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PRINTED BY: WHO Printing, Regional Printer of the Year, National Print Awards 2020.

DIGITAL EDITION

FACEBOOK G

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MESSAGE FROM RAAF BASE WAGGA



S THE SENIOR ADF OFFICER for RAAF Base Wagga, I am very pleased that this edition of *Wings* will feature aspects of the important work performed at 'The Home of the Airman' in its 80th year of service to the nation. I am equally proud to briefly introduce the base – and this edition – to you.

RAAF Base Wagga delivers initial military training for enlisted Air Force personnel; initial and post-initial employment training for aviation maintenance, logistics and personnel management; and post-graduate education for the whole of Air Force.

As the home to Headquarters Ground Academy, it also provides command oversight and support to Air Forcemanaged ground training at RAAF Bases Wagga, Amberley, Richmond, East Sale and Defence Establishment Orchard Hills, as well as the public relations effects of the Air Force Band.

With a focus on the induction and development of the enlisted force, RAAF Base Wagga has become known as The Home of the Airman.

While no flying squadrons are located at RAAF Wagga, it is no sleepy Air Force backwater. To the contrary, there is year-round effort required by training units and the base operations squadron to ensure that Wagga can successfully induct and inculcate new recruits, conduct employment training across a wide range of disciplines, and deliver a broad-based military education to enhance Air Force performance.

To do so, RAAF Wagga's professional instructors and educators, each passionate about their craft, provide high-calibre training to graduate personnel who are technically and mentally ready to operate in challenging military operations. Each day, base personnel strive to meet the intent of RAAF Wagga's motto: 'We Prepare'.

By its nature, RAAF Wagga's work underpins many of Air Force's current achievements. As we approach Air Force's centenary year, I offer that if the smart, sharp, savvy and enthusiastic graduates developed by RAAF Wagga's diverse training teams are anything to go by, Air Force's next century is set for even greater success.

Please enjoy this (Wagga) edition of *Wings*.

Group Captain Chris Ellison Senior Australian Defence Force Officer, RAAF Wagga Officer Commanding Ground Academy



MADE MY DAY

Yesterday was a day I will never forget and that is why I am writing to you.

I was looking through your *Wings* magazine, Volume 72, No.3, page 54 and saw the picture of Concord and Spitfire. That picture was in a British Airways (BA) monthly magazine about 30 years ago. My husband Victor, who worked for BA, and I decided it was a lovely picture so I cut it out and took it to a shop to be blown-up and framed.

I am now 86 and living in a RAAF nursing home and the picture is above my bed. My husband passed away after spending 40 years with BA and just a month before we decided to emigrate here.

Anyway, thank you so much for making my day and a very happy person. *Hazel Hansen*,

Merriwa, WA



• Please send letters to editor@ raafapublications.org.au, including your name and details. Letters may be edited for length and clarity.

MANAGER'S MESSAGE

Welcome to the Summer 2020 edition of Wings. Once again, we have compiled an interesting array of material for your enjoyment. We have initiated two serials with this edition: the history of Qantas which celebrated its centenary on 16 November and the fascinating work of Kelly Johnson and the projects of Skunk Works. The Qantas story effectively began with 'The Drive that Started an Airline' in the Spring edition.

The RAAF will celebrate its centenary next year and we will begin a series on Air Force history in the Autumn 2021 edition.

In a little coup for a magazine of our style, we are introducing QR coded links to videos of exciting activities related to some of our feature articles. Scan your smartphone (or tablet) camera over the codes in 'Riding Shotgun', the Martin-Baker ejection seat feature (page 24) and again for an overview of the Liberator restoration project at Werribee (page 50). Thanks to Andrew Eden, Managing Director Martin-Baker Australia for the innovation.

I would like to publicly acknowledge the effort of our editorial team, particularly Sandy and Katie for the consistent quality and style of content and presentation and our sales team, Sue and Phil, for working through the barriers set by forces beyond our control and sustaining our financial support. Thank you also to our sponsors and the businesses that appreciate our commitment and reach for sticking with us through a tough year.

We wish you all a Merry Christmas, enjoy the festive season and we look forward to welcoming you back fresh in 2021.

Ron Haack

Wings magazine manager

CORRECTION

In the Spring Edition, Bomber Command Commemoration story (page 14) we inadvertently flipped the image of Kevin Dennis and gave an incorrect abbreviation for the Conspicuous Gallantry Medal as CMG instead of CGM.

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JOIN THE AIR FORCE ASSOCIATION

Air Force Association membership is open to serving and former members of the Australian Defence Force and Allied Armed Forces, their family members, current and former Air Force and Air League cadets and anyone with an interest in aviation and who supports the AFA's mission and objectives.



EDITED BY Bob Treloar

A more professional ARFORCE

THE CHIEF OF AIR FORCE says the RAAF is "far more professional" now than when he joined it four decades ago. Speaking on the Australian Aviation Podcast, Air Marshal Mel Hupfeld said the difference in culture is "almost night and day".

"I'd compare it to the discussions I would have with World War II veterans when I was a young pilot. They'd all say, "My god. Your Air Force is far more professional than it ever was. I'd look back to when I first started flying in the Air Force compared to what we do now, and I'd say the same thing," AIRMSHL Hupfeld said in one of his first public interviews since the government announced its commitment of \$270 billion to defence spending over the next 10 years – some \$75 billion more than previously planned.

The 2020 Force Structure Plan suggested Australia was seeking to take

a more proactive approach to defence in the Indo-Pacific region, with Prime Minister Scott Morrison declaring a post-COVID-19 world could be "poorer, more dangerous and more disorderly".

That was followed by the 2020 Defence Strategic Update, which advocated a more holistic approach to combating tension – including a "shape, deter and respond" ethos that advocated the military working closely with policy makers and diplomats to shape the world to avoid military intervention.

"There's a lot more to do for reform in

how we do our business," said AIRMSHL Hupfeld. "One of the leadership outcomes is that we recognise and take care of our people.

"We demand a lot of them, I also expect a lot of them, but I need to make sure I give them the opportunities and take care of them to be able to provide the outcomes that I seek." Source: Australian Aviation.

BELOW F-35A Lightning II flight line, RAAF Base Williamtown.





EXERCISE LIGHTNING STORM,

a three-week intensive aerial combat training exercise over the east coast of Australia concluded in early September.

The Air Force exercise was designed to integrate people and systems to ensure air and ground forces could maintain their joint operational readiness despite the challenges presented by COVID-19. The pandemic has presented a 'contested environment', requiring deliberate and lateral thinking to modify many existing protocols to support the higher rate of effort.

Exercise Lightning Storm ensured Air Combat Group was able to get back on track with the training continuum following the cancellation of Exercise Pitch Black 20, an important component of Defence's annual large force employment training program. *Source: Defence News*



RAAF JOINS US EXERCISE

A RAAF TASKFORCE comprising EA-18G Growlers, F/A-18A Hornets, an E-7A Wedgetail and a KC-30A Multi-Role Tanker Transport took part in Regional Prescence, a major exercise in the US island territory of Guam, Western Pacific in July.

More than 150 Air Force personnel deployed for the exercise, which cultivated regional ties and enhanced Australia's interoperability with the armed forces of Japan and the USA. The training also improved Air Force integration with HMAS *Canberra, Hobart, Stuart, Arunta* and *Sirius*. The opportunity to operate as a joint force in the air and maritime environment with US and Japanese forces enabled participants to understand each other's warfighting capabilities, to fight better in the maritime environment and fully employ the deployed capabilities across multiple domains. *Source: Australian Aviation*.

Sailors rescued by Army attack helicopter

AN ARMY ARH Tiger attack helicopter was a welcome sight for three sailors marooned on a tiny Micronesian island for nearly three days in August.

After setting off in their 23-foot skiff five days earlier, the sailors had veered off course and run out of fuel. While their intended destination was only 37km from their point of embarkation, they were located about 190km from their starting point, Pulawat, Micronesia.

Teaming up with US aircraft to locate the sailors, Royal Australian Navy's HMAS *Canberra* headed to the search area with four ARH Tigers and a MRH 90 Taipan helicopter on board.

An SOS message etched in the sand was sighted by Australian and US aircrews, and an embarked Tiger from the Australian Army's 1st Aviation Regiment then delivered food and water directly to the beach, before performing health checks on the castaways. HMAS *Canberra* was part of Task Group 635.3 conducting an Exercise Regional Presence Deployment when it was called upon to assist in the search and rescue while on its way home to Australia.

The sailors were later picked up by a Micronesian patrol vessel. *Source: The War Zone*

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BELOW The castaways on the beach with their boat and SOS.





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Third RAAF cube-sat TEST PHASE

THE THIRD OF THREE SMALL

SATELLITES, M2 cube-sat, a small satellite developed by UNSW Canberra Space in collaboration with the RAAF under a \$10 million contract, is undergoing a pre-flight test phase in preparation for its planned launch in early 2021. Preparation of the third M2 follows the successful launch and mission operations of the M2 Pathfinder, reported in the spring edition of *Wings*.

M2 Mission Lead Andrin Tomaschett said: "So far we have tested how the electronics in the satellite operate in



The first commercial sub-orbital rocket was launched from the Kooniba Rocket Range, South Australia in September. It is the result of a partnership between Department of Defence (DoD), Australian companies Southern Launch and DEWC Systems, and Dutch company T-Minus Engineering, and carried a payload for the RAAF.

The 34kg, 3.4m-long DART rocket is part of what is known as 'New Space' technologies – small rockets carrying reduced-size satellites using



extreme hot and cold temperatures, which is conducted in a Thermal Cycling Chamber at facilities at the Australian National University's Mount Stromlo. This was followed by vibration testing where the satellite was placed on a shaker table. The table replicates the intense shaking that M2 will endure on launch."

One of the final tests will expose the cube-sat to a range of pressures in a vacuum chamber.

UNSW Canberra Space Director Russell Boyce said the M2 satellite builds on the work of M2 Pathfinder

commercially available technologies.

Australia Defence Minister Linda Reynolds said: "The rocket carried a prototype radio frequency receiver unit designed for the Air Force. The payload provided a steppingstone for the Air Force to explore how advanced rapidly deployable networked sensors can be employed to provide information across defence networks."

It is part of the Air Force's Plan Jericho, a program to detect and track targets, which also includes high-altitude balloon launches. It will enable Air Force, and Australian industry partners, to enhance sovereign technical design and development skills, as well as deepen the collective understanding of advanced sensor performance in high altitude environments.



and will be used for maritime surveillance as well as demonstrations of sensors, communications and onboard processing. "These versatile small satellites have reprogrammable software defined radios on board and can change their purpose mid-mission, greatly improving their functional capabilities for multiple uses by Defence and civilian agencies alike," he said.

The satellite will split into two in orbit and demonstrate formation flying technologies as well. *Source: AuManufacturing*

ADF support for Beirut



THE RAAF DELIVERED critical supplies to emergency stores in the Lebanese capital, Beirut, after an explosion on 4 August caused thousands of casualties and significant structural damage to the city. An estimated 300,000 people lost their homes.

An Air Force C-130J Hercules and crew delivered pallets of emergency shelter tool kits, tarps, tents, fleece blankets and jerry cans. Mission co-pilot Flying Officer David Campbell said it was rewarding being able to help deliver aid in Lebanon's time of need.

A small team of ADF personnel was deployed to Beirut on 5 August to help the Australian embassy with communications and medical support. *Source: Defence Connect*

4



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MILITARY ENGINES

Poseidon demonstrates AR-TO-AR REFUELLING

THE P-8 POSEIDON FLEET is a step closer to full operational capability after demonstrating air-to-air refuelling capability with a KC-30A Multi Role Tanker Transport (MRTT).

Officer Commanding No.92 Wing Group, Captain John Grime said the refuelling flights were an important step towards full operational capability. "It enhances the existing operational effectiveness of the aircraft's long-range surveillance capabilities, extending the endurance and radius of action of the platform," he said. "The strong partnership with No.33 Squadron's KC-30A team demonstrates our ability to integrate fifth-generation capabilities and strengthens our air power contribution for the joint force."

ABOVE P-8A Poseidon engaged with a KC-30A during refuelling qualification.

RAAF pilots drafted to fly UK drones

RAAF PILOTS AND PRIVATE CONTRACTORS are being drafted to help fly UK armed Reaper drones over Syria and Iraq amid shortages in RAF crew and concern over the stresses of piloting deadly unmanned aircraft. Their presence allows the RAF to deploy its trained pilots more efficiently on combat missions and helps plug the crew shortages that are deemed to be the greatest risk to the UK's £1.1 billion (\$1.99 billion) future drone program.

RAAF crews – whose numbers the UK Ministry of Defence will not confirm – will be deployed to help build pilot experience in flying Reaper drones ahead of Australia's future use of the unmanned craft.

Reaper drones have been intensively used in the war against Islamic State in Iraq and Syria, firing a quarter of all missiles and accounting for nearly half of the mission hours flown. After a six-month hiatus during which no weapons were fired, there were 32 Reaper and combat aircraft strikes between April and June this year. *Source: UAS Magazine*



Aircraft complete MIDDLE EAST MISSION



RAAF E-7A WEDGETAIL and KC-30A Multi-Role Tanker Transport aircraft have returned to Australia following a successful year-long deployment. The aircraft had been operating in the Middle East Region as part of Australia's Air Task Group 630, performing airborne command and control and air-to-air refuelling tasks.

Commander of Joint Task Force 633, Major General Susan Coyle said the aircraft provided key capabilities to Coalition forces in the region. "We have been able to provide increased situational awareness across the battlespace and provide air-to-air refuelling to enable Coalition aircraft to continue the fight against Daesh," she said.

Ongoing support for the Coalition continues through ADF personnel embedded in the Coalition headquarters in the Middle East. *Source: Mirage News*

ABOVE E-7A Wedgetail AEW&C crew.





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President's

RECENTLY, WE LOST A GREAT

AUSTRALIAN and notable former commander of the Air Force. When preparing to write an obituary for the late Air Marshal Selwyn 'David' Evans AC, DSO, AFC, I came across one of his beliefs: *We are here on earth to do good unto others. What the others are here for, I have no idea.* David Evans' belief is central to the Objects of our Association, which is why we have embarked on a transformation process designed to improve the Association's capability to support the Air Force family.

The National Board recently endorsed the concept of raising an Air Force Association (AFA) Foundation to assist Air Force veterans and their families in necessitous circumstances. The foundation will endeavour to fill the gap where existing services do not meet individual or family need. It will have its own funding stream and will not be funded by the State/Territory Divisions.

Earlier this year, I mentioned the Association's support for ADF firefighters who were exposed to contaminated waste materials during initial and continuation fire training. It is one of the more complex veteran support activities the Association has undertaken in recent years. There are possibly upwards to 500 living veterans who could be affected. AFA Ltd has represented those veterans at Secretary, DVA's ESO (ex-service organisation) Round Table, face-to-face and video meetings with DVA senior policy staff and more recently in several conversations with the Minister for Veterans' Affairs.

By a quirk of legislation, those veterans are unable to obtain recognition for their fire training

related injuries and subsequently receive the appropriate health support and opportunity for compensation available to current serving ADF and civilian firefighters.

Disappointingly, while there is national and international presumptive legislation for firefighters, those veterans fall outside current beneficial veteran support legislation for their fire training and employment-related injuries. The Association will continue the fight until an acceptable remedy is achieved.

The Association believes there is a need to provide support services to the Air Force family in the Northern Territory, but it doesn't have a Northern Territory Division. Initial investigation indicates a branch at the Tindal Base would seem most effective, given Tindal has the greatest number of Air Force members and families. The branch would also support Darwinbased veterans. Western Australia Division is in discussion with Tindal Base executives. Initial stand-up costs would be funded by AFA National and, if established, it would be a branch of the Western Australia Division.

Air Force sought the Association's assistance in seeking expressions of interest among former serving Air Force members to attend the Air Force centenary commemoration next year in Canberra. Association Divisions have sent an event flyer to members and other ex-service organisations in their state/territory. Final arrangements for the veteran component, which will depend on COVID19 restrictions, are to be decided. Air Force will issue formal invitations early next year.

Several weeks ago, the Association launched its much-needed new national website. The website and social medial platforms will provide much of the information on activities and achievements at the Association's national level. I recommend you pay a visit at raafa.org.au.

I hope the Australian community can enjoy the company of their family and friends over the Festive Season. I am sure we are all looking forward to a brighter 2021.

Carl Schiller, AFA National President



AFA Trophy Award 2020

THE AIR FORCE ASSOCIATION

TROPHY has been awarded since 1961. Until the Air Force Reserve became an integral part of the Air Force workforce, it was awarded to the most proficient RAAF Reserve squadron. The award was deactivated in 2010 and reactivated in 2018 with a revised criterion, 'for proficiency and contribution by Force Element Groups and Wing Headquarters'. It was then awarded to No.44 Wing. HQACG won the trophy in 2019. This year, it was awarded to HQ86 Wing for its proficiency and contribution to Air Force capability during 2019.

Senior Australian Defence Force Officer Amberley, Air Commodore Veronica Tyler presented the Trophy on behalf of Air Commander Australia. It was received by Group Captain Tony Bull, Officer Commanding No.86 Wing, accompanied by Group Captain Stefano 'Steve' Pesce AM, former Officer Commander No.86 Wing.

ABOVE Officer Commanding No.86 Wing, Group Captain Anthony Bull (left) holds the Air Force Association trophy and Group Captain Steve Pesce displays the accompanying

winner certificate.

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AIRMAN FOR LIFE

New South Wales

NSW DIVISION HAS MOVED to

implement a number of projects to support veterans, promote the work of the Association and lift the Association's profile within the active Defence Force and with the general public. Projects will be trademarked with a distinctive logo under an Ad Astra tag. Projects currently in work include adoption of:

- a companionship dog program
- scholarships for tertiary students of RAAF personnel posted to NSW
- a series of podcasts (Ad Astra Aviator Podcasts) to capture the service and life experiences of past and present Air Force personnel as a contribution to the Air Force centenary.

Additionally, surveys have indicated that personnel considering leaving the Service for civilian employment would appreciate some personal transition support. AFA NSW has launched a program to provide one-on-one support from ex-Air Force members already working in the civilian environment. The program is designed to complement any official transition support provided by the Service. Search raafansw.org.au for the 'Transition Support' tab and follow the guidance. The web portal and the registration process for both coaches and applicants has been designed to protect the identity of participants and to mitigate the risk of spam.





No.1 Remote Sensor Unit Sentinel during the Battle of Britain 80th Anniversary Commemorative Service with replica of SQNLDR Bungys Hawker Hurricane in the foreground.

South Australia

BATTLE OF BRITAIN

ACKNOWLEDGING THE 80TH ANNIVERSARY of the Battle of

Britain campaign, the RAAF Association South Australia and RAAF Edinburgh held a commemorative service to mark the milestone on 12 September.

Held at the Air Force Memorial, Torrens Parade Ground, Adelaide, the event was attended by His Excellency Hieu Van Le, Governor of South Australia, and the families of two South Australian airmen who flew in the battle: Richard Bungey, son of Squadron Leader Robert Bungey DFC, and relatives of Sergeant Des Fopp AFC. Other attending VIPs included state and federal MPs.

The commemorative service provided a time for remembrance and reflection.

Senior Australian Defence Force Officer RAAF Base Edinburgh, Air Commodore Brendan Rogers said it was an immense honour and a privilege for serving members to participate in the event. "The Battle of Britain commemorative service in 2020 is an opportunity to honour the British and Australian airmen and airwomen who, 80 years ago, played an important role in the success of the air campaign – both in its execution and its outcome," he said.

"In the summer and autumn of 1940, the Royal Air Force fought a prolonged battle, in the defence of Britain against an experienced and numerically superior German Luftwaffe. That air campaign, which became known as the Battle of Britain, officially lasted from 10 July to 31 October 1940. At least 30 Australians flew in the Battle of Britain conflict, 22 flying in Fighter Command, the other eight Australians flying with Bomber and Coastal Commands. Of the 30 Australians, eight were South Australian.

"We are privileged to have family members of two of those South Australian airmen here with us today. Their service and sacrifice, together with the efforts of all of the men and women who served in that conflict, ultimately changed the course of history.

"At its core, it was through individual and collective acts of courage, skill, sacrifice and spirit that a decisive allied British victory was ultimately achieved. It was a victory which forced Hitler to permanently postpone a landing on



the British Isles, thwarting German occupation efforts while proving that air power alone could be used to win a major battle."

As in recent years, No.1 Remote Sensor Unit (1RSU) based at RAAF Base Edinburgh has supported the event in recognition of its connection to air defence. Delivering the keynote speech at the commemorative event, Commanding Officer 1RSU, Wing Commander Richard Harrison reflected: "To those who served in the Battle of Britain 80 years ago, who gave and risked all, their names will be forever etched in history as airmen and airwomen who fought in one of the greatest air battles ever fought. Their contribution and sacrifice will never be forgotten."

Although mission success was achieved, it came at great cost; 1,503 allied aircrew were killed during the Battle. Of the 449 Fighter Command aircrew who died, at least 14 were Australian.

Participating in the ceremony, 1RSU member Aircraftswoman Chantelle Bradford said it was important to reflect on this history as serving members. "As we commemorate the Battle of Britain, we acknowledge the courage and sacrifice of those who have come before us. It is a reminder of why we serve in the Air Force today, and the continued importance of our surveillance mission."

President RAAF Association South Australia Dr Robert Black (GPCAPT Retd) AM greatly appreciated the support of RAAF Edinburgh for the event, noting it was the largest event the community has been able to hold this year due to the COVID pandemic. "The Battle of Britain Commemorative Ceremony in Adelaide has become a key annual event for us and our community," he said. "It is wonderful to be able to hold the service this year despite the pandemic and not only commemorate those who served but also allow our younger current serving RAAF members to connect with our older veterans at such events."

In the evening, a Battle of Britain Dinner was held at the Naval, Military and Air Force Club in Adelaide. The guests of honour were His Excellency Hieu Van Le, AIRCDRE Brendan Rogers, Senior Air Force Representative SA, and Richard Bungey.

A highlight of the evening was a speech acknowledging the distinguished yet tragically short career of SQNLDR Robert Bungey DFC in the presence of his son, Richard. SQNLDR Bungey, a South Australian airman, completed three operational tours in Europe during the first three years of the war including flying in the Battle of Britain.

On display at the dinner were large replicas of Hawker Hurricane V-6889 which Robert Bungey flew during the Battle of Britain and Supermarine Spitfire W-3228 which he flew when he was Commanding Officer of 452 SQN, the RAAF's first Spitfire Squadron.

D-DAY VETERAN TURNS 100

World War II D-Day veteran Geoffrey Edmunds has turned 100, making him older than the Royal Australian Air Force.

To celebrate his milestone, Mr Edmunds toured RAAF Base Edinburgh's flight line and No.92 Wing at the invitation of Senior Australian Defence Force Officer, RAAF Base Edinburgh, Air Commodore Brendan Rogers. The tour was followed by a morning tea in the officers' mess with members from the base.

Officer Commanding No.92 Wing Group Captain John Grime said: "It was an honour to meet Geoffrey and show him and his daughter around the base. It's because of people like him and his service that makes it possible for the RAAF to be here today. This is an important reminder leading into our Air Force centenary celebrations."

Mr Edmunds said he thoroughly enjoyed the tour and had a marvellous time. He was presented with a photo taken during the visit as a memento of the day.

Mr Edmunds joined the RAF at the age of 17 and served in Coastal Command airsea rescue service, responsible for saving more than 10,000 lives during the war. He was selected to work as a crewman for the combined D-Day Operation. He later joined the Royal New Zealand Air Force in his early 30s.

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BELOW Veteran Geoffrey Edmonds and his daughter, Christine Crocker, at the 92 Wing building artwork wall, during their visit to RAAF Base Edinburgh.



EDITED BY John Kindler

Expanding Australia's defence AND SPACE CAPABILITIES



THE AUSTRALIAN GOVERNMENT

has announced a series of capability investments to enhance Australia's sovereign defence and space capabilities in line with the 2020 Defence Strategic Update and 2020 Force Structure Plan.

An \$87 million investment will go to improving facilities for the joint US-Australian Space Surveillance Telescope at Naval Communications Station Harold E. Holt in Exmouth, WA. After capturing its first images of space in April, the telescope will now undergo extensive tests and is expected to be fully operational in 2022.

A second investment will deliver Australia's first fully owned and controlled military satellite communication constellation. The future satellite capability will supplement, and then replace, the existing Defence satellite communications system, with a focus on the Indo-Pacific region.

Potential opportunities for Australian industry involvement include software development, systems integration, facilities construction, system operators, sustainment, and participation in the supply chain through manufacture and supply of sub-systems and components. Source: airforce-technology.com

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LEFT Joint US-Australia telescope.

TAE AEROSPACE, based in Ipswich, Old, has conducted routine maintenance of a RAAF F-35A engine fan module, the first to ever be completed outside of the US, representing a significant new step for TAE Aerospace and the Australian defence industry. Minister for Defence Industry Melissa Price said: "By maintaining and repairing the F-35 engines in Australia, we can get these planes back in the air quicker, while also creating skilled jobs for many Australians. TAE's recent achievements are a testament to the importance of defence industry in contributing to our economy, and our footprint in the global F-35 program."

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LEFT RAAF Technicians remove an engine from the F-35 training aid at RAAF Base Williamtown.

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TEAM SKYGUARDIAN AUSTRALIA

GENERAL ATOMICS AERONAUTICAL SYSTEMS Incorporated has renamed the industry team comprising Australian partner businesses Team SkyGuardian Australia. The team, launched during Avalon 2017 and previously called Team Reaper Australia, was formed for the development and delivery of MQ-9B medium-altitude, long-endurance remotely piloted aircraft systems to Australia under Project Air 7003. The team members include Cobham, CAE, Raytheon Australia, Flight Data Systems, TAE Aerospace, Quickstep, Airspeed, Collins Aerospace, Ultra and Sentient Vision Systems.

First F-35 ejection seat services at Williamtown

COMMANDER AIR COMBAT

GROUP, Air Commodore Tim Alsop recently visited the Martin Baker Australia ejection seat maintenance facility at the Williamtown Aerospace Centre to gain firsthand appreciation of the facility accountable for assessment, refurbishment and overhaul of Air Force fast-jet ejection seats.

The F-35A Lightning II is fitted with the US16E ejection seat manufactured by Martin Baker and the facility recently began conducting routine servicing of those seats. AIRCDRE Alsop said that while no pilot began their workday expecting to eject from an aircraft, having confidence in the functionality of the ejection seat system brought great peace of mind.

ABOVE MQ-9B SkyGuardian.

TASMANIAN SME SECURES DEFENCE GRANT

CURRAWONG ENGINEERING,

a Tasmania-based producer of unmanned aerial vehicles (UAVs), has secured a \$150,000 Defence Global Competitiveness Grant – available to SMEs looking to expand globally. The grant is expected to be used to purchase specialist plant equipment to increase electronics production capability for parts used in UAVs.

Currawong has developed a Controller Area Network (CAN) servo that provides a complete closed-loop actuator system with real-time position feedback. It has also developed a high-power, high-reliability Electronic Speed Controller – ESC Velocity. Vehicle electronic systems network via a CAN standard and manage the engine control unit, power supply, autopilot and payload. Currawong's in-house software tool, cEQUIP, provides an interface to allow the configuration and real-time data logging of the electronic systems operation.

Currawong Engineering is a world leader in engine powertrain systems for

UAVs, in both military and commercial applications. The company produces Corvid-29 and Corvid-50 engines and is developing a broader range of engine sizes. The Corvid-50, a 50cc engine, is ideally suited to UAVs with a maximum take-off weight of 25-40kg.

Currawong is the latest among several SMEs to receive the grant, joining the

likes of RUAG Australia, Valley Precise Global, Advanced Navigation, EM Solutions, Heat Treatment Australia, IntelliDesign, ImmersaView, Pivot Maritime International and Fivecast.

BELOW Bluebird Aero Systems ThunderB tactical UAV.



Northrop Grumman AWARDED RAAF TRITON CONTRACT

NORTHROP GRUMMAN has been awarded an \$8 million contract to build the MQ-4C Triton Network Integration Test Environment (NITE) to be located at RAAF Base Edinburgh, South Australia. NITE signals the start of growth in the Australian workforce necessary to support the Triton program.

NITE will be developed in three phases, allowing the RAAF to progress from basic continuity testing between distributed environments to an advanced integration capability development



environment via a server farm, network storage and virtualisation.

Australia expects to receive the first ground control station in 2022 and the first of six to seven Triton air vehicles in 2023. Northrop Grumman is already building long-lead items and is scheduled to begin building the airframe for Australia's first air vehicle later this year.

Remotely flying out of RAAF Base Edinburgh, the Tritons are capable of monitoring 40,000sq.km a day and can provide sustained surveillance in the South China Sea from the Northern Territory.

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Collins Aerospace delivers 1,000 F-35 SITUATIONAL AWARENESS SYSTEMS

COLLINS AEROSPACE'S AUSTRALIAN ARM has delivered the 1,000th situational awareness system for the global F-35 Joint Strike Fighter Program. The Electro-Optical Distributed Aperture System (EODAS), designed to offer a complete spherical view of the surroundings to the pilot, collects real-time, high-resolution imagery from six infrared cameras mounted around the F-35 and sends it to the pilot's helmet-mounted display. More than 50 companies from Australia have participated in more than \$1.7 billion in F-35A production contracts so far.

Source: Defence Connect

원 EODAS apertures on

the F-35 Lightning II.

AI FOR THE BATTLEFIELD

ARTIFICIAL INTELLIGENCE

(AI) and machine learning (ML) are reshaping defence industry and the battlefield, and Defence Science and Technology Group (DSTG) is seeking to leverage the technology.

On-board sensors on a multitude of platforms are generating intelligence, surveillance and reconnaissance data streams that, if processed, can provide the warfighter with a tactical advantage. Defence scientist Dr Angela Consoli has been awarded a research fellowship at DSTG and three years to focus on applying Al and ML to help warfighters effectively and intuitively assimilate the data stream. She believes human/Al augmentation is critical for the future of ADF warfighting.

Most of the Al in current defence systems is implemented at the operational layer, away from the warfighter. "The question I'll be answering is: how do we use Al/ML to help our warfighters by giving them the best information and decision superiority?" says Dr Consoli, adding that the "hard part" for Al is the step from structuring data to inferring relationships because it's a much higher cognitive construct and machines are inherently rules-based.

Airborne ELECTRONIC WARFARE DEAL **US NAVAL AIR WARFARE CENTER.**

Weapons Division Office of Naval Research, Naval Air Systems Command and Australia's Defence Science and Technology Group have agreed to co-operatively develop Airborne Multi-Platform Electronic Warfare (AMPEW) capabilities with support from both US and Australian industry.

"The AMPEW Project Arrangement establishes a co-operative project to jointly design, develop, test and demonstrate dynamic multi-platform electromagnetic warfare resource allocation management tools and decision aids," says Head of Air Force Capability, Air Vice-Marshal Cath Roberts. "The primary objective is to decrease aircrew cognitive workload and automate command and control of manned and unmanned EW systems from stand-in to stand-off ranges."

Hawk structural testing



A RAAF HAWK MK.127 AIRCRAFT has been subjected to a test program to demonstrate the structural integrity of a Mk.127 airframe to five times its intended life. BAE engineers exposed the aircraft to the range of loads it would experience in actual flight for the equivalent of 50,000 flying hours. *Source: airforce-technology.com*

ABOVE Hawk Mk.127. Photo: BAE Systems.

LAND 129 tender

RAYTHEON AUSTRALIA has

announced it is teaming with Schiebel Pacific to lodge a tender response for the LAND 129 Phase 3 Tactical Unmanned Aerial System project for the Australian Army. The S-100 can navigate automatically via preprogramed GPS waypoints or can be operated directly with a pilot control unit. Missions are planned and controlled via a simple point-and-click graphical user interface. S-100's carbon fibre and titanium fuselage provides capacity for a wide range of payload/ endurance combinations.

\$7M FOR ADVANCED AIR DEFENCE SIMULATOR

DEFENCE HAS SIGNED a \$7 million contract extension with BAE Systems Australia to support the Advanced Air Defence Simulator in Adelaide for another three years. The simulator, at Woodside Barracks, is used to train soldiers in the use of the RBS70 surface-to-air missile system. BAE is working closely with a number of key Australian businesses as part of the contract, including: Saab Australia (Adelaide) for integration of the weapons simulator and command and control system; Bohemia Interactive Simulations (Williamtown, NSW) providing simulation software; Xenon Systems (Melbourne) for the supply of computer hardware; and Barco (Sydney) for the supply of projectors. *Source: Defence Connect*

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Soldiers of 16 Regiment fire a training RBS70 at Woomera.





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UPLIFTING OPPORTUNITY

Hawk replacement PROGRESS

THE COMMONWEALTH'S REQUEST FOR INFORMATION

(RFI) for its proposed Lead In Fighter Trainer (LIFT) program to be delivered under Air 6002 Phase 1 has closed, eliciting responses from at least three companies. Air 6002 Phase 1 is a \$4-\$5 billion program between 2022 and 2033 to replace the current LIFT capability, a system of simulators and training devices based on the BAE Systems Hawk Mk.127 platform. The Planned Withdrawal Date (PWD) for the Hawk is currently 2026 and the new program aims to deliver a replacement capability that will be in service until around 2050. Beyond the RFI however, the Commonwealth is yet to define its requirements for the future LIFT capability and has not released any further milestones.

The RFI calls for a solution which has the primary role of training RAAF fast-jet pilots and weapons systems operators in transition from the Pilatus PC-21 to the F/A-18F Super Hornet, EA-18G Growler and F-35 Lightning II platforms. A secondary role is to support ADF combat training, either as a friendly or adversary force. The solution is required to be "configurable and scalable" supported by a Defence Aviation Safety Authority approved organisation and, in its secondary ADF support role, be capable of representing 4.0 and 4.5 generation forces and able to employ both kinetic and non-kinetic effects.

While the document does not specify a military off-the-shelf solution, it does require respondents to state whether their proposed platform is in service with, or is being acquired by, other defence forces. The Australian Industry Capability aspect seeks to maximise opportunities for Australian industry.

BOEING DEFENCE AUSTRALIA

Boeing Defence Australia announced in August that it had submitted a response to the RFI, with a proposal based on the T-7A Red Hawk platform now under development for the US Air Force. The



USAF will acquire 351 T-7As as part of its T-X program to replace the elderly Northrop T-38 Talon and expects an Initial Operational Capability in 2024, with Final Operational Capability to follow in 2034.

KOREA AEROSPACE INDUSTRIES

Korea Aerospace Industries (KAI) is expected to have proposed a solution based on its T-50 Golden Eagle platform. The T-50 variant is an advanced trainer, but the aircraft is also produced as a LIFT/Light Combat Aircraft as the TA-50, and as a multirole fighter (FA-50). Across the three variants the aircraft is already in service in the Asia-Pacific region, with the air forces of South Korea, Indonesia and the Philippines and also with the Iraqi Air Force.

LEONARDO

Italy's Leonardo has confirmed it has responded to the RFI with a solution based on its M-346 Master advanced trainer/LIFT aircraft. The M-346 is in service with several air forces around the world, including Italy, Israel and Poland, and regionally with the Republic of Singapore Air Force, albeit with their aircraft physically based in Europe. The company is also developing a light fighter version, equipped with a radar and weapons capability, known as the M-346FA.

The Leonardo proposal is to replace the Hawk with the M-346 in the fast-jet

training role immediately, while allowing the existing platform to continue in its ADF support role for several years. The M-346 is already performing in the fast-jet transition role to the F-35 in Italian and Israeli service and will be doing the same for Poland and Singapore in the future.

BAE SYSTEMS AUSTRALIA

The Hawk Mk.127 has recently undergone upgrade to essentially the same standard as the RAF's new-build Hawk T.2 under the Lead In Fighter Capability Assurance Program (Hawk LIFCAP) and is currently providing fast-jet transition training to the RAAF's F-35, Super Hornet and Growler fleets. The aircraft is celebrating 20 years of operations in Australia this year and, despite the 2026 PWD set some time back, the average airframe age, in terms of flying hours, is only about one-third of its verified fatigue life. *Source: thedrive.com*

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BELOW T-7A Red Hawk.



PROJECT NIGHT JAR CONSORTIUM

AIRBUS HELICOPTERS has joined forces with over 20 Australian companies and universities to form "Project Nightjar", aiming to develop a winning bid for LAND 2097 Phase 4 – an overhaul of the helicopter fleet relied on by ADF Special Operations.

In response to a Request for Proposal for a four-tonne class, rapidly deployable, multi-role helicopter for the Australian Special Forces, Nightjar will offer the highly capable Airbus H145M together with a robust in-country support framework. The H145M has been selected by the military forces of Germany, Hungary, Luxembourg, Serbia and Thailand.

The teaming proposal is expected to generate more than \$250 million of economic benefits and more than 170 Australian jobs.

Bloodhound Mk1 Gate Guards at RAAF Base Darwin.

Daronmont wins **Darwin contract**

AUSTRALIAN-OWNED Daronmont Technologies has secured a \$65 million, five-year contract to support the 41 Wing Mobile Control and Reporting Centre stationed at RAAF Base Darwin that will create 10 new job opportunities. Darwin-based 114 Mobile Control and Reporting Unit was deployed to Afghanistan in 2007-09 and to Papua New Guinea in December 2018, to support operation APEC Assist. Source: airforce-technology.com

LOYAL WINGMAN SIGHTED

BOEING DEFENCE AUSTRALIA'S

(BDA) secretive Airpower Teaming System (ATS) product, more commonly known as Loyal Wingman, has been spotted out in the open.

Until now, the only released pictures of the unmanned platform have been carefully controlled, but it would appear that the aircraft is now being prepared for taxi trials at an undisclosed location, possibly Amberley, Queensland, ahead of its first flight. Limited information released by Boeing acknowledged the ATS was being built "somewhere in Queensland" and the first flight would take place "sometime in 2020".

The ATS, a joint program between

Cedar

BDA and Defence, and known as Defence Project 6014 (Loyal Wingman Advanced Development Program). was launched at the 2019 Australian International Airshow.

Under the terms of the project, Defence is contributing \$40 million to build three ATS prototypes to explore the concept of airpower teaming, under which autonomous vehicles operate with manned platforms during a range of air combat missions. The ATS platform will feature a 2.5m removeable and reconfigurable nose, with an internal volume of over 1.5 cubic metres, to allow "a range of sensors and payloads" to be installed and tested.



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EJECTION SEAT PIONEER MARTIN-BAKER CONTINUES TO IMPROVE AIRCREW ESCAPE SYSTEMS.

I EJECTED BELOW 1,000 FEET while the aircraft was oriented outside the safe ejection envelope," says CDR Todd Cleveland, United States Navy (USN).

"On April 8th, 2013 I was flying an F/A-18F on a combat mission in support of coalition ground forces in Afghanistan. During the flight back to USS [*Dwight D.*] *Eisenhower*, the aircraft developed several compound emergencies that eventually resulted in the right engine being shut down and the left engine flaming out. I have the brilliant and hard-working employees of Martin-Baker to thank for ending up safely floating in the Indian Ocean."

CDR Cleveland is one of 3,544 US aircrew saved by Martin-Baker Ejection Seats, from a total of 7,631 recorded lives saved since 1949.

NACES PROGRAM

CDR Cleveland ejected from the F/A-18F using a Martin-Baker US14A Ejection Seat that the USN catalogues as the SJU-17. The US14A was developed under the Navy Aircrew Common Ejection Seat (NACES) program that standardised the Ejection Seat in the F-14D, T-45C and F/A-18 aircraft.

The NACES program started in May 1985 and was completed in December 1990, after some 137 ejection tests that were split between the Martin-Baker's test facilities at Langford Lodge, Ireland and at the Naval Air Warfare Center Weapons Division China Lake Supersonic Naval Ordnance Research Track.

The first NACESs were installed into T-45, F-14D and F/A-18C aircraft in 1991, the first live ejection took place on 15 May 1992 when Lt CDR J.R Muir USN ejected from his F/A-18C. Nearly two decades later, the dramatic events of Captain Brian Bews' ejection on 23 July 2010 were caught on camera as he ejected from his CF-188A at Lethbridge County Airport in Canada, see images on page 26. Those images clearly illustrate the purpose and functional sequence of an ejection seat – clearing the cockpit, stabilising the seat then deploying the parachute to inflate as quickly and as early as physiologically possible to avoid fatal ground impact and the crash site/fireball.

To date, the NACES has saved 138 lives, the most recent ejection took place from a US Navy F/A-8E on 20 October 2020 near China Lake, California.

Currently there are 2,273 NACES in service in 1,393 aircraft (T-45 and F/A-18) in seven countries (Australia, Canada, Finland, Kuwait, Malaysia, Switzerland and the US).

As a twist in the CDR Cleveland story, both Todd and his brother Brooks went to school in Canberra when their father was stationed in Australia.

The RAAF has been flying with Martin-Baker seats since the introduction of the Gloster Meteor F8 in 1951, and introduced the NACES into service with the F/A-18F in March 2010.

The first Australian life saved was on 14 June 1951 (Mk.1E Ejection Seat) and the most recent RAAF ejection was from a PC-9 on 18 May 2011 (AU11A Ejection Seat). In total 78 Australian lives have been saved to date. Currently there are 362 Martin-Baker seats fitted to some 222 aircraft in service with the RAAF (F-18F/G, F-35A, Hawk, PC-21 and PC-9A).

With the growing RAAF fleet, Martin-Baker set up an Australian division in July 2015. "We have two sites: at RAAF Pearce and at RAAF Williamtown to support the RAAF fleet," says Andrew Eden, managing director of Martin-Baker Australia.

Andrew Martin, vice president of business development at Martin-Baker, and grandson of founder Sir James Martin, describes the company as "evolutionary". "We are proud to have saved so many lives in so many countries over the past 71 years. We call our continuous product development process Engineering for Life," he says.

The NACES configuration has not stood still. A Pre-Planned Product Improvement (P3I) program was instigated in 1999 to expand the nude aircrew ejection weight range from 130lbs – 213lbs to 100lbs – 245lbs (45kg – 110kg). P3I introduced a new (choked) primary cartridge for the catapult phase and a modified seat bucket with an articulated backrest to position smaller aircrew in a forward position for control reach.

In 2003, the primary cartridge was qualified and began its introduction to service, while the articulated backrest was not retrofitted to the fleet until 2007. In 2010, the sitting cushions were replaced with new designs that were more comfortable for long duration flight, which was becoming the norm.

The NACES will continue to receive upgrades to keep it in service. The ejection sequence is controlled by a seat-mounted electronic unit known as the electronic sequencer. The sequencer



measures the external environment (static atmospheric pressure, dynamic air pressure and temperature) to calculate the sensed speed and pressure altitude in order to determine the optimum timing for parachute deployment and crew separation from the seat.

The existing NACES electronic sequencer became obsolete in 2010, last time buys of its obsolete components stretched its manufacture to 2019 after which it would have to be replaced. NAVAIR, the NACES customer, selected the Martin-Baker Sequencer for new build NACES manufacture and also for limited NACES retrofit.

Martin-Baker is a test-based organisation with extensive functional test facilities in the UK and that enabled the replacement electronic sequencer to be thoroughly proven and qualified across the expected aircraft flight envelopes.

The NACES survival kit contains the emergency oxygen cylinder for backup breathing during in-flight emergencies and for ejection purposes. An Enhanced Emergency Oxygen System (EEOS) program was introduced in 2018 to increase the backup breathing capacity in the seat as a result of the unexplained physiological episodes that were being experienced across the F/A-18 fleet.

The EEOS program introduced a higher pressure/larger capacity cylinder with a new activation system. The activation system will be introduced to service as a manual system operated by the aircrew; a future change planned by Boeing will introduce automatic activation following degradation of the primary breathing supply.

The 81 EEOS units ordered by the RAAF for F/A-18F and E/A-18G will be assembled by Martin-Baker Australia on a second production line at Williamtown to increase the rate of production.

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OPPOSITE NACES 600Kt ejection test from F-14D at Supersonic Naval Ordnance Research Track, China Lake in 1990.

LEFT CDR Cleveland Ejectee #5947 with his kids next to his aircraft.



NACES NEXT GEN

Martin-Baker plans to further enhance the NACES to keep it relevant and technologically current to satisfy the very latest aircrew safety requirements.

The enhanced NACES is known as NACES Next Gen and will incorporate six of the key features of the US16E Seat fitted to the Lockheed Martin F-35A Lightning II aircraft flown by the RAAF. The NACES Next Gen Seat will consequently achieve similar function to the high performance US16E, while utilising all the same infrastructure in place worldwide for NACES support. The six key features are:

BETTER HARNESS

- The legacy PCU-56/P torso harness will be replaced with the Martin-Baker fifth-generation seat-mounted (MG5) integrated harness that increases the upper body tidal volume by 30 percent, improving aircrew respiration through elimination of the torso harness waistcoat.
- The integrated MG5 harness can accommodate all the CAESAR multivariate body sizes from Case 1 to Case 8, unlike the PCU-56/P that could not cater for the full arthrometric range.
- The MG5 provides a single point release incorporating a water activated unlock function. The single point release is easier and safer to use single handed as it is centrally located on the abdomen. The legacy torso harness had twin parachute releases located high up on the shoulder and required two hands for efficient operation.
- The MG5 introduces the Head Support Panel located between the parachute risers to support the head during parachute inflation.
- The introduction of the MG5 and Martin-Baker Water Activated Release



System to NACES would provide a common harness type and quick release operation across all RAAF aircraft platforms.

EXTERNALLY DETACHABLE RISERS

• The parachute container design will be modified to enable the harness to be detached by an organisational level maintainer without specialist support equipment. That enables harness replacement without the burden to repack the parachute, allowing all parachute packing infrastructure to be moved from the field a central depot reducing life-cycle cost.

HEAD AND NECK PROTECTION

 An inflatable system called the Neck Protection Device (NPD), developed for the US16E Ejection Seat for the F-35, has been integrated

into the Next Gen headpad to protect the head and neck during the catapult, emergence and stability phases of the ejection sequence.



Scan the QR code above to view an online video of the US16E NPD tests.

EARLIER DROGUE DEPLOYMENT

• The drogue is deployed at catapult separation in order to stabilise the ejection seat before main parachute deployment.

An earlier drogue deployment will enable inflation at a smaller sideslip angle so the seat will be more stable until separation. Better stability means lower loads on the ejectee, further reducing the risk of injury.





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ABOVE Capt Brian Bews' RCAF ejection on 23 July 2010. Scan the QR code (right) to view a video of the ejection (see opposite for QR instructions). Video: William Gilson.



• The hem of the drogue will be reefed to delay drogue inflation for a brief interval to allow the seat to decelerate, thus reducing the shock loads on the ejectee during a high-speed ejection.

ARM AND LEG RESTRAINT

- An active arm restraint system will be added to mitigate possible arm flail injuries during even a moderate speed ejection.
- The existing NACES uses a twin leg-garter system that the aircrew don pre-flight and connect/disconnect during ingress/egress. A Passive Leg Restraint System that requires no crew action during ingress or egress will be incorporated.

BIGGER DIAMETER PARACHUTE

 The existing IGQ5000 parachute will be replaced by an IGQ6000 parachute with a 20 percent bigger diameter canopy, enabling a heavier suspended weight to be ejected and reducing the descent velocity across the aircrew weight range.





ABOVE Martin-Baker NACES Electronic Sequencer. LEFT US14A NACES.

RIGHT NACES Survival Kit with EEOS fitted.





ABOVE NACES ejection tests from Martin-Baker Meteor test aircraft and rocket track test. Scan the QR code (right) to view a video of the Meteor ejection test with the new Martin-Baker sequencer.





VERIFICATION & VALIDATION

Martin-Baker employs a complex set of software packages for design and performance modelling of NACES changes, long before any metal is cut. Siemens NX PLM software is used for 3D design and manufacture, proprietary six degrees of freedom software is used to model the ejection sequence, while an ADAMS biomechanical model is used to predict the head and neck loads associated with ejection across the escape envelope.

Further software tools are used to check, debug and validate code changes made to optimise time interval and ejection mode sequencing.

NACES performance predictive modelling is validated through careful analysis of verification test results. Verification tests include both environmental and functional ejection elements.

Environmental tests physically expose the dormant Next Gen NACES to vibration, shock, humidity and temperature criteria, and are followed by ballistic tests of the environmental

HOW TO SCAN A QR CODE

To use QR codes, you will need a smartphone or tablet.

With an iPhone or iPad

- Open the camera app on your device.
- Hold your device over the QR code so it appears in the viewfinder (phone/tablet screen) in the camera app until a notification appears (it won't take long).
- Tap the notification to open the link. It will open a webpage where you can view the video.

With an android phone or tablet

• You will need to install a QR code reader app from the Google Play Store. Once installed, scan the QR code with your device's camera app, as above. test article to demonstrate robust design and functionality after limit condition environmental exposure.

Static ejection tests verify correct function of the harness and arm/leg restraint systems and are conducted into a catch net. Dynamic tests demonstrate functional reliability and performance.

Highly instrumented human manikins of different sizes are ejected from the Martin-Baker Meteor test aircraft at speeds up to 450 Knots Equivalent Air Speed (KEAS) and from a rocket sled for higher speeds up to 600KEAS.

NEXT GEN EMBODIMENT

The majority of F/A-18E/F/G Super Hornet fleets will remain in service for many decades to come. The F/A-18 platform is also being offered by Boeing as the future combat fighter aircraft for Germany, Canada, Switzerland, Finland and India. Those prospects will sustain Boeing F/A-18 production for at least the medium term.

The US Navy T-45 training aircraft will be replaced by a new aircraft under the Undergraduate Jet Training System Program. As the US Navy prefers to standardise equipment across its platforms, the new aircraft will most probable use the Martin-Baker NACES Next Gen to minimise life-cycle cost.

Next Gen enhancements will ensure that the NACES maintains its incredible life-saving record for later model F/A-18 Super Hornets and for replacement training aircraft yet to be acquired.



ABOVE Martin-Baker Australia with finished packed NACES parachutes for RAAF.

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SCIENCE & TECHNOLOGY. SKUNK WORKS PART 1



ESTABLISHED IN 1943 TO DEVELOP A TURBOJET-POWERED FIGHTER TO COUNTER GROWING GERMAN THREATS, LOCKHEED MARTIN'S SKUNK WORKS WENT ON TO DEVELOP REMARKABLE AERONAUTICAL AND SPACE TECHNOLOGIES.



The legendary Skunk Works, the Lockheed Advanced Development Projects (ADP) facility founded by Clarence "Kelly" Johnson at Burbank (later Palmdale), California, originated in 1943 after Johnson's involvement with the P-38 Lightning fighter project. Over the decades, it has produced cutting-edge aircraft such as the P-80 Shooting Star, U-2 Dragon Lady, F-104 Starfighter, F-117 Nighthawk, F-22 Raptor and F-35 Lightning II. But it is probably best known for the SR-71 Blackbird.

The following excerpts and photographs are from *The Projects of Skunk Works:* 75 years of Lockheed-Martin's advanced development programs by Steve Pace (Voyageur Press, 2013). Wings intends to serialise the book over a number of editions and has initiated the series with Chapter 3, The 1960s: Advancing the state of the art. Metric conversions of the Imperial measurements have been added, except for altitudes.

I went to Washington to discuss the A-12 as an air defense fighter to replace the F-108.

 excerpt from Kelly Johnson's A-12 Log (abridged), 16-17 March 1960.

he 1960s brought nothing less than amazing – even mindboggling – air vehicles that were created in the Skunk Works. The word "classified" and the phrase "top secret" took on whole new meanings, for the Cold War was hot and US national security was at the forefront of military planning. Except for those personnel with a need to know, nobody was privy to what was going on behind the closed doors at Burbank, California, and within a highly restricted place in Nevada called Area 51.

The Skunk Works changed what was borderline science fiction into clear-cut science fact by creating aircraft that were previously impossible to produce. Moreover, to build those futuristic aircraft, it had to use exotic materials and invent the means to process and assemble manned aircraft from those materials. It was a time for advanced creations, engineering and inventions, and the Skunk Works triumphed.

OXCART: THE A-12

Project Gusto was established to find a replacement for the U-2. ADP and the Convair Division of General Dynamics Corporation were put to the task. On 20 August 1959, Lockheed and Convair submitted two Project Gusto proposals to a joint Central Intelligence Agency/ Department of Defense/US Air Force selection board.

The Lockheed design as proposed, called Archangel, featured a maximum speed of Mach 3.2, 4,370-mile [7,033km] range at maximum altitude and a maximum cruise altitude of 97,600 feet. It measured 102.0 feet [31.09m] long, had a wingspan of 57.0 feet [17.37m] and weighed 110,000 pounds [49,895kg], of which 64,600 pounds was fuel.

Both firms promised first flight 22 months after receiving a contract: June 1961. Both firms had presented designs with similar characteristics, but the design from Lockheed won favour and the selection board chose Lockheed's A-12 design. Project Gusto was terminated and replaced with Project OXCART.

On 3 September 1959, the CIA authorised Lockheed to move forward with engineering designs, aerodynamic structural tests and anti-radar studies. Then, on 30 January 1960, Lockheed was authorised to build 12 air vehicles. First flight was to occur on 30 August 1961, 19 calendar months after production go-ahead.

Initial design studies included the U-3, Arrow I and G2 (G for Gusto). The design propulsive system for those 12 aircraft was the afterburning Pratt & Whitney J58 (Model JT11 D) turbojet engine. By September 1960, however, the J58 program was struggling with weight, delivery and performance goals, and on 11 September 1960 Pratt & Whitney told Lockheed it would not meet the required schedule.

Lockheed had development problems as well and completion date for the first airplane slipped to 22 December 1961, and first flight to 27 February 1962, by which time, according to Pratt & Whitney, the J58 still wouldn't be available.

As an interim measure, it was decided the afterburning Mach 2-rated Pratt & Whitney J75 turbojet engine, already powering the F-105, F-106 and even the latest versions of the U-2, would be used as a temporary solution. A-12 number one (Lockheed factory serial number 121, USAF serial number 60-6924) was completed at Burbank in late December 1961. It underwent a series of functional tests in early 1962 before partial disassembly and secret transport by truck to Area 51.

The convoy departed Burbank on the night of 26 February 1962 and arrived late morning the next day.

The airplane was reassembled and fitted with its two interim J75 engines. There were fuel tank sealing problems, and a cure had to be found and implemented. A series of low, medium and high-speed taxi runs followed. Finally, on 25 April 1962, the airplane was ready for flight. The official first flight was scheduled for 30 April 1962, but Johnson didn't want any surprises, so he decided to fly the airplane on 25 April.

Skunk Works test pilot Louis Wellington "Lou" Schalk Jr had joined Lockheed in 1957, and in 1959 Johnson selected him to serve as his chief engineering test pilot on the A-12 program. Schalk flew Article 121 (as it was called) less than 2 miles [3.2km] along the Groom Lake surface at an altitude of only 20 feet. He encountered flight control difficulties due to improper flight control connections. Those discrepancies were corrected and the plane was ready for another attempt the following day.

On 26 April, Schalk made the first effective flight of A-12 number one; it lasted 40 minutes. During the flight the

A-12 SPECIFICATIONS

CREW: One (pilot / reconnaissance system operator)

PROPULSIVE SYSTEM: Two axial-flow, afterburning, 31,500-lbf Pratt & Whitney J58 (Model JT11D-20A) turbojet engines

LENGTH: 102 ft 3 in [31.17m]

HEIGHT: 18 ft 6 in [5.64m]

WINGSPAN: 55 ft 7 in [16.94m]

WING AREA: 1,795 sq ft [167sq.m]

GROSS TAKEOFF WEIGHT: 117,000 Ib [53,070kg]

MAXIMUM SPEED: Mach 3.2 (2435.9 mph [3920kph])

ARMAMENT: None

PAYLOAD: Photographic reconnaissance equipment

airplane shed some of the triangular fillets that covered the framework of the chines along the outer edge of the aircraft body. Those fillets, attached to the airframe with epoxy resin, had to be recovered and reattached. Location and recovery took the next four days.

Then on 30 April 1962, Schalk climbed the aircraft to 30,000 feet and reached a maximum speed of 390 miles per hour [630kph] during a 59-minute official first flight, as CIA and USAF officials were present. During the second test hop, on 2 May, the airplane flew to a maximum speed of Mach 1.1 (815 miles per hour [1312 kph]), supersonic for the first time.

Four more A-12 airplanes arrived at Area 51 before the end of the year, including the one-off two-seat trainer designated A-12T and named Titanium Goose.

Difficulties plagued Pratt & Whitney and its J58 engine program. By January 1963 the company had delivered 10 J58 engines to the test site. Finally, on 15 January 1963, an A-12 powered by one J58 engine and one J75 engine made a test flight. The first A-12 flight with two J58s came about on 19 January 1963, some nine months after the first A-12 had flown.

The "open-faced" J58s directed air through the air inlet via variable geometry doors and encountered numerous problems at speeds from Mach 2.4 to 2.8. A new engine air inlet system using "spikes" had to be developed and applied before those difficulties were eliminated.

The new engine air inlet system, the brainchild of Skunk Works propulsive system engineer Benjamin Robert "Ben" Rich incorporated "translating spikes" in the inlet mouth that solved the problem.

In 1962, the CIA and USAF ordered two new versions of the A-12. In addition to the A-12, the AF-12 had been ordered by the USAF in early 1960 under the code name Kedlock; only three examples were built.

One of the new versions incorporated a modification to carry and launch a ramjet-powered, 43-foot [13.1m] long Q-12 drone capable of reaching Mach 3.3 (2,512 miles per hour [4043kph]). The two-seat "mothership" received the designation M-12; the Q-12 drone was redesignated D-21, creating the M-12/D-21 combination code-named Tagboard.

The second new version was designed for high-speed, high-altitude reconnaissance. That aircraft was at first dubbed RS-12, then RS-T1, then SR-12, and finally SR-71 under the Senior Crown program. The USAF initially ordered six SR-71 aircraft but, in August 1963 increased the order to 31.

The A-12 program was an unqualified success, and from it emerged several epic aircraft designs that remain significant in the chronicles of aviation history. The A-12 was flying at more than 2,000 miles per hour [3,200kph] at nearly 100,000 feet or 18.9 miles [30,480m] at a time when other aircraft were struggling to reach two-thirds its speed and altitudes of 60,000 feet. That program, closely followed by A-12 variants, earned the Skunk Works and its director the highest civilian praise, the Presidential Medal of Freedom, awarded to Kelly Johnson and his Skunk Works in 1964 by President Lyndon B. Johnson.



KEDLOCK: THE YF-12A

The AF-12 was proposed to the USAF as an air defence fighter version of the A-12 to take the place of the cancelled F-108 Rapier. The AF-12 program metamorphosed into the YF-12 program under the code name Kedlock and remains the fastest, heaviest and highest-flying interceptor type of aircraft ever built and flown. Its closest rival, the Russian Mikoyan-Gurevich MiG-25 Foxbat, could attain Mach 2.8 (2131.4 miles per hour [3430kph]) at 68,000 feet but had limited endurance.

President Lyndon B. Johnson announced, on 29 February 1964: "The United States has successfully developed an advanced experimental jet aircraft, the A-11, which has been tested in sustained flight at more than 2,000 miles per hour [3,200kph] and at altitudes in excess of 70,000 feet. The performance of the A-11 far exceeds that of any other aircraft in the world today. The development of this aircraft has been made possible by major advances in aircraft technology of great significance for both military and commercial applications. Several A-11 aircraft are now being flight tested at Edwards Air Force Base in California. The existence of this program is being disclosed today to permit the orderly exploitation of this advanced technology in our military and commercial programs."

For security reasons, and at Kelly Johnson's suggestion, the aircraft was publicly revealed as the A-11.



TOP First A-12 (Article 123) in its early assembly phase in Burbank. Photo: Lockheed Martin Skunk Works (LMSW).

MIDDLE Evolution of A-12 showing (upper left) Comparison of Arrow I, G2, and U-2; (upper centre) Angel 2 (A-2); (upper right) Angel 11 (A-11); (lower left) Angel 10 (A-10); (lower centre) A-10 with anti-radar (stealth) treatments; and (lower right) A-12 compared to A6-9. Image: Denny Lombard, courtesy LMSW.

ABOVE A-12 number one rotating for its first takeoff on April 26, 1962. Photo: LMSW.

Based on the performance demonstrated by the three prototype YF-12As, the USAF was profoundly interested in fielding a fleet of operational F-12 aircraft. So much so, in fact, that it ordered 93 production aircraft designated F-12B to fill two wings with three squadrons each.

On 14 May 1965, the US Congress voted \$US90 million to cover the cost of Lockheed's starter fee for the project.

Lockheed received a USAF contract valued at \$500,000 for engineering work on the F-12B; followed with another \$500,000 for continued F-12B development on 10 November. But aerospace industry antagonist Robert S. McNamara, US Secretary of Defence, refused to release the appropriated funds to put the F-12B into production. His reasoning was that the growing cost of the Vietnam War wouldn't allow such an expenditure.

The USAF, Congress, and the Department of Defense teeter-tottered for several years over the Improved Manned Interceptor (IMI) program. Lockheed management received an official F-12B program termination notice from the USAF on 5 January 1968. There would be no F-12B.

SENIOR CROWN: THE SR-71

Blackbird is accepted as the unofficial name of the SR-71. It was a direct spinoff of the A-12 airframe and powerplant combination.

President Johnson announced the existence of the SR-71 on a nationwide television program on 24 July 1964.

In part Johnson said: "I would like to announce the successful development of a major new strategic manned aircraft system. This system employs the new SR-71 aircraft and provides a long-range advanced strategic reconnaissance plane for military use. The SR-71 will fly at more than three times the speed of sound, operate at altitudes in excess of 80,000 feet [and it] will use the most advanced [ground] observation equipment in the world."

Kelly Johnson kept a log on the SR-71 program that he succinctly titled SR-12 Log. In it he referred to the SR-12 as R-12. Johnson's first entry is dated 5 January 1962 and he wrote: Met with Dr Charyk, Geary and Lew Myer to discuss starting the bomber. We were given a verbal go-ahead, confirmed later, to do six months of engineering, to do a producibility study, and to move into Buildings 309 and 310 [at Burbank]. (We had started this previously.) I told them that Lockheed would build a million-dollar engineering building on the strength of the proposed program, if they considered it a good bet. Dr Charyk agreed it was a good bet and that there would be some form of a fighter or bomber version produced. (Dr Joseph V. "Joe" Charyk was chief scientist of the USAF; Col. Leo P. Geary was USAF A-12 program manager; and Lew Myer was a USAF financial officer.)

On 19 January 1962 Johnson wrote: Colonel [H. A.] Templeton here in preparation for a visit by Dr Joe Charyk. We discussed various means of getting started on the B-12 armament system.

YF-12A SPECIFICATIONS

CREW: Two (pilot and fire control officer)

PROPULSIVE SYSTEM: Two axialflow, afterburning 34,000 lbf (with afterburning) Pratt & Whitney J58 (Model JT11D-20B) turbojet engines

LENGTH: 101 ft 7 in [30.96m]

HEIGHT". 18 ft 6 in [5.64m]

WINGSPAN: 55 ft 7 in [16.94m]

WING AREA: 1,795 sq ft [167sq m]

EMPTY WEIGHT: 60,730 lbs [27,547kg]

GROSS TAKEOFF WEIGHT: 127,000 lbs [57,606kg]

MAXIMUM SPEED: Mach 3.2 (2,110 mph [3396 kph])

MAXIMUM RANGE: 3,500 miles [5633km]

COMBAT CEILING: 90,000 ft

ARMAMENT: Three Hughes AIM-47 infrared air-to-air missiles

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Prior to this, in a meeting with Major Hurley, from the B-70 project office, I told him that we would agree to go along with the sophisticated AF proposal on a missile with side-looking radar. This is done at a considerable added expense and reduction in airplane radius compared to our simpler glide-bomb concept but which, I did agree, would make the airplane more vulnerable in its attack phase. We are discussing pros and cons of how to set up the management for getting started on the armament, radar and fire control systems. We are considering M-H [Minneapolis-Honeywell], Hughes, and Westinghouse and Goodyear.

Strategic Air Command (SAC) commander Thomas S. "Tom" Power and some of his staff officers visited Burbank on 7 August 1964. They were shown R-12s coming down the production line. At that time the plan was to finish R-12 number one and send it to Palmdale on 21 October 1964. Johnson wrote: *Since the President's announcement, we have decided to go there instead of [redacted] but we have to kick North American out, and they are dragging their feet.*

The first SR-12 was delivered to Palmdale on 29 October 1964. Johnson recorded: A large number of SAC people were here to see taxi tests of airplane number 2001. They were very much impressed with the smooth operation. Johnson delayed its first flight until the following day "due to unfavourable weather and to get it in better shape to fly".

In his log, Johnson later noted: *First* flight of the SR-71. Bob Gilliland made it. Reached a speed of over 1,000mph, which is some kind of record for a first flight. Colonel Geary and Colonel Falk and others were highly pleased, particularly in that we went to [redacted] on the same day and flew the MD-21 [M-21 and D-21] mated, for the second first flight of a new type in one day.

On 4 April 4 1966 the first operational SR-71A (number 2009) was delivered to Beale Air Force Base (AFB). About 19 January 1967 Johnson wrote: *I* called CIA Oxcart Program Manager John Parangosky to tell him of my discussions with Deputy Secretary of Defense Cyrus R. Vance and others regarding use of half the SR-71's as bombers to counter the ABM [Anti-Ballistic Missile] threat. Specifically, they would be adapted to taking out the henhouse radars. I suggested that the CIA re-open the problem of storing the Oxcart airplanes if the SR-71's should be so used, because then we would have only 25 reconnaissance airplanes, which is not too many to have. Of course, I would not deny that 40 reconnaissance airplanes are more than required under the present political situation, unless we have an actual war.

As of 27 January 1967, Johnson hadn't heard back on his suggestion. In his SR-12 log he states: On December 4, 1967 Rus Daniell and I went with Dan Haughton to SAC in Omaha. We saw SAC commander General Joseph J. Nazzaro and his top echelon officers. We presented the FB-12, a common airframe for an air defense fighter or a bomber, making a strong case for high-altitude bombing. We had a very good reception.

But as it turned out the FB-12 was not accepted.

RIGHT YF-12A left missile bay loading exercises. Photo: USAF.

S-S-

BELOW Full-scale A-12 pole model for measuring radar cross section. Photo: LMSW.





TOP Interior view of YF-12A. Artwork: Giuseppe De Chiara.

ABOVE The first three SR-71As under construction in Burbank. Photo: LMSW.





SR-71 OPERATIONAL

On 1 January 1965, the USAF SAC activated its first SR-71 unit – the 4200th Strategic Reconnaissance Wing (4200 SRW) – at Beale AFB just outside of Sacramento, California. That came on the heels of a USAF announcement on 7 December 1964, that Beale AFB would be the home base for its fleet of SR-71s. Since the first SR-71 had only just flown on 22 December 1964, that action seemed premature, but it wasn't at all: an operational command structure had to be in place and prepared to operate the SR-71s as they arrived on base.

In 1965, the SR-71 entered into full rate production at Burbank, and the trio of prototype YF-12As continued to impress the USAF, especially its Air Defense Command (ADC). The best USAF ADC fighter at that time was the Convair F-106, and the Skunk Works had offered up its optionally 20mm cannonarmed and/or all-missile-armed F-12B as its future replacement.

On 8 June 1972, Johnson began

to investigate the use of the SR-71 equipped with AIM-7 Sparrow airto-air missiles and a Westinghouse AWG-10 radar for shooting down a MiG-23. He took the proposal to ADC (now Aerospace Defense Command) headquarters shortly thereafter to see if they were interested. But nothing ever came of the approach.

The Skunk Works produced 12 A-12s, one A-12T, two M-21s, thirty-eight D-21s and D-21Bs, three YF-12As, 29 SR-71As, two SR-71Bs, and one SR-71C. The crown jewel that came out of the A-12 program was none other than the still incredible SR-71 Blackbird.

SR-71A SPECIFICATIONS

CREW: Two (pilot and Reconnaissance System Officer)

PROPULSIVE SYSTEM: Two afterburning, axial-flow, 34,000-lbf (maximum) continuous-bleed Pratt & Whitney J58 turbojet engines, Model JT11D-20



LEFT During its career the SR-71 flew 3,551 operational sorties, totalling 17,294 hours, and 53,490 hours flying time, of which 11,675 hours were flown at 2,000-plus miles per hour. Photo: LM Code One.

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A TEST PILOT'S PERSPECTIVE ON LOCKHEED'S STEALTH FIGHTERS.

COMPILED BY Bob Treloar

HE AMERICAN **GOVERNMENT** launched Operation Linebacker II in 1972 to end the war in Vietnam. During that operation, the US Air Force (USAF) lost 15 B-52 heavy bombers to Russian supplied surface-to-air missile systems (SAMs) sited around Hanoi. The following year, Israel lost 109 aircraft in 18 days during the Yon Kippur war. Those losses, and the appearance of increasingly sophisticated SAM technology, were the catalyst that caused America to turn to stealth technology. The new direction resulted in the development of the F-117 Nighthawk, the F-22 and the F-35. However, the earliest stealth aircraft in the American inventory was the SR -71 Blackbird, which had been in service since 1966.

This article has been developed from a presentation by Jim Brown to the American Institute of Aeronautics and Astronautics on 25 July 2020. The presentation provided an outline of Lockheed's stealth fighter development from a Test Pilot who has flown both F-117 and F-22.

WHAT IS STEALTH?

Stealth technology works on the principle of eliminating radar reflections by deflecting or absorbing radar energy instead of bouncing it directly back to the radar receiver. In effect, that reduces the radar cross section (RCS) of an aircraft and reduces the likelihood of detection. The larger an object RCS, the greater probability of detection by a radar antenna and vice versa. For example, the F-22 has an RCS less than 0.0001m²

F-22 with F-117 in right echelon formation.

and is too small to be detected by most radars currently in use.

Stealth, low-observable technology, conveys an overwhelming combat advantage because it reduces exposure to a full range of detection media, including electromagnetic (EM), infrared, visual and acoustic systems.

Radar systems are the dominant threat. Aircraft with low RCS can approach close to a target before detection and non-stealthy aircraft pitted against stealthy opponents will suffer a significant disadvantage in the air combat arena. Stealthy, low-RCS platforms are able to penetrate deep into contested airspace without detection or interception. If detected at close range, the minimal reaction time available to air defence systems reduces the potential for a successful engagement, significantly increasing the odds for mission success and survivability of the stealthy platform.

HOW DOES STEALTH WORK?

The primary aim of stealth is to reduce the strength of radar energy returning to a receiver in order to avoid detection. That can be done by either absorbing radar energy (radio waves) using a radar absorbing coating on the surface of an aircraft or by the physical shape (design) of an aircraft to deflect radio waves. The composition of radar absorbing materials remains highly classified.

Shaping involves designing an



object in such a way that EM energy is deflected and scattered in different directions, instead of being reflected back along the transmission path to the radar receiver. That is achieved by using sharply angled flat surfaces to deflect and diffuse EM energy or special curved surfaces that conduct radio waves along the surface and reflect no, or very little, energy back to the radar receiver.

LOCKHEED'S SKUNK WORKS

In 1974, the US Defense Applied and Research Agency (DARPA) solicited responses from five aerospace companies regarding the development of a stealth aircraft. Although not included in the original grouping, Lockheed developed two stealth demonstrator aircraft under the code name Have Blue, a top-secret project.

The Have Blue demonstrators first flew in December 1977 and had a dart-like shape with the emphasis on stealth features. Their wing shape had the appearance of a dart folded from a sheet of paper which resulted in a wing sweep of 72° and were smaller than the F-117. They were aerodynamically unstable and required a quadruplex fly-by-wire system to provide suitable flying characteristics. Although both demonstrators crashed over the course of the next two years, each flying around 50 sorties, the program was considered a success.

The US Government subsequently increased funding for stealth technology, much of which was allocated towards the production of an operational stealth aircraft, the Lockheed F-117A. It was an ultra-secret project and the Air Force denied the existence of the aircraft until 10 November 1988.

F-117 NIGHTHAWK

The F-117 Nighthawk became the world's first stealth fighter. It was a twin-engined, single-seat aircraft with four elevons and two all-moving tails. It had a four-channel fly-by-wire control system, a 7g airframe limit and was fully aerobatic, with a maximum allowable angle of attack (AoA) of 14°, the wing generated vortices at 11° AoA. The USAF did not allow its aircrew to perform aerobatics. It was unstable in both pitch and yaw and used the quadruplex flight control system to limit sideslip to less than 1.5°.

A subsonic aircraft with a maximum speed of Mach 0.9 and a minimum speed of 145 KIAS, it had a maximum rate of climb of only 3,000 feet per minute with a Service ceiling of 45.000 feet. Its cockpit was a mixture of glass and analogue instrumentation. It was not equipped with a radar but had an RCS of only 0.001m². Importantly, there were no radar returns from the aircraft either head on or from the tail. The engine intakes were likened to ice-cube trays and had a grid of liners to ensure that any radar waves entering the intakes were diffused, maintained within the fuselage and not reflected to the emitting source. While that, combined with exhaust system shielding, reduced engine effectiveness by some 25 percent, it contributed to the extremely small aircraft RCS.

DEVELOPMENT OF STEALTH IN THE 1960s

Early work on stealth theory by a German physicist was further developed by a Russian mathematician, P. Ya. Ufimtsev, who published a seminal paper titled 'Method of Edge Waves in the Physical Theory of Diffraction' in the journal of the Moscow Institute for Radio Engineering. In his paper, Ufimtsev postulated that the strength of the radar return from an object is related to its edge configuration, not its size.

He concluded that even a large aircraft could reduce its radar signature by exploiting that principle. However, the resulting design would make the aircraft aerodynamically unstable and the state of control-system and computer technology in the early 1960s could not provide flight control circuits capable of enabling aircraft such as the F-117 to achieve stabilised flight.

K\$

ABOVE LEFT F-117 Nighthawk, note the notched framework and shape treatment around the cockpit to deflect radar beams.

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BELOW Straight edges and irregular angles of the Nighthawk airframe.





From inception, the low observability objective drove aircraft design. The need for secrecy and expedience from design to operational capability led Lockheed to use existing off-the-shelf aircraft systems in the F-117 configuration.

Powered by two F/A-18 F404 nonafterburning engines, F/A-18 hydraulics systems, F-16 flight control system, F-15 landing gear, Gulfstream wheel brakes, SR-71 air-to-air refuelling receptacle, Apache helicopter infra-red system, and drag chute and heat tiles (around the engine exhaust) from the space shuttle. The cockpit design was taken largely from the F/A-18 instrumentation and layout; a true collection of spare parts. However, the decision to use parts off-the-shelf maintained the ultra-secrecy surrounding the project and resulted in the first Nighthawk taking to the air in 1981 just seven months after the project received government approval to proceed.

It had two underside weapons bays and was fitted with a tail hook for use in an emergency landing. The tailhook had to break the aircraft skin to be lowered and required after-flight maintenance.

The Nighthawk saw its first significant combat employment in the first Iraq War, Desert Storm and aptly demonstrated the aircraft's revolutionary capabilities. The F-117 force comprised two percent of the attack aircraft fleet, and with a standard load of two 2,000-pound laser guided bombs (GBU-10), destroyed 46 percent of coalition targets, achieving tactical surprise on every night of the war. No F-117s were shot down during the conflict.

However, a Nighthawk was shot down by a SAM while operating over Bosnia in 1999 when its weapons bay doors were opened in preparation for a bombing attack. Opening of the weapons bay doors compromised the stealth attributes of the aircraft. The shoot down was attributed to a mixture of predictability of USAF tactics and Serbian intelligence activities; it was not deemed a failure of stealth technology.

The F-117 fleet was retired in 1998 and remains in flyable storage at Tonopah, Nevada.

F-22 RAPTOR

Due to emerging worldwide threats, in 1981 the USAF identified a need to acquire a replacement aircraft for the F-15 Eagle and F-16 Fighting Falcon. The initiative was identified as the Advanced Tactical Fighter Program. The YF-22 as it was then known, developed by Lockheed and powered by Pratt and Whitney engines, was selected following a fly-off by two competitors.

The aircraft formally entered service in December 2005 as the F-22A. Despite protracted development and various operational issues, the F-22 is a critical component of the USAF tactical air force. Its combination of stealth, aerodynamic performance and avionics systems provides unprecedented air combat capabilities.

Approximately the same size as the F-15, the F-22 Raptor is a single-seat, twin-engine, all-weather, stealthy, tactical fighter aircraft designed primarily as an air superiority asset. While it shares several visual
characteristics with the F-15, it has a larger fuselage designed to carry more fuel and accommodate an internal weapons bay but has a much 'denser' appearance. It has an electronic warfare, signals intelligence and a ground-attack capability.

The two Pratt and Whitney F119-PW-100 engines provide the F-22 with supercruise capability; an ability to cruise around M1.6 at military power, without the use of afterburners. Military power (non-afterburner) is defined as 100 percent power. With full afterburner, the F-22 has a maximum speed of 800 KIAS and in excess of M2.0 above 35,000 feet and cruises at M2.0 using 118 percent power. Full afterburner delivers 150 percent power.

An impressive flight envelope, the aircraft has a 60,000 feet altitude limitation and pilots are required to wear partial pressure suits for sustained flight above 40,000 feet. It is a powerful, highly manoeuvrable aircraft, unimpeded with angle of attack limitations. It uses a three-channel fly by wire flight control system and has an airframe manouvre limit of +9g to -3g.

Powered by two supercomputers that operate 105,000 times faster than those used on the lunar excursion module, the

aircraft has a fully integrated avionics system presented to the pilot on a glass cockpit display that has multiple configurations and redundancies. Mission data, navigation information, situational awareness, threat analysis and prioritisation, and aircraft performance are fully integrated to enable enhanced pilot and aircraft performance in a hostile environment. While planned for a program run of 750 aircraft, only 187 were produced due to high costs, export bans and the changing strategic threat environment. The last F-22 was delivered in 2012. W



ABOUT JIM BROWN



Graduating from the USAF Test Pilot School in December of 1986, James Brown tested the A-7, F-15 Eagle, F-117 and F-22.

In 1994, he was hired by the Lockheed Skunk Works as an Experimental Test Pilot in the F-117 Stealth Fighter program. As Chief Test Pilot, and after flying the Nighthawk for eight years with more than 900 flight hours, he went on to test the F-22, eventually becoming the Raptor Chief Test Pilot.

In January 2016, he retired from Lockheed Martin and joined the National Test Pilot School as the Chief Operations Officer and Test Pilot Instructor. He is a Fellow and past president of the Society of Experimental Test Pilots, a Fellow of the Royal Aeronautical Society and an Eagle of the Flight Test Historical Foundation. He has logged over 9,600 flight hours in 152 different models of aircraft and is the world's highest time Stealth Fighter pilot.

Vi

OPPOSITE PAGE Have Blue Demonstrator Aircraft – a folded paper dart. √√√ LEFT F-22 Raptor.



Source: Qantas



RAAF BASE. WAGGA



THE LARGEST RAAF TRAINING BASE IN AUSTRALIA, RAAF BASE WAGGA WAS ESTABLISHED IN 1940 AS RAAF STATION FOREST HILL.

COMPILED BY WGCDR David Lavicka, SQNLDR Nigel Webster and Michael Nelmes.

ABOVE Flight line at RAAF Station Forest Hill in 1942 with 31SQN Beaufighters.

RIGHT Aerial shot taken of the base in 1942.

FAR RIGHT No.2 SFTS staff in 1940, with WGCDR Scherger in the centre of the front row.



the Australian Government selected a 120ha farm at Forest Hill, 10km from Wagga Wagga in the New South Wales Riverina for a flying training

IN EARLY 1939,

establishment. RAAF Station Forest Hill was built as a permanent base with primarily brick buildings and opened in July 1940. Its home unit, No.2 Service Flying Training School (No.2 SFTS), was commanded by WGCDR Frederick Scherger (later ACM Sir Frederick Scherger KBE, CB, DSO, AFC).

The school was one of a growing number of Empire Air Training Scheme Units. It took newly trained pilots from elementary flying training schools and gave them more advanced training on Wirraways and, for those destined for multi-engined flying, Avro Ansons.

Instructors and trainees were often pushed to their limits to meet the



pressures of supplying qualified aircrew. Accidents and incidents were all too frequent. The most infamous garnered world-wide attention. In September 1940, two Ansons collided in mid-air and joined together, one on top of the other. The two trainee pilots in the lower aircraft and one from the top aircraft bailed out, but the remaining trainee, LAC Fuller, remarkably landed the joined pair.

In January 1942, No.60 and No.61 Squadrons formed with Wirraways and took on the tactical training of staff pilots. Shortly afterwards, No.2 SFTS disbanded and No.31 Squadron formed at the station with Beaufighters before moving to the Northern Territory and South West Pacific to fly against the Japanese. No.5 Operational Training Unit, a Beaufighter training Unit formed at Wagga on 26 January 1942 before moving to Tocumwal on 20 October 1943, took its place.

Meanwhile, No.2 Training Group Headquarters formed at Romano's Hotel in town for the duration of the war, and No.2 Communications Unit occupied the civil aerodrome at Gumly (now a suburb of Wagga). A few US Army Air Force



(USAAF) aircraft of the 70th Bombardment Squadron (B-17 Flying Fortress heavy bombers) transitioned through, handled by the 4th Air Depot Group USAAF.

No.1 RAAF Hospital was established at nearby Turvey Park. Its buildings later became the Charles Sturt University teachers' college. Advantage was also taken of the spacious engineering facilities at Forest Hill by forming No.5 Aircraft Depot for the duration of the war. There, repair and maintenance was completed on over 600 single- and twin-engine aircraft. In1944, the base's population peaked at 2,270.

POST-WAR

At war's end, the base was used for storing hundreds of surplus RAAF aircraft prior to their disposal. The RAAF Ground Training School was formed on the base on 4 February 1946. In 1950, that unit took on its present-day name, RAAF School of Technical Training, and the base was formally renamed RAAF Base Wagga to more closely link it with the City of Wagga Wagga. In 1961, the local council granted the base the Freedom of the City, an honour that has been regularly exercised.

No.1 Recruit Training Unit arrived in Wagga in 1960 before moving to South Australia in 1964 for facility refurbishment. It did not return to Wagga until 2008. During the 1980s, major accommodation and training projects were constructed, making RAAF Base Wagga one of the most modern training facilities in Australia. It was further expanded in 1994 with the transfer of RAAF Radio School to the base. In 1988, a major historic aircraft restoration for the Australian War Memorial, a World War II Japanese Zero fighter, was completed as an apprentice project.



BELOW Anson Siamese Twins cleverly recovered to base by LAC Fuller.

BELOW CENTRE Wirraway aircraft over the Riverina in early 1940.

BOTTOM No.5 Aircraft Depot Engine Run Up Bays.









In 1985, two other units were formed from within the RAAF School of Technical Training: the School of Management and Training Technology (renamed School of Postgraduate Studies in 2003); and the RAAF Clerical and Supply Training School (renamed RAAF School of Administration and Logistics Training in 2005).

Disbanded post-war, No.31 Squadron was re-formed in 2010. In recognition of its wartime activities of the squadron and that of No.5 Operational Training Unit, the combined Officers' and Sergeants' Mess was renamed the Beaufighter Mess.

In 1999, Ground Training Wing was established at RAAF Base Wagga and when the RAAF College moved to the base in 2008, the two units briefly amalgamated as RAAF College, before being re-established as separate entities. In 2019, following a review of training delivery across Air Force, Ground Academy was formed from RAAF College and Ground Training Wing to provide oversight of all Air Force-managed ground training.

Much of the base's wartime infrastructure still exists and is in daily use, including:

- the original brick guardhouse and dwarf gates on the highway
- one large steel hangar (Hangar 84)
- two large brick hangars (88 and 89)
- a semi-circular spray of 13 Bellman 'temporary' hangars, believed to be the largest number of Bellman hangars in one location in the world
- the original 1940s Officers' Mess, still replete with open fire
- the parade ground
- a 25m firing range
- a brick 'stop butt' facility into which aircraft weaponry could be test-fired.

RAAF WAGGA AVIATION HERITAGE CENTRE

The Aviation Heritage Centre was opened in 1995 as RAAF Museum – Wagga Annex to provide a focus on the Air Force's involvement in the Riverina and access to the history and memorabilia of military aviation and training.

RAAF Base Wagga is the last remaining Riverina World War II Base to operate within a network of bases that incorporated Narrandera, Temora, Deniliquin, Tocumwal and Uranquinty. It is the only place to see regionalspecific Air Force memorabilia, including photographs and documents, which show the activities of the region during and after WWII and after.

The Aviation Heritage Centre is also an important aid in promoting present-day Air Force activities and tourism for Wagga, and supports numerous local Air Force Associations. It is open on Wednesdays, Saturdays and Sundays,10am to 4pm, and entry is free. There is also a display of static aircraft at the front gate, including a Canberra bomber, Winjeel trainer and Meteor, Mirage and Sabre jet fighters, which can be viewed at any time.

THE BASE TODAY

The RAAF Base Wagga celebrated its 80th Birthday on 1 July 2020. It is the 'Home of the Airmen' and the largest RAAF Training Base in Australia. Training provided at the base covers:

- initial military training through No.1 Recruit Training Unit
- initial and post-initial employment training for ADF aviation maintenance personnel through the RAAF School of Technical Training
- initial and post-initial employment training for Air Force specialists in logistics and personnel capability management through the RAAF School of Technical Training
- post-graduate education across enlisted personnel and officers through the School of Postgraduate Studies.

Training is supported by:

- Headquarters Ground Academy, providing command oversight, training development, personnel services, logistics, chaplaincy and physical training
- No.31 Squadron, providing key management functions as the Airbase Operations Squadron
- Wagga Health Centre, providing medical and dental support
- a station of the Joint Military Police Unit, providing military policing functions across the base
- other service groups including representatives of Estate and Infrastructure Group and Chief Information Officer Group, and their contractors. ¹/¹/₁



ABOVE No.5 Aircraft Depot Engine Workshop Hangar.



ABOVE WAAFs display a piece of their trade.



ABOVE Technical trainee practising on an aircraft component.



있 <u>ABOVE</u> Trainee under supervision.



AS AUSTRALIA'S NATIONAL AIRLINE CELEBRATES 100 YEARS OF CONTINUOUS OPERATION, WE LOOK BACK AT HOW IT BEGAN.

ABOVE RIGHT From left: Hudson Fysh, Paul McGinness and their mechanic George Gorham departing Longreach for Darwin, August 1919.





QANTAS - THE EARLY YEARS

ANTAS AIRWAYS WAS not the first airline in the world; that honour arguably belongs to The St. Petersburgh-Tampa Airboat Line. Commencing operations on 1 January 1914, the world's first 'winged' airline began flying the 40-odd kilometre distance between the two cities across Tampa Bay in Florida, in Benoist XIV flying boats.

Nor was Qantas the first airline to operate regular commercial flights in Australia; those credentials belong to Norman Brearley's West Australian Airways. Though it was incorporated almost a year after Qantas, Brearley's company won a government contract for passenger and airmail service between Derby and Geraldton and immediately commenced Australia's first regular commercial service in December 1921.

It would be another 11 months before Qantas would have the luxury of a regular pay cheque, as Paul McGinness took off from Charleville carrying Queensland's first airmail -106 letters – bound for Longreach.

Australians cannot even claim Qantas Airways is the oldest airline brand name still in existence; KLM snapped up that accolade when it was incorporated in October 1919, a little over a year earlier than Qantas.

However, on 16 November 2020, Qantas will turn 100 years of age and hold the mantle for the oldest airline still in existence to have operated continuously since its inception. KLM discontinued operations during WWII and in 2004 merged with Air France to become Air France – KLM. As a result, Australia's own Qantas will be the first airline in the world to celebrate its centenary.

As Australia's national carrier notches up 100 years of operation, it's worthwhile to touch on the library of books written on the subject of Qantas' history, and perhaps gain some understanding of where it came from and how it has evolved over its first century. This is the first in a four-part series that will break the airline's history down into its early years, the propeller era, Qantas at war and, finally, the jet era and beyond. For readers with a love of 'Team Building Human Factors' speak, we could sub-title them Forming, Norming, Storming and Performing – so we will.



ABOVE Hudson Fysh welcomes Ross and Keith Smith to Darwin.

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BELOW Vickers Vimy piloted by Ross and Keith Smith with Jim Bennett and Wally Shiers (mechanics) arrives at Darwin, 10 December 1919.

FORMING: 1919-1923

In August 1919, two World War I decorated, Air-Ace pilots set out from Longreach, western Queensland, for Darwin in a heavily laden Model T Ford. Employed by the Department of the Army, Paul McGinness DCM DFC and Hudson Fysh DFC (later Sir Hudson Fysh) had accepted a mission to survey for emergency landing fields in the remote Australian outback. The emergency landing fields would also serve as navigation markers and possible refuelling stops for the contenders of the 1919 Great Air Race from England to Australia.

Barely surviving the two-month ordeal, trekking by car through scrub, sand and crocodile-infested waters, the two otherwise unemployed pilots came upon a brilliant concept. As they made their way across the remarkable landscape, the men witnessed firsthand the difficulties the inhabitants of the harsh and unforgiving country faced on a daily basis. Just getting supplies, mail and medical attention would take days or even weeks. During the wet season, towns and properties could be isolated for up to a month.

To men of the sky, the solution was obvious. What was truly needed in the outback was an aviation business that could support those living and working in the extreme conditions. It was a grand plan, but a plan that needed support and lots of money. It wasn't until a chance Sunday afternoon meeting with an influential grazier named Fergus McMaster that the seed to create the business was sown.

By late 1919, McGinness and Fysh had completed the survey work for the Great Air Race. McGinness, driving back from Darwin on a more realistic southern route than the originally devised Gulf route, had located and



prepared sites for emergency airfields, sent navigation instructions back to Darwin for the fliers to find their way on the last segment to Melbourne, and was waiting in Cloncurry for Fysh to arrive from Darwin. The eventual winners of the race (Ross and Keith Smith) were now completing the final hours of their 18,000km odyssey to a heroes' welcome in Melbourne – and £10,000 in prize money. Fysh, who had remained in Darwin to prepare the town's first landing field was now hitching a ride southbound to meet up with his aviation partner in Cloncurry.

McGinness was filling in a warm Sunday in Cloncurry preparing for a social picnic when fate walked up and asked for some help. A wealthy and influential grazier, Fergus McMaster, had come to grief a few kilometres out of town with severe car troubles. With the vehicle stuck in a ditch, he was in need of assistance. As McGinness set about fixing McMaster's car, he began telling the grazier of the enterprising business idea he and Fysh had devised for outback Queensland. McMaster was of course grateful for the ingenious help to get his car mobile again, but it was McGinness' infectious enthusiasm for starting an aerial business that garnered the influential local's interest.

As the months passed, Fysh and McGinness found many sympathetic and enthusiastic supporters for their business proposal, including two other local graziers Ainslie Templeton and a silver-haired octogenarian named Alexander Kennedy. Templeton knew McMaster well, and knew that the business needed him if it was ever to literally get off the ground. Aware that McMaster would be in Brisbane performing his duties as chairman of the Anti-Cattle Duffing Association, Templeton arranged a meeting to get the enterprise underway. Within a few weeks, and with another ally, Dr Hope Michod in tow, the six men gathered in the stylish Gresham Hotel in Brisbane, to formalise their agreement. There, around a small, glass-topped round table in August 1920, the men put their signatures and some £3,000 in cash to an agreement that would form a historic aerial business – trading name yet to be determined.

The newly formed company set up headquarters in the office of P.W. Riley (Auctioneers) in Winton, holding its first directors' meeting in the Winton Club.

The Company Certificate of Record in the name of the Queensland and Northern Territory Aerial Services Ltd would not be issued until 16 November 1920 – the official birthdate of Q.A.N.T.A.S. Other names were considered for the new business, including the rather lofty Australian Trans Continental Aerial Services Co Ltd and Western Queensland Auto





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Call 1800 011 046 or visit openarms.gov.au Aero Services Ltd. History bears out the wisdom of their final choice, given that WQAES doesn't roll off the tongue with quite the same lilt as QANTAS. McMaster explained that the acronym was "coined with ANZAC as its inspiring factor".

With the ink still drying on the August deal, McGinness and Fysh departed for Sydney to meet with a fellow WWI pilot, Nigel Love. Love, who had fought in the skies over France with No.3 Squadron, was now constructing Avro aircraft under licence on a cattle paddock he had selected beside the Cooks River in Sydney - now Kingsford Smith Airport. QANTAS signed an agreement to purchase two of his three-seat, Dyak-powered Avro 504K aircraft for delivery as soon as possible. With the expectation of needing larger aircraft, however, the purchase agreement was later changed to a single Avro 504K aircraft and one of the larger Avro 547 triplanes.

With the dawn of 1921, QANTAS' first aircraft - the Sunbeam Dyak-powered Avro 504K, was ready for delivery. At the same time, QANTAS landed its first job - to fly another biplane, a Royal Aircraft Factory BE2e from Sydney to Longreach on behalf of its new owner, Charles Knight. Knight's deal was to employ the pilots to bring his purchase home and to teach him to fly. Fysh, McGinness and Arthur Baird (QANTAS' first aircraft engineer) completed final checks of the Avro and set off from Sydney for Winton on 21 January 1921 - McGinness and Knight in the Avro and Fysh and Baird following in the BE2e. With just a few incidents along the way, including a near loss of the BE2e in cloud near Singleton and some severe navigation issues, the fleet arrived in Winton on 6 February.

In the heady days of aviation such 'incidents' were not rare and there was some concern within the new company about finding sufficient customers for their new service. As Fysh pointed out, the public saw that aeroplanes were "uncomfortable, unreliable and had frequent forced landings, so people were afraid to leave the ground in such an unnatural venture!". Knight quickly discovered that for himself and by the time they arrived in Longreach he had



already changed his mind about the whole flying thing, and sold the BE2e to Fysh and McGinness for £450. QANTAS was now a fully formed company with two aeroplanes and a third on order. It was now time to start doing business.

Fysh set off south from Winton home base in the BE2e and McGinness north in the Avro in search of that ever-elusive beast, aviation income. With a going rate of about 2 shillings per mile for taxi service or £3 for a 10-minute joy flight, fiscal certainty was a long way off. What was needed was a regular, government-sponsored mail and freight run like Brearley had already secured for his airline in Western Australia. Lobbying and negotiations began in earnest and went all the way to Prime Minister Billy Hughes' office, for a subsidised run joining the railheads between Charleville and Cloncurry. As is the case in such matters though, nothing is ever easy. As negotiations with the government dragged on, the aerial company sat on

ABOVE

The First Fleet: taking delivery of QANTAS' first aircraft – the BE2e (top) that Charles Knight would sell to QANTAS as their second aircraft and the Sunbeam Dyak-powered Avro 504K (above).

RIGHT Chartering a QANTAS aircraft in 1921 for Turkey shooting from the air. Owner of (aptly named) Wellshot Station standing with Fysh sitting in BE2e holding dinner.

FAR RIGHT Duck Street Office, Longreach.

a financial knife edge, spending money on repairs and fuel while trying to survive on coins for joy flights.

At each town and station property they visited, both men would wear many hats. They had to be not only pilots, but salesmen and lobbyists as well – garnering support from the local communities and landowners while providing any and every aviation service possible. On one trip, Fysh visited Wellshot Station near Illfracombe and, presumably testing out his formation flying skills, was employed to take the station manager turkey shooting by air. Meanwhile, McGinness was urgently called on to make what was possibly the first aero-medical evacuation in Australia, bringing newly born girl Melda (Peg) Glasson and her mother into Winton hospital in the open-cockpit Avro, just the first of many medical flights QANTAS would undertake, eventually extending to its support for the Royal Flying Doctor Service.

QANTAS' first year of operation proceeded at a frenetic pace. In April of 1921, following its first official board meeting, the company moved headquarters from Winton to Longreach, eventually taking up office in Duck Street. The small weatherboard shop,



complete with hitching rail out front, would serve as the fiscal heart and administrative nerve centre for the business, while flying operations were centred just east of the town's showgrounds on land supplied by the Agriculture Society. Company Board papers stated that as of 15 May 1921, after just four months operations, McGinness had traversed 7,400 miles, carried 285 passengers and flown 111 hours, earning a gross revenue of £934. Fysh had amassed similar figures giving the company a credit balance after expenses of some £881.

Finally, in December, their lobbying action paid off when the government called for tenders to operate an air service from Charleville to Cloncurry. Of course, there was no certainty QANTAS would win the tender and there were some interesting stipulations required of the application. For example, the service would have to be flown in an experimental type of aircraft and the pilot had to be of English descent. While the vet to be delivered Avro 547 fitted the bill, its poor flying characteristics rendered it unsuitable for the task, so the QANTAS Board decided to tender on the basis of an order for two Vickers Vulcan aircraft. While the company awaited the Vulcans, a newly acquired De Havilland DH4 would have to make do. Neither Fysh nor McGinness held any desire to fly the Vulcan – nicknamed the 'Flying Pig'. At £3,700 each, they were not only ugly but expensive. As with the Avro 547, QANTAS would never take delivery of the Vulcans, as they could not achieve their promised performance of climbing to 10.000 feet with a full load in 13.5 minutes. In the heat of western Queensland, they could barely get airborne.

In early 1922, QANTAS received word that it had won the tender. In order to fulfill the contract, the airline purchased two Armstrong Whitworth aircraft.



CIVIL AVIATION. QANTAS CENTENARY



Though they too struggled with the summer conditions, at just £700 each the AW's were far less expensive than the Vulcans and they proved to be quite reliable workhorses.

Meanwhile, things for McGinness were not going as he would have liked. The airline that he had 'lit the spark of' was changing. Opinions are divided on whether it was his need for a more challenging existence than the mundane regular flying could provide, or the board's new rule requiring pilots to 'take the pledge' (no alcoholic drinking at all - ever), or the more likely version that control of the company was leeching away from him. One sticking point was the employment of the company's new manager Marcus Griffin without McGinness' knowledge or approval being sought. Whatever his reasons, on the 25 October 1922, McGinness had had enough and tendered his resignation, barely two years after the company he had conceived had started. McMaster, as chairman, reluctantly accepted his resignation but encouraged him to stay on to see in the first regular service of the airline.

A week later, at 5.35am on 2 November 1922, QANTAS made history. McGinness and Baird, with 106 letters



aboard, departed Charleville before an assembled crowd of locals, in the Armstrong Whitworth G-AUDE on its first commercial service. After passing through Blackall, McGinness landed in Longreach at 10.15am. There, Fysh was waiting with the silver-haired Alexander Kennedy ready to continue the service on to Cloncurry in the sister Armstrong Whitworth aircraft, G AUCF. The only hitch in the day was the second AW's inability to take off. Unable to achieve enough power during the take-off run, Fysh aborted the take-off and returned to the assembled crowd to swap back to the aircraft McGinness had just arrived in. As he transferred the load and made ready for a second attempt, Kennedy, holder of QANTAS passenger

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ABOVE Ugly Ducklings that QANTAS never owned: The Avro 547 triplane (top) and the Vickers Vulcan (above).

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OPPOSITE TOP First Airmail Service arrives Longreach 2 November 1922. From left: A. Baird, N. White (director), Dr Hope Michod, M. Griffin (manager), Alexander Kennedy (QANTAS' first official passenger – ticket No.1), P. McGinness (pilot), F. McMaster, H. Fysh and T.F. Barker (director) in front of Armstrong FK-8.

OPPOSITE BELOW 20-year reunion: the men who built QANTAS reunite in 1939 on the rooftop of Shell House, Margaret Street, Sydney, QANTAS Empire Airways Headquarters. From left: Hudson Fysh, Fergus McMaster, Arthur Baird and Paul McGinness.





ticket number one, famously yelled to the crowd, "Be damned with the doubters!". Some conjecture still exists as to his meaning, was he belying those who had doubted QANTAS' ability to achieve the dream of a regular air service, or merely shouting back at those friends warning the 85 year old of the perils of aviation, as demonstrated by the just completed aborted take-off?

Finally airborne, Fysh described the scene of Kennedy, on his first flight in an aeroplane. "His flying cap had slipped round and his whiskers were streaming in the wind, but looking back I could see a happy smile on his face."

Fysh flew on stopping at Winton and McKinlay, averaging 69 miles per hour for the 310-mile journey.

As Fysh, with engineer Baird and passenger Kennedy aboard, landed the Armstrong Whitworth safely in Cloncurry later that day, QANTAS had come of age and was now truly formed. It now existed as a proper company with an enthusiastic and influential board, two new teetotalling pilots employed to replace McGinness and bolster the service, a fleet of five biplanes, and most importantly a government-subsidised contract for regular air service.

All this was realised in the space of three years. Next would come consolidation...

To be continued next edition.



Join Australia's most exciting aviation organisation and be a part of the mission to keep Warbirds flying! For more information on the association and how to join, visit www.australianwarbirds.com.au Air Force Association National President Carl Schiller OAM, CSM is Patron of a unique Victorian aircraft restoration project, which in recent times has also been accredited as a museum. From earlier roots in the Veterans and Friends Association B-24 Squadrons of Australia, former RAAF Liberator pilot Bob Butler, his crewman Eric Clark and a small band gathered in 1988 to discuss how they might fulfill a dream to acquire and restore a Liberator for the nation. From those beginnings the project has grown into what it certainly one of Australia's largest, most comprehensive and thorough historic aircraft restoration projects. Along the way additional restoration projects – an Airspeed Oxford and Avro Anson trainer (RAAF types flown at Werribee, the site of the project) and a CAC Boomerang fighter – have joined the B-24 in the hangar.

THE LAST LIBERATOR DOWNUNDER

A72-109

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BELOW LEFT A72-109 70TU, 1945.

RIGHT Richard Sbrana and Graeme Hore working on the upper gun turret. Photo: Norm Morris.

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BELOW RIGHT Charles Cull working on a bomb release unit. Photo: Norm Morris.







B-24 BRANCH SECRETARY RAAF ASSOCIATION VICTORIA **TONY MULLER** LOOKS AT THE EFFORT TO RESTORE THE LAST SURVIVING RAAF LIBERATOR -AUSTRALIA'S ONLY HEAVY BOMBER OPERATED IN THE WAR AGAINST JAPAN. VER THE PAST 32 YEARS, the future of our Liberator has been the subject of suggestions ranging from the sublime to the ridiculous. It was going to fly. It was going to Point Cook. It was going to Ballarat. It was even to be disassembled and taken to the Avalon Airshow, where it would be reassembled and taxied along the runway. None of those things happened.

The ambitious souls who gathered together with Air Force personnel at RAAF Base Wagga in August 1988 had one idea, to locate a B-24 Liberator to restore and display in an appropriate museum for the people of Australia. Fortunately, that ideal has been followed faithfully by the hundreds of volunteers and members who have provided their time, skills and money to bring the aircraft to the stage where it will now have a permanent and proper home in a rebuilt and restored hangar.

You might wonder why some people would gather together so many discarded items in the hope that one day they may prove to be useful, but luckily for our project they did. Most of the donated items have been in need of restoration, which has kept our volunteers occupied over the years.

THE FUSELAGE

The main body is from a RAAF B-24M (serial A72-176) which flew with No.7 Operational Training Unit (70TU) at Tocumwal, NSW in 1945. Interestingly, it had been flown by the unit's CO and previous Officer Commanding No.82 Wing, AIRCDRE Deryck Kingwell. After the war it was dismantled at RAAF Base East Sale, Victoria for disposal and most probably scrap. But instead of being delivered to the smelter as were the rest of the RAAF's 287 Liberators, the fuselage was bought by the Toye brothers and trucked to George's backyard in the Latrobe Valley town of Moe. It rested there on its belly for 40 years.

When rescued from among trees by what was then the B-24 Liberator Memorial Fund, the fuselage was still in surprisingly good condition. In 1995, it was delivered to Werribee by a Gippsland CMF unit and dismantled into sections for access to remove corrosion and then sealed with an etching paint. The interior was photographed before being stripped of all remaining fittings. Every panel, former and stringer was

BELOW Tony Muller working on a Twin Wasp motor; Next project, an Avro Anson. Photos: Norm Morris.





cleaned, treated and reassembled. That first phase was planned to take five years and ran over time by a year or so, but it was necessary. With little physical damage, most of the panels only needed minor repairs.

WINGS & TAIL ASSEMBLY

With a fuselage secured, the major components now needed were wings and a tail assembly. None had survived from the RAAF Liberator fleet, but in the 1990s a crash-landed US Army Air Force B-24D was identified in Papua New Guinea's Ramu Valley. With hydraulics shot out by a Japanese fighter, its pilot was forced to land without flaps or brakes. After a high-speed landing it ran into the rough at the end of the runway, and the nose wheel collapsed. The damage was enough for the Americans to leave it for us to discover 50 years later.

The wings and tail assembly were removed, and over two years of cooperation between the Army, Air Force, Navy, Qantas, the Burns Philp shipping line and volunteers, they were shipped to Australia. Unfortunately, the ship was caught in a fierce storm and most of the tail unit fell overboard. However, enough parts to build another were located in Darwin. As for the large Fowler landing flaps, a set was found stored in a farm shed.

While the rescued wings had very little corrosion, their outer sections and tips had been badly damaged during the crash landing. A replacement pair of outer sections were acquired from the USA as part of a trade deal which initially turned sour but was eventually resolved. The replacement wing sections were from a US Navy Privateer version of the Liberator. Because the Privateer's role had included low-level flying over the sea, they had been sealed against corrosion and therefore the wings required very little attention.

The wingtips were made from plans, and the volunteer who made them was heartbroken when they were stolen. One of our sister hangars, in which the wingtips and other parts were stored, collapsed and we were not allowed inside for months while asbestos was



ABOVE How far the aircraft has come along since its days in a Moe backyard. Photo: Phil Buckley.

removed and the area declared safe. It provided rich pickings for thieves, who took every bit of metal they could carry including an ejection seat. Conscious the wingtips would probably go overseas, Customs was alerted and a few weeks later they turned up, dumped on the roadside near the hangar fence.

ENGINES

Early in the project's history, we were donated three mighty Pratt & Whitney R-1830 fourteen-cylinder, 1,200-horsepower radial engines. They had been treated with a preservative for storage, which initially made it impossible to rotate the drive shafts. A fourth engine was assembled from donated spare parts and christened the Bitza. Using the R-1830 spare parts book and workshop manual it took over a year to assemble, as additional parts had to come from America when there was enough money in the kitty. The restoration team was so scared of running the beast (Bitza) that the test frame made for it was designed to withstand an earthquake. The engine was not fitted with a propeller to aid cooling for prolonged operation, so it was only intended the engine at least start. When it was to start, the entire crew of hangar volunteers gathered behind with their backs against the hangar wall, safely away from anything that might let go. Much to everyone's surprise, it not only started but ran very sweetly. The project now has five running engines, the fifth from a deal with a New Zealand repairer.







ABOVE From top: cockpit canopy (photo: Phil Buckley); retractable ventral ball turret (photo: Michael Nelmes); display cockpit (photo: Michael Nelmes).

UNDERCARRIAGE & GUN TURRETS

One undercarriage oleo leg was found under a house in suburban Melbourne, and a second donated by a farmer who had tried to make a wool press from it. A firm in South Melbourne offered to restore them and that provided a pair of functional undercarriage legs. Two more have since turned up. Two landing wheels, tyres and inner tubes from South America completed the main undercarriage.

The upper gun turret had been among a load of turrets being delivered in the USA when the delivery truck caught fire on its way to a production facility. As the truck was then blocking the highway, police pushed it into a ravine. In 1996, a collector arranged to salvage those turrets and one was transferred to the Memorial project. It is now restored and operational.

The rear gun turret, donated by volunteers at RAAF Base Amberley in Queensland, is also not far from complete restoration. The nose turret, a composite of several units, has been restored to an operational state and is awaiting the manufacture of new Perspex skin. A second nose turret being assembled from donated parts will form part of the artefact displays in a larger, upgraded hangar into which the project will relocate.

The Darwin Aviation Museum offered parts to restore three of the retractable Sperry ventral ball turrets, on the proviso that one was restored for their presentation. That was done and the turret retained will be fitted into the fuselage. The leftover parts were cobbled together to form a third turret for external display.

MUSEUM ACCREDITATION

Over the past five years, the project has gone through the long and sometimes difficult process to achieve accreditation by Museums Australia as an official museum, and this was achieved in 2019. The entire team is looking forward to completing the original mission intent to restore an RAAF Liberator and to display the aircraft "in an appropriate museum for the people of Australia".

We hope everyone who has been part of this journey in the past will get as much pleasure in seeing that happen as will the current volunteers, members and supporters. With the B-24 moving into its new home, there will be more space to continue the work on the collection of training planes used during the war at Werribee Airfield: the Airspeed Oxford currently underway, followed by an Avro Anson project currently in containers. The museum is looking for a Tiger Moth to complete the trio. It will also allow Nick Knight to do justice to his CAC Boomerang (RAAF serial A46-147).

The B-24 Liberator Memorial Australia has celebrated many milestones in its history, and many setbacks as well. The recent news that the new Hangar No.1 will soon be moved close to the smaller hangar in which the Memorial now operates is certainly a reason to celebrate. The B-24 can then be displayed as it was when it left the Consolidated Aircraft factory in November 1944. W

• B-24 Liberator Memorial Australia Inc. is currently situated in the hangar at the corner of Farm Road and Princes Highway, Werribee, Victoria. Phone 03 97311263.

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The project will relocate into its larger hangar in the near future.

For update information and opening times, email liberator@b24australia.org.au, visit b24australia.org.au and facebook.com/B24Werribee, or view the recent 10-minute video, Melbourne Day Trips: B-24 Liberator Restoration on



YouTube – scan the QR code (left) with your smartphone or tablet for a direct link (see page 27 for QR code instructions).



LIBERATORS AND LIBERATION WORDS Michael Nelmos

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THE ONLY HEAVY BOMBER FLOWN BY THE RAAF AGAINST JAPANESE FORCES, THE B-24 LIBERATOR PLAYED A SIGNIFICANT ROLE IN VICTORY IN THE PACIFIC.

HE LOCKHEED MARTIN

F-35 Lightning II aircraft for the RAAF are being assembled at Fort Worth, Texas. Seventyfive years ago, another RAAF frontline combat aircraft was being rolled out at Fort Worth: the Consolidated Aircraft Corporation B-24 Liberator heavy bomber. Fort Worth was just one of five factories owned by three manufacturers. At the largest of those, the Ford Motor Company's plant at Willow Run, Michigan, B-24s were being rolled out at the rate of up to one per hour.

First flown in 1939, the B-24 was built in larger numbers than any other American aircraft – more than 18,000. The prodigious output supplied not only the US Army Air Force (USAAF) on every front, but also the Royal Air Force (RAF) and, from early 1944, the RAAF.

This year, 15 August marked 75 years since the end of World War II. As a companion piece to our museum feature and the conclusion of our Fannie Bay Dogfight series, we thought it appropriate to look at the role played by Australia's B-24 Liberators during the final year of the war. As the only heavy bomber employed by the RAAF against Japanese forces, the B-24's effectiveness against diverse and distant tactical targets and Japan's transportation network made a significant contribution to victory in the Pacific.

American heavy bombers, mostly B-17 Fortresses of the 19th and 7th Bombardment Groups USAAF, had been seen at Darwin and Batchelor in the Northern Territory since the early days of the Pacific War. US Liberators of the 90th Group commenced operations from Northern Queensland in November 1942, and from Batchelor and Fenton in the NT the following February. The USAAF's 380th Group arrived at Fenton in May 1943. Staging for fuel at Truscott or Corunna Downs in WA when necessary, the B-24 had the range to carry an effective bomb load as far as Borneo and return.

EARLY RAAF CREWS

RAAF crewmen joined the RAF's first B-24 squadrons in the European and North African theatres during 1941-42. In RAF Coastal Command, the B-24 'very long range' bomber covered a gap in the Atlantic Ocean, enabling it to hunt and attack German U-boats which were decimating Allied supply convoys. Later, RAAF crewmen flew RAF Liberators in both the Mediterranean and Burma-India theatres. Their missions included not only bombing, but also resupply for partisan forces and air-dropping special duties operatives behind enemy lines roles later taken on by RAAF B-24s in the Pacific theatre.

A few RAAF crew flew with the 380th Group from Fenton in 1943. Around November that year, the Americans indicated that B-24 allocations to the RAAF were likely. From February 1944 groups of experienced RAAF crews joined an operational training program, initially in Queensland and then in New Guinea, where they flew 10 or 15 missions with US Squadrons. That exposure was designed to prepare a cadre of crews with B-24 experience to fly the aircraft in RAAF service.



Returning to Australia, the men joined the 380th Group or became instructors with No.7 Operational Training Unit (7OTU) at RAAF Station Tocumwal, NSW. There, on Australia's largest airfield, a dozen war-weary former USAAF Liberator aircraft arrived for aircrew and maintenance staff training before, in May 1944, new examples were ferried across the Pacific to Amberley, Old, a prelude to large-scale delivery.

Within six months Tocumwal was home to the RAAF's largest training unit, boasting 2,000 personnel and 58 Liberators.

VS

OPPOSITE PAGE Ford's Willow Run factory, Michigan USA, where in 1944 a Liberator was rolled out every hour.



TOP NT Heavy bomber bases in Australia, 1942-45. Map: Michael Nelmes.

ABOVE North-West Area Force Liberators in NT and WA roamed the region as far as Borneo, Sumatra and the Philippines. Map: Australian War Memorial (AWM).

INTO RAAF SERVICE

Several former Vultee Vengeance dive-bomber squadrons were recalled from the New Guinea theatre and began converting to the B-24. Three squadrons, No.24, No.21 and No.23, were formed into No.82 Wing RAAF under the command of GPCAPT Deryck Kingwell. No.24 SQN, initially attached to the 380th Group, flew its first B-24 mission on 6 July 1944 from Manbulloo, NT. Throughout 1944, Tocumwal-trained crews continued to undergo further training in New Guinea before joining a RAAF squadron (see table below).

The majority of B-24 operations fell into two categories: long-duration armed patrols in search of shipping and supply craft in the Timor, Arafura and Banda Seas; and attacks on land targets such as airfields and emplacements in Timor, the Celebes, Netherlands East Indies (NEI, now Indonesia) and Borneo. One notable success was a series of three daring low-level attacks on power stations in Java between 27 January and 8 February 1945. Another noteworthy mission came on 6 April 1945 when, together with RAAF B-25s, nine B-24s of 82 Wing bombed and damaged the Japanese light cruiser *Isuzu* in the Flores Sea. Two Liberators were shot down by sustained fighter attacks.

No.200 and No.201 Flights were among the RAAF's most secret units. No.200 FLT flew for the Allied Intelligence



WARTIME RAAF LIBERATOR UNITS

Units listed in sequence of operational deployment. Additional bases were maintained at Truscott and Corunna Downs WA for long-range missions.

UNIT	PARENT WING	OPERATIONAL BASES	BECAME OPERATIONAL
70TU	_	Tocumwal NSW (heavy bomber training)	February 1944
24SQN	82	Manbulloo NT, Fenton NT, Morotai	July 1944
21SQN	82	Fenton, Morotai	January 1945
25SQN	-	Cunderdin, WA	March 1945
200FLT	-	Leyburn, Qld	March 1945
23SQN	82	Long, NT, Darwin, NT, Morotai (det)	April 1945
201FLT	-	Darwin	April 1945
12SQN	85	Darwin	May 1945
102SQN	-	Cecil Plains Qld	July 1945
995QN	85	Darwin	September 1945





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ABOVE A Japanese 'sugar dog' supply craft burning after a No.12SQN B-24 attack. Photo: AWM.



ABOVE RIGHT A Coastal Command Liberator attacks German U-boat submarine U293 in the Skagerrak off Denmark. Photo: AWM.



Bureau, air-dropping special operations personnel of Z Special Unit into Borneo, the NEI and Timor. NO.201 FLT was a forerunner of today's electronic intelligence units, but although it moved north to Darwin, it did not go into action.

In June 1945, 82 Wing moved from the NT to Morotai in the Halmahera Islands – closer to targets in the Celebes and Borneo. After staging a series of pre-invasion attacks, the wing covered the amphibious 'Oboe' landings in Borneo at Labuan, Tarakan and Balikpapan. In July, advance parties arrived at Balikpapan, but the war ended before the wing fully relocated there.

Post-war, the B-24 squadrons undertook the transport of Australian prisoners of war back home from camps in the NEI. In 1947, the Australian-built Lincoln replaced the Liberator and it faded into the annals of history.

During their year of service, RAAF Liberator units lost 169 men and 14 aircraft on operations or in accidents. Numerous Australians also lost their lives while serving with RAF and USAAF squadrons. The display of the sole remaining RAAF example at Werribee, Victoria (see museum feature, page 50) will be a fitting tribute. W

• Wings assistant editor (history) Michael Nelmes authored Tocumwal to Tarakan: Australians and the Consolidated B-24 Liberator (Banner Books ACT, 1994).

LIBERATORS BY THE THOUSANDS

More than 18,000 B-24 Liberator heavy bombers were built by the Unites States during World War II. Of those, 287 were flown across the Pacific to Australia for use by the RAAF during 1944-45.

Seven RAAF squadrons, one operational training unit and two special flights operated the type: Nos. 12, 21, 23 and 24 Squadrons flying from NT bases and later from Morotai in the Halmaheras, No.25 Squadron from WA, No.s 99 and 102 Squadrons in Qld, 7 OTU at Tocumwal NSW, and Nos. 200 (special duties) and 201 (radiocountermeasures) Flights flying from Qld, NT and the Philippines.

The RAAF's use of the aircraft focussed on tactical raids on Japanese airfields and installations, patrols and low-level attacks on enemy supply vessels, support for the Oboe invasions of Borneo, and long-range strikes north-west to the Netherlands East Indies (NEI now Indonesia), while 200 Flight air-dropped special mission personnel into Borneo and the NEI.

CONSOLIDATED B-24J LIBERATOR SPECIFICATIONS:

Crew: 11 Length: 20.5m

Wingspan: 34m

Max take-off weight: 29,500kg

Powerplant: Four Pratt & Whitney R-1830 Twin Row Wasp supercharged radial engines of 890kW each

Armament: 3,600kg of bombs, 10 x 0.5-in machine guns

Max speed: 478kph (255kts)

Range: combat 2,480km (1,330nm),

ferry 6,000km (3,200nm)

Service ceiling: 28,000ft

WORDS David Armstrong



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IN THE FINAL INSTALMENT ON THE BATTLE OF DARWIN, **DAVID ARMSTRONG** FOCUSES ON THE MUCH-MALIGNED USAAF 33RD PURSUIT SQUADRON PILOT **2ND LIEUTENANT ROBERT OESTREICHER.**

OBERT OESTREICHER has become an enigma in the annals of Darwin World War II history – a much-discussed participant of the Fannie Bay dogfight and a figure who has caused persistent disagreement among historians. His defence of Darwin on 19 February 1942 is legendary but the postscript to the dogfight over Fannie Bay has varying viewpoints, depending on the historian telling the tale.

Evolution of the air battle on the morning of 19 February 1942 is not widely disputed (apart from 2nd Lt Peres' movements) and is covered extensively by Douglas Lockwood in his 1966 book *Darwin's Pearl Harbour*, in Bob Alford's *Darwin's Air War 1942-45*, and more recently by Dr Tom Lewis' *Carrier Attack*. There is, however, much conjecture around the actions of the surviving B Flight pilot, 2nd Lieutenant Robert (Bob) Oestreicher, who claimed the downing of two Japanese planes.

Lewis has given talks and presentations covering Oestreicher specifically, including the explicitly titled *The Hero who Wasn't, the Mythic Deeds of Pilot Robert Oestreicher in Darwin's First Air Attack.* According to Lewis, Oestreicher had 'bugged out' when all hell broke loose over Fannie Bay that morning and, as recently as the 2019 Military Writers Festival in Darwin, Oestreicher's claims of shooting



TOP What is believed to be 2nd Lt Robert Oestreicher's P-40 at Daly Waters on her way south 20/21 February 1942. Photo: Australian War Memorial.

ABOVE 2nd Lt Oestreicher's *Miss Nadine* (P-40E #43).



down Japanese aircraft were not only disputed, but his knowledge, ability and courage questioned.

However, Alan Powell, Emeritus Professor in History and Political Science at Charles Darwin University, has a different view. Professor Powell has researched and written extensively about many aspects of Top End history and more specifically around the Darwin raids in his book *The Shadow's Edge: Australia's Northern War*.

In opposition to the increasing criticism of Oestreicher, Powell, through meticulous research and direct communication with many primary contacts missing in previous works, has uncovered some concise information that demonstrates a series of highly likely (and at the very least, more accurate) events from 19 February onwards. His research points to a complete misrepresentation of events around Oestreicher's actions on that fateful day. Oestreicher should be remembered as a pilot caught in a horrendous position and who responded tactically as he should have.

Powell's evidence concludes it is likely that Oestreicher attacked two different Japanese formations, both belonging to the Japanese carrier *Soryu*. The first formation comprised 18 Kates which reported being attacked by a fighter and had four planes damaged, but none lost. The second formation of 18 Val Dive-Bombers also reported being attacked by fighters. One was lightly damaged, while a second was forced to ditch in the ocean (a Japanese destroyer later rescued its crew).

In the confusion of that first-ever dogfight over Darwin and considering the undisputed shooting down of the four B Flight Kittyhawks in quick succession by Nagahama, it is highly likely that the attack on both the Kates and the Vals was by Oestreicher. Japanese Zero pilots also reported being engaged by a sole P-40 after they had shot down the other P-40s. In other words, it appears likely that Oestreicher took the fight to the Japanese – against overwhelming odds.



TOP 2nd Lt Oestreicher in *Miss Nadine* flying cover over B Flight. Image courtesy of Fine Art America.

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ABOVE 2nd Lt Oestreicher and Miss Nadine.

Directly after that action, Oestreicher's P-40 was seen (by AA crews) nose down, full throttle and racing at about 350 knots at treetop level over Darwin in the direction of Daly Waters (the Qantas refuelling bush airstrip 500km south of Darwin that was used for the first international flights from England) in a bid to escape the overwhelming number of enemy aircraft. Some sources say he landed at Daly Waters (to assess his damaged aircraft and refuel), however, he is confirmed as being part of efforts to replace a shredded tyre on his aircraft Miss Nadine (courtesy of Zero fire) later that day at RAAF Field, Darwin.

Also, *Miss Nadine* was sighted on the ground just before the second Japanese bombing raid prior to midday on the same day, supporting Oestricher's report that he landed his damaged aircraft at RAAF Field once low on fuel. He was ordered south to Cloncurry the following morning and pictures of his P-40 refuelling at Daly Waters seem to confirm that event.

Powell's research differs from other historians in that he interviewed Robert Oestreicher in person (when he visited Darwin in the late 1980s) and was able to speak with USAAF personnel who served with Oestreicher during and post-World War II. He also spent time at the Research and Analysis Division of the US Army Centre of Military History in Washington DC, where records are kept in relation to the air war over Darwin from a US perspective, where he was a guest of Chief of Research Ed Drea.

The interesting feature about that institution is that most of the staff were Japanese American citizens and excellent at comprehending Japanese culture with respect to interpreting war records in relation to the Pacific theatre. Most had 30 plus years' experience reading Japanese wartime records. Generally speaking, it is considered by Ed Drea's team that Japanese war records were not accurately kept and often deliberately so, for many reasons, but most often related to under-reporting of loses for propaganda purposes (both in house and for the public at home in an increasingly desperate Japan). Unfortunately, for recent writers on the subject, those Japanese records have become the definitive facts on which their research is conducted and, in turn, lead to allegations about Robert Oestreicher. Time spent by Powell at the Maxwell Air Force Base in Alabama. where WWII USAAF records are located, rounded off a concise piece of firsthand research.

CORRECT COUNT

Commander Mitsui Fuchida, who led the attack on 19 February 1942, stated in an interview in 1965 that seven aircraft were lost in the raid over Darwin (not three, four or five as indicated in various Japanese records). Powell says: "Fuchida's mention of seven losses is particularly related to later concerns because of disclosures that aircraft ditched near their carriers were not counted as shot down or missing. The knowledge of both Japanese attitudes and American P-40 fighter tactics has influenced my Pacific War research ever since and this factor, combined with Fuchida's figure of seven aircraft losses, the only credible total ever given, became vitally important when Robert Oestreicher's achievements came under attack from two sources, both Australian."

Powell's investigation goes on in some detail to highlight that a Val (Tail number 354) was discovered at Nightcliff (15km from Fannie Bay) and another Val was observed by Army personnel (AA crews dotted that area of Fannie Bay) crashing into the sea off East Point. Adding to the mix is a report by Corporal Max Oates from one of the AA Batteries who noted: "I had to go with another man on the 20th, to find the aircraft that was shot down. We did find it eventually on the edge of the Holmes Jungle. The two AA guys who shot it down got Commander in Chief Commendation Cards. At first, we thought it was a single-seat machine. Then Parker, I think his name was, dug down and found the other bloke underneath. Below the rear gunner had been the pilot. The plane had made a fairly big hole and caught fire."

Oates's AA site was at Berrimah, not near Holmes Jungle or Nightcliff, and clearly, this Val was not the victim of lowlevel AA fire; it hit the ground in a vertical dive, from altitude. It is highly probable that that particular Val was shot down by Oestreicher as he said. The plane seen



plunging into the sea is also highly likely to be Oestreicher's second victim.

Powell goes on to say: "Fuchida's loss figures, combined with these other revelations about the non-inclusion of ditched aircraft by Japanese record keepers, complicates enormously the official picture from the Australian point of view and resulted in a mishmash of awards and credits that owed more to misplaced patriotism, wartime propaganda and sheer ignorance than to truth. One of these misplaced awards seems to have been offered in the case of the Val dive-bomber that crashed at Holmes Jungle."

Archival records from the National Archives and Research Administration in Maryland (covering US movements from 1942 Darwin), state that on the day after the bombing, an American Lieutenant accompanied by staff was sent out to verify the wrecks of two planes shot down and claimed by the Lieutenant (most likely Oestreicher).

Interestingly, notes from 1947 recorded by Lieutenant Owen Griffiths (HMAS *Platypus*) who was in Darwin on 19 February, tell of an Aboriginal man named Louis from Melville Island (just north of Darwin) who came across some Japanese eating crabs. Louis delivered the emaciated Japanese to Army personnel on Bathurst Island 15 days after the attack. One of the men had a pilots Imperial Japanese Navy (IJN) ID hanging around his neck. He indicated he had been shot down by a lone P-40. This would almost certainly be the result of Oestricher's various engagements.

THE FIGHTER PILOT

Looking closely at the pilots from the 33rd Pursuit Squadron who accidentally arrived back in Darwin at the same time 188 Japanese aircraft were arriving to attack the city, we can see that apart from Pell and Oestreicher, there was very little flight time among them. Pell was a veteran of the Philippine campaign but had not seen a lot of combat and Oestreicher, although also not having seen combat, had logged many hours in P-40s.

The tactic of diving away at speed if confronted by Zeros that had a height advantage was not an official procedure but was widely talked about among P-40 pilots since it's successful use by the American 'Flying Tigers' who flew against the Japanese while supporting China in 1941 and earlier. It was also known that the A6M2 Zero became increasingly unstable at speed, due to an absence of a hydraulic control system, and that the tactic of outrunning a Zero at speed made a lot of sense for a P-40 pilot.

The P-40 could be turned 'inside out' by a Zero but was able to escape in a dead flat or shallow dive at full power. Once clear of the Zero, P-40 pilots immediately gained altitude, hopefully exceeding that of the Zero, and could be back in the fight utilising speed and power from a height advantage. That appears to be exactly what Oestreicher did. His reactions, so to speak, were textbook.

In terms of questioning Oestreicher's courage, excellent research comes via Powell and original USAAF documents that again counter the allegations levelled at Oestreicher. Powell's interview with Brigadier-General Donald Hutchinson, Captain in the USAAF during the war and the Executive Officer of the 49th Fighter Group of which the 33rd Pursuit Squadron was a part, is compelling. He remembered Oestreicher quite well and duly invited Powell to a 49th reunion in Duluth, Minnesota.

At that event, numerous retired



pilots and ground crew remembered Oestreicher and all had virtually the same observation of him – that he was a likeable personality who got on very well with the Australians, was an excellent 'Tower' man (from his time as a controller in Darwin after his return there), and was a very good fighter pilot.

A BRILLIANT CAREER

As the intensity of the Western Pacific campaign moved slowly north, so did many Pursuit pilots. Oestreicher eventually made the switch to twinengine planes (due to pre-war experience in two engine variants), retrained briefly in Charters Towers and was posted to Port Moresby (Ward's Strip) for a full tour of duty from September 1942 to June 1943 flying the A-20 Boston.

The Boston had only one pilot and a dorsal rear gunner. It was a fasttwin-engine light attack aircraft that was well armed for forward offensive action but poorly configured for its own aerial defence. Oestreicher flew many missions in defence of the Kokoda campaign in the wake of the Coral Sea battle. He also took part in what is considered some of the most dangerous low-level attacks of the war – on the Japanese bases at Rabaul and Lae.

The danger in flying those missions began long before the actual combat operation with a crossing of the 4,000m high Owen Stanley Ranges. Many aircraft were lost in that region of Papua New Guinea. On the other side of the range, the Tainan Air Wing of the IJN were encamped. The Tainan AW catered for some of Japan's best fighter pilots and they had a great deal of early success against both American and Australian pilots.

After the war, an interview with Saburo Sakai, who was known as the 'Sky Samari' (credited with over 60 destroyed allied aircraft including many over Papua New Guinea), recounted the bravery of the A-20 pilots. He said at the time: "We flew what was then the outstanding fighter aeroplane of the entire Pacific theatre. Our pilots enjoyed a clear-cut superiority against the enemy, many of them having gained their greatest experience through combat in China and through the rigid and exacting training requirements of pre-war Japan. It was not surprising, therefore, that the enemy suffered such grievous plane losses against the Zeros, which flew from Lae.

"To us, however, it seemed that the courage of the pilots and crews who operated the B25 Mitchells and B26 Marauders [and the A20 Boston, which the Japanese seldom recognised as a separate aircraft] was deserving of the highest praise. These twin-engined raiders lacked the firepower and the armour protection of the B-17 Flying Fortress, yet, time after time, they flew against Lae and other targets minus the fighter escort our own high command deemed indispensable for the survival of bombers. They always came in low, anywhere from 1,500 feet above the ground to such a low level that they were actually slicing through the top

of tree branches. They combined with their courage the highest piloting skills. They were undaunted. Their morale was marvellous, despite the terrible toll we exacted of their ranks."

Oestreicher flew for nine months under those conditions, an extraordinary feat, and was duly recognised for his flying skills in such challenging conditions. Critically, and quite unbelievably that part of Oestreicher's career is seldom mentioned, if at all, and some (recent) historians still naively portray him as 'lacking courage'.

I will let Alan Powell have the last word about this incredible pilot and the legacy of the Fannie Bay Dogfight: "Robert Oestreicher was promoted to First Lieutenant when he returned to Darwin and the 49th Fighter group, Captain in New Guinea, Major in Brazil, and Lieutenant Colonel on his return to the USA. He retired with that rank when the war ended.

"He died in January 1991 at the age of 73 years. I hesitate to call him a hero, a much-abused word these days (and one, in my judgment and knowing the man, he would not have used himself). His memory like that of all who live long was imperfect, too. But he showed the courage to admit and face fear and, on February 19, 1942, he knew what to do and did it when other brave men did not. And he, along with Paul Wurtsmith, Donald Hutchinson and the men of the 49th Fighter Group (33rd PS) fought well for Australia. They are all gone now. Long may their memory last."

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AN INCIDENT FROM 40 YEARS AGO ILLUSTRATES THE IMPORTANCE OF HAVING THE AUTHORITY TO ACT WHEN PLACED IN A POSITION OF RESPONSIBILITY.

23 JANUARY 1979! I would be involved in a momentous day with a complete stranger, a compatriot aviator. As with all momentous events, there was no inkling as to how the day would unfold.

Having returned from leave, I was scheduled for a check ride in a Huey. It was late in the afternoon when we finally got air borne and headed east out of Fairbairn Air Force Base, ACT. Ron Mitchell, the QFI checking me out was very experienced, a bloody good pilot and a nice all-round bloke. I was anticipating enjoying the check ride.

East of Fairbairn, the terrain runs from grazing plains to hilly scrub and mountainous rain forest. As one of our training areas, the terrain had lots of features that allowed Check Captains to challenge their charge. As the sortie progressed, we strayed further and further east until we left the training area, enjoying the evening light effects in the hilly and rough terrain. About an hour into the flight, one of the emergency frequencies came to life with transmissions that were not readily discernible.

After a short period of focused listening, we realised two Navy A4 Skyhawk pilots were quite intensely talking about an engine malfunction. Not long after, the discussion turned to a contemplated ejection which, further seconds later, turned into a statement of "Ejecting" at about an altitude of 15,000ft. We then heard the remaining Skyhawk transmit a mayday and a position report to a ground-based station beyond our radio reception.

There was a flurry of activity in our cockpit. While one of us plotted the position of the ejection on our maps, the other tried on UHF, VHF and HF to contact the other Skyhawk and then one agency or another, without success. Strangely though, after plotting the A4 ejection position, we appeared to be very close.

All of a sudden, we heard the pilots Personal Locator Beacon (PLB). We thought maybe five to 10 minutes before he hit the ground; hope he does not land on top of us. We headed in a direction we thought might be about right, hoping to hear the signal get louder and were rewarded. Meanwhile further attempts to contact the other Skyhawk proved fruitless.

The terrain we were headed into while homing on the signal became steeper and rougher, and night was closing in. We were below a cloud base in a valley system. The cloud was close to settling on the hills above us, with a little mist in the air. Yes, we were worried. As the PLB signal got louder, we were discussing whether or not we had time to finalise before cloud and lack of light made flying conditions too hazardous. It was also going to be a very cold night in the mountains and a long way through torturous terrain to any "civilization" for the downed pilot.

We both thought at this stage, the pilot had no idea that underneath him was a chopper with two blokes frantically trying to meet him when he hit the ground. I was trying to imagine how he felt.

Quote from Col Tomlinson, A4 pilot:

Next came the great opening shock of the chute. The ballistic spreader, now incorporated in the seat, threw the risers out instantaneously and I slowed from 260 KTS to zero in approximately half a second. My whole body felt like a piece of rag being whiplashed as the opening shock rippled through it. I felt dazed for a few seconds and a feeling of nausea developed in my stomach. I checked my limbs for injury and at that stage everything felt sore but I could move okay. Reaching up and pulling down on the right hand risers I stabilised underneath the chute and gave the 'boss'

"I could taste blood and hoped no internal damage had been done. This increased the sick feeling that had developed and taking a puff of emergency oxygen, I noticed it was not flowing. A feeling of loneliness hit as I descended towards the mass of white undercast cloud with the wind occasionally whistling through the risers and canopy. The feeling was very eerie, especially as I also had a sensation of going up and down in updraughts when all I wanted to do was get down.

a thumbs-up as he flew by.

The RSSK8 (dinghy and survival pack) was becoming increasingly uncomfortable and I released one side of it to relieve the pressure; also hoping that after descending through the cloud



I would come out into a clear area and be able to release the pack just above the ground so it would not injure me on landing. Not long afterwards the tops of the clouds (approximately 7,000 feet) started to engulf me and the white mass that took away the bright sunshine and blue sky felt very pleasant for some reason. There was no sensation of movement whatsoever until small glimpses of the ground appeared below.

I broke out of the cloud about 500 feet above heavily timbered rain forest country and taking a quick look around all I could see was the surrounding hills covered in cloud and drizzle."

The PLB signal got louder as we headed up a valley. We were below the cloud and still well clear of terrain. Then the valley forked markedly. It was a decision of right or left. If the decision was wrong, we would have insufficient light remaining to turn around and try the other way. We veered left and the signal got louder.

Then there it was, a parachute suspended in a huge tree, surrounded by other huge trees, with this bloke standing nearby. Whoopee! We were now circling over the A4 pilot.

We discussed our lack of a crewie to work the winch. There was a flying order stating, for centre of gravity reasons, there was to be no single pilot winching operation without the Commanding Officer's authority. Luckily, I was the CO. Ron was okay about operating the winch and would have to leave the cockpit, but then, of course, I was not yet re-rated: that was what our flight was about. I asked Ron had I passed the check ride? He signed me up on the spot. Now we were set for a winch.

Ron exited his seat for the rear cabin and I set up an approach to the hover over the survivor. Bit of adrenalin running. Important outcome, weather deteriorating, light fading.

Then Ron called that we were not equipped with a winch collar. He noticed the downed pilot was wearing an old-style Mae West life preserver designed to take a winch hook, but there was documentation strongly recommending against that despite years of previous use. Again, the CO role came into play.

Ron called winch hook going down. Quite quickly, it seemed, the pilot was hooked and coming up. Then out of the corner of my eye I saw Ron pulling him in through the door. Pretty good work.

Ron finally rejoined me in the front and I glanced around as we rolled into a climb to get the heck out of there. A young bloke was perched on the seat in the back with a big smile on his face. I thought "bloody good". What a coup for all of us in the military system.

Quote from Col Tomlinson:

I reached down and with the aid of my legs was able to pull the RSSK8 back up as the trees now came rapidly towards me. It took some time to relocate the RSSK8 connections and while doing them up I noticed a small clear area of about 20 feet in diameter below. Attempting to steer into it by pulling on the rear risers I was only successful in slowing some of the drift over the ground and landed into the top of a 100 foot high tree on the edge of it. Crashing through the top of the tree, I hoped the chute would not tangle and hold me stranded 100 feet high. Luckily it didn't. I continued through the foliage, breaking off branches as I went. The next thought was 'will the chute hold out and not be ripped to shreds and I fall another 60 feet?'. Again luckily, the foliage broke my fall and I landed quite safely onto the rain forest floor.

"I released the chute and RSSK8, activated the SARBE and unsuccessfully attempted to contact the 'boss'. I then calculated it would be at least 30 minutes before a helo would get to the area so I switched it off, looked around at the thick undergrowth that surrounded me and mentally prepared myself for a long wait before rescue. I decided I would re-activate the SARBE in 10 minutes in case there was anyone else in the area. I noticed a large fallen



On one hand it was a 40 million dollar plane, on the other hand the spider was **inside** the cockpit.



log protruding out of the undergrowth about 20 yards away in the clear area I had seen. Dragging the RSSK8 I repositioned myself on the log and took off my gear. Just as I was taking out the foliage penetration flares, I heard the faint sound of a helo approaching. I couldn't believe my ears, 'magic sound' resounding down the valley. You couldn't miss that Iroquois WOK WOK.

"Switching the SARBE back on, I wondered how the hell they got there so quickly as I had only been on the ground for 10 minutes. I fired a pen gun flare, then another, and another. The sound continued to come closer.

"After the chute was sighted I was able to talk them into my position. I was on a log with very little tree clearance above and I could only see about 30m through the heavily timbered trees. It was drizzling and not a very pleasant place to stay for any length of time so I was very relieved to have the Iroquois hovering above. I was winched up into the helicopter through the foliage. It was a very welcome sight for me to see the crew!" We somehow managed to contact Air Traffic Control at Nowra Navy Base and headed toward it.

Suddenly, a voice came on the radio identifying as a Navy chopper with a doctor on board, requesting we land in the first clearing we could both identify and swap the downed plot to their chopper.

Ron and I glanced at each other, shook our heads and said we can land but let the doctor come to our helicopter. It was a sensible decision not to ask a pilot, possibly in shock following the ejection to walk to the other chopper. But the decision was also driven, a bit, by our unspoken thoughts, "bugger that". Nothing better than an Air Force helicopter delivering a downed Navy pilot right into the middle of a major Naval Base. Nothing like a bit of "competition". We landed at Nowra with the doctor on board. Not much fanfare: not much of anything as we settled in the lines.

We found accommodation which was readily supplied, but we were in our flying suits and had no other clothes with us. "Maybe we can find you a **ABOVE** Col's parachute was recovered some time later and presented to him.

meal and you can eat out the back of the kitchen" – mess dress rules. My first thought was "Stick it". My second thought was "Stick It". We took a taxi into town in some borrowed clobber and found a restaurant. All's well that ends well.

I am in the habit of reflecting on notable events in my life. I know there were some hinge points in this rescue that were important to its effectiveness and positive outcomes.

Importantly, decisions that contravene standing orders designed to protect personnel and equipment in routine training operations can and were made tactically to prosecute a contingent mission. Similarly, the decision to deviate from an approved task to carry out a task very different from the original, as in this case, resolved a situation that could have ended in tragedy.

The A4 pilot was fortunate that,

as the Unit Commanding Officer. I was in a position to authorise deviation from promulgated orders. If any of the decisions taken during this contingency had to be referred to higher level or were subject to bureaucratic processes, the rescue would either have been abandoned leaving a person's life in jeopardy or completed with some trepidation as to disciplinary consequences. Latitude to take action contrary to preconceived direction, subject to rational consideration and sound judgement should be an inherent authority assigned with task responsibility.

The successful conclusion to this extemporaneous set of circumstances serves to illustrate the value of delegating authority commensurate with responsibility. I fear in today's society we are on a path of increasing delegated responsibility while withholding authority, but demanding accountability. What's more, modern management doctrine does not appear to comprehend the difference between authority and responsibility despite significant education in management and leadership theory and practise.

I fear we have entered, in some ways, an age depicted in the cartoon to the right.

Often, senior managers tend to demand accountability without assigning any authority to make decisions and then treat failure with punitive action while everyday successes are largely ignored. Leaders/ managers have become fearful of delegating authority because they themselves fear the consequences of bearing responsibility for their subordinates' decisions.

We seem to be in an age of arse protection.

This is a story from 40 years ago. I have had recent input from Ron



Mitchell, the Captain/QFI of the aircraft and I have managed to get input from Col Tomlinson, the Navy A4 pilot who ejected. So good to talk to them about this incident after all those years.

Peter Ring, Principal, Lingk



WORDS Flying Officer (AAFC) Paul A Rosenzweig



ROM 16 MARCH this year all Australian Defence Cadets undertook an operational pause in face-to-face activities. That has provided an opportunity for Cadets to reflect on the milestones they have achieved to date.

Leading Cadet Luke Gould cast his mind back to 18 April last year, when he became one of the first Air Force Cadets to fly solo in the new Diamond DA40 NG aircraft.

LCDT Gould is a member of No.403 Squadron, Australian Air Force Cadets (AAFC) based at St Francis Xavier College in Beaconsfield, Victoria. He spoke to the Public Affairs Officer for Aviation Operations Wing, Flying Officer (AAFC) Paul Rosenzweig, about his impressions of flying solo.

WHAT WAS YOUR FIRST EXPERIENCE OF FLYING?

When I was about four or five, I went to Alice Springs on what I thought at the time was the most amazing big plane; it was like nothing I had ever seen before. It's safe to say I never stopped looking up at the sky after that.

WHAT WAS YOUR FIRST EXPERIENCE OF FLYING THE DA40 NG LIKE?

It was brilliant. We were the first course flying them and had spent about two days learning about all of the



Diamond's amazing features, like the composite structure, the jet fuel and the Electronic Engine Control Unit, but nothing prepared me for just how quiet it would be.

Moving the planes out of the hangar in the cold morning, sitting in comfy seats and experiencing the freedom of the air really was not comparable to any other experience. Having a 'glass cockpit' was also very useful – being able to see an overview of traffic and all the traditional instruments in one place really blew me away.

WHAT WAS YOUR EXPERIENCE OF FLYING SOLO?

It was a massive relief to have my instructor tell me I could go, since weather had already delayed me the day before. I was nervous (but who wouldn't be?), yet after I had started the engine and started moving, everything felt perfect. My nerves became excitement, my taxiing felt perfect. I could use my own callsign for the first time and that really drove home the reality. Taking off with the biggest grin on my face, my circuit went so fast. But I made a mistake, and turned onto finals a little late, and ended up having to execute a go around and then had a nice landing. Being greeted by everyone, and having a photo with my instructor, I couldn't believe that in 12 days I had gone from lesson one to my first solo!

HOW HAS THE AAFC HELPED YOU?

The one thing which I believe to be very important is being confident in yourself and putting in a bit extra – my extra study for radio calls and checklists really paid off in my Elementary Flying Training School course, to be sure of the correct procedure without second guessing.

LEFT LCDT Luke Gould is congratulated by his instructor SQNLDR Gary Presneill following his first solo flight in the DA40 NG. Photo courtesy EFTS.

CADETS OVER JANDAKOT

JUST BEFORE THE OPERATIONAL pause took effect, a powered flying activity was conducted for two WA squadrons south of Perth. Junior Air Force Cadets were offered noninstructional Cadet Air Experience (CAE) flights, and instructional Pilot Experience (PEX) flights were offered to those with aviation theory training.

Eight Cadets from No.707 (City of Mandurah) Squadron at Coodanup joined the activity, together with 35 from No.708 Squadron in Rockingham. Pilot Officer (AAFC) Alex Hartner said: "We flew 23 PEX and 12 CAE flights, and eight ferry flights between Jandakot and Murrayfield". The Cadets flew in Cessna A152 Aerobat and Cessna 172R Skyhawk II aircraft, operated by the Royal Aero Club of Western Australia at Jandakot, an approved service provider.

Cadet Sergeant Jasmine King, Training Operations Officer for 708 Squadron, who had previously flown her first glider solo flight in October 2019 gathered the following reflections from some of the cadets who flew:.

Cadet Gladwin Shekarr: "I learnt a lot about how to handle the aeroplane. Overall I really enjoyed the flight by the amazing pilots at the Royal Aero Club."

Cadet Corporal Matthew Ellem: "I was always afraid that personally flying an aircraft would make me panic. Before the flight commenced, I trusted the pilot, and was focusing on what he was doing to control the aircraft. After landing, I was disappointed to be back on the ground. And now I want to have more experience with aviation and flying."

Cadet Billy Morgan: "In the aircraft we did a variety of fun and interesting manoeuvres. There really was no way to get bored on that flight. Through the AAFC I have also been lucky enough to have gone on the gliding day at Narrogin. The rolling green fields and the rather cold morning will always have a place in my heart as with this flying day experience too".

An initiative by the Officer Commanding Aviation Operations Wing, Wing Commander (AAFC) Steve Pepper, created Wing Aviation Liaison Officer (WALO) positions in each Wing headquarters in early 2020. WALOs are tasked with managing and coordinating flying opportunities in each of the operational Wings around Australia and thus enhance the future management of flying training opportunities.

Following a virtual meeting with the

WALO team earlier this year, WGCDR (AAFC) Pepper said: "I spoke about the Deputy Chief of Air Force's focus on planning and preparation. Planning and activity management is the task which our WALO group is focused on, and we will rely on them to get Cadets into the air on activities throughout the country."

He reassured Cadets and staff that AAFC National HQ is working with Air Force Headquarters to keep informed and plan for the future. "AOW is part of this planning and there are daily meetings throughout the AOW to build and plan for the future."



DA40 NG VIDEOS RELEASED

ability to add scenes of cadets doing many of the flying activities – but we will address that in the future".

As well as promoting the aviation side of AAFC service, the videos will be of great benefit to aspiring young pilots, who can gain some introductory knowledge before attending a powered flying course.



CADETS. AAFC



DIAMOND SOLO PILOTS TO BE HONOURED

AS THE AAFC'S ELEMENTARY FLYING TRAINING SCHOOL (EFTS)

considers options for resuming flying training, it is also preparing to honour its graduates – Cadets who have flown their first solo flight in the Diamond DA40 NG light aircraft.

The first to fly solo was Cadet Sergeant Mark Hargreaves (No.402 Squadron), who recorded his gratitude: "I would like to thank the Australian Air Force Cadets and the RAAF for giving me and other Cadets the opportunity to undertake flying courses where Cadets can live their dream and fly in the high tech and amazing DA40- NG".

Cadet Corporal Brianna Haunold (No.710 Squadron) was the first from WA to fly her first solo flight. She appreciated learning to fly with experienced instructors. "This for me was especially valuable as I wish to join the Air Force in the future, so I have an idea of what to expect and have gained skills I believe will be useful to me within the Air Force," she said.

Cadet Corporals James Culpeper (No.508 Squadron) and Patrick Swingler (No.405 Squadron) also attended a powered flying training course at Point Cook last year, but poor weather initially denied them the opportunity to make their first solo flight. They returned later in the year for continuation training, and on Sunday 1 December 2019 they made their first solo flight.

Powered flying instructor Squadron Leader (AAFC) Nico Robbertse observed: "On completion of their first

ove The AAFC's f

ABOVE The AAFC's first solo pilots will be honoured by the Elementary Flying Training School at Point Cook.

S-

BELOW CCPL Patrick Swingler is congratulated by his instructor SQNLDR (AAFC) Nico Robbertse following his first solo flight in the Diamond DA40.

solo flight, their smiles were much broader than just ear-to-ear, they extended all the way to the back of their heads".

SQNLDR(AAFC) Robbertse is now Commanding Officer of the EFTS.

The EFTS is currently compiling a montage of its solo pilots to create a display to honour that great milestone in the careers of our Air Force Cadets.





GUARD OF HONOUR

S WE SLOWLY COME TO THE END of a tumultuous 2020, the Australian Air League (AAL) has been able to finally start attending public events. In October, the cadets and Officers of NSW Group provided a guard of honour at the Reserve Forces Day Council luncheon to celebrate the launch of the book *Twice the Citizen* compiled by Major Ross Aitkin Ret'd, covering the 20 years of the Reserve Forces Day Council's commemorations and to acknowledge the Charge of Beersheba.

Held in the Strangers' Room at NSW Parliament House, the event was hosted by Captain Reverend Fred Nile MO Ret'd with guest of honour General Sir Peter Cosgrove AK AC (Mil) CVO MC, Lady Lynne Cosgrove and Lady Joan Cutler. Other guests included Dr Geoff Lee MP representing the Premier of NSW, David Elliott MP and Israeli Ambassador His Excellency Danny Danon.

The AAL was represented by cadets and Officers from Albion Park, City of Blacktown Boys, Camden, Marrickville and Moorebank Boys Squadrons, and **ABOVE** General Sir Peter Cosgrove AK AC (Mil) CV0 MC with the AAL Cadets and Officers taking part in the guard of honour.

BELOW Australian Air League cadets and Officers tour the Legislative Assembly Chamber of the NSW Parliament.

despite short notice and a one-hour practice, they proudly formed a guard of honour carrying the pennants of the Australian Light Horse Regiments of World War I.

Following the event, the cadets were treated to a behind-the-scenes guided tour of Parliament House and a wellearned luncheon.

ABOUT THE AUSTRALIAN AIR LEAGUE

The Australian Air League is a youth group for boys and girls aged eight vears and older who have an interest in aviation either as a career or as a hobby. In the Air League they learn about aviation through classes in theory of flight, navigation, aircraft engines and a variety of subjects. The AAL also aims to enable them to achieve their full potential and become better citizens who can effectively serve the community. With Squadrons in most states, the AAL has been serving the community in Australia since 1934. It is entirely self-funding and is staffed by volunteers.

For further information, see airleague.com.au, phone 1800 502 175 or email info@airleague.com.au.



PERSONAL FINANCE. ADVICE

MONEY Alert

SOUND ADVICE ON TWO FINANCIAL THREATS.

PROBLEM GAMBLING — THERE'S MORE THAN MONEY AT STAKE

Most people would accept that wagering (and losing) \$10 on a horse once a year in the Melbourne Cup is pretty harmless, even a bit of fun. However, such an apparently innocent activity hides a dark side; the growing number of people addicted to gambling in its many forms, both live and online.

An addiction to gambling can be every bit as destructive to lives, relationships, families and mental health as other forms of addiction, such as alcohol and drugs. If you'd like to read the facts about gambling, we recommend gamblingonline.org.au.

Here are some key points: the chance of winning the first division of the lottery is one in 13.9 million; the chance of getting all six numbers correct in Powerball is one in 54.9 million; and the chance of winning the top prize on a poker machine is one in 9.7 million – in fact, there's a better chance of being struck by lightning than winning the jackpot on a poker machine.

You might think you can increase chances of winning on the pokies by playing for longer, but that's not how they are designed to work. Or you might think you can improve your chances on the roulette wheel or other games of chance by having numerous spins or rolls. Mathematically, each spin or roll is a separate event.



With sports betting or card playing, while the outcome might be improved by skill level in the short run, the reality is that there are so many variables outside the gambler's control, that losing is inevitable.

Here's a sobering question: if you choose to gamble, what else is at stake besides the money? Quite a lot really, if you give it a moment's thought. For more information or contacts for confidential assistance on problem gambling, go to gamblinghealthonline.org.au.

IDENTITY THEFT SCAMS – HOW TO PROTECT YOURSELF

Identity theft scams are on the rise. In 2020, Scamwatch (run by the Australian Competition and Consumer Commission) has received more than 24,000 reports of stolen personal information, an increase of 55 percent compared with 2019. Notably, people aged 25-34 years reported losing personal information more than any other age group.

Scamwatch reports that during COVID, with more people working and socialising online, there has been a large increase in the theft of personal information, such as bank and superannuation details or passwords, passports, employment ID cards, driver licenses, tax assessments, utility bills and Medicare and credit cards.

Phishing scams, the most common form, are up by 44 percent. Scammers claim to be from government departments or businesses, such as the Tax Office, myGov, Telstra or the NBN, to gain bank account details and other information. Scammers use the information to access victims' bank or superannuation accounts, take out loans or impersonate them on social media to try to extort money from family and friends.

The key message is, never give out personal or financial information to anyone you don't know or trust, especially via email, text, social media or over the telephone.

If you suspect you are a victim of identity theft, contact IDCARE (idcare. org). It's a free government-funded service that will work with you to develop a response plan for your situation and support you throughout the process.

If you have been the victim of a scam, contact your bank as soon as possible and notify the platform on which you were scammed.

For more information, go to the Scamwatch website (scamwatch.gov. au). You can also follow @scamwatch_ gov on Twitter and subscribe to Scamwatch radar alerts.

5 TOP TIPS FROM SCAMWATCH

- Don't be pressured into giving personal information to an unknown contact, no matter who they say they are.
- Don't click on links in unexpected emails or messages, even if the message appears to come from a legitimate source.
- Use strong passwords and never share them with others.
- Install anti-virus software on your devices and keep it up to date.
- Limit the personal information you share online. W

Air Commodore Robert M C Brown Chair, ADF Financial Services Consumer Centre


AIR MARSHAL SELWYN DAVID EVANS AC, DSO, AFC (RETIRED)

3 June 1925 – 2 September 2020

CHIEF OF AIR FORCE **AIR MARSHAL MAL HUPFELD** PAYS TRIBUTE TO A FORMER CHIEF AND VETERAN.

I WAS SADDENED to hear about the passing of former Chief of Air Staff AIRMSHL David Evans at the age of 95 at the Greenway Views retirement home, Canberra. AIRMSHL Evans' contribution to our country and our Air Force cannot be overstated.

He was among the first teenagers to join the Air Training Corps upon its foundation in 1941 and enlisted in wartime RAAF on 5 June 1943. He graduated in the Empire Air Training Scheme as a Sergeant pilot in 1944 and was in the middle of a conversion course when World War II ended.

AIRMSHL Evans was slated to be demobilised along with several thousand other Australians. However, so deep was his desire to serve his country as an aviator and warrior, he travelled to RAAF Headquarters in Melbourne and argued his individual case with the officer responsible for discharges. He was successful.

AIRMSHL Evans continued his career in Air Force, which included flying for the Berlin Airlift, service in Vietnam in 1967 and several high-profile roles within Air Force. He was promoted to Air Marshal in 1982 and appointed to Chief of the Air Staff where he focused on morale, air power doctrine and improving defensive capabilities in northern Australia.

Although he retired in 1985, he continued to serve his country by writing and lecturing on defence matters and passing on his vast knowledge to a new generation. He also served as patron of numerous organisations including the Airfield Defence Guards Association, the Royal Australian Air Force Association (ACT Division), The Celtic Club Australia, and the Royal Australian Air Force Staff College Association.

AIRMSHL Evans was a truly great thinker and contributed immensely to building the sophisticated, professional force I have the honour of commanding today.

For those of you who had the pleasure of knowing AIRMSHL Evans, I hope you will spare a moment to remember the person his successor AIRMSHL Jake Newham described as possessing an "extraordinary zeal and robustness that helped instil a renewed sense of pride in the Service". W



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BOOKS. REVIEWS



WRITTEN IN THE SKY

By **MARK CARR** *Melbourne Books*, *RRP* \$29,57

WRITTEN IN THE SKY is an

autobiography of one man's desire to fly. Mark Carr joined the Royal Australian Navy (RAN) as a Midshipman to train as a naval aviator in the Fleet Air Arm. He has flown with the RAN, RAAF, Ansett Airlines and Cathay Pacific Airways, and has expertly woven a historical backdrop across his experiences.

The demands of Navy flying, particularly landing on HMAS *Melbourne*, a very small aircraft carrier by world standards, quite rightly draws admiration for Australian Navy pilots who routinely faced the challenges of carrier operations. Mark's light-hearted description of Navy terminology provides another example that sets the Navy apart from the other services.

Subsequent transfer to the RAAF to fly Orion long-range maritime patrol aircraft provided an extension to his military career, although a desire to avoid staff duties caused him to look beyond the services.

Joining Ansett airlines helped him realise another boyhood dream until it was shattered by the vicious, bitter and protracted airline pilot dispute in the late 1980s.

Mark chose to leave Australia and fly for Cathay Pacific Airways. While international flying might seem less stimulating after a career in the services, the author's writing skills ensure the reader remains engaged and absorbed with his accounts of challenges and rewards.

This autobiography stands out as a simply told, down-to-earth account without gilding the lily. Carr takes the reader into the cockpit with him. *Written in the Sky* is suitable for those with an intimate knowledge of flying, while it will also engage the aviation enthusiast who will enjoy the experience.



AN INTERESTING POINT: A history of military aviation at Point Cook

By **STEVE CAMPBELL-WRIGHT** *Big Sky Publishing, RRP* \$29.99

ON SUNDAY, 1 MARCH 1914, a Bristol Boxkite aircraft flown by Lieutenant Harrison took to the skies over Point Cook, Victoria, marking the first flight by a military aircraft in Australia – the beginning of the nation's long and distinguished military aviation capability.

The author, Steve Campbell-Wright, served in the RAAF for over 35 years and holds a master's degree from the University of Melbourne and postgraduate qualifications from Deakin University. He skilfully blends the history and development of Point Cook with that of the Australian Flying Corps from 1914 to 1918 and the RAAF from 1921. While describing the development of the base buildings and infrastructure, his portrayal of the people who took the decisions, implemented plans and conducted operations from Point Cook brings a compelling human touch to the history.

Between the wars, Point Cook became the epicentre for the establishment, development and mastery of the technical and engineering expertise essential for the successful conduct of future aviation operations.

An Interesting Point is well researched, well written and easily maintains the reader's interest throughout. It is well presented and supported with beautiful photographs that bring the history to life.

The book will appeal to those who have at least a passing interest in aviation history. To quote a former Chief of Defence Force and Chief of Air Force, Air Chief Marshal Angus Houston: "The history of Point Cook is an important story. It is one which should be better known to all Australians."



ON A WING AND A PRAYER: The race that stopped the world

By **DI WEBSDALE-MORRISSEY** *Text Publishing, Melbourne (2019), RRP \$32.99*

IN THE EARLY HOURS of 20 October 1934, scenes dubbed "Mildenhall Madness" befell the aerodrome at Mildenhall near London. An estimated 60,000 spectators had gathered to watch 20 aeroplanes take off. With a few exceptions they were not the biplanes we think of from that era, but sleek monoplanes. Three had been designed just for the race. They would need speed, reliability and endurance – their destination was 18,000km away in Melbourne, Australia.

As part of Victoria's centenary celebrations, Sir MacPherson Robertson had agreed to sponsor a London to Melbourne air race. As the author says, the announcement "rattled the cages of aeroplane manufacturers and aviators". It would be a challenge like no other.

The first England to Australia air race of 1919 saw just one of seven competitors reach Darwin in the designated month, and it took nearly three more months to reach Melbourne. Just 15 years later, the time between London and Melbourne was reduced to 71 hours – a far greater leap than in the subsequent 85 years.

On a Wing and a Prayer includes stories from an Australian perspective and an epilogue on what happened to the competitors in the years after the race. An appendix lists the conditions stipulated for the race. For the handicap section, an interesting formula for calculating each aircraft's speed is included. It was seen as a questionable approach (the organisers probably didn't want to trust manufacturers' figures), and resulted in at least one aircraft being placed behind where it probably deserved to be.

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