by Airbus Defence and Space and Thales Alenia Space, is owned and operated by Arabsat, an Arab League intergovernmental organization. Positioned at 26°E in geostationary orbit, Arabsat-6B will provide TV broadcasting, broadband and telecommunications services over the Middle East, Africa and Central Asia. It has a design life of about 15 years.

GSAT-15, built and owned by the Indian Space Research Organization, will operate at 93.5°E in geostationary orbit to provide telecommunications services, as well as dedicated navigation-aid and emergency services for India. It has a design life of 12 years.

The payload mass for this launch was 9811 kg. The satellites totalled about 8963 kg, with payload adapters and carrying structures making up the rest.

Cygnus Launch next ISS resupply ...

The first flight of Orbital ATK's enhanced Cygnus spacecraft will carry more than 7,000 pounds of equipment and experiments to the International Space Station on a mission that marks the resumption of NASA's commercial resupply efforts. Standing inside the Payload Hazardous Servicing Facility at Kennedy Space Center in Florida, the 20.5-foot-tall, cylindrical Cygnus has been loaded for flight and will soon be bolted inside a protective fairing for its targeted launch date of 3 December.

The enhanced Cygnus can carry about 25 percent more mass than its predecessor and features upgraded Ultraflex solar arrays that unfurl like a fan into a circle and are lighter than the previous models. For NASA, the increased capacity brings the obvious benefit of taking more to the station at once, ranging from daily supplies of food and clothing for the station residents to new experiments so astronauts can continue to use the space-based laboratory to the benefit of all on the Earth.

Science payloads include a new life science facility that will support studies on cell cultures, bacteria, and other micro-organisms; a microsatellite deployer and the first microsatellite to be deployed from the space station; experiments that will study the behavior of gases and liquids and clarify the thermo-physical properties of molten steel; and evaluations of flame-resistant textiles.

In addition to the first flight of the enhanced version of the Cygnus, the launch marks the first use of the workhorse Atlas V rocket from United Launch Alliance (ULA) to lift a payload to the space station.

Cygnus will use autonomous systems and be guided by ground controllers to maneuver carefully near the space station until it is close enough for station astronaut Kjell Lindgren to grasp it with the station's robotic arm. Cygnus will then be moved into place and latched to the station for unloading. It will remain docked at the station for about three weeks.

Orbital ATK named the ship S.S. Deke Slayton II in tribute to the Mercury 7 astronaut who became a leader in commercial spaceflight.

The cargo includes numerous experiments across an array of specialties along with some student-devised projects. The laboratory facilities of the station have been vital in studying the effects on astronauts of long-duration spaceflight akin to the impacts crews might experience during future deep space missions and an eventual journey to Mars. Station commander Scott Kelly – who is more than 225 days into his yearlong residency in space – continues to take part in many of the experiments and observations so researchers can develop ways to counter effect conditions such as bone-loss that astronauts experience during long stays in weightless conditions.

Crew supplies including food, water and clothing also will be unpacked and stowed. The residents count on deliveries from an assortment of international cargo spacecraft to keep the station's pantry and closets full.

Station residents will load the empty spacecraft with equipment and unneeded items before it is released to burn up in the atmosphere.

NASA
http:www.nasa.gov

THOMAS PESQUET CLOSER TO SPACE WITH MISSION NAME PROXIMA

On 12 November 2015, ESA astronaut Thomas Pesquet revealed the name and logo for his six-month mission to the International Space Station starting next November.

Thomas will be the 10th astronaut from France to head into space and his mission name of Proxima continues the French tradition of referring to stars and constellations.

The name was chosen from over 1300 entries to ESA's competition earlier this year. The winner was provided by 13 year-old Samuel Planas from Toulouse, France.

The announcement was made in France's ministry for higher education and research in Paris, in the presence of secretary of state Thierry Mandon, ESA Director General Johann-Dietrich Woerner, and the president of France's CNES space agency, Jean-Yves Le Gall.

The logo continues the exploration theme, with star trails evoking future space travel and exploration beyond low-Earth orbit. Two stylised planets can represent our Earth and Moon or the Moon and Mars.

The 'x' in Proxima is centred in the middle of the patch to signify the star Proxima Centauri. It also refers to the unknown as well as Thomas being the 10th French space voyager.

The three vertical lines form the distinctive outline of the International Space Station as well as representing the colours of Earth, the Moon and Mars, while hinting at the French national flag. Minister Mandon handed Thomas a French flag during the press conference to carry into space.

Thomas commented: "I am really pleased with this mission name and the logo. It ticks all the boxes I had in mind by continuing the naming tradition for French astronauts and recognising the legacy of human spaceflight so far while also being forward-looking and futuristic."

Science first

As on all missions, as much time as possible will be spent on science. Thomas already has a full schedule performing experiments plus using

technology that will allow doctors on Earth to monitor his vital signs while he works.

With a year to go before launch, Thomas will continue the non-stop training since he was assigned as an ESA astronaut in 2009. Thomas flew to Paris for the announcement from training in Houston, USA, and will now fly to Star City in Russia.

ESA
http://www.esa.int

Fifteen Years of ISS Operations

By George Spiteri

This is a personal reflection and brief overview of 15 years of ISS operations

As a child of the sixties I grew up with the concept that Space Stations would look like the iconic wheel orbiting Earth in the film "2001: A Space Odyssey" or similar to the one in the Children's TV series "Space Patrol". The International Space Station (ISS) became modular in design having relied on a series of Russian rockets and US Space Shuttles to be constructed 250 miles above Earth.

Amazingly and sadly unbeknown to many people on Earth, there have been human beings living and working in space continuously since 31 October 2000 when the three person crew of Expedition One blasted off from Baikonur Cosmodrome and arrived two days later at the fledgling ISS.

Expedition One

American Bill Shepherd and Russians Sergei Krikalev and Yuri Gidzenko were the first crew to board the ISS which in 2000 consisted of the Russian Zarya and Zvezda modules and the US Unity node. Their mission lasted 136 days when they returned to Earth aboard Space Shuttle Discovery the following March.

STS 105 and Expedition Three

For this writer this mission was memorable as I had the privilege to visit the Kennedy Space Center and attend the launch, having obtained a press pass on behalf of the Midlands Spaceflight Society.

I achieved my childhood dream of standing next to the famous countdown clock to watch "Discovery" blast off into a clear blue sky on 10 August 2001, carrying its seven person crew including the third long duration crew to the ISS. The event was made doubly memorable as I also had the opportunity to witness the crew leaving the Operations and Checkout Building and enter the Astro Van en route to Pad 39A, an event that occurred twice as the launch was scrubbed the previous day due to the inclement Florida weather.

Space Shuttle tragedy affects ISS

The crew of Expedition Six were in space when they received news that the astronauts on STS 107 had been killed aboard "Columbia" during re-entry on 1 February 2003. The Shuttle disaster had implications for ISS missions as Ken Bowersox, Don Pettit and Nikolai Budarin were scheduled to return aboard Shuttle "Atlantis" the next month. However, with Shuttle missions suspended the crew had to use their Soyuz vehicle and ISS missions were temporarily downgraded to two person crews.

The ISS returned to three person crews when German astronaut Thomas Reiter joined Pavel Vinogradov and Jeff Williams during Expedition 13 in July 2006 with Shuttle flights having resumed a year earlier. By Expedition 20 the ISS had expanded to six person operations as it was originally intended and was truly an "international" spacecraft with representatives for the first time from all its member partners, US, Russia, Canada, Japan and Europe.

First European commander

Belgian Frank de Winne became the first commander of the ISS from outside the US or Russia when he led the crew of Expedition 21 in 2009. He was followed by commanders from Canada and Japan as the ISS also began to expand as Space Shuttles took up piece by piece most of the modules and solar panels necessary to assemble the orbiting outpost.

The Harmony, Columbus, Kibo and Tranquility modules were added to the ISS between 2007 and 2010. The astronauts' favourite piece of the ISS, the Cupola became part of the Station in 2010, offering panoramic views of the Earth below. The Russian Rassvet module was added to the complex a few months later almost completing the ISS as planned.

So many EVAs!

Spacewalks became a key element vital to construct, assemble and maintain the ISS. Astronauts and cosmonauts stepped out into the void of space nearly 200 times, totalling to almost 50 days of spacewalking duration. The spacewalks have assisted in adding the relevant modules and solar panels to the complex, conducted emergency repairs during ammonia leaks, not to mention performed photo opportunities with the Winter Olympic torch and as a result have provided some of the most spectacular photographs ever since the space age began. Who will ever forget the out of this world "selfie" taken by Mike Hopkins during his EVA in 2013?

In the future it is envisaged that robots such as R2 will conduct EVAs replacing humans. The ISS already has a wealth of robotic experience with Canadarm2, Dextre and the Japanese robotic arm and has conducted simulated Robotic Refuelling Missions outside the Station.

Work and exercise

Inside the ISS, the crews have conducted daily scientific experiments ranging from biological, physics, astronomy and Earth resources studies to performing routine maintenance to upkeep the vehicle. Astronauts and cosmonauts have had to exercise daily for two hours to help with the effects weightlessness has on the human body. Sunni Williams ran for over four hours on the Station's treadmill, completing the Boston Marathon as it took place on Earth in 2007!

ISS goes commercial

Since 2012 there have been a series of privately built spacecraft that have visited the ISS, sending critical supplies and scientific hardware to the crews. Elon Musk's Dragon vehicle was first to arrive, having been captured by Canadarm2 and berthed onto Harmony. Orbital Sciences Corporation Cygnus spacecraft also flew to the ISS a year later but exploded shortly after lift-off on its fourth flight to the ISS from its Wallops launch site in 2014. Unfortunately, the latest Dragon vehicle suffered a similar mishap two minutes after launch from Florida in June 2015.

Emergencies aboard the ISS

Crews regularly practice on board emergency evacuation and fire drills during their long duration missions. There have been occasions when that training has been vital during several minor emergencies that have occurred aboard the Station, for example in January 2015, the US crew had to don breathing masks as a precaution against a possible toxic leak and evacuate to the Station's Russian segment till the problem was resolved. Crews have also took shelter inside their Soyuz craft and prepared for an immediate return to Earth when the ISS has flown close to pieces of orbital debris.

A year in space

Most ISS flights have been approximately six months in duration. In March 2015, Scott Kelly and Mikhail Kornienko were launched in an attempt to complete the first year long ISS mission as a precursor to possible flights to Mars. This is also a first for the US space programme as no previous astronaut has stayed in space for that length of time. The Russians have considerable experience having had several cosmonauts orbit the Earth for a year and longer aboard their Mir Station in the 1980's and 1990's.

The future of ISS

The ISS is expected to remain in orbit till 2024. US crews are expected to be visiting the Station courtesy of US launched vehicles from American soil by then and the Russians have hinted that they may go it alone in the future, yet despite the political and cultural differences the ISS remains a monument to what nations can achieve in the peaceful exploration of space for the benefit of all people.

GAS

American Bill Shepherd and Russians Sergei Krikalev and Yuri Gidzenko were the first crew to board the ISS which in 2000 consisted of the Russian Zarya and Zvezda modules and the US Unity node (below). Their mission lasted 136 days when they returned to Earth aboard Space Shuttle Discovery the following March.

ISS Mission Update

By George Spiteri

Expedition Forty-Five is just over five weeks into its mission to the International Space Station (ISS). The orbital outpost is crewed by its new US Commander Scott Kelly and Flight Engineers, Russians Mikhail Kornienko, Oleg Kononenko, and Sergei Volkov, American Kjell Lindgren and from Japan, Kimiya Yui.

Japan launched its "Kounotori" ("White Stork") H-II Transfer Vehicle-5 (HTV-5) cargo vehicle from its Tanegashima launch site at 1250 BST (2050 local time) on 19th August following a three day delay due to poor weather at the launch site.

"Kounotori" was grappled by the Station's Canadarm2 at 1128 BST on 24th August and berthed to the Earth facing port of the Harmony Module over three and a half hours later at 1502 BST delivering 4.7 tons of critical supplies to the ISS, including the CALorimetric Electron Telescope (CALET) which will search for signatures of dark matter and sources of high energy cosmic rays and was transferred by Kibo's robotic arm at 1529 BST on 25th August to be installed on Kibo's External Facility.

Padalka, Kelly and Kornienko boarded Soyuz TMA-16M/42S and undocked it from the Station's Poisk Module at 0812 BST on 28th August. Soyuz then re-docked to Zvezda'a aft port 18 minutes later and the crew re-entered the Station approximately two hours later. This manoeuvre was necessitated by the imminent arrival of the next Soyuz the following week.

Soyuz TMA-18M/44S was launched from Baikonur at 0537 BST (1037 local time) on 2nd September, carrying veteran Sergei Volkov and rookies ESA's Andreas Mogensen from Denmark and Aidyn Aimbetov from Kazakhstan. Aimbetov was a late replacement for UK singer Sarah Brightman who withdrew from training in May 2015, citing family reasons. This was the 500th launch from the historic Site 1 where Yuri Gagarin lifted-off in 1961. Soyuz docked at the vacated Poisk Module at 0839 BST on 4th September and over two and a half hours later the hatches were opened with the ISS becoming home to a crew of nine for the first time since 2013.

Padalka relinquished Command of the Station to Kelly during the familiar ceremony on 5th September and after a week of joint activities Padalka, Mogensen and Aimbetov undocked Soyuz TMA-16M/42S from Zvezda at 2229 BST on 11th September to signal the official start of Expedition Forty-Five, leaving Volkov aboard the complex with his new crewmates.

Soyuz landed 90 miles South East of the remote town of Dzhezkazgan, Kazakhstan at 0151 BST (0651 local time) on 12th September completing for Padalka a flight of 168 days 5 hours 9 minutes, becoming the cumulative space endurance record holder with 878 days 11 hours 31 minutes over five missions and Mogensen and Aimbetov completed their shorter visiting flights of 9 days 20 minutes 14 minutes.

On 17th September, two CubeSats were launched from Kibo's airlock, one was aimed at observing the Ultraviolet spectrum during the Orionid meteor shower in October and the second was a Brazilian CubeSat aimed at gathering meteorological data. 14 more CubeSats were also deployed between 5th and 7th October including two from Denmark to study the tracking of ships on the high seas and another to track civil aircraft.

"Kounotori" was released by the Station's Canadarm2 at 1753 BST on 28th September, following a one orbit delay due to the arm automatically safing itself. The Japanese cargo vehicle was then sent to a destructive re-entry over the Pacific Ocean the following day, having completed its mission to the orbiting outpost.

The next cargo vehicle, Progress M-29M/61P was launched from Baikonur's Site 1 at 1749 BST (2249 local time) on 1st October and docked to Zvezda's aft port six hours later at 2352 BST delivering 3.1 tons of supplies to the crew.

As of 9th October, Kelly and Kornienko have completed nearly seven months of their planned year in space, Kononenko, Lindgren and Yui have spent 80 days in orbit and Volkov has logged 38 days aboard the orbiting outpost.

GAS

Grants for schools across the UK to celebrate British ESA astronaut's launch

To celebrate British European Space Agency (ESA) astronaut Tim Peake's mission to the International Space Station (ISS), ESERO-UK is launching the second round of the Tim Peake Grant Scheme.

The Grant Scheme is open to primary, secondary and post-16 schools across the UK. The scheme is designed to help schools mark Tim's historic mission with an imaginative and educational project which also involves their local community. Schools will be awarded up to £1,000 and encouraged to apply with creative and cross-curricular ideas. Some fantastic projects are already underway after successful applications in the first round of the Grant Scheme. With dozens of grants to allocate, the ESERO-UK team is excited to see what the next round of applications will bring.

The Tim Peake Grant Scheme is run by ESERO-UK, and is made possible by additional funding from the UK Space Agency. The deadline for submissions is 5pm on Monday 14 December 2015 – the evening before Tim flies to the ISS. For more information about the Tim Peake Grant Scheme, visit ESERO-UK.

Principia
www.principia.org.uk

Carolian Astronomy Society - Kidderminster

10th Anniversary Astro Day

To celebrate the 10th Anniversary of the group, Carolian Astronomy Society are holding an Astronomy/Space Day with three lectures plus space merchandise stalls at King Charles School, Comberton Road, Kidderminster. DY10 1XA.

Speakers are:

Dr. Andy Newsam: "Things that go Bump in the Night"

Jerry Stone "Is Pluto a Planet"

David Eagle "The Rosetta and Philae Missions"

More details at

www.carolianastro.co.uk

Astronaut News

By Rob Wood

Agenzia Spaziale Italiana - The Next Astronaut

The caller was Roberto Battiston, President of the Italian Space Agency (Agenzia Spaziale Italiana or ASI). The reason was to offer a veteran astronaut a third opportunity to fly in space. Paolo Nespoli told the story at the press conference held at the premises of the ASI in Rome on 30 July 2015, "When Professor Battiston called me to ask about my availability for a possible new mission I was surprised, because at that time I was trying to figure out whether I should change my polo shirt into jacket and tie. It was hard to say no", he said smiling. He explained that he was proud and honoured to be asked and just had to dust off his old STS-120 T-shirt with the tricolour flag and the logo of the ASI which he just so happened to be also wearing at the press conference.

The above is typical of Paolo Nespoli's humour. He is always friendly and approachable at outreach and other public events. He is also a consummate professional with a long history of public service. He is one of four active Italian astronauts with ESA. Samantha Cristoforetti who returned to Earth on 11 June 2015 after an extended 199 day stay on the International Space Station (ISS), Luca Parmitano who flew an ISS residency in 2013 and Roberto Vittori, a three time space veteran with flights in 2002, 2005 and 2011.

Earlier this year unofficial musings on the Internet suggested that Luca Parmitano would be the next European astronaut to receive a flight assignment. The mission was named as ISS residency 52/53, launching on Soyuz MS-5 in May 2017. This information came from a normally very reliable source, but on 26 June 2015 a different name came from a news release from the Yuri Gagarin Cosmonaut Training Centre. It reported that Paolo Nespoli was to start training for ISS 52/53.

A little over a month after the release of the Gagarin Centre news item, ESA and the ASI confirmed Nespoli's assignment to the public. The 30 July 2015 ESA news release also reported that the flight is part of a barter agreement between NASA and the ASI regarding Italy's contribution to NASA's ISS hardware with the Multi-Purpose Logistics Module (MPLM).

Three MPLM's were built and used to bring supplies to the ISS in the cargo bay of the US Space Shuttle. One of them was turned into a permanent module of the ISS and is used for storage on the space station. Although owned by NASA, Italy built the MPLM's. In exchange they received NASA research time on the ISS, hence an increase on their normal ESA astronaut allocation.

Nespoli's mission will be ASI's third long-duration flight under the barter agreement, following the missions of Parmitano and Cristoforetti. He will be 60 years old when he starts his third spaceflight and in September 2015 he was asked about this, "Age is secondary," he said. "You have to have the physical prerequisites but what matter most are competence and experience." He will take the record of ESA's oldest astronaut in space from Germany's Hans Schlegel who was 56 when he flew on STS-122 in 2008.

Paolo Angelo Nespoli (Major, Italian Army, Ret.) was born on 6 April 1957 in Milan, Italy, but grew up in a small town north of that city called Verano Brianza. At the age of 19, following his graduation from high school, he was drafted into the army. Italy still had National Service at this time and it was only on 24 October 2000 that the Senate of the Italian Parliament voted to end conscription into the Armed Forces from January 2003.

He volunteered to join the paratroop forces because he wanted the challenges of that branch of the Armed Forces. His National Service was supposed to last a year but he ended up staying for eight. He had never thought of a career in the military but he enjoyed what he was doing and decided to sign up for further service following his initial year.

As a non-commissioned officer, he worked as a parachute instructor at the Scuola Militare di Paracadutismo of Pisa. In 1980 he joined the 9th Parachute Assault Battalion 'Col Moschin' (Moschin Hill), based at Vannucci Barracks, Livorno. This unit is roughly the equivalent of the UK's Special Air Service Regiment. With 'Col Moschin' he deployed to Lebanon where he spent 18 months as a member of 'Mission Italcon' (1982-1984), which was the Italian contribution to the multi-nation peace keeping force.

Following his return to Italy in 1984, he received a commission and continued to serve as a Special Forces operator. He would also start thinking of the future. Like many born in the second half of the 1950's he grew up with grainy images of astronauts on the Moon and also like many he wanted to be an astronaut, but it was only at the end of his time in the army that he gave this goal serious thought. He spoke no English and had no degree so it looked a far-fetched idea but he believed it was not beyond his capabilities and so he decided to go for it.

He was technically still serving in the military until 1987 but he enrolled at the Polytechnic University of New York from 1985. This not only helped with his English language skills but also got him on the degree ladder. In 1988 he obtained a bachelor degree in Aerospace Engineering and in 1989 a master degree in Aeronautics and Astronautics, both from New York. In 1990 he added a second bachelor degree, this time in Mechanical Engineering, from the University of Florence.

He had returned to Italy in 1989 and took up employment with Proel Tecnologie in Florence as a design engineer. Whilst there he conducted work on the flight units of the Electron Gun, one of the main parts of the ASI's Tethered Satellite System (TSS). Two TSS satellites were eventually flown: TSS-1 on STS-46 in 1992 and TSS-1R on STS-75 in 1996.

In February 1989, he applied to be part of the ASI's second group of astronauts, which was being selected to work on the TSS Programme. He was one of the final ten candidates but not part of the final selection of four when they were named in May 1989. Two of those chosen went on to fly the TSS missions; Franco Malerba, who became Italy's first astronaut on the 1992 flight and Umberto Guidoni, who flew on the second with another Italian astronaut, Maurizio Cheli.

In 1991, he began working for ESA's European Astronaut Centre in Cologne, as an engineer involved in the training of astronauts. He contributed to the basic training programme and was responsible for the preparation and management of astronaut proficiency maintenance as well as the Astronaut Training Database, a system used for astronaut training. In 1995, he worked on the EuroMir project at ESA's ESTEC centre in Noordwijk, Netherlands, where he was responsible for the team that prepared, integrated and supported the computers used on Russia's Mir space station for the control of the experiments and to support the astronauts.

In 1996, he was assigned to NASA's Johnson Space Center (JSC), where he worked in the Spaceflight Training Division on training crews for the ISS. During his time as an ESA employee he worked on a number of European manned spaceflight missions and programmes including ESA's EuroMir 94 and EuroMir 95 flights, Germany's Mir 97 mission, and the Columbus space station module.

ESA had selected two groups of astronauts, one in 1977 and a second in 1992. Several member states, France, Germany and Italy, had their own astronaut teams. In 1998, they decided to unite their respective squads with the existing ESA core team to form a single European Astronaut Corps. At this time Italy had only one active astronaut, Umberto Guidoni. This was not sufficient for future plans and therefore the ASI held another recruitment exercise. In July 1998 they named two astronaut candidates who reported to the European Astronaut Centre in August 1998. The two were Nespoli and Roberto Vittorii.

The same month Nespoli relocated to the JSC and joined NASA's 17th astronaut class for the start of basic training. In 2000 he graduated from basic training and this made him eligible for advanced training, taking

on ground positions associated with actual manned space missions and eventual assignment to a space crew. In July 2001, he finished the Space Shuttle robotics arm course and in September 2003 he completed an advanced skills training programme for spacewalks.

In August 2004, he was assigned to the Yuri Gagarin Cosmonaut Training Centre for his initial training on the Soyuz spacecraft. He successfully passed his Soyuz training and returned to the JSC, where he maintained his qualifications and attended further courses. He also carried out technical duties for NASA, ESA and the ASI whilst awaiting a flight assignment.

On 9 June 2006, NASA and ESA both released the news that he had been assigned to the crew of STS-120, which was then looking to a summer 2007 launch. It would be autumn when the flight took place. STS-120 Discovery (23 October – 7 November 2007), delivered the 'Harmony' (Node 2) connecting module to the ISS. Nespoli was MS-4 for the mission. He served as the intra-vehicle crew member for the flights extra-vehicular activity (EVA or spacewalk) operations and had responsibility for a number of European backed activities in the fields of human physiology, biology and education.

Node 2 was part of a NASA/ESA barter agreement. ESA assigned responsibility for its development to the ASI in order to take advantage of their experience with the MPLM. It was designed and built by Thales Alenia Space at their branch in Torino, Italy. They had also created the MPLM's. In return for providing Node 2, ESA got a free Space Shuttle launch for their 'Columbus' ISS module which was attached to Node 2 in February 2008.

Similarly to his first spaceflight, the announcement of his second was released by NASA and ESA on the same date. On 21 November 2008 he was named as a flight engineer for ISS Expeditions 26/27 due to launch in November 2010. For this mission he would use the Soyuz spacecraft for launch and landing. As part of this assignment he served as a back-up flight engineer for Soyuz TMA-19/ISS-24/25, which was launched on 16 June 2010.

His second spaceflight was Soyuz TMA-20/ISS-26/27 (15 December 2010 – 24 May 2011). His duties during the mission were wide ranging. On the experimental level he carried out work for the European, US, Japanese and Canadian space agencies. He participated in docking operations of ESA and Japanese cargo spacecraft.

Sadly, on 2 May 2011, during the final weeks of his flight, Nespoli's mother, Maria Motta, died. The funeral took place on 4 May in the family's hometown. Half-an-hour after the funeral, as the ISS flew over Italy, all the crew observed a minute's silence and suspension of activities on the station as a mark of respect.

Following post flight rehabilitation, analysis and rest time he was assigned to ESA's ESRIN centre in Frascati, near Rome. ESRIN is the headquarters for ESA's Earth observation activities. In 2013 he was a cavenaut on ESA's CAVES (Cooperative Adventure for Valuing and Exercising human behaviour and performance Skills) 2013 mission (15-28 September). This took place on the Mediterranean island of Sardinia. The experiences gained from caving are considered to provide a convincing analog to space exploration.

On 25 June 2015, he was formally presented to the staff and management of the Yuri Gagarin Cosmonaut Training Centre prior to the commencement of his training on the Soyuz spacecraft and the Russian segment of the ISS. He was next off to the JSC. Further training will take place in Europe and Japan.

The Canadians In-Waiting

On 10 June 2013, Chris Hadfield announced his retirement from the Canadian Astronaut Corps. He had returned to Earth the previous month following his highly successful ISS residency. Up to and including Hadfield, 8 Canadian astronauts had flown 16 spaceflights plus a Canadian private spaceflight participant, Guy Laliberté.

With Hadfield's departure, this left the Canadian Space Agency (CSA) with just two active astronauts, Jeremy Hansen and David Saint-Jacques, neither of which had flown in space. This is the smallest number of active astronauts in the Canadian programme since they selected their first group in 1983. There is no further recruitment planned at present.

At the time of Hadfield's retirement there was a lot of pessimism in Canada about if another Canadian astronaut would visit the ISS. It was true that there was no immediate prospect of another residency but as long as they were patient, an often needed skill for an astronaut, then Hansen and Saint-Jacques had a chance of flying. Indeed, Hansen said that the agency had told him and his fellow rookie that the aim was to fly them both into space before the end of the decade.

Hansen said that many people suggest there is uncertainty about the future of Canadian space exploration. Giving an interview at the JSC he commented, "People use that term 'uncertainty' and I guess it's accurate in one context, that we don't know timelines. But there's not any uncertainty in my mind that we're going to continue as an agency."

In 2013, the CSA said that there would probably not be another of their astronauts on the ISS before 2016. By inference, suggesting that there might be one in 2016. That seemed a very optimistic statement even at the time. It was probably made with public consumption in mind as they must have known internally that it would be a lot longer than that. Provisional ISS crewing slots even then suggested that there was not even a tentative place for a Canadian astronaut before ISS Expeditions 62/63 (December 2019 to June 2020). There was some hope that a commercial crew vehicle might provide for another place, however, taking into account likely delays with the new vehicles then this could not realistically be expected before the end of the decade either.

As always, a major spanner in the works is government funding. The space agency's budget is quite modest and there had been questions asked about the government's commitment to space research. However, the Canadian Government's budget issued on 21 April 2015 included provision to continue as a partner in the ISS programme through to 2024 although at this time no monetary figures were given (This made Canada the third of the ISS International Partners to commit to an ISS extension after the USA and Russia. ESA and Japan have yet to agree but are expected to). This appears to open up a route to the space station for Canada's astronauts.

On paper this seemed very good news for the astronauts but it does rely on the Conservative Party winning the general election on 19 October 2015. Or does it? With the Liberal Party sniping at the Conservatives low space spending one would hope they would spend more not less. But I would not hold my breath regardless of what happens. Politicians say one thing out of power but once they have it there is no saying what they might do. Opinion polls for the Canadian election are all over the place and over the last month all three main parties are shown in winning positions although not with an overall majority (see Breaking News).

On 2 June 2015, the Canadian Conservative Government explicitly confirmed a commitment to fly two Canadian astronauts to the ISS, one by 2019 and a second by 2024. This is pretty much what the position looked likely to be back in 2013. If we assume that Canadian participation in the ISS will continue through to at least 2024 (and I do believe it will despite my normal pessimism about this sort of thing where politicians are involved), then Hansen and Saint-Jacques should make it into space as long as they 'stay the course'.

It was back on 31 March 2008 that Jim Prentice, Minister of Industry for Canada with responsibility for the CSA, announced a new astronaut recruitment drive. This was the third time the CSA has recruited astronauts. Six were chosen in 1983 and four in 1992. The application process opened on 24 May 2008 and by its close on 27 June 2008, 5352 persons had applied. The two successful applicants, Hansen and Saint-Jacques, were announced on 13 May 2009.

Jeremy Roger Hansen (Lieutenant-Colonel, RCAF) was born on 27 January 1976 in London, Ontario. He was raised on a farm but his main love was spaceflight. He cannot remember a time when he did not want to become an astronaut. He was fascinated by space exploration and turned his treehouse into a spaceship. He joined the Canadian Air Cadet Program at the age of twelve and obtained both glider and private pilot licenses through his participation in the cadets by the age of seventeen.

He has served in the Canadian Armed Forces since 1994. In 1999 he

received a bachelor degree in Space Science (First Class Honours) from the Royal Military College in Kingston, Ontario. There was a delay in pilot training so he decided to stay at the college and one year later he received a master degree in Physics. His research focus for his masters' degree was on Wide Field of View of Satellite Tracking.

He received his Royal Canadian Air Force (RCAF) pilot wings in 2002. From 2003 to 2004 he trained to be a fighter-pilot with the 410 Tactical Fighter (Operational Training) Squadron, part of '4 Wing', based at Canadian Forces Base (CFB) Cold Lake, Alberta, where he learned to fly the McDonnell Douglas CF-18 Hornet multirole fighter aircraft. For his operational career his home base remained at CFB Cold Lake with 4 Wing although he made several deployments to the USA and Europe.

In 2004, he joined 441 Tactical Fighter Squadron flying the CF-18. He was involved in North American Aerospace Defense Command (NORAD) operations, deployed exercises and arctic flying operations. When 441 stood down in 2006 he transferred to the newly reformed 409 Tactical Fighter Squadron, still operating the CF-18. His responsibilities included leading tactical formations and serving as a maintenance test pilot. From 2007, he was the Combat Operations Officer for 4 Wing; overseeing the effectiveness of NORAD air defense operations and the operability of deployed and forward operating bases.

He heard about the new astronaut recruitment drive from various sources. He was told by his parents who had seen the advert in a newspaper and he received emails and phone calls from friends and colleagues. Many people were aware of his interest but he had also seen it himself on CBS News.

He was selected as a Canadian astronaut in 2009 (CSA Group 3). He joined NASA's 2009 ascans (NASA Astronaut Group 20) for his basic training. This was successfully completed in 2011 and he was then assigned to duties in the ISS Operations Branch at the JSC. He was appointed a crew support astronaut for ISS Expeditions 34/35 (Chris Hadfield's mission), which launched on 19 December 2012.

He has participated in ESA's CAVES and NASA's NEEMO (NASA Extreme Environment Mission Operations) programmes. He was a cavenaut on CAVES 2013, caving on the Mediterranean island of Sardinia in September 2013 and an aquanaut during the NEEMO 19 undersea exploration mission to the Aquarius undersea research habitat off the coast of Florida in September 2014. The aim of these missions is to provide a convincing analog to space exploration.

David Saint-Jacques (Ph.D., M.D.) was born on 6 January 1970 in Quebec City, Quebec. In 1993, he received a bachelor degree in Engineering Physics from École polytechnique de Montréal, Canada, and in 1998 a Doctor of Philosophy degree (Ph.D.) in Astrophysics from Cambridge University, UK. In 2005, he earned a medical doctorate (M.D.) from Université Laval in Quebec City.

His Ph.D. studies included theoretical work on astronomical observation and design, fabrication and commissioning of instruments for the Cambridge Optical Aperture Synthesis Telescope and for the William Herschel Telescope in the Canary Islands. From 1999 to 2001 his postdoctoral research included the development and application of the Mitaka Infrared Interferometer in Japan and the Subaru Telescope Adaptive Optics System in Hawaii. In 2001 he joined the Astrophysics group at the Université de Montréal.

Following graduation as a medical doctor in 2005 he worked at McGill University's Faculty of Medicine in Montreal. He was also a clinical faculty lecturer whilst at McGill. From 2007, he was a medical doctor and the Co-Chief of Medicine at Inuulitsivik Health Centre in Puvirnituq, Canada, an Arctic village on Hudson Bay.

He was in Puvirnituq when he heard about the new astronaut recruitment. He was working late when a colleague briskly came into his office singing the song 'Fly Me to the Moon'. She told him, "Hey, they're recruiting astronauts, so you better apply." He was somewhat surprised because he had never expressed any thoughts about becoming an astronaut to anyone. It was if the World stopped for a second. He thought he had to try.

He was selected as a Canadian astronaut in 2009 (CSA Group 3). He joined NASA's 2009 ascans (NASA Astronaut Group 20) for his basic training. This was successfully completed in 2011 and he was assigned to duties in the Robotics Branch at the JSC. Like Hansen he has also participated in NEEMO and CAVES missions. In October 2011 he was an aquanaut during NEEMO 15 and in September 2012 he was a cavenaut for CAVES 2012.

[BREAKING NEWS: On 19 October 2015 the Liberal Party won an unexpected landslide victory and will form the new Government. Liberal MP and former Canadian astronaut Marc Garneau successfully defended his seat gaining an impressive increased majority. Let us hope he proves to be a friend of the space programme. He is tipped to get a cabinet post.]

Ready for Duty

Most months NASA Administrator Charles Bolden issues a blog post. In his blog of 9 July 2015 was the passage, "I also want to take this opportunity to offer a special word of congratulations to astronaut candidates from the class of 2013, who are transitioning into flight-ready status." We know this better by the terminology 'active astronauts'.

On 17 June 2013 NASA announced the selection of its 21st group of astronauts. Eight were picked from the second largest number of applications in NASA's history. From 15 November 2011 to 27 January 2012 a total of 6,372 were received. These numbers were only beaten by the 1978 class which had seen 8,079. The eight new astronauts reported to the JSC in August 2013 to begin their basic training.

Their basic training included Russian language learning, scientific and technical briefings, instruction about ISS systems, tutoring on EVA operations, robotics guidance, physiological schooling, T-38 flight training, and water and wilderness survival training. They successfully completed basic training in July 2015 making them eligible for technical duties in the Astronaut Office and flight assignment. Brief details of the eight newly active astronauts follow:

Josh Aaron Cassada (Lieutenant Commander, USN, Ret., Ph.D.) was born on 18 July 1973 in San Diego, California. He has bachelor (1995) and master (1997) degrees in Physics from Albion College, Michigan and followed this with his doctorate, also in Physics, from the University of Rochester (2000).

He was commissioned in the United States Navy (USN) in June 2000 and qualified as a naval aviator the following year. He flew the Lockheed P-3C Orion four-engine turboprop anti-submarine and maritime surveillance aircraft from October 2002 for three years. He has flown 23 combat missions in support of US forces in Iraq. He is a graduate of the US Naval Test Pilot School at Patuxent River (or Pax as it is commonly referred to), Maryland (December 2006). He worked in test flying at Pax from January 2007 with the Air Test and Evaluation Squadron 20.

He was one of 50 USN candidates for astronaut selection in 2008 and was interviewed by the NASA astronaut selection board. He was not part of the group (number 20) when it was announced in 2009.

He became an instructor pilot at the US Naval Test Pilot School from January 2009 for about two years. From February 2011 to April 2013 he managed oversight for $28 billion worth of Department of Defense aviation contracts with the Boeing Company as part of the Defense Contract Management Agency in Seattle. At the same time he was the Navy's chief acceptance test pilot for the P-3C replacement, Boeing's P-8A Poseidon. He retired from the Navy in April 2013 according to official records.

In March 2013 he was a co-founder of Quantum Opus LLC and from April 2013 became its Chief Technology Officer. The aim of the company is to provide researchers with high-efficiency, high-speed photon detectors that will enable next-generation experiments in quantum optics, optical quantum computation, single-photon communication, low-flux biophotonics and remote sensing. He stepped down from Quantum for his ascan training.

Victor Jerome Glover (Lieutenant Commander, USN) was born on 30 April 1976 in Pomona, California. He has a bachelor degree in General

Engineering (1999) from California Polytechnic State University and two master degrees, firstly in Flight Test Engineering (2007) from the Air University, Edwards Air Force Base (AFB), California and secondly in Systems Engineering (2009) from the Naval Postgraduate School. In 2010 he received a Master of Military Operational Art and Science degree from the Air University, Montgomery, Alabama.

He joined the USN in 1998, receiving his commission in 1999. He qualified as a naval aviator in 2001. As a McDonnell Douglas F/A-18C Hornet twin-engine supersonic, all-weather carrier-capable multirole fighter jet pilot with Strike Fighter Squadron (VFA) 34 he flew 24 combat missions during the US invasion of Iraq in 2003. He spent a little over 3 years serving with VFA-34 before, in 2006, he commenced test pilot training at the United States Air Force (USAF) Test Pilot School at Edwards Air Force Base under an Air Force/Navy exchange programme.

He graduated from Edwards in 2007 and was the recipient of his test pilot class' Onizuka Prop Wash Award. The award is named for Ellison Onizuka who lost his life on the Challenger Space Shuttle in 1986 and is awarded by the students in the class to the pilot who contributed most to class spirit and morale. He spent the next two years with Air Test and Evaluation Squadron 31 based at the Naval Air Weapons Station, China Lake, California.

He applied to join the 2009 NASA astronaut group but was not called for interview prior to final selection. Between 2010 and 2012 he served with VFA-195 as a Boeing F/A-18E Super Hornet twin-engine carrier-based multirole fighter aircraft jet pilot. From November 2012 he served as a Navy Legislative Fellow in the US Congress. He was serving in this role when he was selected as an astronaut. In 2013 he received a Certificate in Legislative Studies from Georgetown University.

Tyler Nicholas 'Nick' Hague (Lieutenant Colonel, USAF) was born on 25 September 1975 in Belleville, Kansas. It is a case of 'third time lucky' for Hague because he had applied for astronaut selection for both the previous classes. He got as far as the interview stage in 2008 for the 2009 selection but did not make it that far for the 2004 group.

He has a bachelor degree in Aeronautical Engineering (1998) from the United States Air Force Academy and a master degree in Astronautical Engineering (2000) from the Massachusetts Institute of Technology ((MIT), Cambridge. He is an USAF flight engineer but also has a private pilot licence. From June 2000 to December 2002 he was assigned to the Space Vehicles Directorate of the USAF Research Laboratory at Kirtland AFB where he worked on solar panels for spacecraft and advanced systems for missile interception.

In December 2003, he graduated from the USAF Test Pilot School at Edwards. He was then assigned to the 416th Flight Test Squadron of Edwards' 412th Test Wing where he was involved in the testing of several aircraft. He also helped adapt a Beechcraft C-12 Huron twin-engine turboprop aircraft to carry thermal sensors and ground penetrating radar. He then deployed to Iraq with the aircraft between November 2004 and April 2005 where he flew 139 combat missions on the C-12 during the US occupation. He was part of Operation Horned Owl, where he conducted experimental counter-IED (Improvised Explosive Device) operations.

At the time of his deployment to Iraq he was technically still based at Edwards. His assignment there ended in June 2006 when he was assigned as an instructor at the USAF Academy. He was Assistant Professor of Astronautics there until July 2009 and was then posted as an Air Force Legislative Fellow in Washington DC. At the time of his selection as an astronaut he was supporting the Department of Defense as Deputy Division Chief of the Joint Improvised Explosive Device Defeat Organization. Following his ascan training he was assigned to the ISS Operations Branch of the Astronaut Office.

Christina Marie Hammock was born on 2 February 1979 in Grand Rapids, Michigan. She has two bachelor degrees from North Carolina State University, firstly in Electrical Engineering (2001) and secondly in Physics (2002). Also in 2002 she earned her master's degree in Electrical Engineering from the same University.

She received funding for her education from the Astronaut Scholarship Foundation (ASF). The ASF is a charity organisation originally founded by the Mercury astronauts in 1984. Now, over one hundred astronauts participate in fundraising for the charity together with the support of corporate and individual donors. She is the first of their scholars to be selected as an astronaut although many others have worked within the space industry.

She joined NASA's Goddard Space Flight Center in 2002 and spent two years as an electrical engineer. Between 2004 and 2007 she worked as a research associate for Raytheon Polar Services and this included a winter-over at Amundsen–Scott South Pole Station in Antarctica for the 2005/6 season as well as time working at Palmer Station, which is also located in Antarctica.

From 2007 to 2009 she worked for the Space Department's Space Science Instrumentation Group at the Johns Hopkins Applied Physics Laboratory. During her time there her main focus was on three particle detector instruments: the Jupiter Energetic-particle Detector Instrument, launched on the Juno deep space mission to Jupiter in 2011; the Van Allen Probes' Ion Composition Instrument, which was launched in 2012 to study the Van Allen radiation belts that surround our planet; and similar devices for the Magnetospheric Multiscale mission launched in March 2015 to study Earth's magnetosphere.

In January 2010, she returned to Raytheon Polar Services as an electronics technician and worked under contract to the National Oceanic and Atmospheric Administration (NOAA). She spent part of the 2011/12 winter at Summit Observatory in Greenland, a NOAA Baseline Observatory and in January 2012 moved to the Alaska Observatory near Barrow. From August 2012 she continued her work as an electronics technician at the American Samoa Observatory before taking over as Station Chief in October 2012.

Nicole Victoria Aunapu Mann (Major, USMC) was born on 27 June 1977 in Petaluma, California. She has a bachelor degree in Mechanical Engineering (1999) from the United States Naval Academy, Annapolis, and also a master degree in the same discipline (2001) from Stanford University, California. She was commissioned into the United States Marine Corps (USMC) in 1999 and then entered flight school. She earned her wings as a Naval Aviator in 2003. She was captain of the Navy soccer team and became one of the most decorated women's soccer players in Patriot League history.

She is a McDonnell Douglas F/A-18C Hornet twin-engine supersonic, all-weather carrier-capable multirole fighter jet pilot and served on the aircraft carrier USS Enterprise. She flew 47 combat missions over Iraq and Afghanistan off the Enterprise in 2006 and 2007 during the US occupations of those countries. Her husband is also an F/A-18 pilot but for the USN where he is a lieutenant commander. They met at flight school in 2002 and married in 2009. They have a son, Jack, who was born in 2012.

She entered the US Naval Test Pilot School at Pax in 2008 and graduated the following year. She was then assigned to the US Naval Air Station (NAS) at Pax as a test pilot and operations officer for Air Test and Evaluation Squadron 23. At the time of her selection as an ascan she was serving as an Integrated Product Team Lead at Pax.

Anne Charlotte McClain (Major, US Army) was born on 7 June 1979 in Spokane, Washington. She spent a year in the Reserve Officers' Training Corps (ROTC) programme at Gonzaga University before attending the US Military Academy at West Point, New York. The ROTC is a military scholarship programme funding students in return for military service following graduation. She graduated from West Point in 2002 with a bachelor degree in Mechanical/Aeronautical Engineering.

She was one of the army's top softball players and during her time at West Point was a member of the Army's West Point Black Knights softball team. She was a three-time Patriot League Academic Honor Roll selectee (1999, 2001 and 2002) and played with two Black Knights' squads that advanced to the Softball Championship National Collegiate Athletic AssociationTournament. Not content with being a top softball player she also played Rugby and was part of the USA Rugby Women's National Team (2004 to 2006, and 2010 to 2012) and Captain of USA Rugby South Women's XV All-Stars (2009 to 2011).

She received a Marshall Scholarship in 2002, which she used to fund her master degrees in the United Kingdom. The Marshall Scholarship selects about 40 (37 in the year McClain was accepted) US students each year and is provided by the UK Parliament. It has its origins in the post-World War Two Marshall Plan, via which the USA helped Europe recover from the war. The scholarship was created as a gift in recognition of this. McClain spent three years in the UK and received a master degree in Aerospace Engineering from the University of Bath in 2004 and a second master in International Security from the University of Bristol in 2005.

She was commissioned as an Army officer in 2002 before attending graduate school in the UK. Following graduate school she underwent Army flight training and qualified as a Bell OH-58D Kiowa Warrior, single-engine, single-rotor, helicopter pilot, which is used for armed reconnaissance and ground combat support. She was assigned to the 2nd battalion of the 6th Cavalry Regiment and in July 2006 was deployed to Iraq as part of the US occupation forces. Over the next 15 months she flew 216 combat missions accumulating about 850 hours in the air.

She applied to join the 2009 NASA astronaut group but was not called for interview prior to final selection. In June 2009 she was assigned to the US Army Aviation Center of Excellence at Fort Rucker in Alabama where she qualified as a flight-instructor on the Kiowa Warrior. She continued her assignment at Fort Rucker until she was accepted into the US Naval Test Pilot School at Pax. She started training there in July 2012 and graduated on 15 June 2013.

On 6 June 2013, just prior to her graduation from Pax the astronaut applicants heard of their fate. McClain received the telephone call from NASA enquiring whether she was still interested in the position of astronaut. She said "I couldn't stand, I couldn't breathe and then there were tears." But she recovered enough to joke about checking her schedule before quickly laughing and saying "Of course."

Jessica Ulrika Meir (Ph.D.) was born on 15 July 1977 in Caribou, Maine. She has a bachelor degree in Biology from Brown University, Providence, Rhode Island, in 1999. Whilst at Brown she was part of a student team that submitted a proposal under NASA's Reduced Gravity Student Flight Opportunities Program. Her team was successful and she got her first taste of microgravity when she flew on NASA's Boeing KC-135 Stratotanker aircraft (nicknamed the 'vomit comet'), during parabolic arc manoeuvres.

She then attended the International Space University (ISU) in Strasbourg, France, where she graduated from the ISU Master of Space Studies Programme in 2000. At the ISU she worked on a team project on the use of an Autonomous Lunar Transport Vehicle that would operate between two lunar craters. During her time at ISU she also got her second taste of microgravity, this time on the French Space Agency's version of the vomit comet the Airbus A-300 aircraft.

Between the end of her studies at the ISU in 2000 and the start of her doctorate in 2003 she worked for Lockheed Martin Space Systems Company as a support scientist at the JSC. She was involved in human physiology space experiments for the Space Shuttle and the ISS, science liaison, astronaut crewmember training, and ground support in NASA's Mission Control Center. Again she added to her time spent in microgravity with further flights on NASA's aircraft flying parabolic arcs.

In September 2002, she was one of the aquanauts on NEEMO 4, a NASA undersea mission to test exploration concepts whilst living in an underwater facility off the Florida coast. She helped coordinate the life sciences experiments. She was interviewed by the NASA astronaut selection board in 2008 but was not selected when the group (number 20) was announced in 2009.

She received her doctorate in Marine Biology from the Scripps Institution of Oceanography, University of California, San Diego, in 2009. From 2009 to 2012 she was a post-doctoral researcher at the University of British Columbia in Canada. In September 2012 she was appointed as an Assistant Professor at Harvard Medical School, Massachusetts General Hospital, Boston. Over the years she has conducted considerable research on animals in extreme environments.

She has said she has dreamt about flying in space since she was five and was looking forward to her training especially the part about flying in jets, "I have my private pilot's license," she said, "but I'm really excited about going to Pensacola for real flight training in jets." She has about 180 hours of flight time but is clearly eager for more.

Andrew 'Drew' Richard Morgan (Lieutenant Colonel, US Army, M.D.) was born on 5 February 1976 in Morgantown, West Virginia. He is from a military family, with his grandfathers, his father and his brother having spent time in service. His father served for 24 years in the air force and retired with the rank of Colonel. With this family history is it really that surprising to find reading military history listed as one of his hobbies.

He has a bachelor degree in Environmental Engineering from the US Military Academy at West Point. Whilst there, he was a member of the cadet demonstration and competitive parachute team. He would later jump with the Golden Knights, the army parachute team and was a team physician. In 2002 he earned a doctorate in medicine from the Uniformed Services University of the Health Sciences, Bethesda, Maryland. In 2005 he completed a residency in Emergency Medicine, University of Washington.

He has experience as an emergency combat physician and flight surgeon for the Army special operations community. He has undertaken tough training, including Ranger School and is a trained Scuba and rescue diver. He spent three years as Battalion Surgeon for 1st Battalion, 3rd Special Forces Group (Airborne) 'Desert Eagles'. He has served in Iraq, Afghanistan and Africa and has treated soldiers in combat situations. He said, "I've taken care of many brave soldiers in combat, unfortunately not all of them made it."

At the time of his selection as an astronaut he was completing a sports medicine fellowship via Virginia Commonwealth University and preparing to move his family to Stuttgart for a three-year posting. The later destination changed to Houston, Texas. Following his ascan training he was assigned to the EVA/Robotics Branch of the Astronaut Office.

Engineer Cosmonaut Takes up New Job at Energiya

In about March 2015, Yevgeni Tarelkin was provisionally assigned to Soyuz MS-6/ISS Expeditions 53/54, the third Soyuz/ISS residency crew for 2017 due to launch at the end of September of that year. However, on 1 June 2015, he was dismissed from the Cosmonaut Team of the Yuri Gagarin Cosmonaut Training Centre at his own request in order to take up an appointment at the S P Korolyov Rocket-Space Corporation Energiya (RSC Energiya).

Yevgeni Igorevich Tarelkin (Lieutenant-Colonel, Russian Air Force, Ret.) was born on 29 December 1974 in Chita, Southeast Siberia, Russia, where his parents were serving in the Soviet Armed Forces. In 1996 he graduated from the Yeysk Higher Military Aviation School. Two years later he graduated from the Yuri Gagarin Air Force Academy as a specialist in air transport operation and air traffic management.

He was posted to the Yuri Gagarin Cosmonaut Training Centre in October 1998 where he served as a flight test engineer and later as a senior flight test engineer. He was a cosmonaut training instructor in support of cosmonaut winter, water and desert survival training; special parachute training and microgravity parabolic flight training aboard the Ilyushin-76 MDK aircraft.

On 1 March 2002, he passed the Chief Medical Commission for fitness to proceed to cosmonaut training and on 29 May 2003, he was formally accepted as a candidate cosmonaut by the Interdepartmental Commission. Basic training ran from 16 June 2003 to 27 June 2005 when he passed the state examinations at the Yuri Gagarin Cosmonaut Training Centre. He was officially confirmed as a 'Test Cosmonaut' by the Interdepartmental Qualification Committee on 5 July 2005. This made him eligible for advanced training, taking on ground positions associated with actual space missions and eventual assignment to a space crew.

In 2010, he was assigned to back-up and prime crews. He was a back-up flight engineer for Soyuz TMA-04M/ISS-31/32, which was launched on 15 May 2012, before making his only spaceflight on Soyuz TMA-06M/ISS-33/34. The Soyuz launched from Baikonur on 23 October 2012 and two days later docked with the ISS. He returned to Earth on 16 March 2013. He was designated a flight engineer for both Soyuz and the ISS.

Shortly after landing Tarelkin, together with his Soyuz commander Oleg Novitsky, were flown back to the Yuri Gagarin Cosmonaut Training Centre for post-flight checks. Within a day of the landing they conducted a test where they simulated a controlled descent from orbit to the surface of Mars using a centrifuge. The experiment was to check on the ability of cosmonauts to carry out landing operations following a prolonged spaceflight. This experiment was followed up four days later by them carrying out a simulated EVA on Mars. They wore spacesuits and were suspended on lifting slings which were set to simulate Mars Gravity (roughly about a third that of Earth). Both tests were successful.

As well as being a big year for Tarelkin with the start of his spaceflight, 2012 was also a big year for the Yuri Gagarin Cosmonaut Training Centre and all of its military cosmonauts. The centre was put under civilian control and it was no longer considered a posting for serving military personal. They were given the option of resigning from the military or re-assignment to another place. Serving military cosmonauts were also allowed to leave the military and join the cosmonaut team as civilian specialists. Tarelkin chose to remain a cosmonaut and in the summer of 2012 he retired from the Armed Forces of the Russian Federation.

Following his spaceflight Tarelkin was awarded the title 'Hero of the Russian Federation', the highest award that can be bestowed on an individual in Russia. Following post-flight rehabilitation he remained a test cosmonaut available for reassignment. In March 2015, news appeared on the Internet of his preliminary appointment to a new crew. However, this had yet to be confirmed by the Interdepartmental Commission for the selection of cosmonauts and their appointment to space crews.

In the event, according to the information presented on the Novosti Kosmonavtika message board, he decided not to accept the new assignment and requested his own dismissal from the Cosmonaut Team. This was in order to join RSC Energiya where he took up a position in the division led by Mark Serov, a former cosmonaut.

Astronaut Drain Continues Apace – part one

In the last issue I wrote of Nicole Stott's retirement from NASA. Stott's last official day at the space agency was 31 May 2015 but it was in July that changes occurred at pace in NASA's astronaut corps. Three astronauts transitioned from active status to management status (euphemism for 'no longer on flight status' but still working for NASA in some capacity until such time as they get fed up and call it quits); we had a new Chief Astronaut (see last issue); ascans from 2013 had completed their training (see earlier story) and three astronauts left NASA.

On 7 July, we learned that Cady Coleman, Rick Mastracchio and Steve Swanson had joined the ranks of management astronauts. On 10, 13 and 31 July respectively we heard that Tony Antonelli, Stephen Frick and Michael Foreman had called time on their NASA careers. The following month we found out that Swanson had also decided to call it quits.

Coleman, Mastracchio and Swanson had between them accumulated over 600 days in space on ten spaceflights, in over 50 years-service as active astronauts. Antonelli, Frick and Foreman were less experienced but each had made two spaceflights and spent over 10 years as an active astronaut.

Catherine Grace 'Cady' Coleman (Colonel, USAF, Ret., Ph.,D.) was born on 14 December 1960 in Charleston, South Carolina. She has degrees in Chemistry and Polymer Science/Engineering. Commissioned into the USAF in 1983 she served for 26 years. Selected as an astronaut in 1992 (NASA Group 14), she flew on STS-73 (1995), STS-93 (1999) and Soyuz TMA-20/ISS-26/27 (2010/2011). She spent 180 days in space over her three spaceflights.

Richard Alan 'Rick' Mastracchio was born on 11 February 1960 in Waterbury Connecticut. He has degrees in Electrical Engineering, Computer Science and Physical Science. His work included time spent with the Rockwell Shuttle Operations Company at the JSC. He joined NASA as an engineer in 1990 and worked in Mission Control (1993-1996). Selected as an astronaut in 1996 (NASA Group 16), he flew on STS-106 (2000), STS-116 (2007), STS-131 (2010) and Soyuz TMA-11M/ISS-38/39 (2013/2014). He spent 227 days in space.

Steven Ray 'Swanny' Swanson (Ph.D.) was born on 3 December 1960 in Syracuse, New York. He has degrees in Engineering Physics, Computer Systems and Computer Science. He joined NASA in 1987 as a systems engineer and flight engineer working on the Grumman Gulfstream-II Shuttle Training Aircraft. Selected as an astronaut in 1998 (NASA Group 17), he flew on STS-117 (2007), STS-119 (2009) and Soyuz TMA-12M/ISS-39/40 (2014). He spent 195 days in space. His last official day as a NASA employee was 30 August 2015.

Astronaut Drain Continues Apace – part two

It looked possible that he would receive an assignment for a tour on the ISS and then he seemed a probable for a position as one of the test astronauts for the commercial crew vehicles but in the end he got neither. I must admit, I was surprised not to see Tony Antonelli as one of the named astronauts when the Commercial Crew Flight Crew announcement was made on 9 July 2015. The four named were Robert Behnken, Eric Boe, Douglas Hurley and Sunita Williams (see last issue).

For the July/August 2015 CapCom, I penned a speculative piece on who would be chosen as the test astronauts. Looking as an outsider, to me, Antonelli looked more and more like an obvious pick for a commercial crew test slot. Previously, it was known that he began dedicated Russian tuition in early 2011 suggesting he was looking at an ISS residency but as time went on that seemed less likely and led me to expect his assignment to commercial crew. In the earlier CapCom, I had written.

'My best guess is that the prime crew positions will go to two out of three: Antonelli, Boe and Hurley. As an 'outside bet' I would add: Behnken, Bresnik and Finke. Back-up positions could also go to any of the six but some may be considered too senior for this secondary role. As a very 'outside bet', I would add, Tingle, Walheim and Suni Williams.'

I suppose my 'best guess' was not too far off the mark but why no Antonelli? Then came a NASA news release on 21 July 2015 informing the public of Antonelli's departure. It also noted that his last official day at NASA was 10 July 2015, just one day after the commercial crew announcement. I am not the only one to wonder if the closeness of the dates is a coincidence. As one poster said on Collect Space when expressing their surprise at his non-inclusion as a test commercial crew vehicle astronaut, "Maybe he was too? The timing makes me wonder..."

Dominic Anthony 'Tony' Antonelli (Captain, USN, Ret.) was born on 23 August 1967 in Detroit, Michigan. He obtained a scholarship from the Navy ROTC programme which he used to attend MIT from where he received a bachelor degree in Aeronautics and Astronautics in 1989. Eleven years later, in 2000, he received a master degree in the same subject from the University of Washington, Seattle.

He received his commission in the USN on the same day he graduated from MIT. Pilot training followed at NAS, Pensacola and NAS Chase Field. He was then assigned to NAS Lemoore in California to prepare for aircraft-carrier duty with the McDonnell Douglas F/A-18C Hornet aircraft. He served aboard the aircraft-carrier USS Nimitz with Strike Fighter Squadron VFA-146 'Blue Diamonds' flying the Hornet. He completed a combat tour to the Gulf in 1996 where he flew missions during US operations against Iraq.

On his return, he was assigned to the USAF Test Pilot School at Edwards AFB under an Air Force/Navy exchange programme. On graduation he spent two years working as a test pilot at Naval Air Weapons Station, China Lake, where he worked with the F/A-18C. He was preparing for a return to carrier fleet operations at NAS Lemoore when the news came through that he had been accepted into NASA's astronaut corps.

A lot of astronauts are hired by NASA after two or more applications but for Antonelli it was his first attempt. Self-deprecatingly he said, "I ended up applying just once to NASA. I'm a little reluctant to say that because I think it gives people the wrong idea. It's just luck and timing if you have the qualifications they need. You get the job when and if you happen to fit into the rest of their big puzzle. I personally just applied once and got hired." He did add, "But it's not exactly easy."

Quite often when an astronaut tells the story of how NASA hired them it includes receiving a telephone call from NASA asking if they were still interested in joining them. Antonelli's take on the phone call is somewhat different. I will let him take up the telling of the story.

‘ ”I got asked the question, “Do you like what you’re doing right now?” I thought about it for a second, and I said, “Hey, I’m flying F-18s in defence of the nation’s freedom. Yes, I like what I’m doing right now.” I’m not sure what answer they thought I was going to give them, but I gave them the honest answer. Luckily for me they didn’t end the conversation there. They asked if I’d be interested in doing something different. I said, “Yeah, I’m always open to considering things. What do you have to offer?” Then I was offered to come to NASA and to fly. That wasn’t too tough of a decision to make”.’

He was selected as a pilot astronaut in 2000 (NASA Astronaut Group 18). After basic training he was assigned technical duties in the Astronaut Office. He worked in the Shuttle Operations Branch and then as a CapCom in Mission Control.

On 19 October 2007, NASA announced that he had been assigned as the pilot for STS-119, targeted for launch in the autumn of 2008. There were the usual shuttle delays so the mission did not occur until March the following year. The flight took place as STS-119 Discovery (15-28 March 2009) and delivered the fourth and final starboard truss segment and the fourth and final set of US solar arrays to the ISS.

He was not back on Earth for long when NASA announced his appointment as shuttle pilot for the second time. On 1 May 2009, NASA named him to the crew of STS-132 with a planned launch in April 2010. There was only a slight delay this time. His second spaceflight, STS-132 Atlantis (14-26 May 2010), delivered the Russian ‘Rassvet’ (‘Dawn’) Mini Research module to the ISS for installation on the Zarya module.

At the time of his retirement from NASA, they noted that he had accumulated more than 3,200 hours in 41 different kinds of aircraft and completed 273 carrier-arrested landings. There was also praise from Chris Cassidy, Chief of the Astronaut Office, “Tony was a major contributor to our office. His skills and expertise were extremely valuable to our exploration and Space Launch System engineering team. We wish him the best in his future pursuits.”

Ex-Astronaut Movements in the Private and Public Sector Areas

Ken Ham no longer works for Bigalow Aerospace but is employed by Tactical Air Support, Inc. as from May 2015 as a Senior Systems Analyst at Edwards AFB. He was a NASA astronaut from 1998 to 2012. He flew two Space Shuttle missions. He was the pilot on STS-124 (2008) before commanding STS-132 (2010). Both missions visited the ISS.

Also from May 2015, Robert Curbeam was appointed Deputy and Vice-President of Space Systems for the Raytheon Company at El Segundo, California. He was a mission specialist astronaut for NASA from 1994 to 2007 and flew three Space Shuttle missions: STS-85 (1997), STS-98 (2001) and STS-116 (2006). The first was a solo flight and the others visited the ISS.

UK Astronaut Sightings

Brief details on UK astronaut sightings follow. For full details see Collect Space and their Sightings section - http://www.collectspace.com/sightings/sightings-unitedkingdom.html This is kept updated by many in the space community and is always more up to date than any printed material.

Chris Hadfield: 18-21 January 2016 on a tour of the UK with performances in Oxford, Birmingham (Symphony Hall) and Edinburgh.

Eugene Cernan: 8–9 April 2016 with Space Lectures events in Pontefract.

To be named: 7-8 October 2016 with Space Lectures events in Pontefract - they have said there will be two astronauts attending.

For the October 2016 Space Lectures event the clues from them are that neither are Apollo astronauts but both are very high profile. One person on the Collect Space message board has assumed that means Space Shuttle or ISS astronauts but I think the clues refer to the main Apollo Programme i.e. Apollo 7 to 17. There are no Gemini astronauts who fit the bill but there are several Skylab astronauts who might be considered.

NB: If anyone wants to know more about these or other sightings and they do not have access to Collect Space on the Internet please contact me either through the Midlands Spaceflight Society or by email at - RobandJill@blueyonder.co.uk - I often find out about visits at too short notice to put in CapCom. But, a word of warning. It is always best to check in advance of travelling that an event is taking place as planned. I travelled all the way to London a number of years ago to meet a cosmonaut only to discover he had cancelled because of work commitments. I had not phoned before travelling. I have no involvement in the organisation of the above astronaut events and therefore no liability is accepted for any changes that occur.

Bits & Pieces

Wedding and baby news in this issue’s ‘Bits and Pieces’

1/ Congratulations to Russian cosmonaut Sergey Ryazansky and his wife on the birth of their son on 24 July 2015.

2/ Retired NASA astronaut Stephen Oswald married former congresswomen Mary Bono (former widow of singer Sonny Bono) on 28 September 2015.

3/ Over the weekend of 10/11 October 2015, newly qualified NASA astronaut Christina Hammock married Robert Koch. On 14 October 2015 she wrote on her Facebook account, “Back to work after trading out boots for wedding shoes last weekend. Now they call me Christina Hammock Koch.”

CORRECTION

In the last issue I noted that a new 6-hour fast rendezvous flight profile to the ISS was used for Chris Cassidy’s flight to the space station in 2013. I said that it had been trialed on two unmanned Progress M resupply runs but this was its first use for a manned mission. I should have said that it had been trialed on three unmanned Progress M resupply runs and not two.

COMMENTS & UPCOMING IN THE NEXT ISSUE OF ASTRONAUT NEWS

Next time out: ‘Virgin Galactic Hires New Pilots’. I will also have part three of ‘**Astronaut Drain Continues Apace’. And there will almost certainly be the ubiquitous item on ISS crewing (actually, there WILL be a piece on ISS crewing – JAXA have named one of their astronauts to an ISS residency starting in late 2017 and there is more).**

Acknowledgements and sources:

Agenzia Nazionale Stampa Associata (Italian news agency); Agenzia Spaziale Italiana; Amazon; Astroaddies; Astronautcandidates.com; Astronaut.ru; BBC.co.uk; Canadian Broadcasting Corporation; Canadian Space Agency; CapCom (previous issues); Collect Space; Elite Forces ©2003/2004 by Richard M Bennett; ESA; Google; The Guardian; Incursori.org; The International Space Station Building for the Future ©2008 by John E Catchpole; Maclean’s (Canadian weekly news magazine online edition); Manned Spaceflight Log II 2006-2012 ©2013 by David J Shayler and Michael D Shayler; NASA and its various centres; NASA Astronaut Selections ©2003 AIS Publications; NASASpaceflight.com; Novosti Kosmonavtika; Patriot League; Praxis Manned Spaceflight Log 1961-2006 ©2007 by Tim Furniss and David J Shayler with Michael D Shayler; Raytheon Company; Researchitaly.it; Spacefacts; Spaceflight101; Spaceflight Insider; Space Lectures; SpaceNews.com; SpaceRef.com; S P Korolyov Rocket-Space Corporation Energiya; Tactical Air Support, Inc.; Washington Post; Who’s Who in Space ©1999 by Michael Cassutt; Wikipedia; You Tube; Yuri Gagarin Cosmonaut Training Centre.

NASA Completes Critical Design Review for Space Launch System

For the first time in almost 40 years, a NASA human-rated rocket has completed all steps needed to clear a critical design review (CDR). The agency's Space Launch System (SLS) is the first vehicle designed to meet the challenges of the journey to Mars and the first exploration class rocket since the Saturn V.

SLS will be the most powerful rocket ever built and, with the agency's Orion spacecraft, will launch America into a new era of exploration to destinations beyond Earth's orbit. The CDR provided a final look at the design and development of the integrated launch vehicle before full-scale fabrication begins.

"We've nailed down the design of SLS, we've successfully completed the first round of testing of the rocket's engines and boosters, and all the major components for the first flight are now in production," said Bill Hill, deputy associate administrator of NASA's Exploration Systems Development Division. "There have been challenges, and there will be more ahead, but this review gives us confidence that we are on the right track for the first flight of SLS and using it to extend permanent human presence into deep space."

The CDR examined the first of three configurations planned for the rocket, referred to as SLS Block 1. The Block I configuration will have a minimum 70-metric-ton (77-ton) lift capability and be powered by twin boosters and four RS-25 engines. The next planned upgrade of SLS, Block 1B, would use a more powerful exploration upper stage for more ambitious missions with a 105-metric-ton (115-ton) lift capacity. Block 2 will add a pair of advanced solid or liquid propellant boosters to provide a 130-metric-ton (143-ton) lift capacity. In each configuration, SLS will continue to use the same core stage and four RS-25 engines.

The SLS Program completed the review in July, in conjunction with a separate review by the Standing Review Board, which is composed of seasoned experts from NASA and industry who are independent of the program. Throughout the course of 11 weeks, 13 teams – made up of senior engineers and aerospace experts across the agency and industry – reviewed more than 1,000 SLS documents and more than 150 GB of data as part of the comprehensive assessment process at NASA's Marshall Space Flight Center in Huntsville, Alabama, where SLS is managed for the agency.

The Standing Review Board reviewed and assessed the program's readiness and confirmed the technical effort is on track to complete system development and meet performance requirements on budget and on schedule.

The program briefed the results of the review in October to the Agency Program Management Council, led by NASA Associate Administrator Robert Lightfoot, as the final step in the CDR process.

This review is the last of four reviews that examine concepts and designs. The next step for the program is design certification, which will take place in 2017 after manufacturing, integration and testing is complete. The design certification will compare the actual final product to the rocket's design. The final review, the flight readiness review, will take place just prior to the 2018 flight readiness date.

"This is a major step in the design and readiness of SLS," said John Honeycutt, SLS program manager. "Our team has worked extremely hard, and we are moving forward with building this rocket. We are qualifying hardware, building structural test articles, and making real progress."

Critical design reviews for the individual SLS elements of the core stage, boosters and engines were completed successfully as part of this milestone. Also as part of the CDR, the program concluded the core stage of the rocket and Launch Vehicle Stage Adapter will remain orange, the natural color of the insulation that will cover those elements, instead of painted white. The core stage, towering more than 200 feet tall and with a diameter of 27.6 feet, will carry cryogenic liquid hydrogen and liquid oxygen fuel for the rocket's four RS-25 engines.

The integrated spacecraft and payloads are nearing completion on their CDR. Flight hardware currently is in production for every element. NASA is preparing for a second qualification test for the SLS boosters, and structural test articles for the core and upper stages of the rocket are either completed or currently in production. NASA also recently completed the first developmental test series on the RS-25 engines.

NASA
http://www.nasa.gov/sls

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The Editor welcomes contributions for CapCom. Articles on any aspect of space exploration are considered. Articles in Word format or text files should be sent by email to ***capcom.editor@midspace.org.uk****.*

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All copy intended for the **January/ February 2016** issue should be emailed to the editor by **Friday 18 December 2015**