



**ROYAL
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AUSTRALIAN DIVISION
SYDNEY BRANCH

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NEWSLETTER



Silvereye soared to a maximum altitude of 10,027 feet and placed first in its division at the Spaceport America Cup held annually in New Mexico, USA. Photo by Allen Chan

Title: **'The University of Sydney Rocketry Team - Winner in the Spaceport America Cup'**

Date: **Wednesday 31st July, 2019**

Time: **18:30 hours (sharp)**

Venue: **Mechanical Engineering
Theatre Mechanical Engineering
Building University of Sydney**

**Refreshments will be available prior to the commencement of the meeting.
Attendance will attract 1.5 CPD hour**

Biggest achievement for Australian University Student Rocketry: The University of Sydney Rocketry Team was announced as a winner in the Spaceport America Cup intercollegiate rocketry competition, having competed in the 10,000 feet commercial off-the-shelf category, with a total score 1146.9 points and a Predicted versus Actual results of 98.9%. Second was the Eidgenössische Technische Hochschule Zürich, with a total score of 1042.3 and interestingly, a Predicted versus Actual results of 0%. To view full results and launches click: <http://www.soundingrocket.org/2019-sa-cup.html> On the afternoon of Saturday 29th June in Las Cruces, New Mexico, [the University of Sydney Rocketry Team](#) was announced as a winner in the Spaceport America Cup intercollegiate rocketry competition. The team was the first Australian team to attend and compete in the university rocketry competition held annually in New Mexico. Competing against 51 student teams from around the globe, including Princeton and ETH Zurich, the University of Sydney team claimed victory with its custom-built rocket, *Silvereye*, in the 10,000 feet commercial off-the-shelf category.

"Winning the 10,000 feet commercial off-the-shelf category at Spaceport America Cup 2019 is the culmination of more than eight months of hard work," said team president André Franck Bauer. "Our win represents the biggest achievement for university student rocketry in Australia's history. We are proud to have represented our country well and look forward to collaborating with other universities for next year's competition."

The University of Sydney team was commended for its precision and safety preparedness, with the rocket reaching a height just 27 feet above the target altitude of 10,000 feet – about three kilometres. The team also received an honourable mention for their sportsmanship, using their expertise to assist other teams launch and recover their rockets. "It has been an absolute honour leading a team of dedicated and talented students in New Mexico to launch *Silvereye*. Our rocket has been successfully flown and recovered both in Australia and now in the US, highlighting the robustness and adaptiveness of our design," said the team's chief engineer, Mitchell Galletly.



Competing against a global cohort of universities and working alongside leading aerospace organisations has allowed the team to gain new insights into the international space industry that they hope to share with their peers. University of Sydney Vice-Chancellor and Principal Dr Michael Spence congratulated the students on the result. "It is wonderful to see their hard work pay off on a global stage. Their success in New Mexico not only demonstrates the high calibre of our students, but also showcases our commitment to world-class research in aerospace engineering," Dr Spence said.

Silvereye was constructed from a custom-designed and manufactured carbon fibre airframe and uses a solid propellant to achieve speeds approaching the speed of sound. In 2020, the team hopes to compete again while also paving the way for other universities to join them.

About the University of Sydney Rocketry Team - The University of Sydney Rocketry Team is Australia's oldest tertiary student rocketry team – a dynamic group of [student aerospace engineers](#) who design and manufacture high-powered rockets. In 2018, the team became the first Australian university team to design and build a rocket that successfully reached 10,000 feet. The team's trip to New Mexico was substantially enabled by a **\$5,000 grant from the RAeS Australian Division** and also supported by 33 donors, who raised over \$3,000 through a [crowdfunding campaign](#).

The Evening: The evening will be split into two – Part A: A Presentation By the Team, in the Mechanical Engineering Theatre discussing the planning, design, power plant, hardware and software, and the construction of the Silvereye Rocket – Part B: A visit to the Bennet Laboratory to 'touch and feel' the Silvereye Rocket – cameras allowed.

Depending on the registered numbers the attendees maybe split into two groups with the First Group visiting the Bennet Laboratory whilst the Second Group will attend the presentation in the Mechanical Engineering Theatre, simultaneously. Afterwards the groups will swap and the process re-run.

Agenda: 18:30 hours sharp: Presentation by The Rocketry Team/Visit to the Bennet Laboratory
19:45 Hours: Q & A
20:00 Hours: **Light supper** (pizzas) will be provided to give the Rocketry Team and attendees the opportunity to mingle and to continue discussions.

RSVP: Registration for the evening **is required** by clicking on/copying and pasting into your URL this link: <http://raesjuly219.eventbrite.com.au> Your registration will be confirmed by email with an attached ticket. **Please print the ticket and present the ticket at the door. Please note:** A 'Non Members Fee' of \$10 applies and is payable via credit card. Non Members should enter the code **NM** when requested to enter a RAeS/EA membership number. Any member who does not have access to the internet can send a letter to Mr Jeff Lock, 4 Hillcrest Place, North Manly NSW 2100 with your name (plus names of accompanying persons), membership number or state 'Friend' if you are a Friend of the Branch, and phone number.

Lecture registration includes:

- **Attendance at the Event and Q & A session**
- **Networking opportunities at the welcome tea and coffee**
- **Following the presentation, light supper (pizzas) will be provided to give the speaker and attendees the opportunity to mingle and to continue discussions.**

Join the Society immediately and enjoy free lecture attendance: **Students are free in the first year; join immediately as an Affiliate with no entry restrictions; members receive the Aerospace magazine, and can nominate for and vote in Sydney Branch and Australian Division elections. Refer for further details:** <https://www.raes.org.au/membership/join-now/>

Public Transport: The closest train station is Redfern station, which is a 10 minute walk away from the venue. From Railway Square near central station any 42X bus (e.g. 422, 426...) and the M30 will take you to the University of Sydney (on City Road). Please allow time to travel by public transport, including waiting time, and time to walk to the venue. Please refer for further details: <http://www.sydneybuses.info/routes/timetables-route-maps>



Parking: is available in the Shepherd Street multi-story car park, located on the corner of Cleveland St and Shepherd St. The rate is \$2 per hour (up to \$6 maximum), but note that only gold coins are accepted in some machines. Parking is also available in University of Sydney On-Campus Parking for \$2 per hour (up to \$6 maximum). Additionally, free parking is available in surrounding streets. Please observe parking restrictions and allow time to drive to the University of Sydney, park, and walk to the venue. **Venue map copy and paste address into your browser:** <http://sydney.edu.au/maps/campuses/?area=CAMDAR> Scroll down the 'Building Bar' on the left hand side to: Mechanical Engineering Building J07 and click.

Closed Member Only Group on Facebook: Sydney branch is live video streaming our monthly branch lectures. Watch lectures live or at a later time, at the "RAeS - Sydney Branch - Members Only" group within Facebook. Please note that this service is only available to financial members of the Royal Aeronautical Society.

Presentation of Fellow Certificates: At the recent Fellows of the Society evening held 12th June at the Kirribilli Club conducted by the Sydney Branch, recently elected Fellow, Mr Manjinder Phull FRAeS, was presented with his framed Fellowship Certificate by the Chairman of the Sydney Branch, Mr David Cox.



Dr Kate Manderson FRAeS and AVM Mark Skidmore FRAeS

During the dinner following the Australian Division's Annual Aviation Safety Forum 2019 held at the Four Seasons Hotel, Sydney, 26th June, Dr Kate Manderson FRAeS, President and Board Chair, Australasian Society of Aerospace Medicine Ltd and Capt Lisa Norman FRAeS, Manager, Boeing 787-9 Introduction Qantas Flight Operations were presented with their framed Fellowship Certificates by AVM Mark Skidmore Ret FRAeS, President, Royal Aeronautical Society Australian Division.



Capt Lisa Norman FRAeS and AVM Mark Skidmore FRAeS

Qantas Group Updates Airbus order with eXtra Long Range A321: The Qantas Group has secured up to 36 Airbus A321 XLR (eXtra Long Range) aircraft for delivery from financial year 2024 onwards, in an update of its existing order. The update will see 26 of the Group's existing A321 NEO orders converted to A321 XLRs and add a further 10 XLRs – taking the total order from 99 aircraft to 109. The order includes significant flexibility for the Qantas Group to adjust delivery schedules depending on market conditions. The fuel efficient, longer-range XLR will improve fleet flexibility and network options for potential use by different airlines in the Qantas Group. Its ability to fly longer distances means it can be used to open new destinations or replace wide-body aircraft on existing routes, improving overall economics.

A321XLR* Xtending the A321neo success:
Unbeatable fuel efficiency now flying Xtra Long Range

Up to **4,700 nm / 8,700 km**

+15% range **+15% range**

A321neo A321LR A321XLR

180 - 220 Typical Seating
2-class

AIRSPACE cabin

A321neo unbeatable economics
-30% fuel burn per seat

What is an A321XLR?
MTOW **10t** | Rear Centre Tank & optional Additional Centre Tank

AIRBUS

The A321 XLR has a range of around 8,700 kilometres, which is 15 per cent longer than the A321 LR. Depending

on cabin configuration it can carry up to 244 passengers. It offers a 30 per cent lower fuel burn per seat compared with previous generation aircraft. Key to the XLR's flying range are additional fuel tanks in the belly of the aircraft plus, improved aerodynamics and a 25 per cent increase to maximum take-off weight compared with the Group's existing A320s Classics, which are used across Jetstar and in resources markets with QantasLink. Qantas Group CEO, Alan Joyce said: "We already know the A320 is a great aircraft and this new variant can fly further and more efficiently than any other single aisle jet on the market. It can fly routes like Cairns-Tokyo or Melbourne-Singapore, which existing narrow-bodies can't, and that changes the economics of lots of potential routes into Asia to make them not just physically possible but financially attractive. We'll take a decision closer to the time about which parts of the Group will use these aircraft, but there is plenty of potential across Qantas and Jetstar. We'll also take a view on whether they are used to replace older aircraft or whether they are used for growth, which will depend on what's happening in the market. All fleet decisions we make are ultimately guided by our financial framework, which balances our capital expenditure and need to invest for the future with our debt levels and ongoing returns to shareholders."

The first deliveries from the Group's A320 Family order will begin with 18 A321LR aircraft for Jetstar, arriving between mid-2020 and mid-2022. These will operate a mix of domestic and international routes. The first A321 XLR would be available to the Group from the 2024 financial year onwards.

Following this update, the Qantas Group A320 Family order sits at 28 x A321 LR, 36 x A321 XLRs and 45 x A320 NEOs, with continued flexibility around timing and structure in negotiation with Airbus.

Qantas direct flights from Brisbane to Chicago and San Francisco: The new routes, to be operated by Qantas' Boeing 787-9 Dreamliner aircraft, are expected to launch by the end of April 2020 and will add more than 170,000 seats across the Pacific each year. The announcement follows the DOT's [tentative approval](#) of the joint business between Qantas and American earlier this month. Seats are expected to go on sale in the coming weeks, pending final approval. Directly linking Australia and the third-largest US city for the first time, Qantas would operate the flights four times per week between Brisbane and Chicago.

The city is one of American Airlines' major hubs, giving Qantas customers access to 30 additional unique one-stop destinations from Australia. With the added gateway, Qantas customers will be able to connect to more than 200 onward destinations from Chicago, Los Angeles and Dallas/Fort Worth. The direct service from Brisbane will



save customers flying between Australia and Chicago more than six hours of travel time on a return trip. The new three-times-per-week Brisbane to San Francisco service will complement Qantas' existing flights from Sydney and Melbourne – meaning customers could choose from double daily Dreamliner services from Australia's east coast to San Francisco.

Qantas Group CEO Alan Joyce said the launch of 787 flights from Brisbane to Chicago and San Francisco would be a win for customers and tourism. "This is fantastic news for Queensland. It demonstrates the confidence that we have in the local tourism industry and our commitment to the Sunshine State. This will give Qantas and American Airlines customers unprecedented access. These new services will connect both Australian business travellers and holidaymakers with key centres of commerce, industry and culture in the United States. I'd like to acknowledge the support of the Queensland Government, Brisbane Airport Corporation and Tourism Australia for helping to make these new Dreamliner routes a step closer to reality, and we will work together on joint marketing to showcase the State and boost tourism," said Mr Joyce. These new routes would see a total of 14 weekly services between Brisbane and the US, including the daily 787 Brisbane to Los Angeles service that continues to New York.

Brisbane – Chicago - Statistics

- The 14,326km flight will take approximately 16 hours 20 minutes (slightly more or less depending on winds)
- When it launches, it is expected to be the fourth-longest passenger flight in the world.
- It will be the second longest flight on the Qantas network, closely behind Qantas' Perth-London service (14,499km), which has the highest customer satisfaction rating on our network

'Longreach' Origins Honoured

As a tribute to the airline's Queensland roots, Qantas also confirmed that one of its new 787 Dreamliner aircraft to be delivered later this year will be named *Longreach*. "As we count down to our centenary and retire our extended range 747 aircraft, which all feature the iconic Longreach name, we're proud to

continue its legacy on one of our new 787s. Queensland is a pivotal part of our history and an important part of our identity,” said Mr Joyce.

Opening of Apollo 11, a new exhibition that commemorates the 50th Anniversary of the Moon Landing at The Powerhouse Museum – Friday 26th June, 2019:

The Opening of the Apollo 11 Exhibition began with an introduction by Lisa Havilah, Chief Executive, Museum of Applied Arts & Sciences, followed by a ‘Welcome to Country’ by Mr Marcus Hughes. Dr Dave Williams**, Executive–Digital, National Facilities and Collections at CSIRO, who leads the data-focused research, development and digital capability of CSIRO gave the main Director address for the Apollo 11 exhibition launch.

Dr Williams said that the CSIRO, as Australia’s national science agency, has been addressing the country’s biggest challenges for over a hundred years, and we’re very pleased to have partnered with you on the Apollo 11 exhibition here at the Powerhouse Museum. I lead the area of CSIRO that enables science through national facilities and collections, which we operate on behalf of the nation and make available to researchers across and Australia and the world. This includes the iconic Parkes radio telescope – the Dish – as well as other leading radio astronomy facilities. We also manage deep space communication ground stations for NASA and the European Space Agency and have an active research program in space science and technology development. Space is arguably one of the biggest challenges – and opportunities – before us today.

Australia has a long and proud history in the space sector – from the emergence of radio astronomy as a new field of science from the radar capability developed here during World War II, to supporting NASA missions as far back as 1962. By 1969, Australia was home to more NASA tracking stations than any other country outside of the US. As you’ll discover as you tour the exhibition, communicating with the Apollo 11 spacecraft and sharing news of this ‘giant leap’ was made possible by the technology and Australian teams at NASA’s Honeysuckle Creek tracking station near Canberra and CSIRO’s Parkes radio telescope in NSW. Australia’s geographic advantage – allowing NASA to track its spacecraft at all times as the Earth turned – was one of the reasons NASA was keen to establish ground stations here. And its why we continue to play a pivotal role in NASA’s Deep Space Network, tracking more than 40 spacecraft from the Canberra Deep Space Communication Complex – which CSIRO manages on NASA’s behalf. In June 2019, CSIRO also took on the responsibility of providing operational support to the European Space Agency’s deep space ground station at New Norcia in Western Australia.

The legacy of the Apollo 11 Moon landing was to inspire humanity to dream, and to rethink what we are capable of achieving. In the same way, the missions of today and tomorrow will inspire future generations to push space exploration beyond what is imaginable now. We’ve seen 80 new Australian space startups emerge in just the past three years, and of course the creation of the new Australian Space Agency last year, which aims to triple the size of the local industry by the year 2030. I’m sure you’ll enjoy the exhibition and be inspired by the possibilities that the new era of space exploration presents.

As we know **The 50th anniversary of the Apollo 11 Moon Landing** is quickly approaching. The Moon landing is [a defining moment in history](#). For those who followed the mission’s progress hour by hour, it hardly seems possible that 50 years have passed since mankind first stood on the Moon. That historic flight began on 16 July 1969 with a flawless lift-off from the Kennedy Space Center in Florida, USA, and ended eight days later when Apollo 11’s tiny command module and its three-man crew splashed down safely in the Pacific Ocean. The highlight of the mission was the 21.5 hours spent on the Moon’s surface by astronauts Neil Armstrong and Edwin ‘Buzz’ Aldrin, following their landing in the lunar module *Eagle* on 20 July. Half a billion people watched live TV coverage of their Moon walk (courtesy of Australia’s Honeysuckle Creek and Parkes radio telescopes).

The Powerhouse Museum’s celebration of the Apollo 11 Moon landing consists of over 200 objects from the Museum’s extensive collection. The highlight of the exhibition is Luke Jerram’s [@lukejerram](#) installation *Museum of the Moon* – an enormous Moon sculpture, 7m in diameter (an approximate scale of 1:500,000) within the Turbine Hall at the Powerhouse Museum. (It’s based on NASA imagery and each centimetre represents 5km of the lunar surface.) Other items include:



- A replicate life-size Astronaut suit;
- A fragment of the Moon;
- Some of the original code used to control the guidance systems;*

- The Mercury capsule replica with hatch removed so you can see what it would have been like for the astronauts to travel in such cramped conditions;
- Samples of astronaut's clothing and food items.



* Software engineer Margaret Hamilton led the team that wrote the onboard guidance system for Apollo 11. Just minutes before the landing the guidance computer became overloaded. By prioritising key tasks and delaying others, Hamilton's software helped to avoid an aborted landing. She is pictured here with the code which NASA continued to use for later Apollo missions. Hamilton later wrote of the incident:

"The computer's software was smart enough to recognize that it was being asked to perform more tasks than it should be performing. It then sent out an alarm, which meant to the astronaut, 'I'm overloaded with more tasks than I should be doing at this time and I'm going to keep only the more important tasks'; i.e., the ones needed for landing ... Actually, the computer was programmed to do more than recognize error conditions. A complete set of recovery programs was incorporated into the software. The software's action, in this case, was to eliminate lower priority tasks and re-establish the more important ones ... If the computer hadn't recognized this problem and taken recovery action, I doubt if Apollo 11 would have been the successful moon landing it was."

— Letter from Margaret H. Hamilton, Director of Apollo Flight Computer Programming MIT Draper Laboratory, Cambridge, Massachusetts, titled "Computer Got Loaded", published in [Datamation](#), March 1, 1971

** Dr Williams, Executive Director of CSIRO – Digital, National Facilities and Collections, leads the data-focused research, development and digital capability of CSIRO, and is a member of the Executive Team. He has stewardship of a range of business lines and national facilities including Astronomy and Space Science, the Australia Telescope National Facility, Marine National Facility, Australian Animal Health Laboratory, Australian Collections, Information, Management and Technology and Data 61.

Prior to joining CSIRO in 2014, Dr Williams was Chairman of the European Space Agency (ESA), leading the 20-nation council executive body that oversaw the ESA. During this same period Dr Williams was also Chief Executive of the United Kingdom Space Agency responsible for developing the strategic vision for UK space, securing bilateral arrangements with various countries, and establishing national facilities in Harwell, England. During 2005 – 2010 he served as Director General of the UKSA's forerunner body, the British National Space Centre (BNSC), where he transitioned the National Space Centre into an agency structure, and was Head of the UK Delegation to ESA.

Dr Williams holds BSc degree and a PhD from the University of Reading, served as a Member of the Global Climate Observing Committee, was elected Member of the International Academy for Astronautics in 2012, and is now a non-executive director of AARNET.

Fifty Years After Apollo 11: For members who wish to follow the 50 day lead up to the 50th Anniversary of "Walking on the Moon" 20th July, 1969 – please refer to: [Does-your-brain-works-in-space-but-when-president-kennedy-said-wed-go-to-the-moon-we-didnt-know-that](#) and follow the registration details. The 50 articles have been written by Charles Fishman, who is the author of One Giant Leap: The Impossible Mission That Flew Us To The Moon. His 50-part series, 50 days to the Moon, is appearing between June 1 and July 20.

Past Newsletters are now stored on our website: Members are advised that all Sydney Branch Newsletters since February 2012 are now stored on our website. To access this information enter our web address (www.raes.org.au) into your browser, click 'About' then 'Sydney Branch' and scroll this page to the heading 'Sydney Branch Newsletters'. Newsletters are arranged by month within each year heading.

Society Merchandise for Sale: Sydney branch has a selection of Society Merchandise for sale at its regular monthly meetings. Items include Society Ties, Tee Shirts, Caps, Pins, Lapel Badges, Silver Kestrel Brooches, and Mugs.



Our Sales Director, David Adkins, accepts cash, cheques, and credit cards through PayPal.

Aerospace Websites: www.57rescuecanada.com : Follow Capt. Karl Kjarsgaard's adventures to recover Halifax bomber LW170 which is resting beneath 5000ft of water off the Irish coast;
www.adastron.com/707/updates/updates.htm : Diary of Boeing 707-138B XBA formally Qantas EBA.
www.airshow.com.au
www.atsb.gov.au www.aviationmuseum.com.au - Temora Aviation Museum;
<http://boxkite2014.org/book/book.htm> - The Boxkite project.
https://en.wikipedia.org/wiki/Rolls-Royce_Trent;
hars.org.au Historical Aircraft Restoration Society
<https://herox.com/SpacePoop> The Space Poop Challenge
www.powerhousemuseum.com/whatson
<https://qfom.com.au/> Qantas Founders Museum, Longreach, Qld
<http://www.singaporeairshow.com/>
<https://www.youtube.com/watch?v=JGjmRRTThdk> How TIME created their new cover image with 958 drones
http://www.rbogash.com/B-52/B-52_Disassembly.html How to move a B-52 without flying it – The Final Disassembly and Transport Update for the move scheduled 3/6/2018 - with the wings split and the fuselage in final stages of prep before hitting the freeway.
<https://airandspace.si.edu/collection-objects/assembly-bio-harness-armstrong-apollo-11>

Diary: **July 16-19:** The AYAA Sydney Conference: For students and young professionals, the timing and location of Aerospace Futures 2019 is impeccable with the rapid growth and development of the Australian Space Agency. The event has attracted a wide variety of prestigious industry speakers from around NSW and beyond. Targeting a record 250 student delegates and 400 invited professionals, the event is focused towards undergraduates, postgraduates and young professionals from across Australia and New Zealand. With strong support from government, industry and academia, we warmly invite you to our celebration of Australia's aerospace industry and to inspire the next generation into various aerospace sectors responsible for the development of Australia as a nation. Refer for further details: <https://aerospacefutures.ayaa.com.au/>

Saturday July 20: The fiftieth anniversary of the first men walking on the moon. Sydney Branch is arranging a 'Special Event' on the night. Further details to be advised.

July 23-26: 2019 Aircraft Airworthiness and Sustainment (Australia) Conference, a non-profit event for the benefit of all those involved in sustaining our fleets, both Civil and Military, safely and economically through their lifecycle. The Conference will be held at the Brisbane Convention and Exhibition Centre. For further details refer: <http://www.ageingaircraft.com.au>

Sept 22-27: 24th International Society of Air-breathing Engines (ISABE) Conference will be held in Canberra. For further details refer: <https://2019.isabe.org/>



Tuesday Oct 8: 61st Sir Charles Kingsford Smith Lecture and Annual Dinner – Lecture to be delivered by Mr Matt Hall who is one of the most tenacious and focused pilots in the Red Bull Air Race and has stood on the second step of the World Championship podium three times in the past four seasons. After coming within three-tenths of a second of clinching the crown in 2018, Matt is pushing harder than ever to remain among the top contenders and close the gap to breakthrough for a maiden title. Matt is a third-generation pilot and his country's foremost aviator. He flew solo in a glider at age 15, got his pilot's license at 18, and has flown more than 6000

hours in various aircraft. A decorated former Wing Commander in the Royal Australian Air Force, he was named Fighter Pilot of the Year in 1997 and became a Fighter Combat (Top Gun) Instructor. Further details to be advised. Please **'Save the Date'** in your diary.

Dec 4-6: Call for Abstracts - **11th Asia Pacific International Symposium on Aerospace Technology (APISAT)**, to be held at Surfers Paradise Marriott Resort, Gold Coast. The symposium provides the opportunity for industry engineers and researchers of universities and academic institutes from Asia-Pacific nations, to discuss the current and future advanced topics in aeronautical and space engineering. Professionals, young professionals, students, institutes, universities and organisations are invited to submit abstracts and share their experience under the technical streams listed below:

Aerodynamics and Design; Structures and Materials; Dynamics/Control/Avionics; and Combustion and Propulsion. Refer conference website: www.apisat2019.com

2-3 May 2020: Wings over Illawarra – The Sydney Airshow - Immerse yourself in history as you wander through rare displays of vintage and classic aircraft including the fully-restored Super Constellation and record breaking Qantas 747 along with some beautifully restored



WW2 fighters. In 2020 your entry ticket will once again include access to the Historical Aircraft Restoration Society aircraft that are open for inspection. To thank **the** supporters of the Wings Over Illawarra event **this year, Wol** are offering tickets for the 2020 event at half price - but be quick, they're only available for a limited time.

15-23 August 2020: 43rd Scientific Assembly of the Committee on Space Research (COSPAR) and Associated Events - COSPAR 2020 will be held in Sydney. Host Organization: Australian Academy of Science; Scientific Program Chair: Prof. Iver Cairns, University of Sydney, School of Physics. Abstract Deadline: **mid-February 2020**, The theme of the COSPAR 2020 Assembly is *Connecting Space Research for Global Impact*. More information can be found at www.cospar2020.org

23-28 February 2021: The Australian International Airshow will comprise industry-only trade exposition days from Tuesday 23 February to Friday 26 February, with public airshow and entertainment days from Friday 26 February to Sunday 28 February. AIRSHOW 2021 CEO Ian Honnery said the RAAF milestone, together with the 2020 Centenary of the formation of Qantas, means organisers are planning for an event that will eclipse Airshow records. For further details refer: www.airshow.com.au



March 31, 2021: Marks the Royal Australian Air Force 100 years as an independent service. For further details refer: airforce.gov.au/our-mission/air-force-2021

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